

Chapter 3

Energy Security in the Framework of Human Security, Oil, and Gas in the North Atlantic Basin

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Since the energy crises of the 1970s, the management by government authorities of the relation between energy needs and economic growth has been a priority.¹ During the last century, the energy system has relied on fossil fuels. Today fossil fuels still represent more than 80% of total energy demand. Furthermore, their geographical distribution implies that the principal oil and gas production fields are not located in the same areas as the largest energy consumers.² Therefore, developed countries (mainly located in the Atlantic Basin) have suffered from a lack of energy sources, so energy security has become a priority for them. However, this has changed recently as a result of the ‘Atlantic energy renaissance’. While import dependency continues to be a driver for energy security concerns in Europe, the rest of the basin is increasingly self-sufficient and more and more a net exporter.³

Growing energy demand (both in developed and developing countries), which is shown in next table, has heightened concern about energy security, a concept that has broadened to include different elements of sustainability.⁴ In this regard, however, between 1990 and 2015 more than 80% of the increase in global energy consumption occurred in developing nations.⁵

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1. Sodupe, K., & Molina, G. “Gobernanza, seguridad energética y sostenibilidad”. In *Gobernanza para un sistema energético sostenible*. Universidad del País Vasco, 2018, 31.
 2. Ibid.
 3. Isbell, P. and Álvarez Pelegrý, E. (Eds.) *Energy and transportation in the Atlantic Basin*. Center for Transatlantic Relations, Johns Hopkins University SAIS, with Brookings Press, in conjunction with the Jean Monnet Network Project on Atlantic Studies, co-financed by the Erasmus+ Programme of the European Union, Washington D.C. 2017. Available at: <https://www.orkestra.deusto.es/es/investigacion/publicaciones/libros-informes/otras-colecciones/1244-energy-transportation-atlantic-basin>
 4. Keiji, K. “Energy security and human insecurity”. In *Poole Gakuin University* (Ed.). (n.d.). Available at: https://ci.nii.ac.jp/els/contentscini_20180330134441.pdf?id=ART0010407155
 5. Sodupe, K., & Molina, G. Op. cit..

Table 1. Total primary energy demand by region in the New Policies Scenario (Mtoe) (2017-2040)

	2000	2017	2025	2030	2035	2040	Change	CAAGR
North America	2,678	2,624	2,675	2,667	2,661	2,693	69	0.10%
USA	2,271	2,148	2,185	2,162	2,139	2,149	1	0.00%
Central and South America	449	667	730	784	847	916	249	1.40%
Brazil	184	285	315	338	363	391	106	1.40%
Europe	2,028	2,008	1,934	1,845	1,779	1,752	-256	-0.60%
EU	1,693	1,621	1,512	1,404	1,321	1,274	-347	-1.00%
Africa	490	829	980	1,086	1,192	1,299	470	2.00%
South Africa	103	131	133	132	135	138	7	0.20%
Middle East	353	740	846	957	1,085	1,200	460	2.10%
Eurasia	742	911	943	960	986	1,019	108	0.50%
Russia	621	730	745	744	754	769	39	0.20%
Asia Pacific	3,012	5,789	6,803	7,344	7,798	8,201	2,412	1.50%
China	1,143	3,051	3,509	3,684	3,787	3,858	807	1.00%
India	441	898	1,238	1,465	1,683	1,880	982	3.30%
Japan	518	428	415	403	390	379	-48	-0.50%
South-east Asia	383	664	826	923	1,018	1,110	446	2.30%
International bunkers	274	404	476	525	578	635	231	2.00%
Total	10,026	13,972	15,387	16,168	16,926	17,715	743	1.00%
Current policies			15,782	16,943	18,125	19,328	5,356	1.40%
Sustainable development			14,146	13,820	13,688	13,175	-257	-0.10%

Note: CAAGR = Compound average annual growth rate.

Source: IEA, "How does the IEA respond to major disruptions in oil supply?". 2011b. [Consulted at 25th November 2018]. Available at: <https://www.iea.org/newsroom/news/2011/march/how-does-the-iea-respond-to-major-disruptions-in-the-supply-of-oil-2011-03-10-.html>

Today, the principal energy demand dynamics have turned to Asia and, as a consequence, the Atlantic Basin has lost some of its traditional demand relevance.

This chapter focuses on energy security: it includes, first, a conceptual framework for the term and its relationship with human security. Given that, traditionally, the principal global energy flows have taken place within the North Atlantic Basin (NAB), there is then an analysis of energy security context across this territorial and maritime space, including the main policies adopted by the EU and the USA, both key players. The chapter ends with some considerations about energy security in the North Atlantic Basin.

Energy security within the framework of human security

Today energy is one of the major inputs for industry, transportation and social welfare. In this regard, according to E.F. Schumacher, energy is “not just another commodity, but the precondition of all commodities, a basic factor equal with air, water, and earth.” Therefore, energy security can be considered a public good.⁶ Some authors believe that public intervention in energy could be justified. Indeed, energy security has been synonymous with national security during times of war over the last 100 years.⁷

Energy security has gained influence within human security, at least since the 1970s—when many countries nationalized their fossil fuel reserves and developed national oil companies and the two oil crises occurred (in 1973-74 and 1979-80). Fuel importing nations began to consider energy supply disruptions as questions of national security to be addressed with military strategies⁸. Additionally, economic stability and growth became essential concerns of national security⁹. This catalyzed, in 1974, the

6. Sovacool, B. K., & Mukherjee, I. “Conceptualizing and measuring energy security: A synthesized approach”. In *Energy. The International Journal*. Vol. 36, 2011, 5343-5355.

7. Energy Charter Secretariat “International energy security. Common concept for energy producing, consuming and transit countries”. 2015. Available at: <https://energycharter.org/what-we-do/trade-and-transit/trade-and-transit-thematic-reports/international-energy-security-common-concept-for-energy-producing-consuming-and-transit-countries-2015/>

8. Karlsson-Vinkhuyzen, S. I., & Jollands, N. “Human security and energy security: A sustainable energy system as a public good”. In *International handbook of energy security*. Cheltenham: UK, Edward Elgar, (n.d.). 507-525. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2562594

9. Graf, R. “Between national and human security: Energy security in the United States and Western Europe in the 1970s”. In *Historical Social Research*. Vol. 35, No. 4, (n.d.),

creation of the International Energy Agency (IEA) which historically associated energy security principally with oil supply.¹⁰

It is true that energy supply interruptions at that time did not pose the severe limitations to people's freedoms as do wars or ecological disasters (which are also related to the concept of human security explained next). However, during the 1980s, when oil supply expansion and lower oil demand led to a loss of control by OPEC (the Organization of Petroleum Exporting Countries), the 1987 Brundtland Report that established the concept of sustainable growth argued that "the traditional concept of security which concerned political and military threats to national sovereignty had to be extended because of the increasing influence of environmental pollution on a local, national, regional and global level."¹¹

The 1990s opened with the Gulf War and the fall of the Soviet Union and continued to unfold with a trend towards privatization and liberalization of energy industries and markets.¹²

In 1994, the United Nations Development Programme (UNDP) prepared the Human Development Report which identified seven types of security beyond physical violence: economic (related to income), food, health, environmental, personal, community and political. Later, in 2003, the Ogata-Sen Commission developed a definition of human security as "to protect the vital core of all human lives in ways that enhance human freedoms and human fulfilment." In 2004, the EU developed the Human Security Doctrine for Europe. In general, 'human security' is mainly used to describe the security of people's livelihoods which may be threatened by civil wars, natural disasters, or failing states.

Energy was not mentioned in either of the UNDP or Ogata-Sen Commission reports. Nevertheless, some authors¹³ claim that energy security participates in at least four of the seven security dimensions previously mentioned, including economic, food, health and environmental security.

Therefore, human insecurity can be caused by energy insecurity. To confront this challenge, the UN decided that 2014 would mark the start of the United Nations Decade of Sustainable Energy for All and called on inter-

329-348. Available at: <https://doi.org/10.12759/hsr.35.2010.4.329-348>

10. IEA "Energy supply security 2014". Paris. 2015. Available at: www.iea.org

11. Graf, R. Op. cit.

12. Energy Charter Secretariat. Op. cit.

13. Karlsson-Vinkhuyzen, S. I., & Jollands, N. Op. cit.

national agents to bring modern and sustainable energy to everyone on the planet.¹⁴

Compared with developed nations, most developing countries find themselves in a more difficult situation due to the lack of any meaningful political, economic and military power to influence the stability of energy supply. As a result, there are still two main positions in relation to energy security: that of the developed consumer countries and that of those nations where a considerable part of society still does not have access to modern energy supply. In this regard, the NAB is located among the first group and the South Atlantic Basin (SAB) in the second one.

