Πανεπιστήμιο Πελοποννήσου

Σχολή Κοινωνικών και Πολιτικών Επιστημών

Τμήμα Πολιτικής Επιστήμης και Διεθνών Σχέσεων

Διδακτορική Διατριβή

“Ενεργειακή Ασφάλεια στην περιοχή της Ανατολικής Μεσογείου: Απειλή ή Ευκαιρία για την Εθνική Ασφάλεια των χωρών; Ανάλυση σύκρισης για τη μελέτη περιπτώσεων Ισραήλ και Κύπρου”

Φλώρος Φλούρος

Κόρινθος, Ιούλιος 2019

University of the Peloponnese

Faculty of Social and Political Sciences

Department of Political Studies and International Relations

PhD Thesis

"Energy Security in the East Mediterranean Region: A Threat or an Opportunity for Countries' National Security? A Comparative Analysis-The Cases of Cyprus and Israel"

Floros Flouros

Corinth, July 2019

Dedication

To my father Sofianos Flouros for what he has done for me in his life

To my wife Maria Laiou for what she has been doing for me in her life

To my daughter Nefeli Flourou for all that we may do together in life

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Prof. Pantelis Sklias for the support and freedom of choices that I received during this long-lasting effort of my Ph.D. study for the last four years. His guidance helped me in designing this thesis and I could not imagine having a better advisor than him.

A special reference to my friend and mentor Philip Terpandjian for all his advice and moral support that he has given to me these years, both in my professional career and during the study of this thesis. I have had endless support and encouragement provided by him while he lives on the other side of the Atlantic Ocean in US. He is a great influencer and a person with noble human values giving a critical and fresh view on simple aspects of life through his wise lens.

Many thanks and appreciations to Mr. Raphael Soustiel who has provided the SPSS software to run the statistical analysis of the data collected in the research of this thesis. Same warm appreciations to Ms. Anna Stathopoulou for all her useful observations and insights related to the design phase of the research.

Last but not least; I would like to deeply thank my family for supporting me spiritually when writing this thesis and for their understanding in general. I thank them for their silent patience shown to me all previous years of studies - and there are so many - since I could have spent all this invaluable time with them instead. Thank you!

ΠΕΡΙΛΗΨΗ

Η παρούσα διδακτορική διατριβή έχει συνταχθεί και υποβληθεί στο τμήμα Πολιτικής Επιστήμης και Διεθνών Σχέσεων στο Πανεπιστήμιο Πελοποννήσου. Ξεκίνησε με αρχικές σκέψεις που αφορούσαν σε ζητήματα ενέργειας και ασφάλειας σε επίπεδο έθνους-κράτους και τελικά μετουσιώθηκε σε μια συγκεκριμένη μελέτη που εξετάζει προσεκτικά το επιλεγμένο θέμα και συμβάλλει στην υπάρχουσα βιβλιογραφία και την ακαδημαϊκή κοινότητα.

Η ενέργεια αποτελεί κινητήρια δύναμη για τις κοινότητες και η ενεργειακή ασφάλεια είναι ύψιστης σημασίας για αυτές. Σε αυτή τη διατριβή μελετάται η ενεργειακή ασφάλεια στην ευρύτερη περιοχή της ανατολικής Μεσογείου και η επίδρασή της στην εθνική ασφάλεια ορισμένων χωρών που βρίσκονται εκεί. Το κύριο ερευνητικό ερώτημα ήταν εάν η ενεργειακή ασφάλεια αποτελεί απειλή για την εθνική ασφάλεια μιας χώρας ή/και μια ευκαιρία γι 'αυτήν. Έτερη υποερώτηση έρευνας ήταν να προσδιοριστούν οι παράμετροι που συνθέτουν τόσο τις έννοιες της ενεργειακής ασφάλειας όσο και της εθνικής ασφάλειας, καθώς θα ήταν ευκολότερο να γίνει κατανοητή οποιαδήποτε λειτουργική σχέση μεταξύ των παραμέτρων και στη συνέχεια να καταστεί δυνατή η μελέτης τους.

Η επιλογή των δύο χωρών, του Ισραήλ και της Κύπρου, έλαβε χώρα διότι πρόκειται για περιπτώσεις με κοινά χαρακτηριστικά που θα ήταν χρήσιμο να συγκριθούν. Με βάση την ανάλυση αυτής της διατριβής, παρέχεται μια επικαιροποιημένη μεθοδολογία όπου περιγράφονται τα απαραίτητα στάδια σχετικά με τον σχεδιασμό και την εφαρμογή ενός εννοιολογικού πλαισίου υπό το πρίσμα της Διεθνούς Πολιτικής Οικονομίας. Επιπλέον, ακολουθείται μια διεπιστημονική προσέγγιση, η οποία παρέχει μια νέα οπτική για το πώς είναι δυνατόν να συμβαίνουν τα πράγματα. Η εξεταζόμενη σχέση μεταξύ της ενεργειακής ασφάλειας και της εθνικής ασφάλειας ενός έθνους κράτους εξετάστηκε και μελετήθηκε υπό την σκέπη της Διεθνούς Πολιτικής Οικονομίας και ειδικότερα μέσω του πρίσματος της θεωρίας του ρεαλισμού. Τα κύρια ερευνητικά ζητήματα που τέθηκαν αρχικά, εξετάστηκαν τελικά. Τα αποτελέσματα της ερευνητικής διαδικασίας που περιγράφονται λεπτομερώς σε αυτή τη διατριβή, δίνουν χρήσιμα συμπεράσματα σχετικά με τα εξεταζόμενα έθνη-κράτη ενώ ακολούθως παρουσιάζονται προτάσεις πολιτικής και συστάσεις τόσο σε βραχυπρόθεσμο όσο και μακροπρόθεσμο ορίζοντα.

ABSTRACT

This Ph.D. thesis has been prepared and submitted to the department of Political Science and International Relations at the University of the Peloponnese. It started with some initial thoughts about energy and security issues at a nation's state level that eventually became a concrete study which examines the chosen topic thoroughly and contributes to the existing literature and academic society.

Energy is a driving force for communities and energy security of an outmost importance for them. In this thesis the energy security is studied in the broader area of the east Mediterranean region and its effect on the national security of some countries located there. The main research question was whether energy security is a threat for the national security of a country and/or an opportunity for it. Other research sub-question was to identify the parameters that both energy security and national security notions consists of since it would be easier to understand any functional relationship between the parameters and then be able to study them.

The selection of the two countries, Israel and Cyprus, happened since they both have common characteristics that would be useful to compare them. Based on the analysis of this thesis an updated methodology is given where the necessary stages are described regarding how to design and implement a conceptual framework under the view of International Political Economy. In addition, an interdisciplinary approach is followed, which gives a fresh view of how things happen. The examined relationship between the energy security and the national security of a nation-state was examined and studied under the International Political Economy umbrella and in particular through the lenses of the theory of realism. The main research question(s) that were initially set are finally addressed. The results and outcomes of the research process which is described in details in this thesis give useful conclusions about the examined nation-states and consequently policy proposals and recommendations are given for both short and long-term periods.

Keywords: energy, energy security, national security, Mediterranean region, Israel, Cyprus, International Political Economy, realism, nation state, stakeholders, climate change, strategic resources.

CONTENTS

Περίληψη

Abstract

List of Tables

List of Figures

CHAPTER 1: INTRODUCTION

1.1 General 1

1.2 Aims of the Thesis 2

1.3 Structure of the Thesis 3

1.4 Definitions, Assumptions 6

1.5 Conclusions 21

CHAPTER 2: THEORETICAL CONSIDERATIONS

2.1 General 23

2.2 International Political Economy 24

2.3 Realism and its versions 39

2.4 Dissertations 49

2.5 Human, Socio-economic and cultural impacts 59

2.6 Multiple Criteria Decision Making 62

2.7 Conclusions 66

CHAPTER 3: LITERATURE REVIEW

3.1	General	67
3.2	The Global Environment	67
	3.2.1 Historical	67
	3.2.2 Resources and states	79
	3.2.3 Oil and Gas players	86
	3.2.4 Energy and Thermodynamics	92
	3.2.5 Stakeholders and the Environment	93
3.3	Security	104
	3.3.1 General	104
	3.3.2 Dimensions	117
	3.3.3 Historical Incidents	166
3.4	Conclusions and Recommendations	172
	3.4.1 Conclusions	172
	3.4.2 Recommendations	177

CHAPTER 4: ANALYTICAL FRAMEWORK, RESEARCH DESIGN AND METHODOLOGY

4.1	General	181
4.2	Analytical Framework	182
	4.2.1 General	182
	4.2.2 Conceptual Framework stages	182
	4.2.3 Selection of area of interest	183
	4.2.4 Implementation of stages	187
	4.2.5 Conceptual Framework design	188

4.3 The Research 191
4.3.1 General 191
4.3.2 The Methodological Approach 193
4.3.3 The Research Question(s) 193
4.3.4 The Qualitative Research 194
4.3.5 The Quantitative Research 204
4.4 Conclusions and Recommendations 212
4.4.1 Conclusions 212
4.4.2 Recommendations 214

CHAPTER 5: CASE STUDIES

5.1 General 220
5.2 The Eastern Mediterranean region 226
5.2.1 General 226
5.2.2 Stakeholders 227
5.3 The Case of Israel 251
5.3.1 Country's Analysis 251
5.3.2 Energy Sector in Israel 256
5.3.3 Overview of Research outcome for Israel 267
5.4 The Case of Cyprus 269
5.4.1 Country's Analysis 269
5.4.2 Energy Sector in Cyprus 276
5.4.3 Overview of Research outcome for Cyprus 282
5.5 Comparison of the Cases 284

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 General 287

6.2 Conclusions 288

6.2.1 Main conclusions 288

6.2.2 Other considerations and conclusions 289

6.3 Recommendations 293

6.3.1 About theory 293

6.3.2 About the research 296

6.3.3 Policy proposals 297

6.4 Limitations 305

REFERENCES 306

APPENDICES 340

APPENDIX A THE MELIAN DIALOGUE (416 B.C.) THUCYDIDES, V.84-116. 341

APPENDIX B THE INTERNATIONAL INDEX OF ENERGY SECURITY RISK. 349

APPENDIX C RESEARCH TECHNICAL DETAILS 355

APPENDIX D SPSS ANALYSIS 361

APPENDIX E STATISTICAL ANALYSIS 366

LIST OF TABLES

Table 1.1 Definitions of terms used in the study 6

Table 1.2 Definitions of “Energy Security” 11

Table 1.3 Decision problems classification 20

Table 2.1 The complementarity of Motivational Assumptions IR Theory 30

Table 2.2 Selected Theories in IR and IPE 32

Table 2.3 The IPE Dimensions 38

Table 2.4 Comparison between Traditional Realism and Neorealism 48

Table 2.5 Types of dissertation in political sciences 50

Table 2.6 Methods to assess a theory in social sciences 51

Table 2.7 Methods to assess a theory in social sciences through a Case Study 53

Table 2.8 Human, Socio-economic and Cultural Impacts 59

Table 3.1 Proven oil reserves (in thousand million barrels) 73

Table 3.2: Regional oil production and consumption 76

Table 3.3: Evolution of non-conventional fuels 84

Table 3.4: Initial Seven Sister Oil companies 86

Table 3.5: Top-25 O&G companies globally (in 2017) 88

Table 3.6 Security through realism's view 106

Table 3.7 Factors affecting security 109

Table 3.8 Historical evolution of resources 114

Table 3.9 Categories of National Security as non-military 118

Table 3.10 Threat to national security as a sequence of events 123

Table 3.11 Energy Frames 129

Table 3.12 Dimensions and indicators of energy security 138

Table 3.13 Vulnerabilities of primary energy resources 144

Table 3.14 ES indicators (ES_i) of a country's Energy Security 151

Table 3.15 Summary of the dimensions and parameters of ES 153

Table 3.16 Set of threats for energy security 154

Table 3.17 Characteristics and challenges for energy security 155

Table 3.18 Countries' policy decisions regarding Climate Change 160

Table 3.19 Options for the higher energy efficiency 161

Table 4.1 Critical functions in the relationship ES-NS 219

Table 5.1 Basic parameters for the case of Israel 252

Table 5.2 Basic energy parameters for Israel 257

Table 5.3 Energy data for Israel (1990-2014) 259

Table 5.4 Energy Balance about Natural Gas (NG) use in Israel 264

Table 5.5 Energy Security Risk Scores for Israel 265

Table 5.6 Basic parameters for the case of Cyprus 270

Table 5.7 Basic energy parameters for Cyprus 277

Table 6.1 Policies proposals 297

LIST OF FIGURES

Figure 1.1 Methodological Steps followed in the study 5

Figure 1.2 Stakeholders' definitions 17

Figure 1.3 Types and strategies for Stakeholders' management 19

Figure 2.1 Classical Approaches of IPE 29

Figure 2.2 Contemporary Approaches of IPE 31

Figure 2.3 International Relation Theories 37

Figure 2.4 Phases of economic nationalism 44

Figure 2.5 Theory of Realism 45

Figure 2.6 Types of assessment/tests 52

Figure 2.7 Chain-theory example 53

Figure 2.8 Roadmap to scientific knowledge 57

Figure 2.9 Roadmap to hypothesis 58

Figure 2.10 Multicriteria concepts/problems approach 64

Figure 2.11 Incoming uncertainties as input to a model of analysis 65

Figure 3.1 Historical evolution 68

Figure 3.2 Global GDP growth (2010-2020) 70

Figure 3.3 World Energy consumption	72
Figure 3.4 World Energy projections in 2040	72
Figure 3.5 Oil production in during 1994–2014	74
Figure 3.6 Oil consumption in OECD/non-OECD countries, 1994-2014	75
Figure 3.7 Change in total oil supply, 2018-2024	77
Figure 3.8 Gross exports, 2012-2024	78
Figure 3.9 Correlation of energy consumption and GDP per capita in 2011	80
Figure 3.10 Fuel mix used of production of global energy, in 2015	81
Figure 3.11 Global Growth in Demand by source of energy, 2014-2040	82
Figure 3.12 Global refined product, 2014-2040	83
Figure 3.13 World Oil consumption, 2010-2020	84
Figure 3.14 Annual Revenue of the top ten O&G producers in 2014	89
Figure 3.15 Total Oil Stocks Globally	90
Figure 3.16 Energy System Diagram	91
Figure 3.17 Major stakeholders associated with the O&G industry	94
Figure 3.18 Impacts of global megatrends on European resource systems	96
Figure 3.19 GDP per Megacities by 2030 (in US$ bin)	97

Figure 3.20 Major changes Urban landscape in 750 megacities until 2030 98

Figure 3.21 Urban Trends by world regions, 1950-2050 99

Figure 3.22 Correlation of energy consumption and GDP per capita in 2011 101

Figure 3.23 Energy Security vs. various Climate characteristics 102

Figure 3.24 The Interaction between ES and IPO 116

Figure 3.25 National Security 121

Figure 3.26 The energy value chain 129

Figure 3.27 The energy security spectrum 134

Figure 3.28 The Dimensions of Energy Security measured by MOSES 140

Figure 3.29 Dimensions of energy security 141

Figure 3.30 A generic energy security system 142

Figure 3.31 Perspectives on energy security 143

Figure 3.32 Energy security assessment framework 145

Figure 3.33 Energy Security of a country and individual ES indicators 150

Figure 3.34 Energy efficiency as a function of energy security 161

Figure 3.35 Options to achieve energy efficiency and energy security 162

Figure 3.36 Global energy security investment per year and the climate change mitigation costs for several climate policy scenarios 163

Figure 3.37 Total global policy cost 165

Figure 3.38 Historical transition of Fuels 179

Figure 4.1 Levels of Analysis 184

Figure 4.2 Selection of area of interest 185

Figure 4.3 Analysis of terms vs related parameters 186

Figure 4.4 Theoretical Conceptual Framework 190

Figure 4.5 Design and execution [1] 191

Figure 4.6 Design and execution [2] 192

Figure 4.7 Broad Conceptual Framework 203

Figure 4.8 Relationship NS_5=g' (ES_{ave}) for the case of Israel 208

Figure 4.9 Relationship NS_t=g' (ES_{ave}) for the case of Israel 210

Figure 4.10 Stress strain curve for a material 218

Figure 5.1 Energy Security Risk Index for Large Energy User Group 221

Figure 5.2 Oil prices vs major political events 1950-2011 222

Figure 5.3 Oil prices vs major political events 1970-2011 223

Figure 5.4 Energy Security Risk Index Scores for Eastern Mediterranean 227

Figure 5.5 Energy Data for Turkey 229

Figure 5.6 TANAP project 230

Figure 5.7 Energy Data for Greece 234

Figure 5.8 TAP project 235

Figure 5.9 Energy Data for Egypt 236

Figure 5.10 AGP between Egypt and Israel 237

Figure 5.11 Petroleum imports and refined products consumption of Jordan 238

Figure 5.12 Natural gas production and consumption of Syria 239

Figure 5.13 Petroleum consumption of Lebanon 241

Figure 5.14 Petroleum consumption of Palestinian territory 242

Figure 5.15 Energy Data for EU28 243

Figure 5.16 Total Primary Energy Supply (TPES) by source for Russia 247

Figure 5.17 Map of Israel 252

Figure 5.18 GDP of Israel 254

Figure 5.19 Military Expenditures of Israel (% GDP) 255

Figure 5.20 Military Index for Israel 256

Figure 5.21 Energy Inensity for Israel, 2005-2015 257

Figure 5.22 Total Primary Energy Supply (TPES) by source for Israel 258

Figure 5.23 Production in Israel in ktoe (1990-2014) 260

Figure 5.24 Ranking of Israel among 75 countries of OECD, 2010-2014 266

Figure 5.25 ES Index of Israel compared to average OECD, 1980-2014 266

Figure 5.26 Map of Cyprus 270

Figure 5.27 GDP of Cyprus 274

Figure 5.28 Military Expenditures of Cyprus (% GDP) 275

Figure 5.29 Military Index for Cyprus 276

Figure 5.30 Energy Intensity for Cyprus, 2005-2015 277

Figure 5.31 Energy Data for Cyprus 278

Figure 5.32 Total Primary Energy Supply (TPES) by source for Cyprus 279

Figure 5.33 A National Energy and Climate Governance System in Cyprus 281

Figure 6.1 A Policy cycle linked to policy and conceptual frameworks 292

Figure 6.2 3-d Analysis 294

ABBREVIATIONS - DEFINITIONS

Billion Cubic Feet (bcf): "A unit of gas measurement approximately equal to one trillion (1,000,000,000,000) Btu's". [i]

British thermal unit (Btu): "The Btu is the standard unit of measurement for heat. A Btu is defined as the amount of energy needed to raise the temperature of one pound of water one-degree Fahrenheit from 58.5 to 59.5 degrees under standard pressure of 30 inches of mercury. I Btu is equivalent to 2.52 x 10^{-14} Mtoe". [i]

bbd: billion barrels per day. A measurement unit used in the oil industry. [ii]

Cubic Foot (Cf): "A unit of measurement for volume. It represents an area one foot long, by one foot wide, by one foot deep. Natural gas is measured in cubic feet, but the measurements are usually expressed in terms of Mcf, Bcf, Tcf, or Quads". [iii]

Dependent Variable (DV): A variable that takes its units/results based on the units of another variable. [iv]

Gross Domestic Product (GDP): "GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources". [v]

Gross Inland Consumption of energy (GIC): "Gross inland energy consumption, sometimes abbreviated as gross inland consumption, is the total energy demand of a country or region. It

---

[1] California Energy Commission (http://www.energy.ca.gov/lng/glossary.html).
[ii] Petropedia (https://www.ranksays.com/info/petropedia.com).
[iii] CNSOPB (https://www.cnsopb.ns.ca/about-us/glossary).
[iv] Statistics HowTo (https://www.statisticshowto.datasciencecentral.com/dependent-variable-definition/).
[v] Word Bank (https://datamarket.com/data/list/?q=all+provider%3Aworld-bank+tag%3Agdp).

represents the quantity of energy necessary to satisfy inland consumption of the geographical entity under consideration”. [vi]

HxCy - Hydrocarbon: An organic compound containing only carbon and hydrogen. Hydrocarbons often occur in petroleum products, natural gas, and coals. [ii]

International Political Economy (IPE)

Independent Variable (IV): A variable that does not takes its units/results based on the units of another variable. [iv]

Liquefaction: The process by which natural gas is converted into liquid natural gas. [ii]

Liquefied Natural Gas (LNG): Natural gas that has been cooled to -260 degrees Fahrenheit (-162 degrees Celsius) and at which point it is condensed into a liquid which is colorless, odorless, non-corrosive and non-toxic. [ii]

Liquefied Petroleum Gas (LPG): Gas consisting primarily of propane, propylene, butane, and butylene in various mixtures. Stored as a liquid by increasing pressure. [i]

MJ (Mega-Joule): a unit of work or energy equal to one million joules. [vi]

MMcf: A volume measurement of natural gas; one million cubic feet. [ii]

MMtpa: “Million tonnes per annum - one tonne (or metric ton) is approximately 2.47 cubic meter of LNG”. [i]

National Environmental Policy Act (NEPA): The environmental law that establishes federal energy policy, sets goals and provides means for carrying out the policy. A national policy for the purpose of encouraging “productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to Nation; and to establish a Council on Environmental Quality". [viii]

Natural Gas: "A hydrocarbon gas that is usually obtained from underground sources, often in association with petroleum and coal deposits. Natural gas generally contains a high percentage of methane and inert gases. See Methane". [i]

Oil and Gas (O&G): Oil and Gas are the major products which are produced in the petroleum industry. [ii]

Peak-Shaving: "Using sources of energy, such as natural gas from storage, to supplement the normal amounts delivered to customers during peak-use periods. Using these supplemental sources prevents pipelines from having to expand their delivery facilities just to accommodate short periods of extremely high demand". [i]

Peak Use Period: "The period of time when gas use on a particular system is at its maximum. This is the period when gas supply is most likely to be suspended for interruptible service customers. Distributors also employ techniques such as peak shaving to soften the impacts of high demand on the pipelines". [i]

Pounds per Square Inch (psi): Pressure with respect atmosphere pressure. A pressure gauge reading in which the gauge is adjusted to read zero at the surrounding atmospheric pressure. [i, ii]

Pressure, Absolute (psia): Gauge pressure plus barometric or atmospheric pressure. Absolute pressure can be zero only in a perfect vacuum. See Absolute Pressure. [i, ii]

Reserves: "Volumes of hydrocarbons (measured in Bcf, Tcf or billion of barrels) that are considered to be economically recoverable using current technology". [i]

[vi] Eurostat (https://ec.europa.eu/eurostat/statistics.../Glossary:Gross_inland_energy_consumption).
[vii] Energy Fundamentals (https://home.uni-leipzig.de/energy/energy-fundamentals/03.htm).
[viii] US Energy Gov (https://www.energy.gov/nepa/downloads/national-environmental-policy-act-1969).
[ix] Business Directory (http://www.businessdictionary.com/definition/tonne-of-oil-equivalent-TOE.html).

Reservoir: “The portion of a resource, such as natural gas, that has been discovered and that is technically and economically extractable”. [i]

Storage Facilities: Facilities used for storing natural gas. These facilities are generally found as gaseous storage facilities and liquefied natural gas (LNG) storage facilities. [i]

Toe: Tonne of oil equivalent (Toe) Unit representing “energy generated by burning one metric ton (1000 kilograms or 2204.68 pounds) or 7.4 barrels of oil, equivalent to the energy obtained from 1270 cubic meters of natural gas or 1.4 metric tons of coal that is, 41.87 gigajoules (GJ), 39.68 million Btu (MMBtu), or 11.63 megawatt hours (MWh)”. [ix]

Trillion Cubic Feet (Tcf): “A volume measurement of natural gas; approximately equivalent to one Quad”. [i]

CHAPTER 1
INTRODUCTION

1.1 General

The scope of this Doctor of Philosophy (Ph.D.) thesis was to study and analyze the subject of Energy Security in relation to the National Security at the nation state level. A main question that needed to be answered is whether Energy Security of a nation-state can contribute to the stability of a region and consequently whether a country's growth act as a real threat or an opportunity for its security. A comparison between two countries located at the eastern Mediterranean region was seen as challenge, so it was decided to study the relationship between Energy Security and National Security with a particular focus on the cases of Israel and Cyprus.

The choice of selecting to study and examine these particular countries was mainly because they both have many similarities and things in common and some of them are like:

- They are of comparable size in terms of area (sq km).
- They are both located in the East Mediterranean region which is of primary importance for global and regional energy issues and also for geopolitical ones.
- In both countries there have been only recent discoveries of oil and gas in their fields.
- They both became independent states in the 20th century, while they are both continuously trying to establish their territory in a hostile environment.
- Consequently, they both concern for their National Security and being very sensitive with issues related to that.

Thus, it was seen as very interesting and useful for the purpose and aim of this thesis to have the selection of these countries: Israel and Cyprus; to study them in terms of the examined notions of Energy Security and National Security under the consideration of the International Political Economy (IPE).

In this chapter 1, the aim and the main scope of the thesis is described in a quite structured approach so it would be easier for the reader and researcher to understand the flow of the information and data in the thesis, while they can also refer more easily to any specific sections as per their interest. Furthermore, it is seen as very helpful and appropriate that any definitions and assumptions used in this thesis are stated in the beginning; by this, a common language may prevail in the study and thus a more clear and transparent understanding can be achieved.

1.2 Aims of the Thesis

The main aim of the current thesis is to study the notions of "Energy Security" and "National Security" under the concept of the International Political Economy. Moreover, the scope is to examine their relationship and interaction through their sub-variables that each of these two main parameters consists of. Thus, it would be interesting to see the correlation degree and the implementation of such an interaction in the regional environment of East Mediterranean and particularly on the state of Israel and the Republic of Cyprus.

The importance of security in our current era is invaluable and it becomes more important when it is related to the national and energy fields. The existing literature does not provide an in-depth study of the relationship of these parameters and thus a strong effort will be applied towards to the direction to contribute a fresh approach to the academic and political community.

For the purpose of the thesis, it is useful to have investigated and answered to some questions such as: "What (the study is going to deal with)", "How (the study will take place)" and "Why (to decide to make such a study)".

For this reason, a synoptic review of them is given as following:

a. *<u>What</u>*: Energy Security is a critical parameter for a country/region which may affect not only the National Security of the country itself, but also the security in the regional area. In this Ph.D. thesis an effort was made to review the existing literature and find any gaps in current knowledge, so it would be useful to investigate them further and close them.

b. *How*: The choice of a topic is a process based on experience and interpretation. For this reason, the topic of this study was selected by considering several steps starting from the general and going to the specific areas, mainly as following:
   - Scientific Field: PhD/Social Sciences.
   - Subject Area: Political Sciences/ International Political Economy.
   - Topic: Security (Energy-National).
   - Method: Analysis through comparison.
   - Title: "Energy Security in the East Mediterranean Region: A Threat or an Opportunity for countries' National Security? A Comparative Analysis-The cases of Cyprus and Israel".

c. *Why*: This PhD thesis tried to review contemporary issues of the Mediterranean region related to the security: both Energy and National of each country and for the region. It is believed that a new approach to Energy Security might be needed nowadays, since energy policies of the past have shaped the current landscape and thus current decisions will affect the future (Pascual and Elkind, 2010).

1.3 Structure of the Thesis

A description of what will follow in the next chapters of this Ph.D. thesis is given as following:

In Chapter 2, theoretical considerations regarding International Political Economy are presented and then a more specific view on the preferred theory for the thesis is given; the realism and its several different versions as seen in contemporary studies. Definitions and assumptions of the main notions and parameters used in this study are presented, since it is important to understand the meaning of each term and notion used herein.

In Chapter 3, a quite comprehensive literature review takes place. A general review of the global environment with reference to prevailing megatrends and main oil and gas players is presented. Furthermore, stakeholders' theory is described in summary as it is important to study the main players in the Mediterranean region. A short reference to thermodynamics in relation to energy issues is given, as it is seen useful to view and use an interdisciplinary approach to a research and study. Finally, a reference to the basic dimensions of the examined notions of Energy Security and National Security is given and their importance to the societies as well.

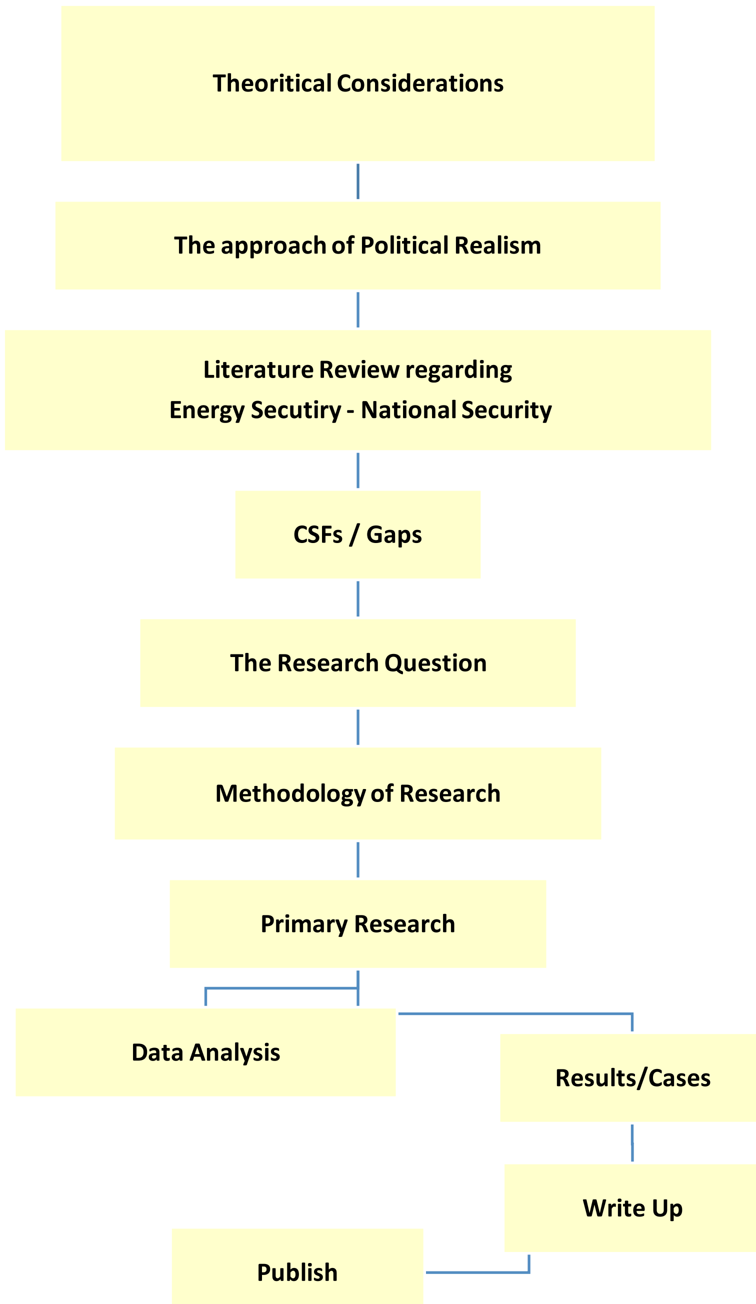
In Chapter 4, the analytical framework is presented in details. A detailed description of the several recommended stages to design and implement a proper conceptual framework is provided. Factors and parameters related to the examined notions are presented. Furthermore, the main research question with other research sub-questions are addressed followed by the empirical research that takes place. The preliminary and secondary research are followed by the primary research and the main components and design are reported. The analysis and the presentation of the findings are presented herein followed by the section with the conclusions.

In Chapter 5, the two main case studies of the selected countries –Israel and Cyprus – are presented. In the beginning of the chapter an overview of the regional area of East Mediterranean is given with a reference to the main stakeholders that play an important role affecting each other. Then, the cases of Israel and Cyprus are presented under the topics of energy security and national security in their territory; each country is presented in a different section of this chapter. A quite extensive study of each country is given with the main data presented including analysis of the country in terms of political, economic, social and technological view. Furthermore, necessary information regarding country's energy state is provided while at the same time a focus on their national policies related to the examined parameters is given. Finally, a comparison between the two cases of Israel and Cyprus is presented with specific focus on their national policies regarding the examined parameters of energy security and national security.

In the last Chapter 6, the findings and results of this thesis are recorded and summarized in a structured way: outcomes related to the theory and framework, outcomes related to the main research questions and outcomes related to the case studies that were chosen in order to check the proposed framework. In addition, policy proposals and suggestions for each of the examined cases are written down. It is always both helpful and necessary to have a summary of a study in which a critical view is also given focusing on the important areas and conclusions that should be notified.

Figure 1.1

Methodological Steps followed in the study



Source: (based on Yfantopoulos and Nikolaidou, 2008).

In the above figure 1.1 the main methodological steps which are followed during this thesis are included. It is believed that it helps both the researcher and the reader to understand the structure of the approach followed during a study and research of a selected topic.

1.4 Definitions and Assumptions

In this section, a recursion to definitions, terms and available literature of the examined subject is presented. In the beginning, it is important to define the terms used herein and then to refer to the basic theoretical areas as found in the literature. A detailed and thorough literature review is considered as the *foundation for substantial useful research* (Boote and Beile, 2005).

According to Fischhendler and Nathan (2014), "the concept of energy security is open for manipulation and various interpretations and even more complex, a person's individual perspective colors significantly the extent to which he perceives risks to energy security and opportunities to enhance it". Thus, it is necessary to refer to definitions of the basic terms that are used in this thesis as in the next table 1.1:

Table 1.1

Definitions of terms used in the study

Term	Definition 1	Definition 2
International Political Economy	"The scientific field which was developed in Western Universities in the decade of 1970s and it is considered today as a separate field in the International Relations" (Sklias, 2011: 20).	"International political economy is the study of the interplay of economics and politics in the world arena" (Frieden and Lake, 2003: 1).

Security	"For realists, the basic survival and protection of the state. Liberals have a more expansive definition, also applying the concept to individuals and groups of people". (Viotti and Kauppi, 2012: 464).	"The goal of states is security (or survival) and not a striving for ever more power". (Waltz 1997: 917).
Critical Success Factors/Parameters	"Limited number (usually 3-8) of characteristics, conditions or variables that have serious impact on the effectiveness, efficiency and viability of an organization or project. Activities associated with CSF must be performed at the highest level of excellence". (Business Dictionary, 2017)	"Key variables or conditions that have a tremendous impact on how successfully and effectively an organization meets its mission or the strategic goals of a program or project". (Tech Target, 2017).
Energy	a./ "dynamic quantity". b./ "the capacity of acting or being active". c./ "a usually positive spiritual force". (Merriam Webster, 2017)	"A fundamental entity of nature transferred between parts of a system in the production of physical change within the system and usually regarded as capacity for doing work". (Merriam Webster, 2017)
National	Relating to a nation, comprising or characteristic of a nationality. (Business Dictionary, 2017)	"Of, relating to, or being a coalition government formed by most major political parties usually in a crisis". (Merriam Webster, 2017)

State	"A politically organized body of people occupying a definite territory; one that is sovereign. A government or politically organized society having a particular character [i.e. welfare state]." (Merriam Webster, 2017)	"The territory of a state"; "the operations or concerns of the government of a country". (Merriam Webster, 2017)
Theory	"Theories are general statements that describe and explain the causes of effects of classes of phenomena". (Van Evera, 1997:7)	"A systematic approach or explanation for the observation which relates to a specific part of life". (Wikibooks, 2017)
Variable	A concept that can have various values. (Merriam Webster, 2017)	Capable to be changed or adapted. (Dictionary, 2017)
Independent variable	"A variable framing the causal phenomenon of a causal theory or hypothesis". (Van Evera, 1997:10)	"A variable that is independent of other variables in an expression or function and whose value determines one or more of the value of the others" (Merriam Webster, 2017)
Dependent variable	"A variable framing the caused phenomenon of a causal theory or hypothesis". (Van Evera, 1997:11)	"A variable whose value is determined by that of one or more other variables in a function". (Merriam Webster, 2017)

Intervening variable	"A variable framing intervening phenomenon included in a causal theory's explanation". (Van Evera, 1997:11)	"A hypothetical variable used to explain causal links between other variables". (Statistics Howto, 2017).
Prime hypothesis	"The overarching hypothesis that frames the relationship between a theory's independent and dependent variables". (Van Evera, 1997:11)	"A hypothesis is an assumption, an idea for the sake of argument so that it can be tested if it might be true". (Merriam Webster, 2017)

Sources: (Merriam-Webster, 2017), (Business Dictionary, 2017), (TechTarget, 2017), (Dictionary Reference, 2017), (Van Evera, 1997: 8-12).

Some more useful definitions that are related to the nation-state, the security is given briefly as following:

- Power: It is the "nation's possession of control" of its sovereignty and destiny. It denotes a level of control related to any foreign forces that could cause damages to the state (Merriam Webster, 2017).
- Military strength: It refers to military capacity and capabilities of the armed forces, and it is a capacity. It is usually seen as a static measure of the power of a state; however, military strength is a variable that is subject to other parameters like the relative strength of opponents and the degree that can be used efficiently (Treverton and Jones, 2005: 1-17).
- Force: As already mentioned above herein, force is one of the instruments of power. It is the use of a military or law enforcement capacity to achieve some objective. It is the actual use of strength and should not be equated with either strength or power. If one applies force effectively it may increase power but if one applies it not properly or inefficiently, then it may reduce its power (Treverton and Jones, 2005: 1-17).
- Collective Defense: It is an "official arrangement among nation-states to offer some defense support to other member states if they are attacked". It is the basis of the classic

defense alliances (i.e. NATO) and it is “distinguished not only by geographical limitation, but also by its focus on military commitments” (Thiagarajah, 2016).

- National defense: It refers to the “ability of the armed forces to defend the sovereignty of the nation and the lives of its people” (Thiagarajah, 2016).
- Global Security**:** It is a set of ideas that support world’s security as everyone’s business. No single nation is secure unless all are secure and it focuses on attempting to reduce any conflict through international law, confidence-building measures, aid, and global governance (IPRSP, 2011).
- Collective Security: It refers to several forms of settlement. It is involving “mutual commitments of member states could be considered a form of collective security, albeit one limited geographically to military defense”. It is seen as a regional and global topic where international institutions like United Nations (UN) are linked with (Miller, 1999: 303-332).

It always helps to conceptualize the meaning of each item/term, since it is subjective and thus it is very helpful to give a definition-or to pick up the most appropriate one- to a term. In addition, it is also important to state basic assumptions that will defined later in the main text of the thesis.

As per Belgin (2012: 12), there are many scholars[3] that had referred to the energy as “the thermodynamic quantity needed by a system of mechanic, organic, electronic and of other structures to do work; work defined as mental and/or physical activities of all kinds for any reason”.

According to International Energy Agency (IEA, 2009: 115), Energy Security is defined as “access to adequate, affordable and reliable suppliers of energy”. Furthermore, IEA recently has also enlarged the definition of energy security stating that it is

> “the uninterrupted availability of energy sources at an affordable price. Energy security has many aspects: long-term energy security mainly deals with timely investments to supply energy in line with economic developments and environmental needs. On the other hand,

[3] (Grant, 1888), (Cook, 1971), (Andrews and Jelley, 2007), (Weissebacher, 2009).

short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance" (IEA, 2017).

More particular, the definition of "Energy Security" has been reviewed and presented by Sovacool (2011: 3-6) as he identified forty-five (45) different definitions, even though some of them were very similar against the other. He claims that the large number of these different definitions makes people to progress different notions of energy security and by this they can justify actions and policies on energy security grounds. In the table 1.2, it is useful to have these different definitions by authors, scholars, institutions and organizations:

Table 1.2

Definitions of "Energy Security"

Source	Definition
Asia Pacific Energy Research Centre	Ability of an economy to guarantee the ability of energy resource supply in a sustainable and timely manner with the energy price being at a level that will not adversely affect the economic performance of the economy, spread across the four As of Availability, Accessibility, Acceptability, and Affordability.
Barton et al.	A condition in which a nation and all, or most, of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk of major disruption of service.
Bazilian et al	Energy fuels and services at reasonable and stable prices, in sufficient quantity, free from imports and indigenously provided, attuned to increases in future demand, delivered at the right time.
Bielecki	Reliable and adequate supply of energy at reasonable prices.
Bohi and Toman	Loss of welfare may occur as a result of a change in price or availability of energy.

Brown and Sovacool	Adequate energy supply and affordable prices as well as social and cultural sustainability and environmental preservation.
CNA	Diversity, or a mix of fuel sources; stability, or stable sources of reserves and technology; intelligence, or the use of energy efficiency and smart meters; reliability, or having strong distribution networks; electrification of ground transport through plug-in hybrids; and bio-based mobility liquid fuels for military applications and aviation.
Deutch	Connection between the economic activity that occurs in both domestic and international energy markets and the foreign policy response of nations.
	The five Ss: Supply (having resources, such as fuel fossils, alternative energy and renewable energy), Sufficiency (adequate quantity of fuel and services for these counties from these sources), Surety (having access to them), Survivability (resilient and durable sources of energy in the face of disruption or damage) and Sustainability (reducing waste and limiting damage to the environment).
European Commission	Uninterrupted physical availability of energy products on the market at an affordable price for all consumers.
Florini	Reliable and affordable access to energy supplies.
Hughes	The four Rs: Review (understanding the problem), Reduce (using less energy), Replace (shifting to secure sources), and Restrict (limiting new demand to secure sources).
International Atomic Energy Agency	Secure supply of energy fuels as well as imports, technologies that promote self-sufficiency as well as protection against disruptions, including those that hedge against price volatility, encourage diversity of technologies and sources, reduce threats to and/ or from neighboring states, enable well-functioning markets, and improve environmental sustainability.

International Energy Agency	Adequate, affordable, and reliable access to energy fuels and services, it includes availability of resources, decreasing dependence on imports, decreasing pressures on the environment, competition and market efficiency, reliance on indigenous resources that are environmentally clean, and energy services that are affordable and equitably shared.
International Institute of Applied Systems Analysis	The term may be defined in terms of access to secure, stable, and reliable supplies of efficient and modern energy supplies and appliances at prices that are affordable and in amounts adequate to meet demands for basic energy services in full to ensure human health and well-being and without detriment to the environment.
Jacobson	Managing global warming, air pollution mortality, security of supply, water availability, land use, disruption of wildlife, resource availability, thermal pollution, water chemical pollution, nuclear proliferation, and malnutrition.
Jansen	The extent to which the population in a defined area can have access to affordably and competitively priced, environmentally acceptable energy services of adequate quality.
Jegen	A term that involves three aspects: interconnectedness and promoting market liberalization, regulating climate change, and improving external governance. It entails four aspects: (1) sufficiency of supply, connected to diversification; (2) affordable prices, reasonable for most people; (3) public utility, so that most citizens and users have access to energy services, and (4) time, a distinction between short-term and long-term energy security needs.
Kalicki and Goldwyn	Access to stable and affordable supplies of fuel for transportation and electrification.
Kalicki and Goldwyn	Assurance of the ability to access the energy resources required for the continued development of national power … it is the provision of affordable, reliable,

	diverse, and ample supplies of oil and gas and their future equivalents and adequate infrastructure to deliver these supplies to market.
Kemmler and Spreng	Promoting energy efficiency and reducing energy intensity, protecting the natural environment, reducing pollution and distributing energy to all who need it so that standards of living can be improved.
Kessels et al	Diversification of supply sources, robust security margins (including spare capacity, emergency stocks, redundancy of infrastructure), flexible and competitive energy markets, mutual interdependence among companies and governments, mutual interdependence between suppliers and consumers, physical security for consumers and producers, quality of information to the public, investments in new technologies, lowered energy imports.
Konoplyanik	Stable, cheap, and environmentally friendly energy cycle including primary suppliers, transportation, refining, transformation, and final consumption.
Lovins	A term that rests on three pillars: making domestic energy infrastructure resilient, improving reliability by phasing out vulnerable facilities and fuel sources, and eliminating reliance on oil from any source.
Medlock	Maintaining a stable supply of energy at a reasonable price to avoid the macroeconomic costs associated with interruption of energy supply or increases in energy price.
Muller-Kraenner	Provision of reasonably priced, reliable, and environmentally friendly energy.
Nuclear Energy Agency	Minimizing vulnerability to unique and unforeseeable events threatening the physical integrity of energy flows or leading to discontinuous energy price rises, independent of economic fundamentals.
Omorogbe	Provision of adequate, affordable, efficient, and reliable energy services with minimal adverse impacts on the environment.

Orr	Seriously pushing energy efficiency, energy systems that rely on renewable and non-depletable fuels, decentralization and small-scale supply, and financing the ability to shift away from fossil fuels and conventional energy systems.
Scheepers et al.	Diversification of energy sources, diversification of imports, long-term political stability of importing regions, and the resource base in those regions.
Shrestha and Kumar	Ensuring the availability of energy resources that are diverse, in sustainable quantities, at affordable prices, that support economic growth, assist in poverty alleviation, and do not harm the environment.
Sovacool	Technical feasibility, affordability, environmental protection, reliability, and security of supply.
Tonn et al	The elimination of imports and diversity of domestic energy sources.
US Agency for International Development	Availability of usable energy supplies, at the point of final consumption, in sufficient quantity and timeliness so that, given due regard for encouraging energy efficiency, the economic and social development of the country is not materially constrained.
US Congress	A future where abundant, reliable, and affordable energy is produced with little impact on the environment and no dependence on the goodwill of hostile nations.
US Department of Defense	Capacity to avoid adverse impact of energy disruptions caused either by natural, accidental or intentional events affecting energy an utility supply and distribution systems.
US Department of Energy	Promoting America's energy security through reliable, clean, and affordable energy.
United Kingdom Department of	Environmental sustainability, or carbon dioxide emissions; reliability, or having the "right" infrastructure, regulatory system, and liberalized market;

Trade and Industry	competitiveness and productivity, or energy costs that do not discourage investment and growth; social equity, or minimal fuel poverty.
United Nations	Protection against shortages of affordable fuel and energy resources.
White	A term that encompasses various aspects of electricity reliability and transmission, energy storage, renewable energy and domestic supply, penetration of non-carbon-based fuels, political consistency, adequate research budgets for energy, protection of intellectual property rights for energy technologies, development and economic growth, equity and access.
World Bank	Access to secure supplies of fuel, a competitive market that distributes those fuels, stability of resource flows and transit points, and efficiency of end use.
World Economic Forum	Autonomy, energy supply that is within the control of a country and free from disruption by external agents; reliability, or distribution that is safe and meets demand without interruption; affordability, or prices commensurable with the buying power of consumers; and sustainability, or sufficient supply of energy to support a high quality of life without damaging the environment.
World Energy Assessment	Availability of energy at all times in various forms, in sufficient quantities, at affordable prices.
World Resources Institute	Sufficiency of supply as well as reliability, affordability, environmental sustainability, geopolitical stability, and social acceptability.
Yergin	Reliable and affordable access to energy supplies, diversification, integration into energy markets and the provision of information.

Source: (Sovacool, 2011: 3-6).

Regarding the definition of the “National Security”, it can be stated that “national security is the safekeeping of the nation as a whole. Its highest order of business is the protection of the nation and its people from attack and other external dangers by maintaining armed forces and guarding state secrets” (Holmes, 2015: 23).

At this point, a short reference to the stakeholders' theory and definitions is seen as necessary, since they are the participants and identities involved in an examined case. As a stakeholder can be characterized "any group who can affect or is affected by the achievement of a country's purpose" (Freeman, Harrison and Wicks, 2007: 3).

Moreover, Freeman considers that a stakeholder is "a genre of stories about how we could live" generating "arguments or further narrative which include business and moral terms to fill in the blanks" on how corporations ought to be governed and how managers ought to act (Jensen and Sandstorm, 2011: 473).

Several different definitions regarding the usage of the term stakeholders are given in the following figure 1.2. The available option for the definition depends on whether a broad or narrow approach is chosen in combination with a normative or more strategic consideration. Thus, there can be at least four different groups of definitions and then possible to adopt one.

Figure 1.2

Stakeholders' definitions

	Broad	**Narrow**
Strategic	Legal or institutional recognition of stakeholder	Stakeholders critical for firm success
Normative	Humans only	Those owned significant responsibility

Source: (based on Friedman and Miles, 2006).

It is seen that one can view stakeholder interests “as joint rather than opposed is difficult” and it is difficult to “find a way to accommodate all stakeholder interests” (Freeman, Harrison and Wicks, 2007: 10). Many stakeholder groups are afforded “a degree of protection in law” and “law is created from cases in an incremental and ad hoc fashion”.

In order to identify significant spheres of influence it is helpful to apply and follow “a systematic identification of stakeholders and their interests” (Friedman and Miles, 2006: 250). Trying to manage the stakeholders properly can be also supported by the fact that “the interests of these groups must go together over time”. A situation that “constantly trades off the interests of one group for another is doomed for trouble and failure” (Freeman, Harrison and Wicks, 2007: 10).

Stakeholder interactions can be seen between network of influences, organizations, countries and thus they don’t all the time “respond to each stakeholder individually but rather to the interaction of multiple influences from the stakeholder environment”.

Organizations and furthermore countries that they are interested to deal properly in the foreign affairs arena, they must pay “attention to such stakeholder integration mechanisms because they can offer them the leverage required to achieve their purposes” (Heugens, van der Bosch and van Riel, 2002: 56). An added value can be created if we understand and satisfy their needs and concerns of the stakeholders, which means “managing stakeholder relationships effectively is less about stakeholders ‘attitudes and more about their behavior and their beliefs about the businesses” Freeman, Harrison and Wicks, 2007: 15).

A theoretical framework that can help managing stakeholders is presented as following in figure 1.3. This model is based on Stakeholder’s capacity and willingness to threaten or cooperate with the organization (Savage et al, 1991: 65).

Figure 1.3

Types and strategies for Stakeholders' management

Potential for Cooperation		**(+) High**	**Low (-)**
	High (+)	Type 4: Mixed blessing Strategy: Collaborate	Type 1: Supportive Strategy: Involve
	Low (-)	Type 3: Non-Supportive Strategy: Defend	Type 2: Non-Marginal Strategy: Monitor

Potential for Threat

Source: (based on Savage et al, 1991).

Based on this model, there are few considerations, outcomes that can be easily addressed as below:

- The potential to cooperate is considered based on stakeholder's capability to expand its interdependence with the organizations and it is also linked with the external environment.
- The potential for threat is considered based on resource's dependence, stakeholder's potential to form coalitions.

Stakeholders can be considered regions, unions of states, states as actors in the international scene, the markets, the constituents. All of them, they collaborate and compete at the same time and it involves people from the individual level up to the group level.

Even though the decision-making process is mostly related to the quantitative methods, it is widely used in the social sciences and political sciences. As per Simon (Koutsoukis, Roukanas and Sklias, 2016: 14) the decision theory is used as a subset of the international political economy that is the "normative study of the international and national economies and their markets".

Table 1.3

Decision problems classification

		Decision Maker
Level of Risk	Minimal/non- existent	Full control over the outcomes that result from a course of action, which is pre-known (deterministic approach).
	Exists	Outcomes can be “enumerated” and probability of each can be also quantified, but they cannot be determined in advance.
	Maximum (no certainty)	Outcomes cannot be “enumerated” and probability of each cannot be quantified, also.

Source: (Koutsoukis, Roukanas and Sklias, 2016: 15-16).

Making decisions in a process includes risk and it is related/linked to the stakeholders around the barriers of the system under examination. The decision-making process is by itself a science and it is found in almost all the other sciences with a wide range of application and level of presence. It can be seen as that there are generally three levels of risk summarized in the above table 1.3.

As per Koutsoukis, Roukanas and Sklias (2016: 19), one of the well-known complications of risk and International Political Economy is included in the term of “political risk” which is also found as “country risk” when it is related to the decisions taken place in politics that can affect the welfare of the stakeholders.

In the literature, Ekberg (2007) proposed a conceptual framework of risk where risk and IPE correlations are also represented; one of them “the politics of risk” refers to “the formation of local and global interest groups oriented around risk issues and the development of policies oriented towards the prevention or resolution of risk conflicts” (Koutsoukis, Roukanas and Sklias, 2016: 20-22).

Following, more useful definitions of terms and notions used in this thesis are given since it is important to have clarity and understanding of them for the purpose of the study (Koutsoukis, Roukanas and Sklias, 2006: 91-114).

- State boundary: It exists and concurs with the sovereignty and geopolitical boundary. It represents a "set of interaction thresholds where the Political and Economic activity of any state is separable from other States".
- State stakeholders: "On the state boundary, the main actors are the governments and/or other policy and decision-making institutions"
- Factors and Indicators: Every factor in a given group is "equivalent to a collection of markers that have influence on the respective tendency at the state's boundary". Furthermore, each factor may be consisted of indicators, either qualitative and/or quantitative. These indicators are found in the next categories: Political, Economic, Social, Technological and Cultural.
- Timeline: As a time unit, which consequently detects the timeline, is considered the calendar year and multiples thereof.
- Policies: They are seen to be emanated at the state boundary and they can be directed either outside or inside this boundary level. Furthermore, policies are many times determined as "a result of endogenous or exogenous influence exerted to the state stakeholders and therefore the state boundary".

For the purpose of this study, it is necessary to assume that both the notions of Energy Security and National Security of a state are seen to be situated at the state boundary level and thus they can be directed either outside or inside that boundary level.

1.5 Conclusions

In this chapter, a summary and introduction of the main areas of the thesis were given. It was clearly mentioned that the notions of energy security and national security of a nation-state will be examined under the umbrella of International Political Economy (IPE). Several definitions for these notions were mentioned and it is understood that there is not a simple one to use, but it varies based on the nature of the objective and aim each time.

The selection of the two countries, Israel and Cyprus, did not happened incidentally, but they were chosen as they both have quite few characteristics that it would be useful to compare them as case studies in the east Mediterranean region.

It can be said that this thesis can finally contribute to the existing theory through different perspectives:

- An updated methodology is given where the necessary stages are described regarding how to design and implement a conceptual framework under the view of International Political Economy.
- An interdisciplinary approach is followed, which gives a fresh view of how things happen. In order to view things different, it is important and helpful to benchmark through unrelated differentiation.
- The examined relationship between the Energy Security and the National Security of a nation-state is examined and studied under the International Political Economy umbrella and in particular through the lenses of the theory of realism.
- The main research questions that are initially set are finally addressed. The results and outcomes of the research process which is described in details in this thesis give useful conclusions fort the examined nation-states and consequently proposals are given for both short and long-term periods.

In the next chapter, the theoretical background is described which is necessary to be examined for the purpose of this study with particular focus on the several theories of the IPE and finally the adoption of the proper and most appropriate one, that of realism.

CHAPTER 2

THEORETICAL CONSIDERATIONS

2.1 General

In order to reach a deep and thorough understanding and thus be able to study more effectively several issues related to policy, economy, society and technology the International Political Economy (IPE) approach can really contribute towards to this effort. This is reinforced by the fact that IPE combine specialized sciences such as politics, economy and international relations.

The IPE help us to perceive the "way that politics shape the economy and the way that economy shapes politics" and it has been developed due to the fact that several global issues could not be explained inside a conventional framework of knowledge (Sklias, 2011:36-18). For the scope of this thesis, it is necessary to choose the most appropriate theory among the available ones; this is the theory of Realism as it is considered the best that explains concepts and contemporary issues. In this connection, it would be possible to create the necessary conceptual framework that is needed in order to carry a research analysis as it will be presented in details in chapter four of this thesis.

During this academic research, there is an overview of available different methodologies that one can choose from and then a reference to the methods available to test the chosen theory; the most appropriate one is finally adopted for application and assessment, which is seen as the case study.

A short description of human, socio-economic and cultural impacts from energy activities to the society is also given since it is considered necessary for the proper and overall study.

Finally, a review of the Multiple Criteria Decision Making (MCDM) approach is given in this chapter since it seems to be well suited for the study of decision-making problems like the one that exists under this thesis.

2.2 International Political Economy

As per Waltz (1991: 22), “theory is just representing things that had happened and it only portraitures events” and he claims that a theory “construct a reality, but no one can ever say that it is the reality (1979: 9).

The IPE has become very quickly one of the main areas of the International Relations, in the broader Political Sciences area. It is seen as one of the most challenging and promising areas of the International Relations that can describe and explain successfully the international system through a “holistic interpretation”. The IPE is considered as a science with dual characteristics; the economic science that covers the knowledge fields of macro and micro economy up to the international trade while at the same time it is the political science of the international relations.

The strong initial relation between the IPE and the economic theory is also one of the main contributions that IPE has given to the international studies. There is a lot of discussion whether the theory of International relations includes the IPE or the other way which may be also the more possible one in case economists include into their analysis the theory of international relations (Ifestos, 2015).

According to Guzzini (2003:142), “if International Political Economy has a birth date, then it was the 15 August 1971”, then US president Nixon tried “to suspend the Bretton-Woods monetary system” as his decision changed the way “the international monetary system was run” and “the US officially declared its power position as challenged”.

It looks helpful to make a short reference to the basic theoretical approaches of the IPE, since the Political Economy (PE) of the International Relations (IR) is complicated while at the same time there is a necessity to protect national interests within a balanced power system (Sklias, 2011: 28).

The whole Political Economy has been built and established upon the notion of rational behavior of the individual and the economists accept that such a rational behavior cannot be anything else apart from the egoistic intention of the man to maximize its individual interest.

The economic theory can be seen mostly as a challenge of optimization, in other words a challenge of better usage of the limited resources; a dynamic macroeconomic pattern assess the operation of an economy during a period and in such a pattern there are some key-variables (which are the means of the economic policy and they are named as control variables) and the scope is to make an optimum choice of those key-variables as a function of time.

The evolution in the Political Economy arthrography took place mainly from the 1980s and by the end of that decade the epistemology of Political Economy was a district category of economy sciences. In summary, the basic epistemological trends and theories in the last centuries can be summarized as following (Antonakis, 2015: 11-22):

First half of 17th century: The first organized economical trend appeared in France at the first half of the 17th century; it was the mercantilism having its main focus on the land that occupied by the feudal lords who was the decision maker for the monetary policy and the external commerce. After the failure of mercantilism, the naturalists took over and they changed the reference base from the feudalism to the individual piece of land and its grower. This led them to the first theory of value, which linked the wealth with money.

Until mid of 18th century: there was no political economy with the meaning of a complete and systematic theory which could interpret the economic reality and to lead to suggestions of economic policy. At that time, the classic theorists changed the focus of interest of the theory of value, from the nature to the man.

It can be said that the Political Economy starts with the publishment of Adam Smith's book "An Inquiry into the Nature and Causes of the Wealth of Nations, 1776). Adam Smith stopped any political and deterministic approach of the economic phenomena and he chose as main task of his analysis the production and exchange of goods within a society of man and trade-producers (Homo Economicus). The success of the classical theory can be explained from this new theoretical framework and the fact that it was established upon the base of the enlightment.

However, the theory of value has been abandoned (except from Marx) because it was considered as metaphysics and the interest of the economists been attracted by more practical aspects as price by keeping basic philosophical foundations of the classic theory like the optimum behavior of the individual and the operation of the free market. In addition, the Newtonian physic urged the economists to introduce the calculus into the economic theory and thus to use mathematics to express several causalities.

Mid-19th century: the new-classic theory prevails by which a maximization of social wealth can be achieved if the individual aims to maximize its own wealth. The new theory contributed a lot to the industrial revolution era which requested a free market to grow in. During the same period of the new classic theory, another theory the Marxism came up as a sub-branch of the classic theory. Marxism dealt with the labor theory of value when the classic theorists left it and they started focusing on the aspect of price.

Beg of 20th century: In Europe, the philosophical trend of logical positivism or else logical empiricism appeared: the main idea was to establish an epistemological philosophy, meaning a philosophy that would be based upon the "logic" as the basic tool of any science while the "positivism" would accept only knowledge based on tangible and specific confirmation of the experience. Basic followers of this trend were Schlick, Waismann, Neurath, Hahn and Carnap.

As per the logical positivism theory, the process of methodological approach to form a scientific statement starts from the experience and then a hypothesis is formed; based on the deductive reasoning an empirical forecast comes out and the theory is subject to the control and measurement through the experimental procedure. This is the verification principle. Theorists that followed the logical positivism believed that the progress of science is a continuous, accumulative process in which any new is built upon the old one and not next to that.

1930-1950s: The "General Theory" of Keynes (1936) confronted the law of Say and supported the idea of actual demand, redefined the notion of economic reality and gave new tools for the study of economy. Keynes introduced in the political economy the macroeconomic analysis and it constituted the new Paradigm in the economic theory, but only a Paradigm; on this theory many other theories have been built on like the theory of Harrod and Domar about the economic enlargement and the work of Tobin about the monetary theory (Nobel prize 1981). One of the weak areas of the theory of Keynes is the stagflation that appeared after the implementation of the theory in the western countries for more than three decades.

Thus, the theory of Friedman appeared but it does not constitute a new Paradigm in the political economy. From the theory of Friedman what is more appealing is not so much its focus on the monetary policy, but its claim that the economic activity is autonomous, that the economic policy needs to be oriented to that and the economy has to operate based on the system of the free market.

1950s: Karl Popper, one of the greatest philosophers in the 20th century, brought up the falsification principle. As per Popper, the knowledge does not start from the observation and thus any description of scientific hypothesis in not based on the experience; any scientific hypothesis starts clearly from the scientist and it is a guess regarding the scientific phenomenon. After the hypothesis is formed, the deductive reasoning follows which delivers the scientific principle which is tested through the experience.

Since Hegel consider the battle between the nations and the wars as the main root cause of any historical change and Marx believed that the battle between the classes as the driving force of history, Popper supported the idea that there is no historical determinism and he introduced the notion of piece-meal social engineering.

1960s: After the criticism that took place against the logical positivism, a new epistemological trend, historicism or relativism appeared and its main followers were Kuhn, Feyerbend, Hanson and Toulmin. The notion of “paradigm” appeared which is not just a simple scientific theory but a more spherical dimension since it consists of a powerful grid of notional, theoretical, experimental and methodological assumptions. Thus, the “normal science” is appeared but after several unsuccessful results in its implementation the period of “extraordinary science” follows which is characterized by a scientific crisis. As per Kuhn, the evolution of science is not a smooth, linear accumulative process, but a more complex phenomenon with periods of continuity and non-continuity (discontinuity), with radical reviews and deep rifts.

A third scientific approach during the 20th century was proposed by Imre Lakatos by introducing the scientific research program which consists of a hard core of basic hypothesis and a sum of positive heuristic. This theory of Lakatos is positioned in the middle of the aforementioned theories of logical positivism and Kuhn; it accepts what the logical positivism supports that any new theory is built upon the previous one by keeping the positive areas of that previous one and it also accepts what Kuhn believed that the scientific research programs are discreetly or else that the new is grown next to the old and not on that.

As per the analysis Dudley Dillard published in the Southern Economic Journal (1978), there is an average of around 40 years between two main economic theories to be revealed and adopted by the society; this period of time seems that it does not happened randomly but it is because of economies are being developed and enriched.

1980s-: After the 1980s, the evolution of the Political Economy took place and the epistemology of Political Economy becomes a district category of economy sciences.

If one considers the political science of the international relations close to the Thucydides work and view, there can be seen three levels of analysis: the human, the state and the international system. During the 20th century, there were too many conflicts and clashes that occurred among and between internationalist movements; Communists, Liberalists, Nazis unfortunately did not finally contribute a lot to “maturity of thought” in relation to the international scene and practice. An explanation to this could be that all of these movements did not follow the three levels of analysis already mentioned above herein, which could help them to avoid mistakes in their implementation during the period of time (Ifestos, 2015).

In the next figure 2.1, the three basic theories of the IPE are presented in a synoptic and comprehensive way.

Figure 2.1

Classical Approaches of IPE

Realism

- Hamilton, List, Krasner, Gilpin, Strange
- Level: State, Individual
- Human Nature: Aggressive
- Units: States
- Confrontation of state: Unionist
- Confrontation of Int. Companies: Harmful
- Behavioral Dynamics: State as rational actor
- Mkt Relations: Negative
- Game Simulation: Zero Sum
- Hegemony: Importance of a sovereign state
- Intern. Organizations: Not important

Liberalism

- Smith, Ricardo, Kant, Wilson, Keynes, Hayek, Keohane, Nye
- Level: Pluralism, Individualism
- Human Nature: Cooperative
- Units: State, Company, NGO
- Confrontation of state: Pluralistic state
- Confrontation of Int. Companies: Harmful
- Behavioral Dynamics: Individual as rational actor
- Mkt Relations: Positive
- Game Simulation: Possitive Sum (win-win)
- Hegemony: post-hegemonic cooperation
- Intern. Organizations: important

Constructivism-Structuralism

- Marx, Lenin, Frank, Cox
- Level: Global structure
- Human Nature: Ductile
- Units: planet, globalization, sex, class
- Confrontation of state: Class Rep
- Confrontation of Int. Companies: Harmful
- Behavioral Dynamics: within societes
- Mkt Relations: Exploitatives
- Game Simulation: Zero Sum
- Hegemony: Hegemony on state and society
- Intern. Organizations: Serving interests of wealth (state, companies and classes)

Source: (Sklias, 2011).

Liberals and realists while arguing about the role of state and markets in the economic and political system, they agree to accept the capitalist production system as the dominant economic-political system (Sklias, 2011: 46).

In the next table 2.1 the complementarity of motivational assumptions in the IR theory are given.

Table 2.1

The complementarity of Motivational Assumptions IR Theory

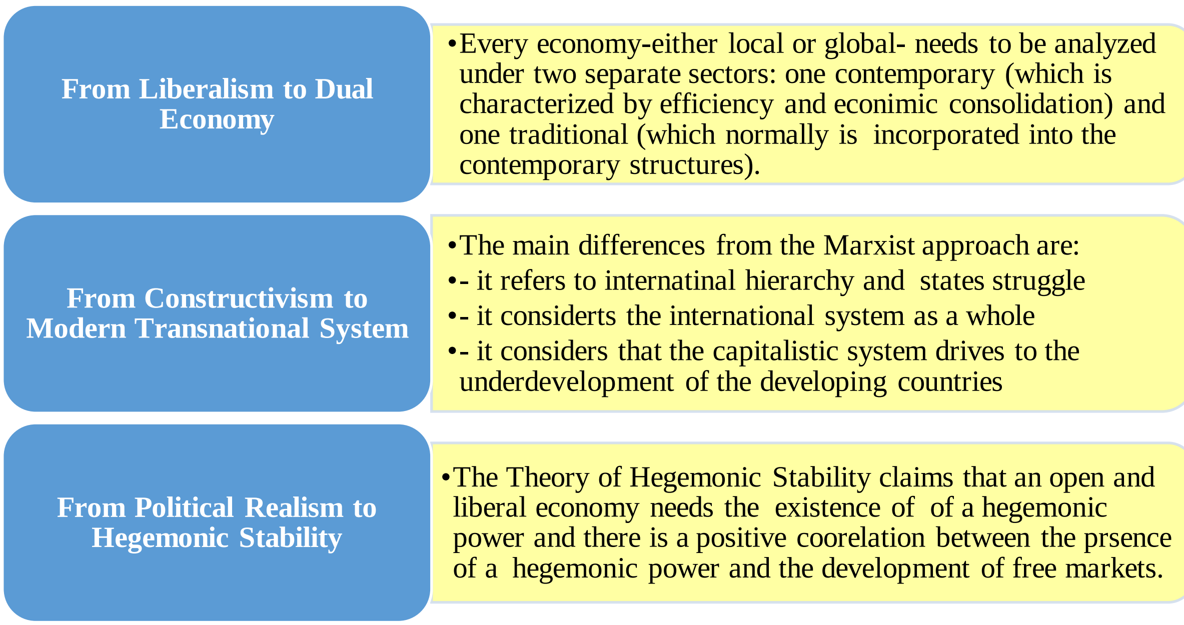
Theoretical Approach	Basic Motive Stressed	Motivational Complex Emphasized	Main Foreign Policy Goal Pursued
Realism	Fear	Power	Security
Liberalism	Profit/Self-Interest	Achievement	Prosperity/Rights
Constructivism-Structuralism/Sociological Institutionalism	Honor/Recognition	Affiliation	Identity/Membership

Source*:* (Freyberg-Inan, 2004).

Apart from the classic, basic approaches of the IPE as already described previously, there are also contemporary approaches which have contributed to the development of IPE. For each classic approach of the IPE a new modern approach has been appeared. A summary of these new approaches is depicted in the next figure 2.2.

Figure 2.2

Contemporary Approaches of IPE



Source: (Sklias, 2011).

Another view of the IPE is the more contemporary contribution by Roukanas (2007) who is proposing the new term of Complex Political Economy (CPE). He believes that there are some weak areas in the main IPE theory which cannot explain some current relations in the global economic and political environment that they are not included in the main area of the Realism.

Even though the framework of the CPE is similar to the IPE's and it still considers that "the state remains the main actor in the formulation of the global economic and political environment" (2007: 11). There are three main preconditions that can be considered as to characterize the CPE (Roukanas, 2007: 11):

a. The state is the main actor in the formulation of the global economic and political environment.

b. The Critical Success Factors responsible for the formulation of the global economic and political environment are the state, the market, the multinational companies and the global organizations.
c. These Critical Success Factors are more frequently interdependent.

In addition, there is also a “meta-theoretical debate” which is mainly characterized by “the two main dichotomies that long characterized the philosophy of social sciences” as indicated following:

- The Verstehen-Erkliiren (explaining-understanding) debate of German sociology and
- The agent structure debate.

In the following table 2.2, these dichotomies have been crossed and finally providing “four main meta-theoretical positions”; a matrix which can is related to both for the social sciences in general and for International Relations (Guzzini, 2003: 142-212).

Table 2.2

Selected Theories in IR and IPE

<table>
<tr><th></th><th colspan="2">Individualism</th><th colspan="2">Holism</th></tr>
<tr><td rowspan="3">Naturalism</td><td rowspan="3">Human Nature

1. World Society (Burton)</td><td rowspan="3">Rational Choice
Game Theory
Strategies
Economics of International Relations (Bruno Frey)</td><td>(Kaplan) Systematic Realism (Waltz)</td><td>(structural) functionalism</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Hegemonic stability theory</td><td></td></tr>
</table>

<table>
<tr><td></td><td>2. Morgenthau (later edition)</td><td>Foreign Policy Analysis
1.Operational Code (George)</td><td>Institutionalism</td><td>Regime theories</td><td>World System Analysis
(Chase-Dunn)</td></tr>
<tr><td rowspan="3">Interpretivism</td><td>3. Morgenthau (1st edition), Niebuhr</td><td>2. Alison (ideal types)</td><td>Polanyian Political Economy (Ruggle)</td><td colspan="2">Dependency (Cardoso)</td></tr>
<tr><td></td><td colspan="2">Historical Sociology (Aron)</td><td colspan="2">Gramscian Political Economy (Cox)</td></tr>
<tr><td colspan="3">English School of International Relations</td><td colspan="2">Constructivism (Kratochwill, Wendt)

Post-Structuralism (Walker, Campbell)</td></tr>
</table>

Source: (Guzzini, 2003: 198).

Realists support the nature of competitiveness in the international relations and they also refer to the “absence of legalized distributive justice institutions”. They tried to examine and studied the multi functionality of the international system and order, the difference and duality of the causes and aims of the war that are included between the international institutions and international politics.

Referring to Realists and particularly to structural ones, Kenneth Waltz’s ten basic principles of Political Realism (Waltz, 2011: 10-22):

1. Anarchy in the international system: There is no central government to impose order.
2. Competitive international system: Among nations, the physical situation is a misty situation. This anarchy structure of international system that creates conditions for competition is the main cause of war in the international relations.
3. The principle of Self-help: States are obliged to organize their self-help, which is the necessary principle of action in an anarchy situation.
4. Security-Dilemma: Measurements that states take to protect themselves are seen as reducing the security of others.
5. State-centered international system: States have never been the only actors; structures are defined not by all actors, but by the man ones.
6. The principle of Rationalism: In the International Relations is often seen redistribution of power and finally a natural choice rule is applied.
7. Basic National interest: The main and basic aim of nations is to maximize their security. Should they secure their survival, only after they can set ambitious targets.
8. Struggle for Power: States are obliged to seek for power, in order to survive in the anarchy international system.
9. Balance Strategy: The primary objective of the states is to maximize their security. In practice, this means that states should take care by themselves [as mentioned above herein "The principle of self-help"], which urged them to deal with balancing of their opponents. Balancing can be achieved by two ways: a) internal and b) external balancing.
10. The principle of Equilibrium Power: It is a micro-theory and one of the one of the distinctive political theories of international politics (Waltz, 2011: 250-253). A system a system "will have a tendency towards equilibrium" and "equilibrium power is constantly being created" (Waltz, 2011: 21).

Especially for the struggle for Power, Waltz considers it as not an end in itself, but a mean of pursuing politics and thus he believes that power is defined as:

a. Control over resources.
b. Control over others.
c. Control over outcomes.

Waltz realizes that power is always relative: a factor is powerful, only if affect the others more than they are affected by others" (Waltz, 2011:19, 398), so he chooses to define the term of "power" by using the first of the three definitions; the one referring to control over resources. Moreover, he clarifies that among nations' competition the important factor is the total power which is seen by contemporary scholars of realism as "hard power". States are ranked in a proper level, step depending on how they are classified in all of the following elements: population size and land area, natural resources, economic capabilities, military power, political stability and ability (Waltz, 2011: 16-18).

Following the Political Realism theory and the "scientific discipline" approach, there are some other also important scholars as following:

- Stephen Krasner and Robert Gilpin: they had studied and explained the causes of the war. More specifically, the factors existed between the international institutions and the states about equal transactions, part of them are the economic ones.
- Susan Strange: she had been raised serious concerns and objections against the post-modern ideas and theories that were expressed in the academic community at that period. She has been successful to support and establish her view for a holistic consideration of the international political and economic issues.
- Grieco (1998a: 485) indicates that "Realism has dominated international relations theory at least since World War II and for realists, international anarchy fosters competition and conflict among states and inhibits their willingness to cooperate even when they share common interests". According to Grieco (1988b: 602), a fundamental Realist insight is that "states are positional in character" which means that realism "observe a deep-rooted tendency in states to assess their level of achievement in any domain of activity-whether it be military power, industrial prowess, or educational excellence-by comparison of their own individual performance to the performance of other states".

According to Jørgensen (2018: 102-127), theorizing within the theory of realism is related to six main features as following:

i. Realism is a theory that basically demands “a monopoly on really understanding the realities of international politics”.

ii. Realism is characterized by a strong sense of tragedy: “we can know our fate without being able to do much about it”.

iii. Theorists and scholars consider “political’ in “distinct conception of politics”.

iv. Theory is seen by “a clear-cut distinction between domestic and international politics”.

v. Theories within the tradition are “all theories of conflict”.

vi. Theory inclines to nourish “a cyclical view of history”; power politics is considered to be “an endless, repetitive form of social action to which there is no enduring solution”.

Liberal scholars seem to follow an old view of how to see “universal harmony of interests”, which is a position that hides “hegemonic aspirations of power of each dominant hegemonic power”. From liberal theory of international relations, we can refer to some of the most important ones as:

- Robert Keohane και Joseph Nye: they may disagree with some Political Realists regarding the nature of the international institutions and the hegemonic role of the great powers, but they look to agree with the main theory of realism concerning the characteristics of the international system and the effect of the power in the international scene. They also seem to agree with the main realistic view that the international institutions are affected by the power and they are institutions of order and not of justice.

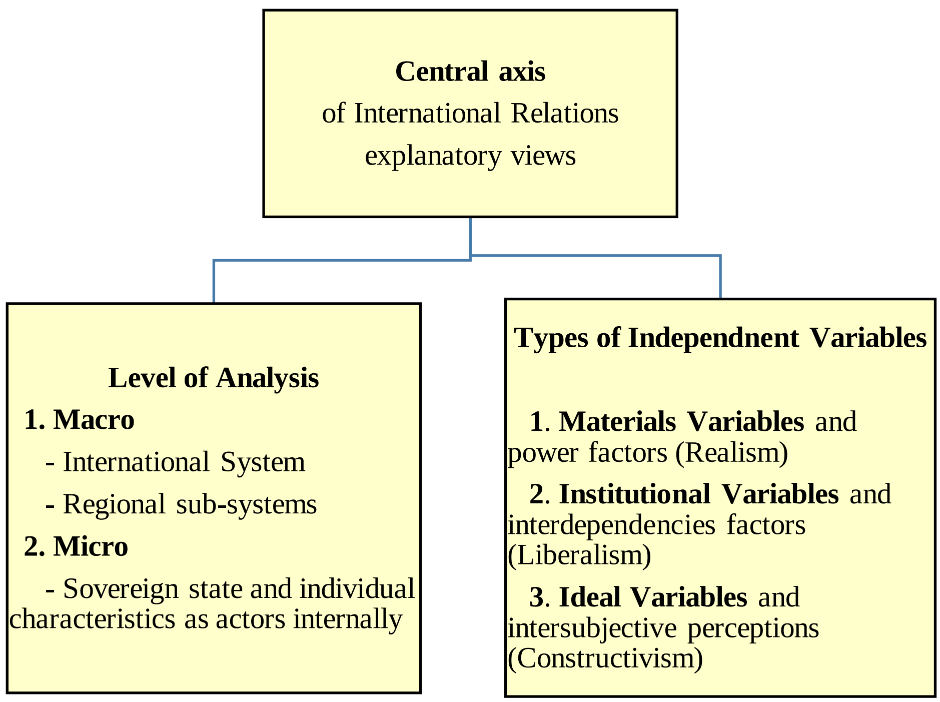
Contrary to any scientific mistake and errors, either by intention or by fault, the theory of realism has been dealing with issues like interrelationship and interdependence (Ifestos, 2015).

Waltz tried “to save the overlap between realist theory and the boundaries of the discipline of International Relations” by his efforts to deal with “the turmoil of the discipline by restricting the global 'net' to its classical International component”. At the same time realists started to reconsidering basic aspects of their theory trying to fit themselves better in the international system and thus these “realist theories became part of a different branch of International Relations, if not a different discipline, namely International Political Economy” (Guzzini, 2003: 142).

Based on Gofas and Tzifakis (2013: 44-47), a theory can be derived as the result of specific choices from two basic pillars as presented in the next figure 2.3:

Figure 2.3

International Relation Theories



Source: (Gofas and Tzifakis, 2013: 44-47).

Each theory can focus to one of the types of independent variables, as stated on the right pillar, in order to study international phenomena, which are the dependent variable.

Based on the theoretical background presented so far and from the above three main approaches in the International Relations, the theory of Realism is the one that will be used/adopted for the analysis in the Thesis, since it is the one that can better describe the several phenomena taking place in the international scene while it also "interprets with higher clarity the real economic and political world" (Sklias, 2011: 78).

As per Gilpin "Realism emphasizes the primary importance of the state and the national security" while realism is essentially a political ideology and statism (mercantilism) an economic one (Sklias, 2011: 53).

In the contemporary era where the globalization has affected the relationships between states and countries there is an increasing "economic integration and interdependence among them". In the International Political Economy, the global "socioeconomic activity can only be comprehended by acknowledging the complex interaction between markets and states and domestic decision-making and international relations" (Koutsoukis, Roukanas and Sklias, 2006: 93).

In the next table 2.3, the dimensions of these relationships of state-market and domestic decision-making and international relations are presented under the pillars of Economic and Political aspects:

Table 2.3

The IPE Dimensions

Dimensions	**Political aspect** **(Soft facts)**	**Economic aspect** **(Hard facts)**
<u>State-Market</u> Scholars: Markiw 91997), Williams (1989), Strange (1986)	<u>State</u>: A unit with population, territory, government of national societies. Its scope to protect the national sovereignty.	<u>Market</u>: A mechanism/place where sellers and buyers meet and interact to reach to a balance when exchange goods and/or services. Its scope to break down the state imposed "barriers" and creates a more open economy.

Domestic-International Scholars: Stiglitz (2003), Wallace (2000), Stubbs & Underhill (2000).	Refers to the level of analysis of the aforementioned relationship "state-market". - At Domestic level: Decisions affect taxes, tariffs - At International level: It is used to gain both economic and political benefits through the participation and collaboration.

Source: (Koutsoukis, Roukanas and Sklias, 2006: 91-114).

As it is seen, the political aspect is related to soft facts while the economic aspect is related to hard facts.

2.3 Realism and its versions

Realism is "a world-view which suggests thoughts about it, and which permeates our daily language for making sense of it" and it is "alive in the collective memory and self-understanding of our (i.e. Western) foreign policy elite and public, whether educated or not" (Guzzini, 2003:212).

As per Viotti and Kauppi (2012: 39), "Realism is an image of international relations based on four principal assumptions" which are indicated as following:

a./ States are the principal actors in an anarchical world lacking central legitimate governance.

b./ The state is viewed as a unitary actor.

c./ The state is essentially a rational (or purposive) actor.

d./ Within the hierarchy of issues a state faces, national or international security usually tops the list.

The approach of Realism has two main differentiations (Sklias, 2011):

a./ Machiavelli: He considered that military power is much more important than wealth during a war conflict.

b./ Thucydides and mercantilists: They paid attention to meanings like power and security. Thucydides believed that wealth plays a very important role to enhance military power.

According to Frieden and Lake (2003: 12) “it is the emphasis on power that gives Realism its distinctive approach to international political economy. While economic considerations may often complement power concerns, the former are, in the Realist view, subordinate to the latter”.

There are four main reasons that realism has such a “staying power” as an ideology (Rosenberg, 1994: 31):

a/ Although there is no clear discretion of the term “international”, “the distinctive social form of the modern state have to be addressed theoretically”.

b./ Realism sounds “plausible” because “it articulates commonly held common-sense assumptions about world politics”.

c./ “To the extent that IR remains an American social science the persistence of realism seems assured”.

d./ “It consists in the absence of any well-known alternative conceptualization of the political structure of the global system to the one extrapolated from normative political theory and the behavior of the critics of realism”.

The realists point out that “the development of utopian strategies to end war could not hope to succeed, because they ignored basic laws of human nature and behavior” (Vasquez, 2004: 43). According to Schmidt (1998: 43) “the realist tradition is certainly regarded by an overwhelming majority of scholars to be the definitive tradition in the field of international relations”.

The main characteristics of the Realism can be summarized as following (Sklias, 2011):

- State is the main actor.
- Unbreakable relation between power and wealth.
- Focus on politics and history rather than the economy.
- Power is linked more to Security issues rather than to Economic ones.
- Basic terms that characterize this school of thought are mercantilism, neomercantilism, state, policy of power, economic nationalism.
- There is anarchy in the global system in terms that there are no hierarchical connections among the states.

Considering the way that IR views the world- through states, anarchy, and diplomatic practice- finally depends upon which approach is chosen: realism, liberalism, and constructivism. For realism, the severe reality mean “we will never overcome conflict among sovereign nation states because we will never escape international anarchy” or as per Huntington, “we will never solve the problem of security under anarchy in relation to development among clashing civilizations” (Weber, 2010: 220).

Since there is not one unique global society and “one government of governments”, but anarchy exist in the real, current world today then the work and approach given by several theorist and scholars still remain “scientific firmly”.

Thucydides (c.460 – c.400 BC) was an Athenian historian and general. He wrote the History of the Peloponnesian War recounts the fifth-century BC war between Sparta and Athens until the year 411 BC. Thucydides has been named as the father of "scientific history" by those who accept his claims to have applied “strict standards of impartiality and evidence-gathering and analysis of cause and effect, without reference to intervention by the deities” (Cochrane, 1929: 179).

As per Thucydides (Zagorin, 2006) there will be incidents and cases to happen in the future similar to those he described and wrote about, according to what he called as “human” which means the humanitarian situation (A22). He always tried to view the incidents in relation to the broaden summation or a general truth. What realism means from the angle of Thucydides is his intention to see people, human relationships and the world as they are, without illusions and without any effort to hide the hard truth of things. His history has been recognized as a “classical work of realistic analysis” (Crane, 1998: 4).

In the Peloponnesian War, democratic, naval Athens fought totalitarian, land-based Sparta provided a simple but awesome allegory for our recent times. Thucydides' work “revealed a precedent for our own polarized world, and might, we hoped, provide a guide through the perils of contemporary international affairs” (Connor, 1984: 3).

In his history, it is revealed the fact that the powerful actors supersede the weak ones and that power is superior to ethics and justice among states relations. This is also the reason that contemporary historians like Carr and Morgenthau consider him with a high respect since they believe that he is the founder of political realism and the first analyst with clear view of amoralism of one anarch global system of sovereign states, as the one in ancient Greece during classic era, who understood that the acts of states are driven to achieve power and self-interest (Zagorin, 2006).

It is worth mentioning the incident happened in 1947 when Secretary of US State George Marshall had called attention to the significance of the Peloponnesian War for an understanding of the contemporary world: "I doubt seriously whether a man can think with full wisdom and with deep convictions regarding certain of the basic international issues today who has not at least reviewed in his mind the period of the Peloponnesian War and the Fall of Athens." (Connor, 1984: 3).

The Melian Dialogue of Thucydides is one of the “culminating points of the Histories”. It attracts the reader by “its unsentimental clarity in the analysis of power”. “Its force and appeal derive in large part from its avoidance of the hypocrisies and subterfuges of politics and its enlightened recognition of the importance of the natural processes in which history is grounded”. “The Melians are unable to make the Athenians recognize the advantages of arguments from justice or convention. The Athenians cannot convince the Melians to capitulate. Logos, despite its clarity and argumentative power, fails to avert the violence and destruction of war and is itself narrowed, distorted, and perverted” (Macleod, 1977). In the Appendix A, the Melian Dialogue as it was written by Thucydides in 416 B.C., is given for any researcher to refer to.

It is important to understand how the social sciences have been developed and more particular the Political Realism, which seems to be the dominant scientific discipline in the international relations. Gilpin (2001) in his “Global Political Economy: Understanding the International Economic Order” has seen Political Realism as a more disciplined scientific approach, that it is “ideologically detached”.

The realism describes, interpret and highlights the nature of the problems while at the same time is not “prescriptive”. Realism considers that the decision and prescription should belong to those actors that are involved in the politics and who (should) know the nature and structure of the problems and issues and consequently the appropriate choices and solutions.

Realism believe that the decisions should not be taken by the academics because they are not under any social controls on them. As per Ifestos (2015), any free Political Realist does not even think to express any normative position which is against the independence of the sovereign States of the international system, the international institutions and the international law that support such independence. He considers the realism as a state-centered since it adopts terms as “sovereignty” and “international institutions” which means that it adopts the “collective human ontology and historical diversity of social entities”. Political realism supports the idea that “the sovereignty of each state remains the only anthropological and political means structured grouping of people”, even there might be any kind of deficits.

There were several liberalists like Nye, Keohane, Lake and constructivists/post-Marxists as Wallerstein, Cox et al supported their ideas, but at the end it is the Political Realism theory supported by scholars like Krasner, Gilpin and Strange that succeeded to be the dominant one until today (Ifestos, 2015).

Regarding the theory/approach of Realism, it is further distinguished in different types and the most important are given as following:

- Realism: The classic concept as found in all the literature and theory books. “A perspective on international relations that focuses on the state as unitary and rational actor and on the actions and interactions of states" (Viotti and Kauppi, 2012: 463). A more detailed description is given later in this section.

- Enriched Realism: In contrast with the realism where the economy is considered as a subset of politics, the enriched realism views the economy as complementary to politics. In addition, there variables as global issues, the role of new technologies, the contribution of non-state actors, the union between economy and politics, local and global (Sklias, 2011).
- Neorealism (or concessional realism): Refers to the idea that "concedes the validity of the principal methodological claims of positivist-empiricism about the claim that theories of IR are structurally homomorphic to natural scientific theories" (Spegele, 1996: 15).
- Mixed-Realism.
- Evaluative Political Realism: "It see itself embedded in a tradition of realist thought which accepts a world that contains cultural and national communities with radically different values organized in nation states" (Spegele, 1996: xi).
- Economic Nationalism: It focuses on the primary importance of the state and national security, while realism is essentially a political ideology and mercantilism an economic one. There are two main principles that characterize economic nationalism: the fact that the international system is not governed by any authority (anarchy), while the role that the state plays appears central and sovereign for the world political and economic environment (Roukanas and Diamantis, 2014).

It is interesting to indicate that the economic nationalism has been gone through different phases which are presented in the next figure 2.4:

Figure 2.4

Phases of economic nationalism

Source: (Sklias, 2011).

As per Koutsoukis, Roukanas and Sklias (2006: 113), “the free market is not a global reality” and it is considered that “economic realism dominates the formation of international economic relations” since most of the states thrive for continuous development and growth even in a “world open economy” as it appearing in the last decades.

As per Gofas and Tzifakis (2013: 47-56), the theory of Realism focus more on quantitative and measurable power factors of the countries and correlates fluctuations on the values of these factors with their affect to the international scene. A useful figure is the following 2.5, which is under the same perception as the aforementioned one:

Figure 2.5

Theory of Realism

Central axis
of International Relations
explanatory views

Level of Analysis

1. Macro (international/regional): Neorealism

I. Offensive Realism: States maximize their power. They try to take over regional hygemony.

II. Defensive Realism: States maximize their security. They seek for strategic relationship that mitigates the structural securiy dilemma.

