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GLOBAL GAS LOCK-IN
BRIDGE TO NOWHERE

ALFONS PÉREZ

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INTRODUCTION: WHAT WILL YOU FIND IN THIS STUDY?

Natural gas is moving up the ranks and gaining importance in the global energy landscape. Gas has entered the official rhetoric as the fuel of the energy transition to a low-carbon economy, although it has not outstripped coal and oil consumption. This affirmation is repeated as a mantra to smooth a path for gas development at the global level. For that reason, this study intends to take a critical approach to the multiple dimensions and implications of the push for gas on a global scale, particularly in the European Union, with the intent to translate this complexity into clear arguments to help the debate, paying special attention to the geopolitical influence and the economic and financial interests in this commitment to gas.

This publication begins with a summary of the main characteristics of gas (Chapter1), which has determined its historical evolution from being previously considered a by-product of crude oil extraction and difficult to transport and store in view of its gaseous state (Chapter2). But once this stage has been passed, and with the unexpected appearance of unconventional gas, its development appears to be unstoppable, both regarding exploration and exploitation of gas fields as well as for planning an endless number of mega infrastructures (Chapter3). Consequently, the geostrategic value of regions with gas reserves is rising and the interest in creating a real global gas market is accelerating.

In the European Union, the drop in internal extraction and the growth in consumption up to 2010 increased its dependence on foreign countries, increasing the pressure on other territories and communities rich in fossil fuels (Chapter4). The EU then announced its Energy Union, a strategy with an exterior dimension, to diversify imports via gas routes outside the Russian zone of influence, and an interior dimension, to interconnect Member States so that m^3 of gas can flow freely within the EU. Despite under-utilisation of existing infrastructures, the justification/excuse of the conflict between Russia and Ukraine is sufficient to plan new gas pipelines and terminals for gas imports, assigning them to the category of Projects of Common Interest and allocating them the capacity to receive financing and public guarantees.

It is precisely the financial part, both for the transition from prices indexed to crude oil to market prices as well as for the multi-million investment needed in gas infrastructures, which is a key aspect of this study. Financialisation of gas and its infrastructures opens the doors for new players (for example, investment funds) which have nothing to do with the world of energy and even less with the needs of the population (Chapter5).

The study also addresses the impact on exporting countries and their population, revealing indicators and concrete cases which show the other side of gas relations (Chapter6).

Finally, methane leaks in the chain from extraction to consumption (Chapter7) are examined. The calculations cast serious doubt on the idea of gas as a "climate friend" and, therefore, the policies that promote it and the free trade agreements that encourage it stand in opposition to the fight against climate change and the Paris Agreement.

NATURAL GAS OR FOSSIL GAS

The term "natural" in "natural gas" can lead to a calculated double meaning. The reason for calling it "natural gas" is because of the origin of its extraction from nature, unlike the gases produced from coal or oil. The gas industry has used the term to link it with the environment and a green future, although it is still a fossil fuel. Hence, to demonstrate its social and climatic impacts and make the greenwashing by the industry visible, we prefer to call it "fossil gas".

BASIC CONCEPTS OF GAS

A necessary step which helps in understanding everything related to the world of gas is to comprehend the basic concepts which recur in articles, studies, official documents, etc. and which end up obscuring the important information contained in them.

WHAT IS NATURAL GAS?

It is a mix of light gaseous hydrocarbons that can be extracted from pure gas fields or in association with other hydrocarbons. Its main component is methane gas (87-97 %) although it also contains small amounts of ethane, propane, butane, nitrogen and carbon dioxide[1]. To call "natural gas" a composition essentially composed of methane obscures the fact that, despite being the fossil fuel with the lowest emissions from combustion, the leaks in prior operations release a global warming potential (GWP) 86 times greater than that of CO_2[2] over 20 years.

GLOBAL WARMING POTENTIAL OF METHANE VERSUS CO_2

REPORT	AT 20 YEARS	AT 100 YEARS
IPCC 1995[3]	56	21
IPCC 2007[4]	72	25
IPCC 2013[5]	86	34

Table 1 / Compiled by the authors based on IPCC reports

Successive reports from the IPCC have considered the GWP of methane to be on the rise; however, many institutions continue to use a GWP of 21 or 25.[6]

1 Gas Union (undated) www.uniongas.com/about-us/about-natural-gas/Chemical-Composition-of-Natural-Gas viewed 10/11/16
2 IPCC (2007) page 84 www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf
3 IPCC (1995) pag.36 www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf
4 IPCC (2007) pag. 55 www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf
5 IPCC (2007) pag. 84 www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf
6 Martín-Sosa, Samuel (2016) www.elespanol.com/ciencia/ecologia/20161101/167603239_12.html

POUNDS OF CO_2 EMITTED PER MILLION BTUS OF ENERGY CONSUMED

		% IN RELATION TO NATURAL GAS
Coal (anthracite)	228.6	195 %
Coal (bituminous)	205.7	176 %
Coal (lignite)	215.4	184 %
Coal (subbituminous)	214.3	183 %
Diesel and heating oil	161.3	138 %
Petrol	157.2	134 %
Propane	139.0	119 %
Natural gas	117.0	100 %

Table 2 / Source: Energy Information Administration (USA)[7]

Natural gas is transparent but, contrary to what it may seem, it is odourless, although a substance is added to it to help detect leaks. It is not toxic, although it can displace oxygen and kill you by asphyxiation.

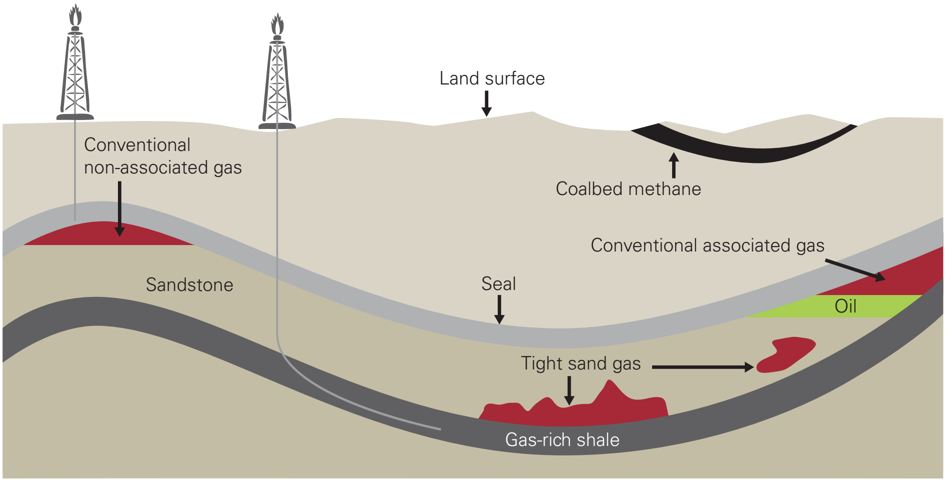
WHAT TYPES OF GAS ARE THERE?

Gas can have different chemical compositions, but the most common classifications are based on its location. Gas is extracted mainly in areas of crude oil extraction, which is why its history is associated and subordinate to crude oil extraction. Apart from the gas we can call conventional, there are so-called unconventional gases such as shale gas, tight gas or coalbed methane.

Shale gas, popularly known as shale or fracking gas, is found in shale rock. Tight gas is found in rock with very low permeability and also requires hydraulic fracturing. Coalbed methane, as indicated by its name, is methane trapped in coal veins and is normally extracted via horizontal drilling, with or without fracturing.

7 US. Energy Administration (2016) www.eia.gov/tools/faqs/faq.cfm?id=73&t=11

SIMPLIFIED GEOLOGY OF NATURAL GAS RESOURCES



Source: U.S. Energy Information Administration[8]

HOW IS IT MEASURED?

Quantities of gas can be confusing, given that its units can indicate volumes, the energy contained or equivalent and, in some cases, weight. In general, reserves tend to be measured in trillion cubic metres[9] (tcm) or trillion cubic feet (tcf); transport, export and import capacities are measured in billions of cubic metres (bcm) or billions of cubic feet (bcf) and the energy it contains can be measured in Kilojoules (kJ), British thermal unit (Btu), kilowatt-hours (kWh) or tonnes of oil equivalent (TOE).

It should be noted that the energy contained per quantity of natural gas, which is the really important parameter, is not constant and varies considerably according to the composition of the gas at the extraction point as well as the filtering process[10].

8 U.S. Energy Information Administration (2011) www.eia.gov/todayinenergy/detail.php?id=110

9 Trillion and billion refer to 10^{12} and 10^{9} units respectively, since they are expressed in the "short scale" system used in the USA, the English speaking part of Canada and the United Kingdom.

10 International Energy Agency (2012) pages 31-32 www.iea.org/media/training/presentations/statisticsmarch/naturalgasinformation.pdf

CONVERSION OF THE MOST COMMON UNITS FOR GAS

	VOLUME	VOLUME	VOLUME	VOLUME	ENERGY	ENERGY	ENERGY	ENERGY	ENERGY	ENERGY	ENERGY
from:/to:	tcm	tcf	bcm	bcf	BTU	MBTU	kWh	GWh	kJ	GJ	TOE
tcm	1	35.3	1,000	3.53E+04	3.79E+16	3.79E+10	1.11E+13	1.11E+07	4.00E+16	4.00E+10	9.55E+08
tcf	0.02833	1	28.33	0.001	1.07E+15	1.07E+09	3.15E+05	0.3145	1.13E+15	1.13E+09	2.70E+08
bcm	0.001	0.0353	1	35.3	3.79E+13	3.79E+07	1.11E+10	1.11E+04	4.00E+13	4.00E+07	9.55E+05
bcf	2.83E-05	0.001	0.02833	1	1.07E+12	1.07E+06	3.15E+08	314.5	1.13E+12	1.13E+06	2.70E+05
Btu	2.80E-17	9.32E-16	2.80E-14	9.32E-13	1	1.00E-06	2.93E-04	2.93E-10	1.06	1.06E-06	2.52E-08
MBtu	2.80E-11	9.32E-10	2.80E-08	9.32E-07	1.00E+06	1	293	2.93E-04	1.06E+06	1.055	0.025202
kWh	9.00E-14	3.18E-12	9.00E-11	3.18E-09	3,410	0.00341	1	1.00E-06	3,600	0.0036	8.60E-05
GWh	9.00E-08	3.18E-06	9.00E-05	0.00318	3.41E+09	3,410	1.00E+06	1	3.60E+09	3,600	85.980
kJ	2.50E-17	8.83E-16	2.50E-14	8.83E-13	0.947	9.47E-07	2.78E-04	2.78E-10	1	1.00E-06	2.39E-08
GJ	2.50E-11	8.83E-10	2.50E-08	8.83E-07	9.47E+05	0.947	277.8	2.78E-04	1.00E+06	1	0.02388
TOE	1.05E-09	3.70E-08	1.05E-06	3.70E-05	3.97E+07	39.68	1.16E+04	0.01163	4.19E+07	41.868	1

Table 3 / Source: International Energy Agency[11]

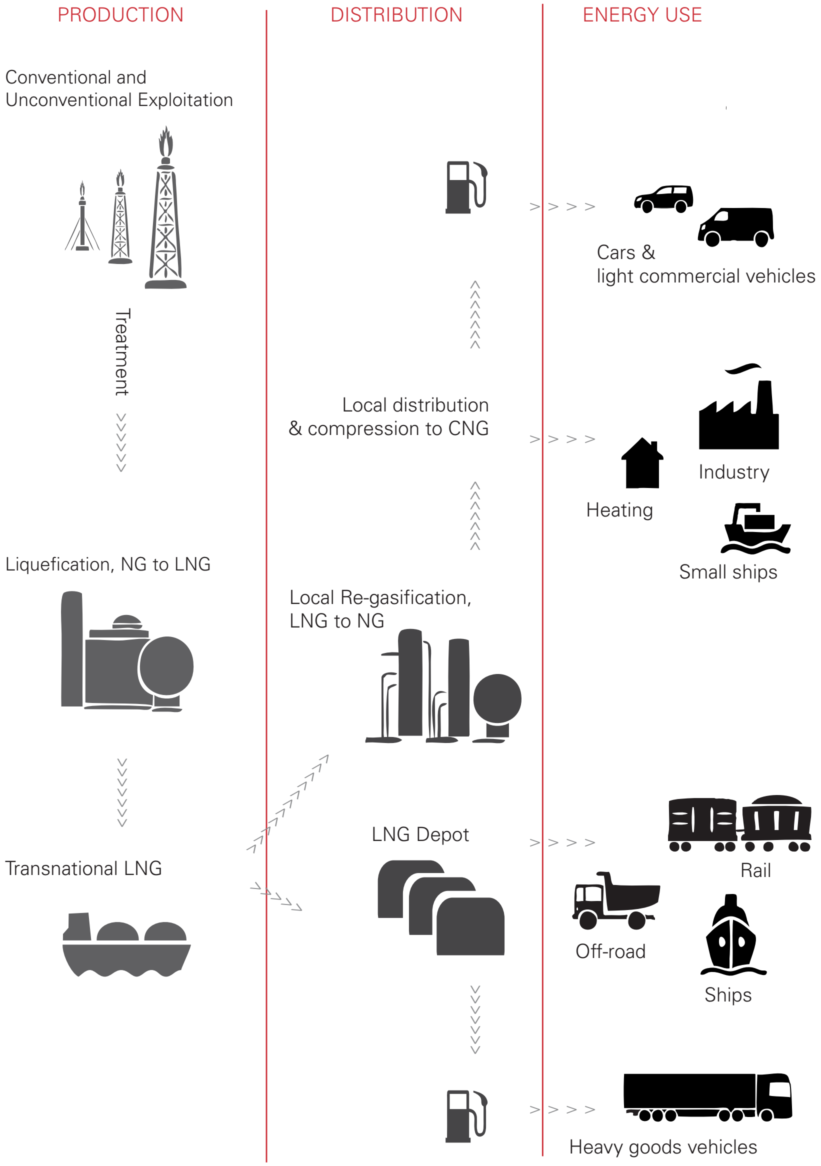
If volume quantities are accompanied by time units, they can indicate the flow of gas that can be produced, transported, consumed, etc. – for example, bcm/year or GWh/day.

HOW IS IT BROUGHT TO THE MARKET?

The chain from extraction to consumption is relatively simple if restricted to its main elements. From the extraction wells, gas is transported to the processing plant, where some components are removed from the gas, such as nitrogen and carbon dioxide, which complicate transportation and combustion[12]. After this operation, and depending on the final destination, the gas is piped to a compression plant, which increases its pressure so it can be pumped to the point of consumption through a gas pipeline. Over large distances[13] or if there is no network of pipelines, the gas is transported to a liquefaction plant, also called an export terminal, where it is converted to a liquid state in a costly process of cryogenization, lowering its temperature down to -162°C and reducing its volume by 600 times. Gas in its liquid stage is known as liquefied natural gas or LNG. LNG allows greater quantities of gas to be transported in LNG carriers. LNG carriers transport the gas by sea to regasification plants or import terminals where it is returned to a gaseous state. From there, it flows through gas pipes to the compression plant and from that point to the consumers. Gas can also be stored for later use (Fernández Durán & González Reyes, 2014).

11 International Energy Agency (2016) http://wds.iea.org/wds/pdf/Gas_documentation.pdf
12 Energy Information Administration (2006) www.eia.gov/pub/oil_gas/natural_gas/feature_articles/2006/ngprocess/ngprocess.pdf
13 Some authors estimate 4,000 km by land and 2,000 underwater. (Fernández Durán & González Reyes, 2014)

GAS SUPPLY CHAIN



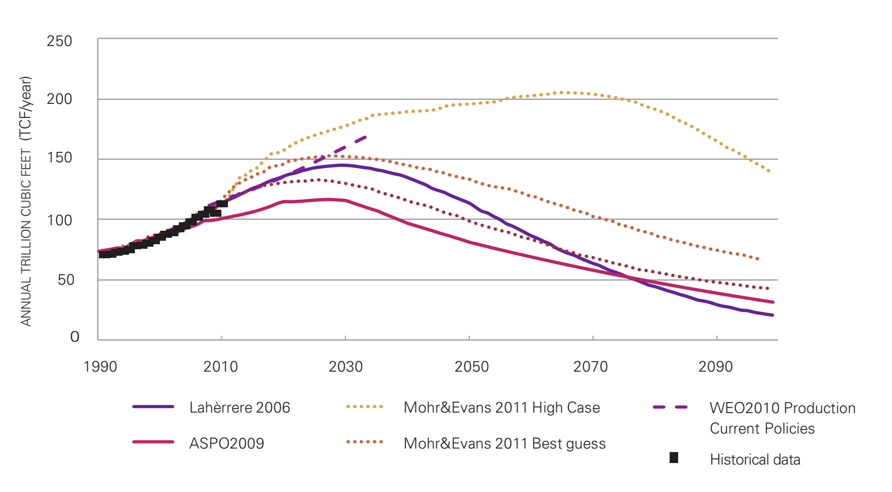
Source: U.S. Energy Charter Secretariat[14]

14 U.S. Energy Information Administration (2011)

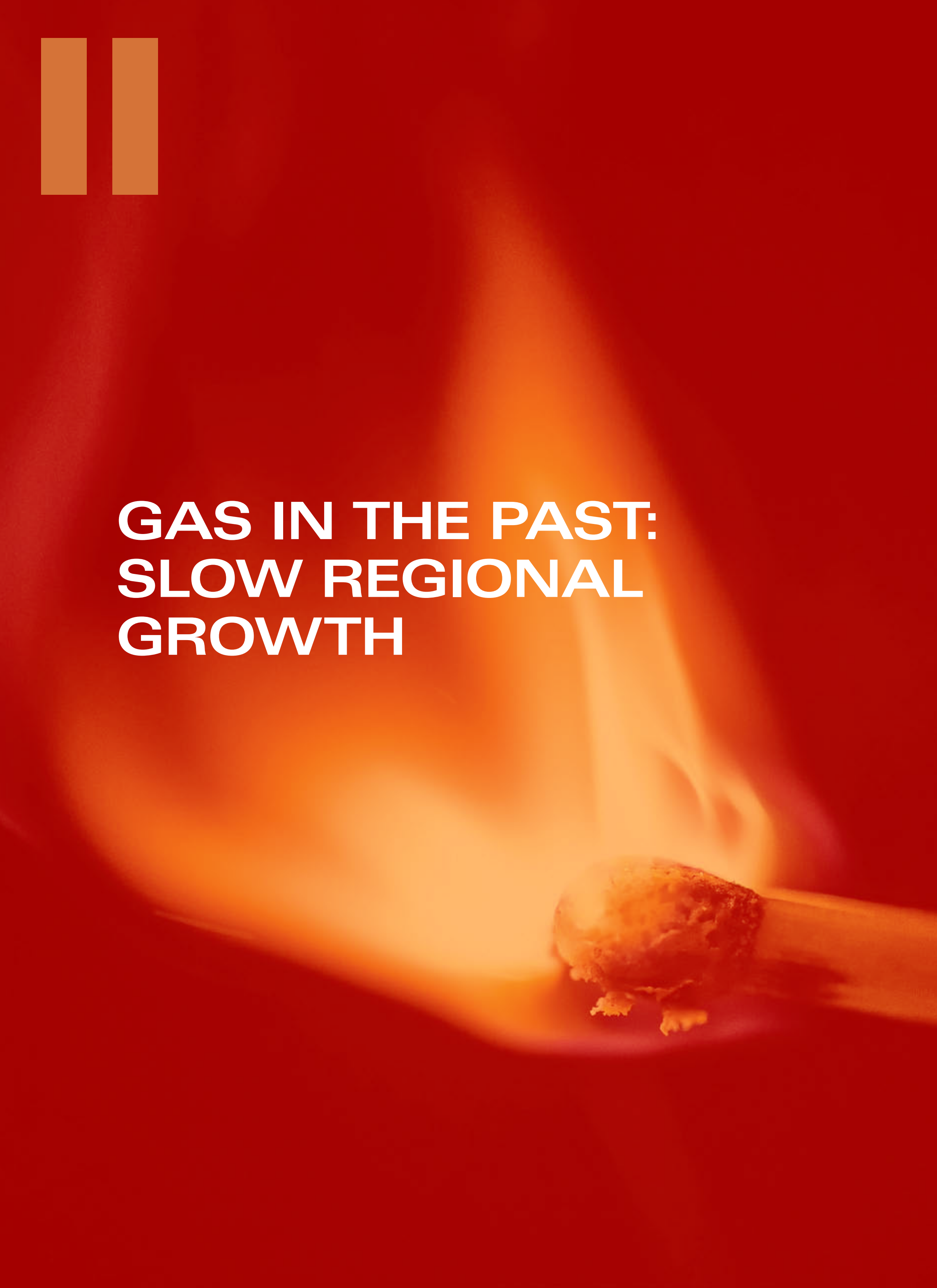
BIOPHYSICAL LIMITS

Natural gas is a non-renewable fossil fuel. Its intensive and extensive use is bringing us closer at an increasing rate to its maximum peak of extraction, to the peak of gas. Most authors place this peak around the year 2030, the year from which a drop in extraction will be irreversible for geological reasons. Furthermore, the downward curve after the peak translates into greater volatility and a trend to high prices for gas, an increase in the pressure to control this resource and consequently a greater negative impact on the most vulnerable populations.