About the energy security concept

There are 45 distinct definitions of the energy security concept, with similarities among them. Some consider this concept from the point of view of the countries of the Organization for Economic Cooperation and Development (OECD). Some are centered on aspects such as electricity supply, so they are not fully applicable to the least developed countries that had incomplete electricity networks, limited access to electricity (as next table shows) or nuclear power units, and non-motorized forms of transport,¹⁵ and therefore such definitions do not cover the entire Atlantic Basin, specially the SAB.

In the past, combining “energy” and “security” in a straightforward sense meant stable energy flow, but today there should be references to other questions.¹⁶ In this regard, the IEA defines energy security simply as “the uninterrupted availability of energy sources at an affordable price,”¹⁷ a definition that does not include any environmental or social notions.

Thus, there is a need for a “holistic” energy security definition which could reveal and reflect the complexity of the concept. It could be the continuous availability of sustainable energy in varied forms, in sufficient quantities, at affordable prices. Furthermore, some authors feel that this definition should include two more dimensions: technology and regulation.

14. Keiji, K. “Energy security and human insecurity”. In *Poole Gakuin University* (Ed.). (n.d.). Available at: https://ci.nii.ac.jp/els/contentscinii_20180330134441.pdf?id=ART0010407155

15. Sovacool, B. K., & Mukherjee, I. “Conceptualizing and measuring energy security: A synthesized approach”. In *Energy. The International Journal*. Vol. 36, 2011, 5343-5355.

16. Energy Charter Secretariat Op. Cit.

17. IEA “Energy supply security 2014”. Paris. 2015. Available at: www.iea.org

Table 2. Access to electricity (% of population)

Country	1990	2015
USA	100	100
Mexico	94.3	100
Honduras	54.7	87.6
Brazil	87.5	100
UK	100	100
Spain	100	100
Morocco	48.1	100
Nigeria	27.3	59.3
South Africa	59.3	84.2

Source: Own elaboration from The World Bank Data - "Access to electricity (% of population)". 2018. [Consulted at 25th November 2018]. Available at: <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>

According to the IEA there are still two further dimensions of energy security: long-term and short-term energy security. In addition, during the negotiations for the "International Energy Charter" in 2014, an attempt was made to develop a common concept of energy security for both developing and developed economies, due to the fact that an integrating concept of energy security would lie precisely at the nexus of interdependence between all the actors involved.¹⁸

Theoretical approaches

It is important to know and understand the main actors and principal factors that influence energy security.

International relations theories

There are three international relations theories that are key to understanding energy security: realism, liberalism and radicalism.¹⁹

The liberalism approach argues that instead of a simple inter state system, the world is more complex, pluralistic and interdependent; as there are multiple actors, such as companies, regional and international bodies and the variety of local and international NGOs and civil society groups.

18. Escribano-Francés, G. *Políticas energéticas: geopolítica y seguridad energética en el sistema internacional*. Unpublished manuscript. 2018.

19. Dannreuther, R. *Energy security*. Cambridge: Polity, 2017. doi: ISBN: 978-0-745-66191-9.

Table 3. Energy security and theoretical frameworks

Theoretical	Global energy framework	Conflict vs. cooperation	Key values
Realism	States as dominant actors	Anarchical system tends towards inter-state conflict	Security
Liberalism	Multiple actors, including companies, NGOs as well as states	Potential for cooperation through interdependence	Economic prosperity
Radicalism	Structures of domination: North-South	Resistance and revolution	Justice Sustainability

Source: Dannreuther, R., *Energy security*. Cambridge: Polity, 2017. doi: ISBN: 978-0-745-66191-9.

The realism approach may also be seen within the context of an anarchical international system lacking an overarching global sovereign authority and the primacy of sovereign States as actors in the international system. In the radicalism the fight and the domination structure North-South are key to understand energy security.

Table 3 summarizes each of these theoretical perspectives regarding the global energy framework, conflict and cooperation, and their key values.

In the NAB the influence of markets and institutions, as well as States, plays a key role in energy security, but it is also important to attend to the dynamics between North and South to understand energy security as a whole.

Energy security from the point of view of countries

Some authors consider that the three main dangers to energy security are: disruptions in energy flows with a political origin, the devastating effects of natural disasters and deficiencies in planning.²⁰ Consumer countries are principally concerned with the first risk, while the other two questions mainly affect supplier countries.

From the point of view of importing countries this concept covers energy supply availability, reliability, affordability, and geopolitical considerations. Europe and the USA are major energy importing regions in the

20. Sodupe, K., & Molina, G. "Gobernanza, seguridad energética y sostenibilidad". In *Gobernanza para un sistema energético sostenible*. Universidad del País Vasco, 2018, 31; Sodupe, K. "Gobernanza en situaciones de emergencia energética". In *Gobernanza para un sistema energético sostenible*. Universidad del País Vasco, 2018, 17.

Atlantic Basin. “While Europe generally shares American concerns over rising energy imports, the EU does not necessarily seek to maximise energy self-sufficiency and rather stresses supply source diversification.”²¹ In this regard the development of renewable energy sources in Europe is not observed from the point of view of increasing security of supply, but from the perspective of meeting international environmental compromises. This trend is in line with the challenge of achieving a more resilient energy infrastructure to face climate change, which could add threats to security of energy supply.

For many energy exporting countries international energy security means the possibility to export its energy at a “reasonable” price that will assure new investments in energy. This point of view was developed after the oil price collapse of 1986, when oil exporting countries faced a reduction of oil export revenues.

There is an additional point of view, that from transit countries for whom energy security could be defined as “the attainment of a technically reliable, stable, competitive and environmentally sound supply of energy resources for the economy and social sphere of the country.”²²

The four As and vital energy systems

It is relatively common to refer to energy security issues as the four As: availability, affordability, accessibility, and acceptability. The first two remain at the heart of the above-mentioned IEA definition. The two other As were linked to energy security in 2007 in the Asia Pacific Energy Research Center (APEREC) report.²³

The four As can be analysed in relation to three key questions: “security for whom?”, “security for which values?”, and “security from what threats?”

The classic energy security studies proceeded from the strong connection between national values such as political independence, territorial integrity and a particular energy system. Therefore, a central question for contemporary energy security studies is to identify and explore connections between energy systems and important social values. As such, human security should be considered.

21. Energy Charter Secretariat Op. cit.

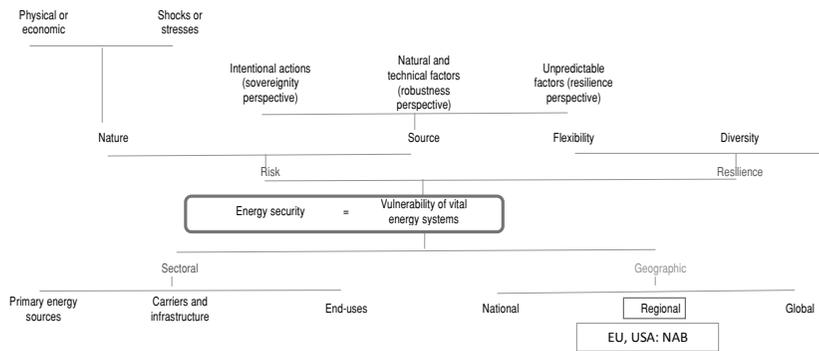
22. Ibid.

23. Cherp, A., & Jewell, J. “The concept of energy security: Beyond the four As”. In *Energy Policy*. Vol. 75, No. 415, 2014. Available at: <https://www.sciencedirect.com/science/article/pii/S0301421514004960>

Table 4. Different interpretations of affordability—the importance of asking: ‘Security for whom?’

Affordability for whom?	Energy prices should be...
Households and private consumers	Low compared to competitors’ prices
Industry and businesses	Low compared to household income
Nations	Low enough to ensure the energy import bill is small compared to export earnings
Energy companies and investors	High enough to ensure sufficient profitability for energy companies and investors

Source: Cherp, A., & Jewell, J., “The concept of energy security: Beyond the four As”. In *Energy Policy*. Vol. 75, No. 415, 2014. Available at: <https://www.sciencedirect.com/science/article/pii/S0301421514004960>

Figure 1. Energy security concept

Source: Modified from Cherp, A., & Jewell, J., “The concept of energy security: Beyond the four as”. In *Energy Policy*. Vol. 75, No. 415, 2014. Available at: <https://www.sciencedirect.com/science/article/pii/S0301421514004960>

Figure 1 summarises the vision of the concept of energy security as “low vulnerability of vital energy system.” This vision differentiates between risks and resilience concepts and can be applied in two ways to energy: sectorally or geographically.