2. Micro (state/individual): Classic Realism

States focus on national parameters and power factors. Internal developments may affect negatively countruy\s choices.

Source: (Gofas and Tzifakis, 2013: 47-56).

At this point, a short description and analysis of these notions are given as following (Gofas and Tzifakis, 2013: 47-56):

<u>1. Neorealism</u>: It is related mostly to the macro level of analysis. It considers that the states are "like-units" and they differentiate themselves only in relation to their position in the international division of power. As "like-units" the states adopt similar targets with the most important to be their survival. One of the famous scholars who supported this theory was Waltz. He is considered by some scholars as a "structural realist", as he has focused on the structure of the international system. Others see him as neorealist, due to the fact that his approach differs to some critical points from that of traditional realists (Waltz, 2011: 23-24).

1I: Offensive Realism: In this theory, the states focus on their survival through their efforts to maximize their power. It mainly studies the big power states and supports the idea that they feel insecure exactly because they hold adequate offensive military capabilities enough to hit their competitors/opponents. Basic theorists of this approach are Mearsheimer, Brzezinski.

1II: Defensive Realism: In this theory, the states adopt such targets that they support their efforts to maximize their security. It believes that the main parameter in the International Relations is "the operation of the mechanism of the balance of power". Basic theorists of this approach are Robert Art and Stephen Walt. They point out the security dilemmas caused by the states' efforts to maximize their power and they suggest caution. They pay main introductory power to the macro level of analysis and they are not so much rejective of the micro level as the offensive realists are.

<u>2. Classic Realism</u>: In this theory, not so much attention is given to the macro level of analysis. Basic theorists of this approach are Carr, Morgenthau, Kennan, Aron. They believe that many local and national factors like national consciousness, culture, and public opinion affect the shape of the national interest and states' choices.

In the Twenty Year's Crisis (1919-1939), Carr considered scholars into two groups of thought: realists and utopians. He was influenced by the "League of Nations", an intergovernmental organization established in 1920 as a result of the Paris Peace Conference that ended the First World War and thus he attacked as "utopians" who thought that a better international structure could be seen around the League. In his opinion, the international order constructed at Versailles was flawed and the League was a hopeless dream that could never do anything practical.

Carr was looking to identity “the rational within the real, rather than impose rationality upon the real” and it is seen to be “the more sophisticated” compared to Morgenthau and a true ‘realist’. The main difference between Carr and Morgenthau is that Morgenthau never recovered a coherent definition of the function of reason. As Carr understands “ideas, purpose and interest form an inseparable triad held together by reason that acts as the locus of action and reason engenders understanding via experience, conditioning interests and desires” (Evans, 1975: 77-79).

Morgenthau’s view about political realism can be see through the below principles (Morgenthau and Thompson, 1993), (Morgenthau, 2005):

- Realism considers that both politics and society are governed by objective laws that have their origin back in human nature. Thus, in order to improve society, it is a prerequisite to accept the governmental laws ruling the society.
- It is more than necessary that realism needs to consider the concept of interest defined in terms of power. It sets politics as an autonomous area of action separate from other areas like economics, ethics and religion.
- Realism believes that its key concept of interest defined as power is an objective category which is universally valid, but it does not grant it with a meaning that is same for everyone.
- Realism is aware both of the moral significance of political action and also of the ineluctable tension between the moral command and the requirements of successful political action.
- Even if an individual keeps a moral right to sacrifice himself in defense of a moral principle, however the state has no right to let its moral right disapprobation of the infringement of liberty.
- Finally, realism does not identify the moral aspirations of a particular nation with the moral laws the govern the universe.

Aron promoted a “morality of wisdom' which gives a central place to the defense of values alongside considerations of power”. He provides a view of survival that focus on the significance of “shared values for the existence of political communities”, and thus consequently the need to uphold them even though ethical perfection cannot be achieved in the political sphere (Coziete, 2008).

Kennan in his famous “Long Telegram” from Moscow in February 1946 and through an anonymous article in Foreign Affairs in 1947 laid out a new way among “the extremes of war and appeasement—containment”. He considered Stalin as more patient and methodic than Hitler. He believed that if the USA could remain patient and address Soviet’s expansionism without war or appeasement over a sufficiently long period of time then the Russians would change their priorities. Finally, he proposed to develop a coherent strategy on non-provocative resistance which would cause a settlement with the Soviet Union or even to the break-up of the Soviet Union (Gaddis, 2011).

All of these realists succeeded to confront with the “ideologies and trends” under development at during their times that they were trying to be established in the international relations area

An expression of classic realism is also seen the “neoclassic realism” that confronts the assumption that al the states are like-units and Schweller is one of the theorists who supports this idea and he believes that the local factors co-shape the foreign affairs policy and affect final choice of the state.

In the next table 2.4, a comparison between the traditional realism and neorealism is given:

Table 2.4

Comparison between Traditional Realism and Neorealism

Parameters/Points	Traditional Realists	Neorealists
Emphasis to History and historical incidents	Use of empirical historical approach.	Use of modern social sciences.
Approach in Research	Induction approach.	Deduction approach.

The issue of Power	Struggle for power is not only a mean of survival; it is also an aim.	Struggle for power is a mean of survival, not an end in itself.
International System vs human nature	Research starts from the examination and study of human nature.	Focus on the analysis of the International System.

Source: (Waltz, 2011: 25-31).

Based on the above analysis, it is seen that the theory/approach of Neorealism (1.) specifically he Defensive (II) is adopted for the purpose of this thesis. It is considered that nation-state's efforts to maximize its security are more important and continuous compared to those actions assisting the increase of power.

2.4 Dissertations

There can be a systematic procedure to study complex public policy choices which were developed during the previous years and it is usually called policy analysis. Its main scope is to help any policymaker to select a convenient bunch of action by clarifying the problem, addressing any alternative solutions and displaying the exchanges among their consequences.

In most real-world policy situations, there are many possible alternatives, many uncertainties, many stakeholders and many consequences of interest. In addition, there is not only one decision maker and little chance of obtaining agreement on a single set of preferences among the consequences. Thus, there is no way to identify an optimal solution.

On the contrary, policy analysis uses a variety of tools to develop relevant information and propose it to the stakeholders that participate in the policymaking process in a way that assists them to take a decision. It is a problem-oriented approach that does not presume a model structure for assessing the consequences of a policy or ranking the alternatives (Walker, 2000).

One of the main challenges facing in social science studies and research is the path forward from "casual theories to scientific knowledge" and a critical factor for the success of this process is to be able to view and consider the external world through the lens of "models" where the areas of study and interest are represented as "variables" that are connected with the usage of "theories" (Kellstedt and Whitten, 2013: 1).

There are almost eight types of dissertation in the political sciences, each one for a different scope. In the next table 2.5 a short summary of these types of dissertation is given:

Table 2.5

Types of dissertation in political sciences

Type of dissertation	**Scope**
Theory-proposing	It advances a new hypothesis and then a deductive agreement from this hypothesis is derived.
Theory-testing	It uses empirical evidence to evaluate existing theory. The evidence can take place through a large-n analysis of a case study.
Literature-assessing	It summarizes and evaluates existing theoretical and empirical literature on the subject.
Policy evaluative	It evaluates current or future public policies.
Historical explanatory (rare)	It uses theory to explain the pattern of historical cases.
Historical evaluative (rare)	It evaluates the factual and theoretical beliefs.
Predictive	It applies theories to extrapolate the future world from current events.
Descriptive	It can be either contemporary or historical.

Source: (Van Evera, 1997: 89-95).

In order to assess/test the theory, there are several different methods that can be adopted and used. In the next table 2.6, a general description of these methods is given so it can be also used for the scope of this study

Table 2.6

Methods to assess a theory in social sciences

<table>
<tr><th colspan="2">If they are made inductively</th><th>If they are made by deduction</th></tr>
<tr><td colspan="2"><u>Experimentation assessment of theory</u>:

▪ Based on the theory, predictions are made
▪ Expose some of them to a stimulus
▪ Check the results, if they are in line with predictions</td><td rowspan="3"><u>Deductive assessment of theory</u>:

To assess a theory “a gives b”, need to:

▪ Check if a,b are examples of more general phenomena A,B
▪ If these A, B are already linked with a law/relationship [i.e. “A gives B”].</td></tr>
<tr><td rowspan="2"><u>Observation assessment of theory</u>:

▪ Based on the theory, predictions are made
▪ Do not expose them to a stimulus
▪ Check the observed data, if they are in line with predictions</td><td><u>Large-n (else statistical) analysis</u>: They are more effective in electoral politics where large numbers of cases are well recorded.</td></tr>
<tr><td><u>Case study analysis</u>: a small number of cases are reviewed in detail to justify if events happened in the way that had been predicted.</td></tr>
</table>

Source: (Van Evera, 1997).

It is a usual practice during the research to use predictions to structure tests for hypotheses; these predictions frame phenomena where the independent variable works/cause provided that the hypothesis works. Such phenomena enclose observable areas of the dependent variable or intervening variables. This means that the difference between hypotheses and predictions is not due to their nature but the application that they are used for. The experiments taken place in social sciences are very rare feasible and thus the main method to assess the theory is usually the observation. Finally, large-n methods do not permit so much strong tests as case studies do; case studies are only few and consequently are recorded in more depth (Van Evera, 1997: 28-30).

In general, case studies serve five types of purpose: test a theory, build a new theory, identify previous/existing conditions, and explain cases of internal significance (Van Evera, 1997: 67-68).

Case studies usually offer two strong methods to manage the effect of omitted variables, which can be summarized as following (Van Evera, 1997: 49-55):

a. There are tests of predictions of within-case variances.
b. When cases for study that are selected are with non-ordinary values on the study variable.

Based on the combination of the certainty and uniqueness of the prediction, there are four types of assessment/tests that can be seen in a matrix figure 2.6 as following:

Figure 2.6

Types of assessment/tests

		Low	**High**
Uniqueness	**High**	**Smoking-gun**	**Doubly-decisive**
	Low	**Straw-in-the-wind**	**Hoop**

Certainty

Source: (based on Van Evera, 1997).

More specific:

(a) Straw-in-the-wind assessment/test: It is the most common type of tests and that is why there are probabilistic predictions being used.
(b) Hoop assessment/test: In this case, the result is a decisive negative test.
(c) Smoking-gun assessment/test: In this case, the result is a decisive positive test.
(d) Doubly-decisive assessment/test: It is the rarest type of tests, while they can provide the most information.

Using a case study there are three types to test a theory and they are indicated in summary in the next table 2.7:

Table 2.7

Methods to assess a theory in social sciences through a Case Study

Methods	**Types**	**Characteristics**	**Use of comparative observations across cases to assess the theory**	**Use of observations within cases to assess the theory**
Controlled comparison	Type of difference: choice of cases with similar general characteristics and different values on the study variable (the variable whose causes or effects we look to establish). Type of agreement: choice of cases with	The most common type of case study in social sciences.	√	-

	different general characteristics and similar values on the study variable			
Congruence procedures	Type I: comparison to typical values	It works better if the chosen cases are of extreme values of SV	√	-
	Type II: Multiple within case comparison	It works better in cases where (i) we can collect many observations of values of variables (IV and DV) and/or (b) these values of the variables change rapidly over time or across space within the case.	-	√
Process tracing		Checking the intermediate steps/events of the decision-making process that the initial independent variable cause effect(s) to the dependent variable	-	√

Source: (Van Evera, 1997: 55-67).

In an assessment of a case study method, three steps need to be followed (Van Evera, 1997: 56):

(a) state the theory.
(b) state expectations regarding what we should observe in the case if the theory is valid and
(c) explore the case for congruence or incongruity between expectation and observation.

Taking into account the aforementioned type I of the Congruence procedure, we may consider it for the examined cases of both Cyprus and Israel where the independent variable of ES is considered to be of extremely high importance nowadays especially after the recent discoveries of HxCy in the eastern Mediterranean region for these countries. It is the theory that supports to choose this method/type for the assessment of the theory when cases with extreme (very high or very low) values of the standard variable are selected (Van Evera, 1997: 58-60).

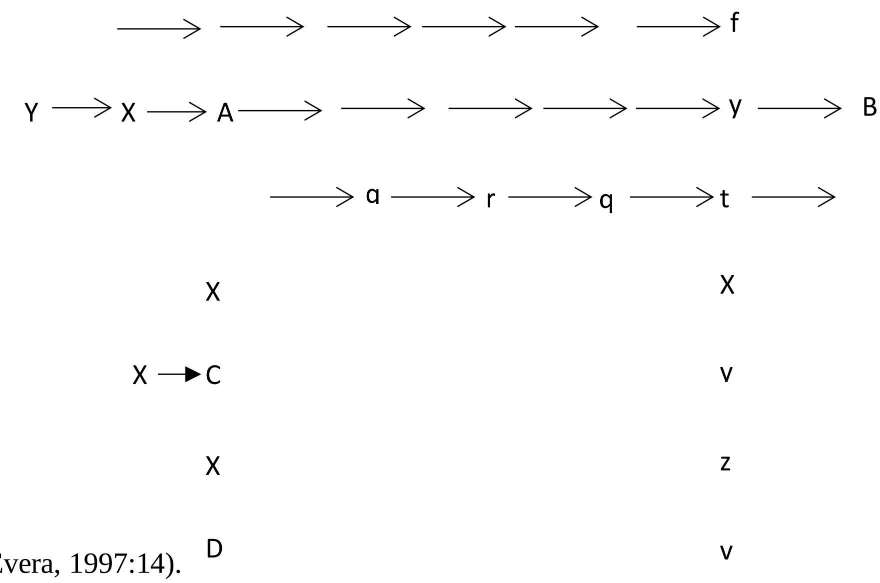
Referring to the type II of the Congruence procedure, the researcher collects a number of pair observations of values of both the independent and dependent variables all over a range of circumstances with the case and then the researcher tests these values in relation to the predictions of the hypothesis and if they are similarly correlated then the test passes. The type II of the Congruence procedure can be seen close to the large-n analysis in case the number of the observations becomes large. In general, it is seen that case studies to be hybrids of the Congruence type I and type II (Van Evera, 1997: 61-63).

Finally, in the process tracing method, the predictions are often unique since no other theories predict the same event which makes this method to be considered as providing "smoking-guns" tests. For the purpose of testing a theory, which by nature makes predictions of the result of the variance on the independent one, it is possible to select "cases with large within-case variance of the values of the independent variance" (Van Evera, 1997: 70-71).

As per Van Evera (1997: 67), case studies applied at the social sciences are not so much decisive as at the hard sciences but this is not due to any weakness of the case studies as a method but due to the "messy nature of social science data and the complexity of social phenomena". In general, there can be more ways of causation between causal and caused variables. An example where two chains of causation that relates variables A and B so a three-chain theory is possible to be derived:

Figure 2.7

Chain-theory example



Source: (Van Evera, 1997:14).

It is important to mention that “a theory that cannot be arrow-diagrammed is not a theory and needs reframing to become a theory” Van Evera (1997: 15). There are several criteria that a theory can be proven to be a good one, such as Van Evera (1997: 17-21):

(a) It has a large explanatory power or else that the theory’s independent variable causes and affects a large scale of phenomena under a large scale of conditions.
(b) It is simple and mean.
(c) It is satisfying our curiosity and thus explanatory.
(d) It is clearly framed (meaning that we need to find/specify the intervening variables k and l) which allows test and application.
(e) Exceptions need to be stated; otherwise the theory might not be well framed.
(f) It explains important phenomena and “questions that matters to the wider world”.
(g) It has prescriptive welfare – which can be reached by identifying dangers that could be avoided- and it can finally produce “useful policy recommendations”.

Trying to design and structure a theory is not always a well-defined process but it relies also a lot on the researcher and the case/circumstances. As per Shively (1990: 163-66), one can probably create a theory by induction, deduction, and borrowing theories from other fields.

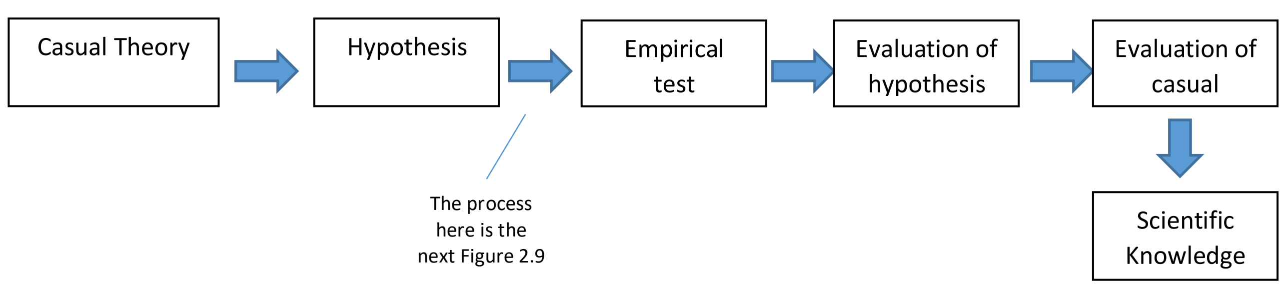
It is important to state that "foreign policy disasters often happen because policymakers apply valid theories to inappropriate circumstances". In general, there are nine aids to theory-making. In our case, we can assume that the examined theory can be seen as coming from the below stated options (Van Evera, 1997: 20-27):

- To study poorly explained cases by the current theory, "unknown causes must explain their outcome" and the effort is to understand and explain them while studying the case.
- Large-n data is also possible to be studies to find the relationship that connects the variables. The drawback of this approach is exactly that a "new large-n data set is usually hard to assemble" so it is better to stick to "existing data sets" and thus it is advisable to "explore theories that use variables that others have already chosen to code".

A typical roadmap to translate a casual theory into scientific knowledge is given in the diagrammatic flow chart:

Figure 2.8

Roadmap to scientific knowledge



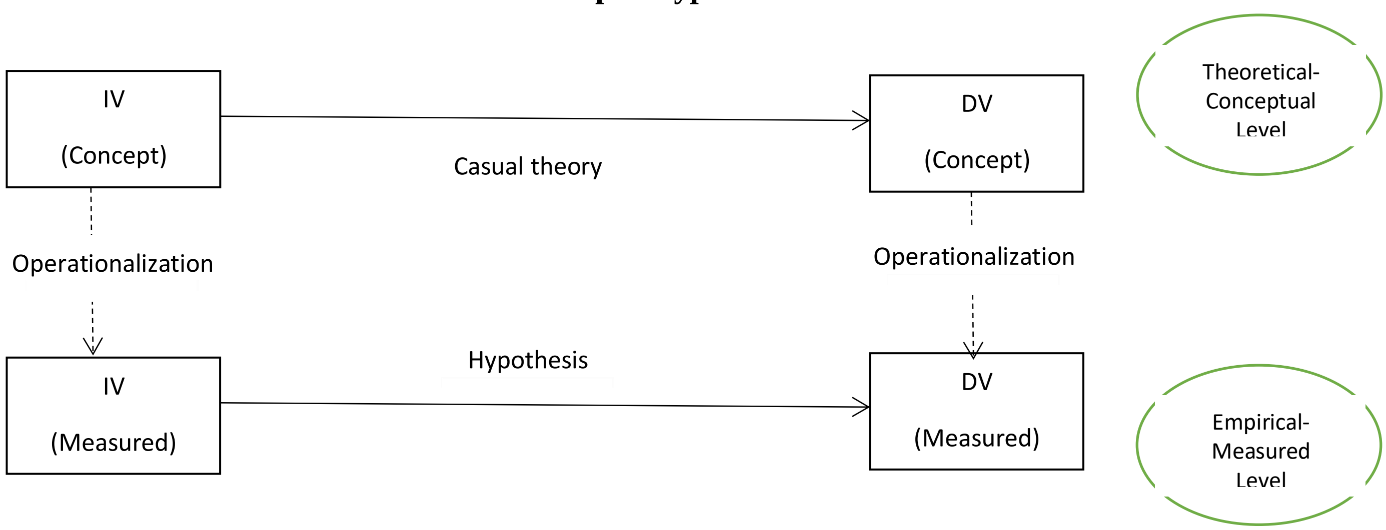
Source: (Kellstedt and Whitten, 2013: 3-4).

A casual theory is usually arising as a "tentative conjecture" of the causes of phenomena that attract out attention and curiosity. Then, it is required to assess/test the theory and this takes place with the hypothesis which is a "theory-based statement about a relationship that we expect to observe". At this point it is very useful to note that for every hypothesis that is formed, there is also a "null hypothesis" that is also a "theory-based statement" which is linked to what we observe in case there is no relationship (null) between the examined variables (ID and DV). Data collection through empirical tests is followed, since they are necessary for the evaluation of the hypothesis – it is called "hypothesis testing" – in order to realize and prove if the collected data support their hypothesis of the "corresponding null hypothesis". Finally, in case the hypothesis passes the assessment then it becomes the prevailing/proved and thus consequently the examined theory the same (Kellstedt and Whitten, 2013: 4).

A useful description in which is presented the path from theory to hypothesis is given in the next figure 2.9:

Figure 2.9

Roadmap to hypothesis



Source: (Kellstedt and Whitten, 2013: 9).

The above step from the theoretical-conceptual level to the empirical-measured level can take place either following cross-sectional design or time-series design. In the cross-sectional design we focus on variation across spatial units at a single time unit; in International Relations, the spatial unit is often the nation state (Kellstedt and Whitten, 2013: 84-85).

Regarding the study of the International Political Economy, it can be considered under the same view/angle as the economics which means that there are not frequently seen “measurement obstacles” (Kellstedt and Whitten, 2013: 96-97).

2.5 Human, Socio-economic and cultural impacts

As per the Brundtland Commission, sustainable development deals with achieving “the needs of the present without compromising the ability of future generations to meet their own needs”. This statement had been agreed at the Rio Conference in 1993 and after that there was“a pressure from all parts of our society to pursue sound environmental management, or better, integrated health, safety and environmental management in all activities, especially industrial ones” (De Bie, 1996).

According to Viser and Larderel (1997: 11), the oil and gas activities related to Exploration and Production (E&P) usually cause economic, social and cultural changes to the local communities. In the next table 2.8, a summary of such changes is presented:

Table 2.8

Human, Socio-economic and Cultural Impacts

	Key Impacts in local communities due to E&P by Oil and Gas industry
a	Land-use patterns either as a primary or a secondary effect
b	Local population levels

c	Socio-economic systems
d	Socio-cultural systems
e	Availability and Access to goods and services
f	Planning Strategies
g	Aesthetics
h	Transportation systems
i	Conflicts between stakeholders

Sources: (a-h: Viser and Larderel, 1997), (h: Mariano, La Rovere, 2014), (i: Celestine, 2003).

A short analysis of each of the aforementioned key impacts is given as following. More specifically (Viser and Larderel, 1997):

a./ Land-use patterns: Such land-use patterns are agriculture, fishing, hunting, lumbering, etc. There might be primary effect like the case of land-take and exclusion or a secondary effect like new access routes that will cause “unplanned settlement and exploitation of natural resources”.

b./ Local population levels: There are cases in which local population is forced to leave their places and migrate elsewhere as a labor force in order to find a job for living and “in-migration of a remote population” looking for new opportunities.

c./ Socio-economic systems: O&G projects bring new job opportunities and salaries to the employees, so there are income differences, inflation and unequality in the local societies since local people do not have equal opportunities to find a job and furtrhermore workers are not paid the same for several reasons (skills, performance, networking, etc).

d./ Socio-cultural systems: These are social structures, organization and cultural heritage, practice and beliefs, effects on the natural resources, rights of access, changes in values which are usually influenced by the foreigners.

e./ Availability and Access to goods and services: Such goods and services are normally accommodation facilities, health services, water and electricity supplies, waste and sewage disposals and even consumer goods that have been appeared in the local community-area.

f./ Planning Strategies: There are tensions and conflicts coming up for issues related to tourism and historical-cultural resources, natural resource use, etc.

g./ Aesthetics: E&P activities usually brings issues related to the noise levels, so local communities may be affected and having problems with the daily life.

h./ Transportation systems: Such systems are related to road, sea and air infrastructure due to the increase of the business of the O&G companies in the region. They may cause changes in local traffic due to truck circulation (see dangerous cargos) and for this reason the access to main routes and their conditions need to be studied during the project phase and thus to propose those cases that eliminate dangers and risks for accidents (Mariano, La Rovere, 2014).

i./ Conflicts between stakeholders: There have been many disputes and conflicts between local communities and the Oil Companies which have caused delays in the project phase and later on during the production. Host communities are seen to request support from the companies to cover their local needs in order to balance the effect which is caused due to the oil exploration and exploitation. In addition, there have been several cases where "bitter and bloody conflicts between elite groups and between youth organizations on one hand, between the urban resident elite and the village community resident on the other scale" (Celestine, 2003).

It is often seen that the economy give priority in policies, while the environment is considered separately from human societies. However, as per the Sustainable development theory, the above subjects are “interconnected, with the economy dependent on society and the environment while human existence and society are dependent on, and within the environment” (Giddings, Hopwood and O’Brien, 2002).

As per Consiglio et al (2006), social impacts of O&G activities can be both positive or negative. They claim that negative impacts such as “resource use and the movement of people” can be balanced by positive impacts such as “the promotion of employment, socio-economic development and improvements in infrastructure”.

There have been arisen differences between the state and stakeholder communities regarding the legitimacy of the land/area and the natural resources in it. The state considers that “it owns the natural resources” and thus they are authorized to decide the path of the best possible exploration option that can contribute to the country’s economy, while at the same time the local communities “often attach more than simply economic definitions to land” (Akpan, 2005: 134-135).

2.6 Multiple criteria decision making

In a relationship that includes two parameters, there can be a function that describes it and connects these parameters. One of these parameters may be the independent variable (IV), which can take a value from a range of values. Thus, it is important to determine the admissible values ($x < x_i$).

In the studied case, the energy security and the national security are the two parameters under examination and so their relationship/causality is; thus, the aim is to determine the function ***f*** that connects and links them, which describes their activity and their interaction.

Of course, each of these main parameters (or else variables) may be consisted of other sub-parameters (or else sub-variables) and it is the scope of the study to identify and define them and then to select them and determine their weight on the main variable since it is not expected that all of these sub-variables affect with the same weight the main, but with a different percentage.

It is important to mention that in political sciences and thus in the examined study, the relationship between such two variables cannot be a deterministic, which means the causality exists (or not) with certainty. It has to be a "probabilistic relationship" which can be that if changes happen to the independent variable (IV) they will be linked with changes in the "probability" of the dependent variable (DV) occurring and those "probabilities are not certainties" (Kellstedt and Whitten, 2013: 53).

During the process to determine the relationship (function ***f***) between the two variables, some of these sub-parameters may be unknown some others may be difficult or impossible to be quantified. The relationship/causality between the variables is represented graphically (in a figure) by the usage of arrows.

There can be a mixed-integer approach that engages generating units that can be shut down or operated between minimum and maximum output levels within a specific time demand block. The mixed-integer problem has the predisposition to generate many sub-problems during the computation and thus a more careful selection of the parameters may result to deal better with any challenges occurred (Wilson, 2015).

Uncertainty is a concept which is related to the quantification of the info and it is mostly caused from imprecise data. The problem is not so much due to meanings used but due to the perception about the verbal definitions of quantitative magnitudes. The parameters of a multicriteria concept/problem are:

- Qualitative information.
- Imperfect knowledge of the relative parameters of the concept/problem.
- Inability of precise value of some of the parameters.

Multiple Criteria Decision Making (MCDM) approaches are well suited for the study of several decision-making problems. The performance of the examined variables ES and NS are generally multidimensional, since they are affected by a variety of factors of different nature, like:

- Financial factors indicating the financial value and impact.
- Strategic factors of qualitative nature (stakeholders, NOCs, IOCs, organization, management, market trend, country's policies, etc.) and
- Economic factors that define the economic and business environment.

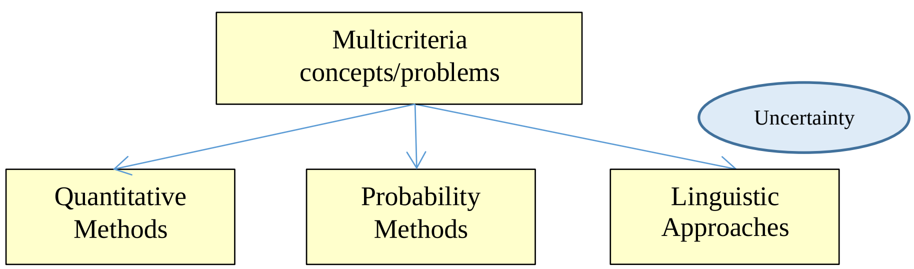
The aggregation of such factors under a global perspective is a subjective process that depends on the decision maker's values and judgement policy (Xidonas, Mavrotas and Psarras, 2009).

In multicriteria concepts/problems, it is seen:

- A set of options A={a_1, a_2, …, an}.
- A set of evaluation criteria B={b_1, b2, …, bn}.
- A set of yields C_{ij} where C_{ij}: (a_i, b_j).

Figure 2.10

Multicriteria concepts/problems approach

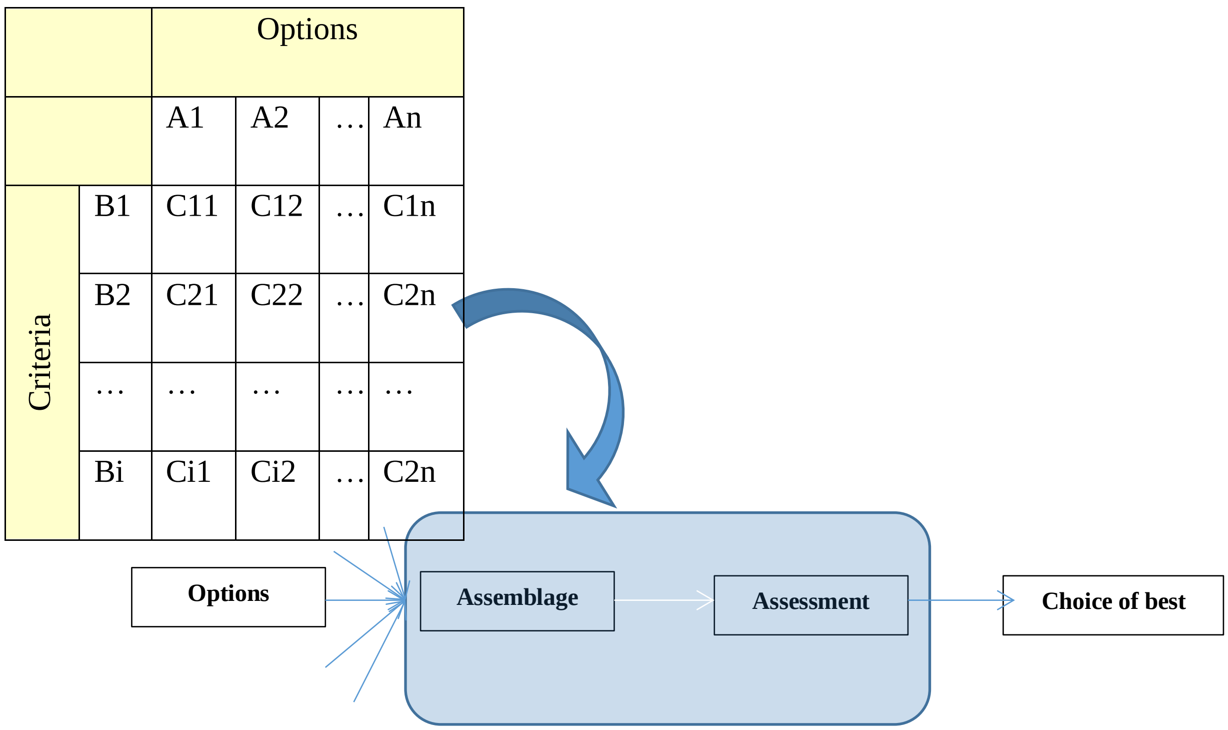


Source: (Xidonas, Mavrotas and Psarras, 2009).

In the figure 2.11, it seen how incoming uncertainties can act as input to a model of analysis:

Figure 2.11

Incoming uncertainties as input to a model of analysis



Source: (Xidonas, Mavrotas and Psarras, 2009).

The degree of participation of a sub-variable into the main variable may be uncertain or not possible to be quantified for many reasons due to the:

- Nature of the sub-variable, which may be a purely qualitative dimension.
- Complexity of the sub-variable.
- External environment that continuously changes them, so they cannot be stabilized.
- Other.

It is also important to note that a sentence, relationship and even function may have a degree of truth and cannot be absolute true of false (model of 0-1), so there might also other unknown variables or factors that should be taken into consideration in order to have an appropriate framework to study and thus to achieve the best possible results.

The linguistic variables differ from the arithmetic because their values are not numbers but words or phrases (Zadeh, 1975).

2.7 Conclusions

Realism is “a world-view which suggests thoughts about it, and which permeates our daily language for making sense of it” and it is “alive in the collective memory and self-understanding of our (i.e. Western) foreign policy elite and public, whether educated or not” (Guzzini, 2003:212).

The theory of Realism is not the exception of the rule; like other theories, it simplifies reality and thus there is always a probability to ignore – intentionally or not - some other factors that might play an important role in decision-making. However, such limitations apply to social theories (Mearsheimer, 2001). At the end, it is considered that the limitations exist in the case that Realism is applied as the theoretical substrate are much less than those of other theories. Realism provides a comprehensive and scientific view to the critical aspects of international politics and specifically issues related to the behavior of a state; thus, it is considered the most suitable theory for power and security issues since they are of vital interest for the survival of a sovereign state.

CHAPTER 3

LITERATURE REVIEW

3.1 General

This chapter will use the insights from the disciplines of energy, security and International Relations to examine the correlation between national security and energy security of a state under the broaden concept of International Political Economy (IPE). The state is regarded as the main - but not the only one- actor in international politics, which is one the basic principles of the theory of realism. As already analyzed in the previous chapter of this Thesis, realism is seen as the dominant theory that focuses on high politics and security issues and it was that theory that was adopted as the prism for the analysis that took place.

A summary of the existing literature concerning the notion of security and then those of both National Security (NS) and Energy Security (ES) is presented in this chapter. They will be studied under the umbrella of International Political Economy (IPE). It is necessary to understand that the security of global environment is continuously changing especially from the beginning of the new century; there are new factors and parameters of the security concept that are included in the contemporary challenges that security confronts (Krishna-Hensel, 2012:1).

3.2 The Global Environment

3.2.1 Historical and Global Data

In human history there are several periods that can be categorized with the use of different parameters. According to Cook (1971:315), considering the changes of energy types, then six separate periods in human history can be identified which are generally named as follows: primitive, hunting, primitive agricultural, advanced agricultural, industrial, technological).

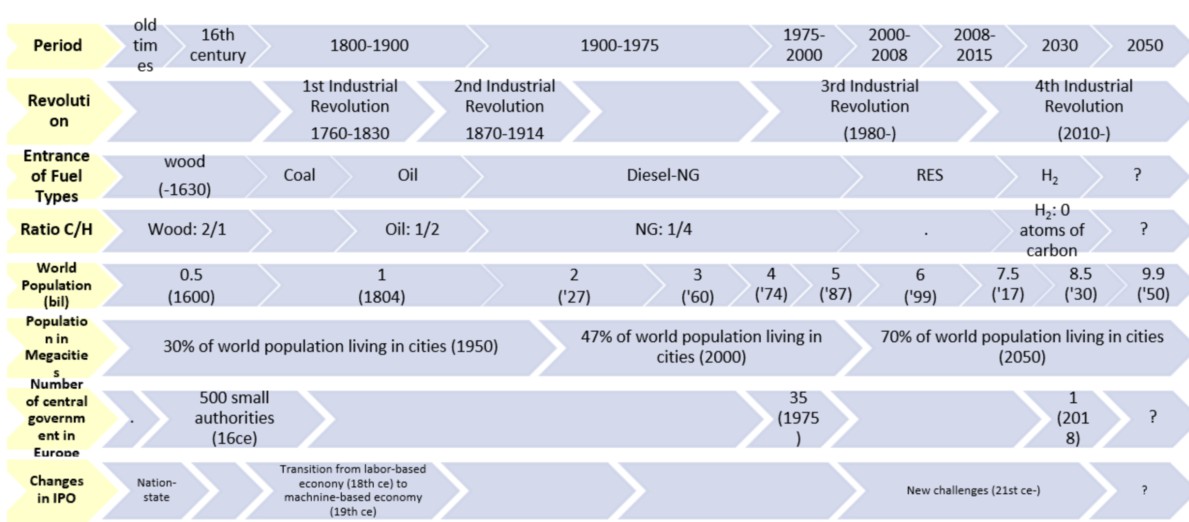
In this study, the below mentioned parameters are chosen in order to represent main historical periods and milestones related to global growth and other energy related topics. More specifically:

- Beginning of the industrial revolution.
- Use of fuel type.
- Ratio between Carbon (C) and Hydrogen (H) in the fuel used (C/H).
- World population.
- Population living in cities.
- Number of central governmental authorities in a region.

There can be numerous different parameters to choose and use and it can be an endless process that may include new data available every time, However, the above parameters are considered representative enough to depict the evolution and changes that took place from the early centuries of the known human life until today and the horizon of 2050. The next figure 3.1 represents such an approach and it may provide useful information for further analysis and reference.

Figure 3.1

Historical evolution



Source: (Author, 2018), (UN, 2018), (Britannica, 2018), (Economist,2012) (National Geographic, 2014), (Effoduch, 2016).

As per the aforementioned figure, the energy transitions that took place have resulted in the different industrial revolutions. From wood to coal, then to oil and diesel, followed by natural gas and then recently to more renewable energy sources, human history has undergone severe changes that consequently affected the shape of the world we know today. It is very helpful and important to understand the several different transition periods since it will give us a tool to study the details of the changes and identify the critical success factors in each case. Since the study focuses on security and particularly national and energy, the information presented in the figure was selected to relate to these examined factors.

The growth and development in most of the cases/parameters presented in this figure have been tremendous in a short period of time during the last decades, when compared to the total period of human existence. As per outlook until 2040, it is expected that this growth will continue with a numerical progress and not just a linear one.

Focusing on the last period at the beginning of twentieth century, a very important consideration about the changes between various types of fuel can be examined. All such changes (from to coal and then to oil) "led to significant changes in the global political economy" (Bilgin, 2012: 32). It was seen practical to represent them in a linear, chronical way as in the next figure, where different time periods are indicated for each one of major and predominated fuels used.

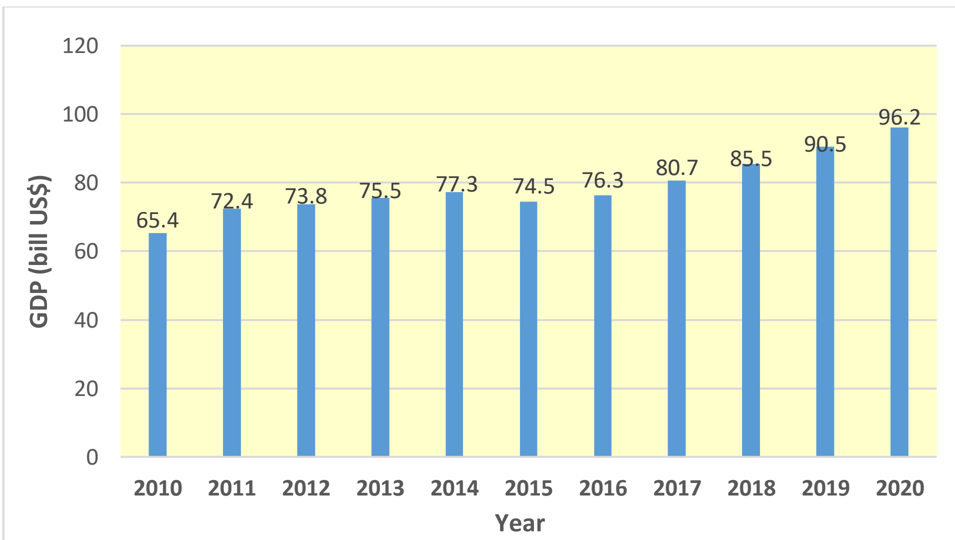
Kern and Markard (2016:291-292) claim that the causes and effects of the changes and transitions happened in the past and previous periods are not expected to remain the same in the near future. More specifically, the initial changes in fuel from wood to coal and even to oil were probably linked to and effected by the need to provide better services to society; now, the latest changes may be "purposive" and they can be seen as "driven, aiming others, by concerns about greenhouse gas emissions, nuclear risks, energy prices or energy import dependence".

An important parameter for a state is the Gross Domestic Product (GDP). GDP is defined as "total market value of the goods and services produced by a country's economy during a specified period of time. It includes all final goods and services: those that are produced by the economic agents located in that country regardless of their ownership and that are not resold in any form. It is used throughout the world as the main measure of output and economic activity" (Britannica, 2018).

A change in the GDP either of a country or on a global scale can provide useful information about the macro environment and indications about the expected trends to follow. In the following figure 3.2, the evolution of global GDP is presented, where it can be seen that it will increase by around 50% within a decade (2010-2020):

Figure 3.2

Global GDP growth (2010-2020)



Source: (Statista, 2015).

According to the secretary general of the Organization of Petroleum Exporting Countries (OPEC), there have been serious changes happening globally in the energy industry since the establishment of OPEC in 1960. Even though many areas and parameters of energy are not the same any more, energy security still remains at the same level of importance.

OPEC's World Oil Outlook 2014 estimates that oil-related investment requirements will approach $10 trillion (in 2013 dollars) between 2014 and 2040. The security of supply and security of demand cannot be decoupled and a comprehensive examination of energy security is needed over the short-, medium- and long-term timescales (Sklias, Roukanas and Flouros, 2016).

According to the annual outlook report of British Petroleum (BP, 2015), several important indications related to the global energy issues are given as follows:

- There will be a "regional imbalance" (production – consumption) in every geographical region until 2040, which is expected to have an impact on energy trade and consequently the energy security of the regions and countries.

- NA becomes a net exporter from this year (2016/17), while Asian countries will continue to grow in terms of energy needs "accounting for around 70% of inter-regional net imports by 2035".

- Middle East will continue to be the largest energy exporter even if its share will be reduced "from 46% in 2013 to 36% in 2035".

World energy consumption rises a total of 28% between 2015 and 2040. More specifically, energy consumption during this period is expected to be:

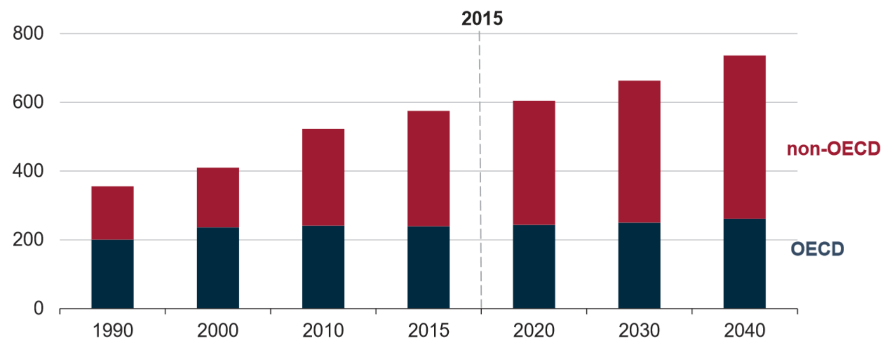
- in OECD[4] countries: increased by 9% and
- in non-OECD countries: increased by 41%.

In the next figure 3.3, the world energy consumption during a five decades period, 1990 to 2040, is presented graphically with both OECD and non-OCED countries. Again, the energy consumption in non-OECD countries is increasing much more faster than that in OECD countries.

[4] The 34 OECD member countries are: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States (OECD, 2018).

Figure 3.3

World Energy consumption (quadrillion Btu)

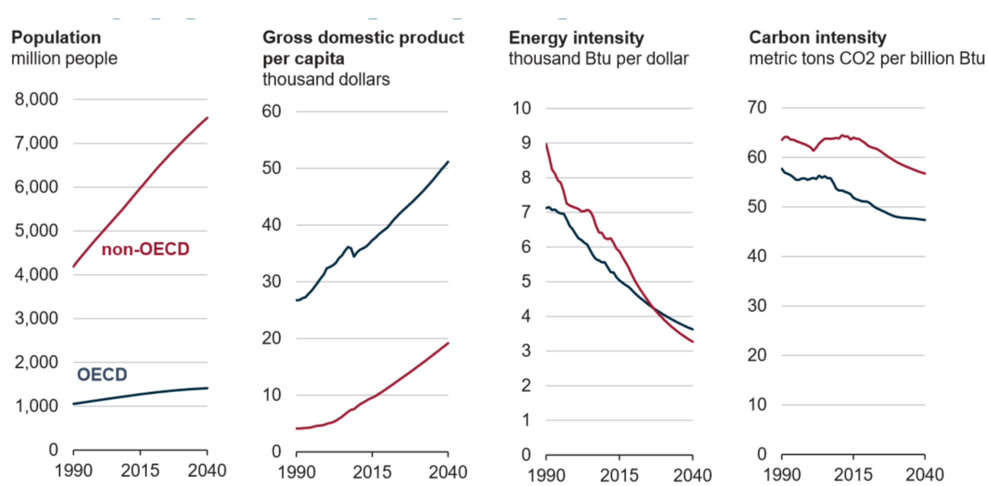


Source: (EIA, 2018).

As can be seen, the greatest increase in energy demand is expected to be caused by non-OECD countries, due to economic growth, access to marketed energy, and high growth rates in populations. All these factors cause higher energy demand.

Figure 3.4

World Energy projections in 2040



Source: (EIA, 2018).

Even though the world population and per capita income are project to continue increase until 2040, the consequently increase in energy demand which is inevitable can be balanced by some critical factors like the amount of energy used per unit of economic growth (energy intensity)[5] has declined steadily for many years on a global scale.

In both OECD and non-OECD countries, reduction in energy intensity is expected to be marked since many of the larger economies started to change their production from high energy-intensive to less energy-intensive industries and services.

There would be a high growth in non-OPEC countries and particular in the US, which has been related already to the decrease in oil prices from levels of US$100 (Brent Oil) from the third quarter of 2014. Prices went down to levels of US$50 in the last quarter of 2015 and even further more down to the level of US$40 per barrel. During 2017 and 2018 prices have been stabilized at the levels of US$50-60 per barrel. In the next table, the proven oil reserves are shown at two different periods over ten years' time; both for the Organization for Economic Cooperation and Development (OECD) and non-OECD countries, as well as for OPEC and non-OPEC members.

Table 3.1

Proven oil reserves (in thousand million barrels)

	end 1994	**end 2014**	**Δ (%)**
OECD	148.4	248.6	68%
non-OECD	969.5	1451.5	50%
OPEC	778.9	1216.5	56%
non-OPEC	216	341.7	58%

Source: (BP, 2015).

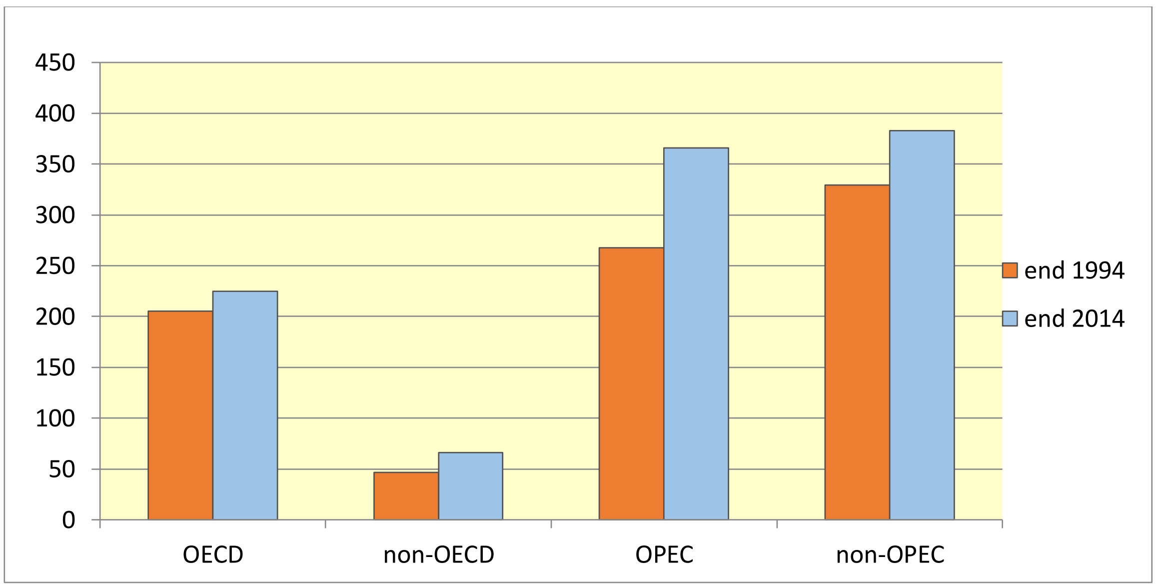
[5] energy consumed per dollar of GDP.

The countries that hold most of the proven oil reserves are not OECD members and proven reserves increased at almost the same rate among OPEC and non-OPEC countries between 1994 and 2014.

In the following figure 3.5, the oil production and consumption of different groups of countries are represented graphically. For the non-OECD countries, the increase was more and production changed by 42%, followed by OPEC countries, which had an increase of 37% during the same period.

Figure 3.5

Oil production in during 1994–2014 (MMtpa)

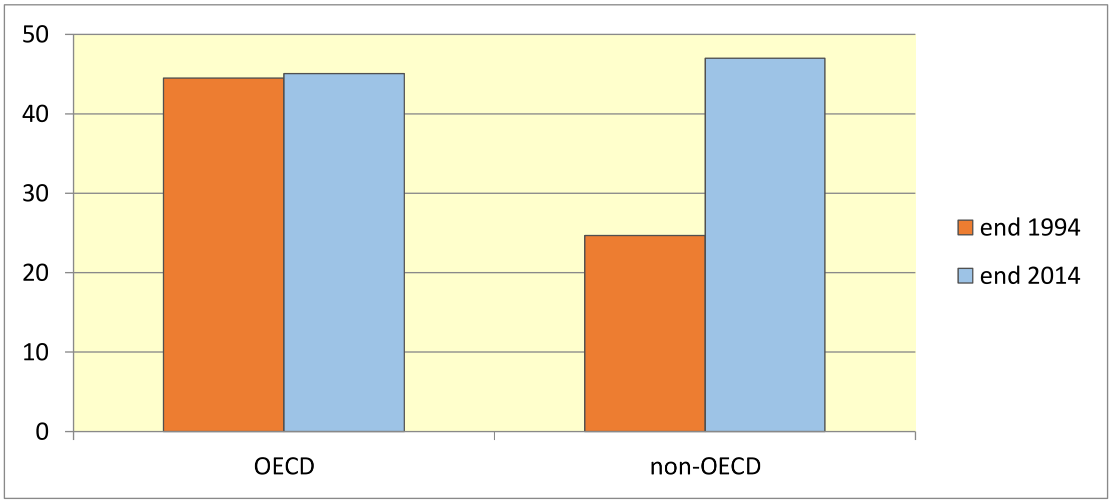


Source: (BP, 2015).

According to the figure 3.6, non-OECD countries almost doubled their oil consumption, whereas consumption remained relatively stable in OECD countries during the same period of last twenty years. This is also supported by the fact that developing countries are growing faster and comprise of bigger part of the global population, where most of the population increase is also taking place.

Figure 3.6

Oil consumption in OECD/non-OECD countries, 1994-2014 (in MMtpa)



Source: (BP, 2015).

Global fundamentals are expected to continue to shape long-term prices, since short/medium-term volatility has returned. The highest growth is to be seen in the developing countries of Asia, the Middle East and Latin America; but, because of the competitive advantages caused by the development in shale gas, growth will be strong in North America, whereas Europe and Japan are expected to lag behind (Blake, 2014).

In the next table 3.2, the regional shares of both oil production and consumption is provided. North America have produced more than what was consumed during the last two decades; this was the opposite of what happened in the Asia-Pacific region, where consumption was increased much more than production for the same period. Europe and Eurasia the only regions where a decline in consumption rates noticed since all the other regions exhibit increases, from 10% in the case of North America to around 100% in the case of the Middle East.

Table 3.2

Regional oil production and consumption

	Oil Production (,000 bpd)			**Oil Consumption (,000 bpd)**		
	End 1994	**End 2014**	**Δ (%)**	**End 1994**	**End 2014**	**Δ (%)**
Middle East	201.2	285.5	42%	4.4	8.7	98%
Europe & Eurasia	136.5	171.9	26%	199.3	182.5	-8%
North America	138.1	187.2	36%	21.3	23.3	9%
South America	5.3	7.6	43%	4.3	7.1	65%
Asia-Pacific	7.1	8.3	17%	17.1	30.8	80%
Africa	7	8.2	17%	2.1	3.8	81%

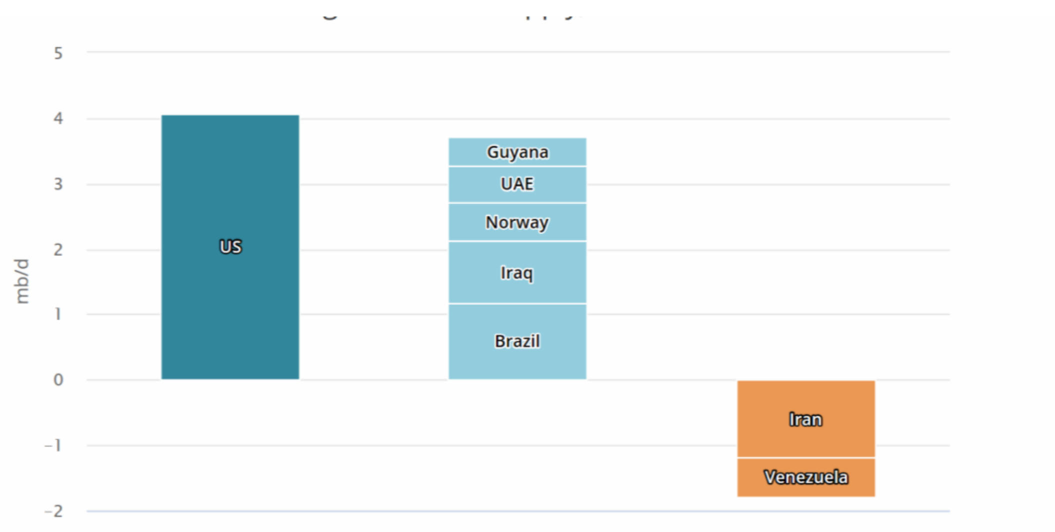
Source*:* (BP, 2015).

As it is expected, the bigger increases in oil consumption within a decade came from the developing world. It is seen that continents like Asia-Pacific, South America and Africa shown an increase of 60-80% during that period, while Middle East almost doubled the consumption volume. At the same time, Europe and Eurasia reports a decrease in oil consumption which can partly explained due to new types of energy started already been used and also due to energy saving behavior from the citizens, something that is not the case in the other regions.

Interesting point is that global Supply growth is supported by several countries such as US along with Brazil, Iraq, Norway, the UAE and Guyana as the biggest sources. At the same time Iran and Venezuela are forecast to post the deepest losses, though the outlook could change dramatically depending on political factors (IEA, 2019). In the figure 3.7, such changes are shown graphically:

Figure 3.7

Change in total oil supply, 2018-2024



Source: (IEA, 2019).

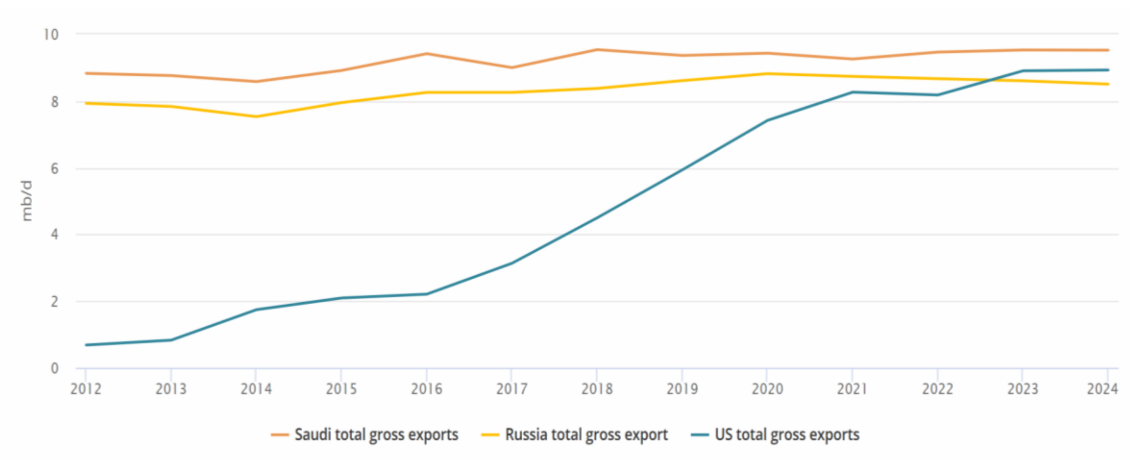
This significant buildup of supply was the result of substantial investments during the previous years and mostly in the upstream industry. The global upstream capital expenses for oil and gas was set to increase by 4% in 2019 which is higher than expected the previous years (IEA, 2019).

Referring to US, the country shows an ability to turn itself into a major exporter within a decade time. It is expected that by 2024, US oil exports will overtake Russia and close in on Saudi Arabia, which brings greater diversity of supply to global markets and enforce the geopolitical position of US (IEA, 2019).

This is driven mainly due to the significant growth in US shale, from almost zero production in 2010 to more than 7 mb/d in 2019 which is a game changer that causes big transformation to global oil markets. Major reason for that US shale was capable enough respond to price signals more swiftly than other sources of supply and with even more production capacity if prices had been risen beyond than current levels (IEA, 2019).

Figure 3.8

Gross exports, 2012-2024



Source: (IEA, 2019).

According to Rifkin (2002:278-300), the challenge of global warming will continue to appear even more sever due to the temperature increase on the planet. He states that even though CO_2 emissions have been reduced as a unit of primary energy consumed globally by around 0.3% per annum during the last 140 years, due to the increased amount of coal and oil used/consumed, CO_2 emissions as an absolute figure have been increased during all this period.

Energy issues, which are strongly related to economics, *can irritate or ease tensions* or conflicts of a political nature depending on the willingness of actors involved. Economic power continues to shift eastward and it is very interesting to study energy security in the broader area of the East Mediterranean and its effect on national security in the countries located there.

Energy Security means “different things to different people, particularly the 1.3 billion people without access to electricity and the 2.7 billion people relying on biomass for their basic needs”. It is very important that “the proposed seventh goal of the United Nations Sustainable Development Goals calls for countries to ensure access to affordable, reliable, sustainable and modern energy for all” (El-Badri, 2015). Energy can influence the foreign policy of a state and also it can be a potential tool for it, while at the same time politics may influence the use of energy resources (Leigh, 2014).

It is necessary to study security of supply together with security of demand, otherwise the approach of the research will be weak and incomplete and at the same time also “enhances risks for consumers in energy planning”. There is an “indissoluble link between both sides of energy security” and “a reliable energy policy should integrate concerns of all actors involved” (Kaveshnikov, 2010: 586).

3.2.2 Resources and states

It worth mentioning that “oil is considered the most important raw material in the world, both economically and politically, and it is likely to be the key source of energy well into the century” (Nye, 2007:237).

According to the Office of Technology Assessment (OTA) the definition of a strategic material can be given as follows:

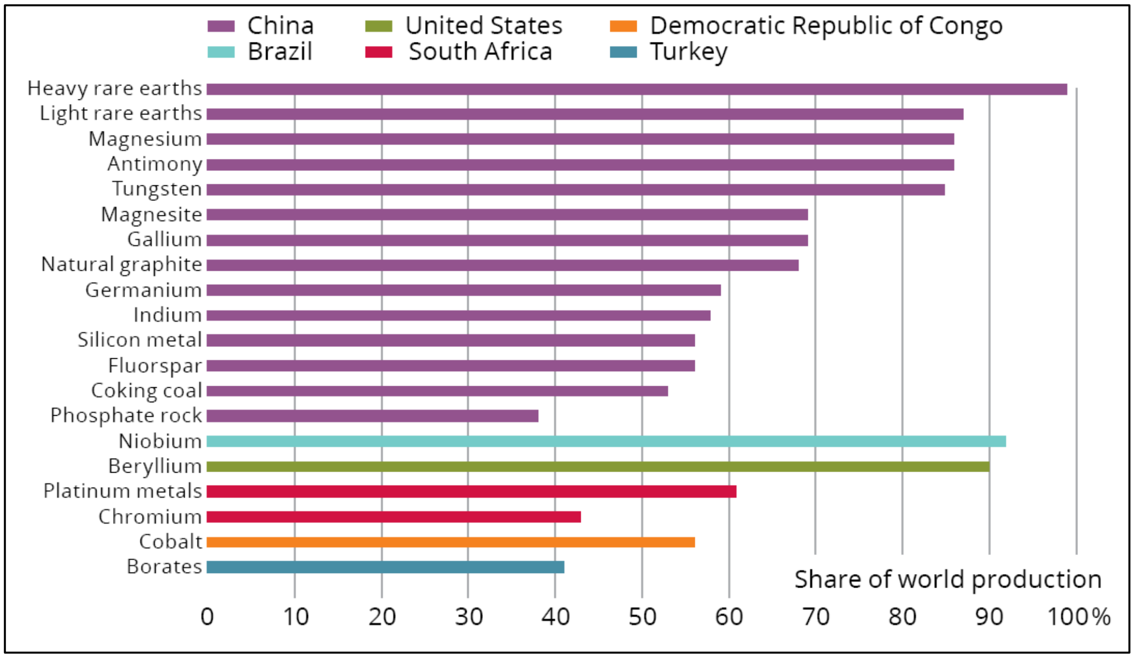
> *A strategic material is one for which the quantity required for essential civilian and military uses exceeds the reasonably secure domestic and foreign supplies, and for which acceptable substitutes are not available within a reasonable period of time (OTA, 1985:11)*

Unequal geographical distribution of several resources might cause “further price increase volatility, undermining living standards and even contributing to geopolitical conflict”. There several “non‑renewable resources deserve particular attention because of their economic relevance, including their role in green-energy technologies” (SOER, 2015).

The European Commission has indicated twenty “critical raw materials” by taking into account “the risks of supply shortage and their economic importance to Europe” (EC, 2014). The global production of these materials is quite concentrated, and the twenty critical raw materials are shown in the following figure 3.9 (SOER, 2015).

Figure 3.9

Correlation of energy consumption and GDP per capita in 2011



Source: (SOER, 2015).

Regarding the available resources of fuels (like fossil, oil, gas, coal), one of the most well-known peak oil theories is the Hubbert peak theory (1956). According to this theory, for any geographical area either a single state oil-producing actor or the planet earth, the rate of petroleum production tends to follow a bell-shaped curve which is the nominal distribution curve (otherwise known as Gauss). Based on this curve:

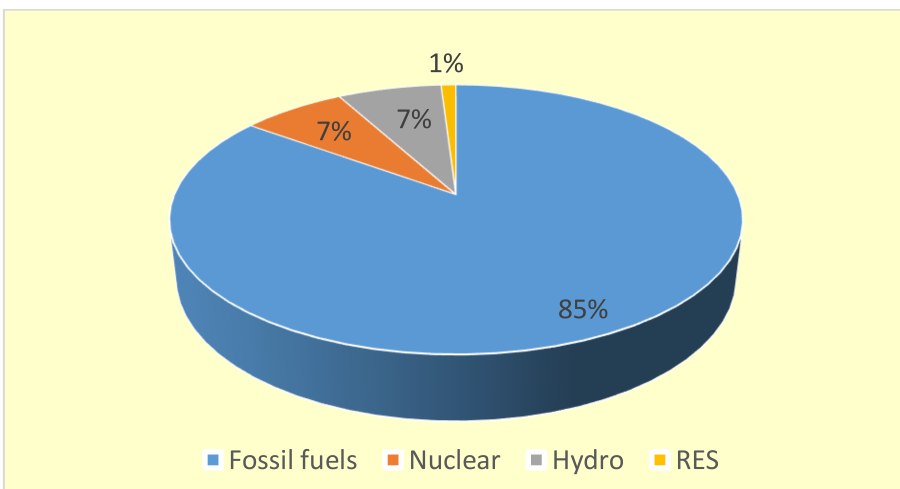
- There is a point of maximum production which is a function of production rates, accumulated production and any new discoveries rates.
- Before the max point: production rate increases mainly due to the discovery rate and any new infrastructure.
- After the max point: production declines mainly due to resource depletion.

The Hubbert peak theory is based on the perspective that the oil and gas reservoir under the ground in any region are not infinite and consequently the rate of discovery that initially increases fast should reach a maximum point and then start falling. In addition, it is important to consider the economics. One of the factors that can be used to assess whether energy in a region/form/use can be used is also the EROEI (Energy Return on Energy Investment). This is the ratio of energy extracted to the energy expended in the process. If the ratio EROEI reaches to one then the oil or gas production cannot be considered any more as a net energy source (Guilford et al, 2011).

As of current usage, the following figure 3.10 presents the fuel mix used for global energy production in 2015. It can be seen that fossil fuels represent 85% of the total amount of energy produced globally while renewable energy resources only 1%. It is necessary to mention that crude oil (40%), coal (22%) and natural gas (23%) are considered as fossil fuels, while geothermal, sunlight, wind and recycling are considered as renewable energy resources.

Figure 3.10

Fuel mix used of production of global energy, in 2015



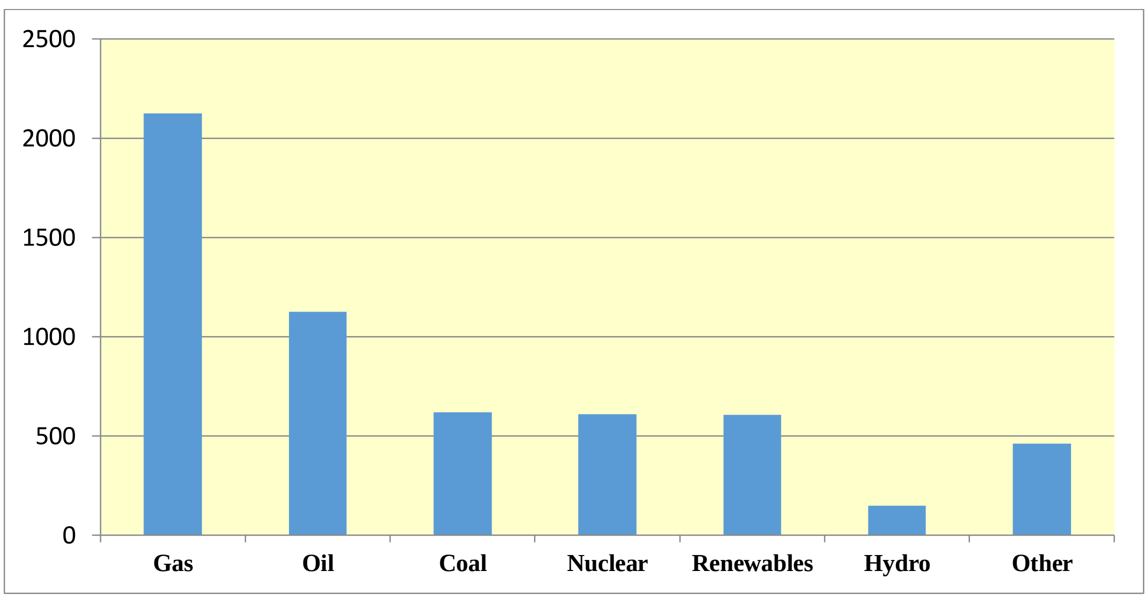
Source: (EIA, 2018).

As per the above figure, fossil fuels have played a dominant role in the energy mix, while it is expected that it will continue do the same during the next decades even if there are new types of energy that will eventually start replacing by some percentage in the energy mix. The disruptor factor would be the innovation and technology, which can replace the existing types of fuel with new ones and should be more efficient and economical.

In the following figure 3.11 it is demonstrated that the primary energy demand is expected to be driven mainly by Natural Gas (NG) following by Oil and Coal. More specifically, the NG will be around 2,300 million tonnes per annum (mtpa) while Oil will be 1,250 mtpa and the coal around 600 mtpa. Nuclear and Renewable Energy Resources are seen to be above 500 mtpa and there are expectations of further increase.

Figure 3.11

Global Growth in Demand by source of energy, 2014-2040 (mill tpa)



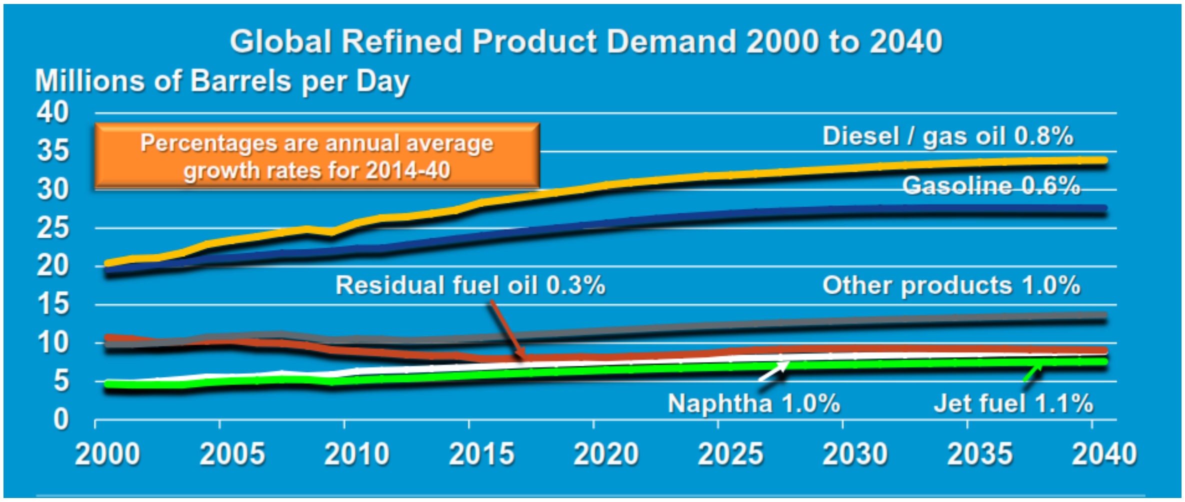
Source: (Blake, 2014).

Fossil fuels are expected to keep their dominant role over the next two decades; however, the trend is in favor of other forms of energy that will eventually earn a greater share in the global nexus.

The demand for oil products is expected to slow down during 2015-2040, while new forms of energy will gradually be preferred by states and societies. In the next figure 3.12 the global refined product demand is given for the next years in millions of barrels per day for the period until the year 2040.

Figure 3.12

Global refined product, 2014-2040



Source: (Blake, 2014).

The consumption of non-conventional fuels[6] during this century is expected to grow significantly. More specifically, it is expected to be doubled by 2040 when compared with the volume consumed at the beginning of this century. Furthermore, consumption of non-conventional fuels may be four (4) times more by 2100 than what it was in 2000. A summary of the evolution is given in the below table 3.3, where the expected CO2 change is also represented for each year until 2100.

[6] As non-conventional fuels are considered coal, shell-gas, sand oil, etc.

Table 3.3

Evolution of non-conventional fuels

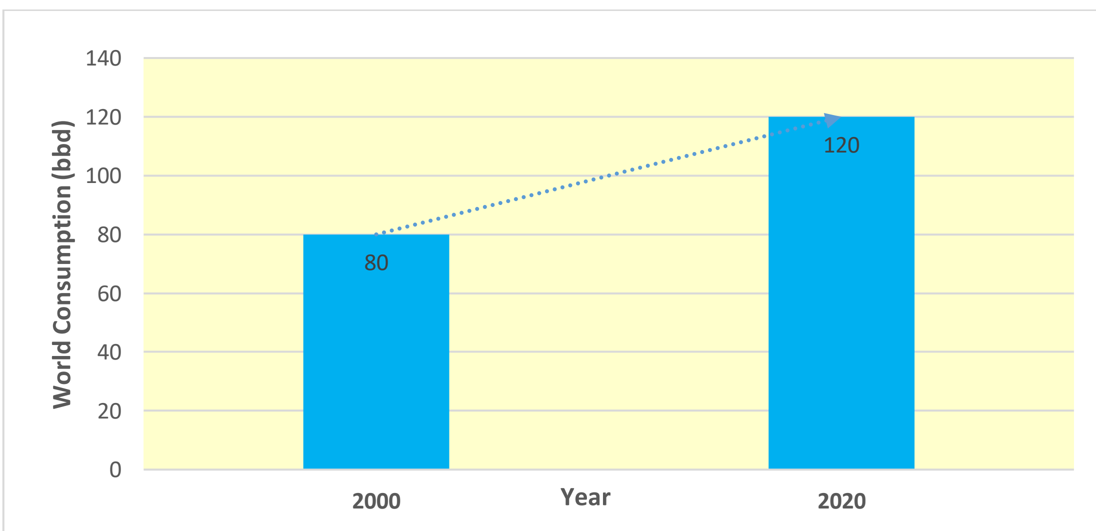
	2000	**2020**	**2040**	**2060**	**2100**
Consumption of non-conventional fuels	x		2x	3x	4x
CO_2 (bill tpa)	6				20

Source: (Rifkin, 2002).

The next graph in figure 3.13 presents the expected growth in oil consumption globally, during 2010-2020. The average expected growth is considered to be around 5% and thus the world daily consumption would reach 120 billion barrels.

Figure 3.13

World Oil consumption, 2010-2020



Source: (IEA, 2017).

According to Rifkin (2002:69-77), the degree of progress of a civilization is proportional to the quantity of energy that is used per capita in a state or a region or the world. Moreover, he considers that there are also other parameters that should be included in that functional relationship, such as the efficiency of technologically tools for capture and energy usage, the size of products and services being produced for serving the human needs.

A schematic representation of this relationship is given as following:

Degree of progress of a civilization, C:

$$C = f(\begin{cases} quantity\ of\ energy\ used\ per\ capita \\ efficiency\ of\ thechnology\ tools\ for\ capture\ and\ energy\ usage \\ size\ of\ products\ and\ services\ being\ produced\ for\ serving\ the\ human\ needs \end{cases}$$

There are expectations and discussions in the market that the centralized form of structure on how the energy is monitored and controlled will change in the years to come. It would even be possible that energy could be produced by each individual alone who would try to meet his own needs, a scenario that it is not far from what is already happening nowadays with the existing new technology: such technology is related to photovoltaics, fuel cells and other small-scale unit available for household needs. The benchmark for this breakthrough evolution in energy management could be the internet-based philosophy with the web spread globally: each individual could produce energy locally to meet his own household needs and then provide the surplus energy to the energy-web to which he will be connected. This is already a practice in many countries in the western world but there is no real and sustainable support from then main state administration and authorities and it has become un-economical for individual users in the short/medium term.

Hydrogen one of the basic and maybe the cheapest element in the nature. It is a clean fuel which when it is burnt (which means reacting with the oxygen) the outcome is water and energy (exothermal reaction). Today the challenge and efforts are mostly related to the warehousing, distribution, supply network of this type of fuel since these processes are not ready for mass use and thus economically.

3.2.3 Oil & Gas players

From the beginning of the explorations and production of Oil and Gas (O&G), hundreds of changes affected O&G producers. It is useful to mention that "Seven Sisters Oil Companies" is a phrase said by Italian state oil Company ENI CEO Enrico Mattei in the 1950s when he described the seven Anglo-American oil companies that formed the "Consortium for Iran" cartel. It was proved that they came so powerful that they dominated the global petroleum industry until the 1970s when OPEC (Organization of the Petroleum Exporting Countries)[7] performed more active than in the past, as a result of the oil crisis.

Due to the fact that oil prices have been increased a lot during the last years, a new group of O&G companies came into the picture since they have consolidated their power and replaced the previous biggest listed energy companies. The new "seven sisters were identified by the Financial Times in cooperation with executives from the O&G industry. A summary for both periods is given in the next table 3.4.

Table 3.4

Initial Seven Sister Oil companies.

No.	Old Seven Sisters oil companies	New Seven Sisters oil companies
1	Anglo-Iranian Oil Company (United Kingdom) – This company became British Petroleum	Saudi Aramco (KSA), 100% state owned
2	Gulf Oil (United States) – In 1984, most of Gulf was acquired by SoCal and the enlarged SoCal entity became Chevron	Gazprom (Russia), 50.023% state owned.
3	Royal Dutch Shell (Netherlands/United Kingdom)	CNPC (China), 100% state owned.

[7] OPEC member countries are: Algeria, Angola, Ecuador, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, Venezuela (OPEC, 2018)

4	Standard Oil Co. of California (SoCal) (United States) – Became Chevron in 1984	NIOC (Iran), 100% state owned.
5	Standard Oil Co. of New Jersey (Esso) (United States) – Became Exxon, which renamed itself ExxonMobil following the acquisition of Mobil in 1999.	PDVSA (Venezuela), 100% state owned.
6	Standard Oil Co. of New York (Socony) (United States) – Became Mobil, which was acquired by Exxon in 1999 to form ExxonMobil	Petrobras (Brasil), 32.2% state owned.
7	Texaco (United States) – Acquired by Chevron in 2001	Petronas (Malaysia), 100% state owned.

Sources: (Sampson, 1975), (Hoyos, 2017).

The initial “seven sisters” in the mid of the last century have become four: ExxonMobil, Chevron (Texaco), BP and Royal Dutch Shell.

Based on the above and comparing the companies of the two periods, firstly it can be noticed that there is a shift to new companies in different countries and regions which is in line with the global shift to the emerging countries and developing ones. Moreover, there is no US company in the new group, while US foreign policy has been proven to be offensive against most of the countries where the “new seven sisters” are located at. For example, four out of seven of these countries (57% of the total) are considered by the US government for the last years and as per the doctrines of the last administrations (i.e. Trump, Clinton, Bush) as “enemies” and high-risk actors in terms of the national security doctrine of the nation: Russia, China, Iran, Venezuela.

As per the annual research issued by the Forbes, the top 25 O&G companies (in the total of 2000 globally) created US$2.2 trillion in sales per year and US$73 billion in profit. In summary, the top-25 are given in the next table 3.5 with their revenue in 2017:

Table 3.5

Top-25 O&G companies globally (as market value in 2017)

#	Company	Market value (US$, B)	#	Company	Market value (US$, B)	#	Company	Market value (US$, B)
1	ExxonMobil (USA)	343.2	10	Rosneft (Russia)	62.4	19	Valero Energy (USA)	29.4
2	Royal Dutch Shell	228.8	11	Petrobras (Brasil)	61.3	20	Sempra Energy (US)	27.5
3	Chevron (US)	206.1	12	Gazprom (Russia)	51.8	21	Marathon Petroleum (US)	26.4
4	Petrochina (China)	204.5	13	Kinder Morgan (US)	48.1	22	Repsol (Spain)	23.8
5	Total (France)	128.1	14	Lukoil (Russia)	44.6	23	Gas Natural Fenosa (Spain)	21.7
6	BP (UK)	114.7	15	Phillips 66 (US)	39.9	24	Surgutneftegaz (Russia)	18.5
7	CPCC (China)	105.1	16	Oil &Natural Gas (India)	37.2	25	Centrica (UK)	14.8
8	Relianc Ind (India)	71.2	17	PTT (Thailand)	32.4			
9	Enbridge (Canada)	69.3	18	Indian Oil (India)	30			

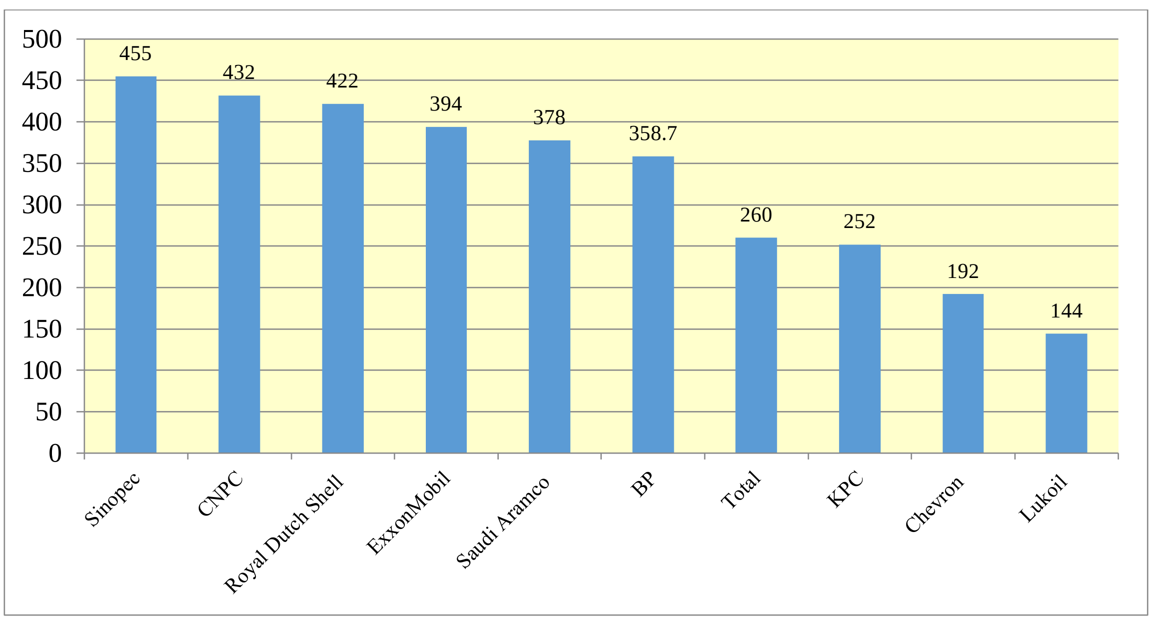
Source: (Energy World Mag, 2017).

Based on the above table, the major part belongs to US companies (seven) with Russia following at the second rank (four); then, India (three) and UK (two) and Spain (two). Finally, the Netherlands, Brazil, France, Canada and Thailand are found with one company each. In addition, it is interesting to mention that there are quite few new companies from the developing countries such as China, India, Thailand.

In the following figure 3.14, the top ten oil and gas producers in the world are presented in terms of their annual turnover which ranges from US$455 bill down to US$144 bill per year. It is very interesting to note that the total revenue of these ten bigger oil and gas producers in the world accounts for almost 4.3% of the Global GDP which is US$ 3287.7 trillion at the year 2014. The data are shown in a descending ranking starting from the higher.

Figure 3.14

Annual Revenue of the top ten O&G producers in 2014 (in US$ bill)



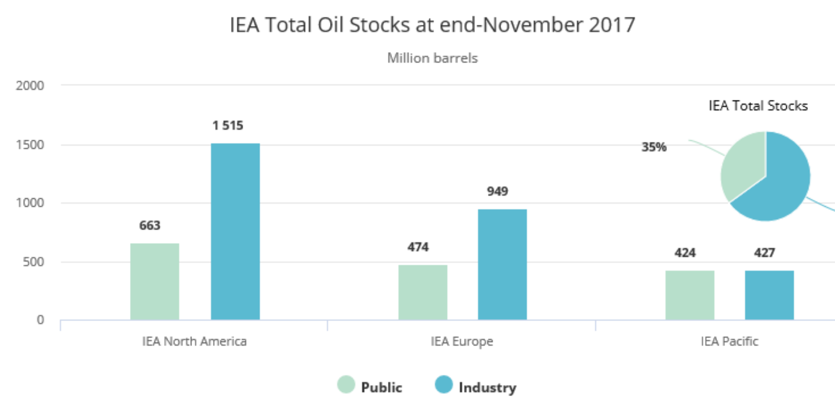
Source: (IEA, 2017).

In the next figure 3.15, the total oil stocks as per last November 2017 are given by the IEA report (IEA, 2017). It can be seen that North America keeps the big portion of the total stocks and Europe ranks second.

This may be explained by the fact that both regions are more concerned about their security of supply and thus they always try to keep a min level of reserves ready to use in case a disruption of supply happens in the markets. In addition, the stocks that the industry keep in North America and Europe are almost double of the stocks related to the public, while this is not the case in Asia where in both sectors oil stocks seem to be equal.

Figure 3.15

Total Oil Stocks Globally (Nov2017)



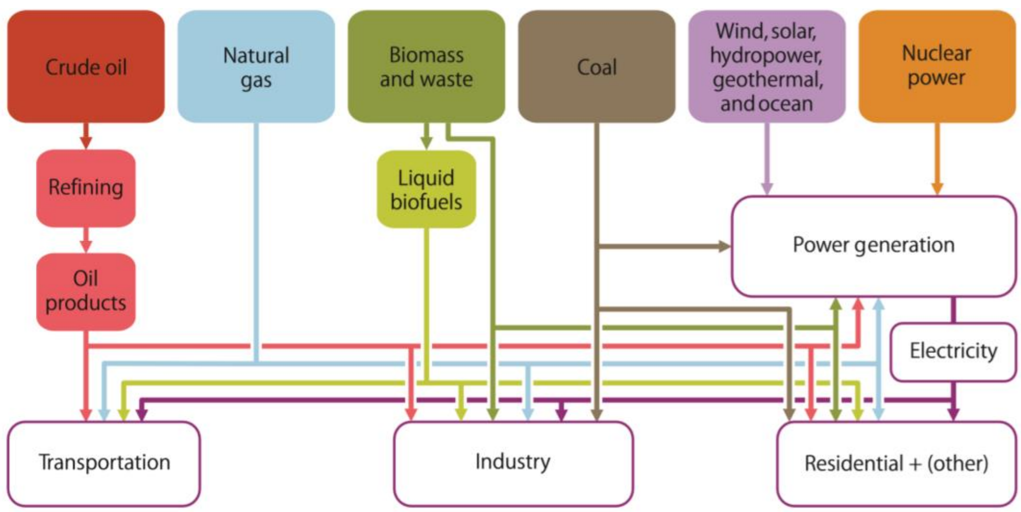
Source: (IEA, 2017).

Strong supply growth has gained the upper hand over geopolitical concerns in shaping oil price trends. Exceptional growth in non-OPEC (Organization of Petroleum Exporting Countries), especially in the United States (US), now have global oil supply growth running at more than double the pace of demand growth. Thus, oil prices have declined dramatically from the US$110 levels (Brent), which was quite stable from beginning 2011 until autumn 2014; in the early 2015 they have been at the US$50 levels and end of 2015 below the level of US$40 per barrel.

In the next figure 3.16, an energy system is presented where resources with their final application are linked and connected through the network that currently exists in the industry and markets. It gives an overview of the set-up and the connections among the several stages from exploitation and exploration to production of fuels and different types of energy with the final major types of application.

Figure 3.16

Energy System Diagram



Source: (WEC, 2017).

In general, it is expected that global fundamentals will continue to shape long-term prices, while short/medium-term volatility has returned. The strongest growth will continue to be in the developing nations of Asia, the Middle East, and Latin America; however, due to competitive advantages from shale gas, growth will be strong in North America as well while at the same time Europe and Japan are expected to lag (Blake, 2014).

3.2.4 Energy and Thermodynamics

On the basis of the well-known laws of thermodynamic, which have brought a breakthrough in the hard sciences and the new development in various areas of the industry, it is known that energy can be neither created nor destroyed, but can only be changed to mass or a lower quality form of energy. It is important that this is understood in order to avoid any confusion. Thus, the lack or scarcity of energy which is a real fear/risk for the coming years for the society is not related to the total amount of energy that is available in the system but to the available forms of energy that will still be available for use tin producing work.

At this stage, it would be interesting to refer to the three basic laws of thermodynamic as follows (Perry and Green, 2007):

- According to the first thermodynamic law, the total energy of an isolated system is constant; energy can be transformed from one form to another, but can be neither created nor destroyed.
- According to the second law of thermodynamics, the entropy of an isolated system tends to increase with time. Entropy is a measure of the amount of energy that is no longer capable of performing work. Any increase in entropy is also linked to a reduction of the energy available to do work in the future. Usually, the type of energy which is not available to do work is considered to be thermal.
- According to the third thermodynamic law, the entropy (S) of an isolated system at absolute zero temperature (measured in Kelvin, K) is also zero: S=0 when t=0 K.

In an isolated system, energy can neither enter nor exit. In a closed system, entropy can be maintained over time, provided that there is a source of external energy. In the case of planet Earth, we do not have an isolated system (since Earth receives a constant flow of energy from the sun and from outer space), but Earth can be considered as a closed system.

On the basis of the aforementioned thermodynamics laws, the total amount of energy in the universe is constant, and the total entropy is continually increasing. Thus, it is finally the energy that comes from the sun that permitted all the organisms and civilizations to grow on Earth, since that energy was used to maintain the entropy in the system of Earth.

As the population is continuously increasing and the need for energy does the same, the use of fossil fuels (i.e. coal, oil, gas) from the beginning of the industrial revolution has further increased the rate at which communities are adding to the entropy of the system of Earth.