OVERVIEW OF CURVES OF MAXIMUM GAS EXTRACTION (TCF P.A.)



Graph 1 / Source: The transition towards renewable energies:
Physical limits and temporal conditions (Mediavilla et al., 2012)



GAS IN THE PAST: SLOW REGIONAL GROWTH

The first underground well for natural gas known was put into operation in 1821 in Fredonia, New York, promoted by William Hart. The well, less than 8 metres deep, was connected by a rudimentary pipeline of hollow tree trunks fastened together with rags and tar. The difficulty of piping and transporting gas restricted its expansion until the Second World War. The improvements in metal processing methods, welding and pipe production during the war turned the construction of networks of gas pipelines into an economically more attractive activity.[15]

The big fossil fuel corporations came into being at the end of the 19th century and the beginning of the 20th century. Standard Oil was created in 1870 by John D. Rockefeller. Required to divide itself into 4 companies by the anti-trust laws of the USA, Exxon Mobil and Chevron were founded. Shell was created in 1907 and shortly afterwards British Petroleum (BP). In 1920, Deutsche Bank offered 25 % of Turkish Petroleum to France as compensation for the damage caused by Germany to the French Republic during the First World War. This act was the embryonic beginning of the company Total.

Several decades later, in 1959, the Groningen gas field was discovered in The Netherlands and the real development of gas in Europe took off. Three years later, The Netherlands started exporting gas to France, Belgium and Germany. At that moment Jan Willem de Pous, the Dutch Minister of Economic Affairs, created a formula to set an export price which safeguarded profits for the exporting country and the licensed company. The solution was to find a "reference value" linking the price of gas to that of an alternative fuel which could substitute it, which at the time was crude oil[16].

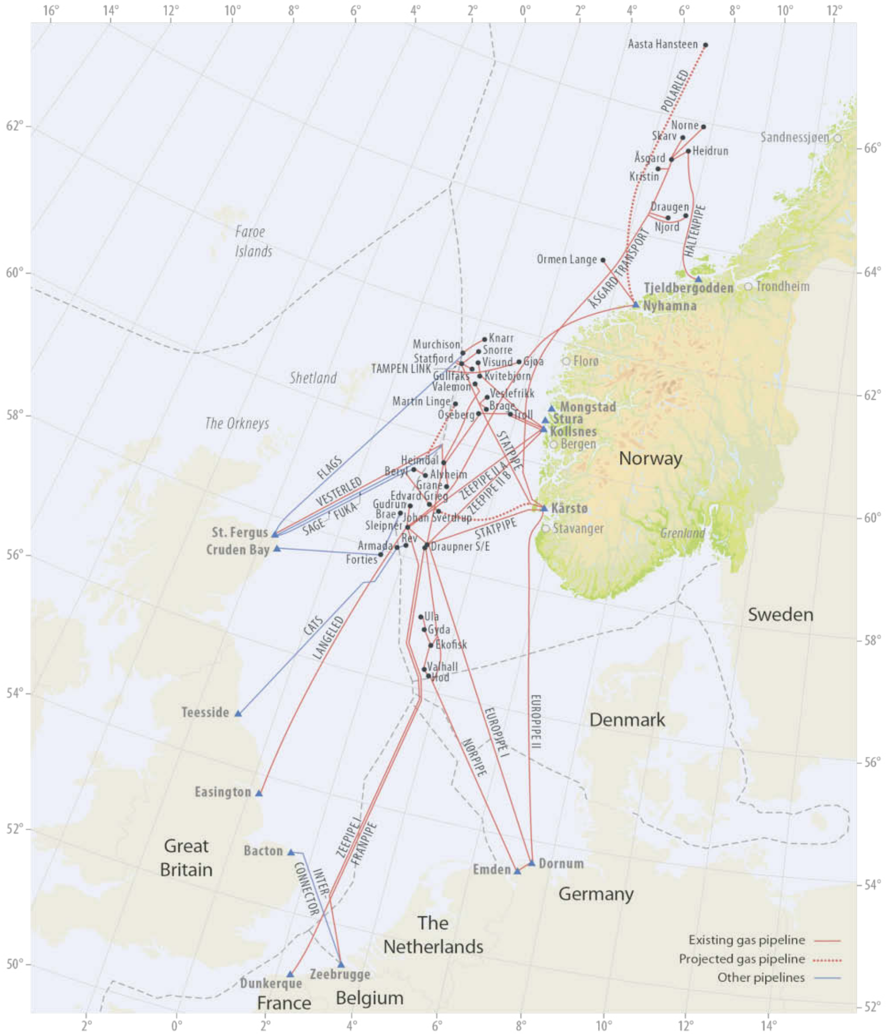
Over time this formula came to be known as the "oil indexed price". This indexing method allowed Exxon, Shell and the Dutch government to earn more profits than if the price of gas had been related to the costs of extraction in the Groningen gas field.

The De Pous method created the basis for gas supply agreements. Contracts envisage periods of 20-25 years and include guaranteed purchase provisions such as take or pay, i.e. the purchaser must pay for a minimum volume of gas even though he may end up not importing it. The object of this type of contract is to establish "stable relations" between exporters and importers. On the one hand, exporting countries could develop the extremely costly infrastructures necessary for export while reducing the risk of them falling into disuse and, on the other hand, importers can ensure a supply to cover their energy security needs.

15 US. Deparment of Energy (s.f.) www.fe.doe.gov/education/energylessons/gas/gas_history.html visitado 06/08/16
16 The Global Gas Historical Network (s.f.) www.gashistory.org/Dutch.html visitado 07/08/16

In the 1960s, the United Kingdom discovered the first gas fields in the North Sea to help cover domestic consumption[17]. Norway followed the same path, but had to build gas pipelines for export to the United Kingdom and Europe because its domestic market was limited (Stern, 2004).

NETWORK OF GAS PIPELINES NORWAY-EUROPE, 2016

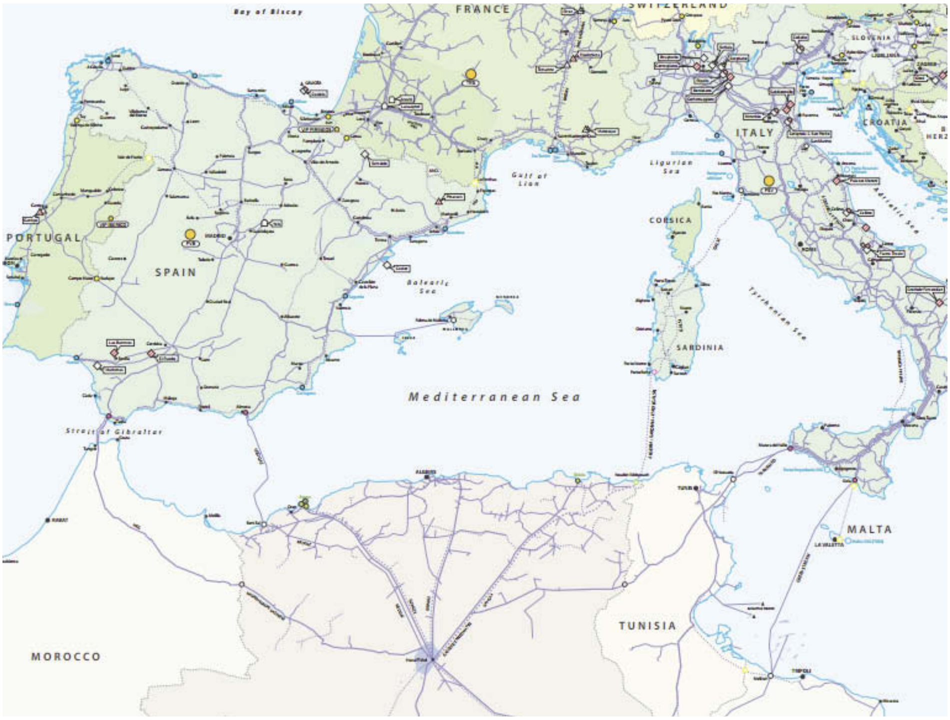


Map 1 / Source: Norwegian Petroleum[18]

17 "Domestic" refers to the national territory.
18 Norwegian Petroleum (2016) www.norskpetroleum.no/en/production-and-exports/exports-of-oil-and-gas/

Algeria built its first export plant in the 1960s as well and started supplying the United Kingdom and France[19]. In 1983, the Trans-Mediterranean gas pipeline started pumping gas from Algeria via Tunisia and Sicily and connecting with the Italian networks. In 1996, the other Algerian pipeline, this time running via Morocco, reached Spain and Portugal. Finally, in 2010 MEDGAZ started operations, a gas pipeline connecting Algeria directly with Spain (Stern, 2004).

NETWORK OF GAS PIPELINES ALGERIA-EU, 2016



Map 2 / Source: ENTSOG / GIE[20]

Gas exports from Russia to Europe did not start until the beginning of the 1970s with the construction of the mega gas pipeline Brotherhood, which started operating in 1983, and later the Yamal-Europe pipeline in 1997.

19 Algerian embassy in London (undated) www.algerianembassy.org.uk/index.php/algeria-uk-relations.html viewed 18/11/16

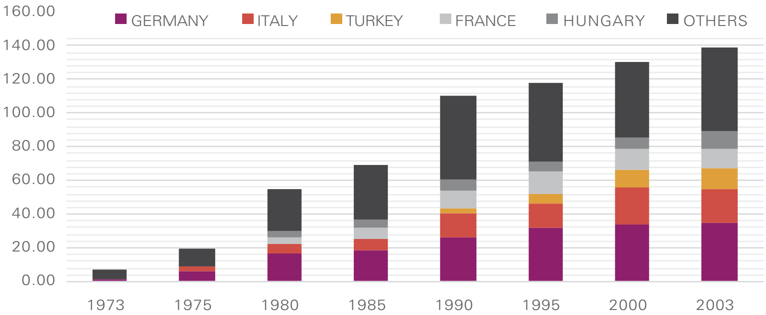
20 ENTSOG/GIE (2016) www.entsog.eu/public/uploads/files/maps/systemdevelopment/ENTSOG-GIE_SYSDEV_MAP2015-2016.pdf

NETWORK OF GAS PIPELINES RUSSIA-EU, 2007

Map 3 / Source: Samuel Balley, 2009

Despite the United Kingdom, France, Italy, Spain and Belgium installing LNG import terminals on their coasts, LNG experienced slow growth because of its high economic cost. The network of Russian gas pipelines, in contrast, cemented the gas-based relationships of Central and Eastern Europe with the gas fields of Siberia, fostering greater dependence on Russia's gas.

IMPORTS FROM THE USSR - RUSSIAN FEDERATION (BCM)

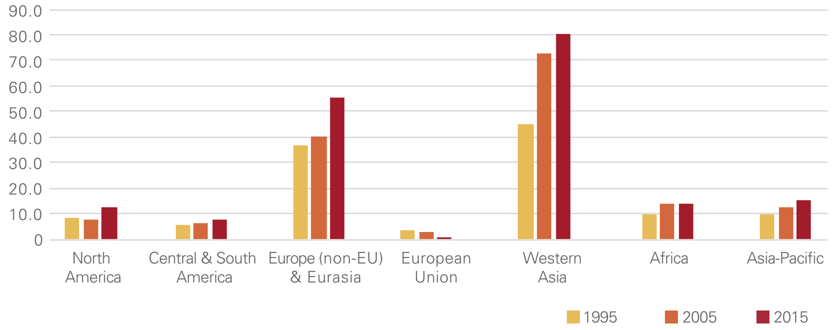


Graph 2 / Compiled by the authors based on data from (Stern, 2004)

GAS TODAY: RAPID GLOBAL GROWTH

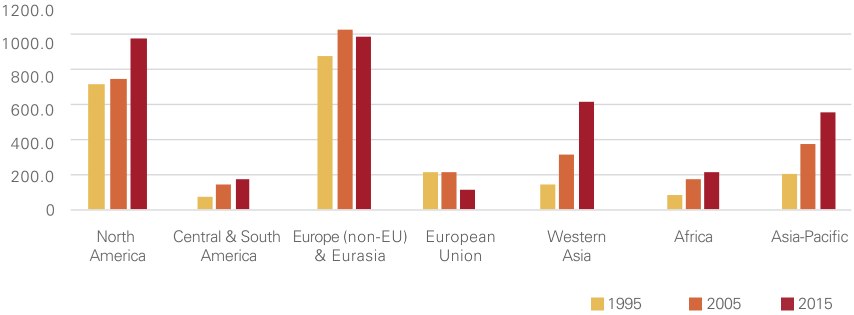
Indicators confirm the current acceleration of gas growth: most regions around the globe have discovered more reserves and produce and consume more gas; liquefaction plants and miles of mega gas pipelines are multiplying, and the fleet of LNG carriers is growing significantly. Hundreds of billions of euros have been invested in developing this sector. In addition, the official discourse is that gas is "the transition fuel" to low-carbon economies and an inseparable friend to renewable energies, preparing the way for extensive use. Multinational fossil fuel corporations are benefitting directly from this development and are underpinning their hegemony in the energy sector by consolidating their share of business in gas as well.

PROVEN GAS RESERVES (TCM)



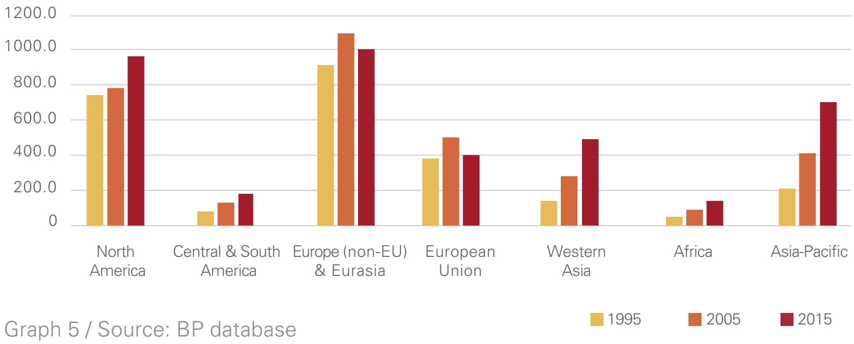
Graph 3 / Source: BP database

GAS EXTRACTION (BCM)



Graph 4 / Source: BP database

GAS CONSUMPTION (BCM)



Graph 5 / Source: BP database

The charts show that the European Union is the region in the world with the largest drop in reserves and extraction, while Western Asia[21] harbours large reserves and North America, headed by the USA, has increased extraction dramatically in the last decade. In broad terms, we can affirm that the EU and Asia-Pacific are importing regions, Western Asia and Africa are exporters, while the other regions are maintaining a certain balance between extraction and consumption. However, if the data are broken down by country they show us a very different picture.

A NEW MAP OF GAS-BASED RELATIONS

This past decade is full of milestones which mark a new geopolitical perspective to energy and gas in particular. The financial crisis of 2007-8, the so-called Arab Spring in Egypt, Libya, Tunisia, Yemen and Syria (2010-13), the Fukushima accident (2011), the renewal of the gas conflict between Ukraine and Russia (2006 and 2009) and civil war in the former Soviet republic (2014-), the lifting of sanctions on Iran (beginning of 2016), the sudden drop in the price of a barrel of crude oil (mid-2014) and the so-called boom of unconventional fuels in the USA[22] (2007-) reveal a global scenario assuredly different from the previous decade.

If we were to draw a barrier around the parts of the world where gas extraction is contested, without a doubt the Arctic would stand out, where it is estimated that 13 % of world reserves of oil and 30 % of gas are located (Aoun, Lojanica, & Mathieu, 2015). Although no exploration or large-scale extraction is planned in the short term, the *Arctic Five* (Russia, USA, Canada, Norway and Denmark) are in constant conflict over drawing borders in this region[23].

21 Generally known as the Middle East, a name criticised for its Eurocentric vision.

22 The boom in unconventional fuels refers to the strong growth in the production of shale gas and tight oil together with fracking technology in the USA from 2007 onwards. www.eia.gov/energy_in_brief/article/shale_in_the_united_states.cfm

23 The campaign initiated by Greenpeace in 2012 aims to prevent exploitation of hydrocarbons and unsustainable industrial fishing in the Arctic. Greenpeace (undated) www.savethearctic.org viewed 19/11/16

TOP 10 IN GAS RESERVES, EXTRACTION AND CONSUMPTION

RESERVES 2015	TCM	ANNUAL GROWTH (2006–15)	EX-TRACTION 2015	BCM	ANNUAL GROWTH (2006–15)	CON-SUMPTION 2015	BCM	ANNUAL GROWTH (2006–15)
Iran	34.02	2.2 %	USA	767.3	4.0 %	USA	778.0	2.3 %
Russian Fed.	32.27	0.3 %	Russian Fed.	573.3	-0.3 %	EU	402.1	-2.0 %
Qatar	24.53	-0.4 %	Iran	192.5	6.1 %	Russian Fed.	391.5	0.0 %
Turkmen.	17.48	32.5 %	Qatar	181.4	12.4 %	China	197.3	15.3 %
USA	10.44	6.3 %	Canada	163.5	-1.4 %	Iran	191.2	6.5 %
Saudi Arabia	8.33	2.0 %	China	138.0	9.4 %	Japan	113.4	3.9 %
Arabes Em.	6.09	0.0 %	EU	120.1	-6.0 %	Saudi Arabia	106.4	4.2 %
Venezuela	5.62	2.7 %	Norway	117.2	2.9 %	Canada	102.5	0.5 %
Nigeria	5.11	-0.1 %	Saudi Arabia	106.4	3.9 %	Mexico	83.2	3.3 %
Argelia	4.50	0.0 %	Algeria	83.0	-0.7 %	Germany	74.6	-1.3 %

Table 4 / Compiled by the authors based on data from the BP database
NB: The TOP 10 for reserves, extraction and consumption show the potential for the reserves in Iran, the growth of extraction in the USA and the increase in extraction and consumption in China. All this contrasts with the drop in extraction in the European Union.

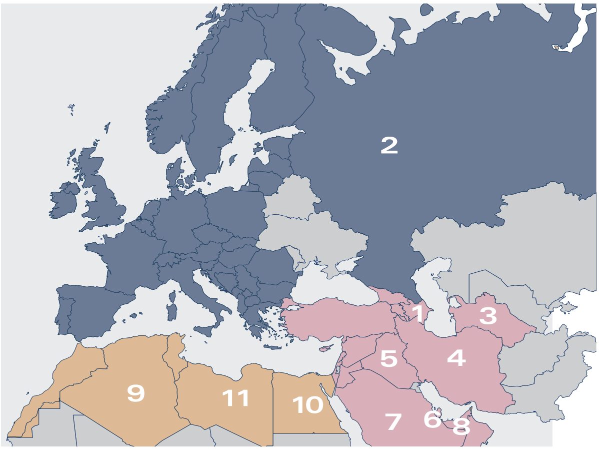
Northern Africa is also a relevant region regarding gas. The reserves in Algeria (4.5 tcm), Egypt (1.8 tcm) and Libya (1.5 tcm)[24] are of great importance for the European Union[25]. But these three gas powers have been affected by various circumstances that have complicated their extraction and export activities. In February 2013, Algeria suffered an attack on the installations at Amena[26], perpetrated by Al Qaeda, resulting in 40 dead. This fact, together with existing fields being exhausted, the lack of investment for new exploration and the increase in domestic consumption resulted in a sustained drop in its export capacity (Hamouchene & Pérez, 2016). In Libya, the civil war of 2011 temporarily halted exports of gas and currently its only liquefaction plant remains inoperable due to the attacks launched during the war[27]. In Egypt, domestic consumption has tripled in the period 2000–12 and gas extraction has been aimed at covering it while significantly reducing its export quotas[28].

24 BP database. Estimate for the end of 2014.
25 4 gas pipelines connect Northern Africa with the EU: 3 from production sites in Algeria and one from Libya. Plans are underway to build a new gas pipeline Algeria-Italy.
26 Statoil (2013) www.statoil.com/en/NewsAndMedia/News/2013/Pages/12Sep_InAmenas_report.aspx
27 U.S. Energy Information Agency (2015) www.eia.gov/beta/international/analysis.cfm?iso=LBY
28 U.S. Energy Information Agency (2015) www.eia.gov/beta/international/analysis.cfm?iso=EGY

In Western Asia attention should be focussed on Iran. The lifting of the embargo recently with the signing of the "joint comprehensive action plan"[29] has opened up a new future for this gas giant. Iran has reserves estimated at 34.02 tcm and minimal exports of 9 bcm/year to Turkey, Armenia and Azerbaijan[30]. Like Egypt, its extraction is for domestic consumption, but the National Iranian Gas Company would like to reach export quotas of 128 bcm/year, which would place it among the world leaders in this sector. With this aim in mind, Iran intends to build a liquefaction plant to export gas to Europe, via Turkey and the Arabian Peninsula[31] as well as gas pipelines such as the Iran-Pakistan or the Persian gas pipeline.