Quantitative framework

The energy situation varies between countries and among regions within countries. The actual policy instruments, which ensure energy security are wide-ranging as next table shows. As important as having emergency response mechanisms is the capability to use them at short notice and to

Table 5. Policy instruments for energy security

Instrument	Characteristics
Diversification	Look for new energy origins, sources and technologies.
Supply expansion	Domestic resource development vs. foreign resources. Production surge is a short-term measure to increase indigenous oil production within a very short period of time. The measure is limited to member countries with significant levels of production.
Security enhancement	Oil and gas production, refining, treatment, storage and distribution by pipelines; electricity generation and transmission, production and storage/processing of nuclear fuel
Stockpiling/Stockdraw	Nowadays IEA countries are required to hold oil stocks equivalent to at least 90 days of net oil imports. Significant regional differences in stockholdings are also evident. It is the most commonly used measure and the most effective, providing additional oil to an undersupplied market. Stocks are generally held either by industry or a combination of industry and a public entity. During an oil supply disruption, member countries can release stocks.
Energy efficiency	It minimises the impact of an energy supply cut. In the case of an emergency the supply to interruptible consumers, and especially to large scale industry users or power plants, would be cut to keep non-interruptible consumers (typically household users) supplied.
Demand restraint	One of the key goals of demand restraint measures is to free up oil in an under-supplied market. Such measures are not restricted to one particular sector of consumption. Because of the high and increasing proportion of oil used for transportation, most demand restraint policies focus on this sector.
Energy subsidies	Energy subsidies are intended either to make energy products affordable or to make energy production economically feasible. They are employed to fight against energy poverty
Energy trade and pricing	Energy trade let energy consumers to secure supplies and producers to gain revenues. The price level should be considered as “fair” and “reasonable” when it is equal to the cost of a marginal supplier. Spot trading volumes at hubs in Europe have been increasing rapidly.
Fuel switching	It is a short-term measure that encourages the use of other energy sources as alternatives to oil such as coal or natural gas. The actual potential to use fuel switching in a crisis has declined significantly in member countries since the 1970s.
Production surge	It is a short-term measure to increase indigenous oil production within a very short period of time. The measure is limited to member countries with significant levels of production.

Source: Own elaboration from Energy Charter Secretariat, “International energy security. Common concept for energy producing, consuming and transit countries”. 2015. Available at: <https://energycharter.org/what-we-do/trade-and-transit/trade-and-transit-thematic-reports/international-energy-security-common-concept-for-energy-producing-consuming-and-transit-countries-2015/>; IEA, “Energy supply security 2014”. Paris. 2015. Available at: www.iea.org

Table 6. MOSES and USA Chamber of Commerce approaches vs. the international relations framework and the Four A's point of view

	Risks	Resilience
External	External risks: risks associated with potential disruptions of energy imports	External resilience: ability to respond to disruptions of energy imports by substituting with other suppliers or supply routes.
Domestic	Domestic risks: risks arising in connection with domestic production and transformation of energy	Domestic resilience: domestic ability to respond to disruptions in energy supply such as fuel stocks.

Source: own elaboration.

understand the variety of threats. Most of these instruments are employed by countries in the NAB.

There are no standard metrics to evaluate energy security. Including more perspectives (i.e., as in the four As, with environment²⁴ and society, etc.) has made this task even more complicated. According to the literature, energy security could be categorized within 320 simple indicators and 52 complex indicators.²⁵ The next two approaches are applied to the NAB and are presented below. The first is from the International Energy Agency (IEA) and the second (more complete, as will be seen) is from the USA. They consider all international relations approaches and the four As.

The IEA approach of short-term energy security

Founded in response to the oil crisis of 1973, the IEA initially focused on oil supply security with a rather traditional view of security of supply, which considered only accessibility and availability.²⁶

The IEA has developed the Model of Short-Term Energy Security (MOSES), a tool based on a set of quantitative indicators that measures two aspects of energy security in IEA countries: risks of energy supply disruptions; and resilience of a national energy system to cope with such disruptions.²⁷

24. For instance, in those countries with a quite developed energy infrastructure there is an increasing need to undertake studies on the resilience of the energy infrastructure to climate change (i.e. the RESET project by Tecnalía and Orkestra addresses this topic for the energy infrastructure of the Basque Country-Spain).

25. Sovacool, B. K., & Mukherjee, I. "Conceptualizing and measuring energy security: A synthesized approach". In *Energy. The International Journal*. Vol. 36, 2011, 5343-5355.

26. IEA. "Measuring short-term energy security". Paris. 2011a. Available at: www.iea.org

27. Ibid.

Table 7. Dimensions of energy security as measured by MOSES

	IEA (MOSES)	USA Chamber of Commerce
Acceptability	—	✓
Affordability	—	✓
Accessibility	✓	✓
Availability	✓	✓
Realism	✓	✓
Liberalism	—	✓
Radicalism	—	✓

Source: IEA, "Measuring short-term energy security". Paris. 2011a. Available at: www.iea.org.

MOSES integrates approximately 30 indicators, analyzes vulnerabilities of primary energy sources and how these affect the security of secondary fuels. It includes external factors related to imported energy, as well as domestic factors related to domestic production, transformation and distribution of energy.

Figure 2 includes the results of some of the IEA methodology indicators calculated by employing different databases for a selection of countries in the NAB region, as well as for some non-IEA countries from the South Atlantic (i.e., Brazil and South Africa). The indicators for some of the parameters remain the same as the IEA estimates from 2011 (particularly for diversity of suppliers for the different primary energy sources).²⁸

The US Chamber of Commerce approach to global energy security

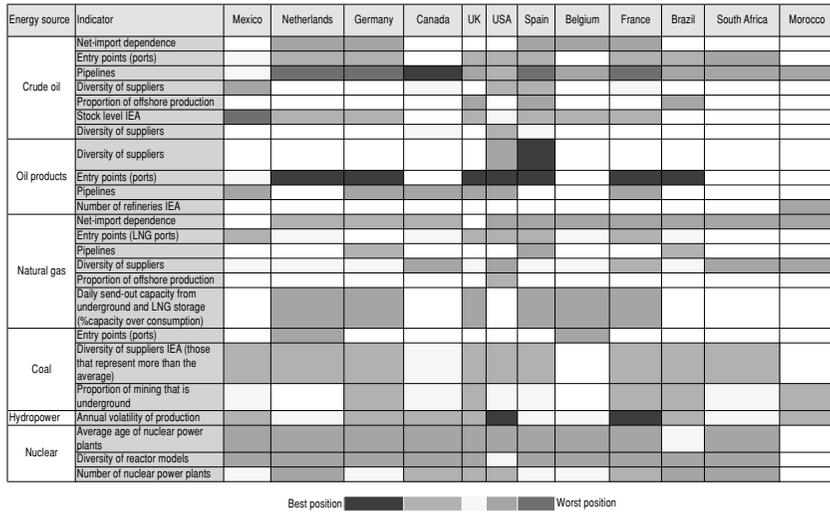
One of the main attempts to provide a confident measure of energy security in the USA is the *US Energy Security Index* elaborated by the US Chamber of Commerce.

The design of this index is based on 37 indicators related to energy security risk, based on nine categories including global fuels, environment and R&D among others. The index creates four subindexes—geopolitical, economic, reliability and environmental—which are then combined into a full index and indicate an overall evaluation of energy security.

Policies must pursue the lowest indexes. The basis of the index is 100 for the year 1980. So every measured risk which scores above 100 is considered bad. In this regard, 1992 can be considered a good year (74.8). The

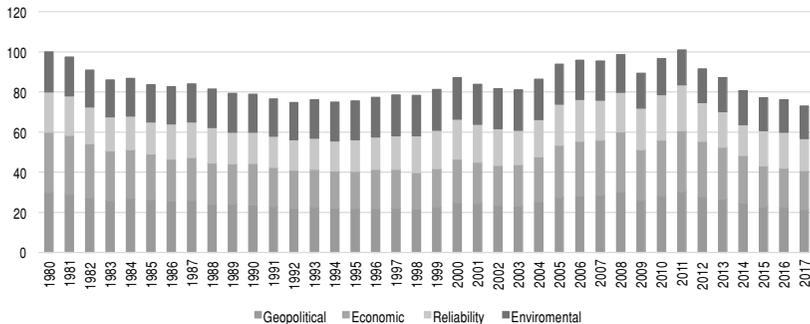
28. Since 2011 there has been no publically-available updated version of energy security using this methodology.

Figure 2. Indicators for countries in the Atlantic Basin



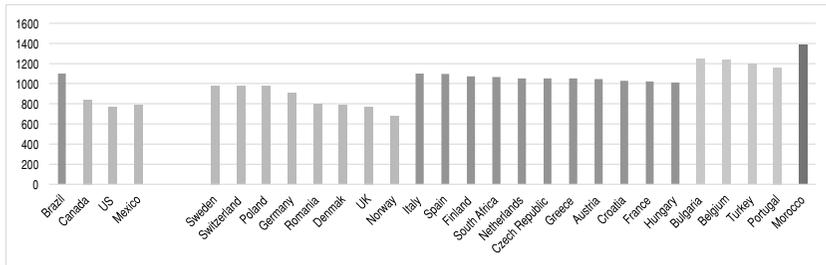
Note: red shades indicate a negative situation with respect to the indicator in question (the darkest red means the worst position). Yellow signifies that the situation may be qualified as intermediate. Finally, green shades indicate good, positive indicators in terms of energy security (the darkest green means the best position). Source: Own elaboration.

