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"Specific novelties of the oil & gas business: an ever-lasting industry?"

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Memoir

With the end of a very important chapter of my life, yet another milestone is set, one I didn't even dare to imagine or I never thought it would be possible in this constellation.

While it took a tremendous amount of hard work, patience and skills on my side, it doesn't even compare to the unmatchable compromise that my parents did in order to facilitate a better life, (thus) a better education for me. This is why I wrote this thesis thinking constantly at the sacrifice they did so that I had the chance to sit in front of my computer and write these lines.

Without further hindrance, I would like to thank dearly my parents for offering me the best gift in my life, for allowing me and supporting me in my study and setting my path. Thank you sincerely for that.

Vă mulțumesc din toată inima ș i vă iubesc mult.

I appreciate very much the entire support I have received from all members of the family. My grandparents are amazing role-models, always doing everything in their power for my brother and me. I would hereby like to mention the departed, Mama Olimpia and Tata Petre, who I know would be very proud to be with us this day of graduation, and I am sure in some way they are.

My little brother, thank you for your trust in me and your unconditional love. It is wonderful to have you near me and be part of your tremendous successes.

Last but not least, thank you Marc-Joël for giving me all this love and being my rock in any type of situation. You fill my life with joy and happiness.

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Abbreviations

ASPO	Association for the Study of Peak Oil & Gas USA
API	American Petroleum Institute
bn	Billion
boe	Barrels of oil equivalent
bcm	Billion cubic meter
CFC	Controlled foreign corporation
DECC	Department of Energy and Climate Change
EU ETS	EU Emissions Trading Scheme
IEA	International Energy Agency
IMF	International Monetary Fund
IOC	International Oil Companies
GATT	General Agreement On Tariffs And Trade
mtoe	Million tons of oil equivalent
NOC	National Oil Companies
OECD	Organization for Economic Co-operation and Development
OPEC	Organization of Petroleum Exporting Countries
tcf	Trillion cubic feet
UKCS	U.K. Continental Shelf
PE	Permanent Establishment

Foreword

The main goal of this thesis is to give a broad overview of the oil and gas sector, its historic development and what the future perspectives and regulatory objectives are.
It is a compendium comprising the past of this industry, advancing all the way to the present status and moving forward to numerous expert scenarios, describing them critically, when necessary.

The global oil and gas markets are so complex and dynamic that it is difficult to identify a single or a group of influential factors for their development. This increases their significance for speculation. For this reason, this thesis includes an overview of the projected expansion of this sector (according to expert organizations in this field) and how they evaluate the portfolio necessary to cover the surging demand in the years to come and an own chapter about the characteristics of oil and gas companies, and the triggers for legal entities to invest and be part of this "game".

The network, both real and financial, is a significant determinant of stability or of a crash in the oil and gas market and, as shown in the respective chapter, in the economy as a whole. The objective of the chapter is to outline how important the connection and cooperation between oil producing and consuming countries is, not only to ensure the security of supply but also to guarantee political and economic stability in the countries depending most of these energy sources.

The last two chapters are focused on two big economies: on the one hand, the rushing and increasingly independent United States and on the other hand, the rather inflexible European Union.

Lastly the purpose of this thesis is to analyze the trends that may have been settled by now, or some that might arise with the perspective to reshape the (energy) world. Furthermore the development of prices, especially on the different continents, plays a significant role to indicate major forces in the near and far future.

1. Part 1: Introduction

People have had an interest in designing and developing instruments to generate power (electricity) for over a century. They recognized early the urgency to find sources that would improve socioeconomic standards.

Not surprisingly already in the 12th century a milestone was achieved by a British clergyman known as Herbert that built the first windmill in England affirming that "the free benefit of the wind ought not to be denied to any man." [1]

Thomas Newcomen invented the first steam engine (1712) and James Watt patented 1775 improvements on it, thus introducing the "Age of Steam". [2]

The era of petroleum production has commenced in the United States in the 19th century and since then it represents a big part of our present energy consumption mix. As such, the year 1859 was marked by significant milestones.

Edwin Drake drilled, what is now known, the first oil well in history at Titusville, in the North-West of Pennsylvania. Simultaneously to the boom in fossil fuel consumption the interest in environmental protection grew, so that in the same year the British scientist John Tyndall proved in front of an audience at the Royal Institution of London the existence of the greenhouse effect. [3]

From here on, John D. Rockefeller recognized the people's need to lead a more comfortable life and the numerous advantages that oil would facilitate, thus investing the majority of his wealth in this new business. With his strategic expertise he founded the Standard Oil Company and provided almost every household in America oil for lamps.[4]

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[1] See Yergin (2012) page 590