Further to the north we have Turkmenistan. The discovery of new reserves gives the country the potential to become a major exporter, with both the European Union and China trying to establish links with this Central Asian republic.

CONCENTRATION OF GAS RESERVES 2015 (TCM)



1	Azerbaijan	1.148337
2	Russian Federation	32.27103
3	Turkmenistan	17.479
4	Iran	34.02
5	Iraq	3.694
6	Qatar	24.52806
7	Saudi Arabia	8.325154
8	United Arab Emirates	6.091
9	Algeria	4.504
10	Egypt	1.846259
11	Libya	1.5049

Map 4 / Compiled by the authors based on data from BP

NB: More than 70 % of global reserves are found in this region.

Gas relations between the EU and Russia also have a major influence on the world map. The outbreak of the war in Ukraine and the EU's high level of dependence on Russian gas are factors used to justify the direction the EU's energy policy has taken. It should be noted that approximately 30 % of gas imports come from the Russian Federation and 50 % of these are routed via Ukraine.

29 U.S. Department of State (2015) www.state.gov/e/eb/tfs/spi/iran/jcpoa/

30 U.S. Energy Information Agency (2015) www.eia.gov/beta/international/analysis.cfm?iso=IRN

31 S&P Global. Platts (2016) www.platts.com/latest-news/natural-gas/london/feature-iran-eyes-major-gas-export-boost-but-26448318

Both the EU and Russia are talking about diversification. The EU is looking for new suppliers and is planning gas pipelines such as the Southern Gas Corridor[32] to bring gas from Azerbaijan (and Turkmenistan) to Italy. Moreover, it hopes to intensify the existing relations with Northern Africa, continue high-level energy discussions with Algeria, USA and Canada, open up to LNG from countries such as Qatar, Nigeria, Egypt, Libya, Australia, Algeria, USA and from new exporters such as Angola, Mozambique, Tanzania, Israel, Lebanon, Iran and Iraq[33].

The Russian Federation, in turn, wishes to re-orientate its gas business to the east since the European market appears to be saturated, due both to the drop in gas consumption following the financial crisis and to the hostile European energy policy. In 2014, *Gazprom*, the national Russian gas company, signed an agreement for 30 years with the *China National Petroleum Corporation* (CNPC) to supply 38 bcm p.a. and to build the mega gas pipeline *Power of Siberia*[34]. Total investment amounts to some $55 billion, although there are sources who say that the drop in the price of crude oil has slowed down the plans of the Kremlin[35].

On the other hand, in this past decade we cannot forget the emergence of new players as a result of the boom in unconventional fuels. The USA, for example, has rocketed its domestic extraction of shale gas, which has gone in just a few years from an almost non-existent fuel to accounting for 40 % of all extraction in 2013. This boom has caused an internal drop in gas prices[36] and in net imports, which have reached the level of 1986[37], albeit accompanied by severe environmental and health damage reported by numerous organisations[38].

In order to reduce the effect of this drop in prices, the USA wishes to place itself at the top of world exports, taking advantage of its technical capacity to do so. In its situation, the USA can export to the Asian market, where the prices are more attractive, or to the European market, which is less lucrative but more strategic regarding its objective to end the Russian hegemony of gas in Europe.

Another fact that is relevant in the USA is the high level of debt for gas extraction companies who are accumulating multi-million losses due to the rapid decline in extraction wells as well as the drop in the price of crude oil[39].

32 The Southern Gas Corridor was formerly known as the Euro-Caspian Gas Pipeline.
33 European Commission (2016) https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v10-1.pdf
34 Gazprom (undated) www.gazprom.com/about/production/projects/pipelines/built/ykv/ viewed 10/08/16
35 Reuters (2016) www.reuters.com/article/us-russia-china-gas-exclusive-idUSKCN0UT1LG
36 The price in 2008 was $8.86/Mbtu and in 2015 $2.62/Mbtu, a drop of 70 %, reaching the price levels of the 90s. U.S. Energy Information Agency (2016) www.eia.gov/dnav/ng/hist/rngwhhdA.htm
37 Energy Information Agency (2016) www.eia.gov/naturalgas/importsexports/annual/
38 Greenpeace (2014) www.greenpeace.org/usa/global-warming/issues/natural-gas/case-studies/
39 Bloomberg (2015) www.bloomberg.com/news/articles/2015-09-17/an-oklahoma-of-oil-at-risk-as-debt-shackles-u-s-shale-drillers

In the case of Australia, the main incentive for developing gas exports was the post-Fukushima situation, with Japan leading LNG imports and an Asiatic market with high demand (South Korea, China, India, etc.). Australia decided to explore new reserves of conventional fuels and coalbed methane as well as planning export facilities. More than 90 % of Australian reserves of conventional gas are located in the maritime zone in the North-West of the country, a zone of high ecological value and high marine biodiversity. In contrast to the USA, Australia has few export facilities, projects are located in remote areas and it does not have specialised workers, therefore the costs of liquefaction facilities are astronomical. For example, the gas export complex *Gorgon LNG*, located in North West Australia, had a final cost of 54 billion dollars (Lee, 2013).

Canada, in turn, has some large gas reserves, but is faced with similar problems to Australia's: projects are in remote areas without infrastructure and in the territories of indigenous communities. In Mozambique, the American company Anadarko and the Italian Eni are hoping to export LNG in 2018–19, but plans will be delayed because of the low price for gas (Maugeri, 2014).

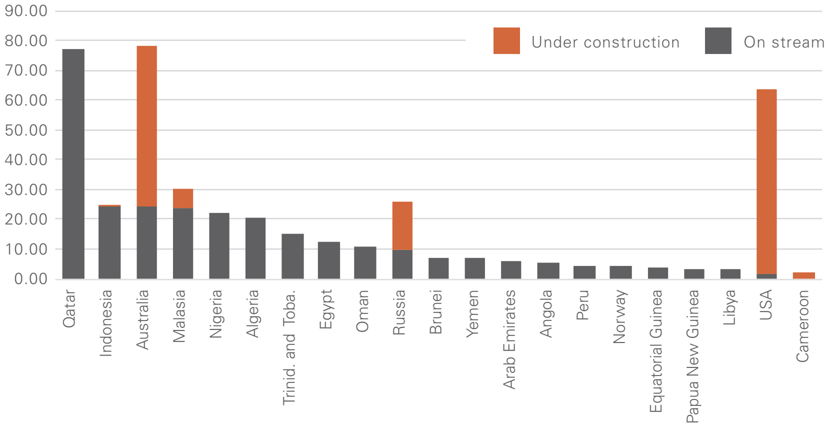
IMPORT AND EXPORT PROJECTS

As was stated in the previous chapter, the eagerness to export gas has gone hand-in-hand with planning endless gas projects. If we consider the liquefaction facilities currently under construction, capacity will increase by practically 50 % (286 MTA already operational and 139 MTA under construction) and it will be concentrated in very few countries, mainly the USA and Australia. If we were also to consider the facilities planned and proposed, the figure would more than double current capacity. Nevertheless, we should treat the projects that have not yet reached the construction phase with care, since they are competing with each other for a share of the global LNG markets and not all will obtain the licence or the multi-million investment needed. The current drop in the price of crude oil is also having a direct effect on the interest of investors for this type of infrastructure, which was proposed when prices were high.

Regasification facilities, on the other hand, are experiencing moderate growth (1499 MTA in operation and 144 MTA under construction) and there continues to be a major imbalance at a global level between LNG export and import capacity. The figures also indicate that the fleet of methane carriers will increase by 25 % in a few years[40].

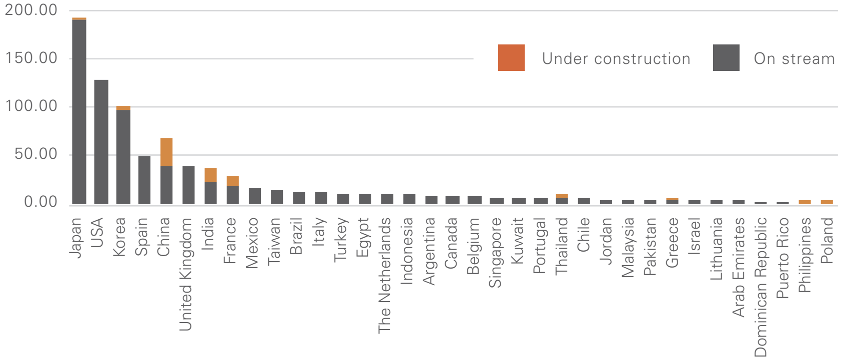
40 According to the IGU World Gas LNG Report — 2016 Edition, there are currently 614 methane carriers in operation and 150 under construction.

LIQUEFACTION FACILITY CAPACITY 2015 (METRIC TONNES PER ANNUM-MTPA)



Graph 6 / Compiled by the authors based on data from (International Gas Union, 2016)

REGASIFICATION FACILITY CAPACITY 2015 (METRIC TONNES PER ANNUM-MTPA)



Graph 7 / Compiled by the authors based on data from (International Gas Union, 2016)

LNG accounted for 9.8 % of total gas supplies in 2015 (International Gas Union, 2016), but this major drive could put it in a new position. Furthermore, LNG drew a new map of gas-based relations with more countries competing for a position in the global gas market and with more flexibility than gas pipelines.

The increase in LNG is not impacting the number of large gas pipelines being planned. The mega pipelines are authentic corridors of relations between territories which go beyond energy matters, but it is indeed difficult to find information on their technical characteristics and their progress. The following table lists the major international gas pipelines:

INTERNATIONAL MEGA GAS PIPELINES PLANNED

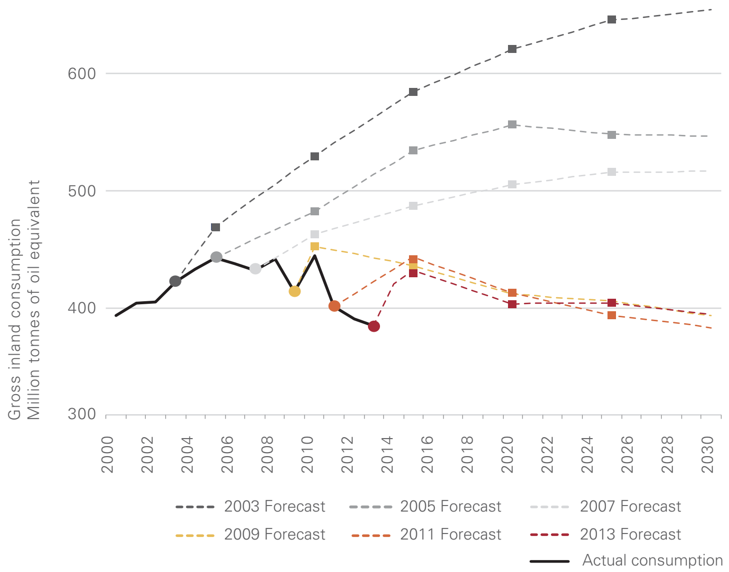
GAS PIPELINE/ COUNTRIES	LENGTH AND CAPACITY	COUNTRY STATUS	COMPANIES
Los Ramones US-Mexico	1160 km 22 bcm	Phase I operational[41] Phase II under construction (operational in 2016)[42]	Northwest Pipeline (Pemex Gas and Petroquimica Basica (PGPB), a subsidiary of Pemex, + Ienoca (Sempra Mexico)) >Phase I; Chihuahua pipeline, subsidiary of PGPB >Phase I MGI Supply > Phase I; SunGard > Phase I; GDF Suez + Pemex > Phase II; TAG pipeline, part of Pemex > Phase II
Power of Siberia China-Rusia	3944 km 38 bcm	Under construction. Operational at the end of 2018[43]	Gazprom China National Petroleum Corporation (CNPC)
TAPI Turkmenistan-Afganistan-Pakistan-India	1420 km 33 bcm	Under construction. Operational at the end of 2019[44]	Turkmengaz; GAIL India ISGS > Pakistan; Afghan Gas Enterpirse (AGE)
Iran-Pakistan	2775 km 40 bcm	Under construction. Operational at the end of 2017[45]	National Iranian Gas Company > Irán Khatam al-Anbia (subcontrata) > Irán Sui Northern Gas Pipeline Limited + Sui Southern Gas Company Limited (consorcio) > Pakistán
Persa gas pipeline Iran-Turkey-Europe	3300 km 37 bcm	No information available on its progress[46]	National Iranian Gas Export Company (NIGEC) Turkey's Som Petrol Option 1: Iranian company + foreign company (consortium) Option 2: 2 Iranian companies + 2 foreign companies Iran-Turkey border: joint company Turkey-Greece border: joint company
Trans-Saharan Pipeline Nigeria-Algeria	4128 km 30 bcm	On hold[47]	Nigerian National Petroleum Corporation Sonatrach > Algeria; Possible contributors if they contribute technical support and not only financial support. Gazprom, GAIL India, Total, Eni, Royal Dutch Shell
Nord Stream 2 Russia-Germany	1200x2 km 27.5x2 bcm	At the planning stage[48]	Gazprom > Shareholder (100 %); OMW > Supporter Shell > Supporter; Wintershall (BASF Gruppe) > Supporter ENGIE > Supporter
Southern Gas Corridor Azerbaijan and Turkmenistan-Italy	3500 km 10-32 bcm	Operational in 2019[49]	BP (United Kingdom), SOCAR (Azerbaijan), Lukoil (Russia), Snam (Italy), BOTAS and TPAO (Turkey), Fluxys (Belgium), Enagás (Spain), Total (France), Naftiran Intertrade (Iran), Petronas (Malaysia) and Axpo (Switzerland).
Galsi Algeria-Italy	288 km 7.6 bcm	Operational in 2019[50]	Sonatrach (Algeria), Edison (Italy), Enel (Italy), Sfirs (Italy), Hera Trading (Italy)
Turkish stream Russia-Turkey	900 km 31.5 bcm	No information available on its progress[51]	Gazprom – Joint company that will belong to a Turkish company in the section of the gas pipeline where it goes overland.
South Stream Russia-Bulgaria-Serbia-Hungary-Slovakia-Slovenia-Austria	2380 km 63 bcm	Cancelled in 2014[52]	South Stream Tranport AG (joint venture) > 16 September 2011. Gazprom (50 %); Eni (20 %); Électricité de France (15 %) Wintershall (BASF Gruppe) (15 %)

Table 5 / Compiled by the authors

41 Business News Americas (s.f.) www.bnamericas.com/project-profile/en/ducto-de-transporte-de-gas-natural-los-ramones-fase-i-los-ramones-fase-i viewed 01/12/16
42 Business News Americas (s.f.) www.bnamericas.com/project-profile/en/ducto-de-transporte-de-gas-natural-los-ramones-fase-ii-norte-los-ramones-fase-ii-norte viewed 01/12/16
43 Gazprom (s.f.) www.gazprom.com/about/production/projects/pipelines/built/ykv/ viewed 01/12/16
44 Asian Development Bank (s.f.) www.adb.org/projects/44463-013/main#project-overview viewed 01/12/16
45 Asian Development Bank (s.f.) www.adb.org/projects/44463-013/main#project-overview viewed 01/12/16
46 European Autumn Gas Conference (2015) www.theeagc.com/wp-content/uploads/2015/11/Ramazani-Azizollah_APP2.pdf
47 OECD (2014) www.oecd.org/swac/maps/02-Transsaharan%20gas%20pipeline.pdf
48 Nord Stream 2 (2016) www.nord-stream2.com/media-info/news/
49 European Commission (2016) (2016) https://ec.europa.eu/energy/sites/ener/files/documents/pci_7_1_1_en_2015.pdf
50 European Commission (2016) https://ec.europa.eu/energy/sites/ener/files/documents/pci_5_20_en_2015.pd
51 TurkStream (2016) http://turkstream.info/project/
52 South Stream (2016) www.south-stream-transport.com/

Gas extraction projects as well as liquefaction and regasification facilities, LNG carriers and large gas pipelines carry high associated risks: 1) the multi-million investments in infrastructures are based on future projections of consumptions that are intentionally optimistic 2) the majority of these investments are backed up by funds and/or guarantees which transfer the risk to the public domain 3) If the whole projected capacity were to start operations, this would cause gas prices to plummet and would contribute to the climate catastrophe 4) the service life of these infrastructures is calculated between 40–50 years and the gas peak will occur before this period; therefore many will fall into disuse.

"OPTIMISTIC" PROJECTIONS FOR CONSUMPTION IN THE EU

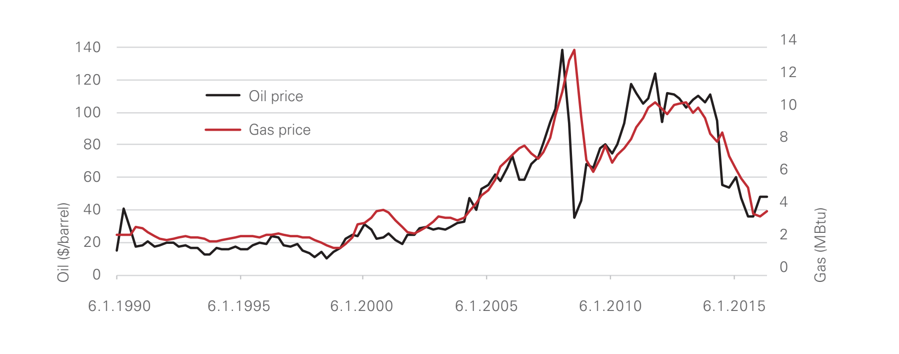


Graph 8 / Source: (European Court of Auditors, 2015)
Note on the original chart: All projections are for consumption in the EU-27 at intervals of 5 years (2005, 2010, 2015, etc.).

THE RECENT FALL IN THE PRICE OF CRUDE OIL

The strong link between gas and oil extraction and indexed pricing for gas in relation to oil means that the fall in the price of oil affects the world of natural gas.

CORRELATION BETWEEN PRICES FOR OIL AND GAS



Graph 9 / Source: IMF Cross Country Macroeconomics Statistics

In general terms, periods of high oil prices cause an initial peak in extraction of the resource, but end by slowing global economic growth and periods of low prices trigger exploration and extraction. The majority of large gas infrastructures were planned in a period (2010–14) of stable prices and a hike in oil and gas. With today's prices, investors do not view future profits from the fossil fuel industry in such rosy terms. This can cause a slow-down in the construction of costly liquefaction and regasification facilities and mega gas pipelines, while those already in the construction phase can experience real problems in making the investment profitable. Furthermore, the public guarantees for these projects must be analysed because they can lead to illegitimate debts[53] that, ultimately, the taxpayer must bear.

LARGE FOSSIL FUEL CORPORATIONS

The large fossil fuel corporations are one of the largest business conglomerates. Although the drop in the price of oil has impacted severely on their income, their volume of business and capacity to influence are decisive for the future of energy. Generally speaking, they produce oil and gas, although some specialise in gas.

53 Plataforma Auditoria Ciudadana de la Deuda (undated) www.dropbox.com/s/1pla1din3znkbkz/Definicion%20Deuda%20Ilegitima.pdf Viewed 18/11/16

GLOBAL FOSSIL FUEL CORPORATIONS ACCORDING TO INCOME IN 2015

RANKING	CORPORATION	COUNTRY	INCOME 2015 (MILLIONS OF $)	INCOME GROWTH 2015 (%)
3	China National	China	299,000	-30.2
4	Sinopec Group	China	294,000	-34.1
5	Royal Dutch Shell	Netherlands/UK	272,000	-36.9
6	Exxon Mobil	USA	246,000	-35.6
10	BP	UK	223,000	-37
24	Total	France	143,000	-32.4
31	Chevron	USA	131,000	-35.7

Table 6 / Compiled by the authors based on Fortune.com
NB: Ranking of companies in all sectors.

EUROPEAN FOSSIL FUEL CORPORATIONS ACCORDING TO INCOME IN 2014

RANKING	CORPORATION	COUNTRY	INCOME 2014 (MILLIONS OF $)
1	Royal Dutch Shell	Netherlands/UK	484,489
2	BP	UK	386,463
3	Total	France	231,580
6	Gazprom	Russia	157,830
8	Eni	Italy	153,676
16	Statoil	Norway	119,561
21	Lukoil	Russia	111,433
37	Repsol	Spain	81,122
49	Rosneft	Russia	65,093
78	OMV	Austria	47,349

Table 7 / Compiled by the authors based on Fortune.com
NB: Ranking of companies in all sectors.

The geographical spread of the large fossil fuel corporations has global reach. Royal Dutch Shell operates in more than 70 countries[54]. British Petroleum also operates in more than 70 countries and increased their area of exploration by 8,000 km^2 in 2015[55]. Total is present in 130 countries and has a workforce of more than 100,000 employees[56]. Gazprom holds 17 % of the world reserves of gas and supplies more than 30 countries[57].