Figure 3. Development of energy security index and subindexes for the US in the 21st Century



Source: Own elaboration from Global Energy Institute, “Energy Security Risk Index”. 2018. [Consulted at 3rd December 2019]. Available at: <https://www.globalenergyinstitute.org/energy-security-risk-index>

Figure 4. Energy security risk comparison for selected countries (North America, European Union, EFTA and NATO) in 2018



Source: Own elaboration from Global Energy Institute, "Energy Security Risk Index". 2018. [Consulted at 3rd December 2019]. Available at: <https://www.globalenergyinstitute.org/energy-security-risk-index>

evolution of the full index for the USA (including its four subindexes) can be seen in the following graph.

As far as subindexes are concerned, the highest values during this period can be found for the reliability factor, so a strong focus of policies on this may be pursued. Oppositely, lowest values during this period are performed by the economic factor, which have increased and have shown ample variations in the last ten years, probably due to financial crisis. It is interesting to highlight the evolution of the environmental subindex that remains the highest together with reliability. The tendency clearly shows a coupling of geopolitical events.

These results should be considered in context of other countries of the Atlantic Basin, especially Canada and Mexico. In the following graph, those countries in green and blue are those, on both sides of the Atlantic Basin, that exhibit the lowest energy security risk indexes. Nevertheless, an important number of countries from the European Union and some from the NATO (like Turkey) are not in the same high performing group (indicated by yellow and red).

Other countries considered include Morocco, South Africa and Brazil. Among these, South Africa and Brazil show the second lowest risk group of the 75 top consuming countries. On the other hand, Morocco is located in the highest risk group, although all three of these countries share a deteriorating evolution of their indexes when compared with OECD countries since the 2000s.

It could be concluded, that in the NAB, where the principal energy security frameworks were developed, the nexus between energy security and human security has little to do with the level of demand insecurity and supply inaccessibility among poor consumers suffering from energy poverty, and a lack of energy infrastructures of all types as it happens in the SAB.

However, in spite of the above mentioned conclusion, in the NAB climate change is today a relevant hazard to security of energy supply and will continue to exert a damaging influence on energy infrastructure, which should be made more resilient in the near future. Furthermore there are other threats that could probably affect reducing energy security level in the NAB inducing higher human insecurity (for example, growing domestic energy prices due to energy transitions that may increase energy poverty level²⁹ or cyber attacks that could affect the energy infrastructure leaving at all consumers with no energy access). Therefore, next section deals with energy security policies in this territory.

Energy security in the Atlantic Basin

Data on oil reserves, trade, and refining capacity in the NAB

As in this document energy security is mainly related to oil and gas,³⁰ it is convenient to have an overview on reserves, trade and refining capacity, which influence, among others, the energy politics. Next there are some notes about these elements.

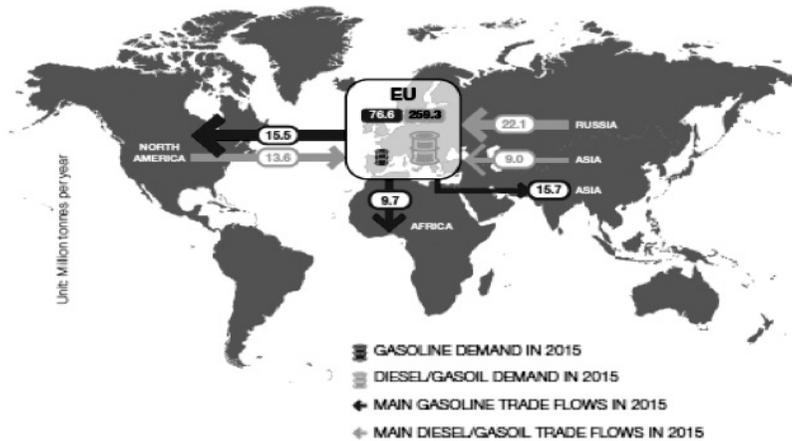
Venezuela and Canada hold the first and the third largest proven oil reserves in the world (estimated at 297 billion barrels and 167 billion barrels respectively including the sand oil in Canada). Other Atlantic countries are also developing and exporting their oil reserves too. In Africa, Nigeria is the continent's biggest oil producer, followed by Angola with (with oil reserves of 13 billion barrels), and Equatorial Guinea. In the Americas, other large oil nations are the USA (with 30.5 billion barrels of proven reserves), followed by Brazil (13.3 billion barrels) and Mexico (12.7 billion barrels of oil).³¹

29. For more information, see Álvarez et al., 2016; Álvarez and Álvaro, 2017; and Álvaro and Larrea, 2018.

30. For gas infrastructures there is a description focused on the Atlantic Basin in Álvarez Pelegrý & Larrea Basterra, 2019.

31. Lété, B. Op. cit.

Figure 5. Major gasoline and diesel/gas oil trade movements. Flows from the EU (2015)



Source: BP Statistical Review of World Energy 2017 in FUELS EUROPE. – “Statistical report”. Belgium. 2018. Available at: <https://www.fuelseurope.eu/publication/statistical-report-2018/>

In 2002, trade movement was mainly north-north. However, from 2002 to 2017 it has increased in the Atlantic Basin and especially north-south according to recent data from BP.³²

Refining is spread around the world and is a truly global business. Most of the regions are dependent on imports to meet market demand. Europe has lost 29 refineries during the last five years. 40% of total refining capacity is in the NAB.³³ By 2023, 10.1% (777 thousand barrels per day) of new refining capacity will be developed in the NAB. 20.3% in the whole Atlantic Basin. The NAB will lose relevance in terms of refining capacity.

The main trade flows to and from the EU have been the result of the gasoline/diesel imbalance demand. The EU also suffers also from shortage of jet production. NAB oil products trade is within a framework of very diverse and complex flows worldwide.

32. BP. “BP statistical review 2002 of world energy”. 2003. Available at: <https://www.gri-equity.com/resources/industryandissues/Energy/bp2002statisticalreview.pdf> ; BP. “BP statistical review 2018”. 2018. Available at: <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf>

33. FUELS EUROPE. “Statistical report”. Belgium. 2018. Available at: <https://www.fuelseurope.eu/publication/statistical-report-2018/>

Current situation and perspectives

Several geostrategic events during the last two decades have shaped the current situation. These events include: 9/11, the wars in Afghanistan and Iraq, the Fukushima accident, the Arab Spring, the rise of the Islamic State and Russia's affair with Ukraine. Nevertheless, the Atlantic remains a relatively stable geopolitical space, in contrast to the territorial disputes and military tensions of the Pacific Rim. This is largely due to the lack of great power conflict.³⁴ However, the prominence of the region in security and military considerations is rising, especially with the aim of combating illegal activities.³⁵

There are growing trade flows of, and new maritime transportation routes for, raw materials and final products within the Atlantic Basin (driven by emerging economies like Brazil and South Africa). These new trade flows and their maritime transportation routes require surveillance and security. In this regard, the port-cities of the NAB could contribute.³⁶

Piracy is the biggest threat against open and secure maritime transportation routes in South Atlantic Basin, especially in the Gulf of Guinea, where it affects among others Nigeria, Togo, and Cote d'Ivoire. In 2013, for example, out of 47 cases of piracy 29 took place in the coast of Nigeria.³⁷ This country lost around 2.8 billion dollars in revenues in 2018, mainly related to oil and maritime crime and piracy.³⁸ Such security threats may affect change across the Atlantic energy landscape as new energy production is developed in the USA, Canada, Brazil, Angola and Nigeria and as Europe continues to pursue diversification of its import sources.

Given the well-advanced level of NAB integration, Europe and the USA have a direct mutual interest in contributing their resources and experience to assist in the securitization of the entire Atlantic Basin,³⁹ so its maritime network and infrastructure enjoy shared protection against piracy, organized crime, terrorism and sabotage. Such Atlantic cooperation should also

34. For more information see (Hamilton, 2014).

35. Lété, B. Op cit.

36. For more information see (Fonseca Ribeiro, 2017).

37. UNOWA "Maritime security in the Gulf of Guinea". 2019. [Consulted at 29th January 2019]. Available at: <https://unowa.unmissions.org/maritime-security-gulf-guinea>

38. Times Premium "Nigeria lost \$2.8 billion to 'oil-related crimes' in 2018 UN". 2019. [Consulted at 30th January 2019]. Available at: <https://www.premiumtimesng.com/news/headlines/304717-nigeria-lost-2-8-billion-to-oil-related-crimes-in-2018-un.html>

39. Lété, B. Op. cit.

include cybersecurity, as organizations like NATO have underlined, following some known attacks to cyber-infrastructures in places like Ukraine.⁴⁰

Politics

Energy is a key element in terms of economic competitiveness and social welfare. In order to guarantee energy security, nations develop policies that must be put into practice, as will be demonstrated below.

