Introduction

> "No one today is ignorant on the part played by energy, not only in science, but in industry, politics, and the whole science of human welfare. From the cradle to the grave, everyone is dependent on nature for an absolute continuous supply of energy in one or the other of its numerous forms. When the supplies are ample, there is prosperity, expansion and development. Where they are not, there is need", Frederick Soddy 1912[1].

In the modern era, the development of national societies, politics and international diplomacy is strongly linked to the economy sector: energy is, *de facto*, what puts in action the mechanisms of this complex apparatus that we call World. From the discovery of fire made by cave men, to the modern use of fossil fuels and advances in nuclear physics – energy played a central role in human development and economic growth. It is indeed a multifaceted concept, which represents a pivotal concern in International Affairs: the oil wars in the Middle East, the construction of intercontinental pipelines, the rise and fall of oil prices, economic and political sanctions regime and energy shortages – can be easily associated with few of the key moments of international diplomacy. We are testimony, today, of the current political and economic situation of destress (both on global and national level), which impacts significantly on world's energy sector and, at the same time, it is also caused and alimented by it. World energy demand is persistently growing and, due to the shortage and geographical distribution of natural resources, dependency rates of national governments are rising[2]: this economic and political bound to third parties shapes the diplomatic relations within the International Community. Because energy supports

[1] Nobel Prize winner, Frederick Soddy was an English radiochemist involved in several energetic, economic and scientific disputes. Cited in Haghighi 2007, p. 1.

[2] According to main International Agencies (Eurostat, EIA and IEA) National Energy Dependency rates are overall increasing worldwide, even if at different speeds. For further information and data see: *Global Energy Consumption.*

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diverse and several (if not almost every) human activities, the current energy crisis gains relevance and complexity; most people, however, do not understand fully the range of this situation of distress, there is more to an augmented price at the gas station[3]. For policy makers and national representatives, instead, energy security and dependence represent a crucial issue deeply interconnected with National Security, therefore a daily concern.

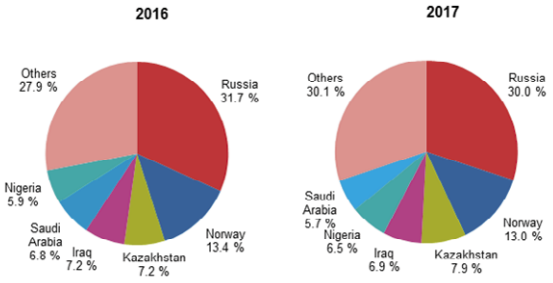
Conventional energy sources represent the major cause of environmental stress due to CO2 emissions, which drive a wide range of environmental changes counting global climate change, acid deposition and air pollution. Coal mining destroys areas of natural habitat, hydropower carries significant ecological and social costs and oil and natural gas extraction impacts on our sensitive ecosystem and are not made to last (United States Environmental Protection Agency – EPA s.d.). The dramatic environmental consequences of high-energy consumption deserves a deeper and more accurate investigation because there is no '*planet B'* in this reality: unless a scientific breakthrough will allow humanity to survive on other planets soon, the Earth is our only home and we must safeguard and take care of it. The main objective of this work, though, is oriented towards a different but related perspective. Neglecting by choice the environmental issues, the purpose of this short analysis is firstly to understand what does energy security really mean, why is it important for Modern States and which are the consequences of high rates of energy dependence; secondly, to analyze the past and current status of energy relations between the European Union and the Russian Federation. Due to the lack of sufficient (able to meet the demand) energy sources within the territory of the Union and the abundance of them in Russia, the trade seems to be a *win-win* situation; however the constant need of primary energy might exacerbate the consequences of EU energy dependence, or convert it in a more balanced form of dependence.

The main subjects of this analytical work, indeed, are going to be the European Union and the Russian Federation, as they represent two main (but very different) powers on the International Arena. The core of this research is going to be devoted to the analysis of the past and current Euro-Russian energy relations; the aim is to demonstrate how outdated is the concept of unilateral energy dependence in the contemporary relationship between the European Union (consumer) and the Russian Federation (supplier).