The power which these companies accumulate is exercised via multiple mechanisms to exert direct and indirect influence. On the one hand, there are lobbies, or pressure groups formed by corporations in the sector who seek to exert influence on institutional decision-making processes to benefit their own interests.

The largest European gas lobby is GasNaturally, with 7 main organisations with members such as Shell, Eni, E.on, Statoil, BP, Exxon, Chevron, Gazprom Germania, Fluxys, Enagas and more than a hundred companies.

The vision of GasNaturally is: "In our vision, natural gas helps making a clean future real. It replaces other carbon-intensive fuels and works hand in hand with renewables to build that clean energy future."[58]

Two of the largest European organisations for renewables, the European Wind Energy Association (EWEA) and the European Photovoltaic Industry Association (EPIA) have been taking on this vision through the dominant position which Total, Iberdrola, E.on and Enel have taken on their board of directors and through the regular meetings with GasNaturally[59].

54 www.shell.com/about-us/who-we-are.html
55 BP (2016) www.bp.com/en/global/corporate/about-bp/bp-at-a-glance.html
56 Total (2016) www.total.com/en/energy-expertise/exploration-production/oil-gas
57 Gazprom (2016) www.gazprom.com/about/production/reserves/
58 Gas Naturally (s.f.) www.gasnaturally.eu/about-gasnaturally/our-vision visitado 06/12/16
59 The Guardian (2015) www.theguardian.com/environment/2015/jan/22/fossil-fuel-firms-accused-renewable-lobby-takeover-push-gas

On the other hand, the phenomenon of revolving doors is also a way of placing corporate interests to the fore. Cases such as Marcus Lippold, who worked for ExxonMobil and then became manager for cooperation with OPEC at the EU's Directorate-General for Energy; or the MEP Chris Davies, who ended his public role of 15 years and now, from his own environmental "consultancy", is working with Fleishman-Hillard, the big lobby that represents all the large hydrocarbon companies. The Spaniard Joaquín Almunia was also part of this phenomenon; who used to be the European Commissioner for Competition and then was part of the scientific commission which published the report "Building the Energy Union to stimulate growth in Europe" financed by Enel; so too Nathalie Tocci, who combines her work as adviser to the Commission with the board of the company Edison, part of the energy giant EDF[60]. And, of course, Arias Cañete, Climate Action and Energy Commissioner, known for his involvement with oil companies such as Petrolífera Dúcar SL and Petrologis Canarias SL.[61]

Lobbies and revolving doors are legal practices, although not overly legitimate, to which must be added the numerous cases of corruption in the sector such as bribery, embezzlement of funds[62] and many, many more criminal practices (Pérez, 2014).

DISMANTLING CORPORATE POWER[63]

Different groups and organisations in civil society have started a global campaign to report the abuse of corporate power, which can carry out its activities with impunity through its influence and an asymmetrical regulatory framework which protects it. The campaign is proposing an International Peoples' Treaty to provide a political framework with elements intended to support local, national and international movements as well as communities in their resistance and in implementing alternatives to the power of the multinationals and the dominant economic model. Likewise, the campaign is participating in related legislation at the level of the United Nations so that they regulate the operations of multinationals, stop human rights being violated and put an end to this impunity, ensuring the communities affected have access to justice.

60 Corporate Europe Observatory (2015) https://corporateeurope.org/revolving-doors/2015/11/brussels-big-energy-and-revolving-doors-hothouse-climate-change#annex
61 Corporate Europe Observatory (2014) https://corporateeurope.org/power-lobbies/2014/09/many-business-dealings-commissioner-designate-miguel-arias-canete
62 Transparency International (2016) www.transparency.org/topic/detail/oil_and_gas
63 Campaign Stop Corporate Impunity www.stopcorporateimpunity.org/

IV

GAS IN EUROPE

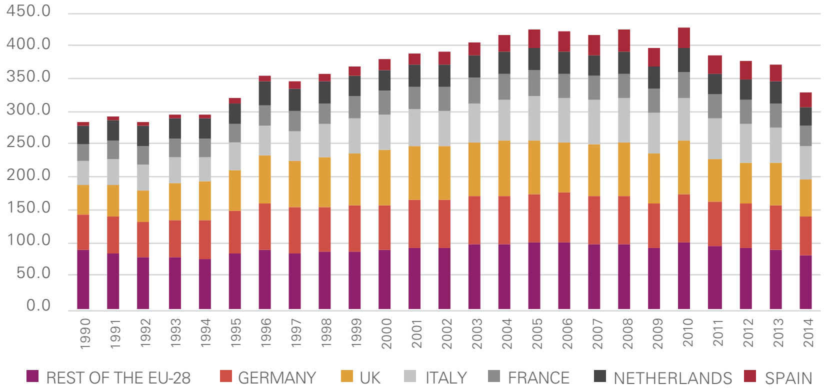
DATA ON GAS IN EUROPE

It can be said that a large part of European gas policy is based on data or indicators which can be read in very different ways, depending on the intention behind it. Interpretation of data ultimately influences the projections of infrastructures, mobilisation of public funds, relations with exporting countries and many other factors besides.

In this chapter, we try to show some of these different, sometime even contradictory, ways of reading data, given the importance of the conclusions that different players draw from an analysis of these. This chapter also contains some quantitative information useful for reading later chapters.

CONSUMPTION in 2014: 327.5 bcm

GAS CONSUMPTION IN THE EU-28 (BCM)



Graphe 10 / Compiled by the authors based on data from Eurostat

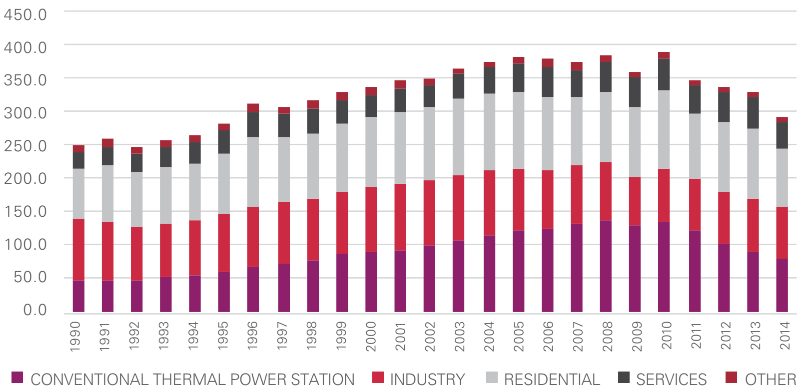
Gas consumption in the EU-28 increased sharply (+3 % p.a.) in the period 1990–2005; after a few years without rising, it dropped (23 % between 2010 and 2014) to the levels of 1995; this was due mainly to the effects of the financial crisis. Since then, gas consumption has been rising again.[64].

It remains to be said that when we talk of "consumption of the EU-28" this is largely determined by 6 countries which account for three quarters of total consumption: Germany (18 %), United Kingdom (17 %), Italy (15 %), France (10 %), Netherlands (8 %) and Spain (7 %). As we will see further on, the TOP 6 group is also the group of the highest importers.

64 Important: The graphs in this chapter do not show the increase in EU gas consumption in recent years, as the research for this booklet had already been carried out in 2016. We apologize for this inconvenience. See: Eurostat (2018) http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_103a&lang=en

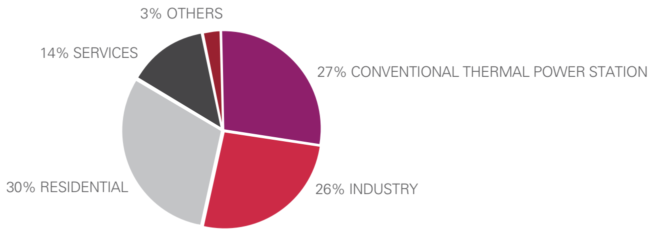
A sector-by-sector analysis shows that the residential sector was the largest consumer in 2014 with 30 %. Electricity generation from gas, which led growth in consumption, tripling in three decades (1990–2010, +286 %), has fallen to 1998 levels. The main causes were a drop in the demand for electricity due to the financial crisis, the growth in renewables[65] and the low price of coal, which left it to gas-powered power plants to cover peak demand[66].

FINAL ENERGY CONSUMPTION IN THE EU-28 BY SECTOR (BCM)



Graph 11 / Compiled by the authors based on data from Eurostat.

USE OF GAS BY SECTOR IN THE EU-28 (2014)

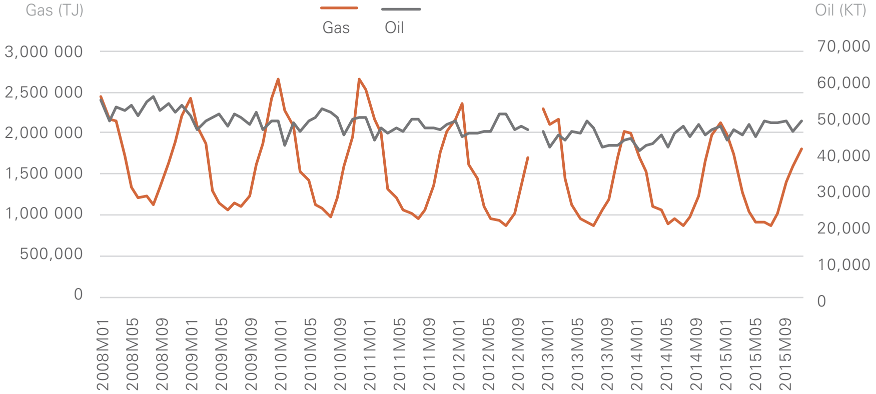


Graph 12 / Compiled by the authors based on data from Eurostat.

The importance of the residential sector underlines the phenomenon of seasonality. In other words, the demand for natural gas undergoes large variations depending on the time of the year, due largely to its relation to the thermal comfort of homes in winter[67].

65 E3G (2015) www.e3g.org/docs/E3G_Trends_EU_Gas_Demand_June2015_Final_110615.pdf
66 Timera Energy (2015) www.timera-energy.com/gas-vs-coal-switching-in-continental-power-markets/
67 E3G (2015) www.e3g.org/docs/E3G_Trends_EU_Gas_Demand_June2015_Final_110615.pdf

SEASONALITY OF GAS AND OIL IN THE EU-28 (TERAJOULES AND THOUSANDS OF TONNES)



Graph 13 / Compiled by the authors based on data from Eurostat.

NB: The chart shows the variations in consumption of gas and oil per month from 2008 to 2015. While the difference for oil between the month with the greatest and the lowest consumption is just over 20 %, for natural gas the variation between months with peaks and troughs is 150 %.

The seasonality of gas has been used to justify a certain degree of over-dimensioning gas infrastructures, ensuring that they must have sufficient capacity to cover peaks in consumption. Nevertheless, the fact that seasonality is strongly linked to the residential sector is a great opportunity to act on demand, for example, by improving the energy efficiency of buildings and renewable self-consumption (Fell, 2014).

EXTRACTION in 2014: 111.8 bcm

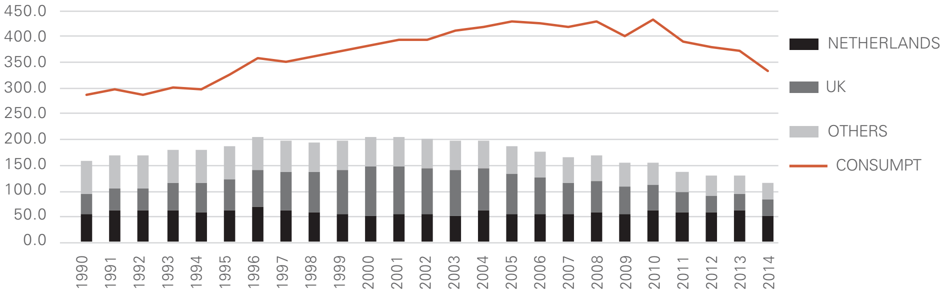
The territory of the European Union is not known for being rich in fossil fuel. In the case of gas, historical fields are suffering an appreciable decline in extraction. In 2014, extraction in the EU was 30 % lower than in 1990. In the 1990s, domestic extraction covered more than 50 % of consumption, but this percentage has dropped continuously to the current level of 34 %, due to the increase in consumption in the 2000s and, above all, to the drop in extraction in recent years.

Currently, the Netherlands and the United Kingdom produce more than 70 % of gas in the EU, although their situations differ markedly. In the case of The Netherlands, extraction has in fact remained stable due to the Groningen[68] field. Because of the frequent earthquakes triggered by gas production, the government has decided to reduce gas production by 60% in 2018, compared to 2014. In the United Kingdom, the fields in the

68 Reuters 2018. https://www.reuters.com/article/netherlands-gas-groningen/update-3-dutch-aim-for-major-cut-in-gas-production-at-earthquake-prone-groningen-field-idUSL8N1PR2JO

North Sea have been exhausted, causing a domestic peak in gas. This resulted in an unstoppable decline in extraction to levels below 1990.

EXTRACTION RELATIVE TO GAS CONSUMPTION
IN THE EU-28 (BCM)

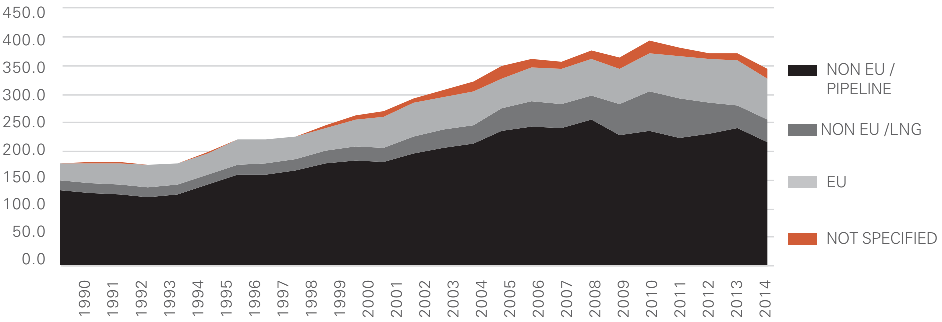


Graph 14 / Compiled by the authors based on data from Eurostat

IMPORTS in 2014: 284.5 bcm

The drop in extraction and the increase in consumption have resulted in imports of gas to the EU rising substantially in recent decades. Most of these imports (85 % in 2014) arrive via the network of gas pipelines and only a small fraction is LNG, despite the EU having a large installed capacity of import terminals.

EU IMPORTS (BCM)

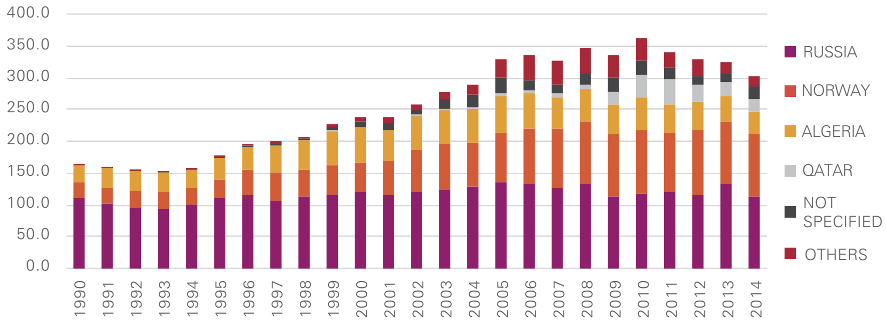


Graph 15 / Compiled by the authors based on data from Eurostat

The same TOP 6 import more than 80 % of the total volume of gas. In 2014, Germany imported 20 %, Italy 16 %, the United Kingdom 13 %, Spain 12 %, France 12 % and the Netherlands 8 %.

Among the exporters of gas to the EU-28, we are faced with a scenario shaped by three countries: the Russian Federation, Norway and Algeria, together with the recent incorporation of Qatar, the largest exporter of LNG in the world. Between them, the four monopolise almost 90 % of exports to the Member States.

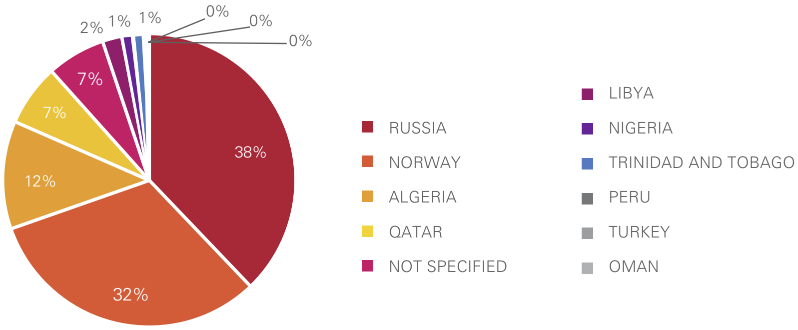
COUNTRIES SUPPLYING THE EU (BCM)



Graph 16 / Compiled by the authors based on data from Eurostat

In the period 1990–2014 countries such as Egypt, Uzbekistan and Turkmenistan were involved in supplying gas to the EU, but those which appear to have consolidated their position in recent years are, without doubt, Qatar, and to a lesser degree Trinidad and Tobago and Nigeria.

SUPPLIERS OF GAS 2014



Graph 17 / Compiled by the authors based on data from Eurostat

EXPORTS AND RE-EXPORTS

Gas exports from the EU to countries outside the Member States do not appear important in terms of volume (10.7 bcm in 2014), but if we analyse and break down the data, we see that countries such as Spain export gas to Japan, South Korea, Brazil, China, Kuwait, India, Turkey and Taipei, without extraction of its own. These re-export activities, i.e. a country imports gas and then re-exports it to a third country, accounted for 4.98 bcm in 2014. Re-exporting can have various motives, for example the opportunity to resell gas at a good price in the Asian market at a time when domestic consumption is falling. But it can also be a consequence of optimistic planning – self-interested and/or dreadful – that, together with import agreements containing take or pay[69] clauses, forces companies to "place" the gas somewhere in the world. Such contracts are confidential, and it is impossible to tell if the resale price is higher or lower than the purchase price.

Some publications in the energy sector place re-exporting as a business option when in fact it is a clear failure of the system with severe consequences for the climate (see Chapter 6)

DEPENDENCE ON GAS

Energy dependence[70] is an indicator which can be defined as:

$$\frac{\text{Imports-exports}}{\text{Gross inland consumption + International marine bunkers}}$$

This indicator measures the dependence of imports given that, if gross inland consumption originates from domestic extraction, energy dependence drops. That means we should call it external energy dependence (dependence on energy from abroad).

69 Europa Press (2015) www.europapress.es/economia/energia-00341/noticia-espana-fue-pais-mayor-volumen-gnl-reexportado-mundo-2014-20150625124927.html

70 Gross inland consumption is defined as the quantity of energy necessary to satisfy a certain geographical area. International maritime bunkers refers to the quantities of fuel stored on ships navigating international waters. They supply primarily oil and other derivatives, but in the case of gas in Europe its value is always zero.

DEPENDENCE ON GAS FROM ABROAD (%)

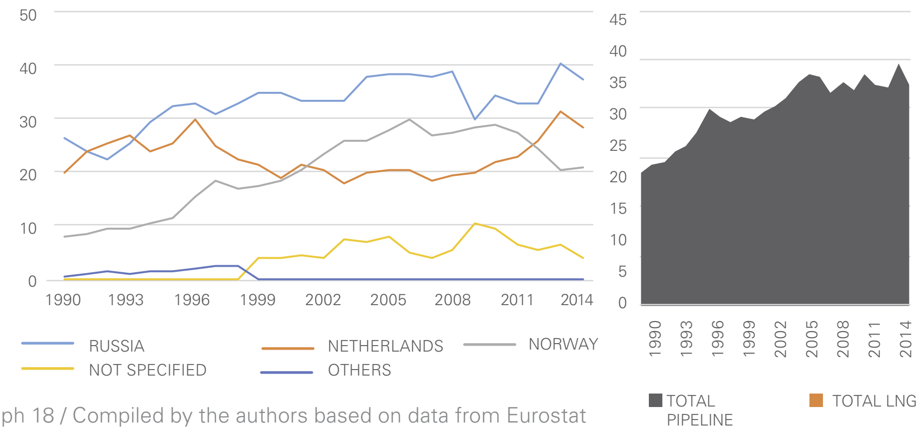
	1990	1995	2000	2005	2010	2014
Slovakia	105.2	86.8	98.8	97.5	99.9	104.8
Lithuania	100	100	100	100.7	99.7	103.8
France	93.6	93	100	99.3	93	103.6
Spain	70.3	96.5	101.1	101.2	99.3	103.5
Belgium	100.6	98.2	99.3	100.6	98.8	101.2
Estonia	100	100	100	100	100	100
Portugal	0	0	98.1	103.8	100.4	100
Finland	99.8	100	100	100	100	99.9
Slovenia	94.8	100.6	99.3	99.6	99.3	99.6
Luxembourg	100	100	100	100	100	99.5
Greece	0	0	99.1	99.1	99.9	99.3
Sweden	93.8	94.9	95.1	95.1	98.8	99.1
Hungary	58	60.3	75.4	81.1	78.7	97.7
Austria	85.4	84.8	80.6	87.7	75.3	96.8
Ireland	0	3.6	72.1	86.7	95.5	96.5
Czech Republic	91	98	99.8	97.8	84.8	96.3
Bulgaria	100.6	99.5	93.5	87.7	92.6	94.1
Germany	75.4	78.6	79.1	79.6	81.2	89.8
Italy	64.6	63.6	81.1	84.7	90.5	89.7
Latvia	107.6	99	101.9	105.6	61.8	72.1
Poland	75.4	64.6	66.3	69.7	69.3	72
United Kingdom	13.1	1	-10.7	7	37.9	45
Croatia	26.2	11.6	41	23.7	18.1	28.6
Romania	20.6	24.9	19.8	30.1	16.8	5
Denmark	-50	-46.7	-64.6	-113.5	-68.1	-46.4
Netherlands	-77.2	-76.4	-49.1	-59.3	-61.6	-73.1
Cyprus	-	-	-	-	-	-
Malta	-	-	-	-	-	-
EU28	45.5	43.3	48.8	57.1	62.2	67.4

Table 8 / Compiled by the authors based on data from Eurostat

Regarding the EU, it can be seen that dependence on gas from abroad has increased significantly since 1990 (+21.9 %) due, primarily, to the rise in consumption and the drop in domestic extraction. More than half of the Member States are around 90 % dependent, and some countries even exceed 100 % because they have been storing gas during the year for future consumption. Only Denmark and the Netherlands can be considered to be net exporters at present and therefore have negative dependence. The only country which has undergone a noticeable change in trend is the United Kingdom, which has gone from a net exporter (-10.7 %) to an importer (+45 %), with an increase in foreign dependence of 55.7 % in only 14 years.