Since communities use fossil fuels to get the necessary energy to do a job (such as electricity, transportation, telecommunication, etc), then there is a cost that needs to paid as per the second thermodynamic law: the cost is an increase in entropy which appears in the form of pollution (Energy Symposium, 2017).

Finally, a political structure looks like a field of forces in Physics. Interactions inside the field have characteristics different from those that they could have in case they would have been acted outside of the field; as the field affects the objects, also objects affect the field. Structure is seen as a) a reward mechanism works so as to produce a uniformity of results despite the diversity of inputs and b) defines a set of restrictive conditions.

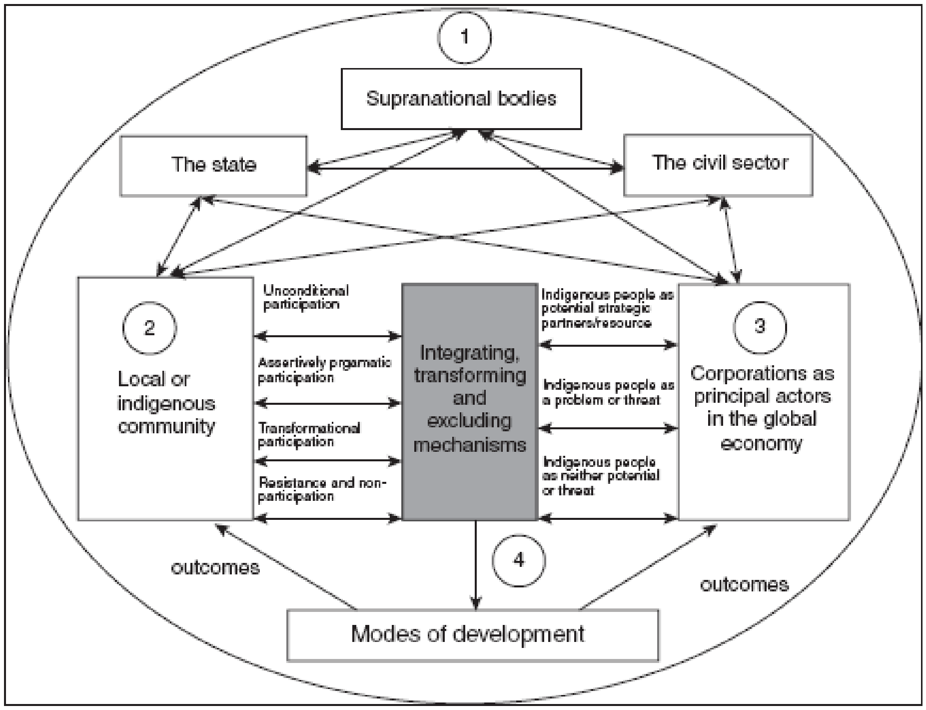
3.2.5 Stakeholders and the Environment

Independent socio-economic impact studies provide identification of socio-economic, cultural and strategic environmental issues, as part of corporate planning, due diligence and risk management.

From the stakeholder’s perspective, it is interesting to consider the interconnections between them and particularly in relation to the O&G industry. The following figure 3.17 shows such links.

Figure 3.17

Major stakeholders associated with the O&G industry



Source: (Mikkelsen, Camp II and Anderson, 2008).

A reference to prevailing megatrends in the global nexus is given herein. Megatrends are regarded as big, transformative forces that affect the global environment and seriously affect economies, industries, societies and individuals. In the globalized world there is a continuous movement in which capital, labor force and goods are exchanged more frequently and faster than before. Global megatrends are “a manifestation of a vast number of processes and changes across the world” (SOER 2015).

In Europe, there is a tendency to deal with such megatrends by two different means (Sklias, Roukanas and Flouros, 2016):

a./ Shape global change to mitigate and manage risks, and create opportunities: it can be done using both “unilateral and multilateral efforts to mitigate environmental pressures or facilitate trade, or through using foreign aid mechanisms to invest in education and poverty alleviation"

b./ Find ways to adapt to global trends: this can be done by anticipating and avoiding harm "by increasing the resilience of social, environmental and economic systems".

It is well-known that the resources societies need to rely on in order to satisfy their basic needs can be categorized into four major groups: food, water, energy and materials. Furthermore, ecosystems are necessary to contribute and support the availability of such resource categories and also to give a range of other ecosystem services that affect human health and well-being.

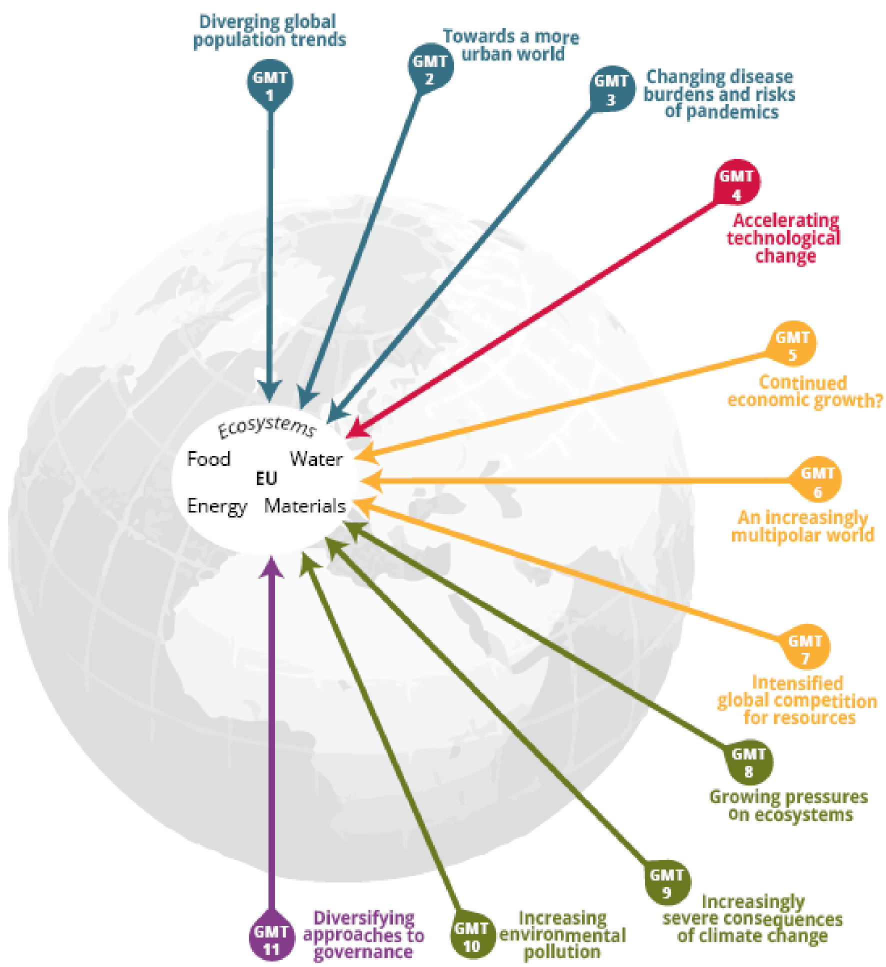
The European Environment Agency in 2010 produced its assessment of emerging global trends (EEA 2013), in which it summarized eleven (11) global megatrends grouped into five clusters: social, technological, economic, environmental and governmental.

Such data and results as per SOER 2015 are based on reliable and comparable environmental information both from European Environment Agency (EEA) and the European Environment Information and Observation Network (Eionet) which is a network of 39 European countries. Such issues are expected to contribute to a discussion about "how Europe should monitor and assess future changes in order to better inform environmental policymaking".

These 11 megatrends have a different kind of impact on the resource categories (EEA, 2013) and they are presented graphically in the next figure 3.18:

Figure 3.18

Impacts of global megatrends on European resource systems



Source: (EEA, 2013).

A small analysis of these 11 megatrends is then as follows:

1. <u>Diverging global population trends</u>

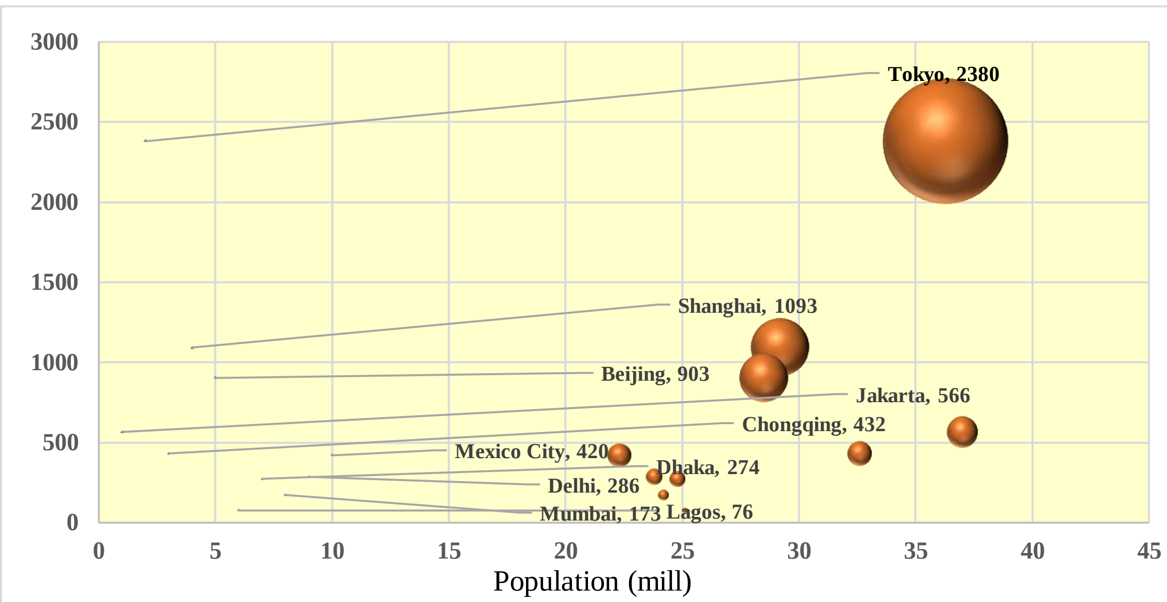
   The Enrst & Young report also indicates that this parameter is one of the main megatrends that will be seen within the next thirty years, since an increase of global population is expected and especially in underdeveloped and developing countries (EY, 2015).

The population is expected to exceed 9.6 billion by 2050 globally, even if the rate of growth is slowing and most of this population increase will take place in developing-world urban areas. Use of resources and moreover the environment is expected to be affected by the increasing population in the developing world, by the global growth of an affluent middle class, and by ageing populations in developed countries (EEA, 2015).

In the following figure the ten (10) bigger megacities are given as per their expected GDP and population by the ye3.19ar 2030. Eight of these ten megacities are found at Asia and their population will be 237 million in urban areas.

Figure 3.19

GDP per Megacities by 2030 (in US$ bin)



Source: (World Resource Institute, 2015).

2. <u>Towards a more urban world</u>

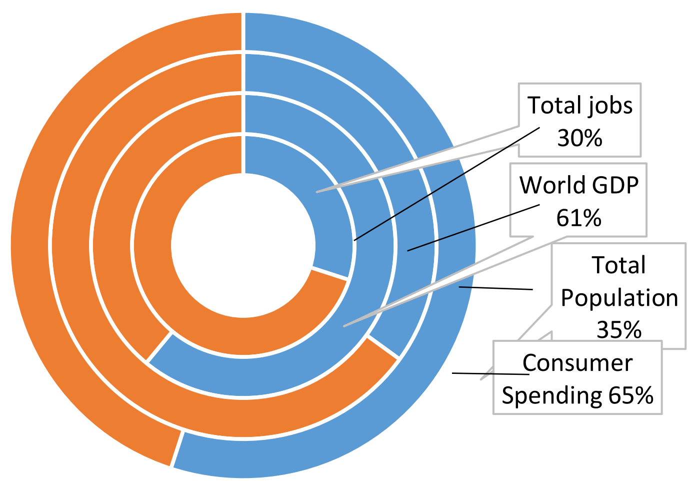
Urban regions in developing countries are expected to absorb most of the global population increase within the next few years and 67% of people will be living in cities by 2050. Organized and well-designed cities could be the proper efficient and environmentally sustainable option to provide for the welfare of a growing population and for this reason “smart planning provides for the efficient re-use and mixed-use of urban space” (EEA, 2015).

Urbanization and an increase in the number of megacities all over the world is also considered an important megatrend, while at the same time large migration flows to developed countries are expected to take place which will finally affect the demographics of the societies (EY, 2015).

According to Oxford Economics (2014), the world urbanizes to around 750cities contributing 60% of global GDP by 2030 while the next figure 3.20 represents expected major changes in Urban landscape in these megacities.

Figure 3.20

Major changes Urban landscape in 750 megacities until 2030

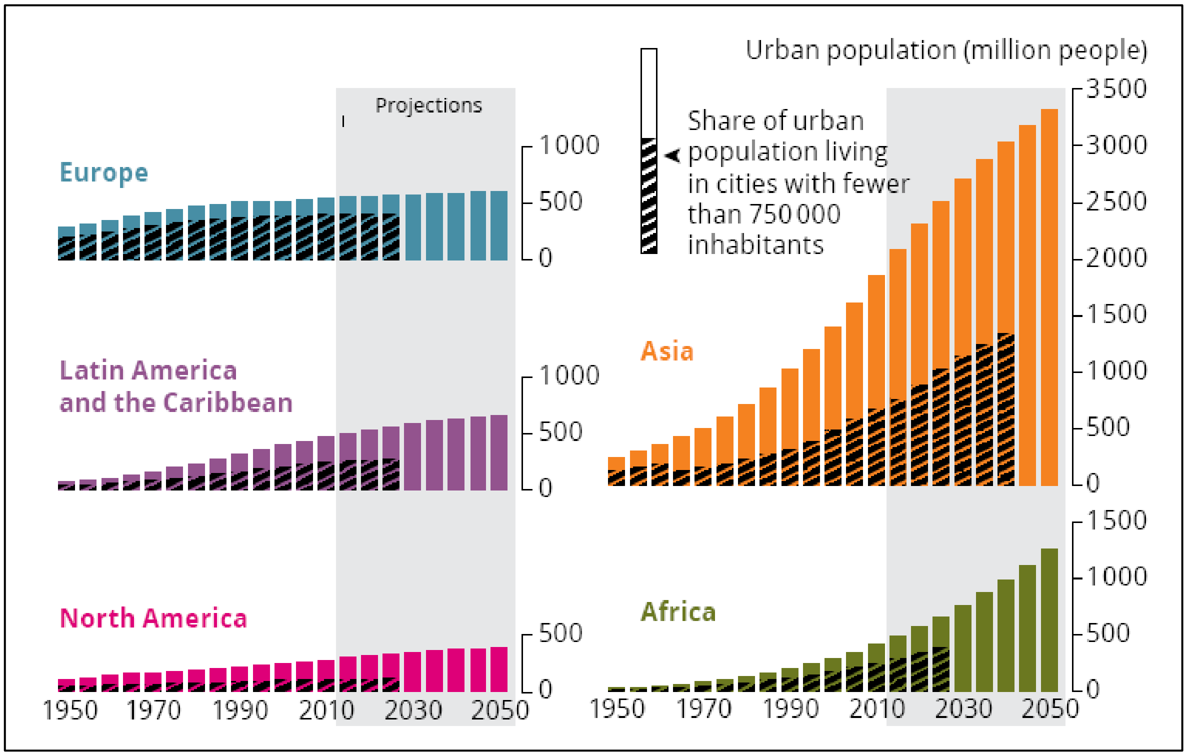


Source: (EY, 2015).

Therefore, urban areas and states will be seeking sustainable solutions to find resources and provide for the well-being of the people. The next figure 3.21 presents several urban trends by areas that expected to happen by 2050.

Figure 3.21

Urban Trends by world regions, 1950-2050



Source: (UN, 2012).

3. <u>Disease and risks</u>

Non-communicable disease is now more prevalent that communicable disease because of "increased ageing and rapidly changing economic and social conditions". The danger of "global pandemics continue", especially due to the easier movement of the population whiles "around a quarter of the burden of disease and deaths are attributable to environmental causes" (EEA, 2015: 37–43).

4. <u>Technological change</u>

The way that technology changes does not allow much space for prediction and it is providing more opportunities to "reduce humanity's impact on the environment and reliance on non-renewable natural resources, while improving lifestyles, stimulating innovation and green growth” (EEA, 2015).

5. Economic growth

Economic growth is foreseen to increase threefold by 2050. Increased economic growth reduces global poverty and increases well-being. The constraints of GDP as a mean to measure “human well-being and the sustainability of growth have prompted international efforts to identify better indicators of societal progress” (EEA, 2015:53-59).

6. Increasingly multipolar world

Developing regions in the world are quickly increasing their share of global economic output, trade and investment. The main reasons for this are structural changes, trade liberalization and fast-expanding workforces. The appearance of a more “diverse mixture of major economic powers can complicate global efforts to coordinate governance” and thus “growing economic interdependence will make it harder to manage the social and environmental impacts associated with production and consumption systems” (EEA, 2015).

7. Global competition for resources

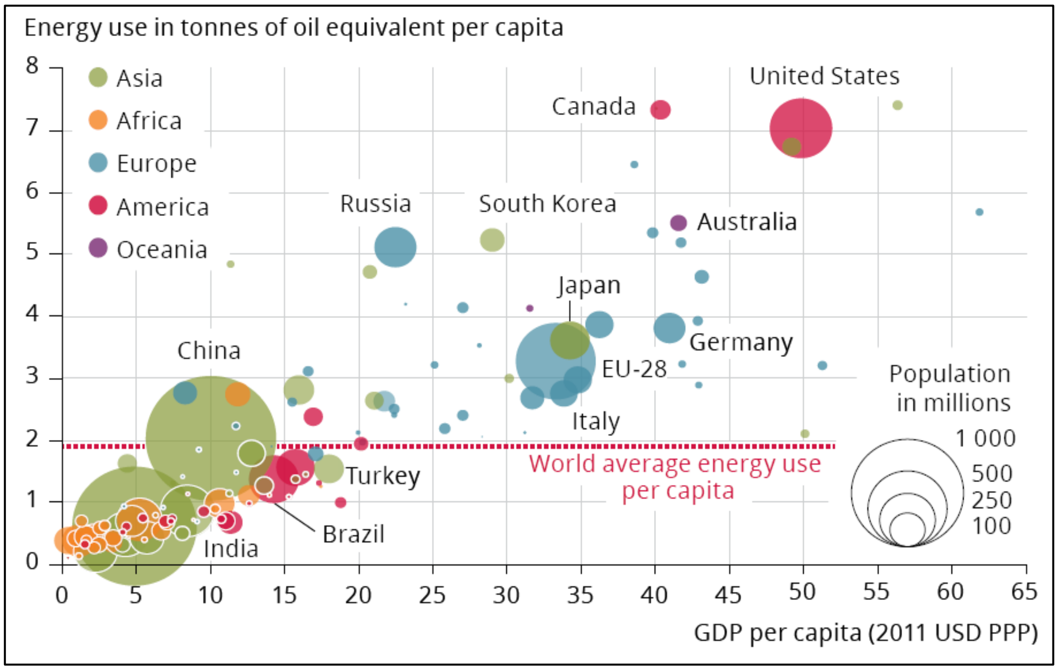
Depletion of resources can cause scarcity in the markets and eventually social problems in communities (EY, 2015). Economies will be related to major investment in infrastructure and energy resources. Energy is a driving force for communities and energy security is of outmost importance to them.

From the early years of the 20th century, the use of material resources increased by ten times and it is predicted to continue until 2030. The ongoing increase in demand for material resources may endanger access to some necessary resources and at the same time cause environmental problems. Even though increasing “scarcity and rising prices should incentivize investments in technologies to alleviate supply risks, such innovations will not necessarily reduce environmental pressures” (EEA, 2015).

In the figure 3.22, correlation between national per capita energy consumption and GDP per capita is presented; the size of bubbles represents the total population of the countries.

Figure 3.22

Correlation of energy consumption and GDP per capita in 2011



Source: (World Bank, 2014), (EEA, 2015).

8. <u>Increasing pressures on ecosystems</u>

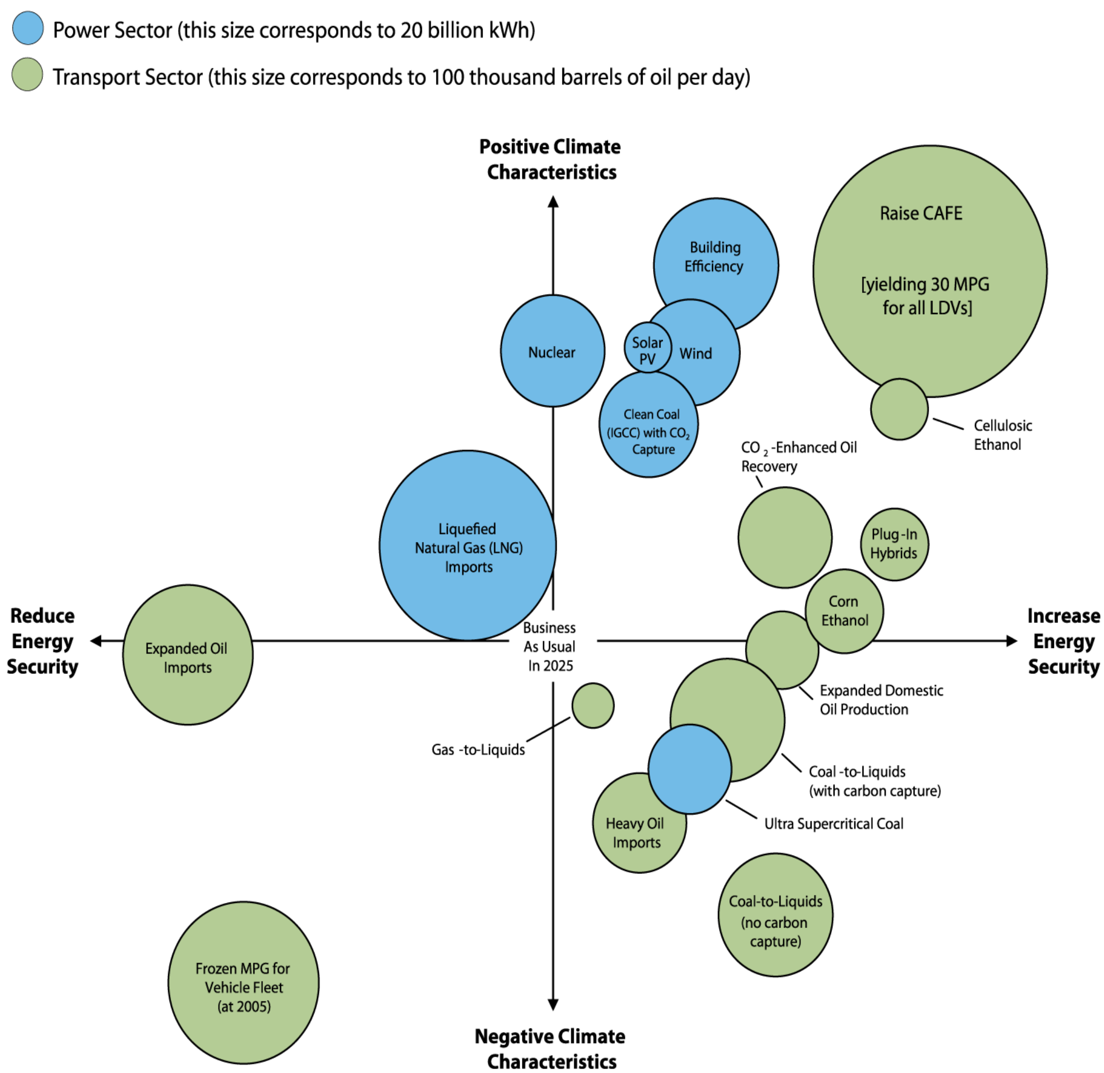
Larger population have greater effect on the type of consumption; food, mobility and energy that affect the ecosystems and related services. Such changes led to thinking about diet such as meat-heavy diets and strategies for bioenergy production (EEA, 2015).

9. <u>Severe consequences of climate change</u>

In the next figure 3.23, there is a comparison between energy security and the climate characteristics of several energy cases. The size of bubble represents additional energy needs in 2025 (EEA, 2015).

Figure 3.23

Energy Security vs. various Climate characteristics



Source: (World Resource Institute, 2015).

Climate change is expected to bring more challenges and problems and it is seen to continuously and ever-more quickly affect "natural ecosystems and their biodiversity, slow economic growth, erode global food security, threaten human health and increase inequality" (EY, 2015).

10. Environmental pollution

Air pollution and the releases of nutrients from agricultural activities remain high. They cause "soil acidification, eutrophication of aquatic ecosystems and losses in agricultural yield" and total pollution is expected to rise in Asia in the near future (EEA, 2015: 93-99).

11. Different approaches to governance

Governments are expected to handle "the increasingly long-term, systemic challenges facing society and their more limited focus and powers". The necessity for "coordinated action on a global scale is reflected in the proliferation of international agreements and the increasing role of business and civil society in governance". Thus, it is necessary to have a "diversification of governance", however this can raise questions "about coordination and effectiveness, and the replacement of government authority with less accountable or transparent non-state actors" (EEA, 2015).

According to United Nations (UN), there are some Sustainable Development Goals and a few of the most important ones are given as follows:

- Ending hunger.
- Achieving food security.
- Achieving improved nutrition.
- Promoting sustainable agriculture.
- Ensuring availability and sustainable management of water and sanitation for all.
- Ensuring access to affordable, reliable, sustainable and modern energy for all.

Some of the main aims of sustainable development are:

- Combating climate change.
- Tackling global warming.
- Reduction of emissions.
- Energy issues.

3.3 Security

3.3.1 General

In the theory of realism, the relative standing and survival and thus existence of a state is strongly affected by its material and resource capabilities and its ability to legislate them in their efforts to gain power; if not available or there is a lack of such resources then the state is vulnerable and in danger (Molchanov, 2012:9-10).

According to Krishna-Hensel (2012:1-6), the theory of realism views that the ownership of resources and also the capability of the nation-state to utilize them properly and efficiently "continues to determine the relative standing and status" of that nation-state in the global system.

Realism considers sovereign states – the main actors – coexist in anarchy, which is the prevailing type of structure at global level. States are obliged to face competition and deal with insecurity; both of which are a situation that a state cannot avoid. For the purpose of this study, there will be focus on the aspect of realism considering the security. As per Walt, the concept of security plays a very main role in the theory of realism and he claims that "realism sees the insecurity of states as the main problem in international relations" and he indicates that "states must provide security for themselves because no other agency or actor can be counted on to do so" (Walt, 2017:1).

Realists claim that security is a rare occurrence for several reasons; the most important are listed below (Walt, 2017):

- Man's innate desire for power.
- Conflicts of interest among states with different resource endowments.
- Economic systems.
- Political orders.
- The "ordering principle" of international anarchy.

As for the definition of the "power" has been already presented in the first chapter of this thesis. Furthermore, it is useful to mention herein that there is a distinction between the hard type of power and the soft one and also refer to the instruments and variables of power. A short summary of these is given as follows:

- Hard power: As hard power is described "a nation or political body's ability to use economic incentives or military strength to influence other actors' behaviors"[8]. Hard power is a form of power that appears to be simpler and more understood when compared to the soft one since it easily experienced while its effects are more visible and measurable. As per Nye (2004), most of the stakeholders are familiar with it. Thus, hard power is heavily resource-based and it is usually seen as the type of power that replies on the capacity of an actor to collect and control many resources and then to utilize them properly to strengthen his position.
- Soft power: Mostly related to influence, which means effort to convince the other party by using methods kind of war. As per Nye soft power "is close to the Liberal tradition even if there is no contradiction between realism and soft power"'. He considers that soft power emphasizes "not the ever-possibility of war, but the possibility of cooperation; not military power, but the power of ideas" (Nye, 2011: 82). He initially claimed that soft power enables countries to get the outcomes they want by co-option rather than coercion. He proposed that a country's soft power links with its culture, quality of education, ideology and values and its foreign policies. A country's soft power comes from its attractiveness and thus is linked with its attributes such as culture, way of life, ideology, politico-economic system, quality of education, think tanks, scientific and technological prowess, reach of intelligentsia and media, legitimacy of action and international influence (Nye, 1990).
- Instruments of power: Force in general, armed forces, law enforcement, intelligence agencies, governmental diplomatic departments and institutions, foreign aid, and international financial controls.
- Variables of power: Military strength, economic capacity, the will of the government and people to use power, and the degree to which legitimacy (as a perception either the people or other nations or international organizations) affects how power is applied.

[8] http://publicdiplomacy.wikia.com/wiki/Hard_Power

In the next table 3.6 a summary is given regarding the different theories of realism related to the topic of security; the purpose is mainly to collect, summarize, compare and present these theories and views by scholars of realism in order to understand better and support further use and analysis.

Table 3.6

Security through realism's view

No.	School of Realism	Realists scholars	Drivers and motivating forces leading/affecting security
1	"Biological realists" (Walt, 2017)	Machiavelli, Niebuhr (1932), Morgenthau (1946)	Human nature and more specifically man's desire for power leads to insecurity for states and there is no central authority to prevent/stop it. The motivating force is human nature: it is considered a constant (cons) parameter when taken into account in any function related to security.
2	Classical realists[9]	E.H.Carr (1946) Kaplan (1957) Deutsch & Singer (1946)	(Due to) inevitable conflict of interest between states holding different resources, systems and political orders. Motivating forces are: government systems, ruling ideologies or even personality of individual leaders.
3	Structural Realists	Hertz (1950)	The "ordering principle" of international anarchy. The absence of

[9] In addition, the so-called "English School" can be included in this category also. Scholars are Bull (1977), Watson (1992), Linklater& Suganami (2006).

		Dickinson (1916) Schwarzenberg (1941)	a central authority causes anarchy and then states compete even when they may not want to. Motivating force is the concept of structure.
4	Neorealists	Waltz (1979)	All states seek to survive and some of them may have more ambitious goals. Regarding great powers, he claims that states may act in response to their internal political issues.
5	Defensive Realists	Quester (1977) Van Evera (1999)	Focus on the structure of power and the contribution of other external parameters, such as location and technology. The main argument is the relative easy or not of conquest, which affects the level of security among the states in an anarchy system. States are more concerned with maintaining their security rather than maximizing it. They support the belief that security is not rare since they are not capable of perceiving/realizing the other state's willingness and thus be ready for the worse scenario.
6	Offensive Realists	Mearsheimer (2001)	States are rational actors seeking to survive and they are capable of hurting

		Lobell (2002)	each other, not fully aware of each other's plans. He proposes that states should always seek to increase their power in order to be capable of repelling any attack.
7	Neoclassical Realists	Rose (1998) Walt (2017) Schweller (1996)	Local politics and state leader's perception about the distribution of power as well, they play an important role and should be taken into consideration into the security concept.

Source: (Walt, 2017), (Author 2018).

Further to the above analysis, it is important to mention that both desire and efforts for power can be seen happening through different options/paths:

- A state tends to increase/maximize the power. (A)
- A state tends to balance power, enough to defend an assault. (B)

Each of these options for a state is adopted by different scholars as below:

Offensive Realists: They believe that due to increasing difficulty of competition, the most prevailing and efficient option is (A). States can maximize security by adopting a offensive doctrine. They see that great powers at global level always try to maximize their power since it is the only reliable path to survive in a system where anarchy dominates.

Defensive Realists: They believe that the more prevailing option is (B). States can maximize security by adopting a defensive doctrine.

Another analysis considers other factors that can affect the aforementioned security of a state as follows:

- Structure of the system.
- Distribution of power among actors (efforts to maximize).
- Entrance of new powers.
- External factors of the state (location, technology).
- Internal factors of the state (innovation, domestic politics).
- Military empowerment of the state.
- Alliance formations among actors.
- Institutions.

A more detailed analysis is presented in the next table 3.7 where each of these factors is described with more information and its expected effect to the security is indicated; either as reinforcing or diminishing effect.

Table 3.7

Factors affecting security

No	Factor	Reinforcing effect	Diminishing effect	Level	Symbols
1	Structure of the system (Symbol: S)	- Classical realists claim that the higher the polarity in the system the higher the security level for the states and thus the less probability of a conflict between them. - Neorealism: Balanced bi-polarity is considered to be the optimum level for maximization of power. - Offensive realists: same as above. In addition, they claim that a non-	According to neorealism view, the higher the polarity the higher the risk exists in the system for a conflict, due to inefficient balance and thus more chances for conflict between the states.	G	Structure: S_i Values: i=0,1 (0: no structure, 1: existence of structure). Polarity: P_j Values:

		balanced unipolarity causes the most unstable form of structure because it leads to hegemonic conflicts.			j=L(Low), M(Medium), H(High).
2	Distribution of Power	The less transactions of power that take place the more stable the system, the more security there is.	The problems and conflicts arise when the flow of power increases	G	N_{Re}: Power Distribution Values[10]: N_{Re} - If N_{Re} <2000 (*) then laminar flow - If 2000< N_{Re} <4100 then transition/mix flow. - If N_{Re} >4100 (*) then turbulent flow
3	Entrance of new powers	This depends on the previous situation and whether the system will be driven to a multipolarity or not. There should be always an optimum number of actors to have	The more actors gain power, there is a contribution to instability due to their ambitious vision, but also because those in decline would try to secure and/or regain	G, R	ENP_j Values: j=L(Low), M(Medium), H(High).

[10] The values indicated herein are indicative and can be changed as soon as more detailed study takes place at a second stage. They are in line with the theory of Mass Transfer where Reynolds number is used to predict flow patterns in different fluid flow situations (Britannica, 2018).

		the highest level of security in the system.	their previous position before it is too late for them (i.e. before their power weakens more).		
4	External factors of the state (location, IT) (or "offense-defense balance")	The mix of other, external factors can build barriers to entry for an invader/assailant. States can increase their level of security by improving their military strength and position.	The opposite may happen also (of what is mentioned in the reinforcing effect case): the mix would benefit the conquest for an invader/assailant. A few critics (Larry 1984, Lieber 2005) do not consider it an affecting factor since they see it as unpredictable and unreasonable.	G, R	<u>L: Location</u> Values: j=cr(critical), n(normal), r(remote). <u>T: Technology</u> Values: i=0,1,2 (from low to high).
5	Internal factors within the state (innovation, local politics)	The more innovative a state, the more competitive it will be in the future and thus create a competitive advantage vs. the other states heading to a higher level of security (Mearsheimer, 2001)	It is seen that authoritarian societies (low level of democracy) tend to exaggerate on security issues and even become more aggressive than required since they try to protect their own	S	<u>IN: Innovation</u> Values: j=L(Low), M(Medium), H(High). <u>LP: Local Politics</u> Values:

			privilege and power of authority. Moreover, alliances in multipolar systems do not lead to a higher level of security (Snyder, 1997).		j=d(democracy), a(authoritarian),
6	Alliance formation (or "external balancing behavior").	Neorealists (Waltz) believe that great power tends to be balanced against the strongest state or coalition, while weak power tends to participate in a coalition. Defensive realists claim that successful alliances contribute to avoiding conquest and aggressive behavior from other states.	Developing countries/states, are seen to be more vulnerable to internal challenges, so that decision making about participating in an alliance depends on the expected support of their allies to switch their power (David, 1992).	G. R	AF: Alliance Formation Values: i=0, 1
7	Military capability	This depends on factors like: - Size of both human and material resources - Historical success stories - Nature of weapons in the state's arsenal - Soldiers' moral - Leadership		S	MC: Military Capability Values: j=L(Low), M(Medium), H(High).

		- Clear mission and strategies from the state.			
8	Institutions	Realists claim that effective institutions could eventually contribute to cooperation among states, under certain circumstances; leading to a higher level of security.	Other scholars (Grieco, 1990) believe that relative gains lead to less cooperation than expected.	R, S	IS: Institutions Value: i=0,1 j=s(strong), w(weak)

Source: (Walt, 2017), (Author, 2018)

Taking into consideration the factors demonstrated in the Table 3.5 of this thesis, then both alliance formation (AF) and local politics (LP), the level of democracy (or autocracy) in the state plays an important role in the decisions and behavior of the state being affected by internal challenges and issues.

Moreover, Mearsheimer (2001) considers three options for a state to choose when forming an alliance and they are presented from the most preferred and efficient to the least, as follows:

- Buck-passing: Leave to another state to deal with/handle the challenge and subsequent cost.
- Alliance formation: A state to participate in a balanced alliance.
- Bandwagoning: Be linked to a great power.

Realism considers security as that of "state and place particular emphasis on the preservation of the state's territorial integrity and the physical safety of its inhabitants". A nation-state is seen as secure when it is possible to defend against an external attack and resist other nation-states from urge it to change its behavior significantly or to sacrifice basic political values (Walt, 1991).

Security challenges can happen for several contemporary issues such as: non-availability of critical resources, industrialization of the developing world (i.e. China, India, SE Asian countries, African countries), increasing demand in industrialized countries, growth of population, higher living standards than in previous decades, new technology that requires more energy, modern consumer behavior to buy and consume more and from young ages, the internet of things and many more (Krishna-Hensel, 2012:1-4).

The security has been facing new challenges due to the recent globalization and some of them are also related to resources availability such as water, food and energy. The new security era is also known as "a complex matrix, fashioned by interdependencies" (Krishna-Hensel, 2012:1).

In the beginning of this section, it is seen as necessary to view and present another reference to the historical evolution of the notions of "resources" (Molchanov, 2012) which can be linked with that of security (Holmes, 2015:17-25). According to Fairgrieve (1915:3-4) during the WWI, the human history should be studies as the story of man's increasing ability to control energy".

During the evolution of the human history, the notion of "resources" has changed meaning; a useful summary of such different considerations is given as following, while the effect of such resources on the energy security is given along with the reference to the basic scholars and theorists (Molchanov, 2012:9-11).

Table 3.8

Historical evolution of resources

Period	**Resources**	**Characteristics**	**Effect to Energy Security (ES)**	**Scholars and Theorists**
Before the industrial revolution.	- initially human (manpower). - animals (horsepower). - sun, wind water.	Readily available, replenishable and almost inexhaustible resources.	No ES problem existed.	

1900s	Oil	High production rates of automotive, shipping (conversion from coal to oil) , air industry brought.	US, Britain, European countries seek for oil fields abroad.	Fairgrieve.
Colonialism	Fossil fuels (coal)	Focus on new countries rich with natural resources	Need to get access to natural resources not available at home, so more need to secure them (as energy).	Ratzel, Semple, Mackinder.
Industrial revolution, WWI, WWII	Fossil fuels (coal, oil)	Non-replenishable resources, energy intense economies, higher demand for energy		Spykman and Rollins, Weigert, Haushofer.
Neo-Colonialism	Fossil fuels (coal, oil)	Far-away energy resources and raw materials.	The ES context appeared.	Schnitzer, Falls, Strausz-Hupe.
Cold War	Fossil fuels (coal, oil), natural gas	US-Soviet rivalry, OPEC	Efforts from the nation-states to re-assert national sovereignty over resources.	Krasner, Conant and Gold.
1990s -	- Fossil fuels (coal, oil). - Natural Gas.	US invasion in Iraq in 1991 can be seen as the first was took place over oil.	Start of a unipolar moment in global politics.	Gray and Sloan, Foster, Cowen and Smith.

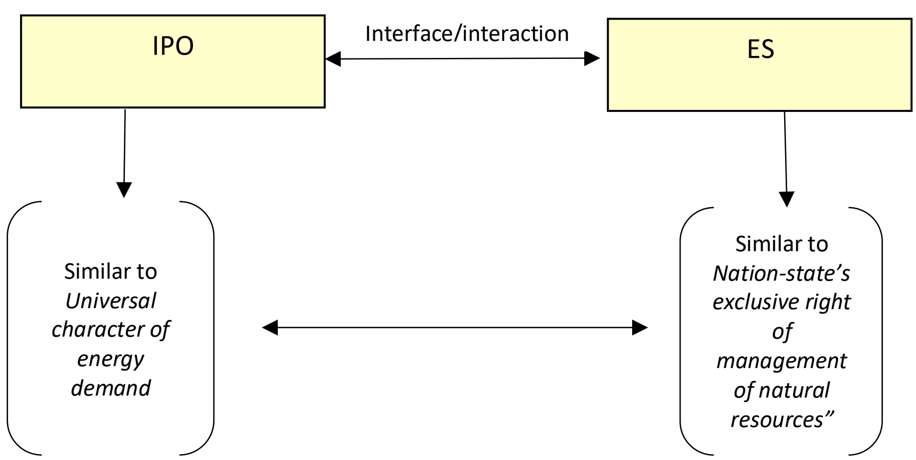
	- Renewable energy sources.			
Post 9/11	- Fossil fuels (coal, oil). - Natural Gas. - Renewable energy sources.	China an emerging polar vs USA in the global politics, emerge of global terrorism.	A political parameter reappears into the equation of energy security.	

Sources: (Molchanov 2012: 9-11), (Author, 2018).

According to Molchanov (Krishna-Hensel, 2012:3), issues related to IPE and energy security are seen as a paradox among the "universal character of energy demand" and the "nation-state's exclusive right of management of natural resources" present in its territory. In the next figure 3.24, the two parameters are represented with a short explanation and notes given to each one.

Figure 3.24

The Interaction between ES and IPO



Source: (Author, 2018).

According to Papp (2012:199-214), the latest developments and achievements in the globalized environment created the need for a different approach to understanding security and not through the previous, traditional channels that are obsolete and no longer effective. Contemporary views on a state's security requires re-focusing and understanding that a new parameter appeared after the 9/11 attack on the World Trade Center in New York, US in 2001: this parameter is terrorism. It seems that one of the major challenges and threats to a state's security will not only come from other states but also from non-states actors, in the near future. The theory of realism considers that societies expect their national governments to apply new measures and take preventive actions to deal with such new challenges and threats.

Finally, it can be said that the intellectual link between the theory of realism and the concept of security is very strong.

3.3.2 Dimensions

The next step of the study is to define the dimensions, like parameters and factors, that both national and energy security consists of and also risks related to them. In the literature, there are different views and perspectives found on this topic. The most basic of them have been selected are given as follows.

a. National Security (NS)

The concept of National Security is often defined in excessively narrow terms and taken to simply connote the preservation of territorial integrity and sovereignty of a state, as well as its core political and cultural values, against military threats from without and disruptive elements from within. Since these threats are seen to arise from the use, or threat of use, of force, national security is regarded to hinge essentially on the coercive power of the state and on the reliability and strength of its friends and allies. Accordingly, safeguarding of National Security is believed to be largely dependent upon the state's military capabilities, the efficacy of its internal security system, notably its paramilitary, police and intelligence apparatus, and its ability to forge an effective foreign policy designed to keep at bay threats from inimical foreign elements.

National Security is not only security linked with military security of a nation. Especially, after the WWII, the meaning of the national security has been widened and it has become a broaden notion including other kind of interests.

In general, there are two school of thoughts that are linked to the notion of National Security, as following:

a. American liberal internationalists: With their dedication to the United Nations and international governance, are neo-Kantians.
b. Realists tend more to the views of Thomas Hobbes (1588–1679), Hugo Grotius (1583–1645), and other philosophers who espoused the supremacy of the nation-state.

In the next table 3.9, a plethora of different categories of National Security is given, followed by a basic definition that better describes its main meaning.

Table 3.9

Categories of National Security as non-military

Category/Type	Definition
Political security	The protection of the sovereignty of the government and political system and the safety of society from unlawful internal threats and external threats or pressures. It involves both national and homeland security and law enforcement.
Economic security	The protection of the capacity of the economy to provide for the people and also the level to which the government and the people are free to control their economic and financial decisions. It also entails the ability to protect a nation's wealth and economic freedom from outside threats and coercion.
Energy and natural resources security	The level to which a nation or people have access to such energy resources (i.e. coal, oil, gas) and natural resources (i.e. water, and minerals). It can be seen as access freely determined by the market without interference from

	other nations or political or military entities for non-market, political purposes.
Homeland security	A set of local security functions especially found in USA after the 9/11 event. It includes airport and port security, border security, transportation security, immigration enforcement, and other related matters.
Cybersecurity	The protection of the government's and the peoples' IT data, systems and infrastructure from damages that can be caused by forces inside and outside the country. Therefore, it is related to national defense, homeland security and law enforcement.
Human security	A broadly defined security that includes: people's safety from hunger, disease, and repression, economic security, environmental security, food security, health security, personal security, community security, political security, and the protection of women and minorities. It focuses on social and economic effects and an assumed international "responsibility to protect" peoples from violence.
Environmental security	Conflicts caused by environmental problems such as water shortages, energy disruptions, or severe climate changes; it is assumed that these problems are "transnational" and thus can cause conflict between nations. In addition, any environmental degradation caused by man is a threat that must be addressed by treaties and international governance as if it were the moral equivalent of a national security threat.

Source: (Holmes, 2015:17-25).

In order to have the expected outcome of a high level of National Security for the state, there should first be a proper assessment of the prevailing situation in the state which is necessary to further analyze, design and act properly.

According to Holmes (2015:17-25), there should be several "criteria for what exactly constitutes a threat to national security" and a summary is given as follows:

- True threat or not?
- Can be tolerated or must be eliminated?
- Does the nation have the proper means to defeat the threat?
- Can the nation obtain the means within a reasonable time frame to make a difference and at an affordable cost?
- Is the threat external or internal?
- If internal, is it from foreign, unlawful, and unconstitutional sources and thus reasonably understood as hostile and a risk to peoples' freedoms, or is it merely an act of lawful dissent or protest?
- Are the threats man-made or natural in origin?
- Natural disasters like hurricanes can be very dangerous, but even if one assumes they are caused by climate change (which is disputable), are they threats to the nation?
- Are "threats" from the weather, disease, or lack of food due to manipulations by states or terrorist groups or natural in origin, to be dealt with accordingly?
- To what extent is the insecurity of other nations related to our own?

The following remarks can address to most of the above questions and concerns:

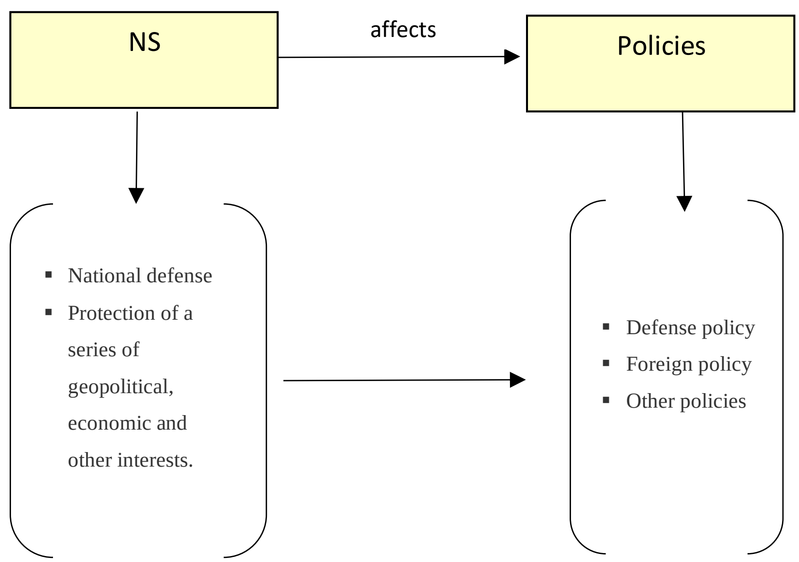
- Social/Human: Perceptions of social inequality should be taken as local concerns and not national security issues.
- Health: Even though a pandemic can cause serious problems for the safety and security of citizens it should be considered as an issue of health and local safety and not a national security issue (unless it is named as an act of biological terrorism).
- Environment: It is likely that a war can result from serious environmental causes and disruptions; i.e. water shortages can create transnational and social tensions that may lead to conflict. From the national and international security perspective, the initial causes of such conflicts are not environmental; they are political and military.
- Environment 2: Climate change is considered a "threat multiplier" since it can affect natural disasters, exacerbate conflicts, internal disruptions in the infrastructure and communities' networks.

According to Holmes (2015:17-25), "National security is the safekeeping of the nation as a whole. Its highest order of business is the protection of the nation and its people from attack and other external dangers by maintaining armed forces and guarding state secrets".

Based on the above, the next figure 3.25 represents the notion of National Security being related to the policies that need to be designed, decided on and applied by the state.

Figure 3.25

National Security



Source: (Author, 2018).

There is a version of the process on how to attain National Security based on suggestions proposed by Holmes (2015:17-25); several characteristics and parameters are used and listed in descending order of importance as follows:

- <u>Preserve</u> the safety of the nation's homeland and protect the integrity of the nation's domestic institutions and systems vital to that purpose. This goal requires strong Active, Guard, and Reserve forces as well as effective intelligence, law enforcement, counterterrorism, cybersecurity, and immigration policies to protect the homeland and secure nation's borders.

- Maintain an armed force capable of successfully completing all of the military missions assigned to it and fulfilling commitments to defend the security of the country.
- Exert nation's influence as much as possible overseas through the entire spectrum of instruments of power, including diplomacy, foreign aid, selective intelligence sharing, public diplomacy, and human rights and humanitarian programs. This requires integrating nation's diplomacy and foreign aid and humanitarian programs more closely to achieve the purposes of the national strategy.
- Focus nation's energy security policy on developing domestic resources and having an open international energy market (free from harmful political manipulation).
- Ensure that the nation's dedication to values and their promotion overseas reflects not only its own history of liberty, but also the universal principles of freedom—thus defining human rights as freedom of expression, the right of democratic self-government, economic freedom, equality before the law, and freedom from persecution and oppression. This will make other nations to support and provide help in the international arena.

The theory of realism has been criticized as having a "narrow view of national security" as having an approach that is "preponderantly focused on force" and that implies that "a nation's security hinges upon its ability to deter an attack, or to defeat it" (Chandra and Bhonsle, 2015: 337-338). Therefore, it would be helpful to update and use a complementary approach to this theory. It is important to take into consideration some additional parameters and factors that have an impact on national security of a nation state; such as globalization, climate change and economic strength.

National Security cannot be seen and explained only by military terms, as it transfers incorrect icon of reality and it can bring nation states to focus mainly on military threats while to neglect other probably more harmful risks which can consequently affect the whole security itself (Ulman, xx).

Table 3.10

Threat to national security as a sequence of events

Category	Description	Cases	Example
1	Threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state	Disturbances and disruptions ranging from external wars to internal rebellions, from blockades and boycotts to raw material shortages and devastating disasters.	
2	Threatens significantly to narrow the range of policy choices available to state and institutions and society within it.	Extension of totalitarianism and authoritarianism, which restricts opportunities for unfettered intellectual, cultural and scientific exchanges	Possible incident for the USA if Hitler or Stalin succeeded to dominate Europe. A similar, smaller case, could be fundamentalism that impacts society's freedom in several countries.

Source: (Ulman, xx), (Chandra and Bhonsle, 2015:337-359).

Based on the fact that the notion of "National Security" of a nation state is "holistic and a function of comprehensive national power" its calculation needs to be a function of "in respect of a number of countries" when they are "compared to others" (Chandra and Bhonsle, 2015:337-359).

The so-called National Security Index (NSI) measure a country's comprehensive national power and it can be consisted of the following sub-indices:

- Human Development Index.
- Research and Development Index.

- GDP Performance Index.
- Defense Expenditure Index and
- Population Index.

The factors that have been seen as “essential in order to assess a country’s comprehensive national power” are listed as following:

- Size and intrinsic resources.
- Human capital.
- Scientific and technological capabilities.
- Economic strength.
- Military power and
- Leadership quality.

As per the study, there is a need of pool of countries whose comprehensive national power will be also evaluated. Thus, each country’s National Security Index (NSI) will be considered and calculated compared to them or in relation to them. The selection of the countries that can be included in the group (pool) can be done by various options such as most important countries per GDP or countries in the same region or countries as energy producers etc. Possible source for data collection are available in the World Bank, IMF, etc.

These aforementioned indices are described in more details in the next section (Chandra and Bhonsle, 2015:337-359):

1. Size and intrinsic resources index (S&I) (NS_1): There are three indicators that characterize the index and each of them is a parameter of national strength and adds to security.
   - Total area of the country.
   - Arable land per capita and
   - Water resources per capita
2. Human capital index (HC) (NS_2): This index has been seen as “an important component in determining a country’s comprehensive national power”. There are six indicators that characterize it, such as:

- Population.
- Physicians.
- Expenditure on health as a percentage of GDP.
- Ratio of economically active population to total population.
- Literacy and
- Public spend on education as a percentage of GDP.

3. Science and Technology (S&T) index (NS_3): It is seen as a critical element in comprehensive national power since it is a main driver for development and growth of a country. The indicators that are considered for this S&T index are as follows:
   - Expenditure on science and technology as a percentage of GDP.
   - Number of personnel involved in research and development and
   - Number of patents produced in a given year.
4. Economy index (NS_4): The economy is considered an integral component of national power since there is even no nation state that can be secure if its economy is not strong and able to provide the necessary resources for a variety of functions. The indicators that are considered for this Economy index are as following:
   - Nominal GDP.
   - Nominal GDP per capita.
   - Gross national savings as a percentage of GDP.
   - Foreign reserves and
   - Public debt as a percentage of GDP
5. Military index (NS_5)**:** The indicators that are considered for this Military index are as follows:
   - Total armed forces.
   - Defense expenditure and
   - Defense expenditure per soldier.
6. Leadership index (NS_6): Leadership is considered as a major determinant of any country's growth and thus it is seen as an important parameter in its concise national power. Leadership can deal and by pass difficult challenges due to the right management and decision making.

The quantitative calculation of the leadership at a nation-state level is a very difficult task. It can be calculated in some areas of national activity and then it can be assumed that the quality of leadership found in those areas can be also reflected in others.

In this case, the Human Development Indices (HDI) for these countries as given by the UNDP is considered for the examined period. The UNDP's indices cover life expectancy, education and income.

National Security Index (NSI): Finally, the NSI is the result of the arithmetic mean, which is the "average of a set of numerical values, as calculated by adding them together and dividing by the number of terms in the set"[11]. In addition, equal weightage has been given to each factor because "each of them is uniformly important to national security" (Chandra and Bhonsle, 2015:345-348).

Assumptions and Limitations:

- Quality of country's leadership has been difficult to be evaluated and quantified, whether it is mature and wise. This means whether it has both the will and capacity to take hard and wise decisions when exercising its power. The quantitative measurement of the quality of leadership over a total "spectrum of national life is exceedingly difficult". Even though, it seems easier over some sectors of national activity provided that the quality of leadership appeared in those sectors could also be reflected in others.

- Other shortages for the calculation of the Leadership Index are that it evaluates leadership only on governance and human development related issues, while leadership applied in these sectors can be different from that applied in the sectors of defense and foreign policy. In addition, such an index is linked with the particular leaders in power at the time of measurement and it should not be used necessarily as an indicator for the future. Even if such an approach adopted herein might be debatable, leadership is seen as an important as a measure of composite national power. Further thoughts and proposals would recommend additional research of this issue aiming to develop better methods.

[11] https://www.dictionary.com/

- Soft power has not been included as a separate factor as it is difficult to objectively quantify, while some of its components are present in some of the other factors or soft power is seen as an activity and function of hard power.

- National interests and threats have not been taken into account, since both are stable enough and vary from time to time.

- Many more factors could have been included to develop the Size and intrinsic resources index but it is considered as almost impossible to develop an equivalence spread over several countries for diverse and often non-compatible resources. For example, it is not impossible to grade a country rich in iron ore reserves but without any hydrocarbon reserves against one brimming with hydrocarbon reserves but with negligible reserves of mineral assets [i.e. uranium, bauxite, others].

b. Energy Security (ES)

First of all, it is important to *evaluate critically* the available literature and thus to be able to do a *work of synthesis* (Knopf, 2006). According to Dixon (2006: 47), "Energy is the lifeblood of all societies; just as we can understand fundamental things about the human body by tracing its flow of blood, we can understand much about a society's activities by tracing its flows of energy".

Energy is "a re-emerging domestic and foreign policy field" (Kuzemco, 2014:58) and the energy policy of a country is considered "highly politicized topic" (Kaveshnikov, 2015:585). According to Pascual and Elkind (2010:1-6), energy security "will be significantly enhanced if solutions are found that take into consideration the need to balance the geopolitical, economic (energy interdependence) and environmental (climate changes) implications of energy".

As per G.W Bush's administration National Energy Policy (2002), it was clearly declared that "energy security is a fundamental component of national security and a prerequisite to continued economic growth". Further analysis and historical cases and events are described in the section named "Historical incidents" later in this study, where the close and tight relationship between energy security, national security and military actions appeared and highlighted.

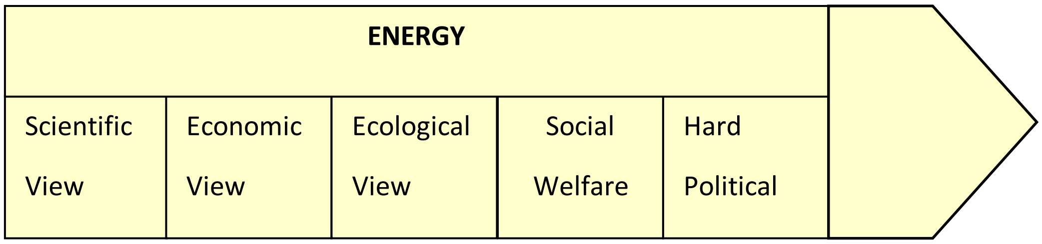
In the literature, it is found that energy can be also considered and viewed from different angles; it is important to mention them as follows (Sovacool, 2011: 6-7):

a. The scientific view: energy is seen through the science of thermodynamics where the three laws of thermodynamic describe and involve energy in their considerations. Therefore, energy is interrelated with mass and it is always breaking down to other forms and types that are of a lower class and quality. In this case, energy security is related to the avoidance of reaching lower levels of energy and become less efficient than from the beginning.
b. The economic view: energy is seen as a commodity and its price is ruled by the laws of the market, such as supply and demand. Thus, energy is considered through the different types like coal, oil, gas and electricity. In this case, energy security means ensuring that proper transactions are allowed to take place in the market to trade the several forms of energy.
c. The ecological view: energy is seen as either renewable or not. In this case, energy security means ensuring the sustainability of the system and the natural environment having in mind the issue of sustainable development that brings future causes to the community.
d. The social welfare view: where energy is seen as a social necessity for the local community and households. In this case, energy security means that energy should be reachable by all the citizens of a state without discriminations and eliminations.
e. The hard-political view: where energy is seen as a resource being available in different locations and geographical regions. In this case, energy security is seen as "a key component of national security, and correct policy becomes a matter of maintaining economic vitality and military strength".

A representation of the above analysis is given in the next diagram as in figure 3.26, where energy is linked and connected with each of these different views mentioned before:

Figure 3.26

The energy value chain



Source: (Sovacool, 2011: 6-7).

Sovacool and Brown (2015:36-42), propose eight different energy frames that describe several energy issues from a different angle and a summary is given in the below table 3.11. Every frame is linked with the parameters of analysis that might follow, the stakeholders involved, the main explanation and focus of concerns.

Table 3.11

Energy Frames

Frame	Explanation	Key proponents	Mode of valuation for energy resources	Focus of concerns
Technological optimists	Energy is merely a property of heat, motion, and electrical potential. We can design various technologies to provide it and to repair whatever damage is done.	Physicists, scientists, engineers, some politicians.	Efficiency	Inefficiency and entropy, environmental restrictions on expanded supply
Free market libertarians	Energy is a commodity, or collection of commodities such as electricity, coal, oil,	Economists, financiers, some politicians.	Price	Cartels and inefficient economic behavior; energy problems arise not as the result of imminent

	and natural gas. It is best managed by the free market.			depletion of domestic or foreign reserves, but from government policy errors exacerbated by the cartel-like actions of oil producing nations
Defenders of national security	Energy supply is a strategic resource that must be defended militarily.	Security experts, defense analysts, political scientists, some politicians.	Energy access and geopolitical stability.	Uneven geographical concentration of energy resources, political instability of producing and consuming countries, and declining availability of fuel substitutes.
Energy philanthropists	Energy services area fundamental human right.	Nongovernmental organizations, aid groups, economic development theorists.	Equity, empowerment.	Indoor air pollution, inequality, and poverty.
Environmental preservationists	Energy production and distribution can be a burden on the environmental bane.	Environmentalists, consumer and public interest organizations, (green) politicians.	Environmental footprint.	Over-consumption of energy, rapid depletion of natural resources, global climate change, and other externalities.
Justice advocates	Energy decisions must respect free, prior, informed consent, and be equitable in distribution of costs and benefits.	Lawyers, ethicists, philosophers, some politicians.	Equity, transparency.	Unfair or inequitable energy planning, forced relocation of communities living near energy infrastructure.
Neo-Marxists	The global energy system exploits class inequality.	Activists, socialists, unions, labor economists	Access especially by class.	Concentration of wealth, unfettered growth and expansion at expense of communities and

		and political ecologists.		environment, centralization and consolidation.
Conscientious consumers	We consume energy to affirm, or even realize, our social values and lifestyles.	Anthropologists, psychologists, sociologists, behavioral economists.	Convenience, cleanliness, and price	Energy illiteracy, incompatible or unsustainable values.

Source: (Sovacool and Brown, 2015:36-42).

As can be seen, the conceptualization of energy will not be the same for each frame but it will give a different perspective and approach to deal with the energy related issues. Moreover, there are often cases where a different frame is adopted by the same group of people (Strauss et all, 2013). Thus, Sovacool and Brown (2015) suggest that there should not be only one choice of the aforementioned frames but they play an informative role for the researchers, decision-makers and politicians that they can refer to. Most probably, there would be a combination of them for each distinctive case depending on the nature of the energy issue and the people involved.

It worth mentioning that "oil is considered as the most important raw material in the world, both economically and politically, and it is likely to remain the key source of energy well into the century" (Nye, 2007:237).

More specific:

a. <u>Geopolitical aspects</u> of energy security are related to:
   i) coordination of "energy-related relations" such as:
      - Competing energy suppliers.
      - Energy suppliers vs. consumers.
      - Competing consumers countries.
      - (a country that seeks to take advantage of energy-related power to command other aspects) vs. (another country).
   ii) Economic importance of energy.

    iii) Risks due to interruption of supply links.

b. Energy interdependence is related to:

    i) Producers seeking for high prices in the market ensuring that demand is not destroyed.

    ii) Consumers depend on continuous and smooth supply in order to secure enough supplies of energy for their economies.

c. Climate change is the most important "challenge for the human race" and it is considered as a "threat multiplier".

According to Fischhendler and Nathan (2014), the literature of Energy Security is mostly related to energy security as:

- A concept (Alhajii, 2007), (Kryut et al, 2009).
- A policy process (Bang, 2010).
- Accessibility of energy services (Jansen and Seebregts, 2010).
- Interplay in the global market (Gillingham et al, 2009), (Greene, 2010).

Kendell (1998) considers that vulnerabilities of an energy system are a combination of both its exposure to risks and resilience:

- Energy Security risks: They differ with respect to their time- profile (shocks or stresses) and the nature of disruptions (physical or economic).
- Resilience refers to the capacity of the actor to respond to disruptions. They can relate to specific risks such as alternative pipelines that can assist to reroute gas imports in case of problems in transit countries or to more general risks categories such as strategic storage that can provide a kind of security from shocks of supply caused by political, economic or technical factors.

The difference between risk and resilience is not always seen as obvious since there are many cases where both can only be analyzed in combination and not separately.

Furthermore, Kendell (1998) proposes that measurement of energy dependence and vulnerability can be divided into physical and economic dimensions:

- Physical measurement: They describe the relative level of imports or the prospects for shortages and disruptions.
- Economic measurement: They describe the cost of imports or the prospects for price shocks.

For long-term cases of measurement of the vulnerability, it is recommended that researchers, stakeholders and policymakers to measure the dependence, which simply gives the extent of the nation state's imports.

It was seen as necessary and helpful to study and refer to several different views that scholars proposed in the past about what would be the parameters and dimensions that ES should be consist of. For the purpose of this Thesis, a reference to the basic ones is given in the next of this section as following:

<u>a./ APERC (2007)</u>

According to Asia Pacific Energy Research Center (APERC, 2007), the notion of Energy Security can be defined by four dimensions as following:

- The Availability of resources.
- The Accessibility of resources.
- The Acceptability in regards to environment.
- The Affordability of costs related.

"Long term energy supply security is contingent on the establishment of "efficient" diversified portfolios of primary energy sources" (APERC, 2007:43).

<u>b./ Scheepers, Seebregts, De Jong, and Maters (2007)</u>

In their approach, Scheepers et al aggregated Energy Security indicators into energy security "indices" using one of the many available methods available in the academic literature. By this, they are able to reduce the variety and size of information and thus have more "user-friendly" results of an assessment. They use a relatively willful but well-defined weight to aggregate their initial indicators throughout the energy system into the "S/D index" for EU countries (Scheepers et al. 2007:31). They suggest that the "S/D index" model can be used for benchmarking and comparison purposes, for historic recent years (statistics) or for the future (scenarios)" (Scheepers et al. 2007:13).

<u>c./ Kryut et al (2009)</u>

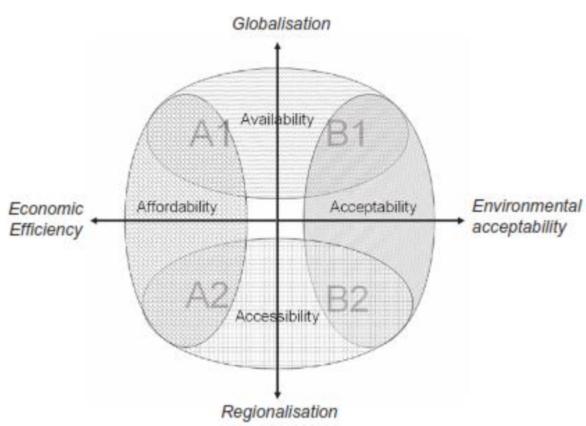
In this similar view, Kryut et al (2009) proposed that the same four dimensions that Energy Security consists of are described as follows:

- The Availability, related to geological existence.
- The Accessibility, related to geopolitical aspects.
- The Affordability, related to economic aspects.
- The Acceptability, related to environmental and/or societal aspects.

The proposed approach by Kryut et al (2009) is presented in the next figure 3.27, as an Energy Security spectrum where the four proposed dimensions of Energy Security are related with global orientations or regional ones.

Figure 3.27

The Energy Security spectrum



Source: (Kruyt et al, 2009).

d./ International Energy Agency (IEA) (2009-)

According to the IEA (2009:115), the most important dimensions of Energy Security are given as follows:

- The extent of imports, most particular those from politically unstable regions.
- The distance from production to consumption.
- The vulnerability of physical supply chains to disruption.
- The degree of fuel substitutability.
- The diversity of the fuel mix.
- The degree of concentration of market power.

e./ Jansen and Seebregts (2009)

Jansen and Seebrehts tried to approach Energy Security via a long-term view. They considered two different approaches for their study:

- Diversity-based indices.
- Supply/Demand indices.

They adopted the approach of a demand-side view that enables application of an "integrated approach" over "longer timescales" (Jansen and Seebregts, 2009: 1654). They suggested that "a growing role of resource rents is a major factor contributing to long-run risks to energy services security" (Jansen and Seebregts, 2009: 1663). In their approach, they considered as a vital energy system the end-use sectors that are also called "energy services" (Cherp and Jewell, 2013: 153).

f./ Stirling (2010)

Stirling noted "some of the principal challenges in seeking to address intractable uncertainties concerning different forms and sources of energy security". More specifically, he reviews the dangers of overemphasis on reductive aggregative "risk-based" measures that imply complete (Stirling, 2011: 167).

His analysis refers to “a particular value in deliberate diversification that remains robust, even where possibilities and likelihoods remain unknown”. He recognizes “three necessary but individually insufficient properties of diversity” such as variety, balance, and disparity. He proposes an analytical framework “for multi-criteria diversity analysis can be applied flexibly to an unconstrained array of different specialist, institutional, or stakeholder perspectives” Stirling, 2011: 168-169).

g./ Elkind (2010)

Another view of Energy Security is given by Elkind (2010: 119-148), who considered also four dimensions as follows:

- Availability, related to the ability of users to secure the amount of energy they need.
- Reliability, related to the avoidance of disruptions and failures, diversification of sources of supply, timely delivery.
- Affordability, related to the price concept and whether it can be affordable by the buyers within a period of time.
- Sustainability, related to the avoidance of any ecological, economic damage that may be caused due to the improper maintenance and over usage of the infrastructure.

h./ Sovacool (2011)

A variation of the previous one is proposed by Sovacool (2011), where there four dimensions as follows:

- Availability, related to the diversification and independence of the fuels and services.
- Affordability, related to the price concept and whether they can be affordable by the buyers within a period of time.
- Efficiency, related to both equipment and behaviorism that permit the most economically efficient use of energy to perform a certain task.
- Environmental Stewardship, related to the acceptance of energy systems by society.

i./ Bilgin (2010)

Due to the new challenges arisen in the twenty-first century, Bilgin (2010) suggested a relationship between the energy market, nation-states (both global and regional) and non-nation states. His conceptual approach takes into consideration four conditions prevailing in the twenty-first century: a more diversified energy mix, more actors involved, more challenges and new powers coming into the global arena. Thus, he proposed four dimensions for Energy Security as follows:

- Feasibility, in economic terms.
- Accessibility, for the actors to the various types of energy.
- Sustainability, in terms that actions of one actor do not harm the others.
- Transparency, in terms of openness to peer auditing of the actors.

j./ Brown et al. (2011)

Brown et al (2011) concluded research on trying to correlate actual energy policy and practice with expert views of the Energy Security concept. They evaluated an energy security index comprised of four dimensions and then indicators

According to Brown et al (2011:4), there are four dimensions that Energy Security consists of, as following:

- Availability: related to the diversification of fuels used to provide energy services but also the location of facilities using those fuels, promoting energy systems which could recover fast from a possible disruption, and eliminating any dependence on foreign suppliers.
- Affordability: related to energy services which can be affordable for consumers and at the same time aiming to avoid price variations.
- Efficiency: related to the performance of energy systems and at the same time changing consumer's behavior in order to further reduce risks.
- Stewardship: related to the protection of the natural environment, communities, and sustainability issues for future generations.

These four dimensions of Energy Security are described and linked through ten indicators and a summary is given in the next table 3.12:

Table 3.12

Dimensions and indicators of Energy Security as per Brown et al (2011)

Dimensions	**Availability**	**Affordability**	**Energy and Economic Efficiency**	**Environmental Stewardship**
Indicators	Oil import dependence (%)	Real electricity retail prices (USc/kWh)	On-road fuel intensity (gpm)	SO_2 emissions (mill tn)
	Petroleum transport fuels (%)	Real gasoline prices (US$/l)	Energy per GDP intensity (kBTU/US$GDP)	CO_2 emissions (mill tn)
	Natural gas import dependence (%)		Electricity use (kWh/capita)	

Source: (Brown et al, 2011: 3-6).

Oil import dependence and natural gas import dependence show how dependent a country is on petroleum supplies from abroad and natural gas. Oil is critical for the transportation sector while gas is one of the main feedstocks for industry use (power plants, manufacturing sector, etc).

Real electricity and gasoline retail prices have been selected for measurement on the household level since this end-user represents the main and largest energy consumer at society level.

The “energy intensity per GDP capita” indicator can be considered as important since it described the amount of energy used to produce a unit of GDP. The electricity use and on-road fuel intensity give a sense of the efficiency of the used by the end-users.

Sulfur dioxide and carbon dioxide emissions are a direct indication of a country's ability to be in line with environmental rules and obligations, while at the same time their potential effect on climate change and additional costs related to that.

k. Badea et al (2011)

According to Badea et al (2011), there are six individual indicators for the purpose of measuring Energy Security such as:

- Energy Intensity, which is defined as the ratio between the Gross Inland Consumption of energy (GIC) and the GDP of the country.
- Carbon intensity, which is defined as the ratio between the CO_2 emissions and the GIC (in tn of CO_2 per toe).
- Dependency, related to imports of specific fuels (oil, gas and coal).
- Primary production, which is measured by the Shannon-Wiener Diversity Index (SWDI)[12].
- Capacity, related to electricity generation, which is measured similar to Shannon-Wiener Diversity Index.
- Energy demand, related to transport, which is measured by the Shannon-Wiener Diversity Index.

They mentioned that when comparing different countries then they may appear at the high top or end of the ranking, which does not mean that those countries at the low end are more vulnerable on an absolute scale but in the long-term versus other countries.

l. Jewell (2011)

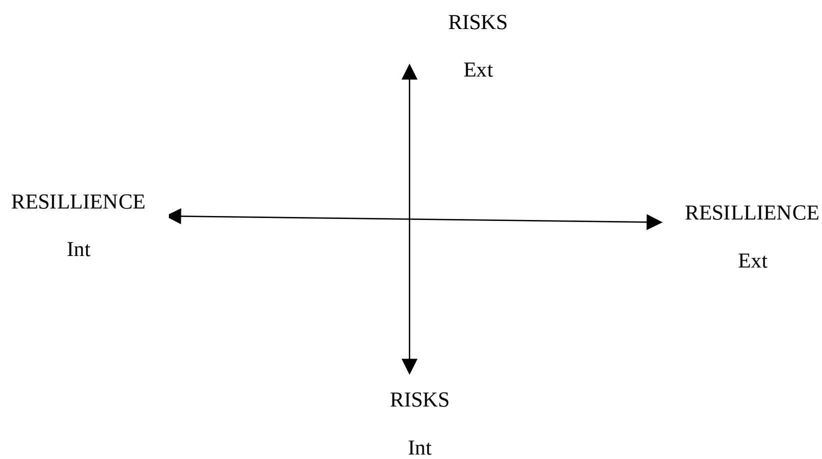
The approach of that Jewell proposed is seen as the International Energy Agency (IEA) Model Of Short-term Energy Security (MOSES) (IEA, 2017). According to that, there are four dimensions of energy security taken in consideration and it includes factors both from the external and internal environment.

[12] $SWDI=-(1/\ln(ns))\Sigma p_i \ln(p_i)$

More specific, the external factors are related to the energy that is imported into a country and local/domestic factor are related to the production, transformation and distribution of energy. In addition, both external and domestic factors reflect both risk exposure and resilience (flexibility), which is seen as the ability of an energy system to respond-adapt-or withstand- or not disruptions happened. In the next figure 3.28, the dimensions of energy security as measured by MOSES model are represented:

Figure 3.28

The Dimensions of Energy Security measured by MOSES



Source: (Jewell, 2011).

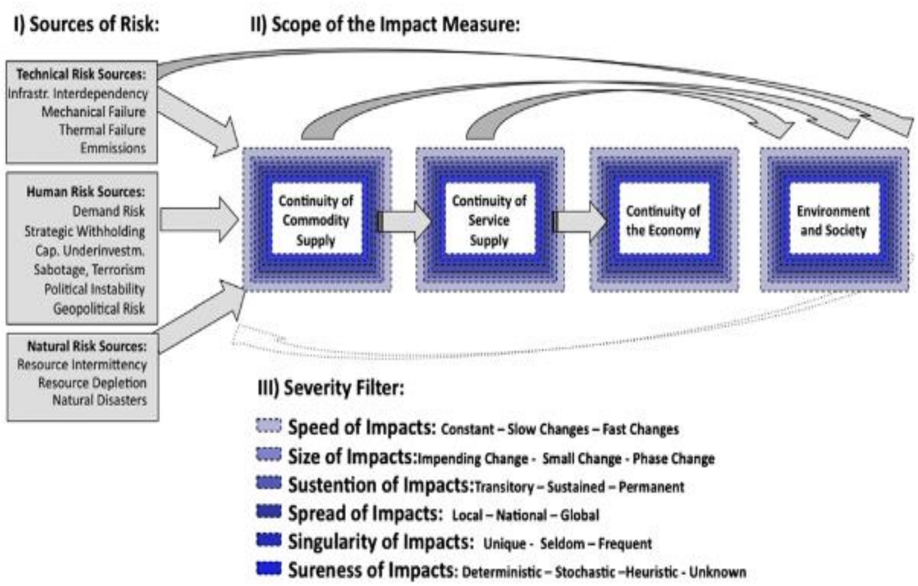
Policy makers often consider environmental issues and concerns to be constraints instead of the primary aim of nation's Energy Security. Even though such constraints are important, they are not under the lens and focus of this methodology since its scope is on short-term physical disruptions of energy supply. This model can be used in order to assess the Energy Security of a country over time and also to analyze the results of a specific policy on the nation-state's energy security status. It is seen as a first step for energy security evaluations for a nation-state and it can be supported by extra indicators related to the nation.

m./ Wizner (2012)

Wizner (2012) considered that continuity of supply, services and economy play a vital role to the sustainability of Energy Security while environmental issues along with the society are also included in the same view. In the next figure 3.29, there is a description and reference to the dimensions of energy security as per Wizner.

Figure 3.29

Dimensions of Energy Security



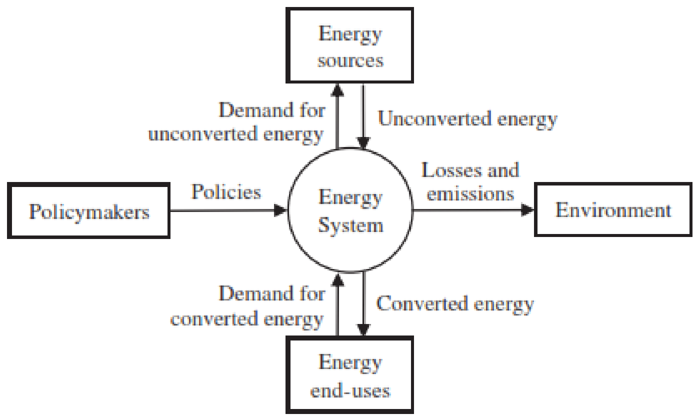
Source: (Wizner, 2012).

n./ Hughes (2012)

Hughes (2012) proposed a generic framework for Energy Security systems that can be described as follows. In this approach, the involved stakeholders are linked with the energy system of a state and the various interactions, interconnections between them and the energy system are indicated.

Figure 3.30

A generic Energy Security system



Source: (Hughes, 2012).

<u>o./ Cherp et al (2012)</u>

On the basis of his study and analysis of Energy Security issues in more than 130 countries, as in the Global Energy Assessment (GEA), it turns out that "the absolute majority of them are vulnerable from at least one of these three perspectives" (Cherp et al, 2012: 327).

They examined Energy Security of an energy system from three perspectives described as robustness, sovereignty and resilience. These perspectives are related and linked to a variety of sciences such as political studies, natural science, engineering and economics and thus they are seen capable of studying different types of threats and risk minimization strategies. A short reference to the perspectives of energy security is given as follows (Cherp et al, 2012:327-330):

- <u>Robustness</u>, is defined as sufficiency of resources, reliability of infrastructure, and stable and affordable prices. The robustness strategies are most prominent when disruptions of energy systems are both controllable and predictable.
- <u>Sovereignty</u>, is known as protection from potential threats from external agents. It means "the ability to control the behavior of energy systems and is often linked to what is seen as

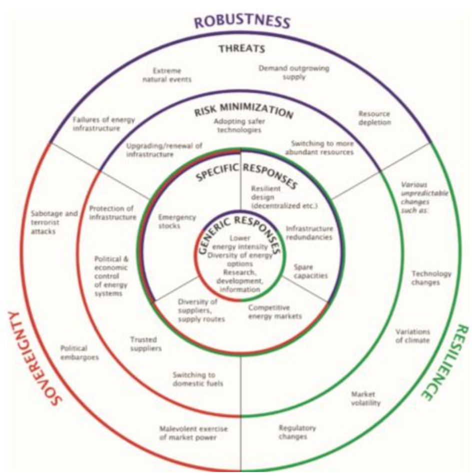
"energy independence". Sovereignty strategies are focused on disruptions arising from forces outside of our control (these can be more or less predictable).

- <u>Resilience</u>, is considered as the ability to withstand diverse disruptions that are caused by "less predictable factors of any nature, such as political instability, game-changing innovations, or extreme weather events". Resilience strategies work in situations of unpredictability, independently of whether or not we have control over energy systems.

In the next figure 3.31, these three perspectives on Energy Security are represented in relation to basic assumptions regarding the nature of potential disruptions.

Figure 3.31

Perspectives on Energy Security



Source: (Cherp et al, 2012)

In this framework of analysis of Energy Security, they considered Energy Security as "the protection from disruptions of nationally vital energy services" and his "analysis aims to identify globally predominant national energy security concerns rather than to compare or rank countries as more or less secure" (Cherp et al, 2012:334).

Such vulnerabilities of primary energy resources are presented in the following table 3.13:

Table 3.13

Vulnerabilities of primary energy resources

(Cherp et al, 2012:327-330):

Energy security perspectives	Robustness		Sovereignty		Resilience
Globally traded fuels					
	Global R/P ratio	Projected demand growth 2008–2035*	Share of international trade in global production in 2009	Number of people (billions) in countries with import dependencies over 25/50/75%	Diversity of global producers by region, SWDI
Oil	30 yr.	15%	66%	5.3/3.6/3.1	1.63
Gas	80 yr.	44%	29%	2.2/0.75/0.65	1.84
Coal	150 yr.	19%	14%	1.3/1.1/0.70	1.92
Other energy sources					
Nuclear	Aging of nuclear power plants; sensitivity to political interventions		Concentration of enriched uranium and reactor manufacturing technologies; nuclear fuel cycle controlled for non-proliferation reasons		Generally large facilities; difficult to substitute in case of failure
Hydro	Sensitivity to water availability; vulnerability to climate change in some regions.		Hydroelectric facilities located on internationally shared rivers		In certain cases extremely large facilities providing majority of electricity of certain countries
NRES	High initial costs; intermittency of supply		Technological dependencies; potential import dependencies for biofuels		Generally assumed to be higher than in the case of traditional sources due to distributed generation and more diverse energy mix

Source: (Cherp et al, 2012:327-334), (IEA, 2010).

Moreover, GEA suggests that energy systems can contribute to global goals such as poverty reduction and stability of climate provided that they would are “radically and rapidly transformed”. The GEA approach can be seen as “a holistic and integrated perspective” that takes into consideration most of “the objectives simultaneously”. Cost-effective climate-pollution-security policies can provide” substantial co-benefits, in terms of costs avoided and the achievement of societal objectives for sustainability”.

Although the GEA pathways have shown that such a transformation is in principle technically possible, the task remains extremely ambitious and will require rapid introduction of policies and fundamental political changes that lead to concerted and coordinated efforts to integrate global concerns, such as climate change, into local and national policy priorities such as health and pollution, access to clean energy, and Energy Security.

p./ Cherp and Jewell (2013)

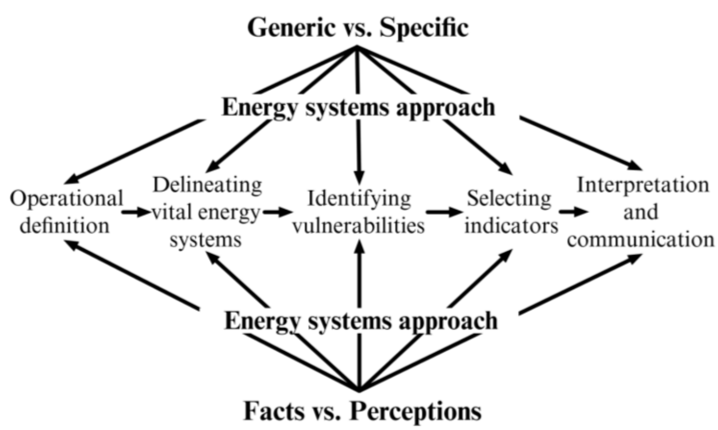
In their review of the Energy Security concept Cherp and Jewell (2013) considered three aspects of energy security which in brief are described as follows:

- Robustness, which is related to adequacy and reliability and infrastructure.
- Sovereignty, which is related to exposure to external threats.
- Resilience, which is related to ability to respond to diverse disruptions.

The assessment framework that they propose does not include indicators as the main tool of measuring Energy Security but their efforts and focus are concentrated on "how to make transparent and informed choices at five distinct stages of an Energy Security assessment".

Figure 3.32

Energy Security assessment framework



Source: (Cherp and Jewell, 2013:168).

The proposed sequence in decision making is as following:

i. Selection of Energy Security definition.
ii. Delineation of vital energy systems.
iii. Identification of vulnerabilities.

iv. Identification and selection of indicators that reflect the identified vulnerabilities (not necessary measure!).
v. Interpretation of indicators and outcome.

They believe that an effective energy security assessment is” specific enough to reflect context-specific issues” and “generic enough to enable sufficiently wide comparison”. Furthermore, such an assessment is based on “hard facts, not opinions” while “still responding to perceptions and policy priorities”. Finally, they claim that “there is no blueprint for achieving the optimum level (Cherp and Jewell, 2013:149).

q./ Zelli and van de Graaf (2016)

Zelli and van de Graaf (2016:50-54) proposed four “interconnected dimensions or prioritized components” of energy security, as follows:

- Availability, linked to the relative interdependence and diversification of energy fuels and services.
- Affordability, linked to both low and stable prices of fuels.
- Sustainability, linked both to the natural environment and depletion of non-renewable resources as well.
- Social acceptability, linked to human rights and dignity of citizens and groups.

r./ Global Energy Institute

The International Index of Energy Security Risk aims “to allow comparisons of energy security risks across countries and country groups, and how these risks change over time”. The International Index measures energy security risks in two ways: (1) in absolute terms; and (2) relative to a baseline average of OECD countries (Global energy institute, 2018).

Each score for a country is related to an average reference index measuring risks for the Organization for Economic Co-operation and Development (OECD) member countries. This OECD index is calibrated to a 1980 base year figure of 1,000.

The highest (best) rank has the lowest score and the lowest (worst) rank the highest score. As higher the numerical score (index) the more risk for the related country. Energy security risk scores for the large energy user group countries show a variety of trends over the years.

The history of the average country in the large energy user group saw its total risks:

- In 1980s: decline.
- In 1990s: level out. This is considered as one of the best for energy security risks.
- 2000s early: increase.
- 2000s late: stabilized.
- 2010: declined sharply.
- 2011-2016: The decline in risk since 2011 was mainly due to a lower volatility of the price of crude oil; this risk is seen to increase for the next few years due to the suddenly decrease of crude oil prices from 2014 until 2016. Whether the expected rise in volatility is enough to drive total risk scores higher needs to confirmed.

It is important to mention that there is almost no country that has good or bad results in all the categories but there is a mix of scores in each of them. In addition, it is also important to indicate that there might a country that has a very good score in the Index but at the same can have sometimes have significant energy security challenges.

The individual Energy Security measures were summarized in eight sections that represent and balance some key and often competing aspects of energy security, which are the following:

- Global Fuels.
- Fuel Imports.
- Energy Expenditures.
- Price and Market Volatility.
- Energy Use Intensity.
- Electric Power Sector.
- Transportation Sector.
- Environmental.

Using these sections, then 29 individual metrics were designed to capture the whole prism of energy supplies, energy end uses, generating capacity, operations, and emissions. There are 29 metrics used in the International Index:

- 9 are "universal" metrics that can be applied equally to every country (i.e. the price of crude oil) and
- 20 are country- related.

The idea behind the assessment of risk and security is to be able to foresee a probability of an energy shock and its consequences for the economy and a country. By using past data for the metrics already described, some of them are mandates for things that cannot be measured directly.

For example, the International Index of Energy Security Risk uses civil and political measurements to measure the political stability of a country and furthermore its reliability as an energy supplier and/or trading partner. However, if countries perform poorly in these metrics it does not necessarily mean that they were unreliable suppliers in the past or necessarily will be unreliable suppliers in the future. However, it does mean the risks of a disruption are higher in countries that do not score well in this metric when compared to countries that do.

For each country, there are 29 metrics, each with a time series value that was normalized into a risk measure where the OECD 1980 equals 1,000. For each country and each year, the 29 metrics are weighted as per Table in the Appendix B. The risk index for a country in any given year is then the sum of the metric values, each multiplied by its assigned weighted share.

The primary data source for the International Index is the EIA's International Energy Statistics database. In addition, other data come from organizations such as the World Bank, IEA, OECD, and others.

One important data series is a country-by-country measure of freedom over time. Freedom House is an independent nongovernmental organization that has developed matrix indices for political rights and civil liberties that can provide a measure a freedom for most countries in the world (Freedom house, 2017). It is based on the basic fact that countries that promote the greatest degree of political rights and civil liberties are more likely to be politically stable and reliable trading partners and by this are less likely to join cartels or use oil supplies to achieve geopolitical aims.