Each State indeed tackles the energetic issue in its own way according to national demand of energy, production (if there is) and choice of domestic energy mix. In the case of energy-exporter countries, there is no energy dependence problem, which appears when there is not (or not sufficient) domestic production and the consumed energy arrives from third States. This relationship, es-

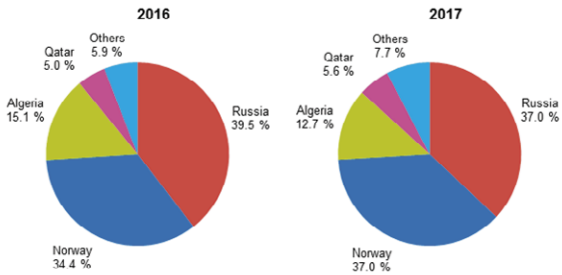
[3] Energy saving represents today one of the main quests for almost all developed centers; power is necessary for everything, especially in households. It is possible to generalize saying that energy is mainly used in three main spheres: Residential uses, Commercial uses and Transportation. See: Dawson 2015.

tablished between the importer and exporter, has remarkable implications for national agendas, especially for the energy import depending country. Considering the economic and political relevance of the European Union in the International System, it might seem unusual that the dependence rate of the EU is one of the highest in the world. According to the Eurostat statistics, indeed, among all energy products the EU in the first half of 2017 imported almost 69% of oil and 20% of natural gas (Eurostat, Statistic Explained, 2018). The Russian Federation was undeniably Europes largest supplier of gas in the last past years, and second in petroleum oils (figure 1 and 2).



Source: Eurostat database (Comext) and Eurostat estimates

Figure 1. Extra-EU import shares of natural gas (2016, 2017).



Source: Eurostat database (Comext) and Eurostat estimates

Figure 2. Extra-EU import shares of Oil (2016, 2017).

The main purpose of this study is indeed an analysis of the delicate situation regarding the European Union in terms of energy dependence from Russian energy supplies. Starting from a brief overview of the current levels of global energy consumption and a scan of conceivable future trends, the research is going to focus mainly on the evolution of the concept of energy security and energy dependence in order to understand the actual energy relations between the European Union and the Russian Federation. Considering the evolution of common EU Policies and the Dialogue with Moscow in the Energy field, the aim of this analysis is to outline which ties bound Europe and Russia and subsequently, the "nature" of their energy relationship – dependence or interdependence.

The primary question, upon which this analytical research is based, is whether it is still actual to talk about European energy dependence on Russian primary energy supply. The main argument of my hypothesis is that currently the Euro-Russian energy relations are more complex and multifaceted than before, therefore there is no more space for unilateral dependence. The concept of mutual dependence, or Interdependence, better exemplifies the core reason of the current energy trade between the Russian Federation and the European Union; the existence of an already built and ramified pipeline network ensure Moscow stable profits from stable export energy flows making inconvenient a (possible) trade disruption. Even if, the security processes imply further research of more diversity and sustainability in energy supplies and despite the current high percentage of Russian primary energy in the EU fuel mix, in a relatively long-term, the Euro-Russian cooperation seems to be resilient.

The contemporary world is going beyond the binary dependence relationship, the interdependence connecting the actors of the International System creates a new reality where the inclusiveness of Energy Security concept spreads to several different areas. Efforts in diversification are crucial, however mutual benefits still rule the Euro-Russian energy relations.

Methodology

In order to determine the nature of the Euro-Russian Relations in the energy sphere, it is compulsory to define first the relevance of Energy Security (what it means both to energy importing and exporting counties) and the actual European energy supply system by referring mainly to energy flows from the Russian Federation. To address this important and delicate task, the analysis is mainly concentrated on the most important steps in the history of energy cooperation between Brussels and Moscow and on the current state of primary energy export from Russia to the EU. For these purposes, the methodology adopted in this scientific research is mainly represented by the following general scientific techniques: deductive and inductive analysis, scientific literature and regulatory documents study, descriptive method and economic data analysis. Furthermore, the systematization, classification and processing of a wide range of notions, facts and figures through "*Imaginative thinking*"[4], has allowed reaching a more cohesive outcome. The core of the research is given by the scholars of International Studies, whose works have shaped and developed the theory of security, from the traditional definition to the contemporary one including also the concept of Energy Security.