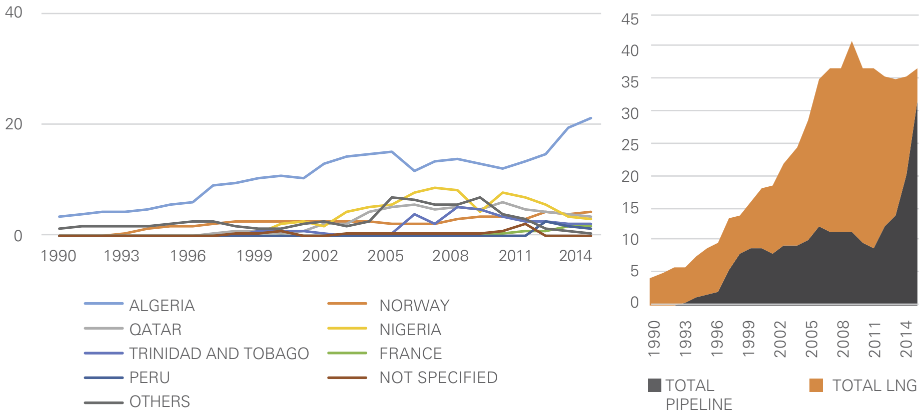
If we look only at the TOP 6 consumers and importers, we can see that, with the exception of the Netherlands, the trend is to an increase in foreign dependence, above the European average.

GERMANY IMPORTS (BCM)



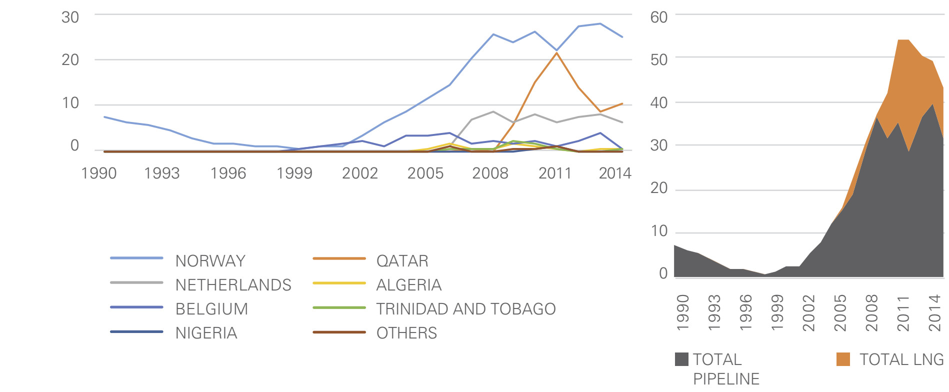
Graph 18 / Compiled by the authors based on data from Eurostat

SPAIN IMPORTS (BCM)



Graph 19 / Compiled by the authors based on data from Eurostat

UNITED KINGDOM IMPORTS (BCM)



Graph 20 / Compiled by the authors based on data from Eurostat

The profiles of the six largest importers are also manifestly different. We have Germany at the head with 89.9 bcm in 2014, importing gas from Russia (41 %), The Netherlands (31 %) and Norway (4 %). German imports also characteristically are made solely through gas pipelines, and therefore are less viable for diversification[71]. Spain is frequently seen as an example of diversification because it combines various suppliers, which do not include Russia, and it uses gas pipelines and LNG. Despite that, of the 36.4 bcm imported in 2014, some 58 % were from Algeria, followed by Norway (11 %), Qatar (9 %), Nigeria (8 %) and Trinidad and Tobago (6 %). The case of the United Kingdom is very different from the others, given that the steep decline in domestic extraction has caused a sharp increase in imports, which were practically zero in the second half of the 1990. Currently (2014), it is importing a total of 42.8 bcm from Norway (57 %), Qatar (24 %) and The Netherlands (15 %).

It remains to be said that the indicator of dependence has marked relevance in the direction European energy policy takes and, if not analysed in depth, can result in confusion. Dependence of 0 % is not necessarily equal to full self-sufficiency and 100 % dependence does not necessarily say that a country is totally dependent on imports. The indicator gives an annual average, but all countries – whether net importers or net exporters – apply import and export manoeuvres to cover peaks in demand or to supply specific geographical areas inside their own territory. Furthermore, dependence does not arise solely on the basis of the volume of gas. Signals from gas prices can encourage storage or importing (at a low price) for later export (at a high price) or consumption; this can distort the value of the indicator.

71 Diversification refers primarily to the ability to avoid dependence on a single supplier.

Nevertheless, the most controversial part is when dependence is linked with vulnerability. That means that the greater the dependence, the greater the vulnerability. In most official statements, this link is used to justify an exterior energy policy that is more offensive and certainly aggressive.

Vulnerability should consider consumption of domestic fossil fuel resources, both with regard to their effect on the climate as well as being finite and limited. And, without a doubt, when dependence is negative but the economy is in the hands of a primarily export-oriented matrix, this gives no cause for celebration because, sooner or later, the decline in domestic resources will result in severe consequences.

ENERGY SECURITY AND THE ENERGY UNION

The various periods and reappearances of the conflict between Ukraine and Russia have caused severe disruptions to the supply of gas; the most serious of which were in the winter of 2006 and 2009, when the dispute between the two countries lead to Gazprom cutting off the passage of gas in all gas pipelines crossing the territory of the Ukraine (Pirani, 2009).

These occurrences put energy security at the heart of the debate on European energy policy and furnished the perfect excuse to launch an offensive that consolidates a genuine European energy model. For the European Commission, this model intends to create greater "coordination" – i.e. integration, harmonisation and supranational control.

The different "energy packages" talk time and again of the attempt to develop this truly European energy policy: in the first package with the directives on electricity (1996) and gas (1998), in the second concentrating on energy security (2003),in the third (2009) on functioning of the internal energy market of the EU, and in the pertinent Green Paper (2006).

Following on from these events, in March 2014 Donald Tusk, Prime Minister of Poland at the time and the current President of the European Council, introduced a proposal which later came to be called the Energy Union. Tusk stressed that Europe must face Russian gas hegemony and renegotiate the inflated prices of contracts with the countries in Central and Eastern Europe. The environment and the climate do not appear in his speech (Poland is the greatest producer of coal in the EU) (Szulecki, Fischer, Therese Gullberg, & Sartor, 2016).

In November 2014, Jean-Claude Juncker was appointed President of the European Commission and redefined Tusk's proposal, giving it a character more focussed on productivity and industry. Juncker marked this concept of the Energy Union as a priority on his agenda and added the importance of the EU becoming the world leader in renewables and it having access to energy at accessible prices. He also added the objective of 30 % energy efficiency, again aligning this proposal with the milestone for 2030 (ibid.).

Finally, on 25 February 2015, the European Commission published the strategy of the "Energy Union"[72] as an attempt to relaunch and achieve the objective of energy integration, linking it to ensure "secure, sustainable, competitive and affordable energy"[73].

Responsibility for the Energy Union has fallen to Maroš Šefčovič, as Vice President, and Miguel Arias Cañete, Climate Action and Energy Commissioner. This strategy is based on five main pillars: energy security, solidarity and trust; the internal energy market (IEM), energy efficiency as a contribution to lowering the demand for energy, decarbonisation of the economy, and research, innovation and competitiveness[74].

On paper the five pillars are presented as a block of unitary progress but in reality there is major asymmetry between them. The first two, energy security and the creation of a single market, are given most of the attention, interest and financing. Gas as a fuel is key and fundamental to the whole strategy.

The Energy Union is unfolding under two principles: diversification and interconnection. First, diversification of gas suppliers is needed and new one found outside the sphere of Russian influence and, second, Member States must be fully interconnected so that kWh and m^3 of gas can flow freely within the EU. In other words, the strategy has an exterior dimension and an interior dimension. The exterior dimension comprises two tactical moves: land-based, through gas pipelines, and sea-based, through LNG. The land-based part is solved with planning large gas pipelines such as the Southern Gas Corridor and the *Galsi* pipeline[75].

The European strategy for LNG and gas storage[76], included in the *Winter Package*, also underlines the importance of creating a network of stores which can supply gas in the case of disruption. The sea-based approach is defined in the strategy by considering Algeria, the USA and Canada as priority countries for energy dialogue at a high level and to continue working with current and potential suppliers such as Australia, Qatar, Nigeria, Egypt, Angola, Mozambique, Tanzania, Israel, Lebanon, Iran, Iraq and Libya.

On the other hand, the interior dimension is planning numerous international electricity interconnections and a new network of interconnected gas pipelines that should allow gas to be circulated and redistributed from new import locations to the places of consumption. Of these, the gas interconnector between Spain and France, the MIDCAT/STEP project, stands out[77].

Considering the size envisaged, the first surprising thing is the notion of "security" on which the Energy Union is banking: it will substitute the Russian Federation with new

72 European Commission (2015) http://europa.eu/rapid/press-release_MEMO-15-4485_es.htm
73 European Commission (2015) https://ec.europa.eu/priorities/energy-union-and-climate_en
74 European Commission (2015) http://ec.europa.eu/priorities/energy-union-and-climate_en
75 European Commission (2015) https://ec.europa.eu/energy/sites/ener/files/documents/pci_5_20_en_2015.pdf
76 European Commission (2015) https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v10-1.pdf
77 European Commission (2015) https://ec.europa.eu/energy/sites/ener/files/documents/pci_5_5_en_2015.pdf

"stable" partners such as Turkmenistan, Azerbaijan, Algeria, Israel, Qatar, Nigeria, Egypt, etc.; it is banking on large multinational corporations who can implement mega infrastructures that come with high financial, social and environmental costs; it is proposing interoceanic transport of LNG with Australia, Canada and the USA, with the impact on the emission of greenhouse gases which this will have; and it is promoting an energy transition with a non-renewable fossil fuel at the core.

The fact of fully implementing the strategy will allow the EU to "speak with one voice"[78], i.e. to consolidate the European energy block (Solorio Sandoval, 2012), and the value of achieving this appears to be above any other consideration.

Despite that, the Energy Union is largely determined by the major tensions at the heart of the EU, most of which result from the collision of national sovereignty and a union-based approach (Szulecki, Fischer, Therese Gullberg, & Sartor, 2016). Germany, for example, despite being the largest importer of gas and oil in the EU, has not shown any great enthusiasm for the Energy Union. It is proposing the controversial Nord Stream 2, a gas pipeline directly connected to Russia, and is protecting its national interest with the energy transition *(Energiewende)* (Dreger, 2014).

BREXIT

There are more questions than answers to the impact that Brexit will have on the EU and on the United Kingdom. For example, whether the United Kingdom will continue to participate or not in the Energy Union and in the institutions coordinating regulation in the EU such as ACER, ENTSO-E or ENTSO-G. And perhaps it will be even more important to know the role of European funds, such as EFSI or CEF, for energy projects[79]. Will it no longer receive institutional and financial support for its projects of common interest? Will it be enough to be a member of the European Free Trade Area (EFTA)?[80]

78 Phrase used by Arias Cañete at the press conference on the Energy Union European Commission (2015) http://europa.eu/rapid/press-release_SPEECH-15-4221_en.htm

79 Norton Rose Fulbright (2016) www.nortonrosefulbright.com/knowledge/publications/136979/impact-of-brexit-on-the-energy-sector

80 Bloomberg (2016) www.bloomberg.com/news/articles/2016-08-24/norway-to-rely-on-gas-dominance-for-key-role-in-brexit-talks

‘SOLID’ INFRASTRUCTURE: GAS PIPELINES AND LNG-TERMINALS

The promotion of mega infrastructures appears to generate a general consensus among institutions and interest groups within the EU. These large projects are looked on as a motor to revitalise the economy and generate employment (Guiteras, 2015)[81].

The greater part of these infrastructures are included in the EU’s list of Projects of Common Interest (PCI)[82]. The PCIs are likely to receive financing from the public purse through the *European Investment Bank*, the fund *Connecting Europe Facility* (CEF), the *European Fund for Strategic Investments* (EFSI), as well as having the ability to accelerate the administrative process to allow their construction.

GAS PROJECTS OF COMMON INTEREST

- Terminal for liquefied natual gas (LNG)
- Storage facility
- Reverse flow
- Compressor station
- Adaptation low to high
- Node
- Pipeline
- Gas hub

Map 5 / Source: Map of Projects of Common Interest – DG Energy[83]

81 EIB (2015) www.eib.org/efsi/what-is-efsi/index.htm

82 PCIs must satisfy some eligibility criteria. European Commission (2018) https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest

83 DGEnergy (2018) http://ec.europa.eu/energy/infrastructure/transparency_platform/map-viewer/

This decisive move to implement large gas infrastructures is not without controversy. A recent study by E3G *(Third Generation Environmentalists)* concludes that the current gas system in Europe is highly resilient from disruptions to supply and a wide range of future demand, and only requires a limited investment in South-East Europe and under certain specific conditions (Gaventa, Dufour, & Bergamaschi, 2016).

SCENARIOS OF DISRUPTIONS OF IMPORTS TO THE EU

Scenario	Extreme cold	Norway disruption	North Afnca disruption	Ukraine disruption
Finding	Little or no disruption in any demand scenano	Little or no disruption in any demand scenano	Little or no disruption in any demand scenano	Significant disruption in South East Europe; little or no disruption elsewhere

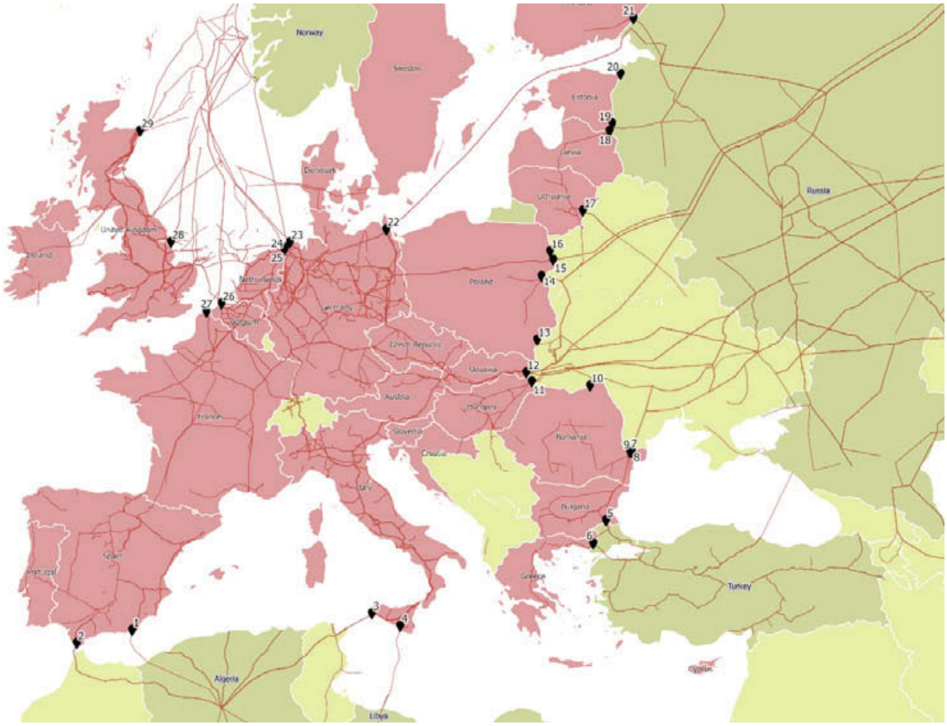
Source: (Gaventa, Dufour, & Bergamaschi, 2016)

NB: the figure shows 4 scenarios: extreme cold, disruption from Norway, Northern Africa or Ukraine. The circles show the quantity that could not be imported because of the disruption (red), the additional quantity of LNG that would have to be imported (sky blue) and by gas pipeline (green) and the quantity that would be lacking (marine blue). Only if supply via Ukraine were disrupted would there be a shortfall of 26 bcm to cover the needs of the system.

The publication acknowledges that it did not analyse the economic costs of procuring additional supplies of gas from other suppliers in the event of severe disruptions or an increase in demand. In any case, the costs are not comparable with the investment needed to build the gas infrastructures.

On the other hand, the EU has existing capacity of international interconnections that were only operating at 60 % in 2015. In the same year, also LNG import terminals were used significantly below their nominal capacity, at around 19 %.

INTERCONNECTION POINTS OF GAS PIPELINES WITH NON-EU COUNTRIES IN 2015



Map 6 / Compiled by the authors based on data from ENTSOG / GIE[84]

84 ENTSOG/GIE (2016) https://transparency.entsog.eu/#/?loadBalancingZones=false

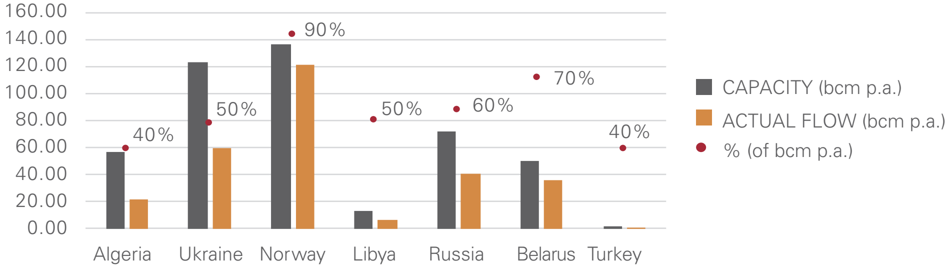
INTERNATIONAL INTERCONNECTION POINTS OF GAS PIPELINES IN 2015

POINTS ON BORDERS	CAPACITY (BCM P.A.)	ACTUAL FLOW (BCM P.A.)	% USED (RE-LATED TO BCM P.A.)	COUNTRY 1	COUNTRY 2
Almería	8.0	6.6	82.6	Algeria	Spain
Beregdaróc 1400 (HU) – Beregovo (UA) (UA>HU)	12.8	5.5	43.3	Ukraine	Hungary
Budince	0.0	0.0			
Dornum / NETRA	22.9	20.3	88.5	Norway	Germany
Drozdovichi (UA) –Drozdowicze (PL)	4.4	3.4	78.2	Ukraine	Poland
Dunkerque	18.3	16.3	89.3	Norway	France
Easington	26.3	18.5	70.4	Norway	
Emden (EPT1)	29.8	16.2	54.4	Norway	Germany
Gela	12.8	6.6	51.1	Libya	Italy
Greifswald	56.8	36.0	63.3	Russia	Germany
Imatra	7.9	2.5	32.0	Russia	Finland
Isaccea (RO) – Orlovka (UA) I	4.9	2.7	54.9	Ukraine	Romania
Isaccea (RO) – Orlovka (UA) II	9.2	6.3	68.5	Ukraine	Romania
Isaccea (RO) – Orlovka (UA) III	8.8	6.4	72.4	Ukraine	Romania
Kipi (TR) / Kipi (GR)	1.6	0.6	37.2	Turkey	Greece
Kondratki	33.7	29.4	87.3	Byelorussia	Poland
Kotlovka	10.5	3.9	36.9	Byelorussia	Lithuania
Mazara del Vallo	35.0	6.7	19.1	Algeria	Italy
Misso / Estonia	0.0	0.0			
Misso Izborsk	6.8	1.8	26.1	Russia	Estonia
Narva	0.4	0.0	7.1	Russia	Estonia
St. Fergus	23.4	22.2	94.7	Norway	United Kingdom
Tarifa	13.9	8.3	59.6	Algeria	Spain
Tieterowka	0.2	0.1	29.3	Byelorussia	Poland
Uzhgorod (UA) – Velké Kapušany (SK)	74.8	35.2	47.1	Ukraine	Slovakia
Värska	1.2	0.1	5.2	Estonia	Russia
VIP Mediesu Aurit – Isaccea (RO-UA)	7.7	0.2	2.1	Ukraine	Romania
Wysokoje	5.5	2.4	43.5	Byelorussia	Poland
Zeebrugge ZPT	15.3	13.4	87.8	Norway	Belgium
TOTAL	**452.9**	**271.5**	**60.0**		

Table 9 / Compiled by the authors based on data from ENTSOG / GIE[85]

85 ENTSOG/GIE (2016) https://transparency.entsog.eu/#/?loadBalancingZones=false

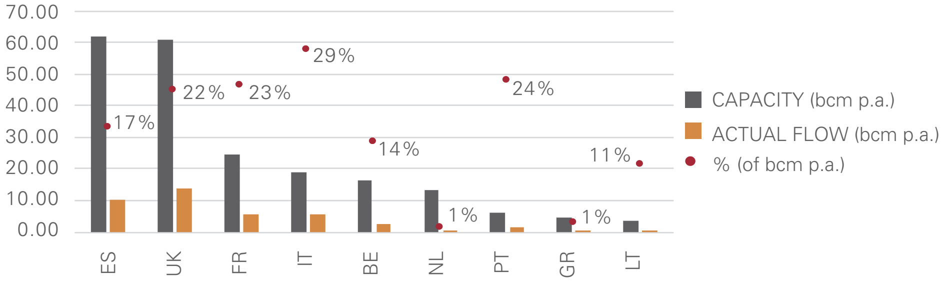
CAPACITY AND USE OF GAS INTERCONNECTIONS BY COUNTRY IN 2015



Graph 21 / Compiled by the authors based on data from ENTSOG / GIE[86]

It can be observed that the percentages of international connections are very different from country to country. For example, Norway lies at 90 %, while the interconnections with Ukraine and directly with Russia reach only 50 % and 60 % respectively.