Europe

The EU imports more than half of all the energy it consumes, especially crude oil (90%) and natural gas (69%). Many countries are heavily reliant on a single supplier (e.g., Russia), so they are highly vulnerable to supply disruptions.⁴¹

Traditionally, measures to face these problems were in the hands of each member state. However, the EU has become increasingly involved in energy security, even if individual national initiatives still remain relevant.⁴²

The EU has pursued the creation of a European energy space, but the efforts to promote convergence faced serious obstacles due to Member States' reluctance to transfer sovereignty in the energy security realm.⁴³ However, as the next table shows, several milestones towards a European energy security concept have been achieved.

A few years later, in May 2014, the European Commission released its Energy Security Strategy, which is an integral part of the 2030 policy framework on climate change. It is also fully consistent with their competitiveness and industrial policy objectives. Short-term measures were developed together with long-term ones that address challenges to security of supply.⁴⁴

40. NATO "What happens when a power plant comes under cyber attack?" 2016. [Consulted at 20th December 2018]. Available at: <https://www.youtube.com/watch?v=bV47gBsrDkc>

41. European Commission "Energy Security Strategy". 2018. Available at: <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/energy-security-strategy>

42. Energy Charter Secretariat Op. cit.

43. Escribano-Francés, G. "Risk of energy availability: common corridors for Europe supply security". Madrid, 2009.

44. European Commission "Energy Security Strategy." Op. cit.

Table 8. Relevant EU documents related to energy security

Document	Observations
European Energy Charter (1991)	The Charter's general objectives are quite wide. Among the most important: increase security of supply; abstention by signatory countries to impose discriminatory measures concerning access to energy resources; easing the obstacles to freer energy trade, including energy equipment and services; promotion and protection of investments in the energy sector; and technological cooperation.
White Paper on EU's energy policy (1995)	The European Commission explicitly rejects the fragmentation of EU's energy markets, proposing the integration of domestic markets and its liberalization.
Green Paper on the security of energy supply (2000)	Vulnerability from energy dependency and its relation with markets and renewables
Green Paper on a European strategy for sustainable, competitive and secure energy (2006)	The European energy security vision had an external and an internal dimension. The external dimension included energy dialogues with Russia and OPEC, and the more ambitious proposal for the creation of a "wider-Europe Energy Community". The internal dimension of EU's energy security was identified in terms of institutions but it implicitly pointed to physical infrastructures and the achievement of the internal market.
Energy package (2007)	Agrees on a two-year action plan towards a common European energy policy. It includes a common external energy policy and the need to link energy issues to EU's external relations in general.
Green Paper "Towards a Secure, Sustainable and Competitive European Energy Network", and the Second Strategic Energy Review: "EU Energy Security and Solidarity Action Plan" (2008)	The Second Strategic Energy Review insists on the focal points already raised by former EU documents: diversifying energy sources and origins, ensuring effective competition and competitiveness, achieving the internal market, enhancing energy efficiency, fostering interconnections, increasing the share of renewables, solidarity mechanisms, the role of stocks and crisis response procedures, storage and LNG capacities, and a greater focus on energy in EU's foreign policy.

Source: Own elaboration from Escribano-Francés, G. – "Risk of energy availability: common corridors for Europe supply security". Madrid, 2009.

One key aspect of the strategy is to promote closer competition while respecting national energy choices.⁴⁵ The following points indicate the policies/objectives of the strategy.

Strengthening emergency/solidarity mechanisms including the coordination of risk assessments and contingency and protecting strategic infrastructure.

- Moderating energy demand.
- Building a well-functioning and fully-integrated internal market.
- Increasing energy production in the EU.
- Further developing of energy technologies.
- Diversifying external supplies and related infrastructure,
- Improving coordination of national energy policies and one voice in the external energy policy.

These pillars may be considered respectively in relation to the liberal and realist theoretical perspectives mentioned above as the reader may notice. For instance, the first, third, sixth and seventh points could be studied under the perspective of the liberalism approach. In the meanwhile, the second, fourth and fifth points are mainly related to the realism.

2016 is another relevant year in relation to energy security, when the European Commission presented the Winter Package with special emphasis on energy efficiency, claiming that it would reduce European dependency on energy imports. It included measures to keep the EU competitive while the clean energy transition transforms global energy markets. The final objective of this package in general terms was to give consumers across the EU a better choice of supply, access to reliable energy prices comparison tools and the possibility to produce and sell their own electricity.⁴⁶

45. European Commission “EU energy security strategy. Communication from the commission to the european parliament and the council. COM (2014)330 final”. 2014. Available at: <https://www.eesc.europa.eu/resources/docs/european-energy-security-strategy.pdf>

46. European Commission. “Putting energy efficiency first: Consuming better, getting cleaner”. Brussels. 2016a. Available at: www.europa.eu/rapid/press-release_MEMO-16-3986_en.pdf

In this package, energy efficiency appears as “one of the most cost-effective ways to ensure energy security” and is presented as an instrument for resolving social issues like energy poverty,⁴⁷ mentioned before.⁴⁸

The importance of gas imports, instruments of risks assessments and collective response was shown by the 2017/1938 Regulation, which covered the issues of gas infrastructure coordination and the guarantee of gas supply to “protected clients” against risk.⁴⁹

In the most recent European Commission documents, the strategy proposes: (1) a space for common regulation within the EU and its neighborhoods; (2) reinforcement of agreements with third countries (e.g., energy exporters or transit countries, see map below); and (3) clarification that strategic energy partnerships with producer countries should be based on the rules and principles of the community’s energy policy.⁵⁰

In this regard, one important aspect of energy security is the promotion of energy corridors (where transit countries point of view is suitable). The EU has developed, particularly in gas, several access routes to gas imports, shown in Figure 6.

The next few years will be crucial for European energy policy. The basis of the Energy Union that will articulate a single market and a common external energy policy must be established. Some of these foundations are related to investments in energy infrastructure and others to the catalyzing of the coordination of external energy policies. Furthermore, the EU must decide on how to cooperate with the United Kingdom and how to articulate foreign energy policy to fight against climate change in its relationships with the Middle East, the Mediterranean, Russia, Central Asia and the Atlantic Basin.⁵¹

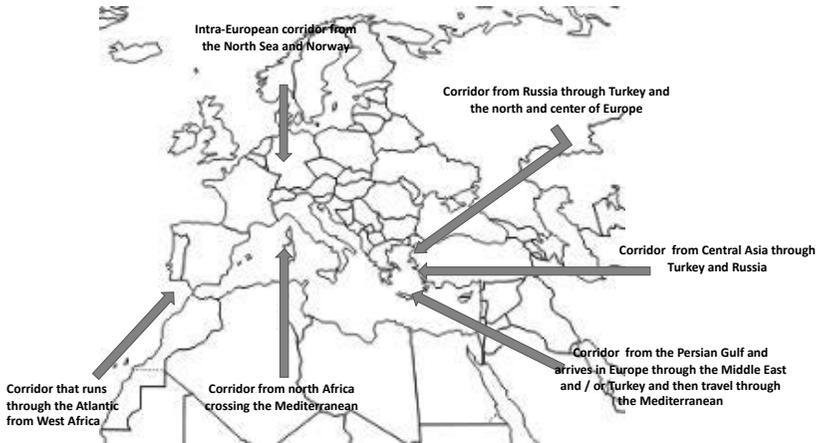
47. For more information see Larrea Basterra, M. “La pobreza energética en la Unión Europea y el Reino Unido. El caso de Inglaterra”. In *Revista ICADE*, No. 102, 2017. ISSN 1889-7045.

48. European Commission “Putting energy efficiency first: Consuming better, getting cleaner”. Brussels. 2016a. Available at: www.europa.eu/rapid/press-release_MEMO-16-3986_en.pdf

49. European Parliament, E. C. “Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing regulation (EU) no 994/2010”. 2017. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2017:280:FULL&from=ES>

50. Escribano-Francés, G. *Políticas energéticas: geopolítica y seguridad energética en el sistema internacional*. Unpublished manuscript. 2018.

51. *Ibid.*

Figure 6. Main energy corridors of the EU

Source: Own elaboration from Escribano-Francés, G., *Políticas energéticas: geopolítica y seguridad energética en el sistema internacional*. Unpublished manuscript. 2018.

North America's energy security integration

When describing energy security interactions in North America, the USA becomes the central actor because of its geographic and economic position between Canada and Mexico. Furthermore, recent interactions between the US and Europe may produce changes in relationships across the Atlantic Basin. As a consequence, the analysis below will delve into US energy security policy in depth.