As it is known, there are always limitations on the available data that can be used and this brings the needs “to balance between the theoretically ideal and the realistically possible”. “Not every risk metric can be measured with solid data, but that does not mean that less-than- perfect data cannot be used provided its usefulness and limitations are well understood”. Even data we commonly view as reliable (i.e. GDP, interest rate, unemployment rate, etc) are themselves developed from samples and extrapolations, and are best thought of as estimates rather than complete compilations. These issues are magnified when dealing with international data. For this reason, the approach that was finally decided to develop the International Index tried “not to let the perfect be the enemy of the good” (Institute for 21st Century Energy, 2017).

s./ World Energy Council (2017)

The World Energy Council (WEC) [13,14] proposes an index of Energy Security of a country which is the outcome of combination of several parameters. According to the WWEC, “energy security is considered as one of the dimensions that comprises energy trilemma”, while the other two dimensions are energy equity and environmental sustainability.

Furthermore, Energy Security of a country is considered to be a “composite indicator” (Badea et al, 2011) and it is a function of the following individual ES indicators (ES_i) (WEC, 2017):

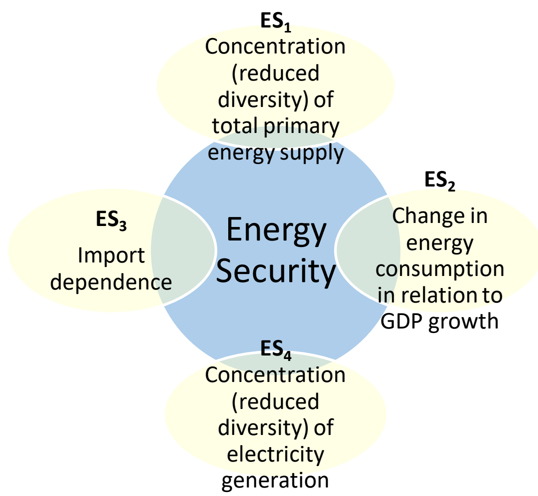
- ES_1: Diversity of total primary energy supply[15].
- ES_2: Energy consumption change in relation to GDP growth.
- ES_3: Import dependence.
- ES_4: Concentration (reduced diversity) of electricity generation.

[13] https://www.worldenergy.org/data/
[14] https://trilemma.worldenergy.org/
[15] : contributor of energy sources to total primary energy supply, indicating current resilience on fossil fuels or other energy sources in the energy sector (IEA, 2013).

A graphical representation of the ES structure as proposed per WEC model is also given in the following figure, where the size and Figure of each circle/bubble is indicative and it should not be taken into consideration for comparison between the reported parameters in the figure 3.33:

Figure 3.33

Energy Security of a country and individual ES indicators



Source: (Author, 2017), (WEC, 2017).

As per the method adopted by the WEC, the energy security index is measured for each country and the its final ranking among the others can be given for a series for over a series of time [i.e. 2011-2017]. Then, it is possible to compare the results with some fundamental parameters like GDP, population change, military expenses, etc. It is a method that it is suggested to be used for a long-term analysis of country's energy security [and not short-term or snapshots of it].

For this reason, there could be also a forecasting tool that could be possibly designed in order to be used for research and forecasting purposes along with the prevailing statistical methods such as extrapolation; it is the action of estimating or concluding something by assuming that existing trends will continue or a current method will remain applicable (https://www.dictionary.com/browse/extrapolation). Thus, it one can change the values of the sub-indicators and see the outcome and effect on the value of the energy security index. Thus, it would be easier to understand the weight that each sub-indicator plays or contributes to the total indicator of energy security.

The model that is proposed by WEC has some advantages since it captures and encapsulates the important parameters already seen in the previous models, while at the same time the ES indicators (ES_i) recommended for use can be measured and calculated based on data for a country. Thus, such ES indicators (ES_i) are not dimensionless but they can be finally characterized with the dimensions that they can be measured. In the following table 3.14, the summary of each of these ES indicators (ES_i) with its dimensions is given:

Table 3.14

ES indicators (ES_i) of a country's Energy Security

ES_i (i: 1-4)	**Description**	**Dimensions**	**Remarks**
ES_1	Diversity of total primary energy supply.	Toe/US$	Availability, which is usually related to geological existence.
ES_2	Energy consumption change in relation to GDP growth.	MJ/$2011 PPP GDP	Affordability, which is usually related to economic aspects. Impact on the economy and correlation with the GDP of the country.
ES_3	Import dependence.	% of energy use	Accessibility, which is usually related to geopolitical aspects.
ES_4	Concentration (reduced diversity) of electricity generation	Oil, gas and coal	Acceptability; less or more concentration impacts. environmental and/or societal aspects.

Sources: (WEC, 2017), (Author, 2018).

where,

- Toe: Tonne of oil equivalent (Toe) Unit representing energy generated by burning one metric ton (1000 kilograms or 2204.68 pounds) or 7.4 barrels of oil, equivalent to the energy obtained from 1270 cubic meters of natural gas or 1.4 metric tons of coal that is, 41.87 gigajoules (GJ), 39.68 million Btu (MMBtu), or 11.63 megawatt hours (MWh)[16]
- MJ (Mega-Joule): a unit of work or energy equal to one million joules.[17]

For this purpose, it is necessary to have the data of those parameters and then to see whether there is any strong correlation between each one of them and the ES.

Based on the aforementioned analysis regarding the dimensions that ES can consist of, a summary is given in the next table 3.15 so it would easier to compare and extract any further conclusion:

[16] http://www.businessdictionary.com/definition/tonne-of-oil-equivalent-TOE.html.

[17] https://www.collinsdictionary.com/dictionary/english/megajoule.

Table 3.15

Summary of the dimensions and parameters of ES

Parameters/dimensions	APERC (2007)	Kryut et al (2009)	IEA (2009)	Elkind (2010)	Sovacool (2011)	Belgin (2010)	Brown et al (2011)	Badea et al (2011)	Wizner (2012)	Hughes (2012)	V.d Graaf & Zelli (2016)	Inst 21st cent (2017)	WEC (2017)
Secure/ Continue of Supply	√	√	√	√	√	√	√	√	√	√	√	√	√
Security of Services				√	√				√			√	
Security of Economy	√	√	√	√	√	√	√	√	√		√	√	√
Environment	√	√	√	√	√	√	√	√	√	√	√	√	√
Society / End-users	√	√		√		√		√	√	√	√	√	√
Policymakers										√			
Substitutability			√		√		√						√

Vulnerability	√		√										√
Geopolitics		√	√									√	√
Transparency						√							

Source: (Author, 2018).

Apart from the aforementioned approaches and views regarding the dimensions that Energy Security can consist of, there are several contemporary challenges and risks that Energy Security is currently facing. According to Sovacool (2011, 2-3), there are "set of threats" at three different levels that can be summarized in the below table 3.16:

Table 3.16

Set of threats for energy security

Level	Set of threats	Comments
Macro	Issues like geopolitical struggles over resources, transboundary environmental pollution, and climate change.	Global energy security can be further divided in three areas: a. Geopolitical and war. b. Global trade and investment barriers. c. Transboundary externalities (i.e. climate change and environmental).
Meso/Medium	There are technology-based energy systems, either vertically or/and horizontally integrated: energy technologies and fuel chains present risks linked to nuclear energy, fossil	They are caused by multiple scales, or events occurring at the local, community, state, national, regional, and global levels.

	fuels, hydroelectric power and small-scale renewable energy.	
Micro	The level of individuals and households; exploring the linkages between energy poverty, pollution, equity, and access to energy.	They refer mostly to unrestricted access to energy services for all, energy poverty, and pollution. They are mainly seen in developing countries.

Source: (Sovacool, 2011).

From another perspective, the basic characteristics of Energy Security and important challenges that can be expected to be dealt with in the next period are given in the following table 3.17.

Table 3.17

Characteristics and challenges for energy security

Characteristics	**Challenges**
Reciprocity: the security of demand is of the same importance to producers as the security of supply is to consumers.	The United Nations (UN) climate change negotiations and the importance of reaching an agreement that is comprehensive, balanced and equitable for all.
Timelessness: security should cover all foreseeable time horizons; security tomorrow is of the same importance as security today.	The role and impact of financial market speculation on the oil market.
Universality: applicable for any country (rich or poor), focusing on the three pillars of sustainable development and the eradication of energy poverty and the provision of modern energy services.	Human resource requirements and potential staffing shortages.
	The need for continuous improvements in data.

Source: (Sklias, Roukanas and Flouros, 2016).

In addition, there are “different severity filters” found in the literature” to define a threshold which the impacts need to exceed in order to count as a threat to energy security” (Wizner, 2012).

c. Energy Security (ES) and National Security (NS)

As in the literature (Molchanov, 2012:11-12), power is mainly a function of a nation-state’s “material capabilities”, the basic of them are given as below:

- Economic level.
- Technological level.
- Efficiency of its army (size, equipment, quality, stamina, leadership, determination).
- The extent of its command of the material world.

Thus, the international political economy has to take into consideration the possession of the materials of a nation-state:

- Demographics.
- Natural resources.

It is in natural resources where energy plays a major part, maybe the most important one. Moreover, “the question of energy security intrinsically points at the question of the nation’s relative power” (Molchanov, 2012: 12). There are “national security concerns” for a country about “vulnerability to supply disruptions” of critical energy resources (Hensel, 2012: 129).

According to Fairgrieve (1915: 330-340), the main pillar of International Relations is strongly described and characterized by the physical location of the “strategic resources of energy” on Earth. In addition, the management and overrule of energy is a function of:

- Limitations of the physical location where the energy sources are available.
- Distribution channels of energy carriers.

Energy Security is seen as “one of the most important strategic challenges facing the US and the world” and moreover Energy Security “cuts across many sectors” such as economic, environmental and “national security”. There is an ongoing discussion and exchange of energy security both in “regional and global contexts” (Krishna-Hensel, 2012: 2-4).

Energy security is regarded as the ability of a state to “control energy” and energy reserves are subject to “uneven spatial distribution in the world of states”, then it is obvious that “the state that controls substantially more energy than it needs and can assert its rights over resources will always be able to punch above its weight” (Molchanov, 2012: 27).

According to Hensel (2012), natural resources and consequently energy needs to be viewed and managed both from economic and national security perspective. She considers that the contemporary global environment and the recent globalization brought about many dependencies on critical resources that in most cases are imported to the nation-states (and thus not available locally). This affects national security because any shortage and/or break of the supply of such critical resources would eventually disturb and cause serious problems to many “vital sectors of the economy of the defendant state” (Krishna-Hensel, 2012: 4-6).

Provided that global oil production starts dropping or even worse is interrupted, then this will “lead to conflict over supplies”. There are nation states (i.e. Saudi Arabia, Russia, Venezuela, Iran, etc) that “use oil as a lever in international relations” in order to claim for power and secure their own “national objectives” (Krishna-Hensel, 2012: 2). The secureness of energy resources for the society like “domestic industrial and household” is of “central” subject in the context of “national security and economic diplomacy, long-term developmental plans and foreign policy strategies” Molchanov (2012: 9).

The National Security of a state is linked with the “question of energy security” and they cannot be “disengaged”. From the beginning of 20th century, the war operations (WWI, WWII, regional conflicts) have required huge amounts of energy which resulted into energy security to be considered as “a subsystem of a modern national security complex” (Molchanov, 2012: 9-30).

Energy Security is strongly related and some times even defined by the ability of the nation-state to secure access to energy in order to efficiently perform (Molchanov, 2012: 11-12):

a. Its military and defense obligations (external environment): Measured by the success to pushing back any invader and nurturinge alliances with other nation-states.
b. Its civilian obligations (internal environment): Measured by the economic growth and social welfare of the nation-state in comparison to others.

In the recent era and after the 9/11 terrorist attack, governments of nation-states have refocused attention on their national interests now facing the challenge of instability due to several cases of conflict such as:

- Civil wars.
- Coups d'etat.
- Terrorist activities such as kidnapping oil workers (Nigeria), blowing up pipelines and infrastructure (Iraq, Libya).

These are non-state actors with different pursuits and priorities, such as:

- Terrorist networks, present not only in one country; their aim is to disrupt and interrupt the supply to several regions because of their ideology (one may refer even to clash of civilizations).
- Corporations, mostly based in the oil importing countries; their aim is availability and accessibility of energy resources.

According to Belgin (2012: 31-32), Energy Security is related to several different types of actors: individuals, states, societies, non-nation states, alliances, institutions either on a regional or global scale. It is seen that "concerns regarding energy security provoke conflicts and promote cooperation both of which stem from priorities of nation states". Finally, he indicates different levels for considering the topic of Energy Security: national, regional, international, transnational, global.

d. Energy Security and the Environment

Due to several contemporary challenges (growth of population, rapid industrialization and energy demand of developing countries, urbanization, etc), both energy security and climate change are "emerging as two of the world's most complex policy challenges" (Sovacool, 2012: 94).

According to Molchanov (2012: 10) Energy Security issues "lie at the intersection of the traditional security concerns and environmental" problems mainly due to climate changes and resource scarcity. According to Sovacool (2012: 93), Energy Security and climate policy "share common goals" while at the same they may be competing each other. There is a need to "find a bridge" between them, since a unappropriated policy mix would bring severe results for the "economy, geopolitical stability and the environment".

It has been widely discussed and agreed during the last summits that took place about the global climate (i.e. Kyoto, Paris, etc.) that serious decisions need to be taken urgently by the countries all over the world in order to prevent the temperature on the planet from increasing more than two degrees Celsius from its current level (IEA, 2009: 198).

In order to achieve such a challenging goal there have been several targets set for the different actions and policies taken by the countries. However, the expected results were not - and they are still not – easy to achieve. On the contrary, most – if not all – of such action items which were expected to contribute to the protection of the climate seem to have had a negative effect on the energy security aspect.

A short summary is given in the following table 3.18 where it is clearly indicated the pros and cons of actions trying to protect the climate.

Table 3.18

Countries' policy decisions regarding Climate Change

Policies for Climate Change		
Actions supporting	**Positive expected result**	**Expected drawbacks on ES**
Reduce use of Coal.	Immediate reduction on GHGs emissions.	Negative effect on the economy of countries with plenty of coal.
Reduce the use of unconventional fuels (i.e. shale gas in US).	Immediate reduction on GHGs emissions.	Increase the degree of dependence on Middle East countries for oil.
Increase use of NG in the energy mix of the country.	Clean energy fuel and thus no GHSs emissions.	Increase the relative power of countries such as Russia and Iran (>50% of global reserves).
Meet and exceed the 450ppm CO_2 target.	Desirable, since this would is the ultimate goal.	Severe impact on energy prices.

Source: (IEA, 2009), (Hartley and Medlock, 2008), (Kryut et al, 2009).

Most of the efforts made by governments were to reduce the emissions of greenhouse gases (GHSs) which finally proved not to be so easy for several reasons. The recent discussion and directions from scholars, institutions and experts refer to energy efficiency, instead.

More specifically, energy efficiency can be supportive to both policies – Energy Security and climate change – since it is the process that is related to ensure less energy consumption in order to produce the same (or even more) of the expected outcome:

Figure 3.34

Energy efficiency as a function of energy security

$$\frac{\text{production outcome (A)}}{\text{energy in various forms (electricity, mechanical by diesel engines, etc) (B)}} = \text{energy efficiency}$$

Source: (Author, 2018).

In the above figure 3.34, it is easily seen that:

- The more the (A) is, which means more outcome in terms of work and/or services the better for the ratio and thus for the final result which is energy efficiency.
- The less the (B) is, which means the energy consumed and needed for the above completion of the outcome, the higher the figure of the ratio and thus the desired energy efficiency.

Table 3.19

Options for the higher energy efficiency

Energy efficiency through different energy sectors			
Energy Sector	**Characteristics**	**Expected contribution to energy efficiency**	**How to implement**
Building	40% of energy use (ave)	Reduction of GHGs by 1.4 Gt/yr by 2030	Use of different building materials
Transportation	60% of global oil consumption	Reduction of GHGs by 1.4 Gt/yr by 2030	Change the standards and quality of all type of fuels
Electricity	50% of energy use (ave)	Reduction of GHGs by 1.2 Gt/yr by 2030	Use of proper lighting technology.

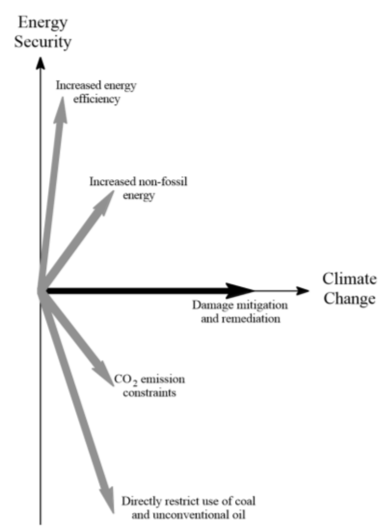
Source: (IEA, 2009).

As per above table 3.19, there are several options that energy efficiency is increased. At the same time climate policy targets have been set by global community. However, there is a serious and difficult obstacle to overcome and this is the economic cost and time. It would need a huge amount of capital investments that many countries just cannot afford; in addition, time also affects such expectations since it is not feasible to achieve such big changes overnight but on the contrary, it will take years while in the meantime the effects on the GHSs will continue. According to Hartley and Medlock (2008:15), “energy efficiency improves gradually as firms and consumers seek to reduce the operating cost of energy-using capital equipment”.

A summary of the aforementioned discussion can be graphically presented with a vector diagram that was proposed by Hartley and Medlock (2008: 23-27).

Figure 3.35

Options to achieve energy efficiency and Energy Security



Source: (Hartley and Medlock, 2008:24).

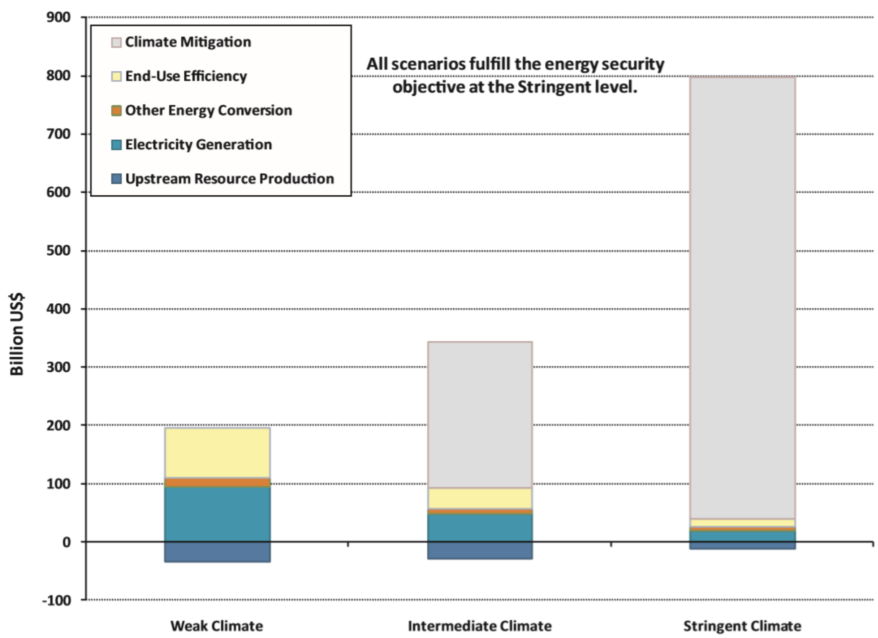
In this diagram, both targets are represented on the y-axis and x-axis and accordingly are:

- Increased Energy Security.
- Improved conditions for less negative results on climate change.

The options that are represented by grey vendors in the upper right quartile are expected to contribute positively to both policies (energy security and climate change). As more the options are seen in the lower right quartile, the costlier and against the energy security of the actor the results will come. An optimum solution is required that will address both concerns and will be feasible to be implemented in a reasonable period. In the following figure 3.36, the relationship between global annual energy security investment, climate change and mitigation costs for several climate policy scenarios (weak, intermediate and stringiest) by the year 2030 are given graphically.

Figure 3.36

Global energy security investment per year and the climate change mitigation costs for several climate policy scenarios



Source: (Riahi et al, 2014).

As per the above graph, three different pairs of scenarios can be considered having as a design parameter the fact that the scenarios in each pair fulfill the climate objective to the same degree (weak, intermediate or stringent). The difference between these scenarios is the level at which the two scenarios in a given pair satisfy the energy security objective; thus, the difference in their costs represents the added costs of security.

For example, considering the weak climate scenario, the cost related to the globally accumulated energy system investment per year is around US$160bill and when other scenarios of Intermediate or a Stringent Climate are considered then the same cost is significantly drop to US$64 billion and US$28 billion/year, respectively. The security policy which is implemented at the nation-state level boosts extra investment costs at the end-use level but it causes less global investment needs for upstream energy extraction in areas like coal mining and oil production (Riahi et al, 2014).

Even though climate policies add to the total energy cost, due to the fact that they support energy efficiency and conservation and thus it is possible to have reduced needs for additional security investments.

Costs related to climate change mitigation include all costs related to:

- Investments in low-carbon technologies.
- Demand reduction (energy efficiency investments and conservation efforts).
- Non-energy GHG mitigation measures.

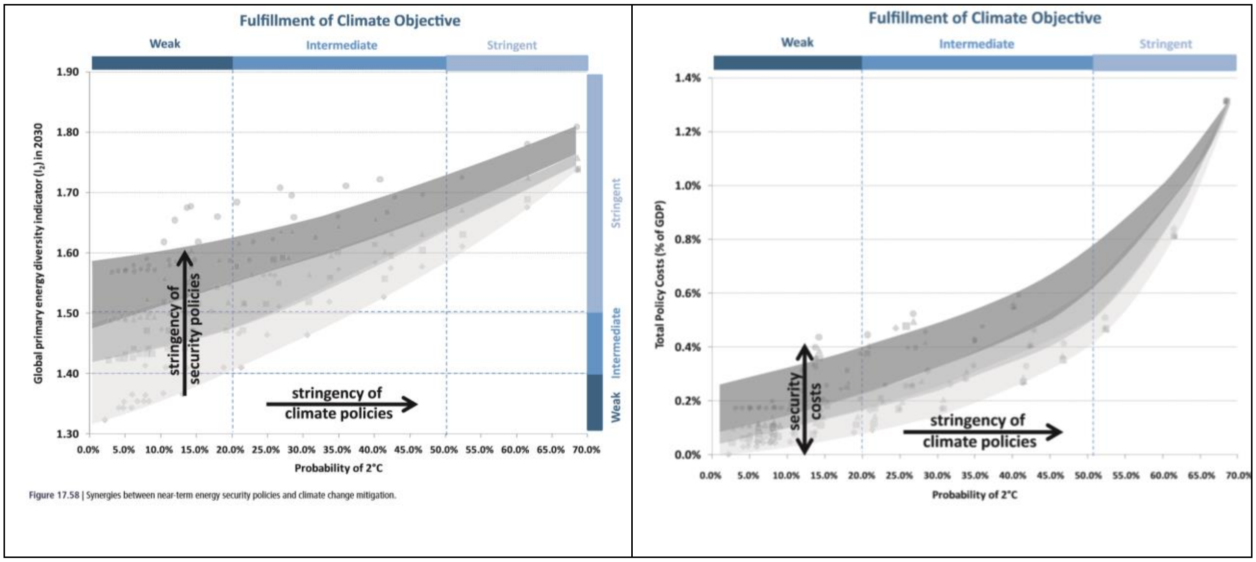
Thus, even though these costs are not small, but are on the contrary significant, because they assure "more comprehensive than that shown for security, which captures only investments".

In conclusion, the aforementioned relationship of climate-pollution-cost should be considered from "a holistic and integrated perspective" and thus "the combined costs of climate change mitigation and energy security come at a significantly reduced total energy bill when the benefits of security are properly factored into the calculation of GHG abatement strategies" (Riahi et al, 2014).

In the next diagram, two figures are presented together precisely because they are very relevant to each other.

Figure 3.37

Total global policy cost when both energy security and climate change targets are achieved



Source: (Riahi et al, 2014).

The first figure (left) represents the relationship between security and climate objectives in 2030 as a function of the probability of staying below the 2°C warming target. The second figure (right) shows gives the probability of meeting the 2°C target versus cumulative total global policy costs (as % of global GDP) during 2010-2030. From both these figures, the effect of decarbonization and reduced import dependence is seen.

As per the above second figure (right), when considering the weak option (that means the climate change is a relatively low priority), then security costs can increase total system costs by as much as 0.2 percentage points. On the contrary, when considering the stringent option (which means climate change is of relatively high priority), then "added costs of security approach zero".

Whenever an effort to boost and achieve both the climate and security targets made, it increases the total energy system costs. It is also important to mention that the higher level of decarbonization the lower the cost of security which gives a good idea that the two targets are interrelated and there are "synergies and multiple benefits" to them.

When nation-states and unions are after strategies to mitigate climate change and apply proper policies that support local supplies instead of imports, the diversity of their energy resource mix is normally increased.

3.3.3 Historical Incidents

For one's easier reference, it may be useful to consider a historical view through three (3) different period, as following:

- Before Westphalia era: It was believed that there were existed a universal principle governing the affairs of states led by kings, princes and religious leaders. It was seen that peace and stability could be achieved and maintained if the communities were not attacking each other because of some universal principle like the religion.
- After Westphalia: The Peace of Westphalia (1968) brought the belief that "the nation-state had sovereign control not only of domestic affairs such as religion, but also of external security". The philosopher Immanuel Kant (1724–1804), challenged this idea and he brought back the universal principle idea not as per the old religious approach, but through a more secular view inspired by the Enlightenment. Kant expressed that of nation-states should be replaced by a new enlightened world order and they should "subordinate their national interests to the common good and be ruled by international law". Thus, the secular view of supranational institutions governing international affairs appeared.
- Today: The idea of the nation-state is commonplace.

Further to the analysis given in the previous chapters and sections of this thesis, several important cases and events related to energy issues and tensions/conflicts occurred in the history so far. An indicative list of the major historical events after the twentieth century has been prepared for the purposes of this Thesis. However, there are numerous other cases and incidents in the history that can consist major part of series of books by only to referring to them. Finally, a selection of the major ones is presented as following (Sklias, Roukanas and Flouros, 2016):

- During the World War I (WWI), Britain changed the type of fuel in its from coal to oil and by this succeeded to reach a tactical/strategic advantage as a country (Yergin, 1988). It was the time that Britain's decision to switch to oil-based navy made its navy "converted from coal to fuel oil in 1910", mostly driven by Winston Churchill who was "deeply concerned with the rising power of Germany's coal based nany" (Bilgin, 2012).

- During the World War II (WWII), oil was the main means of fuel and thus energy security was a bigger notion which also included industrialized services that were more reliant on motorized transportation (Cherp and Jewell, 2011). As per Bilgin (2012: 37-38), Germany "lost the war partially because it failed at securing oil supplies" while at the same time "Japan collapsed extensively because of being deprived of the means to balance the development of the nuclear technology in US".
- During the 1970s, all of the oil industries in the Middle East had been nationalized; an oil embargo was in place that brought threats to industrialized countries since as their growth and political stability was at big risk (Yergin, 1988).
- In 1973 a world oil shock occurred causing turbulence in the international arena in all areas; economic, different types of industries (oil, shipping, manufacturing, etc), diplomatic, geopolitical, societies. It was the first oil crisis (October 1973) in the history of twentieth century.
- During the Iranian revolution in late 1980s, the second oil crisis in the twentieth century (December 1978 - October 1980) caused oil prices to be increased tremendously and consequently brought serious problems to the industrialized countries in the world (Nivola and Carter, 2010: 107).
- The Iran-Iraq war (September 1980 – August 1988) was an army conflict which "contributed to the world oil market's volatility and helped to undermine OPEC's cohesiveness and market control" (Tahmassebi, 1986: 409).
- The recent "Gulf crisis" (August 1990) started when Iraq invaded Kuwait and the supply of oil decreased by around 500 mill barrels during a seven-month period (Morse, 2001: 97).

In addition to the aforementioned crisis, linked to the oil that occurred in the twentieth century and seriously affected the global markets, there are other important incidents that it is worth to mention herein since they are also related to energy issues. Some of the important ones for the purpose of this thesis are given as following:

- In Saudi Arabia, which is the country with the largest oil reserves in the world, it was accepted that there are strong possibilities for some countries to become energy independent, so the country decided to re-direct their efforts to more “sustainable methods for development and maintaining energy independency with foreign nations” (Fischhendler and Nathan, 2014: 154).
- In Israel, the Tzemach Committee, the authority responsible for the country’s energy policy design, was looking for a connection between Energy Security and local competition in the market (Tzemach Committee, 2012).
- In Cyprus and Turkey, the latest discoveries of hydrocarbons in region brought up tensions between the two actors apart from the long existing Cypriot problem (Ogurlu, 2012).
- In Jordan, the International Monetary Fund (IMF) considers the energy issue to be an area of weakness in the country’s economy (Fischhendler and Nathan, 2014: 154).
- In Lebanon, the government has raised its concerns about the intentions and actions of its neighbor state of Israel, accusing it of stealing Lebanon’s oil and arguing that this will cause serious problems for the wealth of its economy in the near future (Abdel-Kader, 2011).
- In the US, the Secretary of State said that “energy security and supply disruptions should be viewed as threats to the NATO alliance” (Shaffer,2013: 1), while in another case the US government has recently expressed its intention to “implement at Energy Security Trust, which will address some of the insecurities that climate-change poses” and the same time to reduce “the influence that foreign oil producers have on national decisions” (Fischhendler and Nathan, 2014: 152).
- In 2006 and 2009, Russia and Ukraine did not succeed to reach agreement on the price of gas, which was one of the factors that led to the crisis, even though not the only one, because of “Russian’s exploitation of energy needs as an instrument of state power” (Elkind, 2010: 136).
- In China, the National Oil Companies (NOC) are considered as the “arms of the Chinese government that are aggressively snapping up exploration and production assets around the world to enhance China’s Energy Security at the expense of that of other consumers” (Downs, 2010: 73).

Considering the stakeholders view already presented in the earlier chapter of this thesis, it is interesting to indicate the main doctrines of the two great powers prevailing in the global relations during the last decades: USA and Russia, but also the emerging power, China.

A short summary of such Doctrines released by US administrations are presented as following:

- Jimmy Carter in 1980: It was characterized by US's rights "to intervene with force, if necessary, to ensure uninterrupted energy supply from the Gulf" (Molchanov, 2012: 17-19) and moreover stated that any effort "by any outside force to gain control of the Persian Gulf region" would be seen "as an assault on the vital interests of USA" (Rutledge, 2006: 46-49).
- Ronald Reagan in 1985: He adopted Carter's doctrine and he even applied it on the Iran-Iraq. It was a doctrine to overwhelm the global influence of the Soviet Union in an attempt to end the Cold War (US Dept of State, 1985).
- George H.W. Bush in 2002: It refers to various related foreign policy principles of his administration that include unilateralism and the use of preventative war to protect nation's interest and enhance national security of the country (Knott, 2017).
- Colin Powell Doctrine in 1990: It is a more journalist-created term, named after General Colin Powell in the run-up to the 1990–91 Gulf War. It was based, in large measure, on a long-simmering debate in the military about how, when and where the United States should use force (Cohen, 2009).
- Bill Clinton in 1992, 1996: Decision to procure additional warships, cargo planes, assault vehicles and other equipment intended for "power projection" into distant combat zones. Furthermore, US efforts to transform NATO from a defensive alliance into a regional police force governed by US (Klare, 1999).
- Barak Obama in 2009: Obama subscribes to a different doctrine, which is usually summarized in polite company as "don't do stupid stuff". He views US's foreign-policy establishment, which he secretly disdains, makes a fetish of 'credibility' — particularly the sort of credibility purchased with force (Goldberg, 2016).
- Donald Trump in 2016: He called Russia and China "rival powers" and reaffirmed commitment to his "America First" doctrine (Godfrey, 2017).

Regarding Russia's doctrines – both for the Soviet Union and later Russia as its continuation – a short summary is given as following:

- Leonid Brezhnev in 1964: The Soviet policy of control and coercion in eastern Europe was known as the Brezhnev Doctrine. At the same time, the country moved from being an autarkic economy to a country trying to integrate into the world market (Sailus, 2017).
- Yuri Andropov in 1982: He declared continuation of the domestic and foreign policies followed under Brezhnev (Burns, 1982).
- Konstantin Chernenko in 1984: It was a pivotal event made to Soviet a shift towards a policy of the "iron fist" in regards to Afghanistan (Simes, 1984).
- Mikhail Gorbachev in 1985: He applied a series of changes in Soviet Union in mostly all areas: social, economic and foreign policies designed to bolster the domestic standard of living and bring a new era of relations with US. His "new thinking" approach caused the end of the Cold War, but also the breakdown of the the Soviet Union itself (US Dept of State, 2009).
- Boris Yeltsin in 1991: After the collapse of Soviet Union, state focused on the growing opposition in the former republics of the Soviet Union and in East Central Europe to its foreign and economic policies, and in particular on demands that Russian military forces withdraw from the newly independent states (Smith, 2010).
- Vladimir Putin in 1999: The energy strategy of the state refers several main priorities such as an increase in energy efficiency, energy development, technological development, eliminate the impact on the environment and sustainable development. At the same, there has been a view in the West that Russia is considered a threat since the country uses "energy as a weapon to rebuild its empire" (Perovic and Orttung, 2007).
- Dmitry Medvedev in 2008: He follows the same doctrine as his precursor Putin.

Finally, it is interesting to refer to the new emerging power, China. China's oil imports needs are expected to reach around 14-15 mbd by the year 2040 (EIA, 2018). The country has been paying seriously attention to several regions abroad in order to increase the available sources of energy and diversify the risk of supply: Asia, Middle East, Africa. Furthermore, there is a strong effort and focus to strengthen its navy power in order to support its aim for better access to the markets (Klare, 2016: 427-429).

China’s doctrine and policies during the periods of each of its last leaders can be summarized as following:

- Jiang Zemin: His foreign policy is seen as passive and non-confrontational; however, he strengthened China's economic stature abroad, attempting to establish cordial relations with countries whose trade is largely confined to the American economic sphere (Kuhn, 2005).
- Hu Jintao: During his presidency, there was a continuous economic growth and development that strengthened further China as a major world power. He supported "China's peaceful development", aiming for soft power in international relations and a corporate approach to diplomacy. China's influence in Africa, Latin America, and other developing regions increased (Lam, 2006).
- Xi Jinping: In September 2013, he introduced a plan for building the “New Silk Road” from China to Europe, a huge investment plan heavily focused on infrastructure related to new roads, ports, pipelines, etc that will support Chia’s increasing needs, both importin goods and energy resources and exporting its own products to the world. The New Silk Road initiative contributes to the country’s plans for expansion; the more choices related to infrastructure, the better for the transportation and thus easiness to reach countries outside and reach higher levels of access to energy sources (Pwc, 2016).

3.4 Conclusions and recommendations

3.4.1 Conclusions

From the theoretical perspective of International Relations, the approach that has been adopted is as: International Political Economy (IPE) > Theory of Realism > Neorealism > Defensive Realism. It is believed that the aforementioned approach describes better the current situation and it is seen as the most viable to study, analyze, explain and theorize a research that takes place in the field of security: both national and energy.

IPE is ready to offer much to security studies and particularly those with emphasis on national and energy security. According to Meadowcroft (2009), IPE usually:

- Provides the political architecture and structure related to the interactions with the stakeholders[18].
- Describes and connects the stakeholders when a policy is applied.
- Gives insight into energy policies and programs.
- Links thee application with the theoretical background, offering a conceptual framework that researchers and theorists can rely on for their further studies.

Regarding energy, it constitutes "one of the world's foremost public policy challenges that social scientists in general and political scientists in particular cannot afford to ignore" (van de Graaf et al, 2016:5). Energy is seen to play "a significant role in the affairs of state" and for most of the states, "ensuring adequate suppliers is viewed as a matter of national security" that can excuse the use of any means in order to protect and secure it – even the military one (Klare, 2016: 433-435).

Energy security is part of national security and both are of great importance for the nation state; climate change is a significant "affecting factor" in this relationship which is being researched

[18] Stakeholders can be considered as the states, institutions, companies, national oil companies, international oil companies, consumers/citizens, traders.

since it plays a serious and important role in the contemporary studies and energy policies revealed by the states.

Energy Security has assumed a central role in global security and international relations (Nolan et al, 2004: 150) [in Bilgin, 2012: 45]. According to the International Energy Agency (IEA), in its Annual Report issued about the World Energy Outlook for 2009 is was clearly mentioned that (IEA, 2009: 115), “energy security is increasingly being discussed as an aspect of climate change and national security”.

On the basis of the literature review, it is found that there is a gap in the relationship between National Security-Energy Security under the umbrella of IPE. It has been noticed that there is a fragmented literature about energy and the aforementioned relationship between National Security-Energy Security-IPE that makes the study difficult, but at the same time also challenging mainly because of the following reasons:

- Many of the well-known energy experts are not in fact seriously interested in theory, but they mostly focus on the near-term outcomes and results (i.e. reports, working papers, policy papers, etc) (Strange, 1994).
- A scientific field that requires a technical background is one of the most difficult to be researched; energy is one of them (Van de Graaf et al, 2016: 6-10).
- The diversified and multitasking issue of energy also needs a multidisciplinary approach, which can be achieved through the multidisciplinary theoretical background of the researcher(s) (Van de Graaf et al, 2016: 6-10).
- The academic community is not always ready or open to accepting and validating an multidisciplinary approach, which is difficult to understand and be critically assessed-by default-due to the prevailing, available norms and beliefs (Spreng, 2014).
- There is an ongoing change taking place in most of the fields of energy, fuel, climate change policies, policies, etc that makes it difficult to follow and study in a holistic and comprehensive approach.

Energy is considered critical for the state and the government; apart from other reasons already stated, it is worth saying that energy is seen as necessary for:

- The preservation of military resources and execution of war; thus, energy is seen as a "strategic commodity" and necessary to be closely monitored by the central government of a state (i.e. US Doctrines; refer to the respective section of 3.1 of this Thesis).
- The normality of the economy and unobstructed operations of a state.
- Improvement of the well-being of the society (i.e. Venezuela, KSA).
- Exports abroad that will create a source of additional income for the state's budgets.
- The support of the foreign affairs policy of the state, since is it often used as a political tool "on the surrounding states to influence their foreign and economic policies" (i.e. Russia with the NG to EU).

According to Sovacool (2011: 12-15), energy is involved in international conflicts through additional paths like the following:

- It is incorporated into weapons that can release it at once to cause damage.
- In modern wars the military strategy relies on weapons whose construction requires energy and energy-intensive materials
- International conflicts that end up in war may cause severe damage to infrastructure.

In general, the supply of energy is seen as a weapon and supply disruptions as threats or attacks on a state. The disruption of supplies can be caused both by suppliers and consumers as well as by transit countries (Shaffer, 2013). Referring to the current status, energy security for the US and western countries is seen as "diversification of supply" while for Russia is seen as "stability and risk sharing" Molchanov, 2012: 26).

After the last global crisis of 2007-08, both energy and food markets, which are of the most importance for societies globally, have remained in turmoil. Lack of resources has finally affected the global economies more than expected and it is a continuous process characterized by instability and difficult to predict, navigating an insidious transition in the way it consumes resources. Lack of resources increase political risks and at the same time geopolitical turmoil exacerbates shortages and complicates the search for solutions.

The new politics of strategic resources considers the political dimensions of strategic resource areas both locally and globally. Energy and food markets are both of national interest and they are not treated as traditional market goods. So, while markets are an essential part of any response to tighter resource supplies, governments also will play a basic role" (Steven, O'Brien and Jones. 2014).

Crude oil has had a deep impact on world civilization and probably more than any other natural resource in known history. Moreover, Oil and Gas (O&G) have a vital role to play in societies and it they are not only of the "most important energy sources that human society have for their energy needs" but also they represent the "feedstock for several consumer goods, thus playing a growing and relevant role in people's lives" (Mariano and La Rovere, 2014).

O&G explorations and exploitations have both positive and negative impacts on the countries and local communities they operate in; they can cause several socio-economic concerns for "host governments, local communities and project proponents".

- It is impressive to see huge investments and growth both from national oil companies and international companies in a region and at the same time to have severe and unchangeable environmental catastrophe. Such negative impacts have also taken place on human, socio-economic and cultural aspects of local societies.
- If they are not dealt properly and effectively, then socio-economic issues can result in "significant non-technical risk to projects such as local backlash, delays in project approvals, missed opportunities for delivery of benefits and reduced scope to prevent and/or mitigate and negative impacts". Such issues are most important if "resource extraction projects are developed in remote, socially or environmentally sensitive regions" (Wagner, Dowse and Jones, 2014).

Several impacts have been already mentioned in this study such as: Land-use patterns, changes in the local population levels due to migration and immigration, changes in the socio-economic and socio-cultural systems, and changes in the transportation to have access to the goods and services and also because of the business of the O&G companies in the region.

Awareness that a sustainable society demands a sound environmental management is growing. "The preservation and advancement of basic human rights, the equitable use of land and resources, and the preservation and sustainable use of the countries natural environment are three inextricably connected aspects of a single historical process" (Celestine, 2003).

Proper preparation by the investors and governmental authorities is needed so stakeholder's management sensitive to human lives is designed and implemented. Sustainable development can only be successful if there is serious concern and real action takes place regarding in the communities of each country which are more vulnerable to O&G investments and later operations.

At local level, there should be unrestricted access to energy services for all the people; at the same time attention is required also to energy poverty and environmental pollution. According to Sovacool (2011), it is important to have better access to energy for the people and society since it is a "key defining characteristic of the economic development" of the community.

As per Bilgin (2012:43), there is a "radical shift" from the beginning of the twenty-first century when new nation-states such as Russia, Iran, Venezuela used the revenues earned from their O&G fields to "consolidate state power along with wealth". Taking into consideration the fact that energy services are "instrumental to modern economies and postmodern lifestyles", energy security "is becoming paramount to human security" (Sovacool, 2012: 67).

Finally, it is important to mention that even if all the available Renewable Energy Sources (RES) are considered together, it would not be possible to cover more than 10% of the global energy demand at this moment; so it remains to be seen what new development will come into the markets during the next years due to the technology effect.

As it was already mentioned, every nation need energy to survive, while some nations use energy as a geopolitical tool of coercion (i.e Russia) and some other can meet their energy-hungry economies a central part of their foreign policy (i.e. China). However, independently what kind of actions nations take to use energy as a geopolitical tool there is also an effect that comes due to the demand of the international market. Even though the oil and gas market is mostly affected by nations and groups of interest, they are still global by default which consequently global economic demand also affects the price of energy and exerts more leverage than actions of any nation cause.

Policymakers often mix social conditions or public health matters with “national security” which creates confusion, wrong assessment and improper decisions. Especially with the issues related to the environmental security policy, there are many areas that is still not so clear for them.

The last thing the nation’s leaders should do is to mistake political dissent as a threat to homeland security; although surveillance and intelligence-gathering capabilities are necessary to combat terrorism, it is imperative that state’s leaders keep a bright line between watching terrorists and monitoring the political views of people (Holmes, 2015: 17-25).

Several scholars claim that Social Sciences and more particularly International Relations do not focus much on technological systems and if they do so, then it is mostly by a superficial and uncritical way. At the same time, it is also mentioned that politics should pay attention to the “carrying capacity of the earth”. It is important to note that technological systems are “driven by energy which is the master resource” (Litfin, 2014).

We don’t make energy decisions only based on facts; we often make decisions based on values and beliefs (Sovacool and Brown 2015: 38). According to Sovacool and Brown (2015: 38), “values can play a combative, corrosive role in the generation of objective energy analysis, and in how energy decision-makers operate in practice”.

It is very important that Energy Security is linked with the National Security of an actor and it is interesting to further analyze and study this linkage which is also one the main aims of this thesis.

3.4.2 Recommendations

Policy makers need “a sharper focus as to what is and is not National Security; it cannot be all things to all people”. Holmes (2015:17-25) claims that the notion of National Security must be limited not only to decide what the government should be expected to do, but to decide what it should *not* do. This is mainly true due to budget restrictions and limitations and thus the main share of the expenses is allocated to protect the country and its interests from any external attack. A "hard fact of international relations" is that any absence of military power (hard power) would make the soft power mostly "symbolic and ineffective".

For example, USA is seen as a "world leader" mainly because of three sources (Holmes, 2015:17-25):

- Military power.
- Economic capacity.
- Dedication to the values of freedom and democracy.

One reason that a lot of focus had been spent on invigorating the soft power is coming mainly from political willingness to reduce military expenditures and increase funds for foreign aids and other diplomatic notions. However, any effort of zero-sum balances between hard and soft power will probably fail. At the same time, whenever a nation state shows less hard power capacity then consequently the soft power gets less efficient. In addition, this causes temporization by the other competitor states and finally leads to higher demand for more hard power (Holmes, 2015:17-25).

According to Holmes (2015:17-25), values should "guide and inform the nation's strategy, not direct or control it". He proposes that "any discussion of National Security must be rooted in a clear understanding of the concepts it involves". The next actions related to National Security analysis are suggested.

a. Build capacity and flexibility in military terms to have many options available whenever a threat to the nation's national security appears. He proposes the approach of deterrent power making enemies hesitant to attack which was the main strategy during the Cold War.
b. Do not take the challenge to balance non-military and military programs dedicated to national security. It is more important to allocate government's budget to hard choices related to the reinforcement of military weapons and systems rather than allocate these funds to more soft issues (i.e. foreign aids, human rights, etc).

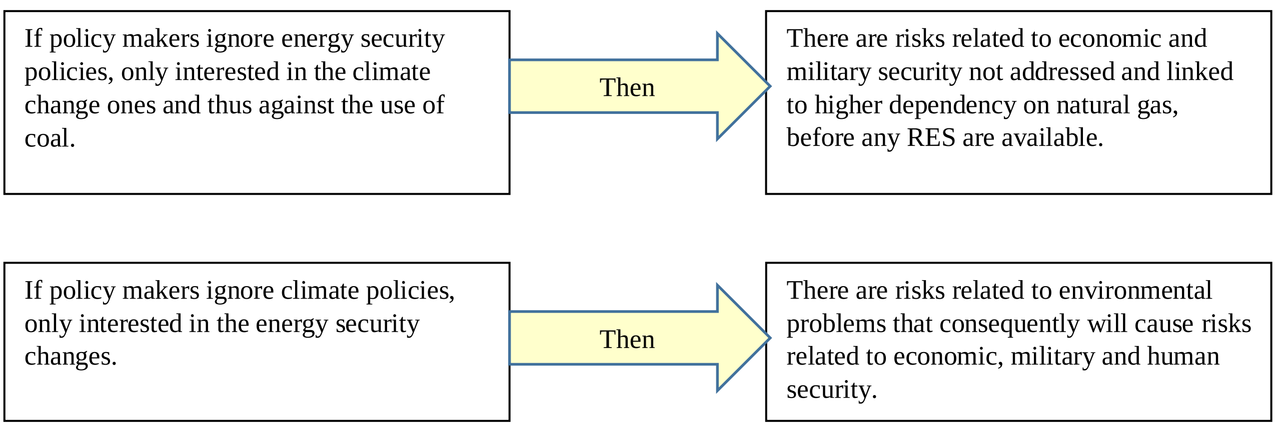
c. Adjust non-military instruments of power and policies (like aligning diplomacy, foreign aid, public diplomacy, international trade, financial policies, human rights policies) to advancing discrete national interests. on assisting the clear targets of national strategy.

d. Have a clear view and understanding of what is achievable or not by a military intervention and what the society's expectations are ["...are these troops nation builders and humanitarian police forces? Or are they military defenders of narrower security interests?..."].

There is a relationship that exist between markets, states and non-state actors (Krishna-Hensel, 2012: 1). As discussed in the section related to policies related to energy security, national security and climate changes, a summary can be presented in the following figure 3.38.

Figure 3.38

Historical transition of Fuels



Source: (Krishna-Hensel, 2012), (Author, 2019).

It is not always necessary that if a country focuses on securing supplies of natural resources (and consequently energy resources) then its position in the global scene will remain strong. There are important factors that may affect it, such as its competitiveness in terms of cost vs to other countries. The macro environment of "fiscal austerity in the wake of budgetary and currency problems, as well as population growth and other demographic pressures, may have a significant influence on the magnitude and speed of the shifts in risk and exposure in the energy sector" (Hensel, 2012: 129-131).

As it has been mentioned, one of the main parameters/components that the Energy Security notion consists of is the availability of energy. It is important and widely accepted by all stakeholders that security of energy availability is directly linked to the security of energy itself.

On the basis of recent developments in fuels, like the shale gas in US, oil extraction from tar sands in Canada, the continuous increase of installations and usage of renewable energy resources brings the actors face to face with the new reality: there might not be such an issue and problem with the availability of energy in the near future since there are more choices than in the past. Technology keeps on positively surprising the parties involved in the energy sector – states, producers, retailers, users - with new innovative techniques and developments that increase the output of the oil and gas that is extracted from the ground, while at the same time improves the efficiency of the machines using fuels and thus less fuel is needed and less GHG are released into the atmosphere.

However, it is still thought to be too early to conclude and envision the future. It is the theory of Realism that suggests one should be on the side of the reality: that it is with more facts and figures rather than being more optimistic than necessary. It is still necessary to minimize the effect of a potential disruption on the global availability and smooth supplies of energy sources. For a state, it is suggested to have either at its side or access to sufficient energy sources to meet its needs for the short, medium and long-term, which requires distinctive strategies to be designed, implemented and monitored in order to achieve its goals related to the energy security and national security of the state.

CHAPTER 4

ANALYTICAL FRAMEWORK, RESEARCH DESIGN AND METHODOLOGY

4.1 General

Following the detailed literature review presented in the previous chapter, the next important steps for the purpose of this thesis are the study, the preparation and finally the design of a suitable analytical framework into which the thesis´ hypothesis will be tested.

In order to conduct a proper analysis, an analytical framework is needed; aiming to guide and facilitate sense making and understanding. Such an analytical framework should incorporate and integrate the various parameters and approaches and thus it could be eventually used and applied properly. For this reason, the analytical framework needs to be relevant to the examined subject, focused on the important issues, scientifically and inclusive by taking into consideration priorities and other external factors that interfere with the subject matter.

Defining such a framework forces the analyst to be selective: one has to decide what variables are most important and informative, therefore reducing the amount of information that will be collected and analyzed.

For better understanding of this thesis environment, a formal qualitative research was conducted up front in the form of in-depth interviews among opinion leading stakeholders. Upon proper analysis of the primary information gathered through these interviews, it was proceeded with the accumulation of secondary data on the variables examined and their statistical processing and comparative quantifications, as needed.

In this section both the analytical framework and the research that was conducted are presented in order to structure the final report of the thesis.

4.2 Analytical Framework

4.2.1 General

A research is mainly needed to contribute to deal with a "problem" which is also defined as "anything that perplexes and challenges the mind so that it makes belief uncertain" (Dewey, 1933: 13). Thus, at the end one has to "translate the general curiosity into a problem that can be addressed through research" (Merriam, 2009: 59).

It is mostly known that ideas shaping cause and effect are found in two main categories (Van Evera, 1997, 40):

- Theories: They are shaped in general terms and they are applicable to more than one areas/case.
- Specific explanations: They describe and explain specific, discrete events.

In order to study and analyze the examined subject of this thesis, an identification process of related areas and sub-subjects took place which can represented in a diagram as in the following figure 4.2. This figure is considered as very helpful to make one to understand how a specific "area" is chosen among other options and then how to proceed to the next lower level and dig into a more detailed, well-defined one for study and investigation.

4.2.2 Conceptual framework design

As per Chester (2009), the assessment and measurement of the Energy Security challenge is related to several complexities and uncertainties of economical, technological, natural and also to the different meaning that people and group give to it.

Cherp and Jewell (2013:147) believe that is not an easy task to make "certain methodological choices" for the assessment and measurement of energy security because of its "multitude of interpretations" and thus they suggest two different methodological approaches:

i. The decision between perceptions and facts regarding "what constitutes a significant energy concern"
ii. The decision between the generic and specific regarding "what is the appropriate level of detail of the assessment".

Based on the previous literature review, there has been a selection of the best practices and suggested stages to be implemented in order to design a real, proper, general framework. For the more thorough development of the framework extra and also different type of parameters can be taken into consideration – apart from those proposed in the literature. The aim is to develop a contemporary conceptual framework that can be used for future assessment and policy decisions. A summary of the suggested stages that are critical and necessary in order to design such a contemporary conceptual framework is given next:

a. Choice of IPE theory (Realism, Liberalism, other).
b. Level of analysis (Global, regional, nation-state, other).
c. Choice of time scale for the analysis (short, medium, long-term).
d. Decide what constitutes a significant ES and NS concern (perceptions and facts).
e. Decide what is the appropriate level of details of the assessment (generic and specific).
f. Selection of definitions for the examined variables (ES, NS).
j. Identification and selection of indicators for each variable.
k. Description of vital systems[19] (country, end-users, other).
l. Identification of vulnerabilities (Robustness, Sovereignty, Resilience).

The above steps can be followed in sequence and each one leads to the next step in way that contributes to the shape and information that the research of this study consists of. The above coherent process provides a well-defined frame while at the same time intends to be as explanatory as possible for any analyst and scholar.

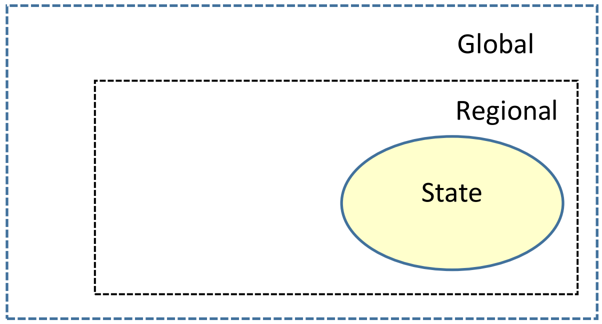
4.2.3 Selection of area of interest

It is seen as necessary to define the reference levels that play the role of boundary limits of the system examined each time. In this particular study, there are seen three (3) separate levels which are named as: Global- Regional-State as they are also shown graphically also in the next figure 4.1

[19] As vital energy system is considered an energy system which is "critical for societies" while the term "system: means that is consists of "resources, materials, infrastructure, technologies, markets and other elements" (Cherp and Jewell, 2013: 150).

Figure 4.1

Levels of Analysis



Source: (Author, 2018).

The necessity of considering different levels of analysis is also supported by the fact that the notions of security in this study - national and energy- are considered as complex and of wide meaning and application. Thus, it is seen as necessary to consider levels of analysis, in order to "grasp the full dynamics of energy security in the political economy of energy" (Fermann, 2014: 30-39).

Global system and consequently the system(s) is considered as a closed system. There are boundaries that separate the internal environment (inside the system) from the external environment (outside of the boundaries of the system). A closed system does not mean an isolated system and it may be elaborated more later in this thesis through a different perspective.

The IPE and most particularly the theory of Realism is studied at the global level; as a theory is applied to the general and outer layer, but its effect penetrates the inner layers and boundaries of the regional and the state's. The adopted theory of Neorealism and in particular that of Defensive Realism – as earlier mentioned - pays mostly attention to the macro-level of analysis, but it is also linked/related to the micro-level; it is not as rejective as the offensive neorealism.

The selection of the two nation-state cases that had been chosen in this thesis, Cyprus and Israel, is strongly supported by several facts and conditions; the basic and the main ones can be described as below:

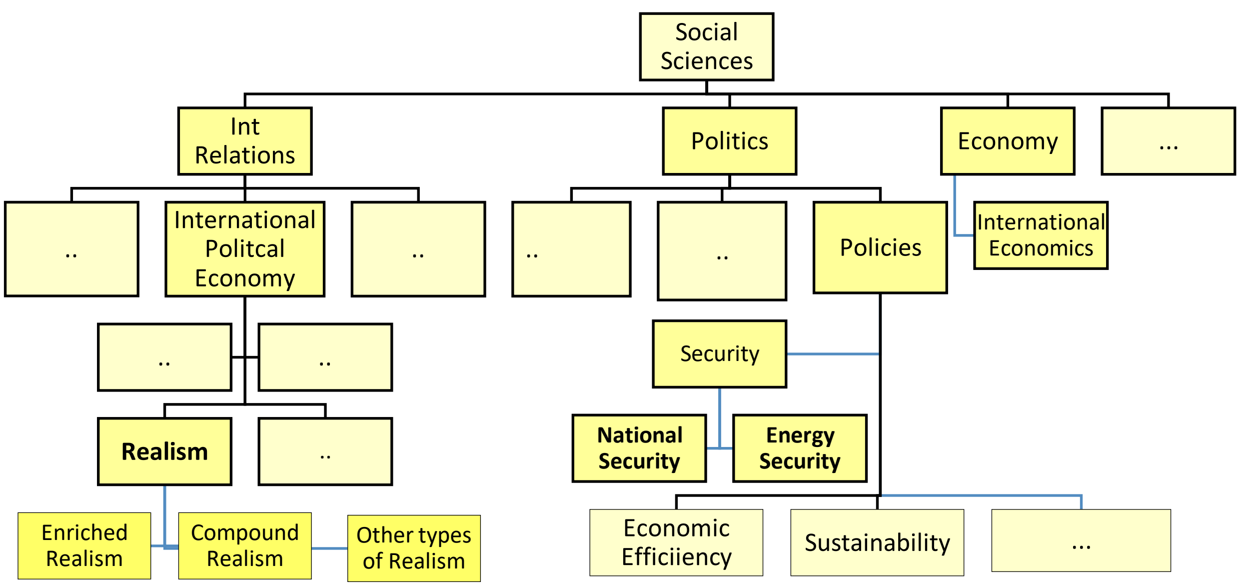
(a) A single case study would be a poor result for identifying and assessing the conditions of the theory.

(b) The selection of the cases/states in this thesis - those of Cyprus and Israel - is supported by many similarities and characteristics applied to both since they are:

- Small in population and size.
- Only recently established as a country/state (in the form they are present today).
- Divided inside their own territory.
- Exist in a hostile environment for their sovereign.
- Seeking for their own survive/existence/growth.
- High density of same culture, language, religion among their citizens.

Figure 4.2

Selection of area of interest



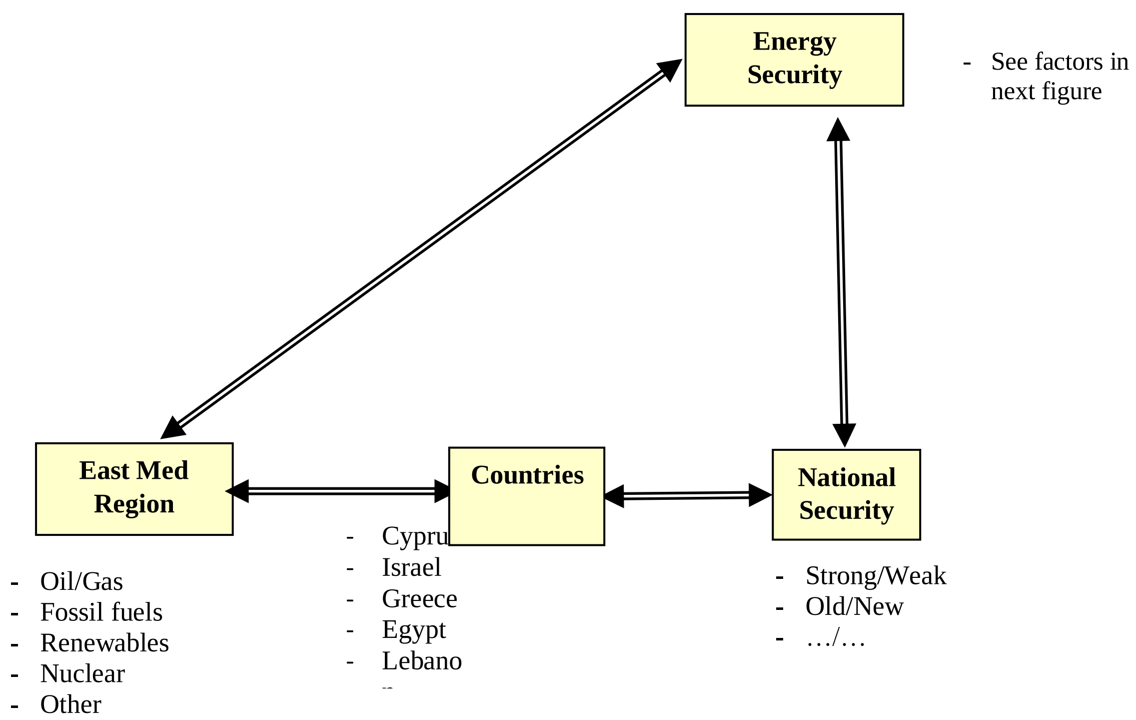
Source: (Author, 2015), (based on Chadwick, 2009).

A further research of each of the above items-terms will follow since it is interesting to have an overall view of them and also to understand any possible correlation that might exist between them and then to focus on.

For this reason, a helpful and explanatory figure has been created, as below figure, in which each term of the subject area is analyzed while possible interrelations are also given graphically. More specific, for each item-term all possible parameters/factors than can characterize or affect or being affected are given in a very concise way.

Figure 4.3

Analysis of terms vs related parameters



Source: (Author, 2015), (based on Chadwick, 2009).

4.2.4 Implementation of stages

As per the above stages, for the current study in this thesis there are decisions to be made in order to proceed with the further research. Cherp and Jewell (2013: 149) suggest that "the methodological choices in an energy security assessment should be systematic rational and transparent" and for this examined study each of the aforementioned stages is specified and described in particular as following:

a. Choice of IPE theory: Based on the previous analysis that is given in chapter two, the theory of Realism is seen as the most appropriate one to be adopted. More particular, the defensive realism seems to describe in an optimum way the international issues and in particular the examined relationship between the national security and energy security of the nation-state.
b. Level of analysis: From the beginning of this study it was decided that the nation-state is the subject and thus the barrier of analysis would be taken as its boarders defined in the international system and law. Moreover, the two separate cases of Cyprus and Israel have been chosen to study and analyze.
c. Choice of time scale for the analysis: For the aim of this thesis, a medium-long term is considered as appropriate to be chosen.
d. Decide what constitutes a significant ES and NS concern: It is the outcome of the Qualitative Research that follows in the section 4.3.4 of this thesis.
e. Decide the appropriate level of details of the assessment: In this current study, it is seen that specific approach will be chosen and will be developed since it works better when assessment of the ES and NS of a particular country takes place (i.e. Israel and Cyprus).
f. Selection of definitions for the examined variables (ES, NS): as below.
    - For the ES, the IEA definition is chosen that describes it as "uninterrupted physical availability at a price which is affordable, while respecting environmental concerns".
    - For the NS, the definition of the security is related to the nation-state which is the main actor in the global nexus among other nation-states.
g. Selection and measurement of indicators for each variable: It is the outcome of the Quantitative Research that follows in the section 4.3.5 of this thesis.
h. Description of vital systems:

- For both the Energy Security and National Security, the approach is through the geographical boundaries where security concerns for both variables are “primarily articulated at the national level” (Cherp and Jewell (2013: 151).

i. Identification of vulnerabilities.

Based on the definition of the three perspectives, the vulnerabilities that are considered for the purposes of this study are sovereignty, robustness and resilience concerns. For the identification and selection of the indicators for each of the examined variables, Cherp and Jewell (2013: 157) claim that they “should reflect the vulnerabilities of vital energy systems identified at the earlier stages of the assessment” and “they can be selected from those suggested in the literature or designed specifically for the purpose of a particular assessment”.

4.2.5 Conceptual framework design

Taking into consideration the aforementioned analysis as well as the theoretical consideration presented in chapter two of this thesis, the necessary research and analysis is carried and eventually the formulation of the final conceptual framework takes place.

According to Cherp and Jewell (2013: 164-165) it is suggested to “consider methods of communication which have a clear qualitative aspect” mainly due to the fact that Energy Security is “very much about context and perceptions”.

As per Van Evera (1997, 8), it can be assumed that in this thesis the following are present:

- A “causal law” where A causes B; for this thesis it will be considered that ES causes NS.
- More specific, in a casual law we can find four patterns: (a) direct causation, (b) reverse causation, (c) reciprocal causation and (d) self-undermined causation. In our case, we have the ES causes NS and NS causes ES.
- A law can be deterministic or probabilistic where A causes B with a probability x.

Based on the above and considering the assumption that in our study we have a reciprocal causation law/relationship, then the probabilistic approach can be both ways: ES causes NS with a probability x, while NS causes ES with a a probability y.

Taking also into consideration the definitions given in the section 2.2 of this thesis, the theory that is framed/studied can be viewed as:

$$ES \longrightarrow k \longrightarrow l \longrightarrow NS \qquad (4.1)$$

where:

- ES is the independent variable,
- k and l are the intervening variables and each one can be consisted of other sub-variables),
- NS is the dependent variable.

As described in the previous chapters of the thesis, it is now possible to consider that for the two variables, "Energy Security" and "National Security", their relationship (function ***g'***) can be considered as:

$$\text{National Security} = \boldsymbol{g'}\,(\text{Energy Security}) \qquad (4.2)$$

where:

National Security can be used as the symbol NS and it can take values from a total

$$NS_i=\{NS_0, NS_1, NS_2, \ldots, NS_i\}\ (i>1) \qquad (4.3)$$

and

Energy Security can be used as the symbol ES and it can take values from

$$ES_j=\{ES_0, ES_1, ES_2, \ldots, ES_j\}\ (j>1) \qquad (4.4)$$

Furthermore, the specific parameters of each of the basic variables will be tried to be included/operationalized. Thus, it might be possible study the relationships between the ES and the specific parameters of NS_i

$$(g_1, g_2, \ldots, g_i) \text{ for the variable of NS} \qquad (4.5)$$

$$(f_1, f_2, f_3, .. , f_j) \text{ for the variable of ES} \qquad (4.6)$$

In other words, we can have the following:

$$\text{For f1: } NSf1_0, NSf1_1, NSf1_2, NSf1_3, \ldots, NSfi \qquad (4.7)$$

$$\text{For f2: } NSf2_0, NSf2_1, NSf2_2, NSf2_3, \ldots, NSf2_i \qquad (4.8)$$

For f3: $NSf3_0$, $NSf3_1$, $NSf3_2$, $NSf3_3$, …, $NSf3_i$ (4.9)

For fn: $NSfn_0$, $NSfn_1$, $NSfn_2$, $NSfn_3$, … , $NSfn_i$ (4.10)

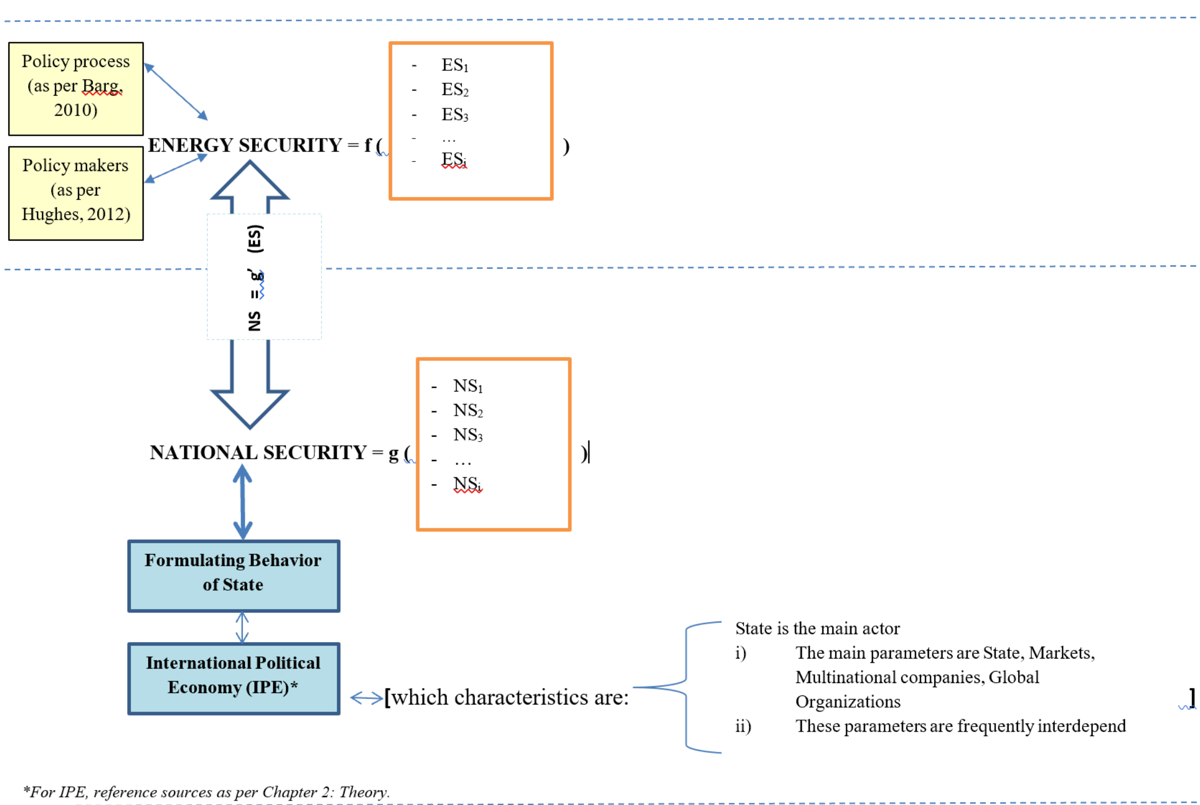
Based on the theoretical considerations already presented in the previous chapter two, a theoretical conceptual framework finally comes out which is given as follows.

The identification of specific parameters of basic variables [NS_i, ES_j] takes place as the outcome of the design and analysis of a primary qualitative research which was conducted for this scope.

In figure 4.4, there has been a serious effort to correlate and combine the important parameters related to each of the examined variables – energy and national security – which will be helpful for the analysis and study herein. The dual relationship between the variable of NS and ES is defined as a separate function named as "g′" that links them together [see above definition (4.2)].

Figure 4.4

Theoretical Conceptual Framework



Source: (Author, 2018).

Such a theoretical conceptual framework needs to consider some other factors that are seen as important and affect the aforementioned variables. As already described in section 3.2.5 referring to stakeholders, such factors play a significant role and they finally influence the decision-making process. In this framework, the policy makers and policy process are seen as important to be included since they can affect seriously the ES variable and it is interesting to study them for any future analysis. Furthermore, there is a link in this framework between the nation state and the NS variable, which has been studied and analyzed already in this session. Subsequently, the International Political Economy (IPE) is also included in this broad conceptual framework as it is the theory finally in the background that affects and being affected by the nation state.

4.3 The Research

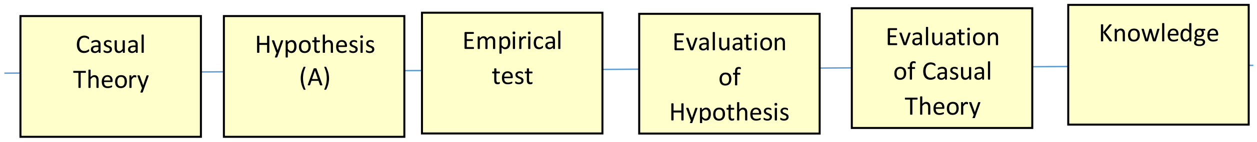
4.3.1 General

In the beginning, a reference to the design process of the research and the steps followed is seen as helpful and necessary. In the following figures, the information flow and steps that follow in the research process are represented graphically.

In figure 4.5 a block diagram of the design process in a research is presented; starting from a casual theory one can make a hypothesis and then proceed with empirical test(s). Based on the test(s) results it would be possible to apply an evaluation of the initial hypothesis and consequently with the evaluation of the causal theory. The final result would be a new knowledge built on the initial, existing one; either with addition and/or corrections and/or changes.

Figure 4.5

Design and execution [1]

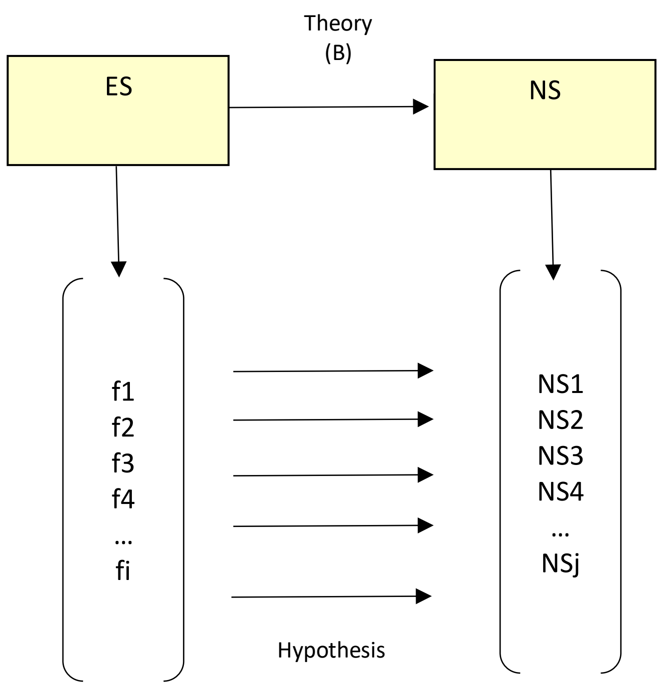


Source: (Author, 2018).

In the next figure 4.6 a further process model regarding a design process in a research is given. It can be noticed that the independent variable (ES) through several possible function(s) can cause an effect to the dependent variable (NS) either as a total (NS_t) or any of its sub-parameters or else named indices (NS_i). The starting point is named as the casual theory and the hypothesis that suits better to describe such an initial relationship follows.

Figure 4.6

Design and execution [2]



Source: (Author, 2018).

The use of statistics helps a lot to assess the hypothesis and more specific the assessment refers to the "probability that the relationship we find could be due to random chance" and if this does not happen (and this is supported by strong evidence) then the confidence of our hypothesis is also strong (Kellstedt and Whitten, 2013: 15).

4.3.2 The Methodological Approach

Based on the previous analysis, it was decided that proper research needs to be designed and conducted.

The identity of the research we conducted is the following:

- The scope of the research: Examining the constructs “energy security” – “national security” and their interrelation through primary and secondary research methodologies.
- Research objective: To identify the main set of indicators-parameters of each construct, validate the general conceptual framework, study the cases of Israel and Cyprus and understand any variances and deviations that might appear in comparison.
- Research design: Integrated.
- Research methodologies: Exploratory qualitative research up front, in order to accumulate goo quality, educated information on the subject matter; quantitative analysis of secondary data next, in order to create comparable data and extract conclusions on the two cases studied in this thesis, i.e. Israel and Cyprus.

In the next section, the main research question and the related sub-questions are clearly described and presented.

4.3.3 The Research Question(s)

The Research question is considered *very crucial* even though *the least addressed part of the research process* (Haverland, 2010).

Based on the previous analysis and the theoretical background, the main research question or else “test hypothesis” as per van Evera (1997) of this thesis can be written as following:

> *Identification of the correlation between the parameter of “Energy Security” and its impact on the “National Security” of a country.*

<u>Other sub-targets/questions</u> of this research of this thesis that need to be answered and it is necessary to be examined are as following:

- Clarification of the parameters that characterize the Energy Security.

- Clarification of the parameters that characterize the National Security.
- Investigation of any relationship-positive or negative- between the two basic variables. Furthermore, examine whether the energy security *should* affect the national security of each country.
- Focus on Israel’s Energy and National Security (case study of Israel).
- Focus on Cyprus’s Energy and National Security (case study of Cyprus).
- Comparison between the cases of Israel and Cyprus.

4.3.4 The Qualitative Research

This section includes the methodology and findings of the qualitative research.

In a qualitative research, the sample is generally selected purposefully and is usually small (Merriam, 2009). Thus, this research was structured in such a way that sampling was purposeful and also the snowball effect was followed, which is a non-probability sampling technique; the sample group appears to grow like a rolling snowball and one interviewee recommends another, and the interviews continue in this manner.

Since the sampling was purposeful, “the size is determined by informational considerations” (Lincoln and Guba, 1985: 202).

The actual number of the interviews is considered by qualitative research professionals (6-9) adequate to duplicate information and the exact number of respondents (8) was determined based on the sample’s sub-groups we created.

4.3.4.1 Qualitative Research Identity

- <u>Research Type:</u> Formal exploratory qualitative research, using the standard protocol of face-to-face, in-depth interviewing.
- <u>Research design</u>**:** 8 in-depth interviews.
- <u>Sampling method</u>**:** Purposeful/snowball by use of screener.
- <u>Sample description</u>**:** 4 stakeholders in diplomacy/government/academia and 4 leading professionals in related fields (energy, engineering, public affairs).
- <u>Conduction</u>: Face-to-face, on pre-arranged meetings at respondent’s convenience.

- Duration of interview: 1 hour.
- Method of recording: Digital audio recording and/or note taking.
- Fieldwork: February to April 2017.
- Documentation: Discussion guide, screeners, profiles (all included in Appendix C1 of this Thesis).

4.3.4.2 Qualitative Research Findings: Insights from the Interviews

The results from the interviews that took place are presented herein in a structured way, based on the thematic units originally formed in the discussion guide used during the interviews, which are as follows:

- Energy Policies and Energy Security Levels:

The energy issue is seen as part of a broader concept of natural resources, in which water is also included. It was mentioned that these concepts could be possibly examined together and not separately, since they have so many common characteristics, therefore it would be beneficiary to study them under a single concept of natural resources.

One example mentioned during the interviews was that of the interest of either Lebanon or Israel. Looking at the broader picture and not confining ourselves to this one example, in the future, as part of direct negotiations between Israel and Lebanon, on the issue of delineating economic zone borders between them, one can say “ok, let’s not only deal with energy, but with the broader concept of natural resources.” This may be helpful in order for both sides to overcome obstacles and difficulties and see the bigger picture.

Another example mentioned was the case of Jordan, where two countries, Israel and Jordan, are sitting together to discuss and negotiate issues related both to energy and water, since both of them are interrelated. It is also common to put both issues on the table during the negotiation process, since more options to deal with are always helpful to the final desired outcome. This is of major importance during negotiations on the international level, because one might not answer the interest of either party on the energy side, but if it may be possible to compensate it in a different way. In negotiations, this is usually called “issue linkage” (Poast, 2011, Davis, 2004); in issue linkage, during the negotiations process, one side puts other issues, which are not the main focus of the negotiations, on the table, and sees whether either side is interested in using these other issues as a compensating thing. However, since it is possible that issue linkage can contribute to cooperation in some cases, the wrong combination of issues or a lesser capability to properly commit to the linkage may undermine the effectiveness of the linkage process.

In terms of Energy Security, most of the interviewees used almost the same type of parameters mentioned in the conceptual framework presented herein, in order to characterize the concept of Energy Security and give the elements that they believe it consists of.

As per two of the interviewees from Israel, it is strongly recommended to consider the case of Israel in two different periods that are separated by the recent discoveries of Natural Gas (NG) in the fields within Israeli territory. Therefore, the findings of the research are divided into these two periods: the period prior to the latest discoveries of NG in Israel and the period following them. More specific, a comprehensive analysis is given for each of these two periods, as follows:

- <u>1st period</u>: the period prior to the latest discoveries of NG in Israel.

  If one is looking at availability and accessibility, of course the difference is if you have it under your soil and also in a meaningful quantity. Israel had it in some very minor oil fields before. Thus, it is argued that in terms of both Energy Security and National Security the recent findings of NG can be a game changer. In reference to the first period, Israelis used to say that they were the only country where you would not find any energy resources. As one interviewer remembers, in 1973 Israeli Prime Minister Golda Meir addressed the audience of a formal dinner honoring German Chancellor Willy Brandt saying "Let me tell you something that we Israelis have against Moses. He took us 40 years through the desert in order to bring us to the one spot in the Middle East that has no oil!" It is this statement that was challenged by the latest discoveries of natural gas fields in the State of Israel, while it also emphasizes the fact that Israel "was never known for its natural resources" (Yadid, 2015).

  In some way, finding the gas fields actually made things a little bit more difficult for Israeli decision makers, since they cannot anymore use the lack of NG reserves as an excuse or exit strategy claiming that the country does not have its own natural resources. This first period is characterized by few things; in terms of availability, the most important fact was that most of the resources where in Arab countries and Israel's energy policy in the region failed because of the overall geopolitical situation, as Israel was isolated from the Muslim world and with no access to actual sources. Until the early 1980s, there were limited areas with explored oil and gas reserves, and Middle East countries were in an advantageous position as energy sources.

This affected the state of Israel in two ways: one, it didn't have access to the major sources of energy in the world, and, on top of that, it didn't have access to most of the other sources and transporters, like the big shipping companies. A good example is that of the Greeks, who refrained from doing any businesses with Israel. That meant that Israel had to look into markets, into directions, that were not obvious, and you can find the country doing deals with Venezuela at a time and Nigeria later on, and buying very expensive oil from the North Sea. Thus, the issue then for the State of Israel was to have a combination of diversification of sources and affordability in terms of purchase; they had to reconcile these two, and since most of those things were very sensitive to whoever dealt with it, it became an issue. As an example of the importance in terms of national security became a secret and back then you could not expose where you had your oil from.

During this first period, Israel was looking for diversification under secrecy, for long-term contracts, for reducing the prices because spot markets were much more expensive than long-term contracts, and then they also had to deal a lot with transportation, which was also a very important part of the entire issue. It had to do with National Security in the sense that big ship owners, Greek ship owners, heavily influenced the attitude and policies of Greece towards Israel in the 1960s and the 1970s (GHHF, 2017). It was the time of war between Israel and Egypt, and Greek ship owners were making their fortunes transporting oil between Egypt and Jeddah, Saudi Arabia. It is also worth mentioning, that Greece officially recognized Israel only as late as 1990, i.e. 12 years after Egypt did (in 1979), when diplomatic relations between the two countries were upgraded to embassy level.

The first period of Israel in terms of National Security was characterized by an effort to find resources, a lack of available resources, and a censorship on the sources in terms of the media, while relations with other oil exporter countries were hidden for other reasons as well. Certainly, as regards energy the major element was accessibility, while affordability became a lesser issue, because "when you need oil, you need oil."

During this first period, energy is also a weapon in the hands of the Arab world in the war against the existence of Israel in any terms possible; the complete boycott on selling any energy fuels to Israel, was followed by a boycott, part of the Arab boycott, which was on any company doing deals with Israel, while in shipping, and particularly are regards tankers, the situation was even harder and until this day that there are still tankers that refuse to visit the port of Haifa in Israel, in order to avoid having anything to do with Israel. The most important thing was the oil crisis in 1973, which really changed the world in many ways. So, geopolitics in the Middle East is highly connected to energy issues and on the overall relations within this region. Now, if we could "jump for a minute" thirty years ahead, we have the US with the ability to meet their internal energy needs, then of course this threat by the Arab world would have not played at that level of influence and importance.

- <u>2nd period</u>: the period following the latest discoveries of NG in Israel.

  As far as geopolitics, this second period is totally different. First, if we look at the overall geopolitics of Israel, by that period there was already peace with Egypt and there was a gas pipeline that went from Egypt to Israel, which is now out of service because of the war. Moreover, there is a peace agreement with Jordan; relations with Cyprus and Greece are completely different, while relations with Turkey are not so much stable.

  Now, in terms of availability Israel started having its own resources, and that changed all its connections in this world. Because of geopolitics, the Arab boycott has been reduced and there are many more that are willing to sell. Overall, global sources have diversified dramatically; there are sources available in South America, in Nigeria, and in Russia; there are oil producers that you couldn't find in the past. So, one can understand that the issue of dependency, which is had been a major problem during the first period, becomes less important in the second period. This also has to do with affordability of course. Affordability is much easier because, once again, your stance in the negotiations is completely different. Now, the most fascinating thing, in connection with geopolitics, is that from facing import problems, you are now facing export problems.

Based on the available data, the interviews show that the most applicable solution for exporting gas from Israel would be a terminal in Cyprus that would operate as a liquefaction plant. It looks as the most viable option, because any mid-seas liquefaction plant would be very costly. It can always be found, but the cost of the installations is estimated at almost three billion dollars, and this is a major thing. The other option for exports would be through Turkey, albeit geopolitics seem to render this scenario less likely, since here is still skepticism about this because there might be a pressure from different parties to utilize Turkey and to increase dependency between Turkey and the US allies in the region. In such an option were chosen, it would give the US more leverage in Turkey than it has now, while at the same time heavy governmental investment from Israel would be required. While the Cyprus-based or mid-seas liquefaction plant would be completely in the hands of the private sector and governments would not invest in it.

In terms of affordability, the second period raises a completely different issue in Israel, also related to national security, but in a different angle, i.e. what should be done: there is a question of how much gas Israel should preserve in the fields of the Mediterranean as national reserves for generations to come, and this was, in a way, contrary to the interests of the private owners of the concessions, who wish to export as much as possible. This debate has been ongoing in Israel for the last five years until today, but as per the interviewees this is a Netanyahu policy and the question of whether this is the right thing will be raised again by any other government that comes to power.

The trend will be more to build reserves and less to increase the share of exports, because the more you reserve and the less you export, you reduce the price of energy in Israel as well, because then the producers would not have the option of taking it out and they would seek more contracts within Israel. This is expected to reduce the price of energy within Israel and that, of course, has implications on all production in Israel.

- <u>Security Policies and National Security Levels.</u>

In the case of Israel and Jordan, for example, the issue of the "safety and security of Jordan" may not be linked solely with energy, but also with water, and Israel might be more flexible in terms of giving the Jordanians more water, in order to receive and return some strategic cooperation on other issues. In the case of water and energy, the concept and scope are bigger and thus more critical to deal with and pay attention to.

It is up to Israel's national policy to decide how to proceed, and this is why a National Security council needs also to be involved in the process. In this council, a national security advisor plays a major role in supporting the government's position on what should the policies be regarding the ratio of NG to be exported, as well as other issues.

As per the interviewees, the parameters that the national security of a country may consist of can be:

- Country's military forces; whether they are strong and capable in relation to the enemies and any hostile neighborhood actors.
- Country's capabilities to act in the global geopolitical nexus, relative to its enemies.
- The alliances that the country participates in/belongs to; especially with powerful countries, mostly in terms of military forces.
- The country's natural and energy resources, which provides it with the leverage required to act independently and even to support its military equipment.
- The options to export to neighboring countries. By this, change the relations with actors abroad and attract their interests in strategic issues, like energy. For example, the issue of exporting and supplying NG to Jordan is a very interesting one, and had the Egyptians not found their own new natural gas reservoir in the Mediterranean recently, then a deal with Egypt would have gone as well about using the refineries and it would have further cemented relations. As far as the Palestinians are concerned, there is the project of the NG field opposite Gaza that British Gas actually has the concession for developing, and has about 20 years of negotiations behind it, and it is connected to Israel's National Security.

- The political will of country's authorities to act against any threat: The will of politicians, and the will of society and culture are also included. More specifically, the strategy of deterrence is strongly based/built on influencing the other country's political will.
- The geographical location of the country: It makes a big difference if a country is located in a hostile environment (like Israel, Cyprus, etc) or has an ideal neighborhood, where no threat against the country has emerged for decades now (like Luxemburg, Norway, etc).
- New technology: For the case of Israel, it was mentioned that the country had been investing a lot in the development of technologies that reduce the world's dependency on fossil sources of energy, and fossil fuels in general, either gas or oil or coal. This is under Israel's national economic advisor, and it is worth mentioning that although Israel already has its own sources of fossil energy during this second period, because of geopolitics and long-term strategic thinking regarding the use of fossil energy as a major tool by Iran, and the Arab world in general, Israel is investing in creating technologies that will reduce its dependency on fossil fuels.

▪ <u>Opportunities on the relationship between energy security and national security</u>.

Regarding the question whether Energy Security affects the National Security of the country, almost all of the interviewees agreed that the notion that Energy Security is one of the parameters, but not the only one: the aforementioned parameters needs to be considered also.

Regarding the profile and background of the interviewees, it is worth mentioning that they are considered very much relevant to the study since all of them have been active both in National and Energy Security issues with their countries and governments: two of them are diplomats and academics with one being also involved in energy and water projects in Eastern Mediterranean region (G. Valinakis, A. Ram); one of the interviewees was a military official who served in NATO and is considered also a scholar of national security subjects, in both in regional and global nexus (P. Christou); two of the interviewees are professors in universities in Israel and much related to natural security studies, and also act as advisors to Israel's Knesset that they had been acting as veteran authorities on the Arab-Israeli conflict and strategic developments in the Middle East, and are considered experts on Israeli strategic doctrine, public opinion on national security issues (I.

Efraim, E. Oded). Finally, the leading professionals in the field of energy and international relations (P. Terp, J. Stephen, G. Siammas) have many years' experience in dealing with the Eastern Mediterranean countries, in sectors like energy and investments in the countries in Middle East and Israel.

4.3.4.3 Results

The exploratory research which was conducted upfront identified as basic parameters for the concept of "Energy Security" parameters like: diversity of total energy supply, changes in energy consumption in relation to GDP growth, energy import dependence and concentration and efficiency of electricity generation and use.

Regarding the notion of "National Security" and it consists of, almost all respondents referred to very similar, if not identical concepts, as indicated in the conceptual framework that follows next.