Sources

The redaction of this work had required a wide range of different references including books, journal articles, official documents, speeches, statements and

[4] Analytical technique adopted mainly in strategic intelligence and International politic analyses, aimed to develop new insights, different perspectives and/or alternative outcomes.

parliamentary outcomes. The collected bibliography can be divided in five groups according to the source and type of the documents. The first one is vital for the contextualization of the entire study; the Monographs and Energy related Books help delineating the evolution of Energy Security Concept. In particular the most relevant authors for this purposes were M. Verda, S. Zhiznin (Жизнин,), A. Zaharov, P. Bardazzi, A.Tonini, S. Haghighi and Bazilian and Roques. The second group is also very important: the Archives and Documentary Sources includes National Energy and Defence Strategies, official Reports on the domestic and international situation regarding energy consumption and production, Treaties, White and Green Papers as well as the European Energy Directives and Policies. This group represents the skeleton of the Euro-Russian energy Relations. The third group instead includes a wide range of publications, papers and redactions on energetic issues. The majority of the sources is given by the publications of internationally recognized research centres; it is noteworthy mention the *Istituto Affari Internazionali (IAI), International Energy Agency (IEA), Energy Policy Journal, Energy Journal, Istituto per gli Studi di Politica Internazionale (ISPI), International Affairs* among several others. The fourth group consists in Newspapers and News Agencies publication, very useful in order to assess the general perspective on the energy issues in both the Russian Federation and Western States. The *Carnegie Moscow Center* and *Carnegie Europe*, the *Oil & Gas Journal, Forbes*, *Reuters*, the *NY Times, Forbes, Telegraph, Borsa Italiana* and *Vedomosti (Ведомости)* – proved to be extremely useful for this specific purpose. The last group of sources, instead, includes the most used websites during the redaction of this analysis; the majority of the current data and information were extrapolated from Eurostat, EIA, World Bank and OECD data databases. Particularly useful were also the European portals, such as the European Commission Press Release Database and the European Parliament website, for the acknowledgement of the last news and developments in the Energy sector at the EU-Level. Of course, these represent only in part the huge number of sources consulted throughout the research.

Structure

The Analysis consists of an introduction, a brief overview on Global Energy Consumption, three chapters, conclusion, three technical appendixes and references. The introduction assesses the relevance and the motives that led to choose this topic, outlining the main objective and aim. The first chapter is dedicated to the historical evolution of the Security Concept, which from a purely military sphere had spread also to different areas including Energy Security; then the notion of Energy Dependence is tackled with a particular attention to some of the most common macroeconomic indicator used to define the level of energy dependence of a State. The first chapter ends with a section dedicated to the European and Russian Energetic Security Strategies. The second chapter is, instead, more focused on the contemporary energy production within the Russian Federation and its export toward the European Union. The core of the chapter is a detailed description of the main pipeline networks – active and under con-

struction – which ensure stable energy flows to the continent; before moving to the last part of the work, a brief overview on the Renewable Energy Sector in the Russian Federation was necessary. The third chapter represents the true objective of this analysis, after recalling the main steps and attempts in the implementation of a common European Energy Policy the work investigates more accurately the Euro-Russian cooperation in the Energy field. From the Partnership and Cooperation Agreement with Russia (PCA) to the EU-Russia Energy Dialogue and the Common EU Strategy on Russia, it appears clear that the relationship between these two important International Subjects was always at the top of their strategic agendas. The conclusions of this analytical work are simple: there is no reason today to consider the Euro-Russian energy cooperation merely as an asymmetrical dependence, the contemporary world processes and evolutions make it a political and economic interdependence.

Global energy consumption

In the purposes of this research, it is indispensable to dedicate some lines to general energy consumption trends. The World is a heterogeneous organism (and I deliberately have decided to call it "organism" because it evolves and has its own needs), therefore generalizations of any kind are hazardous but in order to understand better the concepts of energy security and dependence we must look at the general rates of primary energy consumption.

In the contemporary world the energy sector, on both global and local levels, is becoming more and more important; the development of human civilization raised up the economic-technological growth, the demographic pressure and socio-political friction. The Energy industry of the XXI century embraces several areas of human activity, providing lifeblood to the population, in form of fuels, electricity, heating and combustion. This kind of industry is very dynamic because interrelated to the development and growth of society. The processes of modernization have led to higher global energy demand rates even if substantial technological breakthrough in energy efficiency would have to decrease consumption. Energy experts and agencies as IEA, indeed, forecast a persistent and moderate growth of world energy consumption for the following years[5] (Figure 3).