Geopolitical events during the last decades of 20th Century induced the USA (first, and the later all of North America) to make energy supply the top priority of energy policy.⁵²

First, the North American Energy Working Group (NAEWG) was established in 2001 with the purpose of improving communication and cooperation regarding energy matters of common interest.⁵³ Subsequently, the

52. CEA “Engineering a Collaborative & Clean Energy Future”. 29th Mexican National Congress of Engineering. 2018a. Available at: <https://electricity.ca/wp-content/uploads/2018/03/Remarks-at-Mexican-National-Congress-of-Civil-Engineering-Final.pdf>

53. DOE “North American Energy Work Group Releases Updated Trilateral Energy Report”. 2006. [Consulted at 10th December 2019]. Available at: <https://www.energy.gov/articles/north-american-energy-work-group-releases-updated-trilateral-energy-report>

NAEWG was incorporated into a trilateral Security and Prosperity Partnership (SPP) in 2005 to improve security cooperation in broader areas.

Despite these preliminary efforts, the initiative to foster energy security cooperation suffered from a lack of resources. North America therefore entered into a seven-year period during which no relevant steps were taken.⁵⁴

In December 2014, an inflection point in North American energy cooperation was reached with the signing of a Memorandum of Understanding (MOU) between the responsible agencies of the three countries. This provided an institutional framework for consultation and sharing publicly available information among the participants. As a result, the North American Cooperation on Energy Information common initiative was created.

Today, North America is a semi-integrated energy market in which internal commodity flows, on the one hand, and common external interactions with rest of the world, on the other hand, can be identified.⁵⁵ It is a highly interdependent and multidirectional market that includes trade, innovation and investment by the private sectors.⁵⁶

Recently the three governments decided that the NAFTA (North American Free Trade Agreement) should be replaced. As a result, in October 2018 the USMCA (United States-Mexico-Canada Agreement) was concluded. This could lead to a potential change in North American energy market integration with benefits for the US,⁵⁷ although there was already an

54. Wood, D. "Integrating North America's Energy Markets: A Call for Action". In Wilson Center, Mexico Institute. 2014. Available at: <https://www.wilsoncenter.org/sites/default/files/Integrating%20North%20America%27s%20Energy%20Markets.pdf>

55. NACEI "North American Cooperation on Energy Information". 2018. [Consulted at 30th November 2018]. Available at: <http://nacei.org/#!/overview>

56. Cattaneo, C. "Shooting themselves in the foot": How NAFTA's collapse could disrupt U.S.-Canada energy trade". In *Financial Post*. 2018. [Consulted at: 1st December 2018]. Available at: <https://business.financialpost.com/commodities/energy/shooting-themselves-in-the-foot-how-naftas-collapse-could-disrupt-u-s-canada-energy-trade>; Wayne, E. A. "The Economic Relationship Between the United States, Canada, and Mexico": Earl Anthony Wayne Testifies before the US Senate Committee on Foreign Relations". Mexico Institute, Wilson Center. 2018. Available at: <https://www.wilsoncenter.org/article/the-economic-relationship-between-the-united-states-canada-and-mexico-earl-anthony-wayne>

57. Wayne, E. A. and Shedd, D. R. "Assuring Energy Security with a Modern NAFTA". In *Forbes*. 2018. [Consulted at 10th December 2018]. Available at: <https://www.forbes.com/sites/themexicoinstitute/2018/05/09/assuring-energy-security-with-a-modern-nafta/#35f3e5983019>

attempt to reach a common framework under the so-called “North American Energy Strategy.”⁵⁸

Nevertheless, both Canada and Mexico have developed a framework for bilateral cooperation. In October 2004, the Canada-Mexico Partnership (CMP) was launched,⁵⁹ which included issues like indigenous consultations for the development of energy projects. Another point was subnational cooperation as, in fact, some Canadian provinces and territories are interested in the expansion and modernization of the Mexican energy sector.⁶⁰

North American cooperation has also experienced a progressive shift towards protecting energy infrastructures against external attacks. For instance, due to a wave of cyber attacks both in Canada and the US, both countries established in 2012 a Cybersecurity Action Plan. Mexico has also included international cooperation on cybersecurity as one of the main actions in its National Security Program 2014-2018⁶¹, although differences between cybersecurity capabilities between Mexico and US can be viewed as risks emanation from the former to the latter.⁶²

US energy security in the 21st Century

Three administrations (two republicans and one democratic) have governed the US during this 21st century whose positioning on energy security is explained next.

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58. CEA “Engineering a Collaborative & Clean Energy Future”. 29th Mexican National Congress of Engineering. 2018a. Available at: <https://electricity.ca/wp-content/uploads/2018/03/Remarks-at-Mexican-National-Congress-of-Civil-Engineering-Final.pdf>; US Mission To Mexico “Secretary Perry Remarks at Press Event with SENER”. 2017. [Consulted at 10th December 2018]. Available at: <https://mx.usembassy.gov/secretary-perry-remarks-press-event-sener/>
 59. Government Of Canada “The Canada-Mexico Partnership”. 2018. Available at: <https://www.canadainternational.gc.ca/mexico-mexique/cmp-pcm.aspx?lang=eng>
 60. Government Of Alberta “Mexico Alberta Relations”. 2011. Available at: <https://open.alberta.ca/dataset/911b2ffd-0990-43c3-85ab-b0b1e0b3833f/resource/3a672bb8-f75d-4d14-ba29-78191f6bf020/download/mexico-ab.pdf>
 61. Kobek, L. P. “The State of Cybersecurity in Mexico: An Overview”. 2017. Available at: https://www.wilsoncenter.org/sites/default/files/cybersecurity_in_mexico_an_overview.pdf
 62. Lee, S. “Cybersecurity Strategy Advice for the Trump Administration: US-Mexico Relations”. In *The Henry M. Jackson School of International Studies*. University of Washington. 2017. [Consulted at 20th December 2018]. Available at: https://jsis.washington.edu/news/cybersecurity-strategy-advice-trump-administration-us-mexico-relations/#_ftn21

The Bush Administration (2001-2009)

George W. Bush Administration considered energy security as a key element since the presidential campaign, when he argued that “America, more than ever, is at the mercy of foreign governments and cartels.”⁶³ Also, during his second mandate Bush continued to underline this by affirming that “America is addicted to oil.”⁶⁴

Several initiatives were developed including the Royalties Conservation Fund, implemented to support new drilling and oil and gas production in Alaska’s Artic Refuge, ANWR ⁶⁵, and the National Energy Policy (NEP) in search of strong relationships with energy-producing nations within global alliances. ⁶⁶

The US decision to not sign the Kyoto protocol became a factor of geopolitical tension between the EU and the US,⁶⁷ contributing to shifts which European diplomats described as marking a “significant divergence” between both regions.⁶⁸

An inflection point occurred when Hurricanes Katrina and Rita made land in 2005. These meteorological events represented a political crisis, particularly with respect to energy security issue: oil production and refinery facilities in the Gulf of Mexico were seriously damaged (next table shows the main energy infrastructure in the US related to oil and gas). Given, on the one hand, the serious impact on infrastructures⁶⁹ and, on

63. Allen, M. “Bush Supports Oil Exploration. In Arctic Refuge”. In *The Washington Post*. 2000. [Consulted at: 25th November 2018]. Available at: https://www.washingtonpost.com/archive/politics/2000/09/30/bush-supports-oil-exploration-in-arctic-refuge/33563dc1-5c66-4afa-8f5e-cb135f3defb9/?utm_term=.a040d57b0055

64. Bumiller, E. & Nagourney, A. “Bush: ‘America is addicted to oil’”. In *The New York Times*, Archives. 2006. [Consulted at: 25th December 2018]. Available at: <https://www.nytimes.com/2006/02/01/world/americas/01iht-state.html>

65. The White House “The President’s Energy Legislative Agenda”. 2001. [Consulted at 5th December 2018.] Available at: <https://georgewbush-whitehouse.archives.gov/news/releases/2001/06/energyinit.html>

66. Presidency of US “Reliable, Affordable, and Environmentally Sound Energy for America’s Future”. 2001. Available at: <https://www.wtrg.com/EnergyReport/National-Energy-Policy.pdf>

67. Kahn, G. “The Fate of the Kyoto Protocol under the Bush Administration”. In *Berkeley Journal of International Law*. Vol. 21, No. 3, Article 5. 2003. Available at: <https://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=1248&context=bjil>

68. Borger, J. “Bush kills global warming treaty”. In *The Guardian*. 2001. [Consulted at: 28th November 2018]. Available at: <https://www.theguardian.com/environment/2001/mar/29/globalwarming.usnews>

69. More than 100 oil and gas production platforms were destroyed and nearly 20% of US daily refining capacity went off-line from late August to October. See Chow, E. & Elkind, J. “Hurricane Katrina and US Energy Security”. In *Survival*. Vol. 47, No. 4, 145-

Table 9. Main energy security data on North American infra-structures

		Canada	USA	Mexico
Potentially shareable facilities for fossil fuels in each countries	LNG import and export terminal	1	11	3
	Refineries and upgraders	21	141	6
Current common interconnections	Power lines	25		11
	Natural gas pipelines	27		15
	Liquid fuels pipelines	20		4

Source: NACEI, "North American Cooperation on Energy Information". 2018. [Consulted at 30th November 2018]. Available at: <http://nacei.org/#/overview>

the other hand, how national and international bodies' reacted,⁷⁰ natural disasters began to be considered seriously as threats and, as such, incorporated into the energy security concept.⁷¹ Therefore, during Bush's Administration, climate change appears to have become a significant factor for security challenges.⁷²

In 2007, the president signed the Energy and Independence Security Act (EISA). This piece of legislation was intended to develop new technologies that would secure the reliability of the energy system. The EISA also established an important first step on concerns regarding future cybersecurity.