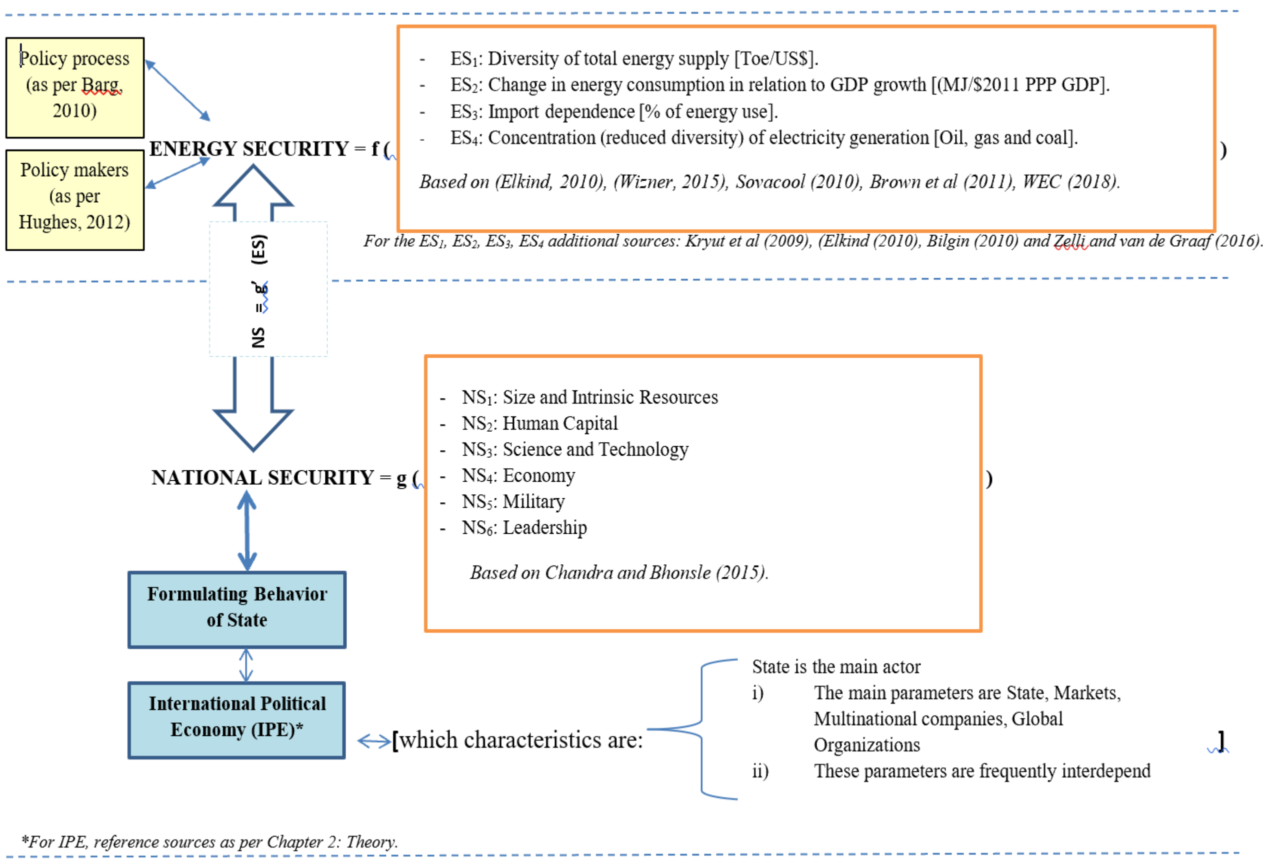
The exploratory research conducted upfront identified as basic parameters for the concept of "National Security" very similar to those indicated in the approach proposed by Chandra and Bhonsle (2015). As per that, the following six variables can be considered as those that a national security of a nation-state can be consisted of: Leadership, Economy, Military, Science & Technology, Human Capital, Size & Natural Resources. Each of these variables is considered as an index and it is separately measured and calculated as it will presented later in details.

In the next comprehensive figure 4.7, there has been serious effort to correlate and combine the important parameters related to each of the examined variables – Energy and National Security – which will be helpful for the analysis and study herein. The base background of the theory in each case is mentioned and there are also indications for further links and references that can help any future research and study.

This comprehensive figure 4.7 is characterized as Broad Conceptual Framework.

Figure 4.7

Broad Conceptual Framework



Source: (Author, 2019).

In this conceptual framework, a function "f" has been considered that includes four independent variables affecting the independent variable of Energy Security (ES). The choice and selection of these independent variables is also in line with the literature review which is presented in this thesis [see section 3.3.1.2].

Similar approach has been also adopted for the definition of the dependent variable of National Security (NS). In this case, there have been identified and selected six independent variables affecting the dependent variable of NS for which another function named as "g" is chosen.

4.3.5 The Quantitative Research

According to Stathakopoulos (1997: 63), secondary data are characterized those data that had been selected in the past for other purposes and not to solve any particular problem that is analyzed on that specific purpose.

4.3.5.1 Quantitative Research Identity

The methodology that was used during the quantitative research and the research identity are described in the following components:

- Methodology: Desk research on literature, one-to-one consultations with research experts/statisticians, quantitative analyses of secondary data, comparative analysis of case studies.
- Method of statistical analysis: SPSS version 25.[20]
- Fieldwork: May 2018 to May 2019.
- Documentation: Desk research reporting, and statistical tables and processes are presented in the Appendices C2 and E of this thesis.

4.3.5.2 Results

Following the qualitative research mentioned above in section 4.3.4 of this thesis, a necessary statistical processing followed of secondary data on the two variables and the key parameters as identified in the qualitative research. The broad conceptual framework (Figure 4.7) which has been designed in this thesis is finally applied.

As already described in the previous section of the thesis, it is possible to consider their relationship (function ***g'*)** between the two variables, "Energy Security" and "National Security" as:

$$\text{National Security} = \boldsymbol{g'}\,(\text{Energy Security}) \tag{4.2}$$

where:

[20] Basic reference to the theoretical background related to Statistics and SPSS is provided in the Appendix D of this thesis.

National Security can be used as the symbol NS and it can take values from a total

$$NS=\{NS_0, NS_1, NS_2, \ldots, NS_i\} \ (i>1) \qquad (4.3)$$

and

Energy Security can be used as the symbol ES and it can take values from

$$ES=\{ES_0, ES_1, ES_2, \ldots, ES_j\} \ (j>1). \qquad (4.4)$$

More specifically:

For the NS, the approach proposed by Chandra and Bhonsle (2015) is followed using six variables: Leadership, Economy, Military, Science & Technology, Human Capital, Size & Natural Resources. Each of these variables is considered as an index and it is separately measured and calculated as it will presented later in details.

Based on the relationship (4.3), National Security (NS_i) is described through the following indexes:

- NS_1: Size and Natural Resources.
- NS_2: Human Capital.
- NS_3: Science & Technology.
- NS_4: Economy.
- NS_5: Military.
- NS_6: Leadership.

For the ES, the adoption of the four indicators as proposed above herein are chosen. In addition, they represent quite well the risks or vulnerabilities of the examined energy system of the nation-state. Such indicators are: Diversity of total energy supply, Change in energy consumption in relation to GDP growth, Import dependence and Concentration of electricity generation.

Based on the relationship (4.4), Energy Security (ES_j) is described through the following indexes:

- ES_1: Diversity of total energy supply.
- ES_2: Change in energy consumption in relation to GDP growth.
- ES_3: Import dependence.
- ES_4: Concentration of electricity generation.

According to the theory related to NS which has been already described in the previous section 3.3.2.a of this thesis, for the purposes of the calculation of the NS there is a need of pool of countries whose comprehensive national security will be also evaluated. Thus, each country's National Security Index (NSI) will be considered and calculated compared to them or in relation to them. For the purpose of the quantitative research, the most important countries in the Eastern Mediterranean region are finally chosen to be included in the pool; Israel, Cyprus, Turkey, Greece and Egypt.

Finally, the NS Index is the result of the arithmetic mean, which is the "average of a set of numerical values, as calculated by adding them together and dividing by the number of terms in the set"[21]. In addition, equal weightage has been given to each factor because "each of them is uniformly important to national security" (Chandra and Bhonsle, 2015). For each of the examined counties –Israel and Cyprus- data that had been collected for each of the aforementioned indexes for the period 2006-2017.

Subsequently, at this point the relationship (function ***g')*** between the two variables, "Energy Security" and "National Security" for each examined country was studied and the results are presented herein. For each country (nation-state), it is examined the relationship of each of the indexes of NS [NS_1, NS_2, …NS_6] with the average $ES_{ave.}$

A The case of Israel

Based on the results, it is seen that a functional relationship between the index "NS_1: Size and Natural Resources" and the independent variable ES_{ave} for the case of Israel exists and it is considered as strong (as the value of regression analysis is much less than 0.05)[22]. Moreover, it is seen that in this relationship a negative (-) sign comes out; this can be initially explained with the

---

[21] https://www.dictionary.com/

[22] When the value of regression is <0.05, then a significant functional relationship exists between the two examined variables (independent and dependent).

explanation that as more natural resources the country owns/keeps, then consequently the more the value of the ES_{ave} is expected to be decreased.

Referring to this specific case of the examined nation-state of Israel for the period 2007-2017, such a negative sign can be explained since there have been continuous imports for the country [recent oil and gas discoveries have not been materialized yet, while it is expected to change in the oncoming years]. In other words, this can be explained as there are imports of energy resources, then there would not be expected for the country to report a strong Natural Resources index (i.e. NS_1).

Subsequently, it is seen that a functional relationship between the index "NS_2: Human Capital" and the independent variable ES_{ave} for the case of Israel does not really exists and it should be considered as weak (as the value of regression analysis is finally >0.05).

It may be interested to see whether any change of this index can happened in the next period of five to ten years (i.e. until 2025-2030) considering changes in the expenditure on health and education as a percentage of country's GDP since "size of population alone is not enough and must be qualified by the extent of economically active population" (Chandra and Bhonsle, 2015: 343).

Next, the functional relationship between the index "NS_3: Science & Technology" and the independent variable ES_{ave} for the case of Israel does not really exists and it is considered as weak (since as the value of regression analysis is >0.05).

Referring to the functional relationship between the index "NS_4: Economy" and the independent variable ES_{ave} for the case of Israel it is seen that such a relationship exists and it is considered as strong; the value of regression analysis is lower than 0.05 when considering the 90% level of significance[23] for the coefficient (and not at 95%). Furthermore, in this relationship a negative sign (-) exists again and it can be initially explained as the more economical growth and development the country achieves, then consequently the more the value of the energy related issued become less risky and thus more easily to handle.

[23] The null hypothesis is rejected if the p-value is less than a predetermined level, α. α is called the significance level, and is the probability of rejecting the null hypothesis given that it is true (a type I error). It is usually set at or below 5%.

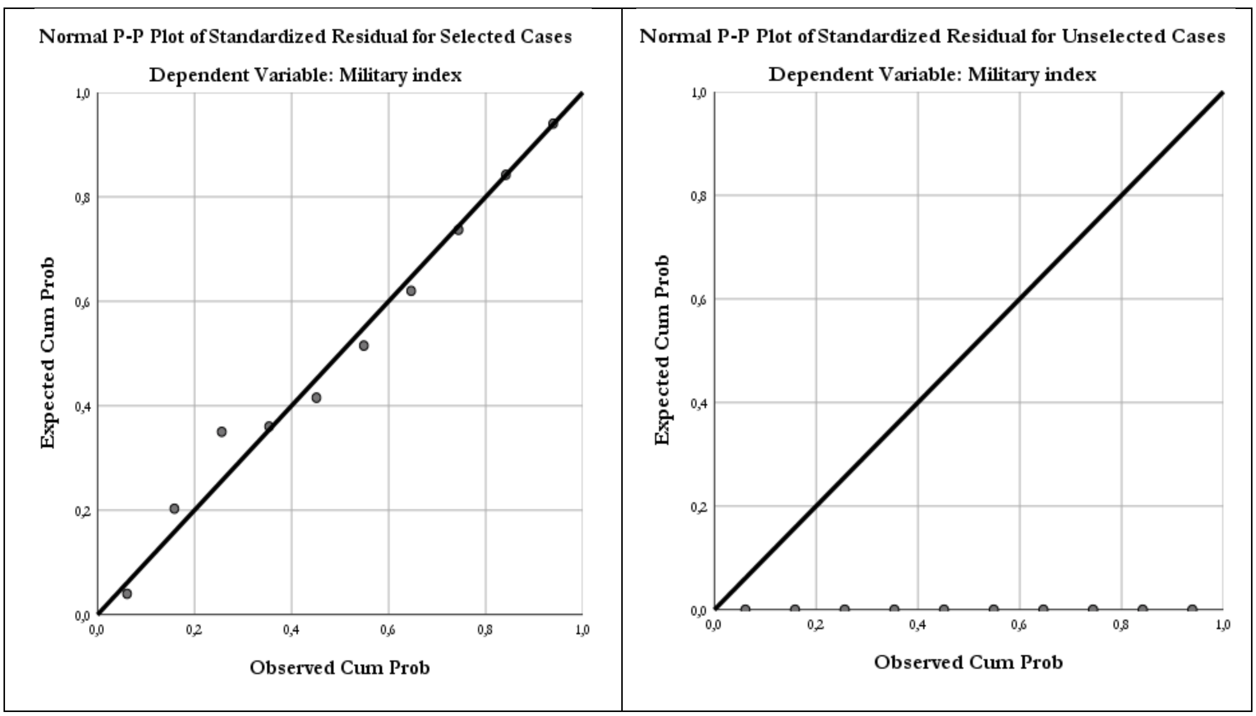
Next, the functional relationship between the index "NS_5: Military" and the independent variable ES_{ave} for the case of Israel is proven that exists and it is considered as strong: the value of regression analysis is much lower than 0.05 when considering the 95% level of significance for the coefficient factor:

$$NS_{military} = -1.232\ (ES_{ave}) + 119.841 \tag{4.11}$$

In the next figure 4.8 the relationship NS_5=g' (ES_{ave}) for the case of Israel is represented (which is same as the figure E1.5.1 also given in the Appendix E of this Thesis).

Figure 4.8

Relationship NS_5=g' (ES_{ave}) for the case of Israel



Furthermore, in this relationship a negative sign (-) exists again and it can be explained as:

- As more the value of ES_{ave} for the nation-state (country), as less attention is given to expenses and investments in other areas in the country, including Military.

- However, in this relationship the negative sign seems that the independent variable can affect both less and negatively the dependent variable
- It may imply that since the country did not have any needs for military for that year/period [expenses, investments, priorities], then an increase of focus and interest on ES would normally follows.
- Military in Israel is seen as imperative (means that is mandatory and needs to be there anyway); thus, it is not expected that the state and government in power would associate any Military related issued to any other issues (such as ES) and have a link between them. For this reason, it is not expected to have a strong relationship between the two variables; because if there would be such a relationship and the state would like to secure a high/strong ES that would mean that a weak/low Military would co-exist, which is something that would directly affect the country's NS.

The functional relationship between the index "NS_6: Leadership" and the independent variable ES_{ave} for the case of Israel exists and it is considered as strong: the value of regression is lower than 0.05 when considering the 95% level of significance for the coefficient. Furthermore, in this relationship a negative sign (-) exists again and it can be explained as the more the value of ES_{ave} for the nation-state (country), as less attention is not given to expenses and investments in other areas in the country, including Leadership.

$$NS_{leadership} = -0.530\ (ES_{ave}) + 72.489 \tag{4.12}$$

It is interesting to note that the leadership factor seems to have a varied impact on the inter se rating of different countries. It has shown no impact on the rating of some countries in similar studies (like the UK, South Korea and France), it has had a relatively limited impact on that of others (like China, Australia and Russia), and it has had a considerable impact on that of countries (like India, Poland and Turkey) (Chandra and Bhonsle, 2015: 337–359).

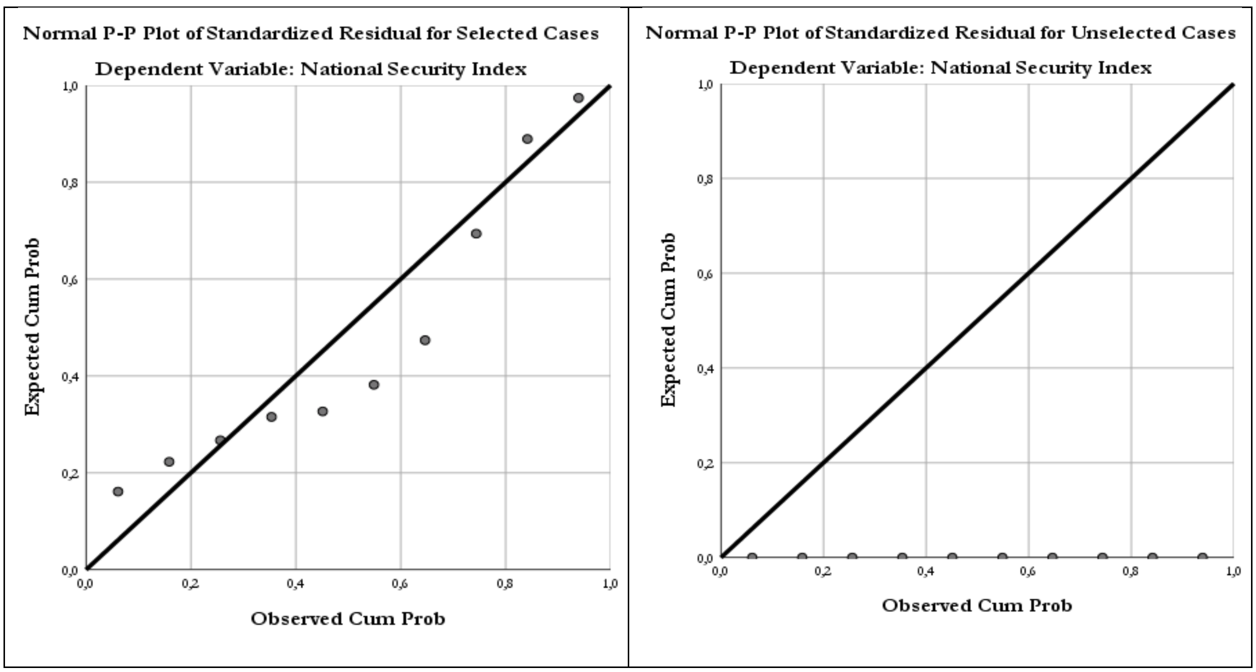
Finally, the functional relationship between the index "NS_t" and the independent variable ES_{ave} for the case of Israel comes out that exists and it is considered as strong: the value of regression analysis is much lower than 0.05 when considering the 95% level of significance for the coefficient factor.

$$NS_t = -0.765\ (ES_{ave}) + 81.134 \tag{4.13}$$

In the next figure 4.9 the relationship NS_t=g' (ES_{ave}) for the case of Israel is represented (which is same as the figure E1.7.1 also given in the Appendix E of this Thesis).

Figure 4.9

Relationship NS_t=g' (ES_{ave}) for the case of Israel



This is an important finding as there is a strong functional relationship between the two examined variables for the case of Israel.

Based on the aforementioned analysis, there are parameters (indices) that have revealed several areas in the state of Israel that need to be further examined and considered, which can be further elaborated and developed in order to include and consider other external parameters and factors, as it will be described in the conclusions section of this thesis.

B. The case of Cyprus

Based on the results, it looks that the functional relationship between the index “NS_1: Size and Natural Resources” and the independent variable ES_{ave} for the case of Cyprus does not seem that exists and it is not considered as strong (as the value of regression analysis is >0.05)[24]. As a reference point and as it will be presented later in this section, this index NS_1 related to the Size and Natural Resources has the lower value of regression (0.217) when compared to all the other indices herein.

The functional relationships between the indexes “NS_2: Human Capital”, “NS_3: Science & Technology”, “NS_4: Economy” and the independent variable ES_{ave} for the case of Cyprus do not exists and they are considered as weak (as the value of regression analysis comes >0.05). In particular, as a reference point the index NS_4 related to the Economy has the highest value of regression (0.939) when compared to all the other indexes herein.

Next, it is seen that the functional relationship between the index “NS_5: Military” and the independent variable ES_{ave} for the case of Cyprus does not exist and it is considered as weak (since the value of regression is higher than 0.05 when considering the 95% level of significance for the coefficient).

The functional relationship between the index “NS_6: Leadership” and the independent variable ES_{ave} for the case of Cyprus does not exist and it is considered as weak (since the value of regression is higher than 0.05 when considering the 95% level of significance for the coefficient).

Finally, the functional relationship between the index “NS_t” and the independent variable ES_{ave} does not really exists for the case of Cyprus and it is considered as weak since in all the cases the value of regression was higher than 0.05 when considering the 95% level of significance for the coefficient factor. This is an important finding as it is finally seen that there is a weak functional relationship between the two examined variables (NS_t and ES_{ave}) for the case of Cyprus.

Based on the aforementioned analysis, there are parameters (indexes) that have revealed several areas in the state of Cyprus that need to be further examined and considered, which can be

[24] When the value of regression is <0.05, then a significant relationship exists between the two examined variables (independent and dependent).

elaborated and developed in order to consider and finally include other external parameters and factors, as it will be described in the conclusions section of this thesis.

4.4 Conclusions and Recommendations

4.4.1 Conclusions

A summary of the main outcomes of the research that took place in this thesis is presented as following. The main research question and the sub-questions as already descried in the previous section 4.3.3 are addressed and the results and findings are given herein.

- Main research question: Identification of the correlation between variable of "Energy Security" and its impact on the variable "National Security" of a country.

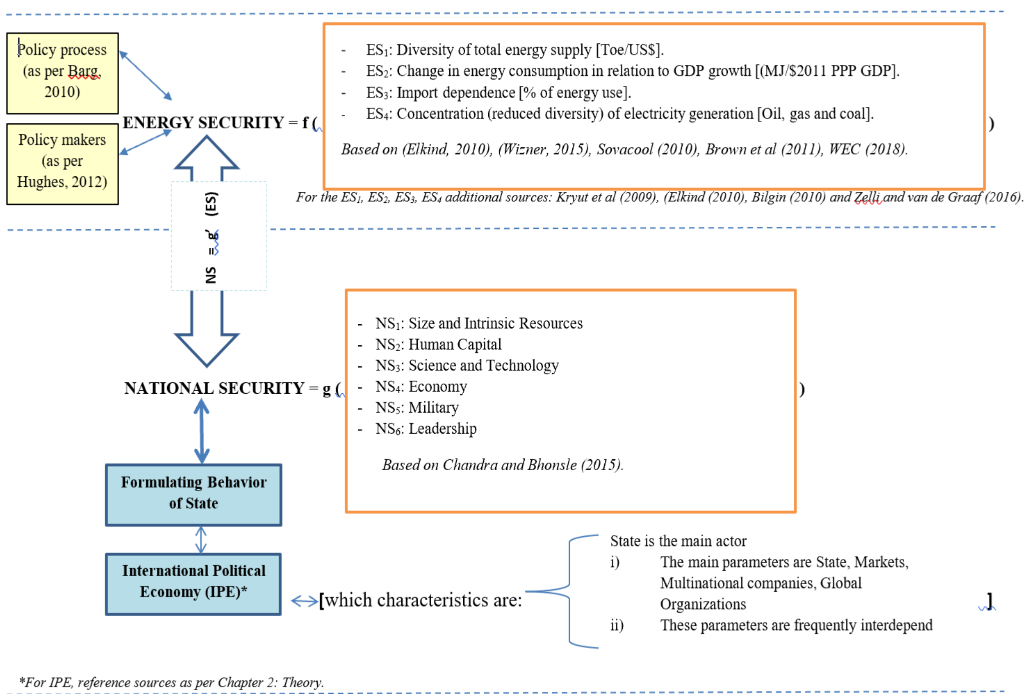
  Results: There is a functional relationship that connects the variable of "Energy Security" and its impact on the variable "National Security" of a country. It was shown that it is possible to consider a relationship (function ***g΄)*** between the two variables, "Energy Security" and "National Security" as:

  $$\text{National Security} = \boldsymbol{g'}\,(\text{Energy Security})$$

  Based on the analysis in this thesis, a comprehensive conceptual framework was designed and adopted for the study of the examined variables at a nation-state's level (see Figure 4.7 and as follows):

Figure 4.7

Broad Conceptual Framework



- Sub-questions 1-2: Identification of the parameters that characterize the notions of Energy Security and National Security.

  Results: Based on the proposed conceptual framework and analysis in this thesis, a function “f” was considered that includes four parameters affecting the independent variable of Energy Security (ES). The exploratory research conducted upfront identified as basic parameters for the concept of “Energy Security” parameters like: diversity of total energy supply, changes in energy consumption in relation to GDP growth, energy import dependence and concentration and efficiency of electricity generation and use. The choice and selection of these independent variables is also in line with the literature review which is presented in this thesis [see section 3.3.1.2].

  Similar approach has been also adopted regarding the dependent variable of National Security (NS). In this case, there were identified and selected six parameters that the variable of NS can consist of and for that another function named as “g”. Regarding the

"National Security" of a nation-state, that these parameters are as following: leadership, economy, military, science & technology, human capital, size & natural resources. Each of these parameters can be considered as an index and it can be separately measured and calculated.

- Sub-question 2: Investigation of any relationship-positive or negative- between the two basic variables; comparison of two cases, Israel and Cyprus.

  Results:

  As it is found and analyzed in this chapter, there is a strong functional relationship between the two parameters for the case of Israel, but this does not happen also for the case of Cyprus. In that case, no such formal relationship seem to exist for the examined period and several suggestions need to be addressed for that later in this thesis.

  Sub-questions 3-5: Focus on Israel's and Cyprus's Energy and National Security.

  Results: This is the object of the next chapter five (5) of this thesis and more thorough analysis and takes place there.

4.4.2 Recommendations

i. General

Based on the previous analysis in this thesis, it comes out that Energy Security can be interrelated and linked with other external factors like:

- Nation state's natural resources possession (ownership).
- Geographic parameters[25] for both the nation-state and the natural resources, which is very crucial
- Natural environment.
- Geopolitical and regional challenges.

[25] Geographical parameters include: physical location, territory, population, natural resources.

- Leadership, human capital and culture of nations' state.

According to Molchanov (2012), Energy Security "should be approached as essentially a political category and a relational quality of international relations". Moreover, the secureness of a nation-state regarding both its availability and accessibility of energy sources and/or supply is strongly defined by "the concrete configuration of forces in the international arena" (Molchanov, 2012: 12).

"Against the background of global climate change, freedom from oil becomes key dimension of energy security" (Molchanov, 2012:20), which can be seen as efforts to more clean energy sources and use.

The security environment is continuously changing especially from the beginning of the new century; then considering the fact that there are new factors and parameters as part of it, it would contribute to understand the contemporary challenge that security confronts (Krishna-Hensel, 2012: 1).

When considering the causal relationship between the ES (ID) and NS (DV), it was very clear that there might be also other variables that cause/affect the NS (DV) and that the research/investigation does not negate them; in reality, the research/investigation of this study does not have anything to deal with those causes at all. The scope is to determine whether the ES (IV) has a positive/negative/no effect on NS (DV) (Kellstedt, Whitten, 2013: 73).

As per Cherp "energy systems are closely entangled with national and human security" and he believes that public discussions and nation policies are strongly driven by "concerns over the reliability of vital energy services". In addition, he considers that security concerns are related to several issues such as armed conflicts, viability of national economies, integrity and stability of political systems. He suggests that policies developed due to the pursuit of energy security are "a key driving force in the transformations of energy systems" (Cherp, 2011: 329).

It is advisable also that doing a social research care must be taken on how conclusive an answer/result/outcome comes out, since it is rare to have definitive conclusions about causality. As per Kellstedt and Whitten (2013: 82), "we must remain open to the possibility that some previously unconsidered (Z) variable will surface and render our previously discovered relationships to be spurious".

ii Extended conceptual Framework

Taking into consideration the broad conceptual framework (see figure 4.7 as herein), the analysis given in the chapter the of the thesis as summarized in the table 3.5, there is an even more broad approach to the framework that can be studied at a later stage.

There are several different functions and equations given below, that describe the parameters under examination, in which other new parameters are included. Thus, a thorough and even more comprehensive approach is available for research and studies.

$$NS = g\,(NS_{indicators}) \tag{4.14}$$

$$g = g'(\text{other } NS_{indicators}) \cdot g'(ES) \tag{4.15}$$

$$\text{Thus, } NS = g'(\text{other } NS_{indicators}) \cdot g'(ES) \tag{4.16}$$

Since the aim is to examine the relationship between NS and ES: see as $NS' = g'(ES)$ then in general, the extended conceptual framework can be described as following:

$$NS' = [g'(ES)]_t \cdot [H(x)]_t \cdot [E]_t \cdot [I]_t \tag{4.17}$$

where the new variables are given as following:

E: External effect, with E to be defined as: $E = Si \cdot Pi \cdot N_{Re} \cdot ENP \cdot L \cdot T \cdot AF$ (4.18)

I: Internal effect, with I to be defined as: $I = INi \cdot LPi \cdot IS$ (4.19)

H(x): a function that is defined as: $H(x) = k \cdot l \cdot p \cdot s \cdot u$ (4.20)

In particular, the variables k, l, p, s and u are described as below:

k: conductivity.

s: entropy ($\Delta S > 0$).

l: elasticity (related to the "ignition point").

p: probability ($0 < p < 1$).

u: uncertainty (see Heisenberg and risk, r[26]).

[26] Where risk, r is defined as "the possibility that a potential threat materialized" (Tunsjo, 2013: 98).

A brief reference to the aforementioned variables is given shortly below herein.

<u>k: conductivity</u>, which is the opposite of resistance and is function of temperature and surface that interacts each time.

<u>s: entropy</u>, which is determined as a measure of the amount of energy that is no longer capable of performing work (see also later in this chapter). It is described by the second law of thermodynamics where the entropy of a system has the tendency to increase and it is an effective guide to the degree of irreversibility. In other words, entropy increases mean, that "additional work is required to overcome these irreversibilities" (Perry, 1997: 11-100).

<u>l: elasticity</u>, which is the parameter related to the type of material. As it is known from Materials Sciences, each material behaves differently and this can be parallel to the type of the nation-state which is examined. Materials and their behaviors is a broad aspect and only a small reference is made herein due to limitations of time, scope and aim of this Thesis.

<u>probability p</u>, which is defined as the "the likelihood of something happening in the future" (Downing, 2009:264). It is normally expressed as a number between zero (can never happen) to 1 (will always happen).

<u>uncertainty u</u>, which is described by the uncertainty principle (that is known also as Heisenberg's uncertainty principle) is any of a variety of mathematical inequalities that proposes a limit to the precision with which certain pairs of physical properties of a particle, such as position x and momentum p, can be known (Seth, 2013: 37).

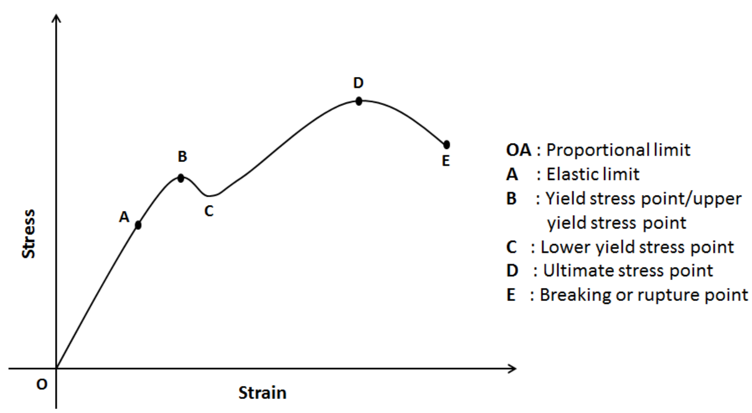
For each material, a characteristic coefficient related to its type exists; for the purpose of this study, it is helpful to consider the elasticity of the material. Consequently, for each material, there is a stress strain curve that represents and describes graphically the behavior of the material when it is subjected to load. In the following figure stresses are plotted along the vertical axis and as an outcome, corresponding strains are plotted along the horizontal axis.

There are different mark points indicated on the curve that show the several stages that a material passes under load effect before its fracture (see below as breaking point) such as below:

- Proportional Limit (see OA), is a point up to which the value of stress and strain remains proportional.
- Elastic Limit (see A), is the limiting value of stress up to which the material is perfectly elastic. If it is unloaded before crossing the elastic limit, material can return back to its original position and status.
- Yield Stress Point (see B), is the stress after which material extension takes place more quickly with no or little increase in load.
- Ultimate Stress Point (see D), is the maximum strength that material bear stress before breaking and after that the material has almost zero strength to accept additional stress.
- Breaking Point or rapture point (see E), is the point where strength of material breaks and the stress is known as breaking strength or rupture strength.

Figure 4.10

Stress strain curve for a material



Source: (Lemaitre, 2001).

There can be some critical functions (or else "strategies") that can be taken into consideration when trying to minimize the effect of the energy security to the national security of a nation-state. As per Hensel (2012: 129-131), there can be described as following:

- N_1: diversify the sources from abroad.
- N_2: less imports, more local resources.
- N_3: develop alternative resources (for the key resources).

The characterization of "Ni", where i=1,2,3,..,n is subjective and it helps the purposes of the general conceptual framework design.

The above critical functions are described in the next table 4.1 along with main measurement techniques

Table 4.1

Critical functions in the relationship ES-NS

Function	Description	Indicator	Measurement technique/
N_1	Diversify: Countries that sources come from abroad.	Count and check the % imported from each country abroad.	How it changed during the last i.e. 10 years. Is it more a spread and diversified portfolio of suppliers? Any 80/20 pareto?
N_2	Dependence: Less imports, more local resources.	Capex and feasibilities in developing more local sources (for the key resources).	How much is the government's annual budget allocation for such for the last i.e. 10 years. How many new local resources haven been developed for the last i.e. 10 years.
N_3	Alternatives: Develop alternative resources.	Research & Development (R&D) expenses to develop new alternative resources (for the key resources).	How much the R&D annual expenses for the last i.e. 10 years.

Source: (Author, 2019).

CHAPTER 5

THE CASE STUDIES OF ISRAEL AND CYPRUS

5.1 General

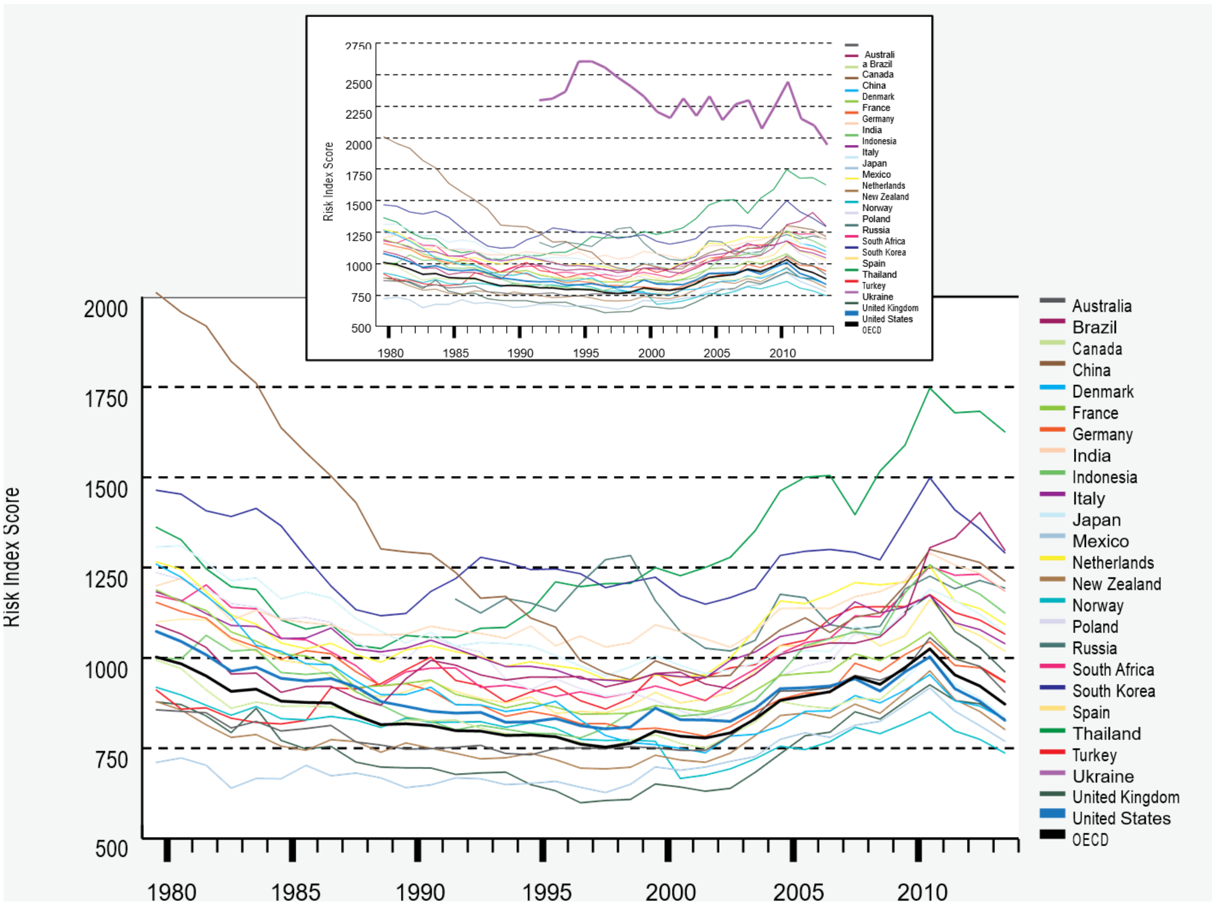
As already presented in the introduction of this thesis at section 1.1, the selection to study and examine the countries of Israel and Cyprus was mainly because they have many similarities and things in common; they are of comparable size in terms of area, they are both located in the East Mediterranean region which is primary importance for global and regional energy issues and also for geopolitical ones, they are both continuously trying to establish their territory in an hostile environment and thus they are both concern for their national security and being very sensitive with issues related to that.

In this chapter, the environment of these countries will be examined, the main stakeholders and then each case study per se.

The world has faced several cases where the oil and gas incidents caused direct and side effects to the economy of the countries, its governments and regimes and the societies. Referring to the ES Index, the following figure 5.1 shows the performance of 25 countries that are the bigger energy consumers during the period 1980-2014.

Figure 5.1

Energy Security Risk Index for Large Energy User Group: 1980-2014



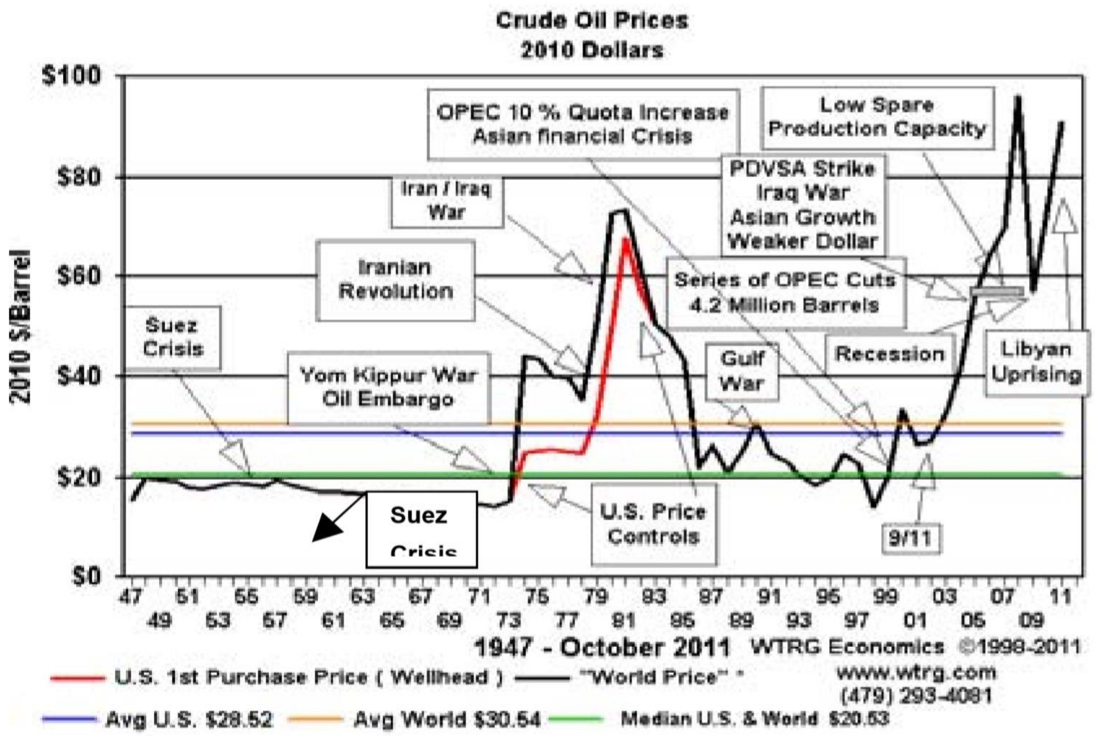
Source: (Institute for the 21st Century Energy, 2017).

For all of these countries, there was a continuously decline of the value of the ES index from the starting reference year 1980 until 2000. Then, for the period 2000-2010 there is a change and the curve shows a clear inclination reaching its peak around 2008-09 where the cost of the oil hit the highest in its historic highs in July 2008 of $144.29 per barrel (O&G, 2016).

There are key post-WWII oil shocks such as the Suez Crisis of 1956-57, the OPEC oil embargo of 1973-1974, the Iranian revolution of 1978-1979, the Iran-Iraq War initiated in 1980, the first Persian Gulf War in 1990-91, and the oil price spike of 2007-2008. Following each major oil shock, there are other minor disturbances of economic downturns (Hamilton, 2011: 239-240). An overview of oil price changes along with major political events since 1970s is given as follows:

Figure 5.2

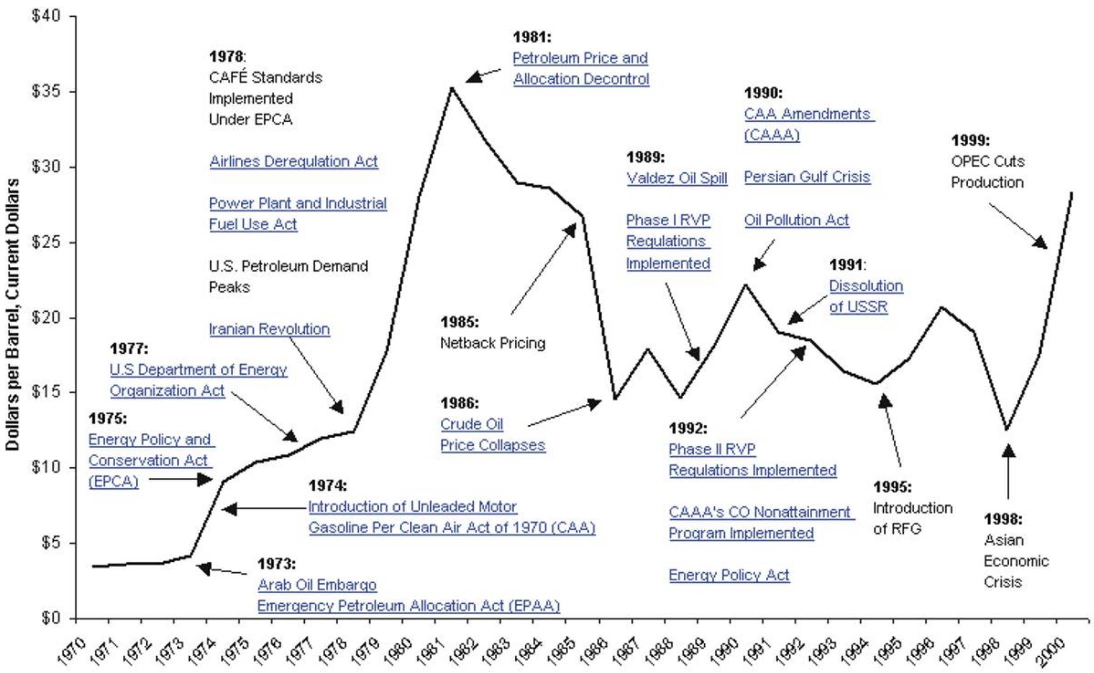
Oil prices vs major political events 1950-2011



Source: (Williams, 2008).

Figure 5.3

Oil prices vs major political events 1970-2011



Source: (EIA, 2011).

Global oil prices have been changing frequently during the previous decades mainly due to:

- Supply-demand balance disruption: Global demand for oil has been increasing faster than production capacity; thus, a real production capacity, which is always different from the nominal/installed one, was difficult to cope with the demand. This means that even slightly minor supply disruptions knock the supply-demand balance and for that reason oil prices go up dramatically.
- Production and raw materials costs: Costs are affected, due to changes in the global economy and technology that seriously acts as a critical factor.
- External effects: Such as disruptions caused by natural, economic or political reasons, military conflicts and terrorism.

- Market expectations and speculation: Future contracts and derivates opened the oil market to speculative capital flows and they become highly reflexive, which does not cope with changes in the other factors. A speculative market when happens to exist with low spare capacity and high uncertainty it can quickly cause price bubbles and longer-term volatility.

Kilian (2008: 871-909) suggested an endogenous model with three-variable in order to indicate three different shocks that could have an impact on energy prices:

- Crude oil supply shocks: Caused by exogenous event.
- Aggregate demand shocks: Related to industrial commodities in the global market.
- Oil-market specific demand shocks: Which are specific to the global crude oil market, usually based on fear of future events that might cause oil prices to change (also known as precautionary demand or speculative shocks).

As per Farrell et al. (2004: 421), "Oil and gas production, transportation, and refining infrastructures are often spatially concentrated, and disruptions can lead to shortages if supply is not restored before stockpiles are exhausted" and he mention that there have been twenty-four oil supply shocks during the period 1950-2003 which can be seen as incidents took place every around eight months or 3.7% of the global supply.

As per Mor (2013), the recent situation in the region is characterized by fast development that should be appreciated but with a major energy security risk. This is not only an energy security; it is a national security risk because of what can happen in the next five years is that since there is so quick rush for natural gas without major insurance or cautious measures to deal in times that gas may not flow from this field-and gas may not flow all the times for different reasons, such as:

- Technical problems, like in filed operations.
- Environmental problems, like a hurricane or earthquake (as some of the gas fields in the Gulf of Mexico still not operating after the Katerina and Rita hurricanes), while this region is earthquake prone.
- Strategic problems like possibilities of ground missiles and sky missiles which should be protected. If there is a major seize in gas flow from the production field, then counties like

> Israel will most likely be in the dark and this is going to be most likely the case an since there is not much back up of energy.

There were various examples where the decision to implement an energy project (i.e. pipeline Baku-Tbilisi-Ceyhan, BTC) was based on political and geopolitical conditions and not economical ones, because the later did not always support the continuation of a project (Nourzhanov, 2006).

While energy supply is important for the economic growth of a country, there is a correlation between energy use and GNP. Since GNP is not the only factor “of level of civilization or quality of life in a country”, it is necessary “when planning for energy needs of a nation to consider alternative socioeconomic models, with emphasis on the socioeconomics and not only the economics” (Sonnino, 1977: 142).

As per Kortweg (2013), there has been limited debate about the strategic implications of the major hydrocarbon findings in the eastern Mediterranean region. He is not optimistic since he does not believe in the industry potential of the gas findings not because they are not available but whether the wealth that’s in the seabed will actually be used for political reconciliation.

One of the fundamental problems is a tendency of zero-sum approach in the region regarding to the handling of the gas findings. Even it looks obvious that the gas findings in the Israeli seabed present a tremendous opportunity, it is not evident that there is also a secure and stable environment that will attract the requested investments from abroad. On the contrary, it does not looks easy due to the strategic implications of the gas findings, not only in the Israeli seabed and the expectations of USD 717 billion of export earnings but also Cyprus as well.

It is important to consider what these resources mean to the overarching political framework, since at the same time it looks that there is no issue with the gas industry because this type of industry is very familiar with operating in very difficult places.

The challenge lies with the vision of political cooperation. The strategic context in the eastern Mediterranean is characterized by uncertainty, by changes in the regional balance of power and tremendous political instability. There was the recent Arab spring, relations with Egypt are troublesome, there were some disruptions in gas supply and it remains to be seen how the relationship between Israel and Egypt will evolve under the new regime in place.

Apart from a nation state approach which is the main purpose of this Thesis, energy security issues have also an important regional dimension mainly because countries are present in geographic proximity that provides them with same conditions regarding their access to energy resources, interaction with energy carriers, the structure of energy use and trading with third parties (Cherp et al, 2012: 356).

5.2 The East Mediterranean region

5.2.1 General

The East Mediterranean region has been facing challenges also related to the energy landscape. Since the economy is foreseen to grow further while at the same time the population of the region is expected to grow from 45.3 mill in 2010 to around 60 mill in 2030, energy demand should also increase significantly over the next years.

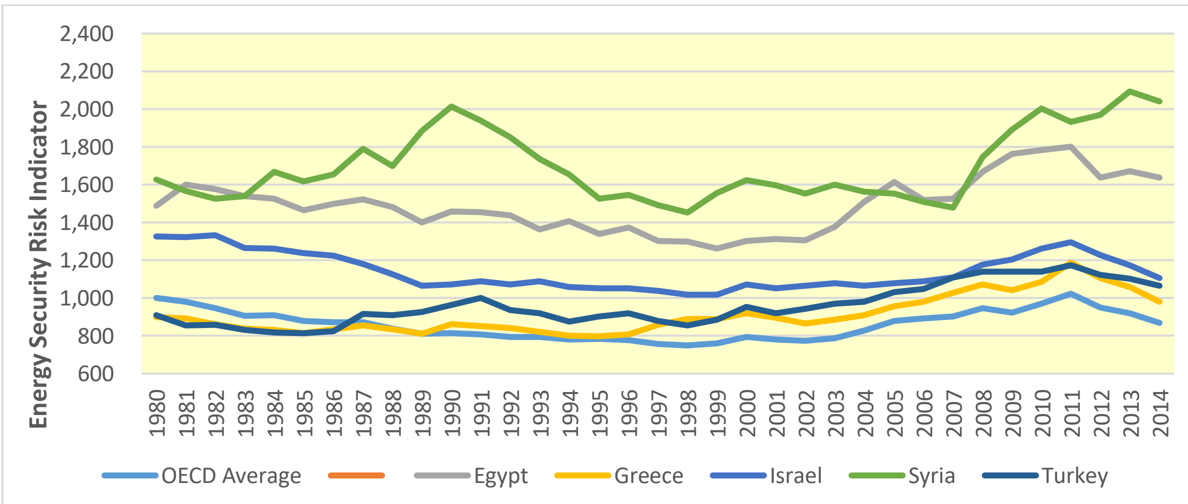
Based on current levels of consumption, regional energy (oil and natural gas) reserves are not enough to last for more than a few decades. However, latest discoveries of large HydroCarbon resources in Natural gas (NG) in the offshore Levant Basin are affecting the supply-side forecasts for the region. These discoveries have the potential to provide the necessary energy supply to meet growing regional demand and possibly even spur exports (EIA, 2013).

As per the World Ban List issued in June 2017, Cyprus is considered a country that belongs to the "Europe & Central Asia" region, while Israel is categorized in the "Middle East & North Africa: region. For the purpose of the Analysis of this Thesis, both countries are considered of the same "East Mediterranean" region. Furthermore, both Cyprus and Israel are ranked as "High Income" countries which has been defined as those countries with a GNI per capita of $12,236 or more (World Bank, 2016).

In the next figure 5.4, the ES index is presented particularly for the countries located in the East Mediterranean region. Based on this graph, it is seen that countries that perform better among the others in the region are Greece, Turkey and Israel. Unfortunately, there are no such data for all the countries in this region and thus countries like Cyprus Lebanon, Palestinian Authority are missing.

Figure 5.4

Energy Security Risk Index Scores for East Mediterranean region



Source: (Institute for the 21st Century Energy, 2017).

Finally, the OECD average, which is represented in the above graph, helps to have each county compared to that and have a reference to understand its relative position for each year.

5.2.2 Stakeholders

a. <u>Turkey</u>: Turkey has been under several transformations internally during the last decade and the country would like to be seen as having a new strategic role in the Mediterranean region. US and European foreign policy used to be built on relations with Egypt and Turkey; being under question with Egypt during the Arab spring, Turkey became more important as a potential counterpart to manage relations in the Arab world.

Turkey had been used as a model by many stakeholders for the way in which the Arab world confronting the Arab revolutions could develop. At the same the Turkish-Israeli tensions started early in this decade still continue, while the two countries had cancelled their yearly military exercises having together with the United States before.

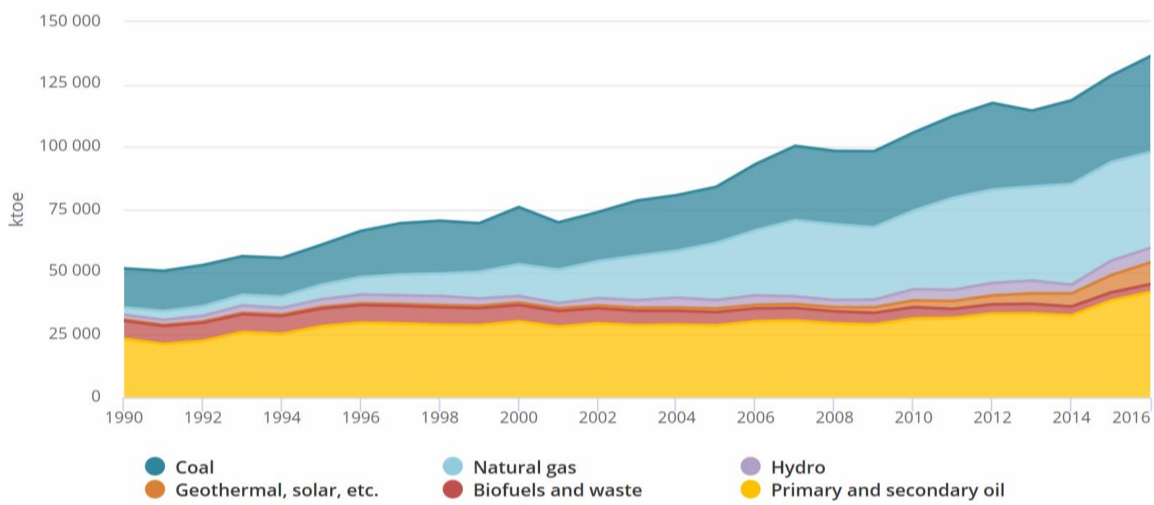
Some of the basic parameters that characterize the country and it is important to be mentioned can be summarized as following:

- Internal problems related to the democratization progress.
- Power game against the secular elite of the country (Kemalists).
- Assession to the EU and obligations to be fulfilled. Turkey's interests look not to be in line with those of EU while at the same time the country considers itself as more powerful than in the past and thus it does not see reasons to compromise or to abide by international rules and laws.
- On the contrary, Turkey many times try to produce law and thus to place new rules in the regional affairs (Filis, 2014).
- Turkey may have problems as a candidate for membership at the EU since it is acting in opposition to EU's efforts to put pressure on Moscow through economic sanctions and reduce Europe's dependence on Russia's natural gas (Pravda, 2014).
- Kurdish minority in combination with new conflicts at its Southern boarders with Syria.
- Arab Spring and Turkey's failure of applying Davutoglu's "zero problem" dogma with its neighbor countries.
- Islamic State issue and international pressure on Turkey from its allies to be actively involved against ISIS.
- Migration flow from Syria seriously affects the country and its economy/demographics.

In the next figure 5.5, Total Primary Energy Supply (TPES) by source - excludes electricity and heat trade – for Turkey during the period 1990 – 2016 is given:

Figure 5.5

Energy Data for Turkey



Source: (IEA, 2019).

The Trans-Anatolian Natural Gas Pipeline (TANAP), is a natural gas pipeline from Azerbaijan through Georgia and Turkey to Europe. It was decided to play be a central part of the Southern Gas Corridor, which would connect the giant Shah Deniz gas field in Azerbaijan to Europe through the South Caucasus Pipeline (SCP), TANAP and the TAP. This project has been of strategic importance for both Azerbaijan and Turkey and it would allow first Azerbaijani gas exports to Europe, beyond Turkey. It is expected to strengthen the role of Turkey as a regional energy hub. TAP continues onshore, crossing the entire territory of Northern Greece, its longest stretch, then onwards east to west through Albania to the Adriatic coast (see next figure 5.6).

Apart from being a growing transit hub, Turkey is considered a major energy market itself with a fast-growing demand for energy. Such demand is driven mostly by the power generation sector, which depends highly on imported natural gas. Even though the market is still highly regulated, Turkey has taken important actions to liberalize mainly the sectors of electricity and natural gas.

State has been involved in pipeline politics and massive investments especially in cases where “intergovernmental agreements played an important role in establishing long-term relations” (Bilgin, 2015: 70).

Figure 5.6

TANAP project

Source: (www.tap-ag.com, 2015).

The Ministry of Energy and Natural Resources (MENR) is a government ministry office of the Republic of Turkey, responsible for natural resources related affairs and energy in Turkey. Turkey’s energy strategy, as set by MENR, stems from domestic market characteristics while it also represents global and regional dynamics. The official strategy proves to be energy security-oriented, with responsiveness to state and private company involvement. This characteristic extensively explains how Turkey synchronizes the tangible characteristics of energy security with geopolitical features and foreign policy priorities.

The Strategic Plan as set by MENR for the period 2009 to 2014 is composed of five strategic pillars (Bilgin, 2015: 60-75):

i. Energy supply security.

ii. The regional and global effectiveness of Turkey in the field of energy.

iii. The environment.

iv. Natural resources and

v. Corporate structure.

The ability of Turkish foreign policy to design long-term and to follow its strategic targets with stability makes the country capable to claim the role of a regional superpower in the greater area. *The "new role" of Turkey constitutes the most important advantage, which is exchangeable in many levels against the West, independently whether this advantage of the Turkish foreign policy constitutes a potentially nugatory expectation* (Giallouridis and Lagidis, 2010).

Turkey has set the following objectives of an Energy Security Policy for the next years:

- Secure energy to meet the 5% GDP growth year-over-year: This could be achieved either with increase capital investments in the upstream industry or by increase its energy imports from abroad, which does not solve the issue on the long-term horizon.
- Reduce natural gas imports from Russia: This could be arranged by targeting on EUs SGC corridor, which does not seem to be followed. On the contrary, Turkish-Russian's relations have been strengthen a lot during the last years, also in the energy sector.
- Diversification of both energy sources and types of imports: This seem to be in progress since the country opened its energy sector to DPI in 80-90s and it was largely driven by Turkey being a EU candidate member.

The nexus of Turley's energy politics and foreign policy is mainly driven by two parameters:

i. Its import dependence on natural gas supplies.
ii. It's aim to become region's energy hub regarding pipelines and corridors of gas from Asia and Caspian Sea. This is mostly supported by PKK's defeat, former Soviet countries cultural and linguistic relations, EU candidacy, G20 membership and NATO membership.

Turkey continues to play successfully the card of its geopolitical location by exacting and getting gradually from its western allies all those concessions that they finally reinforce their role as a regulator in the wider region. It would not be an exaggeration if Turkey's treatment by powerful western countries is characterized as appeasement policy with all the known negative connotations.

The deafening silence of the US during last years, while the intensity continues in the Cypriot EEZ, reflecting the reluctance of the US administration to collide with the anchor, while the latter is a reluctant hand, but for the time necessary partner in the fight against ISIS, the leading US strategic objective. Washington has consistently brought home and reiterates that it recognizes the right of the Cyprus Republic to conduct surveys for gas and oil in the EEZ, but does not go in sharing responsibility for the intensity observed. The representative of the State Department on several occasions declined to criticize Ankara limited to a vague appeal to avoid actions which could increase tension in the region. He noted that "the US continues to believe that deposits of oil and gas on the island as all resources should be shared fairly (equitably) between the two communities in the context of a comprehensive settlement." The choice of the word "fairly" is not random, but an elaboration competent official, according to which any gains arise should be shared according to the percentage of the population. In any case, on this occasion, the American approach is directly influenced by the need for more efficient management of the threat of Islamic State overshadowing 'other issues' (Athanasopoulos, 2014).

Furthermore, Turkey seems not to be considered so much useful to US whenever US is located in a broad confrontation with the radical political Islam (Nahmani, 2003). Turkey is seen trying to implement its neo-Ottoman doctrine and for this reason deterministically behaves in a revisionist manner in the Mediterranean. Moreover, Turkey has been trying to ignore the international law and the Treaty of UNLOS II, Montego Bay 1982, (which it has not voted for its ratification).

However, the new doctrine of Turkey is finally considered not so much strong while at the same time Cyprus demonstrated "an appropriate policy on the issue of HxCy"; the results has put Turkey against "the regional powers and international poles of power of the active geopolitical supra-system" (Mazis, 2015). According to Giallouridis and Lagidis (2010: 165), there should be continuously and steading pressures by Greece and Europe on Turkey to change its aggressive behavior in Aegean and Cyprus; otherwise such a change will not come from nowhere.

As per the New York Times, Turkey is “the winner in the ongoing standoff between Russia and the European Union” and the country managed to “gain advantage of the conflict and secured long-term energy supplies at discounted prices” (Pravda, 2014).

Turkey’s role as an increasing regional power is decreasing the willingness of the Europeans, as well as the United States to press on Turkey too hard. Especially, over the issue of the gas finds in the eastern Mediterranean. This is also related specifically due to its important role in managing the Syrian conflict.

There is a necessity to have an adequate framework for conflict resolution and wealth sharing as the increasing securitization is an issue to take seriously. Rhetoric is becoming more inflammatory, military exercises have been undertaken in recent years with an eye to protecting the gas interests in the eastern Mediterranean.

b. <u>Greece</u>: The country is looking to finalize the delineating of its EEZ with its neighbor countries: Egypt, Italy, Albania while various changes happened in the regional energy map during last years. In addition, there have been continuous efforts to be in close cooperation for energy issues with other countries in the region and mainly with Cyprus, Israel and Egypt (Giannakopoulos, 2014).

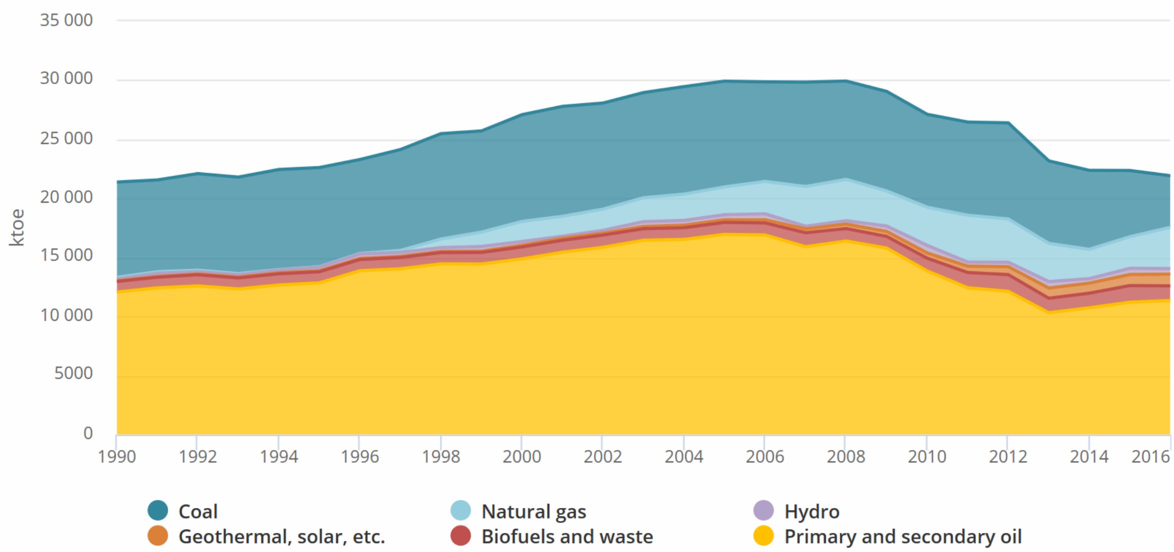
The main point for a state to become a regional power is not its hegemonic character, which means other countries’ agreement to power this force. On the contrary, such a power needs to ensure that other countries take serious account of the clearly expressed or indirectly messages.

Greece is seen to be following an unstable, accidental energy policy which looks that is being affected by any new government in place – as almost every political aspect in the country. The country has been swinging between US’s and Russia’s amicable projects without a continuation in the long-term (Kut, 2002).

In the next figure 5.7, Total Primary Energy Supply (TPES) is shown by source - excludes electricity and heat trade – for Greece during the period 1990 – 2016. Based on the next figure, it is seen that there is a blend of different type of fuel sources that Greece uses with the primary and secondary oil fuel to hold the major part. Other important fuel sources are he hydro and natural gas, with the latter one mainly starting at the end of the last century and increasing its share among the other types.

Figure 5.7

Energy Data for Greece



Source: (IEA, 2019).

There are gas projects of Greece's strong interest that are now canceled such as South Stream. The country has been included in the design of the TAP (Trans Adriatic Pipeline) which will bring gas from the area of Azerbaitzan to Europe. The TAP will start from Kipoi at the borders of Turkey and Greece and it will be connected with the Trans Anatolian Pipeline (TANAP).

In the next figure 5.8 the TAP project is shown, having the design of the pipelines in each involved country.

Figure 5.8

TAP project

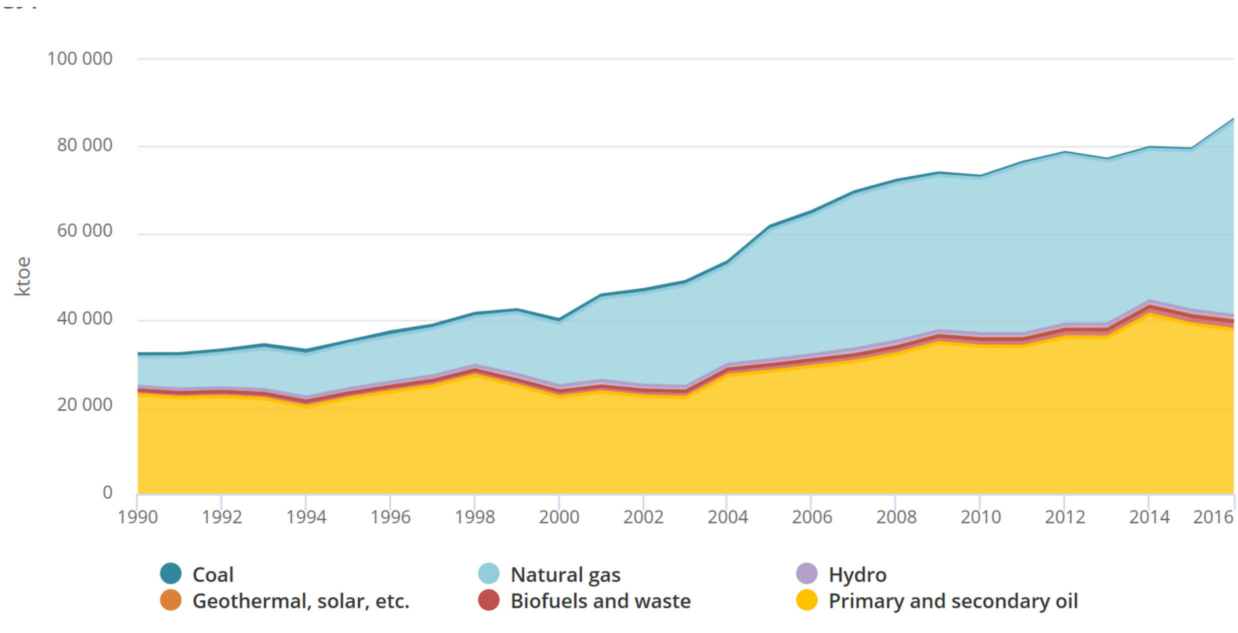
Source: (www.tap-ag.com, 2015).

The EU has given TAP Project of Common Interest (PCI) status under the new guidelines for Trans-European energy infrastructure (TEN-E) and the TAP has been selected as a PCI for its role in opening up the Southern Gas Corridor, one of 12 so-called energy corridors identified by the EU as priorities for the achievement of European energy policy objectives.

c. <u>Egypt</u>: The Arab Republic of Egypt, is a Mediterranean country which extends from the northeast corner of Africa and southwest corner of Asia. It's borders with the Gaza Strip and Israel to the northeast, the Gulf of Aqaba and the Red Sea to the east, Sudan to the south, and Libya to the west. Across the Gulf of Aqaba lies Jordan, across the Red Sea lies Saudi Arabia, and across the Mediterranean lie Greece, Turkey and Cyprus, even though none of them share a land border with Egypt. In the next figure 5.9, Total Primary Energy Supply (TPES) by source - excludes electricity and heat trade – for Egypt during the period 1990 – 2016 is given:

Figure 5.9

Energy Data for Egypt



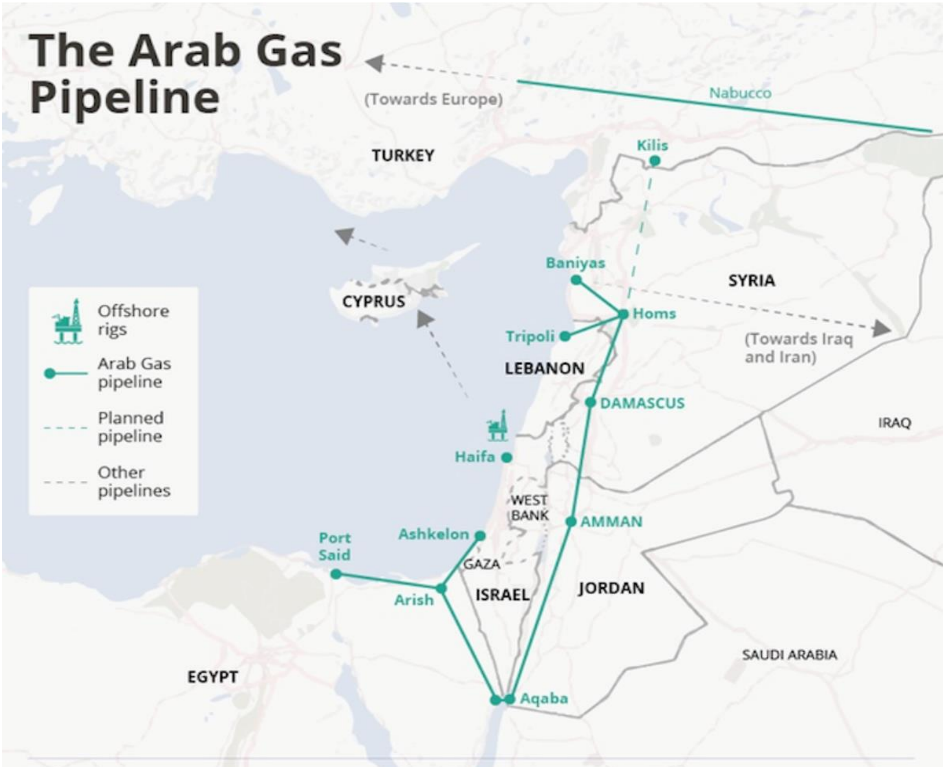
Source: (IEA, 2019).

The latest turmoil that occurred in Egypt during the Arab Spring brought instability to the country and thus further reduced flows of energy in and out from the country. In addition, there was another export pipeline from Egypt to Israel which from El-Arish to Ashkelon but the available quantities have been recurrent over the last few years (EIA, 2013).

The Arab Gas Pipeline (AGP) runs from El –Arish in Egypt through Jordan and into Syria and from there it has a spur to Lebanon; further thoughts are that the pipeline to finally connect with Turkey, but the unstable environment in Syria does not support such an option in the next coming years). Moreover, regarding the Turkish-Egyptian relations, they do not follow the previous decades path, while the period after Morsi's removal marked an historic deterioration of bilateral ties (Sheira, 2014). In figure 5.10, the AGP is shown between Egypt and Israel.

Figure 5.10

AGP between Egypt and Israel



Source: (Energy Egypt 2018).

Referring to Egypt, it is important to refer to one major issue for Cyprus (and Greece) to seriously consider: the fact that the ally between Israel-Egypt-Turkey looks to be no longer the same. Based on the Cairo Declaration that was signed between Greece, Cyprus and Egypt, it is clearly mentioned the importance of the respect of the sovereign rights of the Republic of Cyprus in its EEZ and Turkey is being asked to terminate all seismic exploration within the maritime zones of Cyprus and to avoid similar activities in the future (Nedos, 2018).

As Egypt's production levels had felt during the last decade made both Cyprus and Israel to believe that they could be able to supply Egypt as they were both driven by their recent natural gas findings in their territorial fields. As Egypt has had a major natural gas field discovery recently, such projects might be expensive and not viable, which still needs further evaluation.

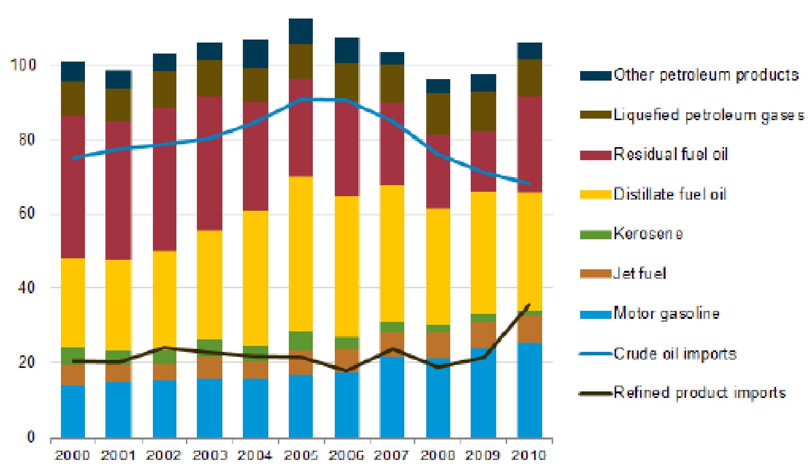
d. <u>Jordan</u>: The country covers its energy demands by around 80% from petroleum products, since the domestic hydrocarbon sources are only count of around 3% of country's needs in 2011. During the previous decades the country the production of oil was declining and it reached to zero in 2012. The country aims to start production and usage of its oil shale resources to power a 500-megawatt electric plant from next year.

In Jordan, there are also oil shale deposits which are estimated to be around 65 billion tons. Provided that they will be assessed to be economically viable, these resources may contribute to decrease country's dependence on foreign energy sources.

The local production of natural gas was around 9.5 Bcf during the period of 2000-2011. Jordan's Risha field is estimated to have a production of around 15 MMcf/d in 2012 and this already contributed to 50% of country's natural gas while the potential of the field's output is over 300 MMcf/d during last years. However, the country still relies on imports to cover its natural gas needs while serious effect happened in country's energy balance due to the interruptions to the Arab Gas Pipeline (AGP). In the next figure 5.11, the petroleum imports and refined products consumption in Jordan is represented:

Figure 5.11

Petroleum imports and refined products consumption of Jordan (in ,000 bpd)



Source: (EIA, 2013).

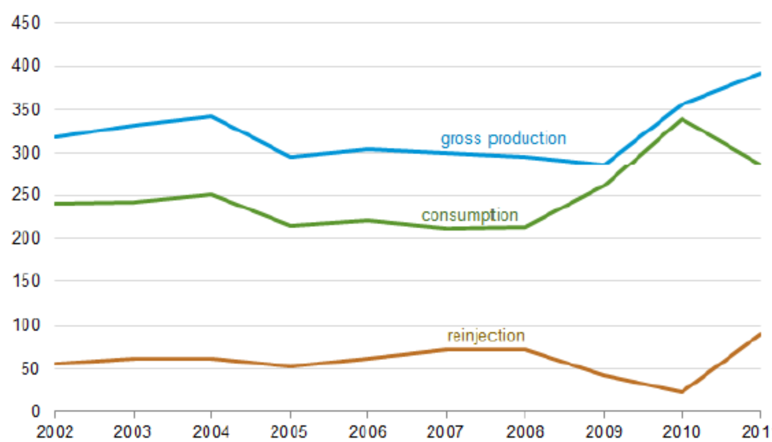
Based on the above figure, it is seen that crude oil imports have been fluctuating reaching a maximum point in 2005-2006 and then returned at a lower point in 2010 compared to the starting one in 2000. Residual fuel oil seems to have been reduced, while motor gasoline had been increased continuously every year, from 2000 to 2010.

e. Syria: In Syria there are oil shale resources of around 50 billion tons in 2010. The main problem at the moment is the severe situation in the country and the serious instability that does not allow any thoughts and discussions for biddings with any international energy company may find it difficult to operate in the country. Taken into consideration such difficulties, and the higher cost of developing unconventional hydrocarbons relative to conventional hydrocarbons, it is not foreseen any serious progress in Syria in the short/medium term period.

There's the Syrian conflict which can be escalated and thus may influence also the dynamic in Lebanon and it might actually be a game-changer that we're not really considering that extensively today. Syria has an issue of common interest between Turkey and Israel; this cooperation on Syria could actually be an opportunity to amend the relations between these two important regional powers. The Israeli-Turkish cooperation is in both countries long-term strategic interest.

Figure 5.12

Natural gas production and consumption of Syria (in billion cft)



Source: (EIA, 2013).

Based on the above figure 5.12, it is seen gross production and consumption of natural gas in Syria were having the same trend during the period 2002-2009 with a gap difference of around 80-100 billion cft. For the next two years the consumption increased a lot and reaching to a point in 2010 where both production and consumption were almost equal. The year after, the Syrian Civil started which is an ongoing multi-sided armed conflict and it is considered as the "second deadliest of the 21st century" (Ray, 2019).

f. <u>Lebanon</u>: It has been seen that there is an intention from the government of Lebanon to focus on the share of natural gas in the country's energy mix and reach it to around 65-70% by the year 2030. However, this is a very ambitious target, since the natural gas is not anymore part of country's energy mix after the loss of Egyptian supplies previously (EIA, 2013).

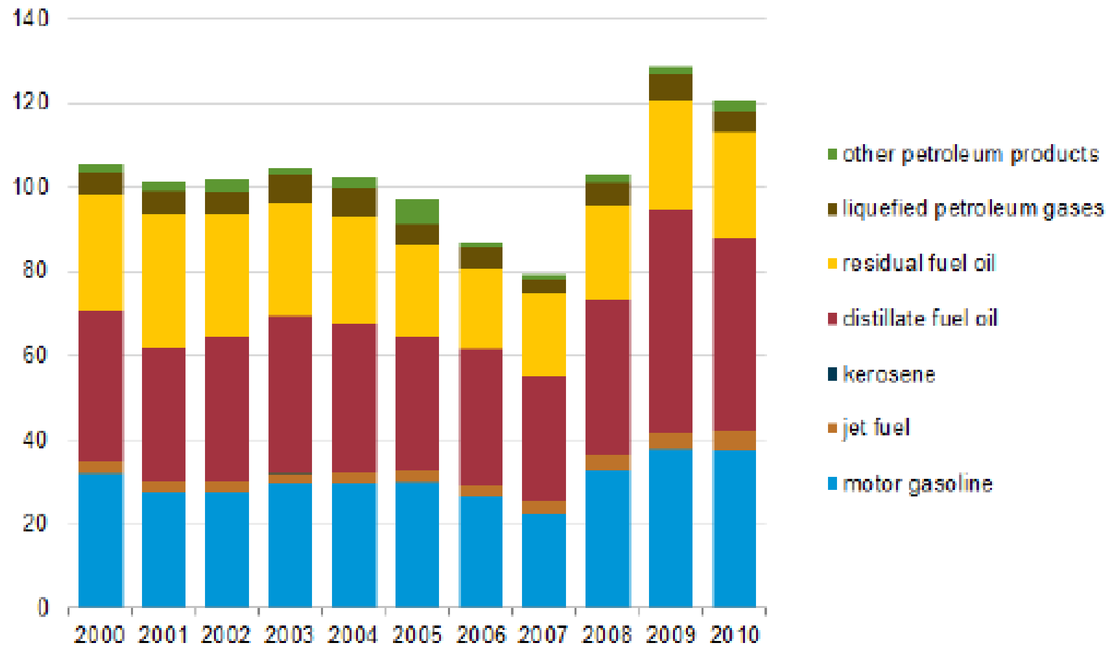
The Lebanese are currently advancing in the legislation process and despite the political turmoil in Lebanon they might be able to issue their tender for explorations. If there was a mutual world, Cyprus would have been an excellent place for hub for exporting gas in an energy facility. But each country for its own utilizing own interest and possibly utilizing the gas for own domestic uses and possibly for exported energy on domestic basis. If Lebanon and Syria managed to find gas in sufficient quantities that would have a potentially stabilizing influence for their foreign policy. At the same time it's vert relative because the strategic context doesn't necessarily change.

Even if a country succeeds to find gas fields in its territory, it is the strategic context that mostly defined by political arguments, not necessarily by the economics. If Lebanon and Syria didn't find gas fines and they might be a little bit frustrated that everything is Israeli waters and Cypriot waters and nothing is in Lebanese or Syrian waters that could be a potential issue of concern, especially if maritime boundaries haven't been set.

In the next figure 5.13, the petroleum consumption in Lebanon is represented:

Figure 5.13

Petroleum consumption of Lebanon (in ,000 bpd)



Source: (EIA, 2013).

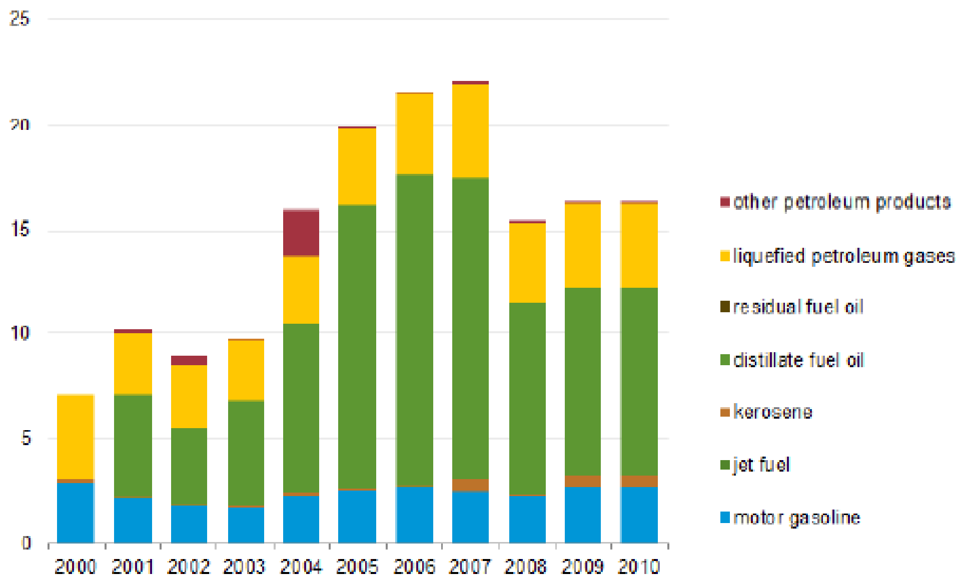
Based on the above figure, it is seen that the overall petroleum consumption of Lebanon during 2000-2010 increased by around 20,000 bpd, which was mainly driven by an increase in consumption of distillate fuel oil. Other oil products like residual and motor gasoline remained almost the same in terms of volume consumption.

g. <u>Palestinian Authority</u>: At Gaza wind field of the Palestinian Authority: it was a major mistake by the party not to utilize or develop this field. Hopefully in the future, the geopolitical and economic considerations conditions will favor the development of this field.

In the next figure 5.14, the petroleum consumption in Palestinian territory is represented:

Figure 5.14

Petroleum consumption of Palestinian territory (in ,000 bpd)



Source: (EIA, 2013).

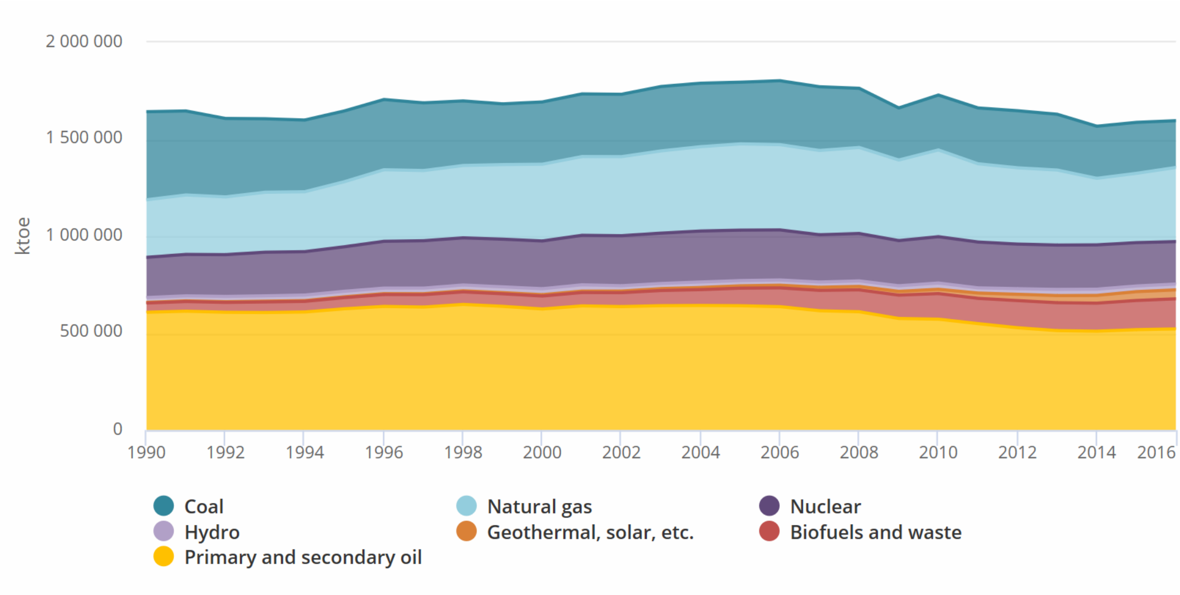
Based on the above figure, it is seen that the overall petroleum consumption of Palestinian territory during the period 2000-2010 was doubled and increased by around 7-8,000 bpd. This was mainly driven by an increase in consumption of kerosene, while other products like motor gasoline and liquified petroleum gases remained almost the same in terms of volume consumption.

h. <u>EU</u>: In European Union (EU), slowing growth is straining public finances for environmental protection and increasing inequality. This rebalancing presents competitive threats but also economic opportunities in meeting the demand of a fast-growing global middle class. At the same time, increasing demand for material resources is a major concern as its economy is structurally dependent on imports. Key risks for Europe include flood events, droughts and other weather extremes, threatening human well-being and infrastructure as well as ecosystems and biodiversity.

In the next figure 5.15, Total Primary Energy Supply (TPES) by source - excludes electricity and heat trade – for EU28 during the period 1990 – 2016 is given:

Figure 5.15

Energy Data for EU28



Source: (IEA, 2019).

Taking into account each country's specific conditions, energy security should be dealt in parallel with developing domestic energy sources and their best possible use by increased energy efficiency, shifting to a more balanced energy mix. This should be especially done in countries that are mostly dependent on oil by (EC, 2013):

- Increasing the geographical diversification of energy import sources.
- Avoiding a single supplier of oil or gas.
- Improving the level of integration within the EU gas and electricity markets.
- Developing cross-border interconnections with neighboring countries.
- Developing storage capacity for oil and gas.

Regarding the energy security of European countries, some countries are more vulnerable to the risk and one of them is considered Cyprus. EU member states and particularly the vulnerable ones, should improve their energy security and rank it as a priority of their policies and actions.

The EU legislation forces Member States to maintain minimum stocks of oil in order to secure the oil supply to EU. Any supply crisis related to supply of petroleum from third countries being unexpectedly interrupted would most probably have a significant effect on the European economic activity.

Kaveshnikov (2010, 585) mentions that many researchers consider the energy security of the EU "as a Common Foreign and Security Policy (CFSP) question". The policy of the EU is targeting to minimize it dependency "to irregularities in energy supplies due to the growing dependence on energy imports from or via politically unstable regions" (Kaveshnikov, 2010: 586).

According to the Article 102 TFEU, it is prohibited the abuse of a dominant position which may affect trade between Member States. The implementation of this provision is defined in the Antitrust Regulation (Council Regulation No 1/2003), which can be applied by the Commission and by the national competition authorities of EU Member States (EU Commission, 2014).

As per EU Commissioner in charge of competition policy Margrethe Vestager (2015):

> G*as is an essential commodity in our daily life: it heats our homes, we use it for cooking and to produce electricity. Maintaining fair competition in European gas markets is therefore of utmost importance. All companies that operate in the European market – no matter if they are European or not – have to play by our EU rules.*

EU's polycentric system of governance is not supporting to "swift and bold power projection abroad", having a type of territorial control which is rule biding through the extension of "acquis Communautaire", dealing with neighbors that they are aspiring to become EU member states, like Turkey (Zielonka, 2011). EU is not acting as a coordinated actor, but most of the times the member states act for themselves in order to support their own national policies and interests either directly or including actions through the EU's mechanisms and institutions.