CAPACITY AND USE OF GAS IMPORT TERMINALS BY COUNTRY IN 2015



Graph 22 / Compiled by the authors based on data from ENTSOG / GIE[87]

86 ENTSOG/GIE (2016) https://transparency.entsog.eu/#/?loadBalancingZones=false
87 ENTSOG/GIE (2016) https://transparency.entsog.eu/#/?loadBalancingZones=false

GAS IMPORT TERMINALS, EU 2015

TERMINAL	CAPACITY (BCM P.A.)	ACTUAL FLOW (BCM P.A.)	% USED (RELATED TO BCM P.A.)	COUNTRY
Milford Haven	31.5	7.59	24.11	UK
Isle of Grain	23.2	0.05	0.24	UK
Barcelona	17.1	2.63	15.37	Spain
Zeebrugge LNG	16.2	2.3	14.24	Belgium
Gate Terminal (I)	13.2	0.09	0.69	Netherlands
Fos (Tonkin/Cavaou)	12.9	4.78	37.06	France
Cartagena	11.8	1.07	9.08	Spain
Huelva	11.8	2.12	17.91	Spain
Montoir de Bretagne	11.6	0.87	7.45	France
Cavarzere (Porto Levante / Adriatic LNG)	9.6	5.32	55.24	Italy
Sagunto	8.8	1.66	18.9	Spain
Bilbao	7	1.63	23.29	Spain
Teesside	6.2	5.89	94.37	UK
Sines	5.9	1.41	23.82	Portugal
Mugardos	5.4	1.14	21	Spain
OLT LNG / Livorno	5.4	0.04	0.65	Italy
Agia Triada	4.5	0.06	1.35	Greece
Klaipeda (LNG)	3.7	0.39	10.53	Lithuania
Panigaglia	3.7	0.05	1.34	Italy
TOTAL	209.7	39.09	18.64	

Table 10 / Compiled by the authors based on data from ENTSOG / GIE[88]

88 ENTSOG/GIE (2016) https://transparency.entsog.eu/#/?loadBalancingZones=false

Percentages of utilisation for import terminals lie very much below pipelines and the downward trend of recent years is continuing. Spain and the United Kingdom are fourth and sixth in the world regarding regasification capacity (International Gas Union, 2016) but utilisation has never reached even 50 %.

Despite existing infrastructures being under-utilised, planning for new projects appears to be unstoppable. The most controversial without any doubt is the Southern Gas Corridor (SGC), the largest energy infrastructure project the European Union has promoted to date. This monumental project is expected to transport gas from Azerbaijan and Turkmenistan to Italy, and enjoys great political support and EU funding.

ROUTE OF THE SOUTHERN GAS CORRIDOR

Map 7 Source: (Bacheva-McGrath, et al., 2015)

GENERAL CHARACTERISTICS OF THE SOUTHERN GAS CORRIDOR

Approximate cost	$45 billion
Length	3,500 km
Capacity	Initially 10 bcm up to 32 bcm to Europe
Sections	Trans-Caspian gas pipeline (TCP) Turkmenistan-Azerbaijan Southern Caucasus Pipeline Extensions (SCPx) Azerbaijan-Georgia-Turkey Trans-Anatolia Pipeline (TANAP) Turkey-Greece Trans-Adriatic Pipeline (TAP) Greece-Albania-Italy
Participating companies	BP (United Kingdom), SOCAR (Azerbaijan), Lukoil (Russia), Snam (Italy), BOTAS and TPAO (Turkey), Fluxys (Belgium), Enagás (Spain), Total (France), Naftiran Intertrade (Iran), Petronas (Malaysia) and Axpo (Switzerland).

Table 11 / Source: (Bacheva-McGrath, et al., 2015)

First of all, the SGC is a union held together by the exchange of "gas for euros" with the corrupt[89] and repressive[90] regime of the Aliyev family, which has ruled Azerbaijan since 1991, and would be the perfect formula for them to gain legitimacy on the international arena.

Secondly, the EU has considered all sections of the SGC as Projects of Common Interest, which grants it the benefits mentioned above. The European Bank for Reconstruction and Development[91] granted a loan of 1 billion euros to the Russian company Lukoil for exploration and extraction in the Shah Deniz II field, a location where the gas for the SGC will be extracted. It seems to be a contradiction that diversification away from Russia entails assigned public resources of the EU to a Russian company, allowing it to exert direct influence over the SGC.

Thirdly, the initial capacity of 10 bcm would only account for 3.5 % of total imports and some 8.7 % of imports from the Russian Federation to the EU (2014 data). The Azeri Minister for Energy, Natig Aliyev, emphasises that economic feasibility is guaranteed given that "Shah Deniz II and SGC will recoup costs between 2028 and 2030 and will continue to operate for 50–60 years"[92]. His reasoning is completely at odds with the objectives to lower emissions in the EU for 2030 and 2050, taking into consideration that the import capacity of the Corridor is to be increased in the future.

Finally, little is said of the impact the project will have on the land. At the Italian end, local communities in Puglia have joined together to form the No TAP committee to reject the SGC because of the damage it could produce in local ecosystems and landscapes and because it has nothing to do with their economy, which is based on agriculture and family tourism (Bacheva-McGrath, et al., 2015).

89 RadioFreeEurope-RadioLiberty (2013) www.rferl.org/a/azerbaijan-ilham-aliyev-corruption-person-of-the-year/24814209.html

90 The Guardian (2015) www.theguardian.com/sport/blog/2015/jun/11/baku-2015-european-games-human-rights-issues-azerbaijan-ilham-aliyev

91 Public bank with a majority shareholding by the EU. EBRD (2016) www.ebrd.com

92 AzerNews (2016) www.azernews.az/oil_and_gas/93879.html

GAS, INFRASTRUCTURE AND EMPLOYMENT? BUT WHAT EMPLOYMENT?

Current development of new gas infrastructures will have very different impacts depending on where they are planned for. In the USA, there are qualified companies and personnel. In Mozambique or Tanzania, which do not have this capacity, foreign companies and technicians will have to cover this need and the local population tends to be given less-qualified jobs with lower pay. In Australia, wages are very high and the companies sponsoring the project are well aware of this, up to the point where part of the proposals for floating LNG terminals (FLNG) are planned as "cheap labour" platforms – i.e. using workers from low-wage countries at a lower cost of the same work performed on land (Maugeri, 2014).

Another key data is gender division of work. Most of the jobs, including the most qualified, are taken by men. At Aker Solutions, for example, the largest international contracting company in the oil and gas sector, women make up 24 % of administrative personnel, but only 3 % of qualified workers (Aker Solutions, 2008). In Trinidad and Tobago, most women with contracts in the oil and gas sectors are in administrative posts, but only 10 % of non-administrative workers on contracts are women (ILO, 2009). Trade unions in the oil and gas sectors of Australia complain that working conditions in the sector help very little to promote gender equality[93].

There is also a growing tendency to use international agencies to subcontract workers with flexible contracts (Graham, 2010). The reasoning for the subcontracting affects occupational safety and makes workers more vulnerable. This decline in working conditions can be attributed to "companies' eagerness to maximise profits for corporations behind the financial crisis, and a general indifference to good practices of health & safety" (Okougbo, 2009).

93 Answers to the surveys carried out by OWTU (Oilfields Workers' Trade Union) and MUA (Maritime Union of Australia) in 2009

FREE TRADE AGREEMENTS

Negotiations on the Transatlantic Trade and Investment Partnership (TTIP) have opened up the debate on the influence which this agreement could have for facilitating exports of gas, primarily shale gas, to the European Union. Both TTIP and CETA (Comprehensive Economic and Trade Agreement between the EU and Canada) intend to remove barriers to trade and in addition, in contrast to previous agreements, to influence non-tariff barriers, i.e. technical standards, administrative requirements and safety.

In parallel to the negotiations, on 18 November 2015, the US Congress took the historic decision to eliminate all existing restrictions on the export of oil contained in the Energy Policy and Conservation Act[94] of 1975. This prohibition was introduced as a result of the oil crisis in 1973 and to ensure that domestic extraction and reserves ensured a more resilient national system.

This historical milestone was erroneously extrapolated for natural gas, the latter being regulated by the Natural Gas Act of 1938[95]. This federal regulation states that the necessary authorisation for gas exports must be authorised by the Department of Energy, taking into consideration whether there is a free trade agreement with the importing country. However, the approval of TTIP would mean ending this restriction and would promote gas exports even more.

But TTIP is not only about exports. Harmonisation of standards – in other words deregulation – could help US companies specialising in exploration and extraction of unconventional fuels to enter the European market. European moratoria and prohibitions at a national/regional level are threatened by the treaty and the use of arbitration tribunals would allow US companies (or any company with a subsidiary in the USA) to take action against a government for putting its investments at risk, including the loss of future profits (Cingotti, Eberhardt, Feodoroff, Simon, & Solomon, 2014).

Finally, it is important to understand that free trade agreements function as communicating vessels that act with a coordinated logic. For example, what cannot be achieved through TTIP[96] can be achieved through CETA, TPP or other agreements to come. All this feeds what some have called the legal architecture of impunity (Hernández, et al., 2015).

94 Energy Policy and Conservation Act (2015) http://legcounsel.house.gov/Comps/Energy%20Policy%20And%20Conservation%20Act.pdf

95 US. Energy Information Agency (s.f.) www.eia.gov/oil_gas/natural_gas/analysis_publications/ngmajorleg/ngact1938.html visitado 16/11/16

96 Trans-Pacific Partnership

V

FINANCIALISATION IN THE GAS SECTOR

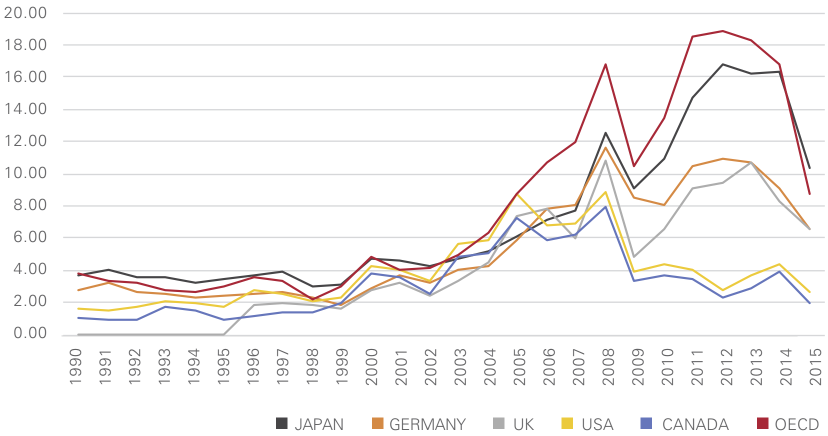
GAS AS A 'TRANSACTION FUEL'

FINANCIALISATION

We can call financialisation the process of the expansion of fictitious capital markets (derivatives, for example) and the growing importance of finances, financial markets, financial institutions and financial elites in the future of the economy (Palley, 2007).

Currently, there is no real global market for gas. The development of gas markets was very much affected by the difficulty of transporting it and, consequently, markets are regional and with markedly different characteristics. The North American market regulates its operations through a spot market price for gas. Meanwhile in the Asian market, long-term contracts with oil indexed prices dominate gas relationships.

GAS PRICES IN DIFFERENT COUNTRIES (US$/BTU)



Graph 23 / Source: Compiled by the authors based on data from the BP database

NB: The general tendency is that market prices (USA, Canada, United Kingdom) are lower than indexed prices when the oil price is high. In 2014 the price for gas in the EU was double, and in Asia triple, the price in North America. The current fall in the price of oil has resulted in a drastic reduction of these differences.

The consolidation of a single market in the EU synchronises with the idea of creating a global gas market with more flexible relations, a market price and new financial players who could benefit from their transactions. And a key point to this is to stop indexing the price to oil and to allow market forces (supply and demand) to determine the price of gas. This is the first necessary step in creating a derivatives market[97] in which gas would be the reference for carrying out transactions for assets linked to fossil fuels, allowing new financial assets to be generated and giving gas its own financial character; in other words, gas would become financialised (Polder, Gilbertson, & Tricarico, 2014).

In the EU, between 2005 and 2012, the volumes of gas imported at market price[98] increased by 30 %[99], requiring traditional exporters to renegotiate reductions in gas prices[100]. At the same time, new exporters such as Azerbaijan accept contracts based on the new model[101], posing more of a threat to the others.

WAYS OF BUYING AND SELLING GAS

TRADITIONAL METHOD	MARKET-BASED METHOD
Bilateral relation importer-exporter	The market mediates in the importer-exporter relationship
Long-term contracts: 20–25 years	Short-term contracts
Oil indexed price	Market price according to supply and demand
Take or pay provisions. An importer is required to pay a minimum volume of gas, even though they may not import it.	*Tolling fee:* An importer purchases "capacity services", paying a fixed price that does not change with the volume of gas. If a purchaser decides not to buy, they only have to pay the tolling fee.
Destination clause: 80–90 % must be delivered to a predefined destination.	Open destination

Table 12 / Compiled by the authors based on data from (Maugeri, 2014)

NB: The table shows the most extreme form of the two models; however, there is an infinite variety of contracts between the two, combining the various parameters in the table. The most striking characteristic is the way in which the price of gas is determined. With the traditional method, the price is proportional to the price of oil, while with the market-based method the price is determined by supply and demand.

97 Gas options and futures, for example, would be exchanged in this market.
98 Arising from the spot market, it is therefore called the spot price.
99 European Commission (2016) https://ec.europa.eu/energy/en/data-analysis/market-analysis
100 In 2012, Gazprom had to lower its price for gas by 10 % when renegotiating contracts with GDF Suez (France), Wingas (Germany), SPP (Slovakia) and Botas (Turkey) Financial Times (2016) www.ft.com/content/2e57f4c4-58ad-11e1-9f28-00144feabdc0
101 GDF Suez negotiated 2.6 bcm p.a. at market prices with British Petroleum, which is operating in Azerbaijan. Bloomberg (2014) www.bloomberg. com/news/20140410/naturalgaslosesdecadesoldtietooilinlandmarkdeal.html

The oil market has already gone through this process of financialisation, which resulted in greater volatility in the price through the speculative movements of players who are unrelated to the world of fossil fuels.

'LIQUID' INFRASTRUCTURE: FINANCIALISATION

LNG STRATEGY

The Commission argues that LNG can contribute significantly to the security, resilience and competitiveness of gas markets in Europe; however, this requires the EU and its Member States to ensure that the necessary infrastructures are created and put in place so they can access the International LNG Market, conclude the Single Market so as to attract LNG suppliers and cooperate with international partners in order to develop a real global market for LNG.

LNG strategy and gas storage in the European Union, February 2016

For the market, infrastructures must cover a very specific function and be placed at specific locations so that physical transactions can be carried out and give credibility to speculative transactions, certifying that the gas can be delivered at any place, any time (Polder, Gilbertson, & Tricarico, 2014). The market also requires large nominal capacities to be available (whether or not used), interconnections and reversible flows so that gas can flow as freely as possible. This is what infrastructures at the service of markets means.[102]

Reconfiguring the gas system in Europe to satisfy these needs requires massive mobilisation of capital to invest in projects. In the 1970, loans for infrastructures in the private sector were given by banks with the guarantee of the earnings which the project would generate. The agreement was traditionally between two parties: the bank and the sponsor (Hildyard N., 2012). But things have changed substantially. After the financial crisis of 2007, the public sphere, gripped by strict austerity policies, saw the opportunity to seize the liquidity available in capital markets for mega projects that would stimulate the economy. The offer of public guarantees that would cover part of the investment risk (Tricarico & Sol, 2015), ensuring "a flow of contractual earnings" (Hildyard N., 2016), made the business very attractive for investors.

102 Diagonal (2014) www.diagonalperiodico.net/global/23092-infraestructuras-al-servicio-mercados.html

INFRASTRUCTURE INVESTMENT FUNDS

ITEM	INFRASTRUCTURE INVESTMENT FUND	COUNTRY	CAPITAL MOBILISED JANUARY 2009 – JUNE 2014 (MILLIONS $)
1	Macquarie Infrastructure	Australia	27,346
2	Brookfield Asset Management	Canada	12,874
3	Global Infrastructure Partners	USA	10,830
4	Energy Capital Partners	USA	9,940
5	IFM Investors	Australia	8,217
6	Borealis Infrastructure	Canada	6,857
7	Colonial First State Global Manag. Asset	Australia	6,385
8	KIAMCO	South Korea	5,316
9	Caixa Economica Federal	Brazil	4,848
10	InfraRed Capital Partners	UK	4,566
11	Alinda Capital Partners	USA	4,440
12	Antin Infrastructure Partners	France	4,200
13	First Reserve	USA	3,769
14	Goldman Sachs Infrastructure Invest. Group	USA	3,690
15	EnerVest	USA	3,500
16	Hastings Funds Management	Australia	3,287
17	KKR	USA	3,263
18	Meridiam Infrastructure – EIB	France	2,884
19	Ardian	France	2,872
20	EQT	Sweden	2,560
21	Highstar Capital	USA	2,534
22	JP Morgan Asset Management	USA	2,341
23	True Corporation	Thailand	2,268
24	Actis	UK	2,163
25	Hunt Power	USA	2,132
26	AMP Capital Investors	Australia	2,082
27	LS Power Group	USA	2,080
28	Partners Group	Switzerland	2,070
29	CPG Capital Partners	Singapore	2,000
30	Energy Investors Funds	USA	1,923

Table 13 / Compiled by the authors based on data from Investor 30

NB: This list contains the most important infrastructure investment funds in the world. These funds look for high rates of return on their investments and stimulate the on-going construction of infrastructures. The USA, with 33 %, and Australia with 31 % of the total capital mobilised in the list, dominate a large part of this business.

The European Investment Bank (EIB), together with the European Commission, announced the *Europe 2020 Project Bond Initiative* (PBI) in 2012, a bond initiative to finance projects which, together with the CEF fund, would help to finance Projects of Common Interest. This financing model leads to greater exposure of the public sphere through public-private partnerships[103] (PPP), with the risks envisaged in the provisions and cost overruns (Guiteras, 2015), requiring support of public financial institutions and public funds at a moment of established scarcity.

If the infrastructures are needed by the public to provide essential and basic services, for investors they become constant flows of income. It is clear that the interests of both parties can collide head-on.