160, 2005. Available at: <https://www.tandfonline.com/doi/full/10.1080/00396330500433449?scroll=top&needAccess=true>

70. DOE decided to use US strategic petroleum reserves and the IEA appealed to the Initial Contingency Response Plan (ICRP), which was established for a quick and effective collective response in case of an oil supply disruption. See IEA "How does the IEA respond to major disruptions in oil supply?". 2011b. [Consulted at 25th November 2018]. Available at: <https://www.iea.org/newsroom/news/2011/march/how-does-the-iea-respond-to-major-disruptions-in-the-supply-of-oil-2011-03-10-.html>

71. Irie, K. "The Evolution of the Energy Security Concept and APEX Energy Cooperation". In *International Association for Energy Economics*. Singapore Issue 2017. Available at: <https://www.iaee.org/en/publications/newsletterdl.aspx?id=429>

72. García, C. G. "The Trump Administration's National Security Strategy". In *Royal Institute Elcano*. Working Paper 14/2018, 2018. Available at: <http://www.realinstitutoelcano.org/wps/wcm/connect/25d788de-9e45-4c6d-acb6-d4e98f89845c/WP14-2018-GarciaEncina-Trump-Administration-National-Security-Strategy.pdf?MOD=AJPERES&CACHEID=25d788de-9e45-4c6d-acb6-d4e98f89845c>

The Obama Administration (2009-2017)

During the Obama Administration, US oil production increased by 75%, mainly due to the former Administration's interest in expanding domestic sources of crude oil in order to reduce that "addiction" and dependence on external oil sources. Natural gas production also increased by more than 30%. As a result, in 2016 the first liquified natural gas (LNG) was exported from the US.⁷³ With respect to Atlantic trade, the first US LNG carrier arrived in Europe in April that year at the port of Sines (Portugal).

The Obama Administration placed restrictions on onshore shale and offshore drilling. Additionally, Obama's environmental and social concerns influenced some decisions on oil and gas infrastructures that included North America connections. Also, during Obama's State of the Union Address in 2013, he proposed avoiding gas price spikes by creating an Energy Security Trust Fund as one additional initiative within a wider strategy called the *All-of-the-Above Energy Strategy as a Path to Sustainable Economic Growth*,⁷⁴ which had energy security as one of its three main elements, together with economic growth and low-carbon technologies.

By the end of 2015, Obama signed the Fixing America's Surface Transportation Act (FAST Act) that pursues the establishment of methods of valuation for energy security, reflecting both domestic and global current issues.

Climate change was also studied from a security perspective during Obama Administration, given its potential to aggravate existing problems and internal instability in other countries.⁷⁵ Once again, climate change can be seen as a risk to the stability of supply from certain world areas and with geopolitical implications.⁷⁶

One result of the shale revolution was a decline in US reliance on imports from the Middle East, and the subsequent declaration of a 'pivot to

73. More information about LNG trade in the Atlantic Basin can be found in (Álvarez and Larrea, 2019).

74. EOPUS "All-of-the-Above Energy Strategy as a Path to Sustainable Economic Growth". Executive Office of the President of the United States. 2014. Available at: https://obamawhitehouse.archives.gov/sites/default/files/docs/aota_energy_strategy_as_a_path_to_sustainable_economic_growth.pdf

75. García, C. G. Op. cit.

76. Goering, L. "Climate change an 'imminent' security threat, risk experts say". World Economic Forum, 26th February. 2019. [Consulted at 2nd March 2019]. Available at: <https://www.weforum.org/agenda/2019/02/climate-change-an-imminent-security-threat-risk-experts-say>

Asia' on this part of the Obama Administration's foreign policy. In any event, none of this means that the USA has disengaged from the Middle East.⁷⁷

The Trump Administration (2017-Present)

A key document for understanding the main philosophy of Donald Trump Administration is the new National Security Strategy (NSS), which appeared in December of 2017 to replace the last NSS of the Obama Administration.⁷⁸ The purpose of the new NSS is to reveal the primary national security concerns of the country and the related plans that the administration proposes to follow. According to García,⁷⁹ energy infrastructure is one of the main targets of the new NSS strategy.

The new NSS includes the objective to “embrace energy dominance,” implying that the US will hold a central leadership position in the global energy system for first time in generations as producer, consumer and innovator. This drive to dominance is intended to lead to resilient and secure US energy infrastructure, along with diversified access to energy. In this sense, the NSS underlines the need to unleash domestic resources (from coal to renewables) and includes a call to continue the integration of the North American energy system along with others for new initiatives to unlock shared potential.⁸⁰

Such energy dominance implies a strategy based on diversification of supply. The US would wield its intended role as energy, technology, and services exporter around the world as a mechanism to help the country's allies and partners to improve their resilience in the face of those suppliers who use energy as a tool for “coercion.” This posture is consistent with the potential of US economy to use and offer as wide a variety of energy forms and services as possible. To a certain degree, Trump's energy dominance strategy implies somehow taking the “all of the above” philosophy of the Obama Administration, but promoting those sources that the previ-

77. Woertz, E. “Has the Shale Revolution Really Led to US Disengagement from the Middle East?”. In *CIDOB*. 2016. Available at: https://www.cidob.org/en/articulos/monografias/elecciones_presidenciales_en_estados_unidos/has_the_shale_revolution_really_led_to_us_disengagement_from_the_middle_east

78. NSSA “National Security Strategy Archive”. 2018. [Consulted at 19th December 2018]. Available at: <http://nssarchive.us/>

79. García, C. G. Op. cit.

80. NSSA. “National Security Strategy Archive”. 2018. [Consulted at 19th December 2018]. Available at: <http://nssarchive.us/>

ous administration attempted to either regulate or to reduce their share in the energy mix.⁸¹

This new strategy is in line with the requests of the energy industry. Only a few days after Donald Trump won presidential election in November 2016, the American Petroleum Institute [API] called for Trump's strategy to include all forms of energy.⁸² In this way, a comprehensive vision of energy resources has been translated into renewed federal support to industries (such as coal⁸³) whose relevance during former administration was thought to be on the decline.

The energy and environmental policy changes of the first year of the Trump Administration were among the most visible and effective decisions taken by the administration to date.⁸⁴ In this regard, the June 2017 decision to withdraw from the Paris Agreement constitutes the cornerstone of Trump's energy policy—including energy security issues, given that climate change actions appear to be viewed with skepticism by this administration. Moreover, the 2017 NSS does not include any references to "climate change" (even if there are several references to clean energy).

Concerns regarding energy security have changed somewhat in the last few years, as the focus has shifted from the traditional attempt to guarantee supply to a new perspective in which integrity of energy infrastructures must be assured.⁸⁵ In February 2018 US Department of Energy (DOE) was assigned the creation of the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) with cybersecurity and energy security as main areas and with a multiyear Plan for Energy Sector Cybersecurity.⁸⁶ At

81. House Committee On Natural Resources "All-of-the-Above Energy Approach". 2014. Available at: <https://naturalresources.house.gov/energy/>

82. Green, M. J. "The Legacy of Obama's "Pivot" to Asia". In *Foreign Policy*, 2016. [Consulted at 10th December 2018]. Available at: <https://foreignpolicy.com/2016/09/03/the-legacy-of-obamas-pivot-to-asia/>

83. Nevertheless, current trends have driven to a major number of coal plants closed during first two years of Trump Administration's than during Obama's first term: see EIA, 2018; Weir, 2019; or Jones, 2019..