Council Directive 2006/67/EC required Member States to continuously keep minimum stocks of oil equal to 90 days of the average daily internal consumption during the previous calendar year. Then, this Directive was repealed by Council Directive 2009/119/EC with effect from 2013. The new directive aligns the stockholding obligation with that of the International Energy Agency (IEA). This means that from 2013, for most Member States, the overall obligation is the same as the one set by the IEA: 90 days of net imports.

The obligation of major producing countries will continue to be based on consumption. Even net exporting countries (Denmark) are expected to continue to have a stockholding obligation under EU law. Furthermore, Member States need to hold minimum third of their obligation in the form of finished products.

For the EU-12 countries with large energy trade deficit, even though counterbalanced by surpluses in other trade categories can serve as a channel through which an energy price shock hits the economy. It would be also important to consider this subject in the broader context of monitoring macroeconomic imbalances and their impact on EU stability and prosperity (EC, 2013).

There is also the euro crisis coming from Europe and the skepticism of the next period's economic situation within the European countries which creates a tremendous amount of European inward-looking. Interests for the EU can be seen as:

- First of all, energy security and diversification away from a dependence on Russian gas. This is the most primary interest from the European point of view.
- Secondly, peace and security in this region.
- Thirdly it's freedom of transporting commerce. One of the things that the Europeans would really not want to see is that the territorial and maritime boundary issues start to impinge on the freedom of commerce. Prosperity of member states obviously both of all the EU member states but also states in the region, avoiding tensions.

The EU perspective was finally a pretense for the Islamic government of Turkey in order to strengthen its political position inside the country and also to clean up political pending issues mainly with the military elite of the country. The EU perspective is not on the top of the priority list of Turkish's Foreign Policy while it was not never a real political, economic and social priority. Due to the failure of Turkey's zero problem strategy that Davutoglu designed last years, there are not many left both in Washington and Brussels that they consider Turkey as a model country (Giannakopoulos, 2014).

Together with the Israeli reserves, an energy strategist shaft consisting of Israel-Greece-Cyprus is more than twice the global energy consumption of gas, measured in trillions of cubic meters (tcm). Today the EU imports around 83% of its oil needs and 57% of its gas, regarded as the world's largest importer of Hydrocarbons (Mazis, 2012).

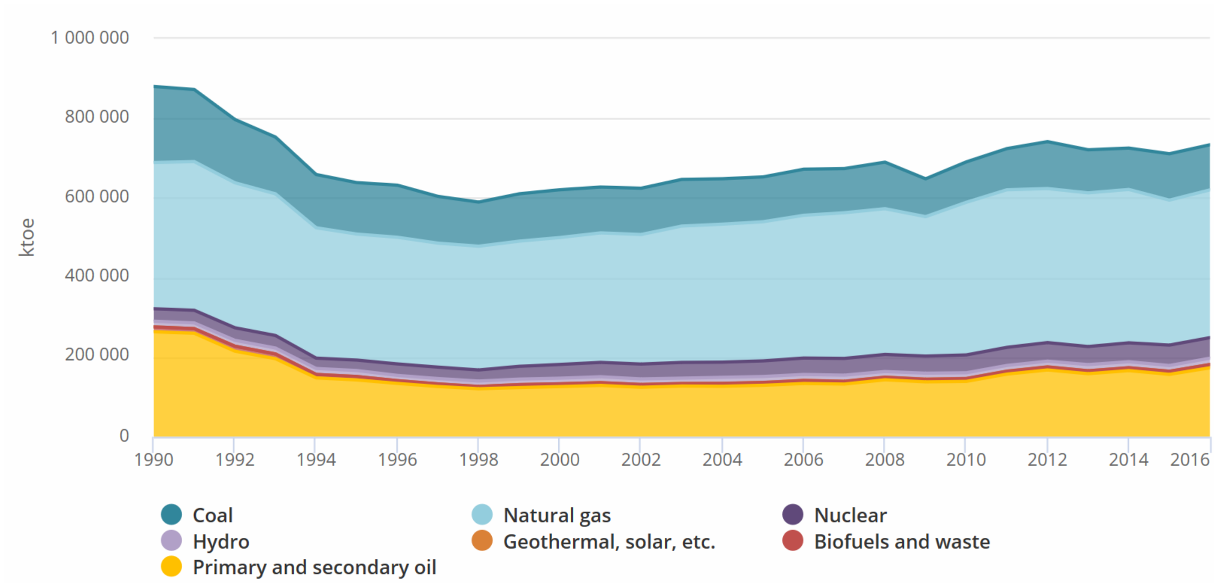
i. <u>Russia</u>: The country has a new assertive foreign policy which is making many Europeans very uneasy. Energy security risks can resort from being based on one source of gas for long period of times. So, cost and benefits in this respect such as euro is very much dependable 35-40% dependable on Russian gas and Russia stopped the flow of gas 6 times since the first of January 2006 and the Europeans are also for the multiplication of sources (Mor, 2013).

Policy differences between EU and Russia "are based not just on interests and material capabilities, but also on varying understandings of energy, its role in society and how it should be governed". Furthermore, "Russia's new approach to energy governance as different to the EU understates the degree of ideological contestation within and between EU institutions" (Kuzemco, 2014: 59).

In the next figure 5.16, Total Primary Energy Supply (TPES) by source - excludes electricity and heat trade – for the Russian Federation during the period 1990 – 2016 is given:

Figure 5.16

Total Primary Energy Supply (TPES) by source for Russia



Source: (IEA, 2019).

There is a real interest of Russia regarding the Turkish energy market and related alternative solutions about transfer of the natural gas through Turkey. Especially after its blockage from the embargo and the cancelation of the South Stream (transfer of Russian Natural Gas through Turkey and Bulgaria to Europe) Russia would be very interested to reach politically with Turkey something that would bring unpredictable energy alliances in the region. As per Nurieva (2017: 102-105), "there are two main characteristics of modern Russian-Turkish relations in the natural gas sector" as follows:

- Turkey's strong dependence on Russian natural gas supplies.
- Turkey's position as a possible alternative transit state for supplying Russian natural gas to Europe.

Russia is considered one of the dominant energy powers in the region since it has been playing a significant role in providing gas to Europe for the last years. At the same time, Russia's strong interest does not allow Turkey to gain a major role as an energy hub; but whenever is needed both countries cooperate together in order to design and implement the proper strategy that will serve their aims (Marketos, 2013: 89).

Russia's interest in Mediterranean affairs and particularly on the island of Cyprus was always active and it has been recently increased by "making Cyprus a new Russian foothold in the Eastern Mediterranean". The military presence of the Russian Navy and at the same time long lasting relations in the economic field can show Russia's active involvement in the region.

Thus, Russia had expressed its real interest in participating in the explorations of the Aphrodite gas field and the one in Block 9. However, both projects were not finally in favor of Russia (Delanoe, 2013: 87-88):

- "Development rights of Block 12 have been granted to a consortium led by the U.S. Company Noble".
- Russian focused on negotiations over the development of Block 9 between a consortium led by the French company Total and the Russian Novatek and GPB Global Resources, the latter belonging to Gazprom, collapsed in December 2012 after the Cypriot authorities were denied their request to upgrade the French-Russian offer.

As per Prifti (2015), Russia did not intervene at all to support its tax heaven, Cyprus, inside the EU even though Russia could easily credit a 5-billion-euro loan to Cyprus but declined to do so. A reason behind that could probably have been that President Putin did not want to antagonize Germany, the hegemon of the EU, since the European debt crisis and an old partner of Russia.

j. <u>US</u>: The United States had been recently engaged in a process of disengagement from the Middle East. It could be argued the extent of this engagement both the withdrawal from Iraq and the new foreign policy orientation towards the Asia-Pacific should come as a warning when it comes to the attention being paid by the Americans, into this region. According to Roussos (2009), traditional US allies in the Middle East region have shown increasing hesitation in following the US strategy in the region. Thus, it would be better to upfront about a new posturing with respect to the Middle East.

For this reason, both Russia and also Turkey trying to fill the gap in the region and the most important took for its foreign policy will be the demonstration of power (Inbar, 2014). The US seem to view current developments for Cyprus and East Mediterranean region under the fact that the situation is very fluid and they could never possible to reprobate directly any Turkish action- at least since the crisis is not upgraded to a military. US has been looking at the “big picture” in Middle East and this can be described with: Iraq-Syria-ISIS and Israel (Athanasopoulos, 2014).

The exploitation of the Hydrocarbons has brought up a closer cooperation between Cyprus and Israel and between Cyprus and Egypt, while a future pooling of the Cypus’ deposit “Aphrodite” which abuts with the Israel’s EEZ can be proved important for the protection of Cyprus’ interests (Giannakopoulos, 2014).

The United States decided to develop an alternative which was called “Noble dina”, together with Greece and Israel. It was retaliated by the Turks by staging and exercising maritime security of themselves. There have been naval incidences over the gas prospecting, the overflights of hydrographic vessels to intimidate, and this is really an issue that we should be taking seriously.

k. NATO: NATO and EU: there was a deadlock between NATO and EU cooperation for many years because of the Cypriot issue. The gas findings have the potential of may increase tensions between NATO member Turkey an EU member Cyprus. The European Union would like to avoid a deepening of tension between Turkey, Israel and and Cyprus, that’s obvious reducing the influence of Russia; this is connected to the diversification strategy of energy security policy and European business opportunities.

Finally, global resource security concerns not necessarily the supply or the availability resources, but the guaranteed access is dominating the current environment when it comes to resources. Thus, the gas findings are influenced by this strategic context.

Gas findings might be an opportunity to meet these interests, but risks still remain.

- At regional level there is an exacerbation of regional tensions. There is an increase in the securitization of the dynamic in the East Mediterranean.
- At international level there is political turmoil in the shape of the Arab spring, the Syrian conflict, greater Russian assertiveness, so the influence of third parties in the region is an issue to take into account, and the euro crisis.
- The euro crisis creates a very negative financial economic framework in which this discussion takes place.

l. <u>Institutions</u>: There are numerous of existing institutions and alliances that are involved in energy related issues, but they have not been successful in reducing national energy security concerns mainly because of their narrow view on a particular energy sector, region, or a group of countries. They seem not to reflect the systemic nature of Energy Security risks and their connection with other energy issues such climate change.

The energy security landscape is expected to rely on both national strategies and the nature of international energy institutions. There can be two scenarios:

- Scenario A: National strategies focus on sovereignty concerns and international institutions are seen not so powerful; then, this combination can cause a regional but not internationally integrated energy system and existence of unstable markets that are ruled by resource nationalism.
- Scenario B: National strategies focus on resilience and international institutions are powerful and strong; then, this combination can cause movement to more secure energy systems independently if they do not have the capacity to deal with that by themselves

5.3 The Case of Israel

Over the last few decades, Israel has experienced a complex and unstable geopolitical environment. In addition to controversy with the Palestinian Authority, Lebanon and Syria, Israel faces the rest of the Arab world, which is also an important factor in the energy grid (Darbouche et. al., 2012: 4-8).

The problematic relations between Israel and Arab countries need always to be taken into consideration since this is strongly affecting the full participation of the constructors and global players to cooperate with Israel since they do not want to harm their business relation with the Arab world doing business in the Middle East region.

According to Roussos (2019), Israel feels being alienated by Turkey's foreign affairs policy and its Adalet ve Kalkınma Partisi (AKP) policy towards political Islam. Thus, Israel feels isolated in the region and consequently its politics are in search of new alliances in the East Mediterranean.

It is known that Israeli government has reached an agreement with Cyprus to make use of airfields providing potential strategic depth in the event of an escalation in regarding the Iranian question. A focus on the risks in the region along with some of the potential that can be learned for Israel, Cyprus and other countries (Mor, 2013).

5.3.1 Country's Analysis

Israel is located in the Levant area of the Fertile Crescent region. The country is at the eastern end of the Mediterranean Sea, bounded by Lebanon to the north, Syria to the northeast, Jordan and the West Bank to the east, and Egypt and the Gaza Strip to the southwest (Wikipedia, 2019). In the next figure 5.17, the map of Israel is showing also the territories of Gaza and West Bank.

Figure 5.17

Map of Israel

Source: (CIA Factbook, 2017).

In the next table 5.1, the basic parameters for the country are given:

Table 5.1

Basic parameters for the case of Israel

Parameter	Applied for Israel	Parameter	Applied for Israel
Area	It occupies an area of 20,770 sq km.	**Ethic group**	Jewish 74.8% (Israel-born 75.6%, Africa-born 4.9%, Asia-born 2.9%, others 16.6%), non-Jewish 25.2% (mostly Arab)
Population	8,299,706 (July 2016 est)	**Maternity mortality rate**	5 deaths/100,000 live births (2015 est.)
Currency	New Sekel (ILS) I US$ = 3.49 ILS (as of 16.10.17)	**Urban population**	92.3% of total population (2017)
		65 years and over	11.33% (male 421,660 /female 518,343) (2017 est.)

Source: (CIA Factbook, 2017).

Some historical milestones for the case of Israel are given as following (CIA Factbook, 2017):

- 1948: Declaration of the state of Israel.
- 1967: the six-days war where Israel defeated Jordan and captured the West Bank, defeated Egypt and captured the Gaza Strip and Sinai Peninsula, and defeated Syria and captured the Golan Heights.
- 1973: Yon Kippur war.
- 1977: Egypt recognizes the state of Israel.
- 1982: Israel invaded Lebanon against PLO.
- 1993: the Oslo Accords, which gave the Palestinian National Authority the right to govern parts of the West Bank and the Gaza Strip.
- 2011: Cyprus came into a Delimitation Agreement with Israel, even though Israel not signed UNCLOS yet.

In the next session, a PEST Analysis for the case of Israel is presented focusing on the main topics that one needs to be aware of in line with the purpose of this Thesis. Thus, it is not a detailed and exhaustive analysis, but a coherent one with an interest to particular points.

PEST analysis

<u>Political</u>: Israel is a parliamentary democracy with a 120-member parliament, known as Kneset. The prime minister who is most of the times the chair of the largest party is elected by the parliament and he is the head of government and head of the cabinet. The Basic Laws of Israel function as an uncodified constitution. Since the formation of the state of Israel in 1948, all governments - except for one case - consist of party coalitions with the implications of this in the political life of a place (CIA Factbook, 2017).

The state of Israel is divided into six main administrative districts, known as mehozot which are: Center, Haifa, Jerusalem, North, South, and Tel Aviv districts, as well as the Judea and Samaria Area in the West Bank (while Judea and Samaria Area are not recognized internationally as part of Israel).

Economical: The state of Israel has GDP of USD 350.9 in 2017 (IEA, 2019). As per IMF report (2017), Israel is facing “a strong economic growth, estimated at 4 percent in 2016, supported by strong domestic demand—partly due to high vehicle sales ahead of a tax increase—and an export rebound”. In addition, the unemployment declined to 4.4 % at the end of 2016 and wage increases have picked up.

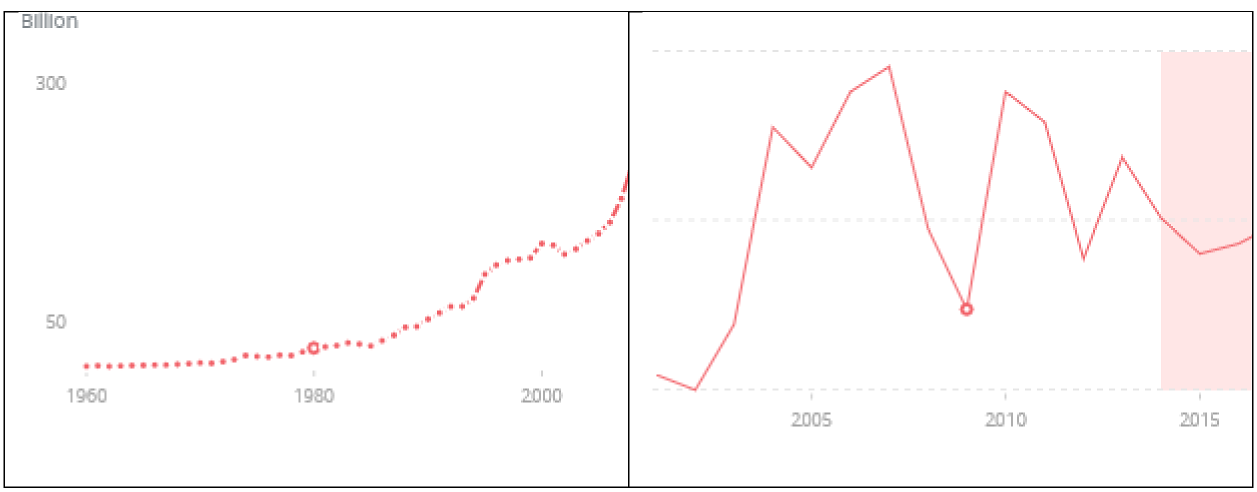
In general, Israel’s near-term economic outlook is positive. Growth is expected to be at 3% and inflation is likely to rise in the near future.

There are still risks that need to be addressed and the most important ones can be presented as following:

- Regional security/geopolitical tensions: They would hit tourism sector and moreover business confidence and investment.
- Tighter and more volatile global financial conditions: It could affect investments
- A significant reversal in housing prices: Impacts on household debt payments may occur by macroprudential policies. Local demand growth could fall significantly and particularly construction activity.

Figure 5.18

GDP of Israel (current US$) **GDP of Israel (growth rate, %)**



Source: (IMF, 2017).

Based on the outlook given by the above graph 5.18, it is seen that the annual growth of GDP for Israel is expected to be from around 2.7 in 2016 to 3.3% in 2019.

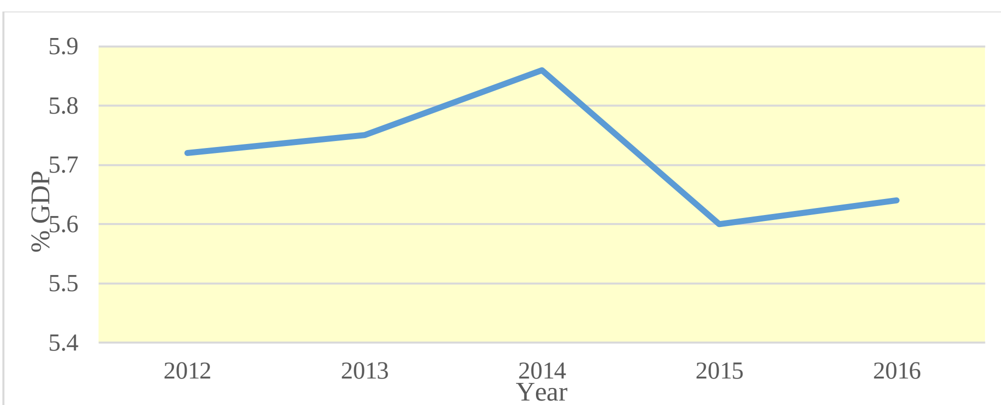
Social: Around 75% of the population are Jews from a diversity of Jewish backgrounds. Approximately 77% of Israeli Jews are born in Israel, 16% are immigrants from Europe and the Americas, and 7% are immigrants from Asia and Africa (including the Arab world).

Technological: Israel has proven to be a high-tech country with many companies being active in IT industry. It looks that this trend will continue and more growth to come. The Internet users are 79.8% of the population of the country (2016). The state broadcasting network, operated by the Israel Broadcasting Authority (IBA), broadcasts on 2 channels, one in Hebrew and the other in Arabic

Military and Security: 18 years of age for compulsory (Jews, Druze) military service; both sexes are obligated to military service; conscript service obligation - 32 months for enlisted men and 24 months for enlisted women.

Figure 5.19

Military Expenditures of Israel (as % of its GDP)



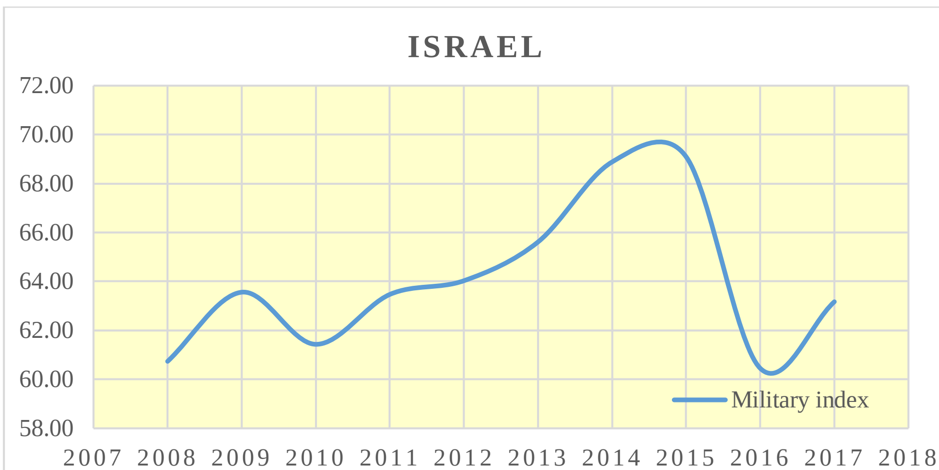
Source: (CIA Factbook, 2017).

In the above figure 5.19 the military expenditure of the country as a percentage of its GDP is given. It is seen that there are period where military expenditure increased (2007-2014), then a period of the next two years (2014-2015) that was rapidly declined and after that it started increasing again.

Based on the data selected and analyzed during the primary research of this thesis there were also information related to Military Index for Israel [see Appendix E1].

Figure 5.20

Military Index for Israel



Source: (Author, 2019).

In the above figure 5.20 the Military Index during the period 2007-2017 is presented. Also here, it is seen a similar trend on the graph between the military expenditures of the country and the military index, during the same period.

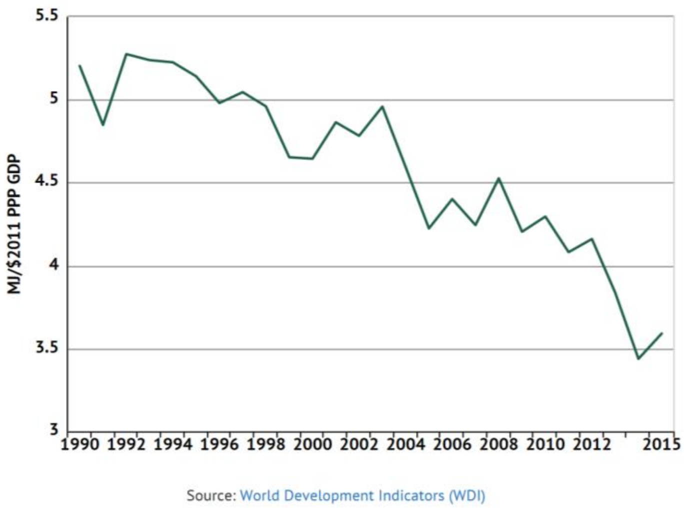
5.3.2 Energy Sector in Israel

i. General

In 2015, energy intensity for Israel was 3.59 MJ per dollar of GDP. Though Israel energy intensity fluctuated substantially in recent years, it tended to decrease through 1996 - 2015 period ending at 3.59 MJ per dollar of GDP in 2015.

Figure 5.21

Energy Inensity for Israel, 2005-2015



DATE	VALUE	CHANGE, %
2015	3.59	4.45 %
2014	3.44	-10.40 %
2013	3.84	-7.77 %
2012	4.16	1.94 %
2011	4.08	-5.00 %
2010	4.30	2.18 %
2009	4.20	-7.11 %
2008	4.53	6.64 %
2007	4.24	-3.57 %
2006	4.40	4.19 %
2005	4.22	-8.05 %

Source: (WDI, 2019).

Some of the basic parameters of Israel related to the energy are given in the next table 5.2:

Table 5.2

Basic energy parameters for Israel (2018)

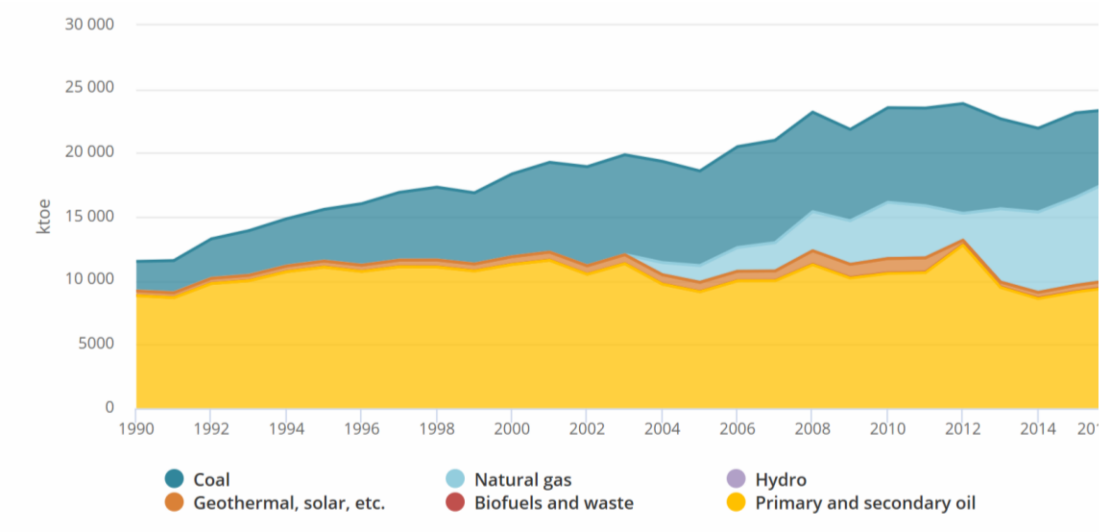
Parameter	Value
Energy production (Mtoe)	8
Net Imports (Mtoe)	15
Electricity consumption (TWh)	59
Electricity consumption/population (MWh/capita)	7
CO_2 emissions (t of CO_2/capita)	7

Source: (IEA, 2019).

In the next figure 5.22, Total Primary Energy Supply (TPES) by source - excludes electricity and heat trade – for Cyprus during the period 1990 – 2016.

Figure 5.22

Total Primary Energy Supply (TPES) by source for Israel, 1990-2016



Source: (IEA, 2019).

Recent gas exploration in Israel’s territory is expected to cover the country's needs for many years and it has been estimated to be able to "provide as much as 73% of Israel's energy supplies for the next 50 years by 2020 if they are not exported” (Fischhendler και Nathan, 2014: 155-156).

These discoveries have increased the importance of critical institutions, namely the antitrust authority and the judiciary, whose decisions, even though causing gas delays, also have strong indications that Israel's economy is based on the foundations of competitive markets. In addition, they have strengthened Israel's energy security while strengthening the state's ability to improve its political and economic relations with neighboring countries.

The game-changer for the Mediterranean region and energy balance was a significant discovery in October 2010 of a big natural gas field offshore of Israel in Levantine Basin where Israel discovered an enormous gas field in what it declares is its Exclusive Economic Zone (EEZ). The Tamar natural gas field off the coast of northern Israel will be yielding gas for Israel’s use.

In Israel, there is the Natural Gas Authority at the Ministry of Energy and Water Resources operating in accordance with the provisions of the Gas Sector Law (Ministry of Energy and Water Resources of Israel, 2015). According to Snow (2015), the Israeli government is extremely receptive to international markets and should also deal with domestic price regulation.

Based on the opportunities for the state of Israel in the Eastern Mediterranean region, the private sector could benefit from “trade and enhanced cooperation”. However, it seems that the country's politicians have so far failed to respond accordingly and energy cooperation has been hampered several times due to serious political difficulties among the neighboring countries of the region (Sachs and Broersma, 2015).

In the case of Israel, there has been a transformation during the last years from a state that was “dependent on imports to supply its energy” to a new state as “a growing natural gas industry”. The recent discoveries of natural gas fields provide new routes to have “adequate amounts of energy to meet domestic demand, while allowing the country to export excess volumes” (EIA, 2018).

The evolution of the production, imports/exports and total consumption in Israel is given below:

Table 5.3

Energy data for Israel (1990-2014)

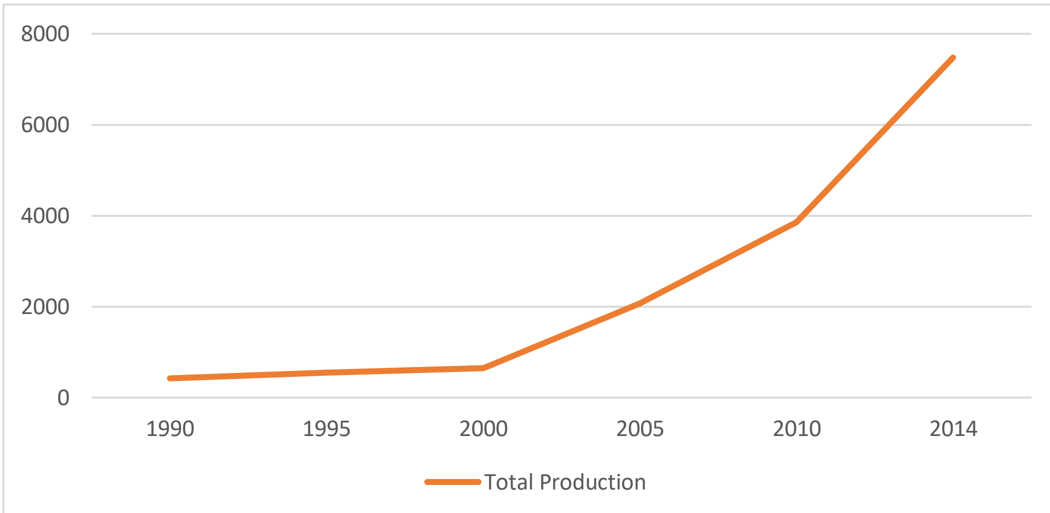
(ktoe)	1990	1995	2000	2005	2010	2014
Total Production	424	548	642	2,076	3,858	7,479
Imports	12,549	17,894	21,762	22,157	24,530	24,251
Exports	1,146	2,039	3,593	4,334	4,053	7,725
Total Consumption	6,967	9,804	11,980	11,949	14,833	14,473

Source: (IEA, 2017).

Especially for the production it is obvious that it has been increasing continuously and this is expected to happened within the next years.

Figure 5.23

Production in Israel in ktoe (1990-2014)



Source: (IEA, 2017).

The main energy consumption for Israel during the year 2015 was mostly supplied with petroleum and other liquids by around 43%, Natural Gas by 30% and coal by 26%). Within the period of 2005-2015 the energy consumption from coal has decreased while at the same time, energy consumption from natural gas “grew more than fourfold” (EIA, 2018).

Energy development is related to a country's attempt to "use gas supply disruption to promote its foreign policy objectives", which strengthens the idea of energy policy as a means of political sovereignty (Shaffer, 2013: 114-115).

ii. Energy Policy

The regulatory situation in the Israeli energy sector remained almost stable for about 60 years until 2011, where Israel was entitled to 12.5% of the sale of energy supplies from license holders beyond the usual corporate tax rate. This opportunity cost has affected friendly licensing conditions for investors. Foreign investors who had concluded contracts with the state of Israel in the energy sector were in a high-risk situation because they lacked the ability to conclude energy contracts with the Arab states due to the Arab economic boycott (Glick, 2015).

In 2012, an inter-ministerial meeting examined Israel's national gas policy. It was decided that gas exports could not exceed 500 bcm or else the "total export quota" should be less than that.

In case the quantities of natural gas permitted for export amount to 500 bcm or if five years have elapsed since the date of adoption of the Commission's recommendations, then the government should reassess the situation "from the point of view of the supply of natural gas and the expected demand for gas for 25 years from that point in time as regards the need to update the total export quota.

The most important conclusions of the Tzemach Committee can be summarized as follows:

- A generally accepted international government policy regarding the development and management of gas is a difficult matter is required.
- Securing a long-term strategy in the field of energy is considered necessary for the country.
- The economic benefits to the national economy should be maximized.
- It is important to build trusty relations with investors and improve any damaged in the past, while the market environment should continue to be competitive.
- The market should allow flexibility in the decision-making process, so that the legislator can intervene and regulate supply and demand issues.

The Tzemach Committee announced that there would be upper limits on export programming (Tzemach Committee, 2012). More specific, there is a different compensation per stock size, starting from 50% for the largest (200 bcm and above) and reaching 75% for the smallest (25-100 bcm).

The significant gas discovery in October 2010 in the Levantine basin in Israel's EEZ represents a critical change in shaping its energy policy. The Tamar field has been proven to be about 10 trillion cubic feet (tcf), while Leviathan seems to be the most successful exploration in the history of Noble Energy (Noble, 2014), with an estimated average capacity of about 22 tcf of gas.

Commercial sales from the Tamar deposit began as early as 2013, and gas reserves under Israeli waters seem to be quite recoverable, capable of covering all of the country's electricity generation needs for the next 40 years.

A very important internal discussion on the exploration of hydrocarbons in Israel concerns the role of the state antitrust. In the year 2014, Israeli antitrust chief David Gilo announced that "the Noble-Delek (US-Israel) consortium controlling Israel's largest natural gas fields was a cartel that will likely distort competition in the domestic natural gas market gas and affecting prices for the Israeli consumer ".

The decisions of the antitrust chief are binding, but according to clause in antitrust law the minister of economy gives exclusive authority to circumvent similar decisions taken by the head of the antitrust authority on sensitive strategic issues or serious diplomatic consequences.

In 2015, Israeli Prime Minister Netanyahu announced the signing of an agreement with the Delek-Noble consortium, the key points of which relate to the introduction of a ceiling on the sale price of gas to Israeli companies, the need for further investment in the Leviathan deposit of US $ 1.5 billion over the next two years, while over a five-year period there will be a restructuring of the shareholding of the major shareholders (Delec, 2015).

Later that year, the government approved a plan to increase the amount of natural gas produced by the Tamar deposit and the immediate further development of Leviathan, Karsis and Tannin gas fields. However, the Supreme Court of Israel has caused further uncertainty and delay in the development of natural gas, based on decision 476, giving a period of one year to the government to bring stability to the energy market (Delec, 2016a).

The recent agreement to sell all the rights of Kareis and Tannin to the Greek company Energean (Delek, 2016b) seems to strongly deny the oligopoly of Delek and Noble, opening the way for open competition among interested parties (Delek, 2016b).

Apart from the exploitation of NG deposits, there is also considerable activity on the issue of the Arab Gas Pipeline (AGP) pipeline whose operation was previously interrupted due to political turmoil in Egypt. The first deliveries were expected to begin in 2016, when the necessary pipeline operations had been completed.

The AGP pipeline starts from El-Aris in Egypt, and passes through Jordan and Syria, and from there, it also ends in Lebanon. There has been thought to connect the pipeline with Turkey, but the unstable environment in Syria does not support such an option for the next few years. The latest turmoil in Egypt has brought some degree of instability, a further decline in flow. In addition, there is another export pipeline from Egypt to Israel that departs from El-Ars in Ashkelon, but the available quantities are intermittent over the last few years (EIA, 2013).

The Israeli authorities had tried to establish a system for controlling gas prices in Israel in order to "keep the cost of electricity under control". As a result, additional uncertainty was added and "to keep more outside the producers from entering the country" (Snow, 2015). Gas from the Tamar Sahara could be used to meet Israel's local needs, and there is always the possibility of "exporting quantities to Cyprus and elsewhere through a floating natural gas liquefaction facility (FLNG)" (Darbouche et. al, 2012: 26-28).

The options for Israel's export of natural gas hinder some restrictions, the main ones being summarized as follows (Shaffer, 2011):

- Israeli energy policy in relation to exports appears with discontinuity and imperfections.
- In this period, it seems to be an oversupply in international markets and prices are not appropriate for export orientation.
- The European Union is considering possibilities to reduce project cost while the it is not properly interconnected with that of Israel.
- The energy market in Europe is not friendly to intermediate server countries

In the following table 5.4 shows the energy balance for Israel's natural gas, which shows the export capabilities of the state.

Table 5.4

Energy Balance about Natural Gas (NG) use in Israel

Supply of NG	**Estimated quantity (bcm)**
Expected resources (A)	680
Out of them, expected resources with probability above 90%	150
Reserves and possible resources (B)	800
Total Resources (A+B)	1480
Total Resources of NG for the design of policy	950
Accumulated demand of NG for the period of 25 yrs	450
Maximum allowable quantity for export	500

Source: (Natural Resources Administration, 2012).

On the basis of a study on the development of energy policy and the capabilities of the State of Israel, there are approaches of a different time horizon such as (Darbouche et. Al., 2012: 25-30):

- Short/Medium Term: Natural gas liquefaction in cooperation with either Cyprus or Jordan (in the economic zone of Aqaba). It is a credible choice given the current state of Israel's relations with its neighbors.

- Long Term: Construction of a FLNG terminal either in the Tamar field or Elliott, provided that a 250 km pipeline will be constructed to transport natural gas off the coast. With this option, Israel could face any "political and regulatory complications in the case of onshore, but also address the" fear of losing national sovereignty and economic benefit by third party".

The regional geopolitical complexity of the East Mediterranean has already influenced progress in exporting gas to the region, and once regional conflicts are resolved, growth will increase significantly. According to Moty Kuperberg, Director of Oil and Gas in a shipping company, there is "an urgent need to promote the development of gas for safety reasons” (Sobczak, 2015).

According to Henderson (2013: 17-18), Israel's export choices should be selected if they are profitable and can convince investors of their commercial viability, and any progress in resolving the political differences in the region should be seen as an additional positive element. As per Energy Security Risk for Israel, in the following table the scores for the years 2010-2014 are given along with its ranking as a country among the 75 countries reporting the same index.

Table 5.5

Energy Security Risk Scores for Israel

Year	2010	2011	2012	2013	2014
Value (*)[27]	1,262	1,297	1,227	1,175	1,107
Ranking (**)	45	42	41	36	35

Source: (Institute for 21st Century Energy, 2017).

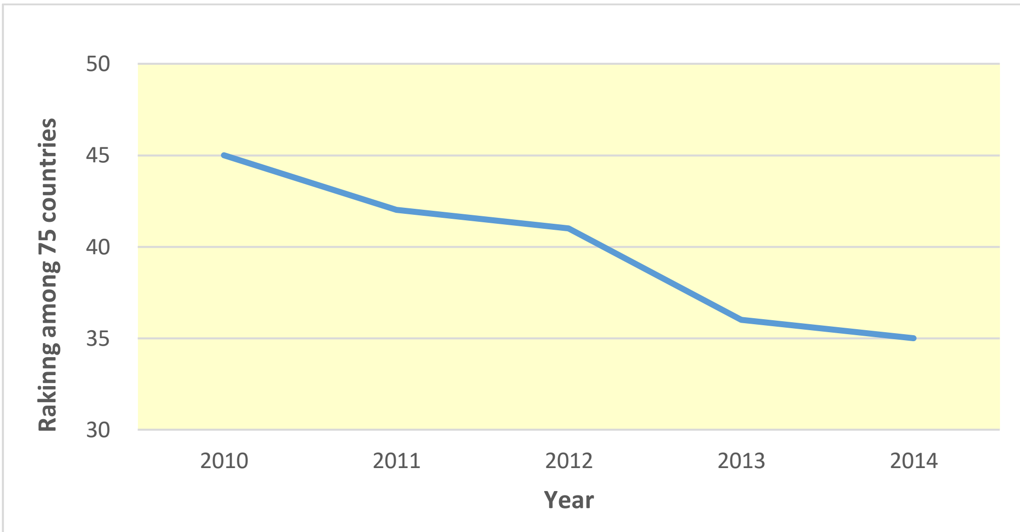
It is necessary to state that in this ranking system, in the scale where 1is the most secure and where 75 the less secure country compared to the others (and the OECD as a reference base).

In the next graph 5.24, it is obvious that there is a continuous decline in the country's risk in the recent years 2010-2014, which can be considered as reducing the ES risk when compared to the other countries, under the same conditions and reference of measurement.

[27] (*): compared to the OECD base reference 1980=1000 (**): among 75 countries

Figure 5.24

Ranking of Israel among 75 countries of OECD, 2010-2014

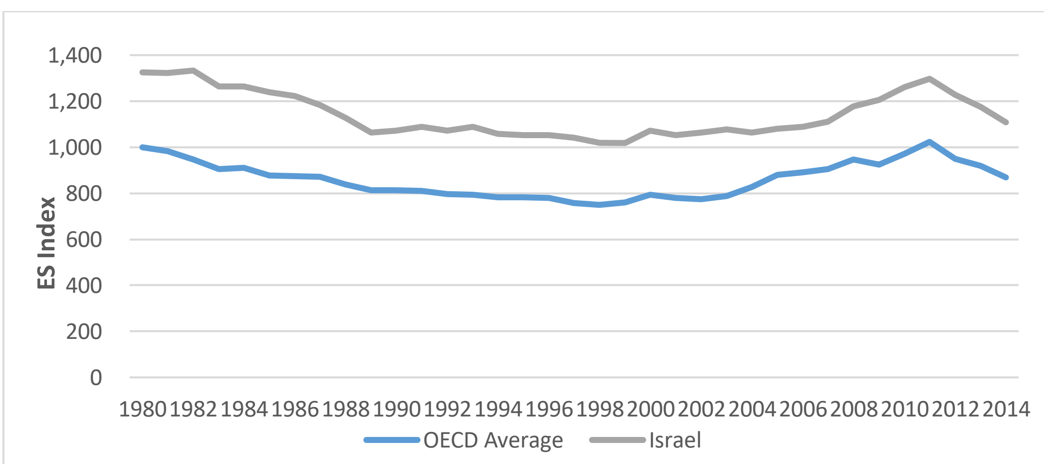


Source: (Institute for 21st Century Energy, 2017).

Furthermore, in the below figure 5.25 the ES index of Israel is presented for the period after 1980.

Figure 5.25

ES Index of Israel compared to average OECD, 1980-2014



Source: (Worldbank, 2017).

It is seen that it follows the general trend of how OECD countries perform during the same period. However, the ES index of Israel is placed always higher than of OECD countries.

5.3.3 Overview of Research outcome for the case of Israel

Based on the research already presented above herein, basic conclusions as given as following.

- Research overview:

  First of all, the research validated the parameters that the notions of both "energy security" and "national security" consist of that have been described in the conceptual framework (i.e. Figure 4 herein). Almost all of the responders referred to the same or even very similar notions as indicated in the conceptual framework.

  Based on the previous analysis in this Thesis and as per the results of the quantitative research (i.e. 4.3.5.2), for the case of Israel most of the functional relationships between the indexes of the National Security "NS_i" and the independent variable ES_{ave} come out that exist and they can be considered as strong.

- Difficulties and particularities:

  The regional alliances and stakeholders play an important role. For example, governments of Greece, Cyprus and Israel are eager to strengthen their relations and cooperate closer. But this is connected to the new shift, that Israel became a potential exporter while there is also a Greek company involved in the operations in the state of Israel. If one look at the dynamics of it, the timing looks perfect and then energy, instead of being a dividing element in the geopolitics, it can become a connecting element.

  Referring to export scenarios that the state of Israel may consider for the future, this will be very important decision for Israel how to export: via Cyprus and having a liquidation plant on Cyprus or via Turkey and invest more directly from the state's treasury.

Furthermore, even if one can be a net exporter it is seen that a country always has to deal with markets abroad for different reasons: because the sources are much cheaper, the fraction technology for the gas extraction might be still debatable, the politicians are sometime non-predictable, etc.

As per the qualitative research, it is noticed that there is a strong intention for the state of Israel to go a step further and invest in renewable energy sources and reduce country's dependence on fossil fuels. In the long term, this can give to Israel again the diversification not to rely only on limited sources of energy. This is expected to contribute to the country's energy security and furthermore for its national security.

- Outcomes:

Regarding the state of Israel, the research showed that it should continue to aim to stand alone because it is surrounded by countries that are technically in "war" with it. Although the state is still not self-sufficient in energy resources, it has made great strides in developing and applying renewable energy (i.e. solar) and be able to use it in irrigation projects for food sufficiency in arid environments, which are also critical aspects for the country and society.

Recent developments in the Israeli gas sector appear to be contributing positively to the country's de-listing of gas imports for its local needs, as until recently Israel has been relying on imports of Sa. from Egypt "for about 40% of its local needs". Even taking into account the new gas fields, policy analysts and policy makers in Israel view the Egyptian gas agreement as a positive factor in maintaining peace with Egypt " (Siddig και Grethe, 2014: 312-313).

5.4 The Case of Cyprus

The recent economic problems, after the global financial crisis that appeared in 2008, weakened country's ability and brought up additional problem for the state to deal and overcome. This is important when considering the national security of the country while Cyprus's EU membership assists the country to raise issues and claim for its rights through European institutions and organizations.

Regional conflicts in the Middle East upgrade the geostrategic importance of Cyprus, and reminds to other stakeholders in the region how important is for a power to be physically present on the island. So, it encourages the involved stakeholder to keep its forces on the island and prolong its presence more.

5.4.1 Country's Analysis

In this section, the macro environment of Cyprus is analyzed as it is important to have an overall view about the country and its main sectors before any further analysis follows.

Cyprus is an island located in the Mediterranean Sea, eastern from the Middle East Levant countries and south of Turkey. It is the third smallest EU country both in terms of population and total area. The country has only few natural resources and thus it has been dependent on energy products' imports to meet local demand for the society and the state (Wikipedia, 2019).

The recent discoveries of natural gas fields in Cyprus' EEZ in the eastern Mediterranean Sea created expectations that the energy status of the country could change and that this would be a game changer as it is expected to contribute to other aspects including the national security of the country.

In the next figure 5.26, the Cyprus is presented showing both parts and the several zones where UN security forces are still based on the island.

Figure 5.26

Map of Cyprus

Source: (CIA Factbook, 2017).

In the next table 5.6, only some of the basic parameters referring to the case of Cyprus are presented such as area of the country, population and demographic like ages and ethnicity:

Table 5.6

Basic parameters for the case of Cyprus

Parameter	Applied for Cyprus	Parameter	Applied for Cyprus
Area	9,251 sq km (of which 3,355 sq km are in north Cyprus).	Ethic group	Greek 98.8%, other 1% (includes Maronite, Armenian, Turkish-Cypriot), unspecified 0.2
Population	1,221,549 (July 2017 est.)	Maternity mortality rate	7 deaths/100,000 live births (2015 est.)
Currency	Euro	Urban population	66.8% of total population (2017)
		65 years and over	12.09% (male 63,870/female 83,809) (2017 est.)

Source: (CIA Factbook, 2017).

It is useful to refer to some historical milestones after the WWII for the case of Cyprus, which are given as follows (CIA Factbook, 2017).

- 1960: State of Cyprus became independent after being a British colony.
- 1963-64: Tensions between the Greek Cypriot majority and Turkish Cypriot minority both present on the island.
- 1974: Greek government-sponsored attempt to overthrow the elected president of Cyprus was met by military intervention from Turkey, which soon controlled more than a third of the island.
- 1983: the Turkish Cypriot administered area declared itself the "Turkish Republic of Northern Cyprus" ("TRNC"), but it is recognized only by Turkey.
- 1988: Cyprus ratified the European Charter of Local Self-Government.
- 2004: UN-mediated agreement, the Annan Plan, failed to win approval by both communities. At the same year, the entire island entered the EU on 1 May 2004, although the EU acquis - the body of common rights and obligations - applies only to the areas under the internationally recognized government, and is suspended in the area administered by Turkish Cypriots.
- 2013: EU's decisions brought Cyprus in front of an extremely difficult economic situation and the country was obliged to face one of its "worst economic period since the Turkish invasion of 1974" as "severe austerity measures have been imposed" to the country (GLI, 2019).

The long-standing problem with the Northern part of the island remains unsolved between Cyprus and Turkey and it is the Cypriot problem that dominates the relations of the two countries for the last 40 years. Turkey considers that the Northern part of Cyprus is of geostrategic importance for at least two reasons: it affects Greek-Turkish relations and it is of global geopolitical interest due to the location (Davutoglu, 2010: 179).

According to the Turkish Prime Minister Ahmet Davutoglu (2010: 176) a country that do not consider Cyprus into its geostrategic analysis and strategy, it cannot play an active role in the global and regional politics. He emphasizes the fact that such a small island is located in such an area where it directly affects strategic connections between Asia-Africa, Europe-Africa and Europe-Africa. However, he declared that Cyprus should be moved out of the “Greek-Turkish” equation, so then the two countries could agree to solve all the pending issues- as defined and recognized by Turkish’ side.

Cyprus ratified the United Nations Convention on the Law of the Sea (UNCLOS) in 1988 in which provisions on marine natural resources and EEZ are also included. Only in 2004 under the Law 64 (I) which refer to “Law to provide for the Proclamation of the Exclusive Economic Zone by the Republic of Cyprus” (the “EEZ Law”) and it was enforced retroactively with an effective date of March 2003 to allow delimitation of its EEZ with Egypt (Giamouridis, 2012: 21).

On the basis of the Exclusive Economic Law (Law no. 64(I) 2004 amended by 2014 Law), “Cyprus declared its EEZ, the outer limit of which shall not extend beyond 200 nautical miles from the baselines” from which “the breadth of territorial sea is measured in accordance with UNCLOS” (Himonas, 2015).

Despite Turkey’s recent activities in Cyprus’ EEZ, that are mainly aimed at preventing Cyprus from exercising its sovereign rights in its EEZ, all licensed companies finally “proceed with their exploration programs, in line with the licenses granted by the competent authorities of the Government” (Himonas, 2015).

In the next session, a Political-Economical-Social-Technological (PEST) Analysis for the case of Cyprus is presented focusing on the main topics that one needs to be aware of in line with the purpose of this Thesis. Thus, it is not a detailed and exhaustive analysis, but a coherent one with an interest to particular points.

PEST analysis

<u>Political</u>: The government type is Republic of Cyprus with a presidential democracy. There is stability in the political life for the last decades while there is a coherent cooperation between the parties. This is very important since whenever a serious issue for the sovereignty of the state comes,

the parties and the government seem to reach into a common understanding and goal which helps to address a slack face in the international scene.

The territorial structure consists of six provinces; each one is headed by the governor, who is appointed by the Government. The Republic of Cyprus has 523 municipalities, of which 39 are towns and 484 communities. Possession of the northern part of the island by Turkey, while Nicosia still remains the only divided capital in Europe.

<u>Economical:</u> Cyprus is already considered a developed country having a GDP of USD21.7 bill in 2017 (IEA.2019). After the latest recession that Cyprus went through, it looks that the economy is coming back om stream which is very encouraging after all the difficult experience that government, banking sector, private sector, foreign investors and other stakeholders had during the previous years.

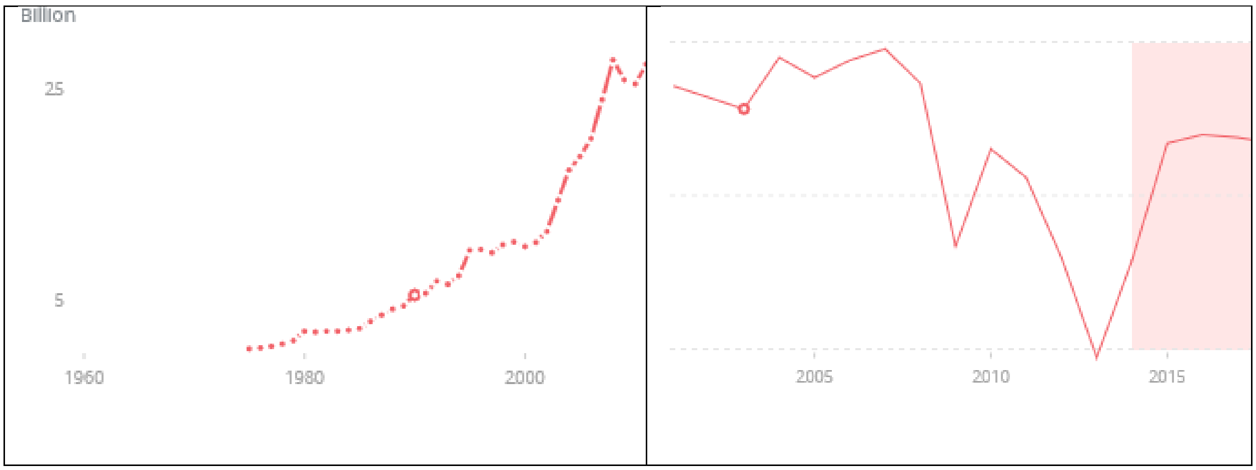
As per IMF report (2014), there are still risks that need to be addressed and the most important ones can be presented as following:

- Protracted period of slower growth in advanced economies: Significant trade linkages with EU would make slower the growth in Cyprus due to lower exports and tourism and adverse confidence effects. Stagnation and low inflation could complicate public debt sustainability and private sector deleveraging and negatively impact banks' balance sheets.
- Regional geopolitical level: An escalation of sanctions against Russia could make slower the growth in Cyprus since the country still keeps strong real and financial links with Russia. High oil prices would spill over into reduced growth in Cyprus and increased external financing needs for energy-related import.
- Sovereign stress reemerges due to prolonged delay in program implementation: Financial sector stability, growth prospects, and debt sustainability would be severely affected. Pressure on the banking sector in the euro area could extend to Cypriot banks and reignite deposit outflows. Cyprus's recently restored access to the capital markets could be lost.
- Financial sector stress could reemerge due a very fast relaxation of external payment restrictions: Financial sector stability could be affected, with strong repercussions on economic activity and debt sustainability.

- Weak recovery of domestic demand and inability to reduce public and private sector debt: Lower growth and increased opposition to further austerity would prolong Cyprus's high debt problem and would hurt balance sheets.

Figure 5.27

GDP of Cyprus (current US$)



Source: (IMF, 2017).

Based on the outlook given by the above figure 5.27, it is seen that the annual growth of GDP for Cyprus is expected to be from around 1.8 in 2017 to 1.6% in 2019.

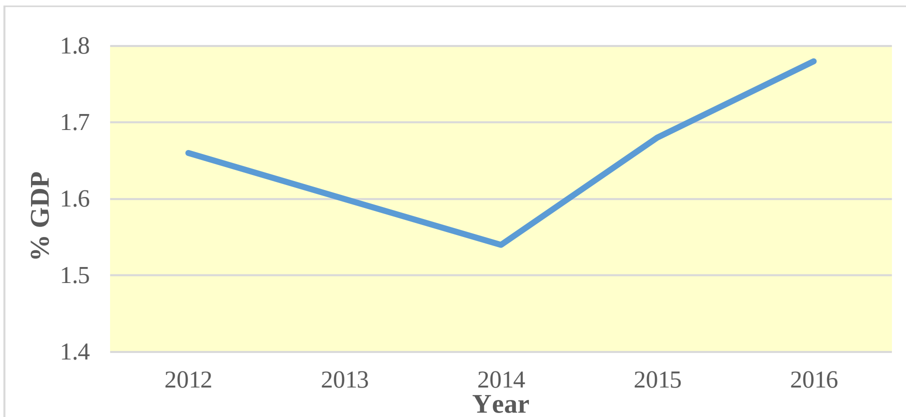
<u>Social</u>: A large number of municipalities with small and non-functional size while the life expectancy is at 78.7 yrs that brings the country in the rank of 53 in the world. There are still difficulties in cooperation between the Greek Cypriot and Turkish Cypriot communities and the negotiations have been in progress for years now, ruling the life of the citizens. The manpower of the country is of very good quality, well-educated and openness. This can be seen by the very good productivity of the employed labor force.

<u>Technological:</u> The level of the infrastructural facilities including telecommunications and transportation are rather satisfactory. Around 76% of the population is Internet user and the country has open-wire, fiber-optic cable, and microwave radio relay.

<u>Military and Security</u>: Cypriot National Guard (CNG): 18-50 years of age for compulsory military service for all Greek Cypriot males; 17 years of age for voluntary service; 14-month service obligation (2016). In the next figure the military expenditure of the country as a percentage of its GDP is given.

Figure 5.28

Military Expenditures of Cyprus (as % of its GDP)

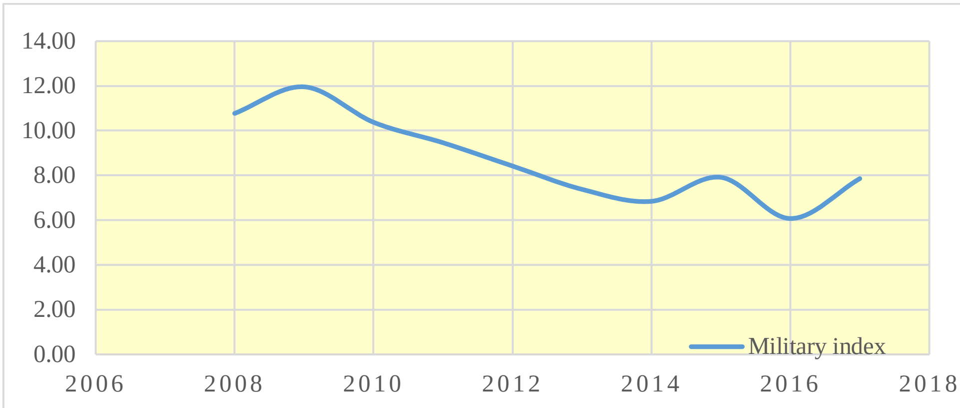


Source: (CIA Factbook, 2017).

It is seen that there was a continuous decline in military expenditures during the years before 2014 reaching the lowest point in the previous decade. After that lowest point, it looks that the military expenditures of the country started increasing for the next years. Based on the data selected and analyzed during the primary research of this thesis there were also information related to Military Index for Cyprus [see Appendix E2].

Figure 5.29

Military Index for Cyprus



Source: Author, 2019.

In the above figure 5.29 there is a representation of the Military Index during the same period 2007-2017. Comparing the two graphs, it is seen a similar trend on the graph between the military expenditures of the country and the military index, during the same period.

5.4.2 Energy Sector in Cyprus

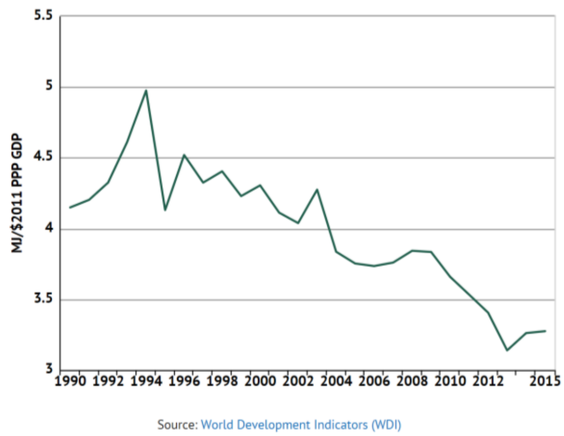
i. General

In 2015, energy intensity[28] for Cyprus was 3.27 MJ per USD of GDP which is lower than the energy intensity in 1996 at 4.52 MJ per USD of GDP. This is well presented in the next figure 5.30, where energy intensity for Cyprus had been continuously declined

[28] Energy intensity level of primary energy is the ratio between energy supply and gross domestic product measured at purchasing power parity at constant prices of 2011. Energy intensity is an indication of how much energy is used to produce one unit of economic output. Lower ratio indicates that less energy is used to produce one unit of output.

Figure 5.30

Energy Intensity for Cyprus, 2005-2015



DATE	VALUE	CHANGE, %
2015	3.27	0.41 %
2014	3.26	3.89 %
2013	3.14	-7.82 %
2012	3.41	-3.61 %
2011	3.53	-3.44 %
2010	3.66	-4.58 %
2009	3.83	-0.22 %
2008	3.84	2.22 %
2007	3.76	0.66 %
2006	3.73	-0.48 %
2005	3.75	-2.17 %

Source: (WDI, 2019).

Basic parameters for Cyprus related to the energy- such energy production, net imports, electricity consumption, electricity consumption per capita and CO_2- are given in the next table 5.7.

Table 5.7

Basic energy parameters for Cyprus (2018)

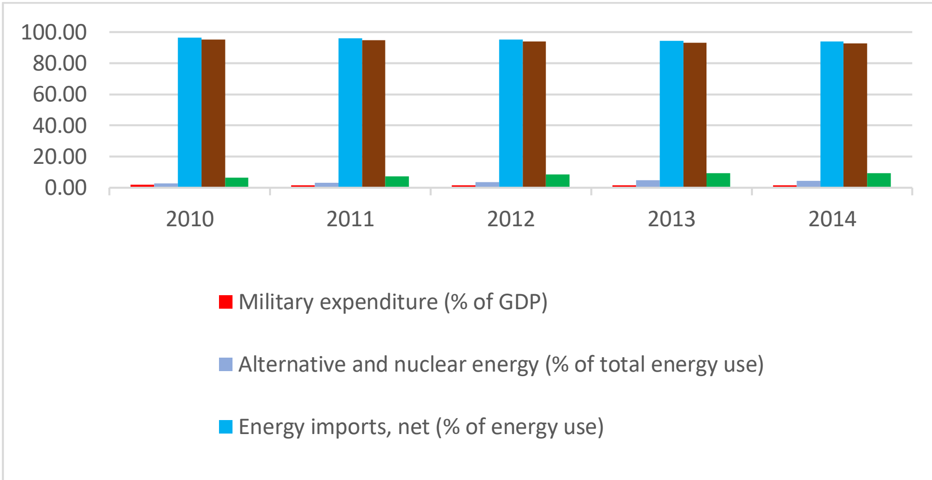
Parameter	Value
Energy production (Mtoe)	0.13
Net Imports (Mtoe)	3
Electricity consumption (TWh)	5
Electricity consumption/population (MWh/capita)	5
CO_2 emissions (tn of CO2/capita)	7

Source: (IEA, 2019).

In the next figure 5.31, several energy data for Cyprus such as alternative energy, fossil fuel energy consumption and renewable energy consumption (as % of total) are presented.

Figure 5.31

Energy Data for Cyprus



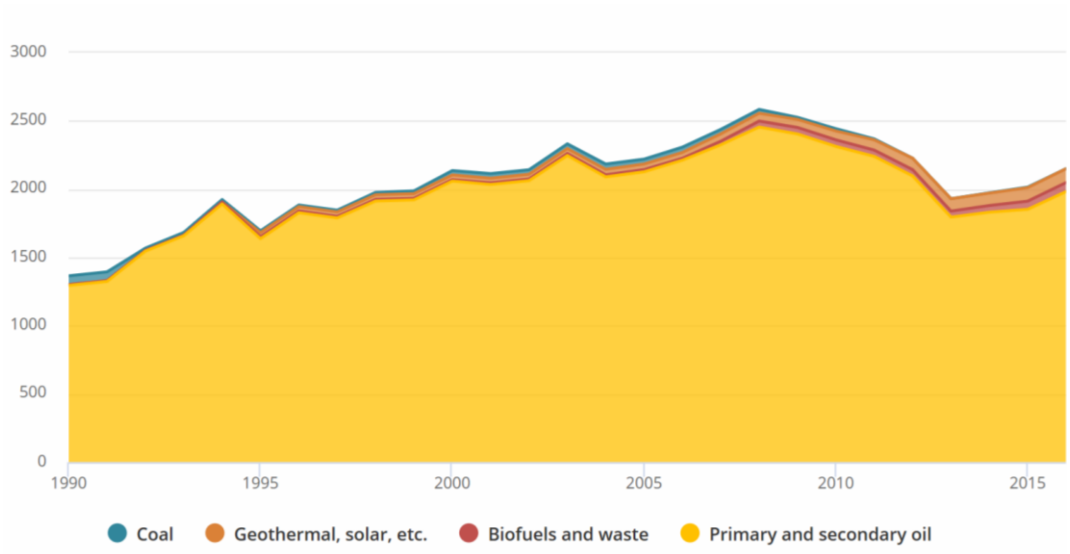
Source: (World Bank, 2017).

Primary energy supply in Cyprus is expected to slightly decrease during the next two decades, until 2040. The main reason is seen the incorporation of more shares of renewable energy that can substitute usage of fossil fuels in the fired generation in the electricity sector. Furthermore, in 2020 heavy fuel oil is expected still to be used until the start of less carbon-intensive natural gas in the power sector at the end that year (NECP, 2019).

In the next figure 5.32, Total Primary Energy Supply (TPES) by source - excludes electricity and heat trade – for Cyprus during the period 1990 – 2016.

Figure 5.32

Total Primary Energy Supply (TPES) by source for Cyprus, 1990-2016



Source: (IEA, 2019).

It is seen that the dominant fuel type used in Cyprus is primary and secondary oil during all previous twenty-five years. After 2000, other types of energy fuels started and became gradually part of the total mix. Such types are geothermal, solar and biofuels.

Hydrocarbon exploration in Cyprus' EEZ has been a contemporary issue for the last years. However, it has only recently attracted much attention since drilling explorations at Cyprus' offshore field started in September 2011. There is a long-running maritime dispute involving the Greek Cypriots, the Turkish Cypriots and Turkey reached crisis levels. Even though the crisis was smoothening in the months later, it is still a subject that continues to fester.

Most of the Hydrocarbons fields have been recently found in East Mediterranean area. Oil and Gas resources lie in very deep waters which make it difficult and expensive to carry out exploration in the area. Having state of the art equipment available, oil and gas companies decided to start new explorations in this region, but recently many of them they have been put on hold since oil prices dropped down dramatically during the year 2015. It is very interesting to see what will happen during the next period and whether the prices in the market will remain at such or they will go higher of the critical level that allow the continuation of explorations in the oil and gas fields.

As per Cyprus' Minister of Energy Yiorgos Lakkotrypis, it is expected for Cyprus to have initial natural gas production from the Aphrodite field around 2024-2025, after negotiations of the state with operators and an ownership squabble delayed output. The minister said that he would meet with Aphrodite's stakeholders in June 2019 in order to discuss "the revenue sharing mechanisms between the government and the companies, infrastructure plans and the price at which companies will sell the gas" and expected that discussions would conclude in a few weeks' time (Kumar, 2019).

Cyprus is not producing any primary energy resources except from RES and thus it is seen as a heavily energy-imported country with more than 90% of is energy needs to be met with imports from outside, mainly petroleum products.

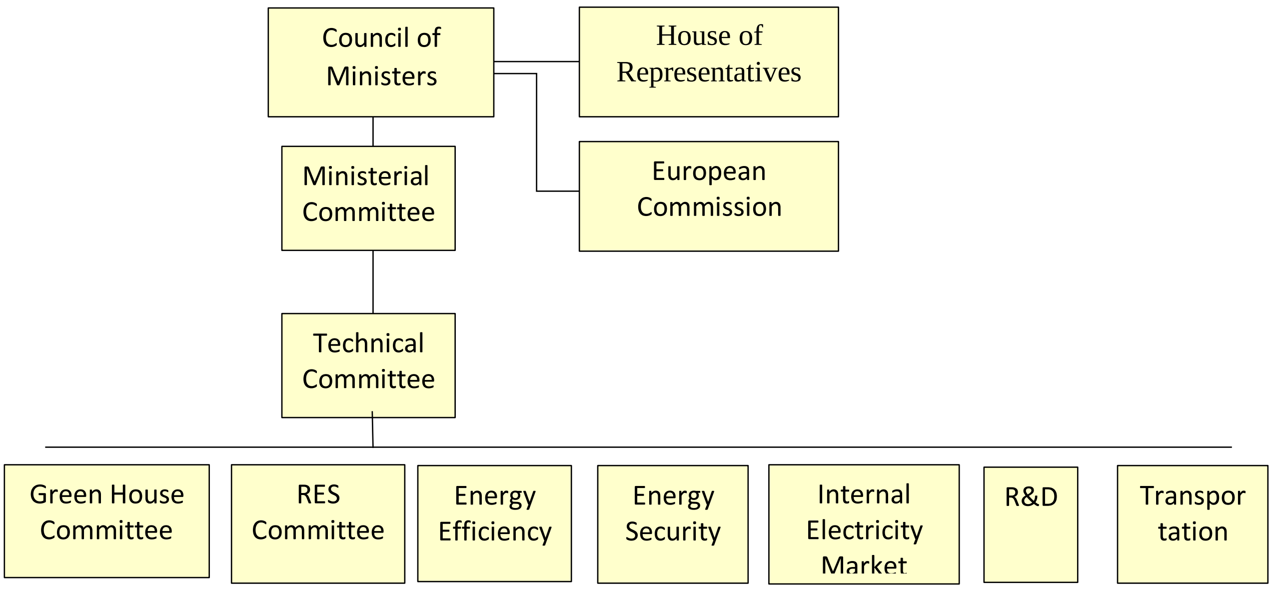
The electricity market is dominated by the state-owned Electricity Authority of Cyprus (EAC) that plays the dual role of both electricity producer and supplier. Natural gas is expected to be an important fuel source for production of electricity in the next decade. In 2014 the electricity market was officially liberalized, but still not any new player entered the market so far.

EU has assessed Cyprus as "one of the most vulnerable countries in EU in terms of energy dependency and security of energy supply". Moreover, it does not have energy interconnections with any other country [either electrical or natural gas] and thus it is seen as an "isolated system". Petroleum products that are imported are around 30% of the total imports in the country which contributes negatively the balance of payments and thus sensitive to any external threat or disruption at the macro level (GLI, 2019).

Regarding the energy design and planning in Cyprus, according to a decision of the Council of Ministers no. 83.709 dated on 15.11.2017, a National Energy and Climate Governance System (NCI) should be established. Such a unit is presented in the following figure 5.33.

Figure 5.33

A National Energy and Climate Governance System in Cyprus



Source: (Ministry of Energy, Commerce and Industry in Cyprus, 2019).

ii. Energy Policy

Cyprus as a full member of EU is obliged to fully comply with the EU legislation, norms and directives. This refers also to the energy policy of Cyprus, which needs to be aligned with the energy policy of EU and thus the following laws have been set:

- In 2003, the Law Regulating the Electricity Market.
- In 2004, the Law Regulating the Natural Gas Market.

For both laws, Cyprus Energy Regulatory Authority (CERA) is responsible for regulating both the electricity and natural gas markets.

As per Hydrocarbons Law, the authorized party to manage the upstream activities is the state and for this reason the Cyprus Hydrocarbons Company (CHC), a private company with a sole member the Ministry of Energy, Commerce, Industry and Tourism was established.

Electricity power plants use natural gas a feedstock which is currently imported from abroad. Recent H_xC_Y discoveries will contribute positively to the fuel used in such power plants, but such development is expected only after 2020 (GLI, 2019).

5.4.3 Overview of Research outcome for Cyprus

Based on the research already presented above herein, basic conclusions as given as following.

- Research overview:

  First of all, the qualitative research validated the parameters that the notions of both "Energy Security" and "National Security" were initially seen to consist of as per the conceptual framework (i.e. Figure 4 herein). During the research, almost all of the responders mentioned similar notions as indicated in the conceptual framework.

  Based on the previous analysis in this thesis and as per the results of the quantitative research (i.e. 4.3.5.2), for the case of Cyprus the results show that none of the functional relationships between the indexes of the National Security "NS_i" and the independent variable ES_{ave} came out that exist as strong.

- Difficulties and particularities:

  Especially for the case of Cyprus, it is seen that regional alliances play an important role, as the county has not been allowed to keep its own military forces and thus need to rely on others to protect from any external threat and in particular Turkey, as it has been proved during the last decades. The size of the country is small and it seen as vulnerable to its external environment and challenges in the region.

Contrary to the case of Israel, Cyprus has not been included in any energy interconnection or nexus and only it was only recently that the state of Cyprus started discussions and efforts to design and implement such projects, because of the recent discoveries of oil and gas in its territory.

However, this is not seen to contribute to the National Security of the country even by a small percentage (as it was noticed for the case of Israel before herein). Cyprus seem to be missing many basic parameters that are not currently in force or much available, such as: military power, limited degree of freedom to take decisions (since it has been supervised by third parties). In addition, the recent economic problems during the period 2010-2014 brought serious problems to the country, as it was then not possible to refund its state expenses from the international markets and consequently problems of the government to restructure the financial sector in the country.

- <u>Outcomes</u>:

Regarding the state of Cyprus, the research showed that there is no formal relationship between the Energy Security and the National Security of the country. It can be said that both notions for the case of Cyprus – Energy and National Security – are still as non-existence and the county mostly relies on others to cover both these critical needs.

In addition, the recent natural gas discoveries in the economic zone of Cyprus seem to have triggered country's opponents to become more aggressive and hostile against the country, by exercising threats and showing delinquent behavior.

Based on the research and the outcomes of this study, it can be seen that energy and resources contribute to the national security of a country, provided that there are some minimum requirements met at the first place; such as military power, leadership and experience of the politicians and decision makers in politics, investments in technology that can become a critical factor in this relationship. Energy and resources can play the role of a catalyst[29] in several relationships, including the examined one between Energy

[29] See Perry (1997:13-83)

Security and National Security of a nation-state. A catalyst can act as accelerator for the rate of a reaction, but also as an decelerator that cause delays and negative outcome.

5.5 Comparison of the cases

Based on the previous analysis about the two examined countries, it is seen that in the case of Israel there is a function [i.e. g΄] that connects the Energy Security and the National Security of the country. On the contrary, in the case of Cyprus, the research showed that there is no such formal relationship between the examined notions. For the case of Israel most of the functional relationships between the indexes of the National Security "NS_i" and the independent variable ES_{ave} come out that exist and they can be considered as strong.

Based on the research that took place in this thesis, it is seen that especially for countries located in a hostile environment like Israel and Cyprus, notions such as energy security are critical. During the qualitative research, the experts that participated and were interviewed mentioned that Cyprus has to consider options that will help dealing/repel with the one country against its sovereignty (Turkey). Furthermore, it was clearly mentioned that government decisions for both countries influence which energy resources are consumed and in what priority based on taxes, incentives, and manufacturing standards. Government must allocate sound military defense to protect its boundary and energy resources.

The implementation of the broad conceptual framework (as seen in the Figure 4.7 in Section 4.3.4.3) at the case of Cyprus and consequently the analysis followed the research phase, revealed some important characteristics and remarks.

It is seen that small countries and nation-states are more vulnerable to external factors and other parameters, especially when basic pillars of their national security are not present or clearly available. In addition, minimum number or level of prerequisites need to be in place in order to be able to apply a relationship at the state's level; such as military power for the state which is also supported by the theory of realism as it was seen before.

Based on the study and analysis of this thesis it is seen that Energy Security in the case of Cyprus is not necessarily linked and it does not affect the other parameter, the National Security of the country. This was the opposite outcome of what was found in the case of Israel. The energy mix in the case of Cyprus is almost linked with the use of oil, while in the case of Israel is mixed, where both crude oil and gas are used as energy sources for the country's needs and consumption. These examined parameters may last independently and one's presence and changes may not necessarily affect the presence and changes of the other.

It can be said that Energy Security in the case of Cyprus act as a catalyst and more particular it may become eventually a negative catalyst considering the existing limitations that prevail at country's level. It is seen that there should be a minimum set of prerequisites at country's level in order to materialize any positive change caused by improved level of the Energy Security of the country. It looks that in the Mediterranean region – political uncertainties; economic hardships (i.e. Cyprus economic crisis in this decade); military conflicts in the region amplify the economic uncertainties.

Referring to the case of Cyprus, especially after the recent natural gas discoveries in tis EEZ, there was an overexcitement and overstatements made by the politicians and leaders of the country concerning potential growth and benefits for the county. Such reactions have finally created over expectations to the society, while at the same time, such overstatements trigger the opponents (i.e. Turkey) to overreact and start causing a serious headache to Cyprus as it comes to be a difficult game to exit from. According to Johansson (2013), natural and energy resources may initiate and consequently sustain conflicts between nation states over small islands and waters, which in case of poor and weak countries may eventually cause insecurity and instability.

As Cyprus is a small and weak country, international law is very important and for its case, small and flexible military units should be the correct solution (state-of-the art is not always the right solution). In the case of Cyprus, it's more complicated since the country is divided and in conflict with Turkey. Furthermore, the examined case is considered as a nod/junction (geographical, energy, culture, etc) so a multi-parameter approach should be considered to understand the dynamics and envision any future actions/solution.

It may be possible to consider a new function for the examined relation between the two notions where additional relationship [i.e. include time, and other]. As per Manson et al (2014), the analysis of a parameter like the Energy Security strongly depends on the time framework used each time.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 General

The international and global political economy presents a diversified blend of Energy Security strategies and policies. This situation can be related to lack of consensus about the nature of the Energy Security problem and also the need for different approaches to deal with diverse resource endowment, political levers, capital availability, risk aversion, and other specifics of nation-states (Brown et al, 2011).

After the oil crisis in the 1970s, oil producers in Middle East viewed Energy Security as “entailed the capability of inflicting political and economic hardship on Western nations dependent on petroleum, as the oil embargoes effectively operated as ‘oil weapons’” (Yergin 1991: 597).

According to Kissinger (1982: xv), it is imperative “to reduce nation’s vulnerability to energy supply disruptions” and he claims that “the link between energy and national security is of enormous importance”. Furthermore, the dependence of the US on oil imports up to 1980-90s “had been long considered the cause of its energy dilemma” (Ebinger, 1982: 80).

Kissinger mentioned that any energy crisis “is not a mere problem of transitional adjustment but it is a grave challenge to the political and economic structure of the free world” (1982: xix). It can have serious consequences on societies and citizens such as:

- A constantly increasing price of the fuel that is required to heat houses and move transportation sector.
- An inflation and recession that will follow.
- A political crisis of global dimensions that will eventually affect country’s national security.

According to Kissinger (1982: xx), except from military defense, “there is no project of more central importance to the national security of the country and its independence a sovereign nation”. It is mainly that governments and states of the producing nations control the upstream[30] chain of the oil and gas industry while the private companies of the consuming countries mostly regulate downstream[31] chain (Ebinger, 1982: 123).

Referring to Energy Security (ES) and National Security (NS), there are several links between energy and national security such as (Ebinger, 1982: xxiv):

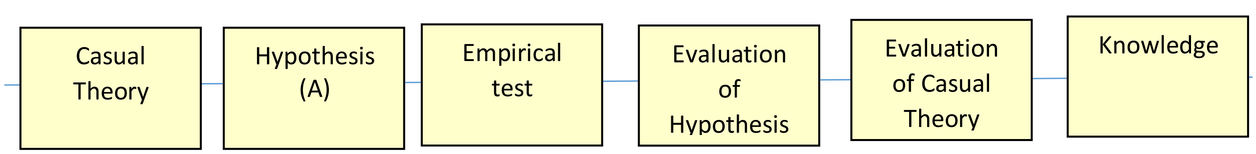
i. International competition for oil.
ii. Reliance on insecure oil supplies strikes on the military security in several areas.
iii. Political, economic and environmental conflicts over energy development, conservation and end-use jeopardizes uncertainty over future economic conditions and the supply and cost of energy.

Any economic difficulties as the result of higher oil prices are mainly caused by only moderate shortfalls in oil prices. However, a large disruption would cause almost incalculable problems and the likelihood of such a disruption is always real (Ebinger, 1982: 77).

6.2 Conclusions

6.2.1 Main Conclusions

As per figure 4.9 already shown in chapter 4 of this thesis regarding the design and execution of research, there are valuable and important remarks and conclusions presented herein.



[30] Upstream: exploitation, exploration, crude oil and natural gas production. The major facilities are on-and off-shore wells, pumps, gas-oil separators, water processing plants, pressure maintenance equipment (Ebinger, 1982:156).
[31] Downstream: refining, transportation, marketing. The major facilities are pipelines, pump stations, storage tanks, tankers, oil ports and industrial plants such as refineries and power stations (Ebinger, 1982:156).

a. Contribution to the main theory/literature: An updated conceptual framework has been proposed in this thesis. Following a systemic approach and thinking in systems terms can contribute methodological choices within Energy Security assessments. Methodological options in Energy Security assessments can be systematic, rational and transparent. They can meditate configuration of energy systems, explained based on the scope of assessments and clearly presented for the target group they are addressed to.
b. The main research question (hypothesis) of this thesis has been finally validated, as shown in the previous analysis and outcomes. The relationship between NS and ES exists and there are various indices that each main parameter/variable can consist of.
c. Selecting indicators and evaluating results; the methodological choices in an Energy Security assessment should be systematic rational and transparent. They should reflect the configuration of energy systems (real and perceived), justified based on the purpose on the assessment and clearly explained for the targeted audience.
d. Assessments of Energy Security and its dimension in future scenarios could probably deal with major challenges to describe vital energy systems that could different from what currently are today (Stirling, 2011:146-169).
e. Based on the current outlook, it is seen that the energy security landscape is expected to be much different and many of the existing energy security threats may not exist while new ones may appear. To assess Energy Security and related issues in the next years, it would be necessary to understand:
    - The diversity of global energy supply in the future.
    - The diversity of fuels used in key end-use sectors.
    - The dependency of each region on imported energy sources.
f. Based on the previous analysis, the basic results and outcome was already described and mentioned in the previous 5.5 section of this thesis.

6.2.2 Other Conclusions and considerations

It has been seen that Energy Security indicators are used to “reflect the vulnerabilities of vital energy systems identified at the earlier stages of the assessment” and thus they can be selected from those suggested in the literature or designed specifically for the purpose of a particular assessment". Selection of indicators can be based on "how well they represent a particular risk or vulnerability of a vital energy system" but in general they would "rarely be a direct measure of a risk or a resilience capacity". They are mostly seen as "quantitative proxy", as "a signal of a state of a complex and dynamic energy system". By nature, and definition, a proxy "does not exactly point to the causes, nature or extent of illness" but it is "still widely used and relatively reliable, especially when used in conjunction with other observations". The nice example of the body temperature used "as an indicator of human health' is also given. In general, there are three strategies for reaching this aim:

- Interpret individual indicators, since when "well-selected indicators can sometimes directly provide the answers". Such interpretation of individual indicators can involve "comparison between countries or different points in time".
- Reduce the number of indicators by combining them into aggregated metrics, since "the more indicators that come into the picture the more difficult it is to make sense of them". For this reason, the second strategy is aggregating indicators into energy security "indices" and thus the amount of information and be minimized and "make the results of an assessment more understandable". Aggregation looks more reasonable if indicators relate to the same vital energy systems and/or to vulnerabilities which can potentially interact. In the quest for an "objective" evaluation of energy security, many studies use mathematical operations to aggregate indicators into a combined index. Aiming for a strictly objective evaluation of energy security is futile. All methods for interpreting and aggregating indicators require some form of human judgment, implicit or explicit, on the relative importance of energy systems or their vulnerabilities.
- Present the indicators in a format that facilitates the assessment: Check if all indicators are necessary, since some of them looked promising at the selection phase but they proved to be "not reliable or differentiating". Then, check if it is possible "to present disaggregated indicators in such a way that they are more understandable without aggregating them".
  - A main challenge in the history for human to deal with and a game changer in the previous industrial revolutions (may also refer to figure 3.1 regarding the Historical evolution).

Based on the previous analysis, nation-states have to check and review their energy policies in order to properly design a new vision for the future. Thus, they have to realize and become familiar with the current and coming megatrends which are going to bring vast changes and effect globally. Leadership and political are necessary in order to deal effectively with challenges and handle any conflicts in the neighborhood. Furthermore, attention to the right strategic realignments is strongly required (Leigh, 2014).

In addition, knowledge and experience on technical aspects related to energy areas always support to build self-confidence and weaken any risks of confrontation over claims. There are more to be achieved regarding coordination across borders on energy issues since it always contributes for governments to develop and sustain energy policies (Florini, 2010).

As per Pascual and Elkind (2010), energy policy decisions are driven by Energy Security through consideration of the major factors. Same causes also actions of other nations, a changing climate, and the quest for energy independence. Energy security along with several other policy issues can be seen an umbrella for international security, economic development and political relations (Ciuta, 2010). Energy security can be significantly enhanced if solutions are found that take into consideration the necessity to balance the geopolitical, economic and environmental implications of energy (Yergin, 2010).

Protection from disruptions of vital energy systems may result from:

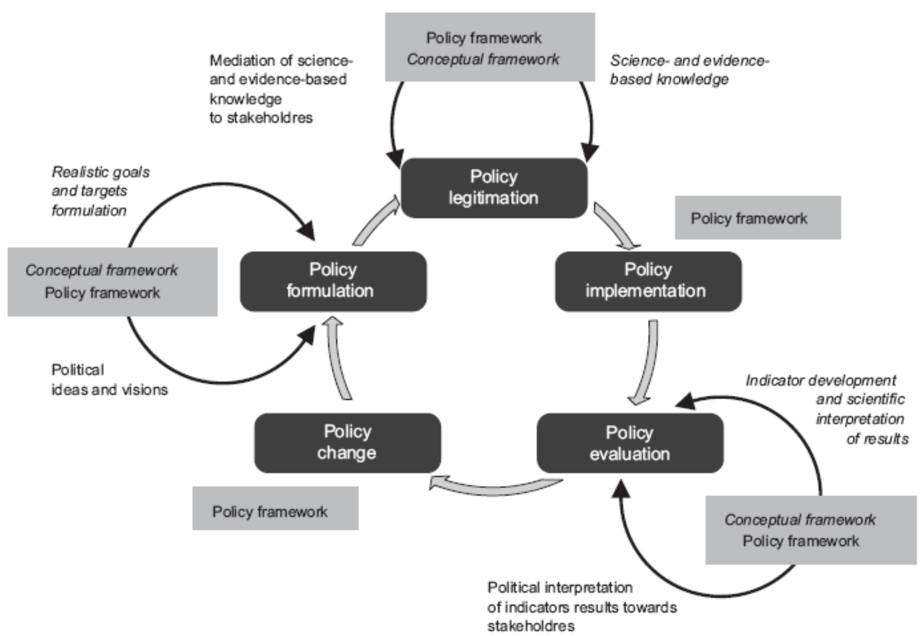
- Impermanent/short shocks: Natural events, technical failures, deliberate sabotage, malfunctioning markets.
- Permanent threats: Resource scarcity, infrastructure aging, unsustainable growth.

Such disruptions can cause security issues such as viability of national economies, stability of political systems and armed conflicts. Even though Energy Security concerns are not same in every country, however they are linked to robustness, sovereignty and resilience of energy systems. State Energy Security strategies and policies which are developed to ensure Energy Security are dominant for the transformations of energy systems. Such state Energy Security strategies and policies try to deal with the aspects indicated herein and they aim to increase the robustness, sovereignty, or resilience of national energy systems.

- Robustness: Efforts to switch to more available and affordable energy sources, induce investments in infrastructure, and manage energy demand.
- Sovereignty: Efforts to switch to domestic energy resources and achieve long-term contractual arrangements with trustworthy partners to utilize national energy assets, establish nationally controlled energy companies in order to secure energy resources outside of the country, utilize nation's power to secure access to energy resources.
- Resilience: Efforts to maintain emergency stocks of strategic nature fuels and target to increase reliability of energy infrastructure.

Figure 6.1

A Policy cycle linked to policy and conceptual frameworks



Source: (T. Hak et al, 2016).

6.3 Recommendations

Based on the analysis and outcome of this thesis, recommendations and expectations for the next period, both short-term and long-term are proposed as herein. They are given in a sequence regarding theory, research and policies for the countries.

6.3.1 About theory

There can be a new approach including new elements to the theory (see interdisciplinary approach):

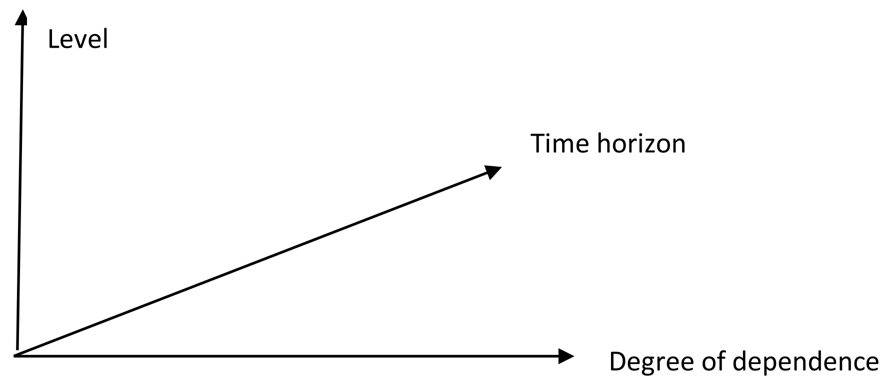
- Further spread and diversify the results and outcomes of this thesis through new research and papers.
- Increase and maximize the impact of the study on academic level through collaborations with governmental institutions for the countries of interest, non-governmental associations involved in security and energy security areas and academia.

One of the main challenges when thinking and designing a new approach as the proposed conceptual framework was first of all to overcome any existing perceptions and beliefs that create a resistance. It is always desired to have a fresh look at the examined case. It is more difficult to change an existing structure and challenge prevailing patterns of beliefs, rather than build something from the beginning and thus have the ability and luxury to think out of the box. As Moe mention (2014: xv), it is that human perceptions of “risk and benefit” can promote or delay/stop the progress.

At a second, further stage of analysis, apart from the aforementioned approaches through levels, it is interesting also the following figure 6.2 that represents a view considering the parameter of time.

Figure 6.2

3-d Analysis



Source: (Author, 2018).