EQUITY FUNDS RELATED TO GAS COMPANIES

FUND NAME	AFFILIATION	COUNTRY	ASSETS (MILLIONS $)
African Infrastructure Investment Managers *	Macquarie Group (up to 2015)	Australia	1,000
Associated funds	**Gas company**	**Country**	**Investment**
IDEAS Managed Fund	Matola Gas Company	Mozambique	NA
African Infrastruc. Investment Fund 2 (AIIF2)	Cenpower Generation Company	Ghana	NA
African Infrastruc. Investment Fund 2 (AIIF2)	Azura-Edo IPP	Nigeria	NA
IDEAS Managed Fund	Gigawatt	Mozambique	407.92

FUND NAME	AFFILIATION	COUNTRY	ASSETS (MILLIONS $)
JPMorgan Funds ** (JPMF)	J. P. Morgan	USA	100,138
Associated funds	**Gas company**	**Country**	**Investment**
JPMF – Eastern Europe Equity Fund	Gazprom	Russia	5,284
	Nostrum Oil & Gas PLC	UK	8,072
	Surgutneftegas OAO Preference	Russia	38,652
JPMF – Emerging Middle East Equity Fund	Qatar Gas Transport Co. Ltd.	Qatar	553
JPMF – Euroland Equity Fund	TOTAL SA	France	7,577
	Gas Natural SDG SA	Spain	2,552
JPMF – Global Convertibles Fund (EUR)	Sacyr SA	Spain	4,560
JPMF – Europe Equity Fund	Gaztransport Et Technigaz SA	France	3,655
JPMF – Europe Equity Plus Fund	Gas Natural SDG SA	Spain	52,367

* www.aiimafrica.com/portfolio_companies/ visitado 05/12/16
** www.jpmorganassetmanagement.lu/en/dms/JPMorgan%20Investment%20Funds%20[ARP]%20[CH_EN].pdf (2016)

Table 14 Compiled by the authors

103 PPPs are different forms of cooperation between the public and private sphere.

NB: The table shows the positions taken by Macquarie and J.P. Morgan in gas companies around the world. Equity funds, i.e. funds which buy shares, allow them to participate in governance and corporate decision-making processes. It remains to be said that the fund African Infrastructure Investment Managers was owned 50 % by Macquiere and 50 % by Old Mutual Alternative Investments, (OMAI). In 2015 OMAI bought the 50 % of Macquiere.

THE WORST EXAMPLE: THE CASTOR PROJECT

The Castor submarine natural gas storage facility, promoted by the Spanish company ACS, was the first project in the pilot phase of project bonds offered by the European Investment Bank. During the first operational activity, the Castor storage facility caused more than 500 earthquakes; one of them measuring 4.2 on the Richter scale. The local population fought for more than seven years against the storage facility, complaining of bad planning and execution of works, as well as warning of the risk of earthquakes. The sponsor decided to abandon the project and apply Clause 14 of the contract which considered compensation if the project was abandoned, including for fraud or negligence.

Just after the earthquakes and before Clause 14 was applied, the project bonds were classed as junk bonds (BB+[104]) and would not gain in value until payment by the Spanish Government was ensured. At that moment, the joy of investors who saw their bonds secured for payment, contrasted with the rage and disappointment of the population, who were aware that they had been saddled with an illegitimate debt amounting to €3.42 billion with interest, in a country battered by austerity and cuts.

ASAMBLEA PLATAFORMA CIUTADANA EN DEFENSA DE LES TERRES DEL SÈNIA, SEP. 2014

104 El Mundo (2014) www.elmundo.es/comunidad-valenciana/2014/06/21/53a55f6322601d75398b4572.html

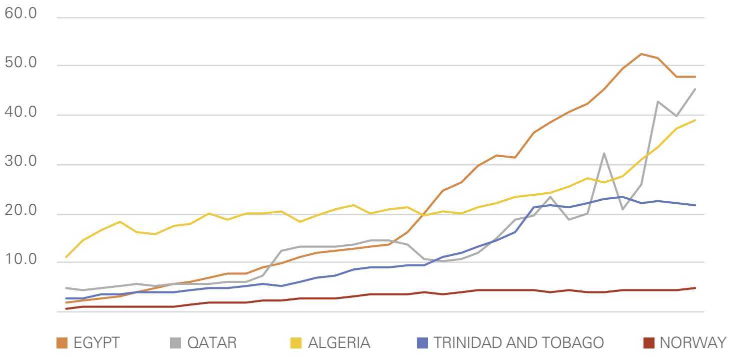
VI

DEPENDENCE AND INSECURITY IN EXPORTING COUNTRIES

DEPENDENCE ON FOSSIL FUEL EXTRACTION

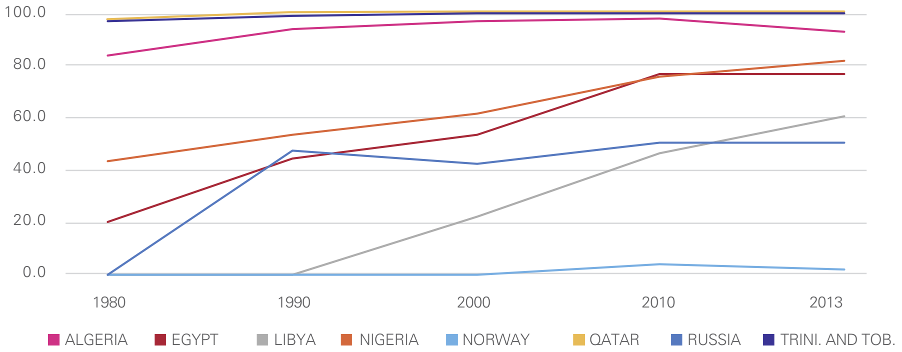
The official rhetoric associated with the discussion on dependence and energy security has proved short-sighted – or is deliberately looking the other way – when the impact on the population of exporting countries has to be assessed. The story is always the same: national budgets highly dependent on the sale of oil and gas, elites who grab the greater part of the business, an increase in domestic consumption due to low fuel prices and de-industrialisation or non-industrialisation in other sectors. Exporting countries become rentier states, almost totally dependent on the income generated by the export of fossil fuels.

GAS CONSUMPTION (BCM)



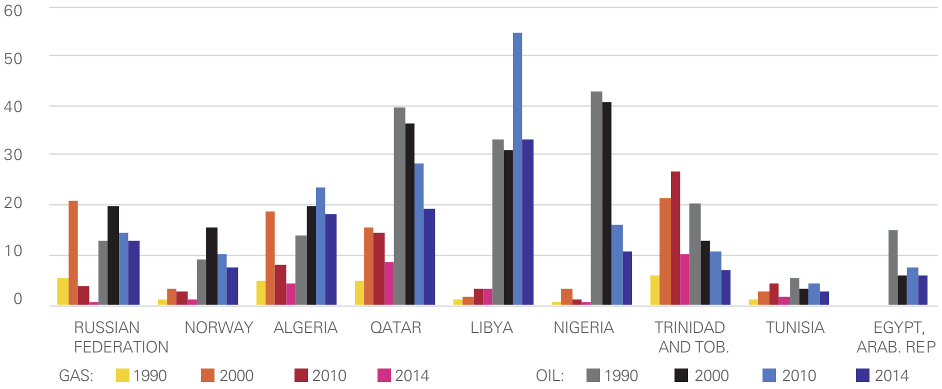
Graph 24 / Compiled by the authors based on data from Eurostat.

ELECTRICITY GENERATED FROM GAS (%)



Graph 25 / Compiled by the authors based on data from Eurostat.

GDP FROM GAS AND OIL (%)



Graph 26 / Compiled by the authors based on data from Eurostat.

As can be seen in the figures, exporting countries become large consumers of gas. Electricity generation from gas combustion rises in many cases to almost 100 %, generating heavy dependence. Domestic consumption to an extent competes with the need to export and is one of the pressures that exporting countries have to bear.

The effect on GDP is less for gas than for oil; nevertheless it is significant. For countries such as Trinidad & Tobago, natural gas accounted for 27 % of their GDP in 2010.

INDICES OF THE SITUATION OF EXPORTING COUNTRIES

Indices such as HDI, Democracy, Global Peace, State Fragility, Corruption and GINI are debatable and controversial, but the international community uses them frequently and they can be illustrative of the situation in different countries. Here is a brief description of each of them:

> Human Development Index (HDI – programme of the United Nations for Development): focusses on three dimensions: education, health and income.[105]

> Democracy Index (Economist Intelligence Unit, EIU): analyses 165 independent countries and two territories to show the state of regional and global democracy. It uses five criteria: electoral process and pluralism, civil liberties, the functioning of government, political participation, and political culture.[106]

> Global Peace Index (Institute for Economics and Peace): analyses up to which point countries are involved in internal and international conflicts. It also tries to evaluate the degree of harmony or discord within a nation using indices of criminality, the incidence of terrorist acts, violence, harmonious relations with neighbouring countries, a stable political scenario and the proportion of the population displaced internally or taking refuge.[107]

105 Human Development Index. United Nations (2016) http://hdr.undp.org/en/composite/HDI
106 Democracy Index. The Economist (2015) www.yabiladi.com/img/content/EIU-Democracy-Index-2015.pdf
107 Global Peace Index. Institute for Economics and Peace (2015) http://economicsandpeace.org/wp-content/uploads/2015/06/Global-Peace-Index-Report-2015_0.pdf

> Failed State Index (FSI, of the Fund for Peace): indicates a risk of political instability by processing 12 primary social, economic and political indicators as well as the existence of social inequality, demographic pressures, migrations, intergroup hate, economic advances, legitimacy of the government, protection of human rights, battles between elites, foreign investment, etc.[108]

> Corruption Index (Transparency International) measures, on a scale of zero (very corrupt) to ten (no corruption), the levels of corruption identified in the public sector in a specific country and consists of a compound index which is based on various surveys of experts and companies.[109]

> GINI coefficient: measures the statistical distribution of the income in a country. The coefficient goes from zero to one; zero is a country with total equality of income and one indicates maximum inequality.[110]

The current and future gas relations of the EU are characterised by profiles of countries with a low HDI (Angola, Tanzania, Nigeria and Mozambique), governments considered authoritarian (Algeria, Angola, Russia, Qatar, Egypt, Azerbaijan, Libya, Iran and Turkmenistan), with high levels of internal conflict and very fragile (Libya, Nigeria, Russia, Iraq and Egypt), with endemic corruption rates (Angola, Iraq, Libya, Turkmenistan and Nigeria) and great inequality in the distribution of wealth (Nigeria, USA, Mozambique and Angola).

108 Fragile States Index. The Fund for Peace (2016) http://fsi.fundforpeace.org/
109 Corruption Index. Transparency International (2016) www.transparency.org/cpi2015
110 GINI Index. Worldbank (2016) http://data.worldbank.org/indicator/SI.POV.GINI?end=2014&start=2014&view=bar

INDICES FOR (PRESENT AND FUTURE) COUNTRIES EXPORTING GAS TO THE EU

COUNTRY	GAS LINK WITH EU		HDI 2015	POS. 1-188	HDI CATE-GORY		DEMOCRACY INDEX 2015	POS. 1-167	TYPE OF REGIME
Angola	Future Exp.	✘	0.532	149	low	✘	3.35	131	Authoritarian
Argelia	Exporter	!	0.736	83	high	✘	3.95	118	Authoritarian
Australia	Future Exp.	✔	0.935	2	very high	✔	9.01	9	Full Democr.
Azerbaijan	Future Exp.	!	0.751	78	high	✘	2.71	149	Authoritarian
Canada	Future Exp.	✔	0.913	9	very high	✔	9.08	7	Full Democr.
USA	Future Exp.	✔	0.915	8	very high	✔	8.05	20	Full Democr.
Egypt	Exporter	!	0.69	108	average	✘	3.18	134	Authoritarian
Iran	Future Exp.	!	0.766	69	high	✘	2.16	156	Authoritarian
Iraq	Future Exp.	!	0.654	121	average	✘	4.08	115	Hybrid regime
Israel	Future Exp.	✔	0.894	18	very high	✔	7.77	34	Partial Democr.
Lebanon	Future Exp.	!	0.769	67	high	!	4.86	102	Hybrid regime
Libya	Exporter	!	0.724	94	high	✘	2.25	153	Authoritarian
Mozambique	Future Exp.	✘	0.416	180	low	!	4.6	109	Hybrid regime
Nigeria	Exporter	✘	0.514	152	low	!	4.62	108	Partial Democr.
Norway	Exporter	✔	0.944	1	very high	✔	9.93	1	Full Democr.
Qatar	Exporter	✔	0.85	32	very high	✘	3.18	134	Authoritarian
Russia	Exporter	✔	0.798	50	high	✘	3.3 1	132	Authoritarian
Tanzania	Future Exp.	✘	0.521	151	low	!	5.58	91	Hybrid regime
Trini. and Tob.	Exporter	✔	0.772	64	high	!	7.1	47	Partial Democr.
Turkmenistan	Future Exp.	!	0.688	109	average	✘	1.83	162	Authoritarian

	GLOBAL PEACE INDEX 2015	POS. 1-162		FRAGILE STATE FRAGILITY 2016	POS. 1-178	STATE FRAGILITY		CORRUP-TION PER-CEPTIONS	POS. 1-167		GINI COEFICIENT	YEAR
!	2,140	98	✘	90.5	4	Alert	✘	15	163	✘	0.421	2009
!	2,131	104	✘	78.3	89	Risk	✘	36	88	!	0.353	1995
✔	1,329	9	✔	22.5	157	Sustei-nable	✔	79	13	!	0.305	2006
!	2,450	134	!	76.3	92	Risk	✘	29	119	!	0.337	2012
✔	1,287	7	✔	23.8	132	Sustei-nable	✔	83	9	!	0.321	2005
✔	2,038	94	✔	34	129	More stable	✔	76	16	✘	0.469	2010
!	2,382	137	✘	90.2	8	Alert	✘	36	88	!	0.308	2008
!	2,411	133	✘	86.9	49	High risk	✘	27	130	!	0.383	2005
✘	3,570	161	✘	104.7	164	High alert	✘	16	161	!	0.309	2007
!	2,656	144	✘	79.7	78	Risk	!	61	32	!	0.392	2008
!	2,752	146	✘	89.6	10	High risk	✘	28	123	no	data	
✘	2,819	149	✘	96.4	3	Alert	✘	16	161	no	data	
✔	1,963	68	✘	87.8	30	High risk	✘	31	112	✘	0.457	2008
✘	2,910	151	✘	103.5	169	High alert	✘	26	136	✘	0.488	2010
✔	1,393	17	✔	21.2	161	Sustei-nable	✔	87	5	!	0.259	2012
✔	1,568	30	✔	45.1	119	Stable	✔	71	22	no	data	
✘	2,954	152	✘	81	76	High risk	✘	29	119	✘	0.42	2012
✔	1,899	58	✘	81.8	75	High risk	✘	30	117	!	0.376	2007
!	2,070	97	!	57.8	117	not very stable	!	39	12	✘	0.403	1992
!	2,202	106	!	76	110	Risk	✘	18	154	✘	0.408	1998

Table 15 / Based on data from the organisations which publish the different indices

IMPACT ON THE POPULATION

Apart from macro and quantitative indicators, there are many other types of proof for the suffering and repression that the population and local communities are subject to.

In 2004, an accident in the LNG factory in Skikda, Algeria, claimed 27 lives[111]. One decade later, in 2013, Al Qaeda attacked the gas installations in Amenas, with the result of 40 people killed[112]. In 2015, the Algerian people rose up against the government's proposal to give the French company Total permission to explore unconventional gas. Joining together in the Unemployed Movement, they organised protests throughout the area (In-Salah, Ourgla, Ghardaia) to demand a ban on fracking and the end of discrimination against the villages of the south (Hamouchene & Pérez, 2016).

In Tunisia, the Amazigh communities of the Sahara suffered with disinformation and uncertainty when faced with possible exploitation of unconventional gas on their lands. The European Bank for Reconstruction and Development gave the Canadian company Winstar a loan for what appeared to be future fracking extraction. Local communities organized themselves to denounce the situation. Their villages were suffering from lack of water at the very same time that the fracking projects were consuming large quantities of water and was endangering the aquifer which watered their crops[113].

In Egypt, the expansion of the Mostorod refinery, 40 km from the centre of Cairo, resulted in the removal of the families living in informal settlements nearby. The European Investment Bank was one of the financiers of the project[114].

The repressive government of Azerbaijan is financed by the sale of fossil fuels. In 2015, the Aliyev regime had a list of more than 100 political prisoners and an increasingly impoverished population. At the same time, it was working shoulder to shoulder with British Petroleum and continued to find "friends" in Europe through its caviar diplomacy[115].

111 Poten & Partners (2004) www.plant-maintenance.com/downloads/AlgeriaFTReport.pdf
112 BBC (2016) www.bbc.com/news/uk-england-35303533
113 Bankwatch (2015) http://bankwatch.org/sites/default/files/briefing-WinstarTunisia-12May2015.pdf
114 Bankwatch (2013) http://bankwatch.org/sites/default/files/bankwatchmail56.pdf
115 European Stability Initiative (2012) www.esiweb.org/pdf/esi_document_id_131.pdf

The situation is similar in Turkmenistan, Uzbekistan, Kazakhstan, Libya, Russia, Qatar and other exporting countries. The national and international elites benefit handsomely from the trade with fossil fuels, while the communities living in the extraction areas suffer from the curse of abundance (Llistar & Pérez, 2016). A curse which extends to Europe as well, with examples such as the repression of the Romanian army in Pungesti (Martín-Sosa, 2015) and the earthquakes which residents suffer near the Groningen field[116].

ANTI-FRACKING PROTEST IN OUARGLA, ALGERIA, FEBRUARY 2015.
The sign says "stop contempt, stop marginalisation". Author: BBOY Lee.

ACCIDENT IN SKIKDA, ALGERIA, 2004.
Source: LNG History and LNG Accidents[117]

116 The Guardian (2015) www.theguardian.com/environment/2015/oct/10/shell-exxon-gas-drilling-sets-off-earthquakes-wrecks-homes
117 LNG History and LNG Accidents (2004) http://timrileylaw.com/LNG.htm

OTHER PEOPLES AFFECTED

This study took the European Union and its gas-related relations as its reference; the description of the impacts on exporting countries and their population is given within this framework. But the impacts of the gas boom affect the whole world.

In 2009, the discovery of unconventional gas in Neuquén, Argentina, was announced, a province with a long history of oil and gas extraction. In 2011, social and environmental organisations started to distribute information and supported the activities of the Mapuche community Gelay Ko, which was affected by the first extraction well. Shortly afterwards, in 2013, Multisectorial Contra la Hidrofractura del Neuquén came into being, a space where organisations against fracking could express themselves. The Multisectorial suffered severe repression during the protests against the Chevron-YPF agreement (Martín-Sosa, 2015).

In New Guinea, the construction of the PNG-LNG, a gas export terminal with a budget of 19 billion dollars[118], has brought with it the transformation of the lands of indigenous communities. Despite the fact that the impact is seen as positive on the labour market in the short term, alcoholism and violence against women has increased alarmingly (Wielders, 2011).

The fight against the Keystone XL oil pipeline [119] and the Dakota Access[120] could be repeated in the gas sector if the new administration under Donald Trump intensifies domestic extraction of fossil fuels. The contamination of aquifers reported in Pennsylvania, Colorado, Ohio, Wyoming, New York and West Virginia, and the latest draft of the report of the Environmental Protection Agency of the USA from 2015, with more than 150 cases of water contamination, are proof of the risks associated with unconventional fuel production (Martín-Sosa, 2015).

In South Africa, too, the population organized in the *Treasure Karoo Action Group* (TKAG), founded in 2011, to reject fracking and defend the local economy of Karoo based on agriculture and tourism (ibid.).

118 The GDP of Papua New Guinea was 16.930 billion dollars in 2014 (data from the World Bank).
119 Web site of the campaign No to Keystone XL http://nokxl.org/
120 Independent (2016) www.independent.co.uk/news/world/americas/dakota-access-pipeline-doj-loretta-lynch-send-mediators-standing-rock-a7453441.html

VII

FOSSIL GAS: CLIMATE FRIEND OR FOE?

Without a doubt, the recent and most relevant milestone with reference to the fight against climate change is the Paris Agreement[121] of December 2015, where all the countries in the world agreed a strategy to fight against climate change so that global temperatures would not rise above 1.5 or 2 degrees.

The agreement was praised by the international community and was seen as a watershed to move towards a low-carbon economy. At the same time, it was strongly criticised by NGOs and sectors of civil society for coming late, not being binding, insufficient and without means of enforcement[122]. The agreement left the target of reducing emissions to the voluntary will of countries and allows the use of highly controversial technologies to achieve its objectives.

Gas is very present in the discussions on climate and in the Paris Agreement as being the fossil fuel causing the least emissions on combustion. However, as stated in Chapter 1, natural gas is composed mainly of methane and this has a global warming potential 86 times greater than CO_2 in the first 20 years. The chain of extraction, transport and consumption of natural gas has appreciable leaks, which must be considered because of their short-term importance. But the quantities of leaks that escape into the atmosphere before combustion are a cause of controversies, above all due to the lack of control, lack of independent studies and the discrepancies among existing data. Nevertheless, scientific proof has grown in recent years that questions the advantages of gas for the climate and puts the levels of leaks much higher than previous estimates, especially in fracking.