[2] See Yergin (2012) page 668

[3] See Yergin (2012) page 428

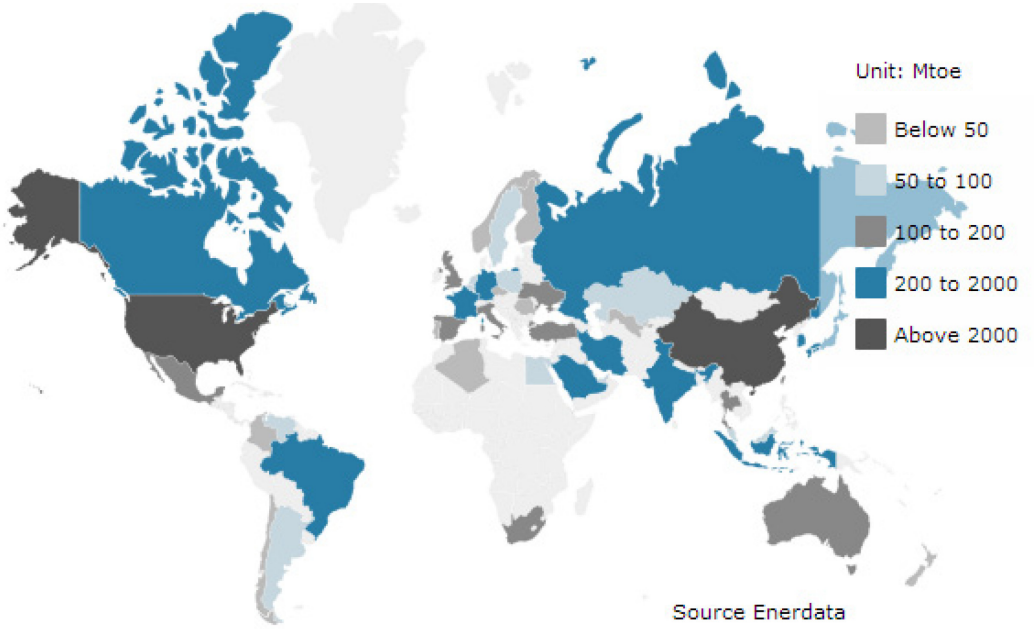
[4] See Bio., John D. Rockefeller [accessed on 04.08.2014]

Ever since the production and consumption of energy, regardless of the source or technology, has risen dramatically. The entire world is dependent on energy and times without it are unimaginable, reasoning why new reserves are sought for with great interest and better technologies are developed to enable the capture of more resources accompanied by a more efficient usage.

Current depiction of the energy world

Energy has become a consumer good that is, at this point irreplaceable. Ever since the invention of fire, civilization emerged and evolved in ways probably never expected. Power, oil and gas demand have risen to such high levels that the industry has focused on developing and mastering alternative methods for energy generation.

Figure 1: Total Energy Consumption 2013



Source: Enerdata, Total Energy Consumption [accessed on 23.08.2014]

The figure above depicts the total energy consumption by country measured in million tons of oil equivalent (mtoe) in the year 2013. A complete list of the countries with the highest energy consumption (on the left of the next two tables) and the highest production countries (on the right), catalogues in both cases China in the lead and the United States as a runner-up.

Tables 1 and 2: Highest ten energy consumption/ production countries

China	3,013
United States	2,187
India	819
Russia	730
Japan	455
Germany	323
Brazil	293
South Korea	267
Canada	254
France	253

China	2,593
United States	1,873
Russia	1,338
Saudi Arabia	631
India	552
Canada	441
Indonesia	416
Iran	352
Australia	332
Brazil	253

Source table 1: Enerdata, Total Energy Consumption [accessed on 23.08.2014]

Source table 2: Enerdata, Total Primary Production [accessed on 23.08.2014]

The highest increase in consumption (+3.6%) as well as production (+2.7%) was registered in the BRIC Countries (Brazil, Russia, India and China) even though China indicated a slight decrease in the year 2012 compared to the last decade. Overall, the world energy consumption and generation in the year 2012 was below the average annual growth rate of the past decade.[5]

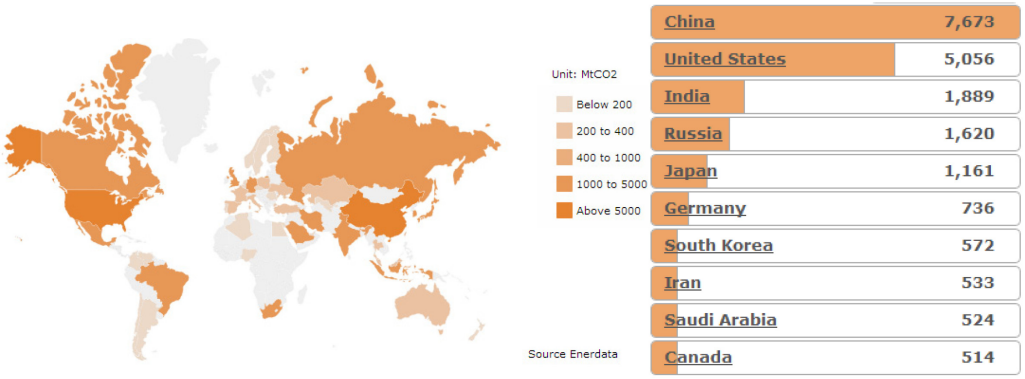
Concomitant to the above described decrease, the quantity of the global CO_2 emissions rose by 1.6%, which exceeded the average increase in annual energy consumption of 1.4%. The major players are depicted below, with China and the U.S. in leading roles, a figure that resembles almost perfectly the energy consumption list and not the production list. This is due to a number of factors.
First, the BRIC countries continue to grant a great share of the energy portfolio mix to the coal production, which is known to contribute the most to the CO_2 emissions.