This estimation does not come out of the blue: the demographic upsurge and economic growth of developing counties are going to weigh on global demand counteracting efficiency achievements. African and Middle Easter countries are indeed growing fast boosting average energy consumption; in Europe and North America, on the other hand, the demand is slowly decreasing[6]. In addition, some macroeconomic indicators accentuate how economic development and growth

[5] U.S. Energy Information Administration (EIA) – Independent Statistic & Analysis 2017a.

[6] Economic indicators corroborate these trends: according to the OECD statistic data, the total primary energy supplies of the OECD Counties have decreased from 5.30k toe in 2000 to 5.26k toe in 2016. <https://data.oecd.org/energy/primary-energy-supply.htm> (2018-10-31).

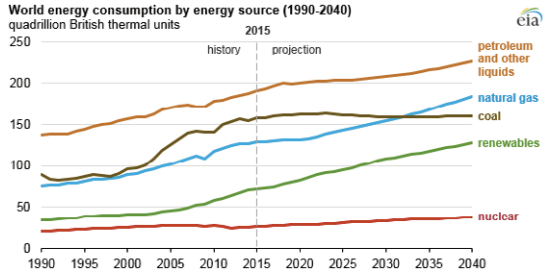


Figure 3. EIA forecast on global energy consumption up to 2040.

on Global and National levels affect energy demand. Considering this different angle, it is possible to highlight several different essential indicators:

World GDP. The growth of the average Gross Domestic Product (GDP) reflects the dynamism and progress of economic development and global production. Of course, developing countries play a great role expanding their productive capacity, meanwhile the developed ones follow post-industrial patterns of evolution focusing more on quality than quantity. Thanks to the scientific and technological innovations, the production of one item requires today less energy than yesterday (efficiency), however the production boost in emerging countries weights rising the global energy demand.

Per Capita GDP. Population's wealth is increasing due to economic drive and international anti-poverty programs. International organizations, the United Nations and several non-profit NGOs fight poverty on a daily basis, hunger and diseases in undeveloped counties promoting also economic development programs and craft classes; this joint action increases *per capita* wealth, fuel use, economic exchange and, consequently, the growth of energy demand.

Urbanization rate. The almost pervasive increase of urban areas has led to a dramatic decrease of rural spaces and inhabitants. If in the XIX century, only 2% of world's population lived in cities, after the "urban Millennium"[7], in developed countries the process ended with 75% of urban population and by 2030 it is going to reach 84%, in developing countries instead the urban inhabitants are going to be 50% at the end of 2020 (The United Nations – Urbanizations, 2001). This means more concentration of energy demand and inevitable rise of consumption.

A tangible example of these forecasts extrapolated from reality; in 2017, according to official energy databases, China's annual energy consumption growth rate has doubled in just one year reaching +2.9% (Enerdata 2018). This national rebound has further stimulated the overall global energy demand, the rates of *acceleration in energy consumption* are indeed astonishing: +1.1% in 2016

[7] Expression that indicates an exceptional historical period, in which for the first time at a Global level the majority of people will live in cities.

and +2.3% in 2017 (Enerdata, "Global Energy Statistical Yearbook 2018"). The annual energy consumption grew not only in the Asian region, but also steadily in Europe, Canada and Russia (meanwhile in the United States it remained quite stable). In order to understand better the issue, it is possible to breakdown World's consumption of 2017 by energy type (Enerdata 2018):

- *Hydrocarbon fuels – almost 60%.* Oil and its derivatives represent still the main source of power, even if in the last two decades its share is gradually shrinking meanwhile the natural gas one is growing (now approximately 22% of total energy consumption).
- *Coal – 27%.* The share of carbon used in energy industry grew significantly in the last years; such upturn originated from the predictions that the planet was expected to run out of hydrocarbon fuels in a short time. However, after the shale gas revolution, which has postponed the deadline of the end of hydrocarbons, and the ecological awareness the rate began to decrease again.
- *Nuclear – 4,4%.* The share of nuclear energy has remained almost the same because only few counties possess nuclear power stations. The level, though, decreased of 2% after the Fukushima-1 catastrophe in 2011; this incident has raised awareness about nuclear risks among the international community leading to the increase of non-nuclear energy production.
- *Renewables (2.5% + 6,8%).* The gap in energy production created by the decrease of nuclear and carbon use, has incremented the production of green energy. The reduction of ecologically harmful sources boosted the green sector initiating a completely new trend of awareness in the developed countries.