One of the authors of the scientific study on methane leaks is Robert Howarth from Cornell University in the USA. The article by Howarth "Methane and the GHG footprint of natural gas from shale formations" published in the scientific journal Climate Change, is one of the most influential due to its sound analysis and the databases used. The study identifies some ranges of losses for each upstream stage[123], differentiating conventional extraction from unconventional extraction.

121 UNFCCC (2015) https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf
122 González, Luis (2016) http://rojoynegro.info/sites/default/files/rojoynegro297_0.pdf
123 Production operations

METHANE LEAKS (% TOTAL EXTRACTED)

	TYPE OF EXTRACTION	
	CONVENTIONAL GAS	UNCONVENTIONAL GAS
Well drilling	0.01 %	1.9 %
Routine and losses from well equipment	0.3 % – 1.9 %	0.3 % – 1.9 %
Liquid unloading	0 % – 0.26 %	0 % – 0.26 %
Total extraction	**0.31 % – 2.17 %**	**2.2 % – 4.06 %**
Gas processing	0 % – 0.19 %	0 % – 0.19 %
Transport, storage and distribution	1.4 % – 3.6 %	1.4 % – 3.6 %
Total	**1.71 % – 5.96 %**	**3.6 % – 7.85 %**

Table 16

If the gas is exported in LNG carriers, the emissions from liquefaction and transport must be added[124]. There is little data available in this field and the only estimate available is the article published by World Gas Intelligence (WGI) on 30 July 2008, which estimated that between 0.1 % – 0.25 % of LNG, per day of transport, is converted to gas. This gas, called BOG (boil-off gas), is used primarily as a fuel, but if produced in excess quantities and it cannot be used in the ship's engines, especially in LNG carriers which are not fitted with re-liquefaction equipment[125], it is combusted in a burner.

If we take a LNG carrier of 150,000 m^3 as reference and we consider the methane leaks during extraction, transport in a gas pipeline and emissions from liquefaction and transport of LNG, we get the following result:

124 Emissions during the regasification process are much less.
125 Technology for ships Q-flex (capacity 210,000 m^3) and Q-max (capacity 266,000 m^3)

EMISSIONS DURING LIQUEFACTION AND TRANSPORT

PORT OF SHIPMENT	TRANSIT	EMISSIONS TRANSPORT (tCO_2eq)[126]	EMISSIONS LIQUEFACTION ($tCO_2eq.$)[127 128]
Ras Laffan (Qatar)	14d 3h	2,438.23	20,407
Skikda-Bethioua (Argelia)	2d 13h	428.13	
Bonny Island (Nigeria)	11d 15h	1,928.54	
Point Fortin (Trin. and Tob.)	11d 7h	1,867.86	
Perth (Australia)	23d 7h	3,953.12	
St. Arthur, Texas (USA)	11d 15h	2,429.61	

Table 17 / Compiled by the authors

NB: Transit time is a measurement of the route between the exporting country and the 5 large European ports with import terminals: Barcelona (ESP), Milford Haven (GBR), Fos LNG Terminal (FRA), Port du Verdon (FRA) and Liborno (ITA); calculated using the BP software Port to Port.

TOTAL EMISSIONS FROM EXTRACTION TO ARRIVAL IN EUROPE

		EMISSIONS FROM EXTRACTION TO THE EU (tCO_2eq)			
		CONVENTIONAL		UNCONVENTIONAL	
PORT OF SHIPMENT	TRANSIT	Min	Max	Min	Max
Ras Laffan (Qatar)	14d 3h	113,177	337,685	213,017	437,525
Skikda-Bethioua (Algeria)	2d 13h	111,166	335,675	211,007	435,515
Bonny Island (Nigeria)	11d 15h	112,667	337,175	212,507	437,015
Point Fortin (Trin. and Tob.)	11d 7h	112,606	337,115	212,446	436,955
Perth (Australia)	23d 7h	114,691	339,200	214,532	439,040
St. Arthur, Texas (USA)	11d 15h	113,168	337,676	213,008	437,517

Table 18 / Compiled by the authors

126 Report on emissions during transportation of LNG www.api.org/~/media/Files/EHS/climate-change/api-lng-ghg-emissions-guidelines-05-2015.pdf
127 Scientific document on liquefaction and the energy consumed http://iopscience.iop.org/article/10.1088/1742-6596/547/1/012012/meta
128 Emissions are considered with reference to a global energy mix www.sciencedirect.com/science/article/pii/S0301421516301458

If we draw a comparison between the measurement of European emissions per capita[129] and the emissions related to the supply of natural gas, the results are more than alarming. A single transit in a ship loaded with 150,000 m^3 of conventional gas from Qatar is equivalent to, in the most optimistic estimate, the annual emissions of more than 16,000 people in Europe, and in the worst case scenarios to those of 50,000. But if we look at a ship loaded with 150,000 m^3 with fracked gas from the USA, the figure shoots up and the range lies between more than 31,000 and more than 65,000 Europeans. And that is without including the emission from the regasification process, final combustion of gas[130] and the risk of losing a load due to an accident[131].

A study headed by Ramón Alvarez, from the *Environmental Defense Fund* in the USA, concludes that changing from coal to gas reduces warming potential by 25 % in the first 40 years, with a proportion of gas loss at 2.4 % (Alvarez, Pacala, Winebrake, Chameides, & Hamburg, 2011). The same study concludes that, if the rate of losses is greater than 3.6 %, changing fuels would not bring any benefits. With these figures, almost any gas that arrives in Europe via LNG would be outside these parameters.

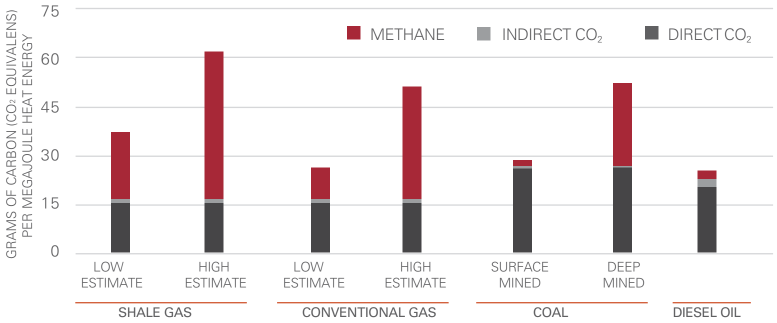
Robert Howarth, in the article Natural gas: Should fracking stop? (Howarth, Ingraffea, & Engelder, 2011), compares emissions from the combustion of gas, adding the losses during the different stages up to consumption and concludes that, in almost all cases, they are greater compared to other fossil fuels.

129 Emissions per capita 2013. World Bank data. http://data.worldbank.org/

130 European Commission (2016) http://ec.europa.eu/environment/integration/research/newsalert/pdf/methane_emissions_from_lng_powered_ships_higher_than_current_marine_fuel_oils_444na4_en.pdf

131 Naucher Global (2015) www.naucher.com/es/actualidad/grave-incidente-de-un-gasero-en-el-puerto-de-barcelona/_n:3580/

EMISSIONS OF FOSSIL FUELS FROM EXTRACTION



Graph 27

FRACKING, FINANCIALISATION AND FREE TRADE AGREEMENTS

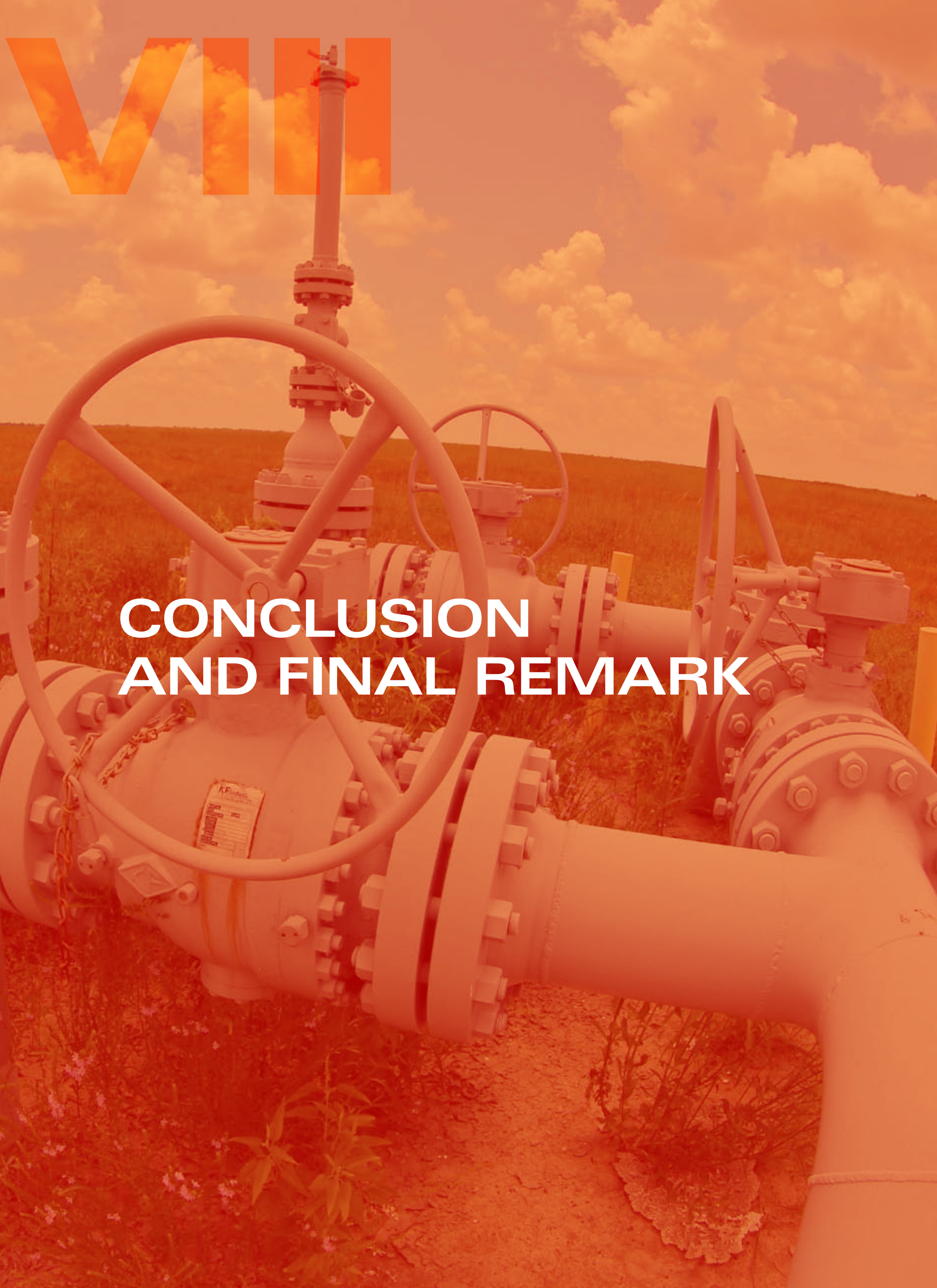
In the Autonomous Community of Cantabria, in the north of Spain, the company Trofagás Hidrocarburos was granted permission in April 2011 to explore for gas [132] over 24,876 hectares, which was given the name Arquetu[133]. Trofagás is a subsidiary of the American BNK Petroleum, whose largest shareholder is Macquarie Capital Markets Canada Ltd, part of the Macquiare Group, the largest investment fund in the world.

A strong social protest succeeded in a regional law being passed against hydraulic fracturing and in February 2014 permission for Arquetu was cancelled.

In 2015, the company Viesgo bought shares in E.on for the supply and distribution of electricity and gas in Cantabria. Viesgo is owned 40 % by Wren House Infrastructure, a Kuwaiti fund, and 60 % by Macquarie European Infrastructure Fund 4.

Can you image what Macquarie could have done through its subsidiary Capital Markets Canada Ltd if CETA had been in force? File a case against the ban on fracking before an arbitral tribunal[134].

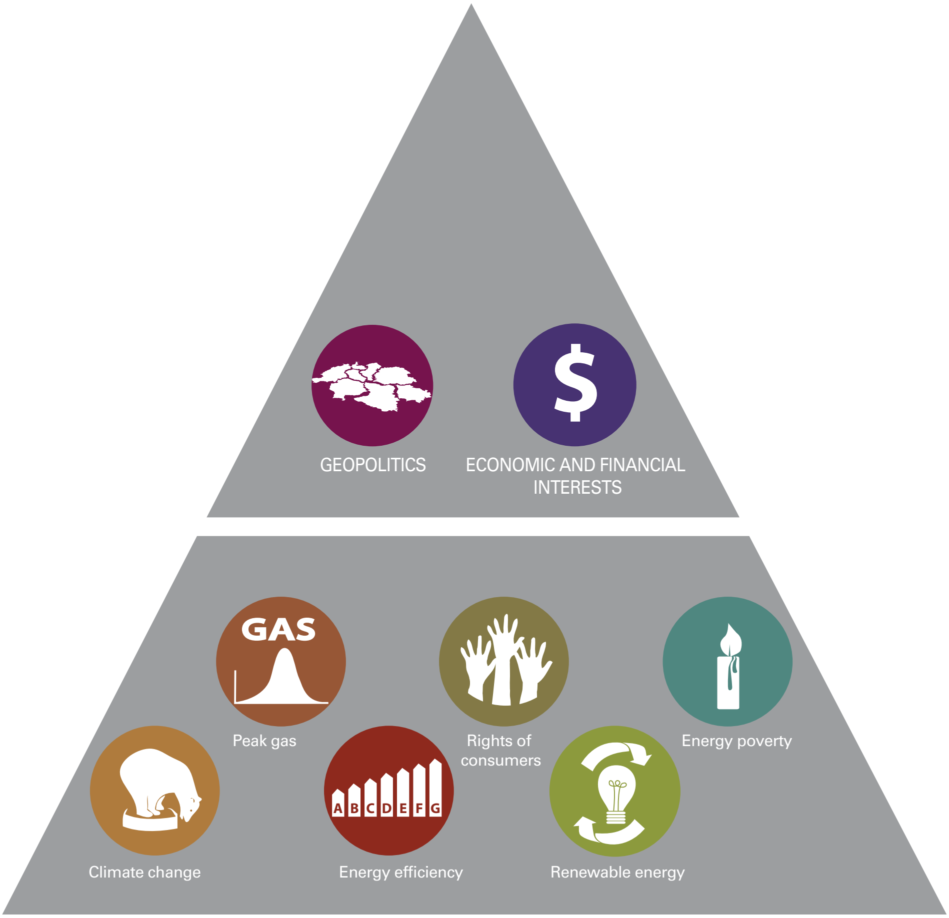
132 Boletín de Cantabria (2011) http://boc.cantabria.es/boces/verAnuncioAction.do?idAnuBlob=206063
133 Ecologistas en Acción Cantabria (2011) https://fracturahidraulicano.files.wordpress.com/2011/07/resumenexpedientearquetu.pdf
134 See the Lone Pine case. Corporate Europe Observatory (2014) https://corporateeurope.org/sites/default/files/attachments/no_fracking_way.pdf



VIII

CONCLUSION AND FINAL REMARK

HIERARCHY OF MOTIVES / INTERESTS IN MAJOR DECISIONS IN THE ENERGY SECTOR



As we have been able to thrash out, the arguments of the official discourse on gas are about imposing a global consensus on the necessity of its extensive and intensive use. A critical analysis of these arguments reveals biased interpretations, contradictions and unresolved doubts, which must be taken into consideration in view of the extent proposed. In other words:

1) The global development of gas is mobilising multi-million investments while ignoring the fact that its extraction is limited in terms of time because it is a fossil fuel that is non-renewable.

2) The large gas infrastructures are being planned based on intentionally optimistic projections of consumption and supported by public guarantees and funds, with the justification that this is a stimulus for economic growth. However, this results on the contrary in greater exposure of the public sphere to risk and creates employment that is limited, sporadic, precarious and primarily for men.

3) The impact of natural gas on climate change, if we consider methane leaks, lies above that of other fossil fuels. This fact is especially relevant if we consider the growth in unconventional gas extraction and the emissions associated with liquefied natural gas.

4) The European Union is highly dependent on imports of natural gas, especially those from the Russian Federation. For this reason, it is promoting a strategy of diversification via the Energy Union, but it is limiting it to the search for new suppliers of gas without seeking other alternatives with the necessary determination, and is creating stronger links with corrupt and authoritarian regimes such as those of Azerbaijan, Algeria, Nigeria or Turkmenistan, who feed off the sale of fossil fuels.

5) The existing gas infrastructures are functioning far below capacity. Despite this, new gas pipelines and import terminals are being planned, using the same model of guarantees and public funds.

6) The creation of a genuine global market for gas is promoting financialisation in the gas sector. The transition from prices indexed to oil to market prices, the use of financial instruments to invest in infrastructures and the penetration of investment funds into gas companies are 3 dimensions to this approach which use free trade agreements as facilitating and dynamic instruments.

7) The exploitation of fossil fuels makes exporting countries highly dependent on the sale of oil and gas, with a few national and international elites taking the major part of the trade, increases the domestic consumption of fossil fuels due to low prices and de-industrialisation or non-industrialisation in other sectors. The peoples and communities affected suffer the curse of abundancy and the multiple impact of the extractive industry.

8) Finally, the official rhetoric uses terms such as security, dependence, diversification, transition and numerous others with the intention of presenting a reality favourable to its interests. In this manner, it is paving the way for an offensive that will generate insecurity, increase dependence, understands diversification as the substitution of gas with gas and constrain the transition by placing a fossil fuel at its centre.

In the world of energy, certain structural power relations prevail. We want to illustrate this with reference to the global and European gas boom through the following pyramid. In the upper part we see two layers: the geopolitical, and the economic and financial layer. In the final instance and when taking decisions on a large scale, these two layers are decisive. As absurd as it may seem, even biophysical limits are subordinate and are only considered if they harmonise with the upper layers. In other words, climate change will be fought if it does not interfere with the accumulation of capital, and fossil fuel infrastructures will be planned, if it is lucrative for large corporations and investment funds, and as tentacles of relations between territories, even though this supports authoritarian regimes.

The solution would probably be something very simple and highly complicated, such as to take a new look at how to satisfy human needs for water, heat, electricity, thermal comfort, cooking food, etc. getting rid of hierarchical power relations of the world of energy, which subordinates the right to live for present and future generations. For the moment, the proposal comes from communities who are committed to energy democracy and the peoples' energy sovereignty – groups who are slowly making their way into the complex energy field.

ACTION ON THE PETROCHEMICAL INDUSTRIAL ESTATE OF REPSOL IN TARRAGONA (CATALONIA)
NB: the posters say "Sovereignty of the people faced with corporate impunity". This action is part of the VOLT activity carried out annually by the Network for energy sovereignty in Catalonia.

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ODG

The Debt Observatory in Globalisation (ODG) was established in 2000 for the purpose of being a critical analysis instrument for complex and/or structural processes in social movements. The work of our research team is aimed at demonstrating the visible (and invisible) impacts and risks of the capitalist and patriarchal system, by producing tools which facilitate interpretation of the current context. ODG is also an open platform for participation, debate and action, which promotes the creation of networks and spaces for building alternatives which strengthen popular sovereignties and empower communities.

For the past five years, our work has, in part, focused on the study of worldwide energy models. Together with other European organisations, we have established that there should be a more in-depth analysis of the promotion and momentum of natural gas, both through the host of newly planned infrastructures, as well as the actors supporting it and in perfect concert with financial capitalism.

ROSA-LUXEMBURG-STIFTUNG

The Rosa-Luxemburg-Stiftung is an internationally operating, left-wing non-profit organisation providing civic education. It is affiliated with Germany's 'Die Linke' (Left Party). Active since 1990, the foundation has been committed to the analysis of social and political processes and developments worldwide.

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Natural gas is gaining ground and increasing in importance in the global energy scenario. There are numerous publications and studies evaluating the risk of fuels such as crude oil and coal, but in the case of gas it is more difficult to find critical analyses of the risks involved in its promotion.

The booklet "Global Gas Lock-in" intends to show the various dimensions and risks associated with the global and European push for gas. It examines its geopolitical, economic, financial, environmental, climatic and social aspects; it analyses the role of major infrastructures, extraction zones, large fossil fuel corporations, free trade agreements, financial capitalism, labour, and public institutions. Simply examining all these dimensions confirms that aspects of the official rhetoric are questionable. Faced with the official discourse, which pours out data on energy security and dependence, which expounds essential and urgent diversification and which repeats the mantra of gas as a bridge fuel for the energy transition, the Global Gas Lock-in contains enough information, references and data to build up an alternative narrative to the official one. It does this, moreover, while trying to demystify the highly technical language of the world of energy, with the aim of making it more accessible so that this publication can be used as the basis for a critical debate on the push for gas.

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