As per Fermann (2014: 22), for the analysis of the concept of Energy Security it is necessary to take into account also the following parameters:

- Different angles: Variety of parameters have been included in the examined variables.
- Different time horizons: Time is a parameter that is always mentioned and the time framework is defined, in order to have it as reference base.

As described in the chapters 4 of this thesis, the functional relationship between the two variables, "Energy Security" and "National Security" (function ***g΄)*** was considered through (4.2) as

$$\text{National Security} = \boldsymbol{g'}\,(\text{Energy Security}) \qquad (4.2)$$

where:

National Security can be used as the symbol NS and it can take values from a total

$$NS_i=\{NS_0, NS_1, NS_2, \dots, NS_i\}\ (i>1) \qquad (4.3)$$

and

Energy Security can be used as the symbol ES and it can take values from

$$ES_j=\{ES_0, ES_1, ES_2, \ldots, ES_j\} \ (j>1) \tag{4.4}$$

Based on the results and outcome presented herein, the functional relationship NS = $\boldsymbol{g'}$ (ES) can be modified and updated in order to become a type as following:

$$[NS]_t = [g'(ES)]_{t-1}\,[f(z)]_t \tag{6.1}$$

where:

g' : The initial functional relationship.

f=f(z): Proposed relationship with z belongs in the sum that includes elements of nation's DNA[32] [such as history, political considerations, anxiety for survival, culture].

t: The time when measured.

t-1: A previous time, not necessarily one (1) year.

During the phase of design of a research and implementation of a framework, it is seen as important to use the time as a design variable and define it. Thus, in the examined case it may be useful to consider a gap or else known as "phase lag"[33], which will not be only a negative influencer (i.e. delay) but on the contrary it can be seen as creative factor and maybe necessary for the quality of future researches and more complete studies and analysis.

It is worth saying that theories especially in social sciences are not only "bivariate" but most of them "multivariate" which means that the relationship/phenomenon under investigation has more than one causes (dependent variables), however we focus on the chosen ones for the purpose of our study and the reasons mentioned earlier in the thesis (Kellstedt and Whitten, 2013: 51-52).

A theory is possible to explain some or few cases either because it needs specific conditions to be applied or because the phenomenon which is caused is not common. Even though such a theory

[32] DeoxyriboNucleic Acid, a self-replicating material which is present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information.
[33] Phase lag is a parameter of the eddy current signal that makes it possible to obtain information about the depth of a defect within a material. Phase lag is the shift in time between the eddy current response from a disruption on the surface and a disruption at some distance below the surface.

describes very well and explains some or few cases and not all, this theory is valid. However, the more cases a theory is applied and explains them, the more useful it is. Furthermore, a theory is not possible to be absolutely correct since it is not feasible to think and imagine and assess every single prediction they make (Van Evera, 1997: 39-48).

Falsification of theories which still keep some explanatory power are not supposed to precede the emergence of a better theory than them (Lakatos, 1970: 115) and furthermore if testing shows that a theory has no explanatory power then we should not keep it independently if a replacement theory exists. Keeping hard questions in the study is mostly advisable, since a theory ma be difficult/hard to be tested/proved at the period of the research but it may become feasible later as "new tests are derived and new data emerge" (Van Evera, 1997: 43-48).

The maturity of state's political culture and level of democracy is an important factor that can contribute to the decision-making process of the government and the authorities responsible for the formulation of nation-state's policies: and thus, also for both national and energy security as well. By this, it may be possible for a government to have options for its policies to choose from and apply; such as market-friendly, environmental sensitive, short or long-term view, etc.

6.3.2 About the Research

Based on the previous analysis and outcomes of this thesis, several areas for further investigation and study can be seen such as:

- Repeat the research for both countries after 5 years, when new/more data would be available and thus a time-series statistical analysis could be possible to be done.
- Repeat the research for other countries in the same region (Turkey, Greece, Egypt).
- Repeat the research for other countries in another region such as Caspian, Artict, Middle East, Gulf of Mexico, etc.

6.3.3 Policies proposals

Based on the previous analysis and outcomes of this thesis, several areas for further investigation and study can be seen such as:

Table 6.1

Policies proposals

	Short-term	Long-term
General	▪ Design and implement the right conservation policy. ▪ Government and authorities need to intervene ensure that the energy rate base is in line with prevailing market conditions. ▪ More liberal tax incentives for investment in fuel-efficient machinery and insulation. ▪ Re-organize the structure and have autonomous energy planning and energy security division at a higher hierarchical level. ▪ Form a group of experts that are knowledgeable and aware of energy related issues. Build an effective response network with officers.	▪ Control oil imports and diversify oil suppliers. ▪ Develop surge capacity and stock piling. ▪ Develop and implement a National Security Doctrine. ▪ Design and implement a comprehensive energy policy on different energy sectors. ▪ Develop a state-of-the-art energy industry ▪ Consider clean types of energy with combination of new technologies and human capital plan that can establish an industry related to the Internet of Things (IoT). ▪ Design a Contingency plan, dealing with policy differences within the same sector of the energy industry and between proponents of each different fuel type
Cyprus	▪ Continue to build strategic alliance on the military sector.	▪ Develop and implement a National Security Doctrine.

	▪ Maximize the EU membership effect in securitization of country's sovereignty. ▪ Involve international players in energy sector in the recent O&G developments in order to leverage their lobby and network to protect country's position. ▪ Train country's human capital on energy diplomacy.	▪ Policy makers should follow a systemic approach which will contribute to more and correct methodological choices within energy security assessments.
Israel	▪ Natural gas liquefaction in cooperation with either Cyprus or Jordan (in the economic zone of Aqaba). ▪ Strengthen the cooperation with neighbor countries in projects like East-Med.	▪ Develop and implement a National Security Doctrine. ▪ Israeli energy policy should assess each project both on techno-economic criteria and geopolitical factors. ▪ Israel's new energy policy should offer investors a "stable and transparent regulatory environment". ▪ Construction of a FLNG terminal either in the Tamar field or Elliott, provided that a 250 km pipeline will be constructed to transport natural gas off the coast.

Source: (Author, 2019).

More specifically:

i. General

According to Ebinger (1982: 41-100), it would be useful "to distinguish between the long-term and short-term options the country has for achieving self-reliance in energy":

- Short/medium-term:
  i. Design and implement the right conservation policy. It is necessary to find a way of "using available fuel supplies more wisely, which is also more economically".

Conservation policy needs to be designed by the state, which is necessary to save local resources and at the same time reduce nation's dependence from imported fuel oil from abroad. It is also important to clarify that conservation should be seen as follows (Ebinger, 1982: 39-41):

- Wise use of limited resources.
- A most-effective use of fuels.
- Substitution of alternative energy, labor and capital for petroleum in order to save money and also lower fuel consumption.

It is important to mention that "without greater energy production, conservation alone may only temporarily reduce reliance om imported oil" (Ebinger, 1982: 57).

ii. The role of government is very important taking the right decisions and avoid any obstacles raised by any stakeholder/group.

iii. The government and authorities need to intervene in state and local regulation of utilities to make sure that the rate base is in line with prevailing market conditions. Withdraw any legislation that restricts gas use when that restriction contributes to switch to oil.

iv. More liberal tax incentives for investment in fuel-efficient machinery and insulation.

v. Re-organize the structure and have autonomous energy planning and energy security division at a higher hierarchical level. Responsibilities and authorization should be not be scattered, but need to be solid and concentrated to one place/division/team/person.

vi. Form a group of experts that are knowledgeable and aware of energy related issues; train the policymakers and make them familiar and experts in energy security areas so they can cope with any plan needed.

vii. Build an effective response network with officers; it is imperative that "any effort to hand emergency plans down from the top without developing a base of local support" will deteriorate the effects of a disruption. Any such network should consist of "effective state and local officers for dealing with energy problems" and it is seen as "vital to the nation's security as a new missile system".

- Long-term:
  i. Control oil imports and diversify oil suppliers.
  ii. Develop surge capacity and stock piling.
  iii. Develop and implement a national security doctrine which is seen as necessary for the future. It may be criticized the fact that any forecast for the next 10 years is more than risky when “analysis/research that producers forecasts in the Middle East risks being proven wrong”, but the opposite view is that a “scenario-oriented thinking is vital to the deliberation of the national security strategy” (Shoval, 2019).
  iv. A comprehensive policy on different energy sectors is required to be developed and deal/overcome any regulatory, financial and technical obstacles.
  v. An urgent program to develop a state-of-the-art energy industry which can eventually allow more use of electricity to replace of oil in most of the sectors of the country’s economy.
  vi. An urgent program to build new and upgrade existing refineries by means of known technologies and reliable costing.
  vii. Nuclear power can be also considered seriously as it is a clean type of energy; any environmental and safety concerns mainly due to geological changes of the soil and seismic area will be studied and taken into consideration.
  viii. Lead and establish an industry related to the Internet of Things (IoT) which could eventually deal with the fourth industrial revolution that is expected to seriously affect also the energy sector.

- Contingency plan:
  i. Curtail and rationalize demand for energy.
  ii. Take more conservation measures.
  iii. Use of surge capacity and emergency fuel.
  iv. Increase the supply of energy by producing more energy and/or (if the first is not possible) switch from one energy source to another.

v. Analyze the impact and risk on domestic planning (and for Cyprus coordinate with EU).
vi. Promote a wider understanding about the problems and disruption and create a national consensus for an appropriate response by the state to address the risks.

A core energy problem would be "to develop an energy policy that faces the future rather than the past" (Ebinger, 1982: 235).

There are also several obstacles against an effective and successful energy policy such as Ebinger (1982, xxvi), (Ebinger, 1982: 78-81):

- Different economic interests of energy-producing vs. energy-consuming nation states.
- Conflicts between production and environmental stakeholders.
- Policy differences within the same sector of the energy industry.
- Policy differences between proponents of each different fuel type.
- Conflicts over the allocation of scare resources.
- Other economic interests.
- Competing institutional and industrial interests.
- Policymakers and government officials involved in energy policy planning don't have the same clear support of their supervisors and authorities, while they are not free to operate in secrecy. They have to work out energy problems in the context of international obligations and other regulations that were not before. They are not probably sure what constitutes a threat to oil security.
- During and after any energy crisis, it is difficult for the state to take measure and actions in order to ensure equal distribution of oil supplies and governments may easily fail for several reasons such as:
  - It is not easy at all to predict how consumers in different parts of the country would behave during a shortfall.
  - It is not easy to dampen/regulate energy price increases, especially in a free market.
  - It does not have almost any influence on the events that caused the energy crisis in the international energy market.

It is almost expected that "whatever causes the disruption, normally there would be several month's delay before a disruption of energy supplies caused a substantial imbalance in the economy". It is seen that "no government policy is effective in a panic situation" as most of the times "diplomatic approaches to political crises are complicated" by assumptions of "how a solution to a problem will affect access to energy supplies". For this reason, the initial action should be "to reduce both domestic and international panic". Finally, disruptions are "open-ended" and "it is not always clear when they begin, and it is certainly not clear when they end". A contingency plan is "a hedge against disaster, a form of national insurance on the energy future" and it needs to be "flexible and open-ended".

An oil/energy crisis would also have financial consequences (Ebinger, 1982: 143-174):

- Developed countries: Affecting their growth and economy, while energy crisis adds "a new dimension to the global antagonism between the superpowers".
- Developing countries: Economic stagnation, unemployment in OECD countries, risk for instability. It would be partially alleviated if these countries rely less on the recycling process[34] . Both developed and developing countries would be "competing for the same scarce resource" (Ebinger, 1982:238).
- Third world: Any rapid rise in the imported "petroleum-derived fertilizers" would cause "chronic food shortages" as fertilizer imports would be cut back.

Energy is a subject of "heated political debate or instrument of political conflict" (Ebinger, 1982: 155). Design and implementation of a contiguous energy policy looks so demanding as it is rarely draws "the attention it deserves by the foreign policy community" (Ebinger, 1982: 242).

More specifically, for the two cases of this thesis policy recommendations are described as follows:

[34] Recycling process: Oil shortage drives prices up and thus profits for the oil-producers increase massively and unspent petrodollars are deposited in international banks. The financial system can recycle the funds by providing lends to countries that prefer to keep high growth rates instead of deflating their economies is response to "oil-induced balance-of-payments deficits" (Ebinger, 1982:143).

ii. Israel

The regional geopolitical complexity of the East Mediterranean has already influenced progress in exporting gas to the region, and once regional conflicts are resolved, growth will increase significantly. According to Moty Kuperberg, Director of Oil and Gas in a shipping company, there is "an urgent need to promote the development of gas for safety reasons" (Sobczak, 2015). According to Henderson (2013: 17-18), Israel's export choices should be selected if they are profitable and can convince investors of their commercial viability, and any progress in resolving the political differences in the region should be seen as an additional positive element.

On the basis of a study on the development of energy policy and the capabilities of the State of Israel, there are approaches of a different time horizon such as (Darbouche et. Al., 2012: 25-30):

- <u>Short Term</u>: Natural gas liquefaction in cooperation with either Cyprus or Jordan (in the economic zone of Aqaba). It is a credible choice given the current state of Israel's relations with its neighbors. The Israeli security service's position is negative as regards the location of export facilities outside Israeli territory due to the fact that it prefers its infrastructure to be "firmly placed under Israeli sovereignty" and raises objections to the option of joint liquefaction with Cyprus due to security / military ground (Darbouche et. al., 2012: 26-27).

- <u>Long Term</u>: Referring to the National Security of the state of Israel, it is seen as critical that a national security doctrine will be prepared and be in place. According to Golov et al (2010: i), the state of Israel has been facing "threats and challenges related to its security" since its creation, however "has never had a national security doctrine". Such a document is "intented to protect and promote" the nation state's national security. In 2019, Prime Minister Benjamin Netanyahu presented to the Israel Cabinet a strategic "national security concept" for the year 2030 (Shaval, 2019), which is again not exactly a doctrine. A National Security doctrine is a document that "encompasses military, diplomatic, economic and social policies" (Golov et al, 2010: i).

Referring to the energy, construction of a FLNG terminal either in the Tamar field or Elliott, provided that a 250 km pipeline will be constructed to transport natural gas off the coast. With this option, Israel could face any "political and regulatory complications in the case of onshore, but also address the" fear of losing national sovereignty and economic benefit by third party". Israeli energy policy should assess each energy project based mainly on its techno-economic feasibility, while taking into account the geopolitical factors that are also important in the decision-making and policy-making process in the state. Israel's new energy policy should offer investors a "stable and transparent regulatory environment" that is capable of attracting and retaining investment in the country, thereby enhancing its geopolitical position in the region (Economist, 2015).

The above options and recommendations are also suggested by Shaffer (2011) as proposed options for Israel's export of natural gas hinder some restrictions as follows:

- Israeli energy policy in relation to exports appears with discontinuity and imperfections.
- In this period, it seems to be an oversupply in international markets and prices are not appropriate for export orientation.
- The European Union is considering possibilities to reduce project cost while the it is not properly interconnected with that of Israel.
- The energy market in Europe is not friendly to intermediate server countries.

iii. **Cyprus**

- <u>Short/medium-term</u>: Strengthen efforts to allow sustainability of its own military power. The momentum is important to be considered and then build strategic alliances on the military sector. Maximize the positive effects of being an EU membership in order to further support the securitization of country’s sovereignty. Involve international players in energy sector in the recent oil and gas developments in order to leverage their lobby and network to protect country’s position. Train country’s human capital on energy diplomacy and involve more politicians and administration in understanding difficulties related to the nature of energy.

- Long-term: Policy makers should follow a systemic approach which will contribute to more and correct methodological choices within energy security assessments. Perceptions of policy makers can be created based on critical questions: What to protect? From which risks? And by which means? Answers to these questions can lead to the way policy makers understand energy systems that will bring information and facts to them (Ebinger, 1982: 149).

6.4 Limitations

It is important to mention few areas that could be found and characterized as weak. Small difficulties that could exist can be as following (Petrakis, 1999):

- Biased research and how free-value is the researcher when interpreters facts (morality, ideas, beliefs, etc.).
- Research and study refers to the examined cases herein.
- Social facts are not observable most of times.
- Social sciences belong to the School of Interpretation and thus it is not easy to produce unconditional trues.

Furthermore, is it a fact and necessity that in most cases the indicators "need to be calculated based on available data". Analysis of Energy Security in future energy scenarios took its data from the variables calculated from Integrated Assessment Models like in other cases [see MOSES, GEA, etc] (Cherp and Jewell, 2013: 158-170).

When indicators are measured, there should be a process that meaningful answers can be derived based on those numbers that indicators are presented with. The aim is to "process, interpret and communicate the indicators in such a way that they convey accurate and relevant information".

REFERENCES

Articles-Papers-Texts

Abdel-Kader, N. 2011. Potential Conflict between Lebanon and Israel over Oil and Gas Resources – A Lebanese Perspective. *Lebanese National Defense*. 78. Available at https://www.lebarmy.gov.lb/en/content/potential-conflict-between-lebanon-and-israel-over-oil-and-gas-resources-—-lebanese [Accessed on 21 Feb 2017].

Ajiboye, E., Jawando, O. and Adisa, B. 2009. Poverty, oil exploration and Niger Delta crisis: The response of the youth. *African Journal of Political Science and International Relations*. 3 (5): 224-232.

Akpan, W. 2005. Putting Oil First? Some Ethnographic Aspects of Petroleum-related Land Use Controversies in Nigeria. *African Sociological Review*. 9 (2): 134-152.

[Antonakis], Αντωνάκης, N. 2015. *Η Περιπέτεια της Πολιτκής Οικονομίας*, Οσελότος: Αθήνα.

Arkkelin, D. 2014. Using SPSS to Understand Research and Data Analysis. *Psychology Curricular Materials*. Book 1. Available at http://scholar.valpo.edu/psych_oer/1 [Accessed on 1 May 2019].

Asia Pacific Energy Research Center. 2007. Quest for Energy Security in the 21st Century Resources and Constraints. Japan, Asia Pacific Energy Center, *Institute of Energy Economics*. Available at: http://aperc.ieej.or.jp/file/2010/9/26/APERC_2007_A_Quest_for_Energy_Security.pdf Accessed on 24 March 2018].

[Athanasopoulos], Αθανασόπουλος, Α. 2014. Η σιωπή των ΗΠΑ για την Κύπρο και το ISIS, *Η Καθημερινή*.Available at http://www.kathimerini.gr/789600/article/epikairothta/politikh/h-siwph-twn-hpa-gia-thn-kypro-kai-to-isis [Accessed on 27 Dec 2014].

[Athanasopoulos], Αθανασόπουλος, Α. 2014. Η «ομίχλη» στην Κυπριακή ΑΟΖ και οι Αμερικανοί, *Η Καθημερινή.* Available at http://www.tovima.gr/politics/article/?aid=646910 [Accessed on 27 Dec 2014].

Australian Government. *National Energy Security Assessment 2009*. Commonwealth of Australia. Available at http://www.industry.gov.au/energy/Documents/Energy-Security/nesa/National-Energy-Security-Assessment-2011.pdf [Accessed on 5 Dec 2015].

Badea, Anca Costescu & Rocco S., Claudio M. & Tarantola, Stefano & Bolado, Ricardo, 2011. Composite indicators for security of energy supply using ordered weighted averaging. Reliability Engineering and System Safety. *Elsevier*, vol. 96 (6): 651-662.

Bir, C., Sherman, M. 2002. Formula for Stability: Turkey plus Israel. *Middle East Quarterly*. 9. (4): 23-32.

Bilgin, M. 2010. New Energy Order and FAST principles. Premises of equitable and sustainable energy security in the twenty-first century. *International Journal of Global Energy Issues*. 33 (1-2): 4-22.

Bilgin, M. 2012. "Energy Transitions and International Security in the Twenty-first Century". In S.F. Krishna-Hensel (ed). *New Security Frontiers: Critical Energy and the Resource Challenge*. Surrey: Ashgate Publishing Ltd.

Bilgin, M. 2015. "Turkey's Energy Strategy: Synchronizing Geopolitics and Foreign Policy with Energy Security". *Insight Turkey*. 17 (2): 67-81.

Blake, E., (2014), World Energy Outlook, *9th Annual GPCA Forum*, Dubai: IHS.

Boote, D., N. Beile, P. 2005. "Scholars Before Researchers: On the Centrality of the Dissertation Literature Review in Research Preparation". *Educational Researcher* 34 (6): 3-15. Doi: 10.3102/0012189X34006003.

BP. 2015. *BP Energy Outlook 2035*. Available at: bp.com/energyoutlook. [Accessed on 25 Dec 2015].

Britannica, 2018. *Gross Domestic Product*. Available at: https://www.britannica.com/topic/gross-domestic-product. [Accessed on 9 March 2018].

Britannica, 2018. *Reynolds Number*. Available at: https://www.britannica.com/science/Reynolds-number. [Accessed on 7 March 2018].

Brown, M.A., Sovacool, B.K., Wang, Y. and D'Agostino, A.L. 2011. Energy Security Dimensions and Trends in Industrialized Countries. *Working Paper Series*. Working Paper 63. Atlanta: Georgia Institute of Technology, School of Public Policy. Available at: https://cepl.gatech.edu/publications/pub/1443 [Accessed on 10 March 2018].

Burns, J. 1982. Andropov Is Chosen To Head Soviet Party; Vows He Will Continue; Brezhnev Policies. *The NYT*. Available at http://www.nytimes.com/1982/11/13/world/andropov-is-chosen-to-head-soviet-party-vows-he-will-continue-brezhnev-policies.html?pagewanted=all. [Accessed on 24 Feb 2018].

Bull, Hedley. 1977. *The anarchical society: a study of order in world politics*. New York: Columbia University Press.

Buzan. B. 1983. *People, States and Fear: The National Security Problem in International Relations.* Brighton: Wheatsheaf Books Ltd.

Buzan, B. 1991. *People, States and Fear: An Agenda for International Security in the Post-Cold War Era.* Chapel Hill: University of North Carolina.

Buzan. B., Waever, O. and de Wilde, J. 1998. *Security: A New Framework for Analysis*. Boulder and London: Lynne Rienner Publishers.

Buzan. B. and Waever, O. 2003. *Regions and Powers: The Structure of International Security*. Cambridge: Cambridge University Press.

Carr, E.H. 1946. *The Twenty Years' Crisis, 1919–1939: An Introduction to the Study of International Relations*, 2nd edn. New York: St. Martin's Press.

Celestine, A. 2003. Hydrocarbon Exploitation, Environmental Degradation and Poverty: The Niger Delta Experience. *Diffuse Pollution Conference*, 2B Policy/Socio Economics.

Chadwick, D. 2009. *Building Conceptual Understandings in the Social Sciences: Approaches to Building Conceptual Understandings*. Ministry of Education. New Zealand.

Chandra, S., Bhonsle, R., (2015) National Security: Concept, Measurement and Management. *Strategic Analysis*. 39 (4): 337-359.

Chester, L. 2009. "Conceptualizing energy security and making explicit its polysemic nature", *Energy Policy*, 38 (2): 887–895, doi:10.1016/j.enpol.2009.10.039.

Cherp, A., Adenikinju, A., Goldthau, A., Hernandez, F., Hughes, L., Jewell, J., Vakulenko, S. 2012. Energy and security. In T. B. Johansson, N. Nakicenovic, & A. Patwardan (Eds.), *Global Energy Assessment: Toward a Sustainable Future*. pp. 325-383. Cambridge University Press.

Cherp A, Jewell J. 2013. Energy security assessment framework and three case studies. In: Trombetta M, Dyer H, editors. *International handbook of energy security*. Cheltenham Glos, UK: Edward Elgar Publishing, p. 146–73.

CIA Factbook, 2017. *Israel* Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/is.html [Accessed on 7 March 2017].

Ciuta, F. 2010. Conceptual notes on energy security: Total or banal security? *Security Dialogue*. 41: 123-144.

Clark, J. 1990. *The Political Economy of World Energy: A Twentieth Century Perspective*. London: University of North Carolina Press.

Cohen, M. 2009. The Powell Doctrine's Enduring Relevance. *World Politics Review*. Available at https://www.worldpoliticsreview.com/articles/4100/the-powell-doctrines-enduring-relevance. [Accessed on 24 Feb 2018].

Conant, M., and Gold, F. 1977. *The Geopolitics of Energy*. Washington DC: US Government.

Consiglio, M. Witchalls, B., Armstrong, K., Stampa, M., Madec, A., Abdullah, M., Depraz, S., Fraser, E. 2006. A Guide to Social Impact Assessment in the Oil and Gas Industry. *SPE International Health, Safety & Environment Conference*, 2-4 April, Abu Dhabi, UAE.

Cook, E. 1971. The flow of energy in an industrial society. *Scientific American*. 225 (3), 134-148.

Correlje A., Van der Linde, C. 2005. Energy supply security and geopolitics: A European perspective. *Energy Policy*. 34: 532-543.

Cowen, D., and Smith, N. 2009. After geopolitics? From the geopolitical social to geo-economics. *Antipode*. 41 (1): 22-48.

Coziete, M. (2008). Raymond Aron and the Morality of Realism. *Working Paper*. Coral Bell School of Asia Pacific Affairs. Australian National University. Available at: http://ir.bellschool.anu.edu.au/experts-publications/publications/1659/raymond-aron-and-morality-realism . [Accessed on 22 Nov 2018].

Crane, G. 1998. *Thucydides and the Ancient Simplicity: The Limits of Political Realism*, Berkeley: University of California Press.

Crawley, R. (2012). *Thucydides-The History of the Peloponnesian War*. Duke Classics.

Cochrane, C. N. (1929). *Thucydides and the Science of History*. Oxford University Press.

Connor, W. R., (1984). *Thucydides*. Princeton University Press. Princeton. NJ.

Darbouche, H., El-Katiri, L., Fattouh, B. 2012. East Mediterranean Gas: what kind of a game-changer? *Oxford Institute for Energy Studies*. NG71.

David, S. 1992. *Choosing Sides: Alignment and Realignment in the Third World*, Baltimore: John Hopkins University Press.

Davis, C. 2004. International Institutions and Issue Linkage: Building Support for Agricultural Trade Liberalization. *American Political Science Review*. 98:1.

Davutoglu, A. 2010. *Το Στρατηγικό Βάθος*, Αθήνα: Ποιότητα.

De Bie, S. 1996. Sensitivity Analysis: The approach to integrate ecological and socio-economic impact assessments. *SPE Health, Safety and Environment in Oil and Gas Exploration and Production Conference*, 9-12 June, New Orleans, Louisiana.

Delanoe, I. 2013. “Cyprus, A Russian Foothold in the Changing Eastern Mediterranean”. *Middle East Review of International Affairs*. 15 (2): 84-94.

Delek, 2016a. *Ruling on Petition to High Court*. Available at http://ir.delek-group.com/phoenix.zhtml?c=160695&p=irol-newsArticle&ID=2129952 [Accessed on 4 March 2017].

Delek, 2016b. *Closing of a Transaction for the Sale of all of the Rights in the I/16 Tanin and I/17 Karish Leases to Energean*. Available at http://ir.delek-group.com/phoenix.zhtml?c=160695&p=irol-newsArticle&ID=2232844 [Accessed on 4 March 2017].

Delec, 2015. *Natural Gas Outline Government Approval*. Available at http://ir.delek-group.com/phoenix.zhtml?c=160695&p=irol-newsArticle&ID=2079875 [Accessed on 4 March 2017].

Deutsch, K.G. 1966. “Recent Trends in Research Methods in Political Science”. In James C. Cladesworth (ed). *A Design for Political Science: Scope, Objectives and Methods.* Monography. 10. Philadelphia: American Academy of Political and Social Science.

Deutsch, K.G., and Singer, J.D. 1964. Multipolar Power Systems and International Stability. *World Politics* 16 (4): 390–406.

Dewey, J. 1933. *How we think.* Lexington, MA: Heath.

Dickinson, G. L. 1916. *The European Anarchy*. New York: Macmillan.

Dixon, T., H. 2006. *The Upside of the Down: Catastrophe, Creativity, and the Renewal of Civilization*. Washington: The Island Press.

Doyle, M. 1997. *Ways of War and Peace: Realism, Liberalism and Socialism*. New York: W.W. Norton.

Downing, D. 2009. *Dictionary of mathematics terms*. 3rd ed. NY: Barron’s.

Dows, E. 2010. Who’s Afraid of China’s Oil Companies. In Carlos Pascual and Jonathan Elkind (eds), *Energy Security: Economics, Politics, Strategy, and Implications*. Brookings Institution Press. 73-102.

Ebinger, C. 1982. *The Critical Link: Energy and National Security in 1980s*. Washington: CSIS.

EC, 2013. “European Economy. Member State’s Energy Dependance: An Indicator-Based Assessment”. *Occassional Paper*. 145, April 2013.

EC, 2014. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'On the review of the list of critical raw materials for the EU and the implementation of the Raw Materials Initiative'*, COM(2014) 297 final, Brussels, 26.5.2014.

Economist. 2015 (June 27). Israel and energy exports: Much hot air about gas. Available at http://www.economist.com/news/business/21656192-government-plans-boost-energy-investment-generate-scepticism-much-hot-air-about-gas [Accessed on 9 July 2015].

EEA. 2013. *Environmental indicator report 2013 — natural resources and human well‑being in a green economy*. European Environment Agency. Copenhagen, Denmark.

EEA. 2015. *European environment — state and outlook 2015: Assessment of global megatrends*. Copenhagen: European Environment Agency.

EIA. 2011. Critical Petroleum related Events. http://www.eia.gov/pub/oil_gas/petroleum/analysis_publications/chronology/petrochrohotgraph.htm. [Accessed on 28 Nov 2015].

EIA. 2013. Eastern Mediterranean Region. *US Energy Information Administration*, Full report.

EIA. 2015. *Country Analysis: Israel*. Available at http://www.eia.gov/beta/international/analysis.cfm?iso=ISR [Accessed on 26 Jan 2017].

EIA. 2018. *Energy Outlook 2017*. Available at: https://www.eia.gov/outlooks/ieo/pdf/0484(2017).pdf [Accessed on 9 March 2018].

Effoduh, Jake Okechukwu. 2016. The Fourth Industrial Revolution by Klaus Schwab. *The Transnational Human Rights*. Review3. Available at: http://digitalcommons.osgoode.yorku.ca/thr/vol3/iss1/4. [Accessed on 10 March 2018].

El-Badri, A. S., 2015. *Security of energy supplies inextricably linked with demand*. Available at http://www.opec.org/opec_web/en/3013.htm. [Accessed on 31 October 2015].

Elkind, Jonathan. 2010. "Energy Security: Call for a Broader Agenda." In Carlos Pascual and Jonathan Elkind (eds), *Energy Security: Economics, Politics, Strategies, and Implications* (Washington, DC: Brookings Institution Press), pp. 119–148.

EU Commission. 2014. "Antitrust: Commission opens proceedings against Gazprom". *Press Release*. Brussels, 4 September.

EU Commission. 2015. "Antitrust: Commission sends Statement of Objections to Gazprom for alleged abuse of dominance on Central and Eastern European gas supply markets". *Press Release*. Brussels, 4 September.

EY, Ernst and Young. 2015. *Megatrends 2015: Making sense of a world in motion*. Available at: http://www.ey.com/GL/en/Issues/Business-environment/ey-megatrends-that-will-shape-our-future-4-global-marketplace [Accessed on 25 Nov 2015].

Evans, G. 1975. E. H. Carr and International Relations. *British Journal of International Studies*. Vol. 1, No. 2: 77-97.

Fairgrieve, J. 1915. *Geography and World Power*. London: University of London Press.

Falls, C. 1948. Geography and War Strategy. *The Geopolitical Journal*. 112 (1/3). 4-15.

Farah, P. 2015. Sustainable energy investments and national security: arbitration and negotiation issues. *Journal of World Energy Law & Business*. 8. 6: 497-500.

Farell, A. Zerriffi, H. Dowlas Abadi, H. 2004. Energy Infrastructure and Security. *Annual Review of Environment and Resources*. 29: 421-469.

Fermann, G. 2014. What is Strategic about Energy? De-simplifying Energy Security. In Espen Moe and Paul Midford (eds), *The Political Economy of Renewable Energy and Energy Security*. Hampshire: Palgrave Macmillan.

[Filis], Φίλης, C. 2014. Η σύμπραξη με Ισραήλ και Αίγυπτο, ευκαιρίες και κίνδυνοι, *e-kathimerini*, November 9, 2014. Available at: http://www.kathimerini.gr/791301/article/epikairothta/politikh/h-sympra3h-me-israhl-kai-aigypto-eykairies-kai-kindynoi [Accessed on 23 Dec. 2014].

Florini, A. 2010. Global Governance and Energy. In Pascual, C., Elkind, J. (ed), Energy Security: Economics, Politics, *Strategies and Implications*, Washington: Brookings, pp. 149-171.

Fischhendler, I. Nathan, D. 2014. "In the name of energy security: the struggle over the exportation of Israeli natural gas". *Energy Policy*. 70: 152-162.

Foster, J.B. 2006. The new geopolitics of empire. *Monthly Review*. 57 (8): 1-18.

Freedom house, 2017. Available at https://freedomhouse.org/report/freedom-world/freedom-world-2017 [Accessed on 17 October 2017].

Freeman, E., R., Miles, S. 2006. *Stakeholders: Theory and Practice*. Oxford: Oxford University Press.

Freeman, E., R., Harrison, J., S., Wicks, A., C. 2007. *Managing for Stakeholders: Survival, Reputation and Success*. London: Yale University Press.

Freyberg-Inan, A. 2004. *What moves Man: The Realist Theory of International Relations and its Judgement of Human Nature*. NY: State University of New York.

Frieden, J., Lake, D. 2003. *International Political Economy: Perspectives on Global Power and Wealth*. 4th ed., London: Routledge.

Gaddis, J. (2011). Quick study: George Kennan’s cold war policy of containment. A conversation with Kennan's biographer. *Economist*. Available at: https://www.economist.com/blogs/prospero/2011/11/quick-study-george-kennan’s-cold-war-policy-containment. [Accessed on 22 Nov 2018].

GHHF, Greek Shipping Hall of Fame. 2017. *John Latsis*. Available at https://greekshippinghalloffame.org/myblog/?inductee=jlatsis-en. Accessed on 3 June 2018.

[Giallouridis, Laggidis], Γιαλουρίδης, Χ, Λαγγίδης, Α. 2010. *Μετακεμαλισμός*. Αθήνα: Σιδέρης.

Giamouridis, A. 2012. The Offshore Discovery in the Republic of Cyprus: Monetization Prospects and Challenges. *The Oxford Institute for Energy Studies*. NG65.

[Giannakopoulos], Γιαννακόπουλος, Α. 2014. “Ανακατατάξεις στην Ανατολική Μεσόγειο: Ο ρόλος της Τουρκίας και οι Στρατηγικές Προτεραιότητες για Ελλάδα και Κύπρο”. *ΕΛΙΑΜΕΠ*. Κείμενο Εργασίας No. 58, Δεκ 2014.

Giddings, B., Hopwood, B., O’Brien, G. 2002. Environment, Economy and Society: Fitting them together into Sustainable Development. *Sustainable Development*. 10. 187-196.

Gilpin, R. 2001. *Global Political Economy: Understanding the International Economic Order*, NJ: Princeton University Press.

GLI. 2019. Available at https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/cyprus [Accessed on 15 June 2019].

Glick, C. 2015. Israel's Populist Energy Crisis. *Townhall*. Available at http://townhall.com/columnists/carolineglick/2015/07/03/israels-populist-energy-crisis-n2021085 [Accessed on10 Feb 2017].

Global Energy Institute. 2019. *Energy Security Index*. Available at https://www.globalenergyinstitute.org/sites/default/themes/bricktheme/pdfs/energyrisk_intl_2018.pdf. [Accessed on 10 Jan 2019].

Godfrey, E. 2017. The Atlantic Politics & Policy Daily: The Trump Doctrine. *The Atlantic*. Available at https://www.theatlantic.com/politics/archive/2017/12/the-atlantic-politics-policy-daily-the-trump-doctrine/548723/. [Accessed on 24 Feb 2018].

[Gofas, A., Tzifakis, N.] Α. Γκόφας και Ν. Τζιφάκης, "Η Άνοδος της Κίνας και το Μέλλον των Σινο-Αμερικανικών Σχέσεων: Μια Θεωρητική Χαρτογράφηση", στο Σ. Πετρόπουλος και Α. Χουλιάρας, (επιμ.) *Η Κίνα και 'οι Άλλοι'*: Οι Σχέσεις της Κίνας με την Ευρώπη και τον Κόσμο, Αθήνα: Εκδόσεις Παπαζήση, 2013, σελ. 44-78.

Goldberg, J. 2016. The Obama Doctrine. *The Atlantic*. Available at https://www.theatlantic.com/magazine/archive/2016/04/the-obama-doctrine/471525/. [Accessed on 24 Feb 2018].

Gray, C.S., and Sloan, G.R. (eds). 1999. *Geopolitics, Geography and Strategy*. London: Frank Cass.

Grieco, J.M. 1988a. Anarchy and the limits of cooperation: a realist critique of the newest liberal institutionalism. *International Organization*. 42: 85-507.

Grieco, J.M. 1988b. Realist Theory and the Problem of International Cooperation: Analysis with an Amended Prisoner's Dilemma Model. *The Journal of Politics*. 50 (3): 600-624.

Grieco, J. M. 1990. *Cooperation Among Nations: Europe, America and Non-Tariff Barriers to Trade*. Ithaca: Cornell University Press.

Gilpin, R. (2001). *Global Political Economy: Understanding the International Economic Order*. Princeton University Press. Princeton. NJ.

Golov et all. 2010. A National Security Doctrine for Israel. Policy Paper. Argov Seminar. *Lauder School of Government, IDC Herzliya*. Available at http://portal.idc.ac.il/en/argov/documents/a_national_security_doctrine_for_israel_-_avner_golov_ran_michaelis_ory_vishkin_rony_kakon.pdf [Accessed on 6th of July 2019].

Guilford, M. Hall, C. O' Connor, P., Cleveland, C. 2011. A New Long-Term Assessment of Energy Return on Investment (EROI) for U.S. Oil and Gas Discovery and Production, *Sustainability*, 3, 1866-1887.

Guzzini, S. 2003. *Realism in International Relations and International Political Economy*. London: Routledge.

Hak, T., Janouskova, S., Moldan, B. 2016. "Sustainable Development Goals: A need for relevant indicators". *Ecological Indicators*. 60: 565-573.

Hamilton, J. 2011. "Historical Oil Shocks". In R. Parker and R. Whaples (eds). *Handbook of Major Events in Economic History*. London: Routledge.

Hartley, P. and Medlock, K. 2008. Climate Policy and Energy Security: Two Sides of the same coin?. *James A. Baker III Institute for Public Policy*. Houston: Rice University. Available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.357.4254&rep=rep1&type=pdf. [Accessed on 17 Nov 2017].

Haverland, M. 2010. Conceiving and Designing Political Science Research: Perspectives from Europe. *European Political Science*. 9: 488-494. Doi:10.1057/eps.2010.61.

Henderson, S. 2013, Natural Gas Export Options for Israel and Cyprus. *Mediterranean Paper Series 2013*. Washington: GMF.

Hensel, N. 2012. “An Economic and National Security Perspective on Critical Resources in the Energy Sector”. In S.F. Krishna-Hensel (ed). *New Security Frontiers: Critical Energy and the Resource Challenge*. Surrey: Ashgate Publishing Ltd.

Herz, J. 1950. Idealist Internationalism and the Security Dilemma. *World Politics*. 2 (2), 157–80.

Heugens, P., van de Bosch, F., van Riel, C. 2002. Stakeholder Integration: Building Mutually Enforcing Relationships. *Business and Society*. 41 (1): 36-60.

Himonas, S. 2015. *Interview during a Qualitative Research*. Athens.

Hobbes, T. 1968. *Leviathan*. Harmondsworth: Penguin. Originally published 1651.

Holmes, K. 2015, *What is National Security?* Available at: http://index.heritage.org/military/2015/important-essays-analysis/national-security/. [Accessed on 12 Oct 2017].

Hoyos, C. 2017. The new Seven Sisters: oil and gas giants dwarf western rivals. *Financial Times*. Available at https://www.ft.com/content/471ae1b8-d001-11db-94cb-000b5df10621. [Accessed on 22 Feb 2018].

Hubbert, M.K., 1956. Nuclear energy and the fossil fuels: Shell Development Company, *Energy Bulletin*, Publication No. 95: 40

Hughes, L., 2012. “A generic framework for the description and analysis of energy security in an energy system”. *Energy Policy* 42: 221-231.

IEA. 2009. *World Energy Outlook 2009*. Available at: https://www.iea.org/publications/freepublications/publication/weo-2009.html. [Accessed on 17 Nov 2017].

IEA. 2017. *Energy Security*. Available at http://www.iea.org/topics/energysecurity/. [Accessed on 26 Feb 2018].

IEA. 2019. Oil 2019. *Analysis and Forecasts to 2024*. Available at https://www.iea.org/oil2019/ [Accessed on 14 June 2019].

IEA, 2019. Statistics. Available at https://www.iea.org/statistics/?country=CYPRUS&year=2016&category=Energy%20supply&indicator=TPESbySource&mode=table&dataTable=BALANCES [Accessed on15 June2019].

Ifestos,P.,2015.Available at: http://ifestos.edu.gr/%CE%B4%CE%B9%CE%B5%CE%B8%CE%BD%CE%AE%CF%82-%CF%80%CE%BF%CE%BB%CE%B9%CF%84%CE%B9%CE%BA%CE%AE-%CE%BF%CE%B9%CE%BA%CE%BF%CE%BD%CE%BF%CE%BC%CE%AF%CE%B1/ [Accessed on 31 Oct 2015].

IMF, 2017. Cyprus: Staff Report for the 2014. Available at http://www.imf.org/en/Publications/CR/Issues/2016/12/31/Cyprus-Staff-Report-for-the-2014-Article-IV-Consultation-42406, [Accessed on 16 Oct 2017].

IMF, 2017. Israel: Staff Report for the 2017. Available at http://www.imf.org/en/Publications/CR/Issues/2017/03/28/Israel-2017-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-44769 [Accessed on 16 Oct 2017].

Inbar, E. 2014. The New Strategic Equation in the Eastern Mediterranean. *The Begin-Sadat Center for Strategic Studies, Mideast Security and Policy Studies*, 109: 11.

Institute for 21st Century Energy, 2017. Available at https://www.globalenergyinstitute.org/international-energy-security-risk-index [Accessed on 15 October 2017].

Institute for Peace Research and Security Policy (IPRSP). 2011. Challenges in Cybersecurity: Risks, Strategies, and Confidence-Building. *Conference Report* [Accessed on 15 March 2019].

Jansen, J.C., 2009. Energy services security: concepts and metrics. *ECN*. Available at:http://www.ecn.nl/docs/library/report/2009/e09080.pdf. [Accessed on 30March 2018].

Jansen, J.C. and Seebregts, Ad., J. 2010. Long Term Energy Services security: What is it and how can it be measured and valued?. *Energy Policy*. 38: 1654-1664.

Jensen, T., Sandstorm, J. 2011. Stakeholder Theory and Globalization: The Challenges of Power and Responsibility. *Organization Studies*, 32 (4): 473-488.

Jervis, R. 1985. From Balance to Concert: A Study of International Security Cooperation. *World Politics*. 38 (1): 58–79.

Jewell, J. (2011). The IEA model of short-term energy security (MOSES). *IEA Working Paper*. Available at: https://www.iea.org/media/freepublications/oneoff/moses_paper.pdf. Accessed on 27 March 2018.

Johansson, T.B., Patwardhan, A.P., Nakicenovic, N. and Gomez-Echeverri, L. eds., 2012. *Global energy assessment: toward a sustainable future*. Cambridge University Press.

Johansson, T. B. 2013. A broadened typology on energy and security. *Energy*. 53. 199–205.

Jorgensen, K.E. 2018. *International Relations Theory. A New Introduction*. Macmillan Education UK.

Kaplan, M.A. 1957. *System and Process in International Politics*. New York: John Wiley.

Kaveshnikov, N. 2015. The issue of energy security in relations between Russia and the European Union. *European Security*, 19 (4): 585-605. DOI: 10.1080/09662839.2010.531707.

Kellstedt, P. M., Whitten, G. D., 2013. *The fundamentals of political science research*, 2nd ed., Cambridge: Cambridge University Press.

Kendell, J. M. 1997. Measures of oil import dependence. *In International Energy Markets, Competition and Policy*, 18th USAEE/IAEE North American Conference, 1997. International Association for Energy Economics.

Kendell, J. M. 1998. Measures of oil import dependence, US, *EIA*, Washington, D.C. Available at: http:// www.eia.doe.gov/oiaf/archive/issues98/oimport.html. [Accessed on 22 Nov 2018].

Keohane, R.O. 1983. Theory of World Politics: Structural Realism and Beyond. In A.P. Finifter (ed.) *Political Science: State of the Discipline*. Washington, DC: American Political Science Association, pp. 503–40.

Kern, F. and Markard, J. 2016. Analyzing Energy Transitions: Combining Insights from Transition Studies and International Political Economy. in Thijs van de Graaf et al. (eds.), Palgrave *Handbook of the International Political Economy of Energy*. London: Palgrave Macmillan, 291–318.

Khodr, H., Hasbani, K. 2013. The dynamics of energy policy in Lebanon when research, politics, and policy fail to intersect. *Energy Policy*, 60: 629-642.

Kilian, L. 2008. The Economic Effects of Energy Price Shocks. *Journal of Economic Literature*. 46 (4): 871-909.

Kissinger, H., 1982. Foreword. In Charles Ebinger (ed). *The Critical Link: Energy and National Security in 1980s*. Washington: CSIS.

Klare, M. 1999. The Clinton Doctrine. *The Nation*. Available at https://www.thenation.com/article/clinton-doctrine/. [Accessed on 22 Feb 2018].

Klare, M. 2016. No Blood for Oil? Hydrocarbon Abundance and International Security. in Thijs van de Graaf et al. (eds.), *Palgrave Handbook of the International Political Economy of Energy*. London: Palgrave Macmillan, p. 47–71.

Knott, S. 2017. George W. H. Bush: Foreign Affairs. *Miller Center*. Accessed on 23s Feb 2017. Available at https://millercenter.org/president/bush/foreign-affairs

Kortweg, R. 2013. "Natural Gas in the Eastern Mediterranean - Casus Beli or Chance for Regional Cooperation?". The Hague Center for Strategic Studies, Netherlands. *INSS - The Institute for National Security Studies*. Published on Jan 14, 2013.

Koutsoukis, N., Roukanas, S. and Sklias, P. 2016. "Decision Making, Risk Management and Global Political Economy: Some prominent interactions". In N. Koutsoukis, S. Roukanas and P. Sklias (eds). *Risk, decision making and global political economy: synergies for interpreting the interaction of economics and politics*. Saarbrucken: Lap Lambert Academic Publishing.

Koutsoukis, N., Roukanas, S. and Sklias, P. 2006. "EU's International Political and Economic Position: Towards a framework for capturing global integration dynamics". In N. Koutsoukis, S. Roukanas and P. Sklias (eds). *Risk, decision making and global political economy: synergies for interpreting the interaction of economics and politics*. Saarbrucken: Lap Lambert Academic Publishing.

Knopf, J. W. 2006. Doing a Literature Review. *Political Science & Politics* 39 (01): 127-132. Doi: 10.1017/S1049096506060264.

Krasner, S. 1978. *Defending the National Interest: Raw Materials Investments and US Foreign Policy*. Princeton, NJ: Princeton University Press.

Krishna-Hensel, S. F. 2012. "Introduction". In S.F. Krishna-Hensel (ed). *New Security Frontiers: Critical Energy and the Resource Challenge*. Surrey: Ashgate Publishing Ltd.

Kryut, B., Vuuren, D.P., Vries, H.J.M., Groeneberg, H. 2009. Indicators for energy security. *Energy Policy* 37: 2166-2181.

Kuhn, R.L. 2005. *The Man Who Changed China: The Life and Legacy of Jiang Zemin*. NY: Crown Publishers.

Kumar, D. 2019. Cyprus expects first natgas output from Aphrodite field by 2025. N.Y.: Reuters. Available at https://www.reuters.com/article/us-cyprus-energy/cyprus-expects-first-natgas-output-from-aphrodite-field-by-2025-idUSKCN1S91Z6 [Accessed on 14 June 2019].

Kut, S. 2002. Το Περίγραμμα της Τουρκικής εξωτερικής πολιτικής στη μεταψυχροπολεμική εποχή. in T., Veremis, T., Dokos (eds). *Η Σύγχρονη Τουρκία: Πολιτικό Σύστημα, Οικονομία και Εξωτερική Πολιτική*. Αθήνα: Παπαζήση.

Kuzemco, C. 2014. Ideas, power and change: explaining EU-Russia energy relations, Journal of *European Public Policy*. 21 (1): 58-75. DOI: 10.1080/13501763.2013.835062.

Lakatos, I., 1970. Falsification and the Methodology of Scientific Research Programmes, in Imre Lakatos and Alan Musgrave, eds., *Criticism and the Growth of Knowledge*, Cambridge: Cambridge University Press, p. 115.

Labs, Eric. 1992. Do Weak States Bandwagon? *Security Studies*. Vol 1, No 3, Spring.

Lam, Willy Wo-Lap. 2006. *Chinese Politics in the Hu Jintao Era: New Leaders, New Challenges*. M.E. Sharpe.

Landau, S., Everitt, B. 2004. *A Handbook of Statistical Analyses using SPSS*. Washington: Chapman & Hall/CRC Press LLC

Leigh, M. 2014. Energy - A Geopolitical Game Changer. *The International Spectator*. 49: 1-10.

Lemaitre, J. ed., 2001. *Handbook of Materials Behavior Models, Three-Volume Set: Nonlinear Models and Properties*. Elsevier. Available at: http://www.engineeringintro.com/mechanics-of-structures/stress-strain-curve-explanation/. [Accessed on 31 March 2018].

Leung, G., Cherp, A., Jewell, J., Wei, Y. 2014. Securitization of energy supply chains in China. *Applied Energy*, 123: 316-326.

Lincoln, Y.S., Guba, E.G. 1985. *Naturalistic Inquiry*. Newbury Park: Sage Publications.

Linklater, A. and Suganami, H. 2006. *The English School of International Relations; A Contemporary Assessment.* Cambridge: Cambridge University Press.

Litfin, K. 2014. “Gaia Theory, Ecovillages, and IR Taking Material Limits Seriously: An Interview with Karen Litfin”. In M. Mayer, M. Carpes, R. Knoblich (eds). *The Global Politics of Science and Technology, Vol1*. Heidelberg: Springer.

Lobell, S. 2002. War Is Politics: Offensive Realism, Domestic Politics, and Security Strategies. *Security Studies*. 12 (2): 165–95.

Macleod, C. W. 1977. Thucydides' Plataean Debate. *GRBS*. 18: 233.

MacKinder, H. 1919. *Democratic Ideals and Reality*, New York: Henry Holt.

Manson, A., Johansson, B., Nilsson, L.J. 2014. Assessing energy security: an overview of commonly used methodologies. *Energy*. 73: 1–14.

Mariano, J.,, La Rovere, E. 2014. *Environmental Impacts in the Oil Industry in Petroleum Engineering Downstream, in Encyclopedia of Life Support Systems (EOLSS)*, Developed under the Auspices of the UNESCO, Eolss Publishers, Paris, France, [http://www.eolss.net].

[Marketos], Μαρκέτος, Θ. 2013. Η «μεγάλη σκακιέρα» της Ανατολικής Μεσογείου-Η γεωστρατηγική θεώρηση των ενεργειακών διαγκωνισμών και ο ρόλος των διεθνών και περιφερειακών δρώντων, in *Foreign Affairs The Hellenic Edition*, 162: 88-90.

[Mazis], Μάζης, Ι. 2012. Ο γεωστρατηγικός άξονας Ισραήλ-Κύπρου-Ελλάδος: Οι τουρκικοί σχεδιασμοί για την περιοχή, in *Foreign Affairs The Hellenic Edition*.

[Mazis], Μάζης, Ι. 2015. *Interview during the Qualitative Research*.

Meadowcroft, J. 2009. What about the politics? Sustainable development, transition management, and long-term energy transitions. *Policy Sciences*. 42 (4). 323-340.

Mearsheimer, J. 2006. *Structural Realism*. University of Chicago. Available at: http://mearsheimer.uchicago.edu/pdfs/StructuralRealism.pdf. [Accessed on 25 Feb 2018].

Mearsheimer, J.J. 2001. *The Tragedy of Great Power Politics*. New York: W.W. Norton.

Merriam, S. 2009. *Qualitative Research: A Guide to Design and Implementation*, San Francisco: John Wiley & Sons.

Mikkelsen, A., Camp II, R., and Anderson, R. 2008. Managerial Implications. in A. Mikkelsen, O. Langhelle (eds). *Arctic Oil and Gas: Sustainability at Risk?*. Oxon: Routledge.

Miller, L. 1999. The Idea and the Reality of Collective Security. *Global Governance*. 5. 303-333.

Ministry of Energy, Commerce and Industry in Cyprus, 2019. *A National Energy and Climate Governance System*. Available at http://www.mcit.gov.cy/mcit/EnergySe.nsf/All/0FC95262EE5B4273C22582FE003158A8?OpenDocument [Accessed on 5 June 2019].

Molchanov, M. 2012. "Energy Security and the Revival of Geopolitics: The Russian Case". In S.F. Krishna-Hensel (ed). *New Security Frontiers: Critical Energy and the Resource Challenge*. Surrey: Ashgate Publishing Ltd.

Mor, A. 2013. New Geopolitics in the Eastern Mediterranean-National and EU Interests. *INSS*, Published on Jan 14, 2013.

Morgenthau, H.J. 1946. *Scientific Man versus Power Politics*. Chicago: University of Chicago Press.

Morgenthau, H.J. 1973. *Politics Among Nations*. NY: Knopf.

Morgenthau, H. J., & Thompson, K. W. 1993. *Politics among nations: The struggle for power and peace*. New York: McGraw-Hill.

Morgenthau, H. 2005. "A Realist theory of International Relations" in *Politics among Nations: The Struggle for Power and Peace*. New York: McGraw-Hill Education.

Morse, E. L. and Jaffe, A.M. et al. 2001. Strategic Energy Policy Challenges for the 21st Century. *Report of an Independent Task Force*. Available at file:///D:/PhD/General%20Bibliography/Morse,%20E.%20L.%20and%20Jaffe,%20A.M.%20et%20al.%202001.%20Strategic%20Energy%20Policy%20Challenges%20for%20the%2021st%20Century.pdf. [Accessed 25 Feb 2018].

Nagel, E. 1961. *The Structure of Science*. New York: Harcout, Brace and World.

[Nedos, Vasilis], Νέδος, Β. 2018. *Επιτάχυνση των συνομιλιών για ΑΟΖ με Αίγυπτο*. Available at https://www.kathimerini.gr/989244/article/epikairothta/politikh/epitaxynsh-twn-synomiliwn-gia-aoz-me-aigypto. Accessed on 15 January 2015.

NECP. Republic of Cyprus. 2019. *Draft Integrated National Energy and Climate Plan for the period 2021-2030*. Available at https://ec.europa.eu/energy/sites/ener/files/documents/cyprus_draftnecp.pdf [Accessed on 22nd June 2019].

Niebuhr, R. 1932. *Moral Man and Immoral Society: A Study in Ethics and Politics*. New York: Scribners.

Nivola, P.S., and Carter, E., E.R., 2010. Making Sense of "Energy Independence". In Carlos Pascual and Jonathan Elkind (eds), *Energy Security: Economics, Politics, Strategies, and* Implications. Washington, DC: Brookings Institution Press, 105-118.

Noble Energy Operations. 2014. *Eastern Mediterranean*. Available at: http://www.nobleenergyinc.com/Exploration/Recent-Discoveries-130.html, [Accessed 26 December 2014].

Nourzhanov, K. 2006. Caspian Oil: geopolitical dreams and real issues. *Australian Journal of International Affairs*. 60: 59-66.

Nurieva, G. 2017. Natural Gas Factor in Israel-Turkey- Russia "Energy Triangle. *Turkish Journal of Middle Eastern Studies*. 4 (1): 102-129.

Nye, J. 1997. *Understanding International Conflicts: An Introduction to Theory and History*. 6th ed., NY: Pearson.

Nye, J., 2004. *Soft Power: the means to success in world politics*. New York: Public Affairs.

Nye, J., 2011. *The Future of Power*. New York: Public Affairs.

OECD. 2018. OECD Watch. Available at: https://www.oecdwatch.org/oecd-guidelines/oecd [Accessed on 9 March 2018].

Office of Technology Assessment. 1985. *Strategic Materials: Technologies to Reduce U.S. Import Vulnerability.* Washington, DC: U.S. Congress, OTA-ITE-248, May.

Oil & Gas Editors, 2014. Noble Energy to sell Tamar gas in Jordan. *Oil & Gas Journal*. Feb 20. Available at http://www.ogj.com/articles/2014/02/noble-energy-to-sell-tamar-gas-in-jordan.html. [Accessed 23 Feb 2017].

Oil & Gas 360, 2016. Why This Oil Crisis Is Different To 2008. Available at http://oilprice.com/Energy/Energy-General/Why-This-Oil-Crisis-Is-Different-To-2008.html. [Accessed on 17 Oct 2017].

Ogurlu, E. 2012. Rising Tensions in the Eastern Mediterranean: Implications for Turkish Foreign Policy. *Istituto Affari Internazionali*. IAI WORKING PAPERS 12 | 04. 1-15.

OPEC, 2018. *Member Countries*. Available at http://www.opec.org/opec_web/en/about_us/25.htm. [Accessed on 22 Feb 2018].

Oxford Economics, 2015. *Future trends and market opportunities in the world's largest 750 cities*. Available at http://www.oxfordeconomics.com/cities/report. [Accessed on 22 Dec 2015].

Papp, D. 2012. "Conclusions: Securing New Security Frontiers". In S.F. Krishna-Hensel (ed). *New Security Frontiers: Critical Energy and the Resource Challenge*. Surrey: Ashgate Publishing Ltd.

Pascual, C., Elkind, J. 2010. "Introduction". In Pascual, C., Elkind, J. (ed), *Energy Security: Economics, Politics, Strategies and Implications,* Washington: Brookings.

Perovic, J., and Orttung, R. 2007. Russia's Energy Policy: Should Europe Worry? *Russian Analytical Digest*. 18/07. Available at https://www.researchgate.net/publication/265184252_Russia%27s_Energy_Policy_Should_Europe_Worry_2_By. [Accessed on 24 Feb 2018].

Perry, R.H., Green, W.D. 2007. *Perry's Chemical Engineering Handbook*, 8th ed. NY: McGraw Hill.

[Petrakis], Πετράκης, Μ. 1999. *Έρευνα Μάρκετινγκ: Θεωρία και Πράξη*. Αθήνα: Σταμούλης.

Poast, P. 2011. *Issue Linkage and International Cooperation: An Empirical Evaluation*. PhD Thesis. University of Michigan.

PWC. 2016. *China's new silk route: The long and winding road*. PricewaterhouseCoopers. February 2016. Available at: https://www.pwc.com/gx/en/growth-markets-center/assets/pdf/china-new-silk-route.pdf. [Accessed on 11 March 2018].

Quester, G. 1977. *Offense and Defense in the International System*. New York: John Wiley.

Radovanovic, M. Filipovic, S., Pavlovic, D. 2017. Energy security measurement—a sustainable approach. Renew. Sustain. *Energy Review*. 68. 1020–1032.

Ray, M. 2019. *8 Deadliest Wars of the 21st Century*. Available at https://www.britannica.com/list/8-deadliest-wars-of-the-21st-century [Accessed on 15 June 2019].

Riahi, K., F. Dentener, D. Gielen, A. Grubler, J. Jewell, Z. Klimont, V. Krey, D. McCollum, S. Pachauri, S. Rao, B. van Ruijven, D. P. van Vuuren and C. Wilson. 2012. "Chapter 17 - Energy Pathways for Sustainable Development". In *Global Energy Assessment - Toward a Sustainable Future*, Cambridge University Press, Cambridge, UK and New York, NY, USA and the International Institution.

Rifkin, J. 2002. *The hydrogen economy: the creation of the worldwide energy web and the redistribution of power on earth*. New York: J.P. Tarcher/Putnam.

Rose, G. 1998. Neoclassical Realism and Theories of Foreign Policy. *World Politics*, 51(1), 144-172.

Rosenberg, J. 1994. *Empire of Civil Society _ A critique of the Realist Theory of International Relations*. London: Verso.

Roukanas, S. 2007. *Economic theory and development under the prism of international political economy*. Athens: National Archive of PhD Theses. Available at http://www.didaktorika.gr/eadd/handle/10442/23581. [Accessed on 12 Sept 2015].

Roussos, S. 2017. “Greece and Regional Dynamics in the Eastern Mediterranean”. In Spyridon N. Litsas and Aristotle Tziampiris (eds): *Foreign Policy Under Austerity*. Palgrave Macmillan: London.

Roussos S. 2009. “On the Road to Damascus: Towards a New European Policy on the Middle East?” In: Arvanitopoulos C., Botsiou K.E. (eds): *The Constantinos Karamanlis Institute for Democracy Yearbook 2009*. The Constantinos Karamanlis Institute for Democracy Yearbook Series. Springer, Berlin, Heidelberg.

Rutledge, I. 2006. *Addicted to Oil: America’s Relentless Drive for Energy Security*. New York: I. B. Tauris.

Sachs, N., Boersma, T. 2015. The Energy Island: Israel Deals with its Natural Gas Discoveries. *Foreign Policy at Brookings*. Policy Paper, 35. February 2015.

Sailus, I. 2017. The Brezhnev Doctrine's Influence on Eastern Europe. *Study*. Available at https://study.com/academy/lesson/the-brezhnev-doctrines-influence-on-eastern-europe.html. [Accessed on 24 Feb 2018].

Sampson, Anthony, 1975. *The Seven Sisters*. New York: The Viking Press.

Savage, G. T., Nix, T. W., Whitehead, C. J., and Blair, J. D. 1991. Strategies for Assessing and Managing Organizational Stakeholders. *Academy of Management Executive*, 5 (2): 61–75.

Schnitzer, E. 1955. German geopolitics revived. *The Journal of Politics*. 17 (3): 407-23.

Schwarzenberg, G. 1941. *Power Politics: An Introduction to the Study of International Relations and Postwar Plannin*g. London: Jonathan Cope.

Semple, E,C. 1911. *Influences of Geographic Environment on the basis of Ratzel's System of Anthropo-geography*. New York: Henry Holt.

Seth, S., 2013. Quantum physics. In Jed Buchwald and Robert Fox (eds). *The Oxford Handbook of the History of Physics*. Oxford University Press.

Simes, D. 1984. And now Konstantin U. Chernenko. *The Christian Science Monitor*. Available at https://www.csmonitor.com/1984/0215/021515.html. [Accessed on 24 Feb 2018].

Shaffer, B. 2009. *Energy Politics*. Philadelphia: University of Pennsylvania Press.

Shaffer, B. 2011. Israel-New natural gas producer in the Mediterranean. *Energy Policy*. 39: 5379-5387.

Shaffer, B. 2013. Natural gas supply stability and foreign policy. *Energy Policy*. 56: 114-125.

Schmidt, B. 1998. *The Political Discourse of Anarchy*. NY: Stake University of NY Press.

Schweller, R.L. 2007. Neorealism's status-quo bias: What security dilemma? *Security Studies*, 5 (3): 90-121,

Sheira, O. 2014. Turkey-Egypt Relations: Incentives to Normalize. *GPOT Policy Brief*. 40.

Shively, W., P. 1990. *The Craft of Political Research*, 3d ed. Englewood Cliffs, N.J.: Prentice-Hall.

Shoval, S. 2019. Israel's National Security Strategy for 2030. *Israel Defense*. Available on https://www.israeldefense.co.il/en/node/35633 [Accessed on 5th July 2019].

Siddig, K., Grethe, H. 2014. No more gas from Egypt? Modeling offshore discoveries and import uncertainty of natural gas in Israel. *Applied Energy*. 136: 312-324.

[Sklias], Σκλιάς, Π. 2011. *Πολιτική Οικονομία των Διεθνών Σχέσεων: Η Διάσκεψη της Κοπεγχάγης για την κλιματική αλλαγή*. Αθήνα: Παπαζήση.

Sklias, P., Roukanas, S., Flouros, F. 2016. Energy Security: Is it a Strategic Cause of Conflicts or Peace among States/Actors in the Global Nexus? *18th EBES Conference Proceedings*. Athens.

Smelser, N., 1973. The Methodology of Comparative Analysis, in Donald P. Warwick and Samuel Osherson, eds., *Comparative Research Method*, Englewood Cliffs, N.J.: Prentice Hall, pp. 45-57.

Smith, A. 1776. *An Inquiry into the Nature and Causes of the Wealth of Nations*. 1 (2 ed.). London: W. Strahan; T. Cadell.

Smith, K. 2010. Managing the Challenge of Russian Energy Policies. *CSIS*. Available at https://www.csis.org/analysis/managing-challenge-russian-energy-policies. [Accessed on 24 Feb 2018].

Snow, N. 2015. More pragmatism urged for developing Eastern Mediterranean Gas. Oil & Gas Journal. Feb 20. Available at http://www.ogj.com/articles/2015/02/more-pragmatism-urged-for-developing-eastern-mediterranean-gas.html, [Accessed 20 Jan 2017].

Snyder, G. 1997. *Alliance Politics*. Ithaca: Cornell University Press.

Sobczak, B. 2015. Politics deflate Israel's global gas hopes. *Environment & Energy*. Available at http://www.eenews.net/stories/1060021202 [Accessed 20 Jan 2017].

SOER. 2015. Available at: at: www.eea.europa.eu/soer. [Accessed on 22 Jan 2016].

Sovacool, B.K. 2011. *The Routledge Handbook of Energy Security*. London: Routledge.

Sovacool, B. 2012. “A Grounded Comparison of Energy Security in Denmark, Brazil, Bangladesh and China”. In S.F. Krishna-Hensel (ed). *New Security Frontiers: Critical Energy and the Resource Challenge*. Surrey: Ashgate Publishing Ltd.

Sovacool, B. and Brown, M. 2015. Deconstructing Facts and frames in energy research: Maxims for evaluating contentious problems. *Energy Policy*. 86: 33-42.

Spegele, R. 1996. *Political realism in international theory*. Cambridge: Cambridge University Press.

Spreng, D. 2014. Transdisciplinary energy research-Reflecting the context. *Energy Research & Social Science*. 1. 65-73.

Spykman, N.J., and Rollins, A.A. 1939. Geographic objectives in foreign policy. *The American Political Science Review*. 33 (3): 391-410.

[Stathakopoulos], Σταθακόπουλος, Β. 1997. *Μέθοδοι Έρευνας Αγοράς*. Αθήνα: Σταμούλης.

Steinbruner, J., Stern, P. and Husbands, J. 2013. *Climate and Social Stress: Implications for Security Analysis*. Washington DC: The National Academic Press. Available at: http://nap.edu/14682. [Accessed on 10 March 2018].

Steven F. S. 2009. Analysis of Variance: The Fundamental Concepts, Journal of Manual & Manipulative Therapy, 17:2, 27E-38E, Available at DOI: 10.1179/jmt.2009.17.2.27E.

Steven, David, O'Brien, Emily and Jones, Bruce. 2014. *The New Politics of Strategic Resources Energy and Food Security Challenges in the 21st Century*. Brookings Institution Press.

Steven, David, O'Brien, Emily and Jones, Bruce. 2014. *Fueling a New Order? The New Geopolitical and Security Consequences of Energy. The Brookings Institute. Paper. April 15, 2014.*

Stirling, A., 2010. The diversification dimension of energy security. In B. Sovacool (ed), *The Routledge handbook of energy security* (pp. 164-193). Routledge.

Strange, S. 1994. *States and markets*. London: Pinter.

Strauss, Sarah, Stephanie Rupp, Thomas, Love. 2013. *Cultures of Energy in the Twenty-First Century in Cultures of Energy: Power, Practices, Technologies*. Left Coast Press. Walnut Creek. p.10

Strausz-Hupe, R. 1972*. Geopolitics: The struggle for Space and Power.* Reprint edition. New York: Henry Holt.

Tahmassebi, H. 1986. The impact of the Iran-Iraq war on the world oil market. *Energy*. 11 (4-5): 409-411.

Thiagarajah, J. 2016. Securing the State. *Daily News*. Available at http://www.dailynews.lk/2016/10/20/features/96497?page=17 [Accessed on 7 March 2019].

Thucydides. 1996*. The Landmark Thucydides: A Comprehensive Guide to The Peloponnesian War,* ed. R.B. Strasser. New York: Touchstone.

Treverton, G., Jones, S. 2005. Measuring National Power. National Security Research Division. *RAND Conference Proceedings.* Available at https://apps.dtic.mil/dtic/tr/fulltext/u2/a434665.pdf [Accessed on 7 March 2019].

Tunsjo, O. 2013. Security and Profit in China's Energy Policy: Hedging Against Risk. Columbia University Press.

Tzemach Committee. 2012. The recommendations of the Inter-Ministerial Committee to examine the government's policy regarding natural gas. *Ministry of Energy and Water Resources*, State of Israel.

UN, 2012. World urbanization prospects — The 2011 revision. *ESA/P/WP/224*. United Nations Department of Economic and Social Affairs, New York, USA.

US Department of State. 2009. Gorbachev and New Thinking in Soviet Foreign Policy, 1987-88. *Archive*. Available at https://2001-2009.state.gov/r/pa/ho/time/rd/108225.htm. [Accessed on 24 Feb 2018].

US Department of Energy. 2019. The National Environmental Policy Act of 1969, as amended. (Available at https://www.energy.gov/nepa/downloads/national-environmental-policy-act-1969) [Accessed on 24 March 2019].

Van de Graaf, T. et al. 2016. States, Markets and Institutions: Integrating International Political Economy and Global Energy Politics. in Thijs van de Graaf et al. (eds.), *Palgrave Handbook of the International Political Economy of Energy*. London: Palgrave Macmillan, 3–44.

Van Evera, S. 1999. *Causes of War: Vol. I: The Structure of Power and the Roots of Conflict*. Ithaca: Cornell University Press.

Van Evera, S. 1997. *Guide to Methods for Students of Political Science*. New York: Cornell University Press.

Vasquez, J. A. 2004. *The Power of Power Politics: From Classical Realism to Neotraditionalism*. Cambridge: Cambridge University Press.

Viotti, P. R., Kauppi, M. V. 2012. *International Relations Theory*. 5th ed., Glenview: Pearson.

Viser, J.P., Larderel, J. 1997. *Environmental Management in Oil and Gas Exploration and Production: An Overview of Issues and Management Approaches*. Joint E&P Forum/UNEP Technical Publication.

Wagner, J., Dowse, S., Jones, M. 2014. Managing Socio-Economic Risk in Frontier Areas: A Case Study from the Falkland Islands. *SPE International Conference on Health, Safety, and Environment*, 17-19 March, Long Beach, California, USA.

Walker, W. E. 2000. Policy analysis: a systematic approach to supporting policymaking in the public sector. *J. Multi-Crit. Decis. Anal.*, 9: 11–27. doi:10.1002/1099-1360(200001/05)9:1/3<11::AID-MCDA264>3.0.CO;2-3.

Walt, S. 2017. Realism and Security. *Oxford Research Encyclopedia, International Studies*. Oxford University Press. Available at:

http://internationalstudies.oxfordre.com/view/10.1093/acrefore/9780190846626.001.0001/acrefore-9780190846626-e-286. [Accessed on 25 Feb 2018].

Waltz, K. 1979. *Theory of International Politics*. Reading, MA: Addison-Wesley.

Waltz, K. 1991. Realist Thought and Neorealist Thought in Robert Rothstein (ed), *The Evolution of Theory in International Relations. Columbia,* SC: University of South Carolina, 21-38.

Walt, S.M. 1991. The Renaissance of Security Studies. *International Studies Quarterly*. 35 (2), 211–39.

Waltz, K. 1997. Evaluating Theories. *American Political Science Review*. 91: 913-917.

Waltz, K. 2009. *Realism and International Politics.* NY: Routledge.

Waltz, K. 2011. *Θεωρία Διεθνούς Πολιτικής*. Μτφ Κ. Κολλιόπουλος, Αθήνα: Ποιότητα.

Watson, A. 1992. *The Evolution of International Society: A Comparative Historical Analysis*. London: Routledge.

Weber, C. 2010. *International Relations Theory: A critical introduction*. 3rd ed. Oxon: Routledge.

Weigert, H. W. 1941. *German Geopolitics*. New York: Oxford University Press.

Williams, J. 2008. Oil Price History and Analysis. *WTRG Economics*. Available at https://www.wtrg.com/prices.htm. Accessed on 14 June 2018.

Wilson R. 2015. Mixed Generation Sensitivity Analysis: An Optimal Scenario Study, *Journal of Multi-Criteria Decision Analysis*., 22: 51–74. Available at doi: 10.1002/mcda.1531 [Accessed on 10 January 2017].

Wizner, C. 2012. Conceptualizing energy security. *Energy Policy* 46*:* 36-48.

World Bank. World Bank Country and Lending Groups. *World Bank Data*. Available at https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. [Accessed on 25 Feb 2018].

World Bank. 2014. The World Bank Annual Report. Available at: https://openknowledge.worldbank.org/handle/10986/20093 [Accessed on 10 November 2015].

World Energy Council. 2017. Available at https://trilemma.worldenergy.org/ [Accessed on 10 January 2016].

World Resource Institute, 2015. Available at: http://www.wri.org/ [Accessed on 10 January 2016].

Xidonas, P. Mavrotas, G., Psarras, J. 2009. A multicriteria methodology for equity selection using financial analysis. *Computers & Operations Research* 36:3187 -3203.

Yadid, J. 2015. Israel's Iron Lady Unfiltered: 17 Golda Meir Quotes on Her 117th Birthday. Haaretz. Available at https://www.haaretz.com/.premium-17-golda-meir-quotes-on-her-117th-birthday-1.5356683. [Accessed on 12 January 2016].

[Yfantopoulos, Nikolaidou], Υφαντόπουλος, Γ., Νικολαΐδου, Κ. 2008. *Η Στατιστική στην Κοινωνική Έρευνα*. Αθήνα: Πολιτεία.

Yergin, D., 1988. Energy security in the 1990s. *Foreign Affairs*. 67 (1): 110–132.

Yergin, D. 1991. *The Prize: The Epic Quest for Oil, Money, and Power*. Simon and Schuster, New York.

Yergin, D. 2010. Forward. In Pascual, C., Elkind, J. (ed), *Energy Security: Economics, Politics, Strategies and Implications*, Washington: Brookings.

Yin, R., 1994. *Case Study Research: Design and Methods*, 2d ed. Thousand Oaks, Calif.: Sage.

Zagorin, P., 2006. *Thucydides-An introduction for the common reader*, Princeton University Press.

Zelli, Fariborz, and van de Graaf, Thijs. 2016. "Actors, Institutions and Frames in Global Energy Politics", in Thijs van de Graaf et al. (eds.), *Palgrave Handbook of the International Political Economy of Energy*. London: Palgrave Macmillan, 47–71.

Zielonka, J. 2011. The EU as an International Actor: Unique or Ordinary? *European Foreign Affairs Review*.16: 281-301.

Internet references and sources used

https://blog.nationalgeographic.org/2014/02/17/geography-in-the-news-the-growth-of-megacities/ [Accessed 9 March 2018].

https://www.britannica.com/topic/gross-domestic-product [Accessed on 9 March 2018].

http://www.businessdictionary.com/definition/tonne-of-oil-equivalent-TOE.html) [Accessed on 9 March 2018].

https://www.cia.gov/library/publications/the-world-factbook/geos/cy.html [Accessed on 16 Oct 2017].

https://www.cnsopb.ns.ca/about-us/glossary [Accessed on 16 Oct 2017].

Word Bank (https://datamarket.com/data/list/?q=all+provider%3Aworld-bank+tag%3Agdp) Accessed on 16 Oct 2017].

https://www.dictionary.com/browse/extrapolation [Accessed on 21November 2018].

https://ec.europa.eu/eurostat/statistics.../Glossary:Gross_inland_energy_consumption [Accessed on 21November 2018].

https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Gross_inland_energy_consumption [Accessed on 9 March 2018].

https://www.economist.com/node/21553017/print [Accessed on 9 March 2018].

ww2.energy.ca.gov. California Energy Commission. 2016. Available at http://ww2.energy.ca.gov/lng/glossary.html [Accessed on 20 January 2016].

https://energyegypt.net/egypt-to-restart-gas-exports-to-jordan-next-january/ [Accessed on 15 June 2019].

http://energyprofessionalsymposium.com/?p=34462 [Accessed on 24 Sept 2017].

https://www.energyworldmag.com/worlds-biggest-oil-gas-companies/ [Accessed on 24 Feb 2018].

http://www.engineeringintro.com/mechanics-of-structures/stress-strain-curve-explanation/. [Accessed on 31 March 2018].

http://english.pravda.ru/world/europe/02-12-2014/129188-russia_eu_south_stream-0/ [Accessed on 13 June 2015].

https://en.wikibooks.org/wiki/Social_Research_Methods/Theory [Accessed on 9 March 2018].

https://en.wikipedia.org/wiki/Israel [Accessed on 3 March 2019].

https://en.wikipedia.org/wiki/Cyprus [Accessed on 3 March 2019].

https://home.uni-leipzig.de/energy/energy-fundamentals/03.htm [Accessed on 9 March 2019].

https://www.iea.org/topics/energysecurity/ [Accessed on 9 March 2018].

https://www.ranksays.com/info/petropedia.com) [Accessed on 9 March 2018].

http://www.pipesinternational.com, 2010 [Accessed on 28 October 2016].

http://publicdiplomacy.wikia.com/wiki/Hard_Power [Accessed on 22 Nov 2018].

www.statista.com. Available at http://www.statista.com/statistics/268750/global-gross-domestic-product-gdp/ [Accessed on 22 January 2016].

https://www.statisticshowto.datasciencecentral.com/dependent-variable-definition/ [Accessed on 9 March 2018].

http://www.tap-ag.com/the-pipeline/route-map [Accessed on 28 October 2016].

https://trilemma.worldenergy.org/#!/pathway-calculator, [Accessed on 31 January 2017].

https://trilemma.worldenergy.org/ [Accessed on 9 March 2018].

http://www.un.org/sustainabledevelopment/blog/2015/07/un-projects-world-population-to-reach-8-5-billion-by-2030-driven-by-growth-in-developing-countries/ [Accessed on 9 March 2018].

http://www.un.org/en/development/desa/news/population/2015-report.html [Accessed on 9 March 2018].

https://warwick.ac.uk/fac/arts/classics/students/modules/introhist/usefuldocuments/thucydides_v.84-116.pdf . [Accessed on 23 November 2018].

https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab [Accessed 9 March 2018].

www.worldbank.org [Accessed on 9 March 2018].

https://www.worldenergy.org/data/[Accessed 9 March 2018].

http://www.worldometers.info/world-population/world-population-by-year/ [Accessed 9 March 2018].

APPENDICES

APPENDIX A

THE MELIAN DIALOGUE (416 B.C.) THUCYDIDES, V.84-116

84 The next summer Alcibiades sailed with twenty ships to Argos and seized the suspected persons still left of the Lacedaemonian faction to the number of three hundred, whom the Athenians forthwith lodged in the neighboring islands of their empire. The Athenians also made an expedition against the isle of Melos with thirty ships of their own, six Chian, and two Lesbian vessels, sixteen hundred heavy infantry, three hundred archers, and twenty mounted archers from Athens, and about fifteen hundred heavy infantry from the allies and the islanders. The Melians are a colony of Lacedaemon that would not submit to the Athenians like the other islanders, and at first remained neutral and took no part in the struggle, but afterwards upon the Athenians using violence and plundering their territory, assumed an attitude of open hostility. Cleomedes, son of Lycomedes, and Tisias, son of Tisimachus, the generals, encamping in their territory with the above armament, before doing any harm to their land, sent envoys to negotiate. These the Melians did not bring before the people, but bade them state the object of their mission to the magistrates and the few; upon which the Athenian envoys spoke as follows:

85 Athenians. Since the negotiations are not to go on before the people, in order that we may not be able to speak straight on without interruption, and deceive the ears of the multitude by seductive arguments which would pass without refutation (for we know that this is the meaning of our being brought before the few), what if you who sit there were to pursue a method more cautious still? Make no set speech yourselves, but take us up at whatever you do not like, and settle that before going any farther. And first tell us if this proposition of ours suits you.

86 The Melian commissioners answered: Melians. To the fairness of quietly instructing each other as you propose there is nothing to object; but your military preparations are too far advanced to agree with what you say, as we see you are come to be judges in your own cause, and that all we can reasonably expect from this negotiation is war, if we prove to have right on our side and refuse to submit, and in the contrary case, slavery.

87 Athenians. If you have met to reason about presentiments of the future, or for anything else than to consult for the safety of your state upon the facts that you see before you, we will give over; otherwise we will go on.

88 Melians. It is natural and excusable for men in our position to turn more ways than one both in thought and utterance. However, the question in this conference is, as you say, the safety of our country; and the discussion, if you please, can proceed in the way which you propose.

89 Athenians. For ourselves, we shall not trouble you with specious pretences--either of how we have a right to our empire because we overthrew the Mede, or are now attacking you because of wrong that you have done us--and make a long speech which would not be believed; and in return we hope that you, instead of thinking to influence us by saying that you did not join the Lacedaemonians, although their colonists, or that you have done us no wrong, will aim at what is feasible, holding in view the real sentiments of us both; since you know as well as we do that right, as the world goes, is only in question between equals in power, while the strong do what they can and the weak suffer what they must.

90 Melians. As we think, at any rate, it is expedient--we speak as we are obliged, since you enjoin us to let right alone and talk only of interest--that you should not destroy what is our common protection, the privilege of being allowed in danger to invoke what is fair and right, and even to profit by arguments not strictly valid if they can be got to pass current. And you are as much interested in this as any, as your fall would be a signal for the heaviest vengeance and an example for the world to meditate upon.

91 Athenians. The end of our empire, if end it should, does not frighten us: a rival empire like Lacedaemon, even if Lacedaemon was our real antagonist, is not so terrible to the vanquished as subjects who by themselves attack and overpower their rulers. This, however, is a risk that we are content to take. We will now proceed to show you that we are come here in the interest of our empire, and that we shall say what we are now going to say, for the preservation of your country; as we would fain exercise that empire over you without trouble, and see you preserved for the good of us both.

92Melians. And how, pray, could it turn out as good for us to serve as for you to rule?

93Athenians. Because you would have the advantage of submitting before suffering the worst, and we should gain by not destroying you.

94Melians. So that you would not consent to our being neutral, friends instead of enemies, but allies of neither side.

95Athenians. No; for your hostility cannot so much hurt us as your friendship will be an argument to our subjects of our weakness, and your enmity of our power.

96Melians. Is that your subjects' idea of equity, to put those who have nothing to do with you in the same category with peoples that are most of them your own colonists, and some conquered rebels?

97Athenians. As far as right goes they think one has as much of it as the other, and that if any maintain their independence it is because they are strong, and that if we do not molest them it is because we are afraid; so that besides extending our empire we should gain in security by your subjection; the fact that you are islanders and weaker than others rendering it all the more important that you should not succeed in baffling the masters of the sea.

98Melians. But do you consider that there is no security in the policy which we indicate? For here again if you debar us from talking about justice and invite us to obey your interest, we also must explain ours, and try to persuade you, if the two happen to coincide. How can you avoid making enemies of all existing neutrals who shall look at case from it that one day or another you will attack them? And what is this but to make greater the enemies that you have already, and to force others to become so who would otherwise have never thought of it?

99Athenians. Why, the fact is that continentals generally give us but little alarm; the liberty which they enjoy will long prevent their taking precautions against us; it is rather islanders like yourselves, outside our empire, and subjects smarting under the yoke, who would be the most likely to take a rash step and lead themselves and us into obvious danger.

100Melians. Well then, if you risk so much to retain your empire, and your subjects to get rid of it, it were surely great baseness and cowardice in us who are still free not to try everything that can be tried, before submitting to your yoke.

101Athenians. Not if you are well advised, the contest not being an equal one, with honour as the prize and shame as the penalty, but a question of self-preservation and of not resisting those who are far stronger than you are.

102Melians. But we know that the fortune of war is sometimes more impartial than the disproportion of numbers might lead one to suppose; to submit is to give ourselves over to despair, while action still preserves for us a hope that we may stand erect.

103Athenians. Hope, danger's comforter, may be indulged in by those who have abundant resources, if not without loss at all events without ruin; but its nature is to be extravagant, and those who go so far as to put their all upon the venture see it in its true colours only when they are ruined; but so long as the discovery would enable them to guard against it, it is never found wanting. Let not this be the case with you, who are weak and hang on a single turn of the scale; nor be like the vulgar, who, abandoning such security as human means may still afford, when visible hopes fail them in extremity, turn to invisible, to prophecies and oracles, and other such inventions that delude men with hopes to their destruction.

104Melians. You may be sure that we are as well aware as you of the difficulty of contending against your power and fortune, unless the terms be equal. But we trust that the gods may grant us fortune as good as yours, since we are just men fighting against unjust, and that what we want in power will be made up by the alliance of the Lacedaemonians, who are bound, if only for very shame, to come to the aid of their kindred. Our confidence, therefore, after all is not so utterly irrational.

105Athenians. When you speak of the favour of the gods, we may as fairly hope for that as yourselves; neither our pretensions nor our conduct being in any way contrary to what men believe of the gods, or practise among themselves. Of the gods we believe, and of men we know, that by a necessary law of their nature they rule wherever they can. And it is not as if we were the first to make this law, or to act upon it when made: we found it existing before us, and shall leave it to exist for ever after us; all we do is to make use of it, knowing that you and everybody else, having the same power as we have, would do the same as we do. Thus, as far as the gods are concerned, we have no fear and no reason to fear that we shall be at a disadvantage. But when we come to your notion about the Lacedaemonians, which leads you to believe that shame will make them help you, here we bless your simplicity but do not envy your folly. The Lacedaemonians, when their own interests or their country's laws are in question, are the worthiest men alive; of their conduct towards others much might be said, but no clearer idea of it could be given than by shortly saying that of all the men we know they are most conspicuous in considering what is agreeable honourable, and what is expedient just. Such a way of thinking does not promise much for the safety which you now unreasonably count upon.

106 Melians. But it is for this very reason that we now trust to their respect for expediency to prevent them from betraying the Melians, their colonists, and thereby losing the confidence of their friends in Hellas and helping their enemies.

107 Athenians. Then you do not adopt the view that expediency goes with security, while justice and honour cannot be followed without danger; and danger the Lacedaemonians generally court as little as possible.

108 Melians. But we believe that they would be more likely to face even danger for our sake, and with more confidence than for others, as our nearness to Peloponnese makes it easier for them to act, and our common blood ensures our fidelity.

109 Athenians. Yes, but what an intending ally trusts to is not the goodwill of those who ask his aid, but a decided superiority of power for action; and the Lacedaemonians look to this even more than others. At least, such is their distrust of their home resources that it is only with numerous allies that they attack a neighbour; now is it likely that while we are masters of the sea they will cross over to an island?

110 Melians. But they would have others to send. The Cretan Sea is a wide one, and it is more difficult for those who command it to intercept others, than for those who wish to elude them to

do so safely. And should the Lacedaemonians miscarry in this, they would fall upon your land, and upon those left of your allies whom Brasidas did not reach; and instead of places which are not yours, you will have to fight for your own country and your own confederacy.

111 Athenians. Some diversion of the kind you speak of you may one day experience, only to learn, as others have done, that the Athenians never once yet withdrew from a siege for fear of any. But we are struck by the fact that, after saying you would consult for the safety of your country, in all this discussion you have mentioned nothing which men might trust in and think to be saved by. Your strongest arguments depend upon hope and the future, and your actual resources are too scanty, as compared with those arrayed against you, for you to come out victorious. You will therefore show great blindness of judgment, unless, after allowing us to retire, you can find some counsel more prudent than this. You will surely not be caught by that idea of disgrace, which in dangers that are disgraceful, and at the same time too plain to be mistaken, proves so fatal to mankind; since in too many cases the very men that have their eyes perfectly open to what they are rushing into, let the thing called disgrace, by the mere influence of a seductive name, lead them on to a point at which they become so enslaved by the phrase as in fact to fall wilfully into hopeless disaster, and incur disgrace more disgraceful as the companion of error, than when it comes as the result of misfortune. This, if you are well advised, you will guard against; and you will not think it dishonourable to submit to the greatest city in Hellas, when it makes you the moderate offer of becoming its tributary ally, without ceasing to enjoy the country that belongs to you; nor when you have the choice given you between war and security, will you be so blinded as to choose the worse. And it is certain that those who do not yield to their equals, who keep terms with their superiors, and are moderate towards their inferiors, on the whole succeed best. Think over the matter, therefore, after our withdrawal, and reflect once and again that it is for your country that you are consulting, that you have not more than one, and that upon this one deliberation depends its prosperity or ruin.