These percentages portray the current status quo in terms of World's energy consumption. The numbers represent an ongoing evolution, a trend, shaped by fundamental historical events that have left a mark in our society.

All began with the "Shale Revolution" in the United States of America: in the most vulnerable time in energy history[8], when the reserves of oil where about to use up, a new extraction technique brought light into the market. The country was expecting (as well the rest of the world) a severe hydrocarbon shortage, furthermore the concrete forthcoming possibility to suffer energy dependence form other countries has led the American Government to act promptly. In order to avoid high priced imports, they have managed in the early 2000 to extract oil from shale rocks (Borovskij 2011), making productive reservoirs previously inaccessible. It is important to specify that shale oil industry in America began developing from the XIX century, but it fell victim of the low petroleum prices that made it uncompetitive on the international markets. Due to the rising global demand and the discover of new oil reservoirs now exploitable, the national American crude oil production raised vertiginously (from 5,000 thousand bar-

[8] Here I am referring to the concrete possibility for humanity to run out of fossil fuels in a few decades, not for past or future shortages, supply interruptions due to political or technical reasons or price fluctuations – all-manageable.

rels per day in 2008 to 9,431 thousand in 2015)[9]. Just after a few years, American shale-extracted oil and gas provided more than requested energy supplies in order to meet, and exceed, national demand[10]. The United States of America, indeed, thanks to this national production increase, have managed to stop being the world's largest energy importer[11]; at the same time, but on the other side of the ocean, People's Republic of China began its personal climb to the top of the 'International hierarchy'. National high rates of population, labour force, industry production and economic growth have translated into a very high-energy need, making Beijing worlds' biggest energy consumer and importer[12].

The final level of energy consumption, however, does not represent a simple derivation from rates, numbers of needs; the international community's concerns about the ecological dimension play also a central role in defining the final level of energy demand. The degradation of the global ecosystem compels States (even if not directly, through political and social lobbying) to search new ways of producing and consuming energy in order to prevent further deterioration of the planet. The main problem is that all the documents and reports elaborated during international summit on climate change proclaim very ambiguous and non-mandatory guidelines in the field of the development of green energy, leaving up to the States the decision to choose their own path in energetic field and following environmental policies, since energy is part of national security concern[13]. Even if the environmental awareness movements were born and then spread from OECD countries, which have proved to be the driving force of green consciousness, today the situation has changed dramatically. The BRICS countries (especially China and India), indeed, represent the current most active national promoters of green energy according to their national energy mixes (Bakharyova 2014). Energy efficiency advancements and high-priced traditional energy sources have as well favored investments in renewables; however, the fall of oil, gas and coal prices postponed for the moment the gradual transition

[9] Data extrapolated from EIA official web site, *US Field production of Crude oil*: <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mcrfpus2&f=a> (2018-09-16).

[10] According to EIA statistics, in 2007, the U.S. shale natural gas production was 1,293 Billion cubic Feet, in less than a decade in 2016, instead it was accounted to 17,032. <https://www.eia.gov/dnav/ng/hist/res_epg0_r5302_nus_bcfa.htm> (2018-06-24).

[11] In addition, for the first time after 1973, the United States of America out formed the Russian Federation's crude oil production. The president of Rapidan Energy Group, Bob McNally, meanwhile celebrating the more than doubled oil production, stated that this represents an historical milestone in American history and it is a reminder for everyone: never bet against the American oil industry. See: Egan 2018.

[12] In 2010, China's energy consumption was more than 2,453 (double than in 2000) after an annual rate growth of +11,2%. For the first time Chinese national energy demand out-placed the total amount of the developed West, including US, France, Germany, Switzerland, UK and other European countries. See: <https://www.iea.org/weo/china> (2018-06-24).

[13] The European Union represents an exception: the environmental legislation of the Union (composed by over 500 Directives, Regulations and Decisions) has significant effects on Member States.

to clean and eco-friendly energy industry leaving the traditional hydrocarbon-based implants more attractive. Indeed, since there is not yet a mandatory green policy at the international level, and all green investments depend on national balances and international oil prices, the development of sustainable energy is precarious and fickle.