84. Friedman, L. and Mufson, S. "Energy & Environment in Trump's First Year". Podcast, 2018. Columbia | SIPA Center on Global Energy Policy. 2018. [Consulted at 5th December 2018]. Available at: <https://energypolicy.columbia.edu/energy-environment-trumps-first-year>

85. CEA "Engineering a Collaborative & Clean Energy Future". 29th Mexican National Congress of Engineering. 2018a. Available at: <https://electricity.ca/wp-content/uploads/2018/03/Remarks-at-Mexican-National-Congress-of-Civil-Engineering-Final.pdf>

86. DOE "Secretary of Energy Rick Perry Forms New Office of Cybersecurity, Energy Security, and Emergency Response". 2018a. Available at: <https://www.energy.gov/>

Table 10. Comparison of last three US administrations on key energy security issues

	George W. Bush (2001-2009)	Barack Obama (2009-2017)	Donald Trump (2017-present)
Main driver	Global alliances	Shale revolution	Energy dominance
External supply	Diversification of imports from production countries	Reduction of dependence through domestic production	US allies and partners to diversify their energy sources through promotion of US energy exports
Domestic energy sources	Royalties Conservation Fund	Coal regulation	Encourage of coal and nuclear industry
	Critical infrastructures improvement and modernisation	POWER+ Plan for affected coal communities	Support to oil industry
	Renewable energy incentives	Nuclear plants security	Completion of critical infrastructures (Dakota Access and Keystone XL oil pipelines)
		“All of the above” but shift from oil to gas in transport	Inclusion of renewable sources in universal access to domestic resources
R&D		Some restrictions on drilling permits (Alaska and outer continental shelf)	
	First encourage for smart grids	Renewable energy incentives	
	Coal plants	New transport fuels and technologies	Cybersecurity
Climate and environment	Energy efficiency	Energy efficiency	Nuclear industry
		Carbon Capture and Sequestration Technologies	Petroleum reserves and fossil fuels R&D
	Air quality protection	Clean Power Plan for air quality and GHG	Withdrawal from Paris Agreement

Table 10. Comparison of last three US administrations on key energy security issues

	George W. Bush (2001-2009)	Barack Obama (2009-2017)	Donald Trump (2017-present)
	Refusal to join Kyoto Protocol	Climate change as global goal and active participation in climate initiatives. Joined Paris Agreement (COP21)	Amendment to CPP
	National goals to reduce GHG emissions intensity		
North American cooperation	North American Energy Working Group (NAEWG)	Memorandum of Understanding (MoU)	Replacement of North American trade agreement: NAFTA by USMCA
Focus on Asia/Atlantic relationships	Close transatlantic relationships with some crisis and restorations	Alignment on climate goals with Europe	Search for new share of efforts within NATO and Europe's dependence
Energy security programs	First initiatives toward Asia	Announced pivot toward Asia	Withdrawal from TPP (Pacific trade)
	Energy for America's Future	New energy for America?	NSS (2017)
	National energy future	ACES (2009)	
	NSS (2002)	ARRA (2009)	
	Energy Policy Act (2005)	NSS (2010)	
	Advanced energy initiative	CPP (2014)	
	NSS (2006)	Energy security Trust	
	EISA (2007)	FAST Act	
	Food and energy security act (2008)	NSS (2015)	
	Energy improvement and extension act (2008)		
Main events related to energy security	11-S	Deepwater Horizon oil rig explodes off Louisiana	Paris Climate Agreement withdrawal

Table 10. Comparison of last three US administrations on key energy security issues

	George W. Bush (2001-2009)	Barack Obama (2009-2017)	Donald Trump (2017-present)
	Iraq War	Arab Spring	Iran Nuclear Deal abandonment
	Hurricane Katrina	Libya attack	
	Financial crisis of 2000	Iraq war over	
	First BRIC's formal summit	First federal government shutdown in two decades	
		Crimea crisis	
		Back to Iraq	
		Syria airstrikes	
		End of Afghanistan	
		Paris Climate Agreement	
		Iran Nuclear Deal	
		Sacred Native American sites	
		Sanctions against Russia	

the same time, the National Cyber Strategy of September 2018 identifies energy and power as one of its seven key areas.⁸⁷

The second half of Trump's first term has begun with a change of majority in the House of Representatives and a government shutdown. If the proposed budget for a fiscal year is not approved by the Congress, the non-essential functions of US government cease to function until an agreement is reached. This could have partially affected energy security, although

articles/secretary-energy-rick-perry-forms-new-office-cybersecurity-energy-security-and-emergency; DOE "Multiyear plan for energy sector cybersecurity". 2018b. Available at: https://www.energy.gov/sites/prod/files/2018/05/f51/DOE%20Multi-year%20Plan%20for%20Energy%20Sector%20Cybersecurity%20_0.pdf

87. Presidency of the Us "National Cyber Strategy of the United States of America". 2018. Available at: <https://www.whitehouse.gov/wp-content/uploads/2018/09/National-Cyber-Strategy.pdf>

the corresponding energy and water budget was assigned before the shutdown.⁸⁸

Recent events regarding the political crisis in Venezuela, are also expected to induce changes in the US energy security policies, due to oil implications. In fact the US has been the main importer of oil from the Caribbean country, and it is supposed that oil from Canada and Mexico may gain importance for the US.⁸⁹

As a summary, there have been changes through every legislative period. The context has led to some remarkable differences between each administration views that are analysed in Table 10.

Final remarks and conclusions

Energy security and economic growth have played a key role since the 1970s, when an important global energy crisis occurred. Energy security—the definitional complexity of which has increased over the last decade as it has incorporated more elements (such as technology and sustainability)—can be analyzed from different points of view.

The realist, liberal and radical approaches to international relations can be brought to bear upon energy security issues in the NAB, as the states, the institutions, the markets and the value of sustainability are very relevant across the basin and its surrounding territories. Moreover, given the clear difference between the North Atlantic (particularly the US and Europe) in their energy export/import profiles with respect to different energy regions, it is clear that views on energy security are influenced by the differing points of view of exporting, importing and transit countries.

Energy security has traditionally been understood as security of supply for energy buyers; however, it could also be analysed from the point of view of the security of demand. The traditional concepts of energy securi-

88. Morello, L. “US science agencies hit by government shutdown”. In *Nature*. 2018. [Consulted at 15th January 2019]. Available at: <https://www.nature.com/articles/d41586-018-07836-6>; Wasson, E., Litvan, L. and Flavelle, C. “Here’s What Would Happen If There’s a Government Shutdown in December”. In *Bloomberg*. 2018. [Consulted at 10th January 2019]. Available at: <https://www.bloomberg.com/news/articles/2018-12-11/shutdown-impact-would-be-limited-as-only-some-agencies-unfunded>

89. Kumar, D. K. and Eaton, C. “Venezuelan oil exports to U.S. still a primary source of cash”. In *Reuters*, 2019. [Consulted at 27th January 2019]. Available at: <https://www.reuters.com/article/us-venezuela-politics-usa-oil-graphic/venezuelan-oil-exports-to-us-still-a-primary-source-of-cash-idUSKCN1PJ2CT>

ty, availability, affordability, accessibility and acceptability have to merge with a broader approach of “energy security as low vulnerability of vital energy systems”.

Countries have developed different indicators and metrics that have become key for a better understanding energy security issues. This chapter has dealt mainly with the quantitative approaches of the IEA and the US Chamber of Commerce. This second approach (more complete and updated yearly) includes other increasingly relevant elements such as R&D and the environment. For instance, currently the reduction of greenhouse gases and other pollutant emissions, along with the improvement of energy efficiency, are at the focus of most national and international regulations and commitments. However, the IEA approach does not include them. This approach should be updated, incorporate new parameters, and consider other countries in order to have a tool with which to make comparisons. In any case, the results obtained, show that nowadays the situation is relatively similar in terms of energy security as at the beginning of this decade.

Energy security should also be framed within the human security concept as it impacts at least four dimensions of human security: economic, food, health and environment. Even if today the nexus between energy security and human security could seem stronger in the SAB, climate change and other elements as energy transitions or cyber attacks could cause different types of supply problems in the NAB as it happened when hurricane Katrina for instance.

In order to face the problems of energy insecurity and to provide adequate responses, NAB countries adopt different measures. The abundant tools to ensure security of supply include trade, diversification, supply expansion, security enhancement, stockpiling, and demand control, and, to some extent, energy subsidies.

The politics and objectives of energy security can differ between the USA (energy dominance, competitiveness and job creation) and the EU (decarbonization of the economy, RES and energy efficiency). These policy divergences are accentuated by the currently diverging trends in domestic production and exports/imports of oil and gas, and in renewable energy development.

In the EU member states have evolved from taking national measures to face the main challenges on energy security to developing some European rules that can be implemented by the EU itself. In part this shift has been provoked by oil and gas issues. Currently the European Commission en-

courages the consumer to be more active in both offering their opinion and taking decisions, and even to play a role as both consumer and producer (prosumers), a role that could become a reality through use of certain renewable energy technologies. Such energies could play a relevant role in reducing energy insecurity in the EU. Likewise, these energies could also facilitate and promote the access to energy in the SAB where energy infrastructure is not so developed.

In the USA, common energy security rhetoric can be found over the three last administrations. Climate issues have progressively moved from being considered solely as an environmental concern to gaining importance within energy security, even if support for new energy sources has been varying. Furthermore, the USA's perspective began from a vision of its dangerous reliance on oil. This changed with the “shale” revolution and pivoted to an emphasis on fossil fuel exports for the first time in decades, creating a new situation.

Energy security is therefore important in the NAB, and future developments will need to address this security across the entire Atlantic Basin (including the South Atlantic Basin) by developing rules and encouraging actors to take relevant measures.

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