112 The Athenians now withdrew from the conference; and the Melians, left to themselves, came to a decision corresponding with what they had maintained in the discussion, and answered: "Our resolution, Athenians, is the same as it was at first. We will not in a moment deprive of freedom a city that has been inhabited these seven hundred years; but we put our trust in the fortune by which

the gods have preserved it until now, and in the help of men, that is, of the Lacedaemonians; and so we will try and save ourselves. Meanwhile we invite you to allow us to be friends to you and foes to neither party, and to retire from our country after making such a treaty as shall seem fit to us both."

113Such was the answer of the Melians. The Athenians now departing from the conference said: "Well, you alone, as it seems to us, judging from these resolutions, regard what is future as more certain than what is before your eyes, and what is out of sight, in your eagerness, as already coming to pass; and as you have staked most on, and trusted most in, the Lacedaemonians, your fortune, and your hopes, so will you be most completely deceived."

114The Athenian envoys now returned to the army; and the Melians showing no signs of yielding, the generals at once betook themselves to hostilities, and drew a line of circumvallation round the Melians, dividing the work among the different states. Subsequently the Athenians returned with most of their army, leaving behind them a certain number of their own citizens and of the allies to keep guard by land and sea. The force thus left stayed on and besieged the place.

115About the same time the Argives invaded the territory of Phlius and lost eighty men cut off in an ambush by the Phliasians and Argive exiles. Meanwhile the Athenians at Pylos took so much plunder from the Lacedaemonians that the latter, although they still refrained from breaking off the treaty and going to war with Athens, yet proclaimed that any of their people that chose might plunder the Athenians. The Corinthians also commenced hostilities with the Athenians for private quarrels of their own; but the rest of the Peloponnesians stayed quiet. Meanwhile the Melians attacked by night and took the part of the Athenian lines over against the market, and killed some of the men, and brought in corn and all else that they could find useful to them, and so returned and kept quiet, while the Athenians took measures to keep better guard in future Summer was now over.

116The next winter the Lacedaemonians intended to invade the Argive territory, but arriving at the frontier found the sacrifices for crossing unfavorable, and went back again. This intention of theirs gave the Argives suspicions of certain of their fellow citizens, some of whom they arrested; others, however, escaped them. About the same time the Melians again took another part of the Athenian lines which were but feebly garrisoned. Reinforcements afterwards arriving from Athens in consequence, under the command of Philocrates, son of Demeas, the siege was now pressed vigorously; and some treachery taking place inside, the Melians surrendered at discretion to the Athenians, who put to death all the grown men whom they took, and sold the women and children for slaves, and subsequently sent out five hundred colonists and inhabited the place themselves.

Available at:
https://warwick.ac.uk/fac/arts/classics/students/modules/introhist/usefuldocuments/thucydides_v.84-116.pdf . [Accessed on 23 November 2018].

APPENDIX B

THE INTERNATIONAL INDEX OF ENERGY SECURITY RISK

#	**METRIC BY CLASSIFICATION**	**DEFINITION**	**IMPORTANCE**	**WEIGHT (%)**
	GLOBAL FUEL METRICS			**14**
1	Security of World Oil Reserves	Global proved oil reserves weighted by each country's relative Freedom Index and by an index of global diversity of oil reserves.	Indicates risk attached to the average barrel of global crude oil reserves. As a measure of reserves, it largely reflects longer-term concerns.	2
2	Security of World Oil Production	Global oil production weighted by each country's relative Freedom Index and by an index of global diversity of oil production.	Indicates the level of risk attached to the average barrel of crude oil production globally.	3
3	Security of World NG Reserves	Global proved natural gas reserves weighted by each country's relative Freedom Index and by an index of global diversity of gas reserves.	Indicates the risk attached to the average cubic foot of natural gas reserves globally. As a measure of reserves, it largely reflects longer-term concerns.	2

4	Security of World NG Production	Global NG production weighted by each country's relative Freedom Index and by an index of global diversity of oil production.	Indicates the level of risk attached to the average cubit foot of NG production globally.	3
5	Security of World Coal Reserves	Global proved coal reserves weighted by each country's relative Freedom Index and by an index of global diversity of gas reserves.	Indicates the risk attached to the average ton of coal reserves globally. As a measure of reserves, it largely reflects longer-term concerns.	2
6	Security of World Coal Production	Global Coal production weighted by each country's relative Freedom Index and by an index of global diversity of oil production.	Indicates the level of risk attached to the average ton of Coal production globally.	2
	FUEL IMPORT METRICS			**17**
7	Petroleum Import Exposure	Net petroleum imports as a percentage of total national petroleum supply, adjusted to reflect the reliability of international petroleum production (measured using the Freedom Index) and the diversity across producing countries	Indicates the degree to which changes in import levels expose the country to potentially unreliable and/or concentrated supplies of crude and refined petroleum	3
8	NG Import Exposure	Net petroleum imports as a percentage of total national NG supply, adjusted to reflect the reliability of international NG	Indicates the degree to which changes in import levels expose the	3

		production (measured using the Freedom Index) and the diversity across producing countries	country to potentially unreliable and/or concentrated supplies of NG.	
9	Coal Import Exposure	Net petroleum imports as a percentage of total national coal supply, adjusted to reflect the reliability of international coal production (measured using the Freedom Index) and the diversity across producing countries.	Indicates the degree to which changes in import levels expose the country to potentially unreliable and/or concentrated supplies of coal.	2
10	Total Energy Import Exposure	Net energy imports as a share of total primary energy consumption.	Indicates the degree to the country is reliant on foreign sources for it energy needs.	4
11	Fossil Fuel Expenditures per GDP	Net fossil fuel imports costs as a share of GDP.		5
	ENERGY METRICS			**20**
12	Energy Expenditure Intensity	Total real cost of energy consumed per real $1,000 USD of GDP per year.	Indicates the magnitude of the energy costs in the economy to energy price shocks and exposure to price changes.	4
13	Energy Expenditure per capita	Total real dollar cost of the energy consumed per person per year.	Indicates the importance of energy in personal budgets and the susceptibility of households to energy price shocks.	3

14	Retail Electricity Prices	Average electricity costs in real cents per kWh.	Indicates the availability of low-costs reliable forms of power generation.	6
15	Crude Oil Prices	Real cost per barrel of crude oil	Indicates the susceptibility of the economy to high prices for petroleum, which supplies a significant portion of national energy demand	7
	PRICE & MARKET VOLATILITY METRICS			**15**
16	Crude Oil Price Volatility	Annual change in crude oil prices, averaged over a three-year period	Indicates the susceptibility of the economy to large swings in the price of petroleum.	5
17	Energy Expenditure Volatility	Average annual change in energy expenditures per US $1000 of GDP	Indicates the susceptibility of the economy to large swings for all forms of energy	4
18	World Oil Refinery Utilization	Average percent utilization of global petroleum refinery capacity	Indicates the likelihood of high prices at high capacity utilization and higher risk of supply limitations during refinery outages or disruptions	2
19	GDP per capita	Total real dollar GDP per person per year	Indicates the importance of wealth and productivity to the ability to innovate and respond to energy shocks.	4

	ENERGY USE INTENSITY METRICS			**14**
20	Energy Consumption per Capit	Million British thermal units (Btu) consumed per person per year.	Indicates changes in both energy intensity and in per-capita GDP and importance of energy to individuals	4
21	Energy Intensity	Million Btu of primary energy used in the domestic economy per $1,000 USD of real GDP	Indicates the importance of energy as a component of economic growth	7
22	Petroleum Intensity	Million Btu of petroleum consumed per $1,000 USD of real GDP.	Indicates the importance of petroleum as a component of economic growth	3
	ELECTRIC POWER SECTOR METRICS			**7**
23	Electricity Diversity	Average of market share concentration indexes (HHI) of: (1) the primary categories of electric power generating capacity, adjusted for availability; and (2) primary categories of electric power generation.	Indicates the flexibility of the power sector and its ability to dispatch electricity from a diverse range of sources.	5
24	Non-CO2 Emitting Share of Electricity Generation	Percentage of total electric power generation contributed by renewables, hydroelectric, nuclear and fossil-fired plants operating	Indicates the degree to which the power sector is employing non-CO2 emitting generation	2

		with carbon capture and storage technology.		
	TRANSPORTATION SECTOR METRICS			**7**
25	Transportation Energy per Capita	Million Btu consumed in the transportation sector per person per year	Indicates changes in both transportation energy intensity and in per-capita GDP and importance of transportation energy to individuals	3
26	Transportation Energy Intensity	Million Btu of primary energy used in the transportation sector per $1,000 USD of real GDP.	Indicates the importance of energy used in transportation as a component of economic growth	4
	ENVIRONMENTAL METRICS			**6**
27	CO2 Emissions Trend	Annual change in total national energy related CO2 emissions.	Indicates the exposure of the economy to domestic and international emissions reduction mandates.	2
28	Energy-Related Carbon Dioxide Emissions per Capita	Metric tons of CO2 emissions (energy related), per capita.	Indicates the joint effect of the amount of energy used per capita, and the carbon intensity of that energy use	2
29	Energy-Related Carbon Dioxide Emissions Intensity	Metric tons of CO2 per $1,000 USD of real GDP.	Indicates the importance of carbon-based fuels as a component of the economy.	2

Source: (Institute for 21st Century Energy, 2017).

APPENDIX C
RESEARCH TECHNICAL DETAILS

C1 QUALITATIVE RESEARCH

C1.1 DISCUSSION GUIDE

ENERGY POLICIES & ENERGY SECURITY LEVELS

- Which are the key factors in formulating a state policy on energy?
  Example(s) if possible, on the case of Israel.
- What is the meaning and the significance of Energy Security for a state, overall?
- Which facets of government, diplomacy, development, and society does energy security influence the most?
- How much does Energy Security contribute to a state's energy policy (and vice versa)?
- Having said all that, which are the main policies interrelated to energy policy?
- Which are the main policies interrelated to Energy Security? Clarification of the parameters that characterize the notion of Energy Security.
- Thinking of the energy security of each country in the Mediterranean region, i.e. Cyprus, Greece, Egypt, Israel, Lebanon, Syria, and Turkey, could you contribute a note as per each one's declaration? In comparison, which one would you say stands alone? Why?

SECURITY POLICIES & NATIONAL SECURITY LEVELS

- Which are the main dimensions of National Security these days? Why?
- In the Mediterranean region, in particular? Why?
- Which are the parameters that characterize each dimension?

- Thinking of the National Security of each country in the Mediterranean region, i.e., Cyprus, Greece, Egypt, Israel, Lebanon, Syria, and Turkey, could you contribute a note as per each one's declaration? In comparison, which one would you say stands alone? Why?

INVESTIGATION OF ANY RELATIONSHIP-POSITIVE OR NEGATIVE- BETWEEN ENERGY SECURITY AND NATIONAL SECURITY

- Could/should Energy Security affect the National Security at each country?
- Why/not?

C1.2 RESEARCH ID AND PROFILES OF SAMPLES

RESEARCH I.D.	
Title	▪ Primary research in the scope of exploring the relationship between Energy Security (independent variable) and its impact on National Security (dependent variable) at state level, by taking Israel and Cyprus as case studies.
Scope of Research	▪ This research is conducted in the context of an academic study under the concept of the International Political Economy and aims at examining the notions of Energy Security and National Security and their sub-variables and the main components of each one, as well as the way they interrelate. ▪ Theory of choice: realism and its different versions.
Research Objective	▪ Identify the main set of indicators-parameters that the examined variables consist of. ▪ Clearly indicate the advantages, limitation and possible applications of these variables. ▪ Develop a conceptual framework in order to relate these variables. ▪ Validate the outcomes of the study on the state of Israel and Cyprus and understand any variances and deviations that might appear in this case.
Research Type	▪ Qualitative research.
Methodology	▪ In depth-interviews.

Method of Interviewing	▪ Face-to-face.
Length of Interview	▪ 30 minutes to 1 hour, depending on interviewee's status.
Sample Specifications	▪ Leading administrators of international politics/diplomacy, government (environmental policy/defense), and academia (energy/security) ▪ Leading professionals in the field of energy, engineering, international relations, and public affairs.
Sample Structure	▪ 4 Diplomacy/government/academia. ▪ 4 Leading professionals (energy, engineering, public affairs).
Type of Records	▪ Digital recording upon interviewee's permission. ▪ Note-taking. ▪ Note mapping upon interview's completion.
Type Of Analysis	▪ Content analysis. ▪ Critical comparative analysis. ▪ Other as needed.
FIELD WORK DETAILS	
Recruiting method	▪ Snowball with quotes by use of screener.
Protocol	▪ Deliberation set-up.
Interviewer	▪ Floros Flouros.
Period	▪ 1/2/2017 – 31/3/2017.

C2 QUANTITATIVE RESEARCH

- Methodology: Desk research on literature, one-to-one consultations with research experts/statisticians, quantitative analyses of secondary data, comparative analysis of case studies.
- Method of statistical analysis: SPSS.
- Fieldwork: May 2018 to May 2019.
- Documentation: Desk research reporting, audio records of briefings/consultations, statistical tables and processes.

Sources of data as following:

1. Energy Security for each country for the period 2006-2017 from sources as below:

a./ total primary energy supply (Toe/1 000 US$) based on
https://data.oecd.org/energy/primary-energy-supply.htm
b./ Change in energy consumption in relation to GDP growth (MJ/$2011 PPP GDP)
based on https://data.worldbank.org/indicator/eg.egy.prim.pp.kd?end=2015&start=2006
c./ Import dependence (% of energy use) based on
https://ec.europa.eu/eurostat/tgm/table.do?tab=table&tableSelection=1&labeling=labels&footnotes=yes&layout=time,geo,cat&language=en&pcode=t2020_rd320&plugin=1
d./ Concentration (reduced diversity) of electricity generation in Oil, gas and coal based
on https://www.worldenergy.org/data/efficiency-indicators/

2. National Security for each country for the period 2006-2017 from sources as below:

a./ Size and Natural Resources Index based on:

i. Area in sqm as per http://www.fao.org/nr/water/aquastat/data/query/results.html
ii. Arable land as per http://www.fao.org/nr/water/aquastat/data/query/results.html
iii. Water resources per capita based on
http://www.fao.org/nr/water/aquastat/data/query/results.html

b./ Human Capital Index based on:

i./ Population based on CIA Gov, https://www.cia.gov/library/publications/the-world-factbook.

ii./ Physicians based on
https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?end=2014&locations=CY&start=2008
iii./ Expenditures based on
https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?end=2015&locations=CY&start=2008
iv./ Active population is taken as a proportion of the total population. The economically active population comprises all persons of either sex who furnish the supply of labour for the production of goods and services during a specified time-reference period as per the International Labour Organisation (ILO). Data are to be multiplied by 1,000 FAO,
http://www.fao.org/nr/water/aquastat/data/query/results.html
v./ Public spending on education based on
https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?end=2014&locations=CY&start=2008
vi./ Literary based on http://data.uis.unesco.org/?ReportId=2656

c./ S&T Index based on:

i./ R&D as %GDP based on
https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?end=2015&locations=CY&start=2008
ii./ No of R&D personnel based on http://data.uis.unesco.org/
iii./ No of patents based on https://www.wipo.int/members/en/

d./ Economic Index based on:

i./ GDP nominal based on
https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2017&start=2008
ii./ Gross national savings based on are calculated as gross national income less total consumption, plus net transfers. World Bank national accounts data, and OECD National Accounts data files.
iii./ Forex reserves based on
https://en.wikipedia.org/wiki/List_of_countries_by_foreign-exchange_reserves#cite_note-28
iv./ Public dept as %GDP based on https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html
v./ per capita nominal GDP based on
http://www.fao.org/nr/water/aquastat/data/query/results.html

e./ Military Index based on:

i./ Total armed forces based on https://data.worldbank.org/indicator/MS.MIL.TOTL.P1?end=2016&locations=CY&start=2005

ii./ Defence expenditures based on https://www.sipri.org/sites/default/files/1_Data%20for%20all%20countries%20from%201988%E2%80%932017%20in%20constant%20%282016%29%20USD.pdf

iii./Defence expenditure per soldier is calculated by dividing the total defence expenditure for 2012 by the number of armed forces personnel.

f./ Leadership Index based on:

i./ HDI based on http://hdr.undp.org/en/data#

g./ National Security Index is calculated as following:
Indexing of factors and sub-factors was based on values that were taken from sources as below steps:

- Step 1: collection and collation of data for the relevant sub-factor for five countries from sources such as the UN Data Bank, World Bank etc. Data for all the countries are from the same source and for the same year to ensure uniformity. Such countries that have been chosen to form a group/pool are located in the same East Mediterranean region and they are most important ones: Cyprus, Israel, Greece, Turkey and Egypt.
- Step 2: calculate the minimum and maximum values for these five countries of the selected data to establish a comparative distinction with the highest and lowest value respectively and application in the formula explained in the subsequent paragraph.
- Step 3: evolving an index that is a value of a sub-factor in the range 0–100.
- Step 4: adding values of indices of sub-factors and dividing the same by the number of sub-factors provided the value of the factor.
- Step 5: adding the value of indices of factors and dividing the same by 6, that is the number of factors denoted the total value of the composite national security index of each country. The formula used for the calculation of the index for positive variable was as follows: Index = Country Value – Minimum Value/Maximum Value – Minimum Value x 100. In the case of a negative variable, wherein the lower value determines a higher power ratio, the computation is carried out based on the following formula: Index = Maximum Value – Country Value/Maximum Value – Minimum Value x 100. Data sets are for the latest year available for all countries to ensure uniformity.

APPENDIX D

STATISTICAL ANALYSIS USING SPSS

It is common in several areas of research for continuous variables to be converted to categorical variables by grouping them, prior to analysis, into two or more categories. Multiple linear regression is a method of analysis for assessing the strength of the relationship between each of a set of explanatory variables (sometimes known as independent variables, although this is not recommended since the variables are often correlated), and a single response (or dependent) variable (Landau and Everitt, 2004).

Applying multiple regression analysis to a set of data results in what are known as regression coefficients, one for each explanatory variable. These coefficients give the estimated change in the response variable associated with a unit change in the corresponding explanatory variable, conditional on the other explanatory variables remaining constant. The fit of a multiple regression model can be judged in various ways: calculation of the multiple correlation coefficient or by the examination of residuals.

In case a single variable is involved, there is "what is generally referred to as simple linear regression" (Landau and Everitt, 2004):

- Simple linear regression is used to model the relationship between a single response variable, y, and a single explanatory variable, x; the model is
  $y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$

  where (x_i, y_i), i = 1, …, n are the sample values of the response and exploratory variables and ε_i are random disturbance terms assumed to be normally distributed with mean zero and variance σ^2.

- The intercept parameter, β_o, is the value predicted for the response variable when the explanatory variable takes the value zero.

- The slope parameter, β_1, is the change in the response variable predicted when the explanatory variable is increased by one unit.
- The parameters, also known as *regression coefficients*, can be estimated by least squares.

The term "analysis of variance" was introduced by the famous statistician Sir Ronald Aylmer Fisher, who described it as "the separation of variance ascribable to one group of causes from the variance ascribable to the other groups". In another way, the ANnalysis OF VAriance (ANOVA) is a "partitioning of the total variance in a set of data into a number of component parts, so that the relative contributions of identifiable sources of variation to the total variation in measured responses can be determined". Based on this partition, "suitable F-tests can be derived that allow differences between sets of means to be assessed" (Landau and Everitt, 2004).

According to Sawyer (2009), ANOVA is a statistical test used to detect "differences in group means when there is one parametric dependent variable and one or more independent variables". There are cases with "conceptually-based perspectives regarding the use and interpretation of ANOVA, with minimal coverage of the mathematical foundations". A statistically significant ANOVA is usually "followed up with a multiple comparison procedure to identify which group means differ from each other".

In case a set of dependent variables is to be compared in a one-way design, the multivariate analogue of the one-way analysis of variance described below is used (Landau and Everitt, 2004):

- The model assumed for the observations from a one-way design is

  $$y_{ij} = \mu_i + \varepsilon_{ij}$$

  where y_{ij} represents the *j*th observation in the *i*th group, and the ε_{ij} represent random error terms, assumed to be from a normal distribution with mean zero and variance σ^2.
- The null hypothesis of the equality of population means can now be written as

  $$H_0: \mu_1=\mu_2=...=\mu_k=\mu$$

leading to a new model for the observations, namely

$$y_{ij} = \mu + \varepsilon_{ij}$$

- There are some advantages (and, unfortunately, some disadvantages) in reformulating the model slightly, by modeling the mean value for a particular population as the sum of the overall mean value of the response plus a specific population or group effect. This leads to a linear model of the form

$$y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

where μ represents the overall mean of the response variable, α_i is the effect on an observation of being in the ith group ($i = 1, 2, \ldots, k$), and again ε_{ij} is a random error term, assumed to be from a normal distribution with mean zero and variance σ^2.

- When written in this way, the model uses k + 1 parameters ($\mu, \alpha_1, \alpha_2, \ldots, \alpha_k$) to describe only k group means. In technical terms, the model is said to be overparameterized, which causes problems because it is impossible to find unique estimates for each parameter — it is a bit like trying to solve simultaneous equations when there are fewer equations than unknowns. The following constraint is generally applied to the parameters to overcome the problem:

$$\sum_{i=1}^{k} \alpha_i = 0$$

- If this model is assumed, the hypothesis of the equality of population means can be rewritten in terms of the parameters α_i as

$$H_0: \alpha_1=\alpha_2=\ldots=\alpha_k=0$$

so that under H0 the model assumed for the observations is

$$y_{ij} = \mu + \varepsilon_{ij}$$

as before.

- The necessary terms for the F-test are usually arranged in an analysis of variance table as follows (N is the total number of observations).

Source of Variation	*DF*	*SS*	*MS*	*MSR (F)*
Between groups	$k - 1$	BGSS	BGSS/$(k - 1)$	MSBG/MSWG
Within groups (error)	$N - k$	WGSS	WGSS/$(N - k)$	
Total	$N - 1$			

  Here, DF is degrees of freedom, SS is sum of squares, MS is mean square, BGSS is between groups sum of squares, and WGSS is within group sum of squares.
- If H_0 is true and the assumptions listed below are valid, the mean square ratio (MSR) has an F-distribution with k – 1 and N – k degrees of freedom.
- The data collected from a one-way design have to satisfy the following assumptions to make the F-test involved strictly valid:

  1. The observations in each group come from a normal distribution.
  2. The population variances of each group are the same.
  3. The observations are independent of one another.

The hypothesis tested is that the set of variable means (the mean vector) is the same across groups. Unfortunately, in the multivariate situation (unless there are only two groups to be compared), there is no single test statistic that can be derived for detecting all types of possible departures from the null hypothesis of the equality of the group mean vectors. A number of different test statistics have been proposed and all such test statistics can be transformed into F-statistics to enable p-values to be calculated. (All the test statistics are equivalent in the two-group situation.) Multivariate analysis of variance (MANOVA) assumes multivariate normality of the variables in each factor level and a common covariance matrix (Landau and Everitt, 2004).

Researchers usually chose “the repeated measures paradigm as a means of reducing error variability and as the natural way of measuring certain phenomena (for example, developmental changes over time, and learning and memory tasks)”. For that case, “effects of experimental factors giving rise to the repeated measures are assessed relative to the average response made by the subject on all conditions or occasions”. Finally, “each subject serves as his or her own control, and, accordingly, variability caused by differences in average responsiveness of the subjects is eliminated from the extraneous error variance”. As a result “the power to detect the effects of within-subjects experimental factors (is increased compared with testing in a between-subjects design”. However, “the advantages of a repeated measures design come at a cost, namely, the probable lack of independence of the repeated measurements”. Observations that use “the same subject made under different conditions are very likely to be correlated to some degree: and due to that “the analysis of repeated measure data” becomes “more complex than when each subject has only a single value of the response variable recorded” (Landau and Everitt, 2004).

References

Arkkelin, D. 2014. Using SPSS to Understand Research and Data Analysis. *Psychology Curricular Materials*. Book 1. http://scholar.valpo.edu/psych_oer/1

Landau, S., Everitt, B. 2004. *A Handbook of Statistical Analyses using SPSS*. Washington: Chapman & Hall/CRC Press LLC

Steven F. Sawyer (2009) Analysis of Variance: The Fundamental Concepts, Journal of Manual & Manipulative Therapy, 17:2, 27E-38E, DOI: 10.1179/jmt.2009.17.2.27E

APPENDIX E

STATISTICAL ANALYSIS

E1. THE CASE OF ISRAEL

E1.1 Relationship NS_1=g' (ES_{ave})

E1.2 Relationship NS_2=g' (ES_{ave})

E1.3 Relationship NS_3=g' (ES_{ave})

E1.4 Relationship NS_4=g' (ES_{ave})

E1.5 Relationship NS_5=g' (ES_{ave})

E1.6 Relationship NS_6=g' (ES_{ave})

E1.7 Relationship NS_t=g' (ES_{ave})

E2. THE CASE OF CYPRUS

E2.1. Relationship NS_1=g' (ES_{ave})

E2.2. Relationship NS_2=g' (ES_{ave})

E2.3. Relationship NS_3=g' (ES_{ave})

E2.4. Relationship NS_4=g' (ES_{ave})

E2.5 Relationship NS_5=g' (ES_{ave})

E2.6. Relationship NS_6=g' (ES_{ave})

E2.7. Relationship NS_t=g' (ES_{ave})

E1 The case of Israel

E1.1 Relationship $NS_1=g'(ES_{ave})$

The index NS_1 has been defined as the "Size and Natural Resources" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E.1.1.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Size and natural resources
b. Models are based only on cases for which country = ISRAEL
c. All requested variables entered

Table E.1.1.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = ISRAEL (Selected)	country = ISRAEL (Unselected)				country = ISRAEL (Selected)	country = ISRAEL (Unselected)
1	,779[a]	.	0.607	0.558	0.024526	0.998	0.128

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = ISRAEL.
c. Dependent Variable: Size and natural resources

Table E.1.1.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.007	1	0.007	12.364	,008[c]
	Residual	0.005	8	0.001		
	Total	0.012	9			

a. Dependent Variable: Size and natural resources

b. Selecting only cases for which country = ISRAEL

c. Predictors: (Constant), Average Energy Security

Table E1.1.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.184	0.179		28.938	0.000
	Average Energy Security	-0.014	0.004	-0.779	-3.516	0.008

a. Dependent Variable: Size and natural resources

b. Selecting only cases for which country = ISRAEL

Table E1.1.5

Residuals Statistics[a,b]

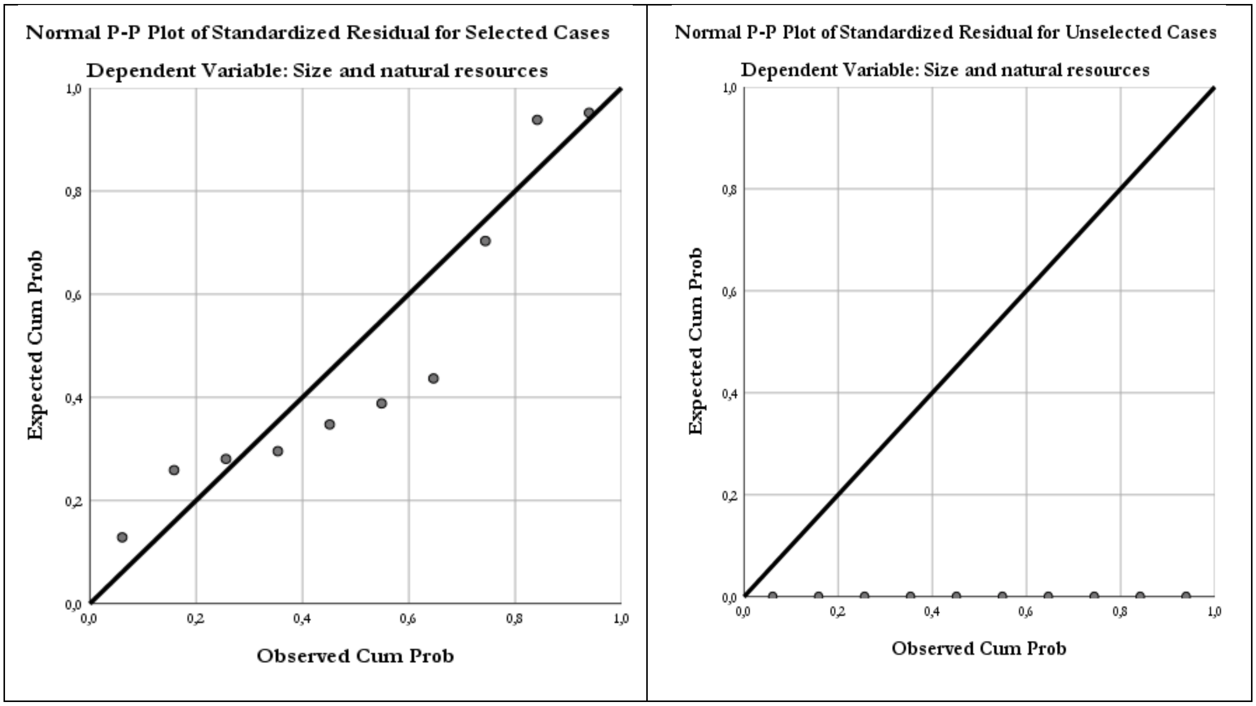
	country = ISRAEL (Selected)					country = ISRAEL (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	4.52392	4.60586	4.5550	0.02874	10	4.47842	4.71910	4.52397	0.070201	10
Residual	-0.027781	0.04075	0.0000	0.02312	10	-0.60910	-0.13842	-0.2989	0.164053	10
Std. Predicted Value	-1.081	1.769	0.000	1.000	10	-2.664	5.708	-1.080	2.442	10
Std. Residual	-1.133	1.661	0.000	0.943	10	-24.835	-5.644	-12.190	6.689	10

a. Dependent Variable: Size and natural resources

b. Pooled Cases

In the next figure the relationship NS_1=g’ (ES_{ave}) for the case of Israel is represented.

Figure E1.1.1



E1.2 Relationship NS_2=g' (ES_{ave})

The index NS_2 has been defined as the "Human Capital" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E1.2.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Human Capital.
b. Models are based only on cases for which country = ISRAEL
c. All requested variables entered

Table E1.2.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = ISRAEL (Selected)	country = ISRAEL (Unselected)				country = ISRAEL (Selected)	country = ISRAEL (Unselected)
1	,513[a]	.	0.263	0.171	2.233292	0.994	0.609

a. Predictors: (Constant), Average Energy Security

b. Unless noted otherwise, statistics are based only on cases for which country = ISRAEL.

c. Dependent Variable: Human Capital.

Table E1.2.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.248	1	14.248	2.857	,129[c]
	Residual	39.901	8	4.988		
	Total	54.149	9			

a. Dependent Variable: Human Capital.

b. Selecting only cases for which country = ISRAEL

c. Predictors: (Constant), Average Energy Security

Table E1.2.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	89.247	16.313		5.471	0.001
	Average Energy Security	-0.608	0.360	-0.513	-1.690	0.129

a. Dependent Variable: Human Capital.

b. Selecting only cases for which country = ISRAEL

Table E1.2.5

Residuals Statistics[a,b]

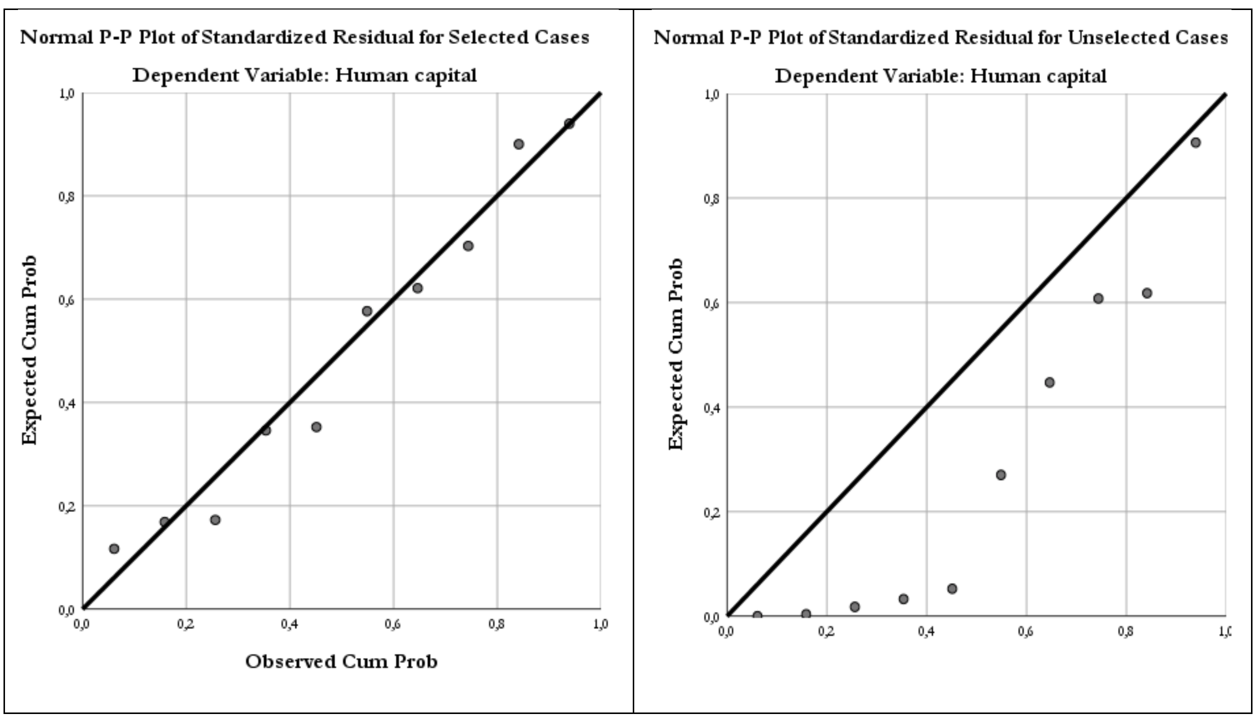
	country = ISRAEL (Selected)					country = ISRAEL (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	60.34050	63.9269	61.701	1.25821	10	58.3494	68.88348	60.3427	3.0725908	10
Residual	-2.66009	3.46884	0.0000	2.10556	10	-12.8834	2.94177	-2.8737	4.5058927	10
Std. Predicted Value	-1.081	1.769	0.000	1.000	10	-2.664	5.708	-1.080	2.442	10
Std. Residual	-1.191	1.553	0.000	0.943	10	-5.76883	1.317	-1.287	2.018	10

a. Dependent Variable: Human Capital.

b. Pooled Cases

In the next figure the relationship NS_2=g' (ES_{ave}) for the case of Israel is represented.

Figure E1.2.1



E1.3 Relationship NS_3=g' (ES_{ave})

The index NS_3 has been defined as the "Science & Technology" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E1.3.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Science & Technology.
b. Models are based only on cases for which country = ISRAEL
c. All requested variables entered

Table E1.3.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = ISRAEL (Selected)	country = ISRAEL (Unselected)				country = ISRAEL (Selected)	country = ISRAEL (Unselected)
1	,284[a]	0.298	0.081	-0.034	1.44612	1.012	0.001

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = ISRAEL.
c. Dependent Variable: Science & Technology.

Table E1.3.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.473	1	1.473	0.704	,426[c]
	Residual	16.730	8	2.091		
	Total	18.203	9			

a. Dependent Variable: Science & Technology.

b. Selecting only cases for which country = ISRAEL

c. Predictors: (Constant), Average Energy Security

Table E1.3.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	55.358	10.563		5.241	0.001
	Average Energy Security	-0.196	0.233	-0.284	-0.839	0.426

a. Dependent Variable: Science & Technology.

b. Selecting only cases for which country = ISRAEL

Table E1.3.5

Residuals Statistics[a,b]

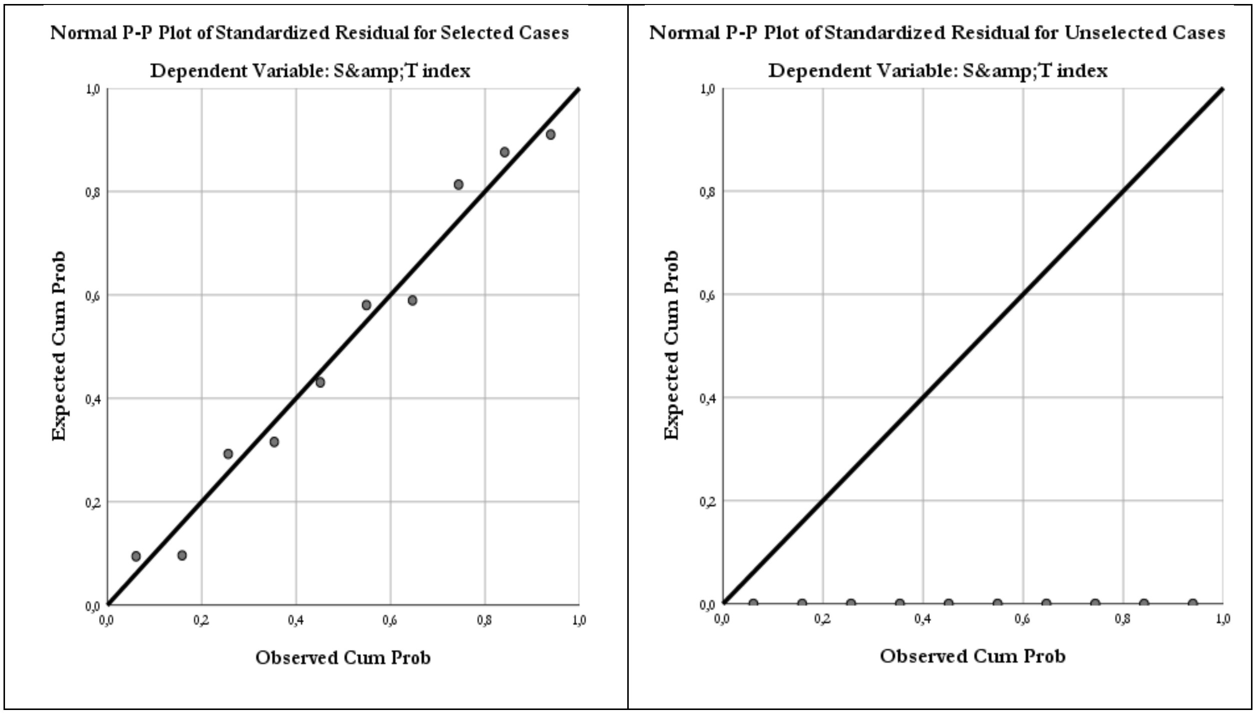
	country = ISRAEL (Selected)					country = ISRAEL (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	46.06355	47.2167	46.501	0.40456	10	45.4233	48.81045	46.0642	0.9879598	10
Residual	-1.89940	1.93992	0.0000	1.36342	10	-47.1904	-43.9333	-44.553	0.9464769	10
Std. Predicted Value	-1.081	1.769	0.000	1.000	10	-2.664	5.708	-1.080	2.442	10
Std. Residual	-1.313	1.341	0.000	0.943	10	-32.632	-30.3800	-30.809	0.654	10

a. Dependent Variable: Science & Technology.

b. Pooled Cases

In the next figure the relationship NS_3=g' (ES_{ave}) for the case of Israel is represented.

Figure E1.3.1



E1.4. Relationship NS_4=g' (ES_{ave})

The index NS_4 has been defined as the "Economy" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E1.4.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Economy.
b. Models are based only on cases for which country = ISRAEL
c. All requested variables entered

Table E1.4.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = ISRAEL (Selected)	country = ISRAEL (Unselected)				country = ISRAEL (Selected)	country = ISRAEL (Unselected)
1	,562[a]	0.028	0.315	0.230	6.4853	0.437	0.274

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = ISRAEL.
c. Dependent Variable: Economy.

Table E1.4.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	154.976	1	154.976	3.685	,091[c]
	Residual	336.476	8	42.059		
	Total	491.451	9			

a. Dependent Variable: Economy.

b. Selecting only cases for which country = ISRAEL

c. Predictors: (Constant), Average Energy Security

Table E1.4.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	144.604	47.372		3.053	0.016
	Average Energy Security	-2.006	1.045	-0.562	-1.920	0.091

a. Dependent Variable: Economy.

b. Selecting only cases for which country = ISRAEL

Table E1.4.5

Residuals Statistics[a,b]

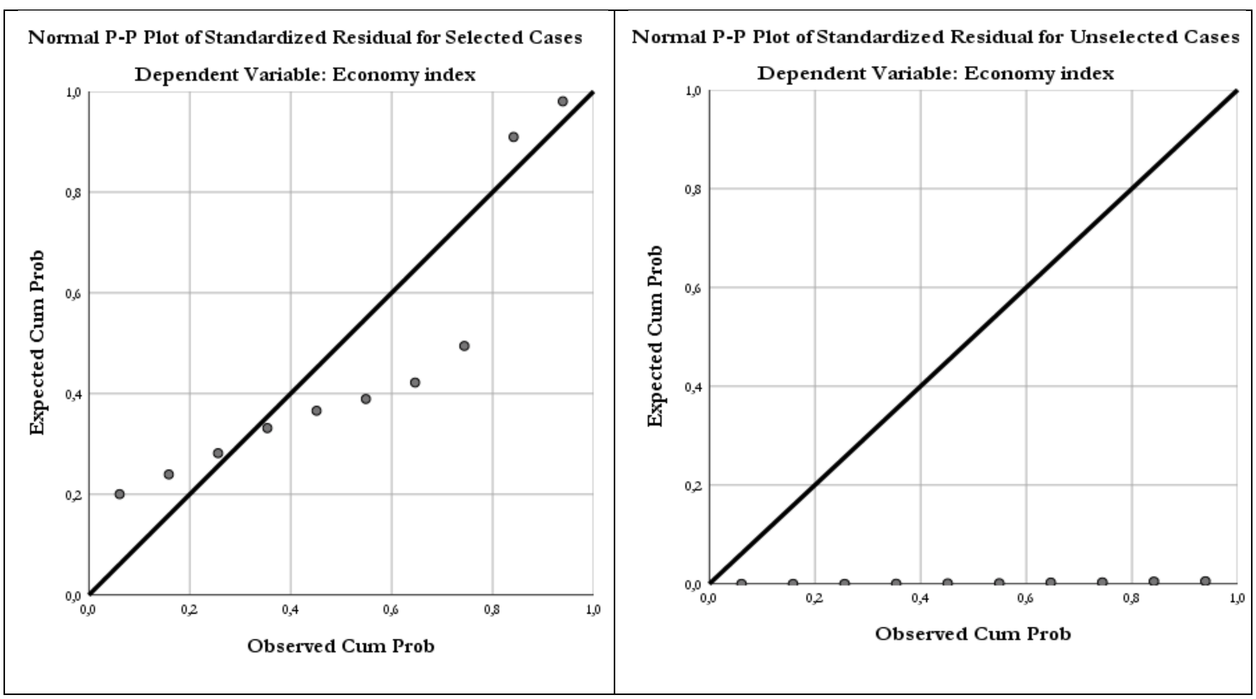
	country = ISRAEL (Selected)					country = ISRAEL (Unselected)				
	Min	**Max**	**Mean**	**Std. Deviation**	**N**	**Min**	**Max**	**Mean**	**Std. Deviation**	**N**
Predicted Value	49.26904	61.0972	53.756	4.14964	10	42.7023	77.44415	49.2763	10.133535	10
Residual	-5.45171	13.3592	0.0000	6.11442	10	-50.9041	- 16.57936	- 22.8463	10.195430	10
Std. Predicted Value	-1.081	1.769	0.000	1.000	10	-2.664	5.708	-1.080	2.442	10
Std. Residual	-0.841	2.060	0.000	0.943	10	-7.84912	-2.55644	-3.5227	1.5720768	10

a. Dependent Variable: Economy.

b. Pooled Cases

In the next figure the relationship NS_4=g' (ES_{ave}) for the case of Israel is represented.

Figure E1.4.1



E1.5. Relationship NS_5=g' (ES_{ave})

The index NS_5 has been defined as the "Military" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E1.5.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Military.
b. Models are based only on cases for which country = ISRAEL
c. All requested variables entered

Table E1.5.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = ISRAEL (Selected)	country = ISRAEL (Unselected)				country = ISRAEL (Selected)	country = ISRAEL (Unselected)
1	,838[a]		0.702	0.665	1.7619	2.237	0.021

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = ISRAEL.
c. Dependent Variable: Military.

Table E1.5.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.461	1	58.461	18.832	,002[c]
	Residual	24.835	8	3.104		
	Total	83.295	9			

a. Dependent Variable: Military.

b. Selecting only cases for which country = ISRAEL

c. Predictors: (Constant), Average Energy Security

Table E1.5.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	119.840	12.870		9.312	0.000
	Average Energy Security	-1.232	0.284	-0.838	-4.340	0.001

a. Dependent Variable: Military.

b. Selecting only cases for which country = ISRAEL

Table E1.5.5

Residuals Statistics[a,b]

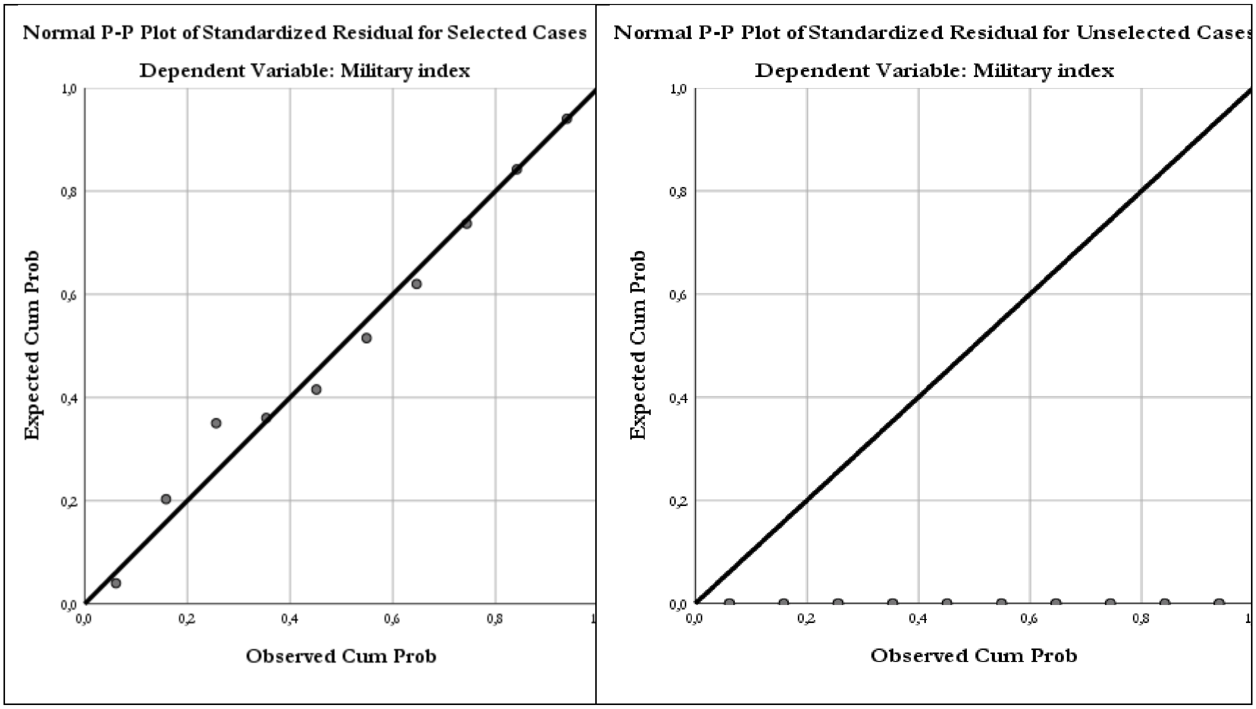
	country = ISRAEL (Selected)					country = ISRAEL (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	61.28717	68.5519	64.043	2.54865	10	57.2539	78.59192	61.2916	6.2238746	10
Residual	-3.08317	2.74282	0.0000	1.66114	10	-70.6819	-46.3854	-52.587	6.9816255	10
Std. Predicted Value	-1.081	1.769	0.000	1.000	10	-2.664	5.708	-1.080	2.442	10
Std. Residual	-1.750	1.557	0.000	0.943	10	-40.1165	-26.3267	-29.846	3.963	10

a. Dependent Variable: Military.

b. Pooled Cases

In the next figure the relationship NS_5=g’ (ES_{ave}) for the case of Israel is represented.

Figure E1.5.1



E1.6 Relationship NS_6=g' (ES_{ave})

The index NS_6 has been defined as the "Leadership" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E1.6.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Leadership.
b. Models are based only on cases for which country = ISRAEL
c. All requested variables entered

Table E1.6.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = ISRAEL (Selected)	country = ISRAEL (Unselected)				country = ISRAEL (Selected)	country = ISRAEL (Unselected)
1	,641[a]	0.235	0.411	0.337	1.39209	0.676	0.335

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = ISRAEL.
c. Dependent Variable: Leadership.

Table E1.6.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.796	1	10.796	5.571	,046[c]
	Residual	15.503	8	1.938		
	Total	26.299	9			

a. Dependent Variable: Leadership.

b. Selecting only cases for which country = ISRAEL

c. Predictors: (Constant), Average Energy Security

Table E1.6.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	72.489	10.169		7.129	0.000
	Average Energy Security	-0.530	0.224	-0.641	-2.360	0.046

a. Dependent Variable: Leadership.

b. Selecting only cases for which country = ISRAEL

Table E1.6.5

Residuals Statistics[a,b]

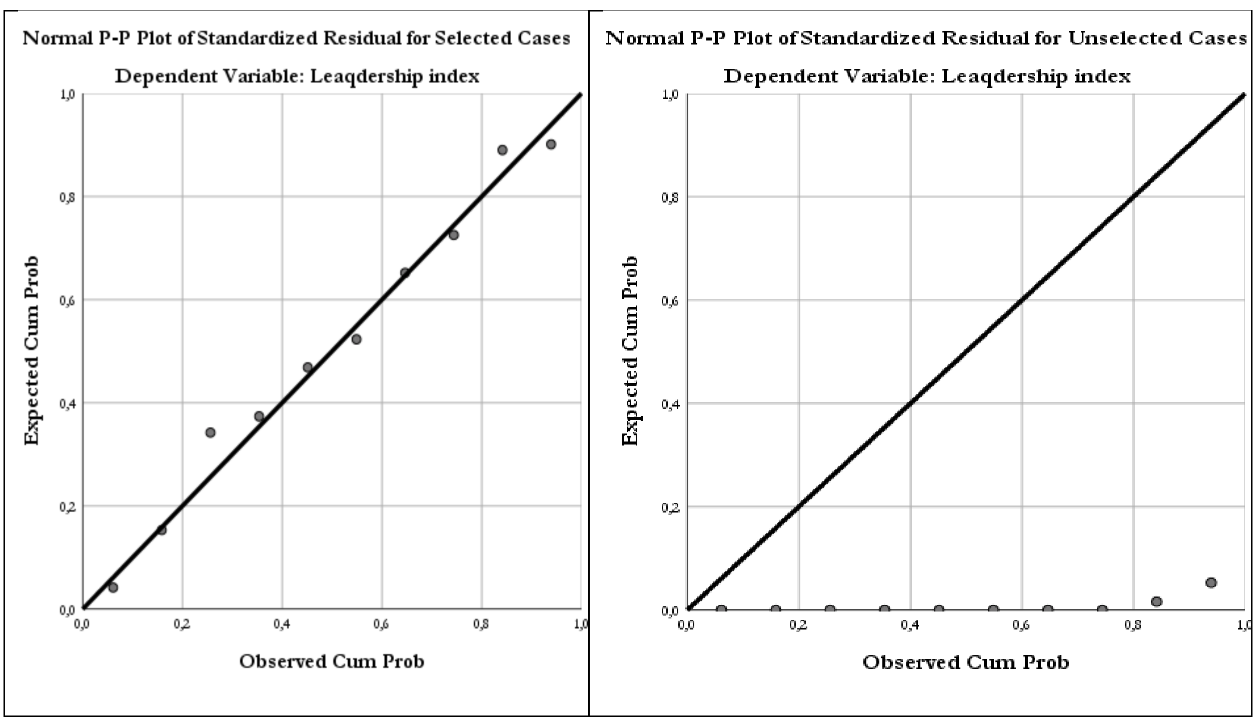
	country = ISRAEL (Selected)					country = ISRAEL (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	47.32672	50.4486	48.511	1.09524	10	45.5935	54.76316	47.3286	2.6746065	10
Residual	-2.41070	1.79332	0.0000	1.31247	10	-12.7231	-2.25370	-6.3696	2.8739780	10
Std. Predicted Value	-1.081	1.769	0.000	1.000	10	-2.664	5.708	-1.080	2.442	10
Std. Residual	-1.732	1.228	0.000	0.943	10	-9.13961	-1.61893	-4.5756	2.0645060	10

a. Dependent Variable: Leadership.

b. Pooled Cases

In the next figure the relationship NS_6=g' (ES_{ave}) for the case of Israel is represented.

Figure E1.6.1



E1.7 Relationship NS_t=g' (ES_{ave})

At this point, the examined parameter is the total National Security of the nation-state (country) NS_t which is studied how it is related to the and the independent variable ES_t (total Energy Security). The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E1.7.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Total National Security.
b. Models are based only on cases for which country = ISRAEL
c. All requested variables entered

Table E1.7.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = ISRAEL (Selected)	country ~= ISRAEL (Unselected)				country = ISRAEL (Selected)	country ~= ISRAEL (Unselected)
1	,711[a]		0.506	0.444	1.657	0.632	0.051

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = ISRAEL.
c. Dependent Variable: Total National Security.

Table E1.7.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.509	1	22.509	8.196	,021[c]
	Residual	21.971	8	2.746		
	Total	44.480	9			

a. Dependent Variable: Total National Security.

b. Selecting only cases for which country = ISRAEL

c. Predictors: (Constant), Average Energy Security

Table E1.7.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	81.134	12.105		6.702	0.000
	Average Energy Security	-0.765	0.267	-0.711	-2.863	0.021

a. Dependent Variable: Total National Security.

b. Selecting only cases for which country = ISRAEL

Table E1.7.5

Residuals Statistics[a,b]

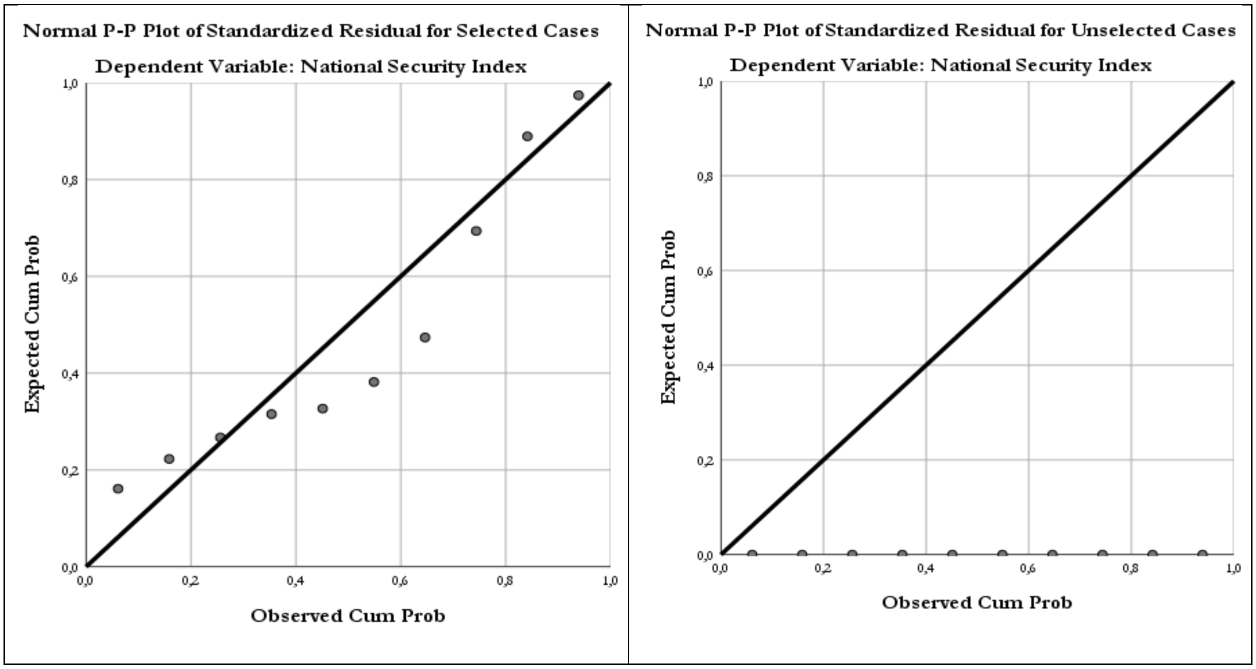
	country = ISRAEL (Selected)					country = ISRAEL (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	44.80098	49.3088	46.511	1.58145	10	42.2983	55.53873	44.8037	3.8619653	10
Residual	-1.63985	3.21963	0.0000	1.56245	10	-32.4987	-18.1956	-21.586	4.0700209	10
Std. Predicted Value	-1.081	1.769	0.000	1.000	10	-2.664	5.708	-1.080	2.442	10
Std. Residual	-0.990	1.943	0.000	0.943	10	-19.6102	-10.980	-13.026	2.4559143	10

a. Dependent Variable: Total National Security.

b. Pooled Cases

In the next graphs the relationship NS_t=g’ (ES_{ave}) is represented.

Figure E1.7.1


Normal P-P Plot of Standardized Residual for Selected Cases
Dependent Variable: National Security Index
Expected Cum Prob
Observed Cum Prob
0,0
0,2
0,4
0,6
0,8
1,0
Normal P-P Plot of Standardized Residual for Unselected Cases
Dependent Variable: National Security Index
Expected Cum Prob
Observed Cum Prob

E2. The case of Cyprus

E2.1. Relationship $NS_1=g'(ES_{ave})$

The index NS_1 has been defined as the "Size and Natural Resources" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E2.1.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Size and natural resources
b. Models are based only on cases for which country = CYPRUS
c. All requested variables entered

Table E2.1.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = CYPRUS (Selected)	country = CYPRUS (Unselected)				country = CYPRUS (Selected)	country = CYPRUS (Unselected)
1	,428[a]	.	0.183	0.081	0.116180	0.900	0.011

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = CYPRUS.
c. Dependent Variable: Size and natural resources

Table E2.1.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.024	1	0.024	1.798	,217[c]
	Residual	0.108	8	0.013		
	Total	0.132	9			

a. Dependent Variable: Size and natural resources
b. Selecting only cases for which country = CYPRUS

Table E2.1.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.737	0.366		10.205	0.000
	Average Energy Security	0.010	0.008	0.428	1.341	0.217

a. Dependent Variable: Size and natural resources

b. Selecting only cases for which country = CYPRUS

Table E2.1.5

Residuals Statistics[a,b]

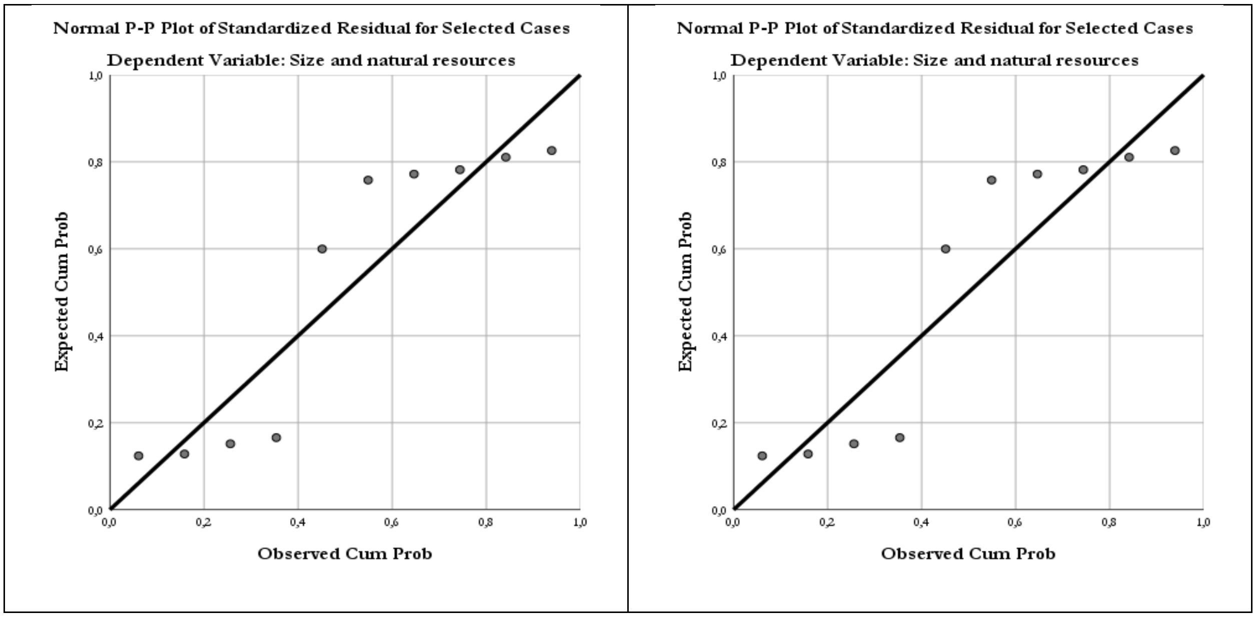
	country = CYPRUS (Selected)					country = CYPRUS (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	4.08066	4.25869	4.2250	0.051927	10	4.16443	4.22504	4.20204	0.021264	10
Residual	-0.13437	0.10898	0.0000	0.109636	10	0.29496	0.42557	0.35295	0.05509	10
Std. Predicted Value	-2.780	0.649	0.000	1.000	10	-1.167	0.001	-0.442	0.409	10
Std. Residual	-1.156	0.938	0.000	0.943	10	2.539	3.663	3.038	0.474	10

a. Dependent Variable: Size and natural resources

b. Pooled Cases

In the next graphs the relationship NS_1=g’ (ES_{ave}) for the case of Cyprus is represented.

Figure E2.1.1



E2.2. Relationship NS_2=g' (ES_{ave})

The index NS_2 has been defined as the "Human Capital" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E2.2.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Human Capital.
b. Models are based only on cases for which country = CYPRUS
c. All requested variables entered

Table E2.2.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = CYPRUS (Selected)	country = CYPRUS (Unselected)				country = CYPRUS (Selected)	country = CYPRUS (Unselected)
1	,328[a]	.	0.107	-0.004	2.244748	1.190	0.076

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = CYPRUS.
c. Dependent Variable: Human Capital.

Table E2.2.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.748	1	5.748	0.962	,355[c]
	Residual	47.814	8	5.977		
	Total	53.562	9			

a. Dependent Variable: Human Capital.

b. Selecting only cases for which country = CYPRUS

c. Predictors: (Constant), Average Energy Security

Table E2.2.4

Coefficients,[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	49.951	7.705		6.483	0.000
	Average Energy Security	0.158	0.161	0.328	0.981	0.355

a. Dependent Variable: Human Capital.

b. Selecting only cases for which country = CYPRUS

Table E2.2.5

Residuals Statistics[a,b]

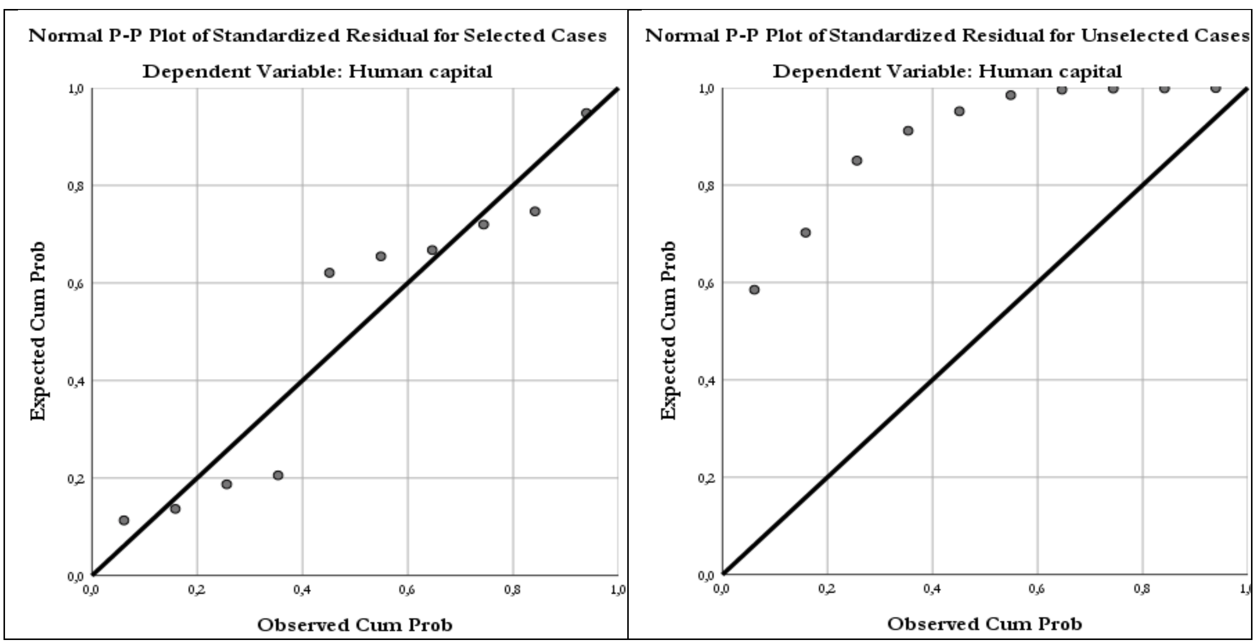
	country = CYPRUS (Selected)					country = CYPRUS (Unselected)				
	Min	**Max**	**Mean**	**Std. Deviation**	**N**	**Min**	**Max**	**Mean**	**Std. Deviation**	**N**
Predicted Value	55.24763	57.9874	57.469	0.799148	10	56.5367	57.4695	57.1157	0.327248	10
Residual	-2.95677	3.9827	0.0000	2.3049	10	0.52534	7.90310	4.58257	2.6357	10
Std. Predicted Value	-2.780	0.649	0.000	1.000	10	-1.167	0.001	-0.442	0.409	10
Std. Residual	-1.209	1.629	0.000	0.943	10	0.215	3.233	1.876	1.078	10

a. Dependent Variable: Human Capital.

b. Pooled Cases

In the next figure the relationship NS_2=g' (ES_{ave}) for the case of Cyprus is represented.

Figure E2.2.1



E2.3. Relationship NS_3=g' (ES_{ave})

The index NS_3 has been defined as the "Science & Technology" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E2.3.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Science & Technology.
b. Models are based only on cases for which country = CYPRUS
c. All requested variables entered

Table E2.3.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = CYPRUS (Selected)	country = CYPRUS (Unselected)				country = CYPRUS (Selected)	country = CYPRUS (Unselected)
1	,298[a]	0.284	0.089	-0.025	0.216859	1.190	0.001

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = CYPRUS.
c. Dependent Variable: Science & Technology.

Table E2.3.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.037	1	0.037	0.780	,403[c]
	Residual	0.376	8	0.047		
	Total	0.413	9			

a. Dependent Variable: Science & Technology.

b. Selecting only cases for which country = CYPRUS

c. Predictors: (Constant), Average Energy Security

Table E2.3.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.111	0.683		3.089	0.015
	Average Energy Security	-0.013	0.014	-0.298	-0.883	0.403

a. Dependent Variable: Science & Technology.

b. Selecting only cases for which country = CYPRUS

Table E2.3.5

Residuals Statistics[a,b]

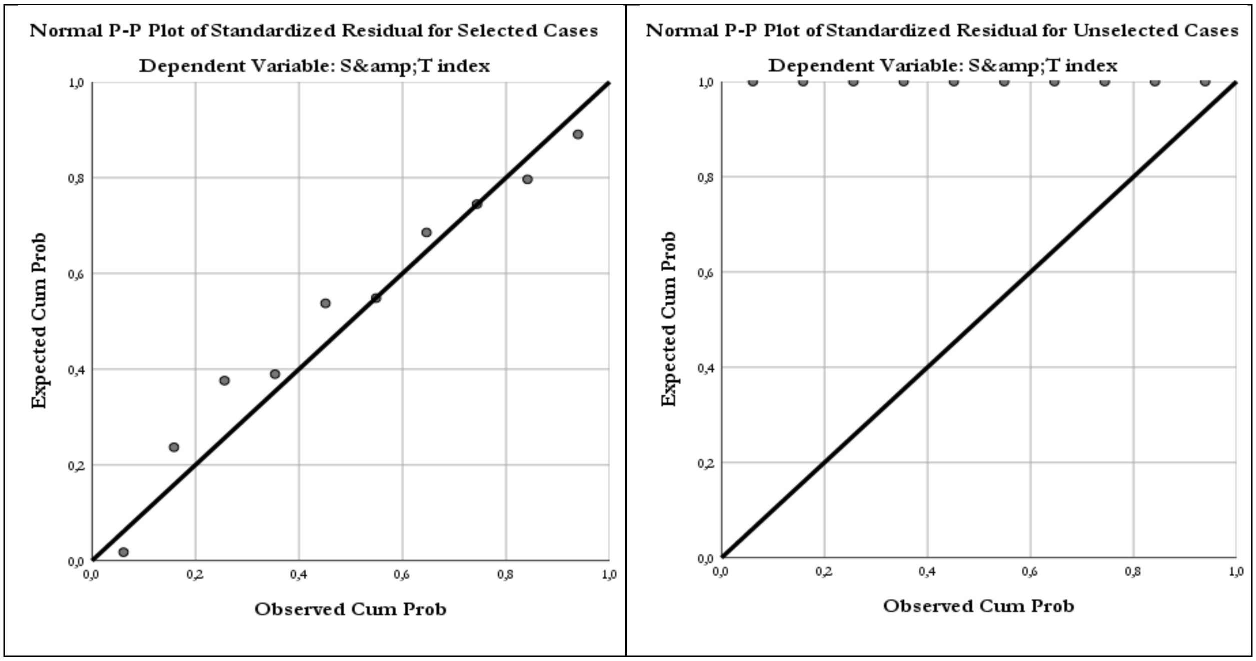
	country = CYPRUS (Selected)					country = CYPRUS (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	1.46959	1.68843	1.5110	0.06383	10	1.51009	1.5854	1.53922	0.02613	10
Residual	-0.45602	0.2664	0.0000	0.2044	10	42.7906	46.8260	44.9617	1.41964	10
Std. Predicted Value	-0.649	2.780	0.000	1.000	10	-0.001	1.167	0.442	0.409	10
Std. Residual	-2.103	1.229	0.000	0.943	10	197.32	215.929	207.332	6.525	10

a. Dependent Variable: Science & Technology.

b. Pooled Cases

In the next figure the relationship NS_3=g’ (ES_{ave}) for the case of Cyprus is represented.

Figure E2.3.1



E2.4. Relationship NS_4=g' (ES_{ave})

The index NS_4 has been defined as the "Economy" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E2.4.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Economy.
b. Models are based only on cases for which country = CYPRUS
c. All requested variables entered

Table E2.4.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = CYPRUS (Selected)	country = CYPRUS (Unselected)				country = CYPRUS (Selected)	country = CYPRUS (Unselected)
1	,028[a]	0.562	0.001	-0.124	1.52487	2.700	0.011

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = CYPRUS.
c. Dependent Variable: Economy.

Table E2.4.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	**Regression**	0.014	1	0.014	0.006	,939[c]
	Residual	18.602	8	2.325		
	Total	18.616	9			

a. Dependent Variable: Economy.

b. Selecting only cases for which country = CYPRUS

c. Predictors: (Constant), Average Energy Security

Table E2.4.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	**(Constant)**	26.806	4.806		5.578	0.001
	Average Energy Security	-0.008	0.101	-0.028	-0.079	0.939

a. Dependent Variable: Economy.

b. Selecting only cases for which country = CYPRUS

Table E2.4.5

Residuals Statistics[a,b]

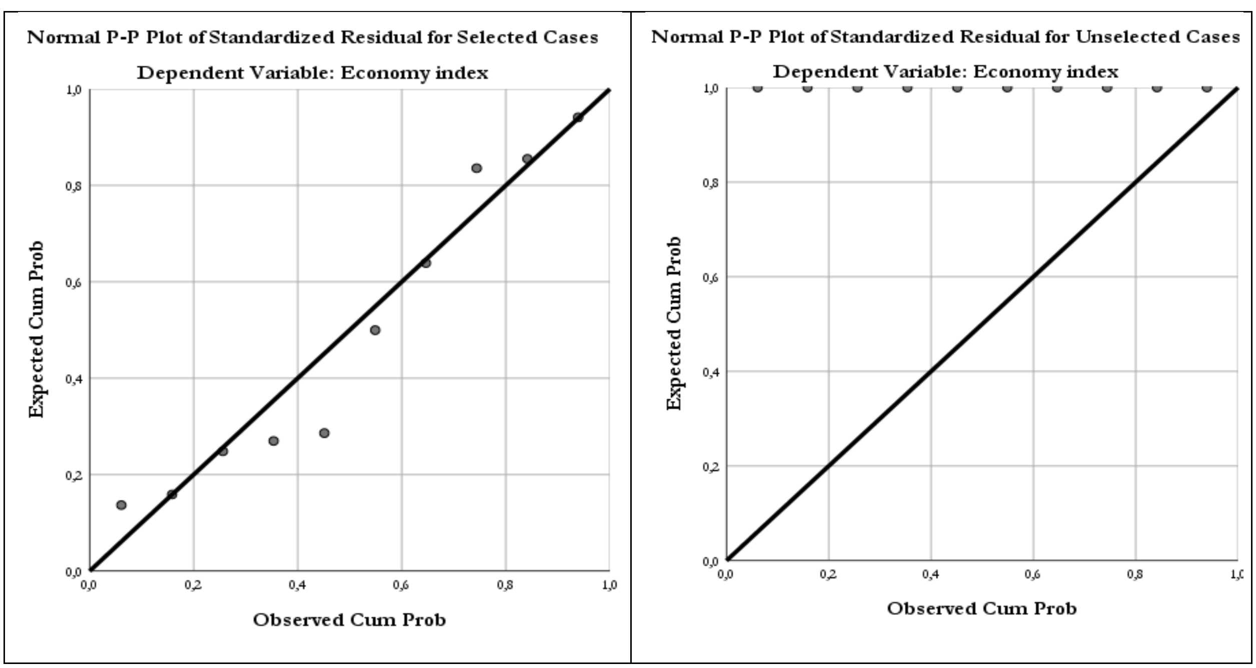
	country = CYPRUS (Selected)					country = CYPRUS (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	26.40406	26.5411	26.430	0.0399	10	26.4299	26.4766	26.4476	0.01637	10
Residual	-1.6701	2.3846	0.0000	1.4376	10	18.8741	40.2738	27.3083	7.3803	10
Std. Predicted Value	-0.649	2.780	0.000	1.000	10	-0.001	1.167	0.442	0.409	10
Std. Residual	-1.095	1.564	0.000	0.943	10	12.377	26.411	17.909	4.840	10

a. Dependent Variable: Economy.

b. Pooled Cases

In the next figure the relationship NS_4=g’ (ES_{ave}) for the case of Cyprus is represented.

Figure E2.4.1



E2.5. Relationship NS_5=g' (ES_{ave})

The index NS_5 has been defined as the "Military" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E2.5.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Military.
b. Models are based only on cases for which country = CYPRUS
c. All requested variables entered

Table E2.5.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = CYPRUS (Selected)	country = CYPRUS (Unselected)				country = CYPRUS (Selected)	country = CYPRUS (Unselected)
1	,277[a]		0.077	-0.039	1.9161	0.978	0.004

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = CYPRUS.
c. Dependent Variable: Military.

Table E2.5.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.433	1	2.433	0.663	,439[c]
	Residual	29.372	8	3.672		
	Total	31.806	9			

a. Dependent Variable: Military.

b. Selecting only cases for which country = CYPRUS

c. Predictors: (Constant), Average Energy Security

Table E2.5.4

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.813	6.039		0.631	0.545
	Average Energy Security	0.103	0.126	0.277	0.814	0.439

a. Dependent Variable: Military.

b. Selecting only cases for which country = CYPRUS

Table E2.5.5

Residuals Statistics[a,b]

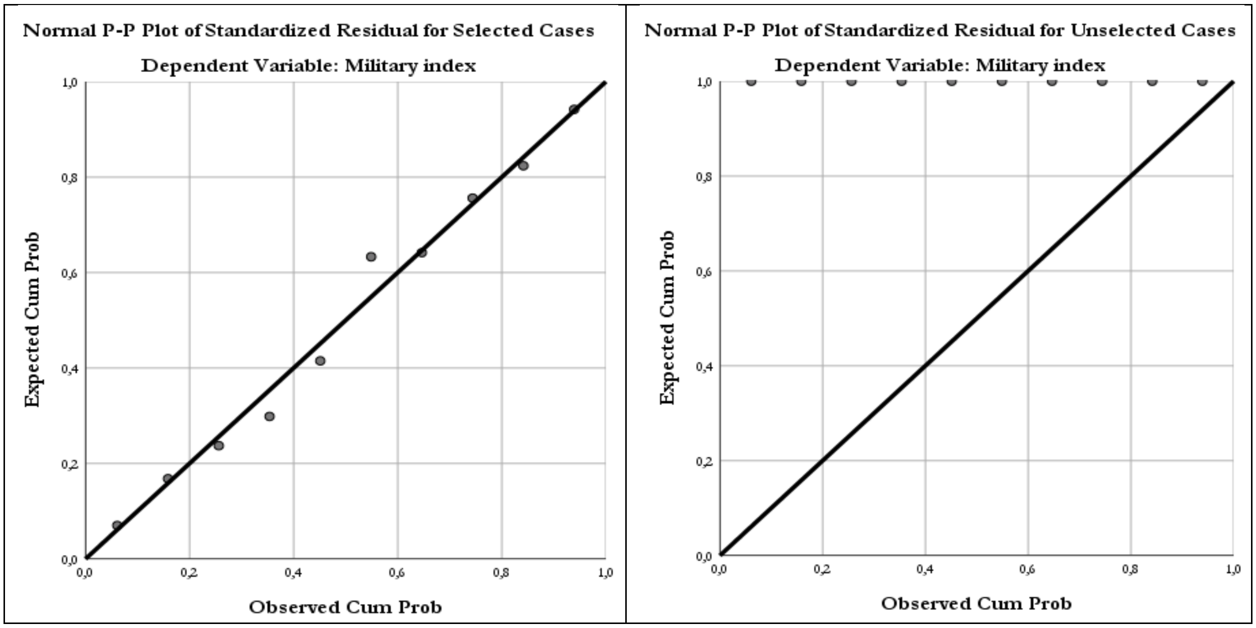
	country = CYPRUS (Selected)					country = CYPRUS (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	7.2586	9.0413	8.7040	0.5199	10	8.0974	8.7043	8.47414	0.21292	10
Residual	-2.8274	3.0098	0.0000	1.8065	10	51.9332	60.9925	55.5688	3.2226	10
Std. Predicted Value	-2.780	0.649	0.000	1.000	10	-1.167	0.001	-0.442	0.409	10
Std. Residual	-1.476	1.571	0.000	0.943	10	27.103	31.831	29.001	1.682	10

a. Dependent Variable: Military.

b. Pooled Cases

In the next graphs the relationship NS_5=g' (ES_{ave}) for the case of Cyprus is represented.

Figure E2.5.1



E2.6. Relationship NS_6=g' (ES_{ave})

The index NS_6 has been defined as the "Leadership" of a country. The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E2.6.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Leadership.
b. Models are based only on cases for which country = CYPRUS
c. All requested variables entered

Table E2.6.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = CYPRUS (Selected)	country = CYPRUS (Unselected)				country = CYPRUS (Selected)	country = CYPRUS (Unselected)
1	,235[a]	0.2641	0.055	-0.063	1.9099	1.051	0.010

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = CYPRUS.
c. Dependent Variable: Leadership.

Table E2.6.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.700	1	1.700	0.466	,0514[c]
	Residual	29.182	8	3.648		
	Total	30.883	9			

a. Dependent Variable: Leadership.

b. Selecting only cases for which country = CYPRUS

c. Predictors: (Constant), Average Energy Security

Table E2.6.4

Coefficients,[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	45.048	6.019		7.484	0.000
	Average Energy Security	-0.086	0.126	-0.235	-0.683	0.514

a. Dependent Variable: Leadership.

b. Selecting only cases for which country = CYPRUS

Table E2.6.5

Residuals Statistics[a,b]

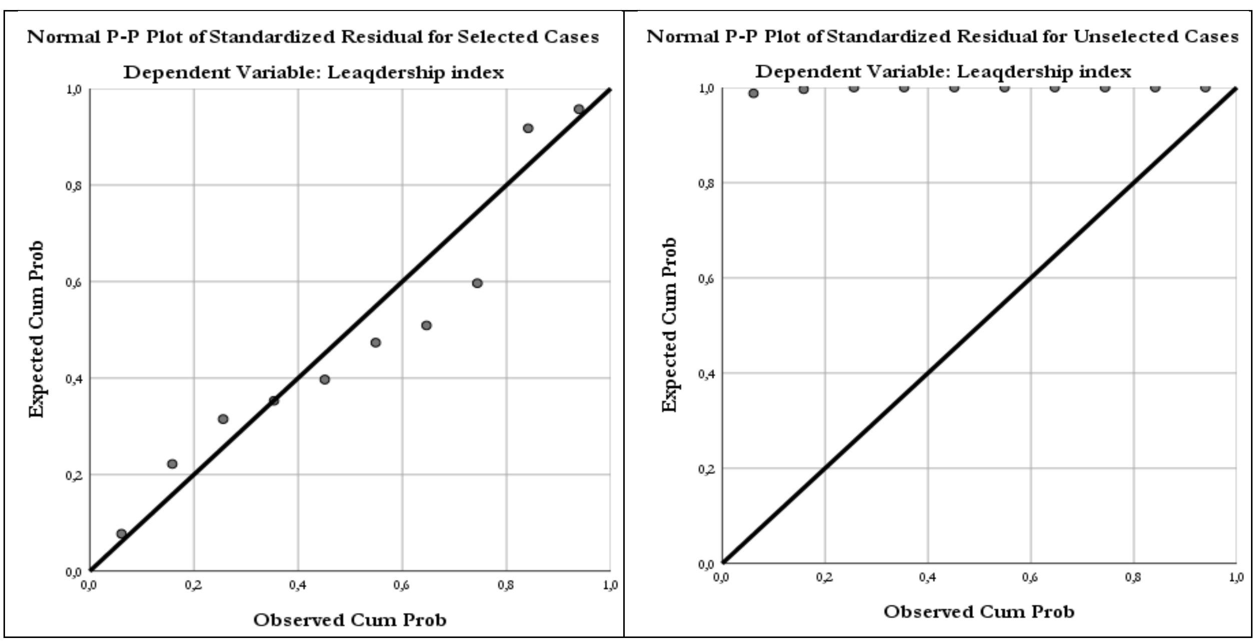
	country = CYPRUS (Selected)					country = CYPRUS (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	40.6770	42.1672	40.959	0.43467	10	40.9586	41.4660	41.1511	0.17799	10
Residual	-2.7170	3.2826	0.0000	1.8006	10	4.28728	9.0657	7.3598	1.6012	10
Std. Predicted Value	-0.649	2.780	0.000	1.000	10	-0.001	1.167	0.442	0.409	10
Std. Residual	-1.423	1.719	0.000	0.943	10	2.245	4.747	3.853	0.838	10

a. Dependent Variable: Leadership.

b. Pooled Cases

In the next figure the relationship NS_6=g’ (ES_{ave}) for the case of Cyprus is represented.

Figure E2.6.1



E2.7. Relationship $NS_t=g'(ES_{ave})$

The examined parameter is the total National Security of the nation-state (country) NS_t which is studied how it is related to the and the independent variable ES_{ave} (average Energy Security). The results of the statistical analysis using the SPSS tool are given in the following tables:

Table E2.7.1

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	Average Energy Security[c]		Enter

a. Dependent Variable: Total National Security.
b. Models are based only on cases for which country = CYPRUS
c. All requested variables entered

Table E2.7.2

Model Summary [b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	country = CYPRUS (Selected)	country = CYPRUS (Unselected)				country = CYPRUS (Selected)	country = CYPRUS (Unselected)
1	,181[a]		0.033	-0.088	0.79728	1.739	0.002

a. Predictors: (Constant), Average Energy Security
b. Unless noted otherwise, statistics are based only on cases for which country = CYPRUS.
c. Dependent Variable: Total National Security.

Table E2.7.3

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.171	1	0.171	0.270	,618[c]
	Residual	5.085	8	0.636		
	Total	5.257	9			

a. Dependent Variable: Total National Security.
b. Selecting only cases for which country = CYPRUS
c. Predictors: (Constant), Average Energy Security

Table E2.7.4

Coefficients,[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	21.918	2.513		8.723	0.000
	Average Energy Security	0.027	0.053	0.181	0.519	0.618

a. Dependent Variable: Total National Security.

b. Selecting only cases for which country = CYPRUS

Table E2.7.5

Residuals Statistics,[a,b]

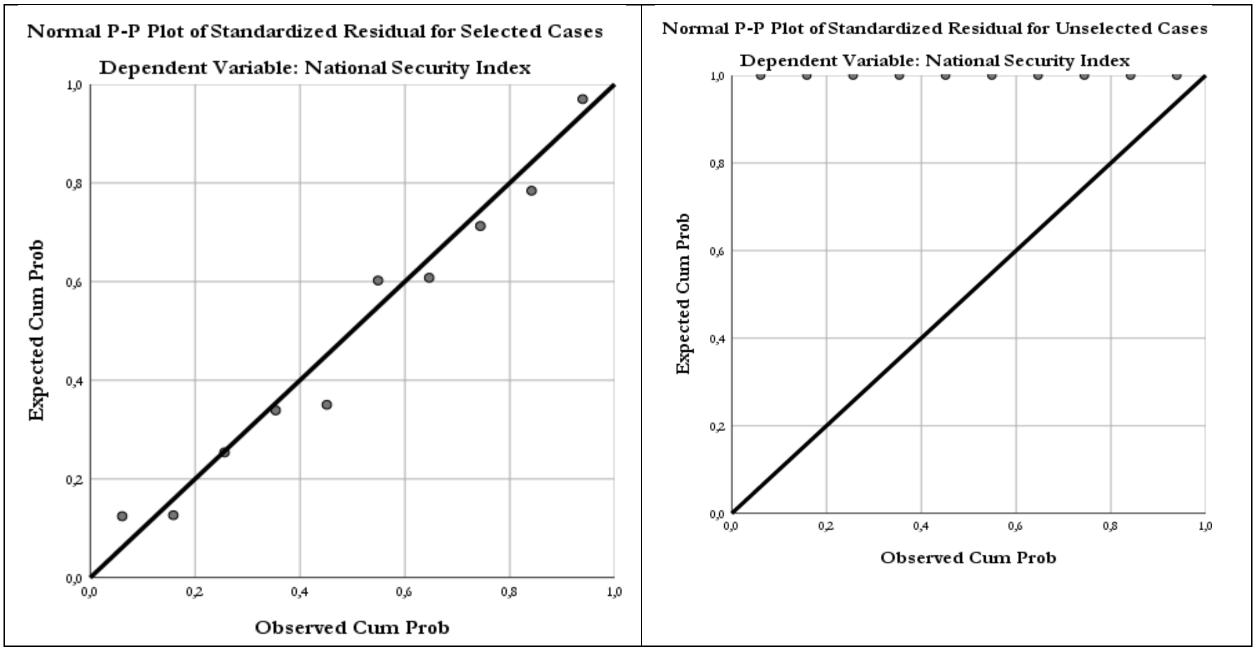
	country = CYPRUS (Selected)					country = CYPRUS (Unselected)				
	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation	N
Predicted Value	22.8333	23.3065	23.2170	0.1380	10	23.055	23.217	23.1559	0.0565	10
Residual	-0.9194	1.4976	0.0000	0.7516	10	20.5332	26.4186	23.355	2.26368	10
Std. Predicted Value	-2.780	0.649	0.000	1.000	10	-1.167	0.001	-0.442	0.409	10
Std. Residual	-1.153	1.878	0.000	0.943	10	25.754	33.136	29.293	2.839	10

a. Dependent Variable: Total National Security.

b. Pooled Cases

In the next figure the relationship NS_t=g' (ES_{ave}) for the case of Cyprus is represented.

Figure E2.7.1


Normal P-P Plot of Standardized Residual for Selected Cases
Dependent Variable: National Security Index
Expected Cum Prob
Observed Cum Prob
1,0
0,8
0,6
0,4
0,2
0,0
Normal P-P Plot of Standardized Residual for Unselected Cases
Dependent Variable: National Security Index
Expected Cum Prob
Observed Cum Prob