Noteworthy are also the current challenges facing the hydrocarbon fuel markets, which make very hard for a precise analytic elaboration forecast on the evolutions of international prices or reserves exploitation. As known, the increase in energy prices does not automatically originate a demand fall because (especially in the short run), fuels or other energy sources are not something easily replaceable by consumers. The rate of oil prices changes constantly and this *fluctuation* discourages economic forecasts: in summer 2015, indeed, it was predicted that the average price was going to grow significantly by 2016, however, this did not happen and the prices continued to fall until the late 2016, when a small augmentation showed up (Taberner 2016). This price drop was provoked by a remarkable increase of oil production: in those years indeed, the United States of America intensified their national production of *'hard-to-extract'* crude oil (shale oil) due to the revocation of the export-prohibition (Overchenko 2015). The OPEC cartel, even if American oil pour out in the market, kept producing more than needed by global energy demand, leading therefore to the creation of an oil surplus and drop of its price. The possibility for Iran to restore its oil export after the lift of international sanctions has influenced as well the 2015's oil price drop.

Recapitulating, the economic growth, social and urban development, as well as the challenges facing hydrocarbon market, environmental awareness and historical and technical progress define the current levels of world energy demand. However, it is important to underline that the geography of the world energy sector is not cohesive; according to Zakharov (2015), indeed, the historical deviation of the main global energy flows required special attention.

The growth or decrease of both national and regional energy productions and the development of new economies and realities, deeply affects the general structure of the international energy sector. Global networks of energy supply adapt to these new conditions shifting and evolving at the same time; energy comes and energy goes to one or another side of the planet. Considering just the last 50 years, it is possible to point out three main causes to the shift of international energy streams:

1. The great revolution of oil production in the United States of America, through the shale technique, has allowed the exploitation of unconventional oil fields. According to the International Energy Agency (IEA), this break though will lead to the American Leadership in world oil production by 2020 reducing at the same time oil flows to the United States: USA's energy dependence, indeed, has already decreased from 20% to 10-15% (Ivanov, Matveev 2017). Regarding the gas market, instead, the American inner gross domestic production meets perfectly national demand, leaving an open door for further development in the international gas-export sector.

2. The *Arab Spring*, among all its consequences brought to the International System, has affected deeply North African's energy export. Due to the expansion of terrorist groups, political instability and military regime, Libyan energy producers have suspended, indeed, their activity on national soil. Similarly, Algerian natural gas production also fell: the political turbulence cut the financing to gas-extraction sector, heavily in need of new forefront explorations works. Consequently, because of the consequences of the Arab Spring, European energetic supplies have decreased dramatically (International Energy Agency – IEA 2016) and only in these last past years, have started to rise again[14].
3. The OECD countries, exception made for Japan and Republic of Korea, are slowly lowering their energy consumption, making the Asian-Pacific region the most attractive world energy market. This area, indeed, is very appealing for energy producers due to a high and stable energy demand; suppliers form the Middle East (especially Iran) are looking closely to the development of this area. The Russian Federation is also checking their neighbour Asian Market, redirecting gas originally destined to European Countries, to China.

Each event mentioned above introduces remarkable changes in the structure of the world energy sector; all of them, together, modify and shape the World energy networks and its regional sub networks adapting them to the new international *status quo*.

The general outline of global energy consumption given by this introductory part represents an indispensable tool for the upcoming research. In order to proceed with the meticulous analysis of the European energy dependence, indeed, it is necessary to be aware of global energy trends and flows: why they are increasing and due to which economic, structural and political factors. To follow, after a preliminary chapter dedicated to the evolution of the concept of national security, a smattering of macroeconomic analysis is going to present a few ways to measure and define the level of energy dependence in order to understand better the positions of the European Union and Russian Federation in the matter.

[14] Furthermore, it is worthy mentioning other few international developments which make obvious and certain future significant increase of European supplies: recently Israel has discovered, indeed, a huge field of non-conventional oil and shale gas; Cyprus, on the other hand, has found a new oil field in its territorial waters and Egypt was also fortunate finding one in its off-shore territory.