Furthermore, the EU also partly increased its coal production, to compensate the fluctuation loss of renewables. On the contrary, the U.S. has reported a decrease in

[5] See Enerdata, Total Primary Production [accessed on 14.04.2014]

total CO_2 emissions due to general movement of replacing coal with natural gas (which has the lowest CO_2 emission grade compared to coal and petroleum). [6]

Figures 2 and 3: CO2 emissions in 2012



Source figure 2: Enerdata, CO2 emissions from fuel combustion [accessed on 14.04.2014]

Source figure 3: Enerdata, CO2 emissions from fuel combustion [accessed on 14.04.2014]

Moreover, the International Energy Agency forecasts in its "World Energy Outlook 2013 Factsheet" that by the year 2035 the demand for all energy forms will increase but that the share of fossil fuels in the global energy mix will fall by 6% and that the governments can influence the trend. [7]

Also IEA predicts that new technologies will be developed that will allow better recovery of resources from the fields, but then again that simultaneously the CO_2 emissions will increase by 20%.[8]

The International Energy Agency also published in 2014 the "World Energy Investment Outlook" which shows the rate of investment in energy supply since the year 2000. This displays a clear increase in oil and gas supply (depicted in the next figure), with an increase in power until 2011 and then a slight decrease with average annual investments in all technologies of around $1.600 billion.[9]

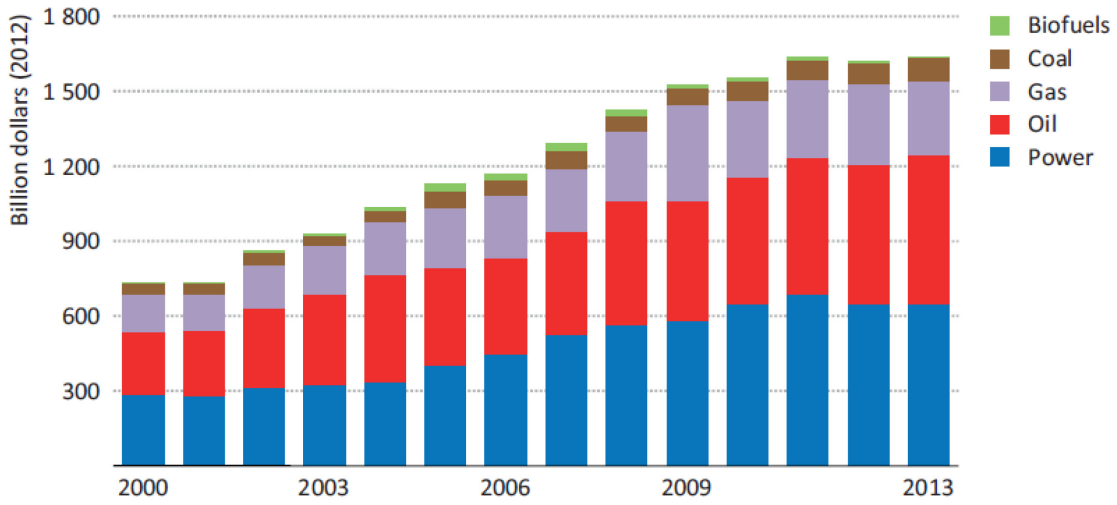
[6] See Enerdata, CO2 Emissions from fuel combustion [accessed on 14.04.2014]

[7] See IEA, World Energy Outlook 2013 Factsheet [accessed on 14.04.2014]

[8] See IEA, World Energy Outlook 2013 Factsheet [accessed on 14.04.2014]

[9] See IEA, World Energy Investment Outlook, see page 20 [accessed on 24.07.2014]

Figure 4: Investment in global energy supply



Source: IEA, World Energy Investment Outlook [accessed on 24.07.2014]

2. Part 2: Outlook for the energy markets

In the recent past scientists focused on analyzing the current market situation and energy demand in close connection to the availability of resources. Many of them warned that at the current rate of consumption, the existing reserves will run out.

However, at the IHS CERAWeek in March 2013, the CEO and Chairman of ConocoPhillips, Ryan Lance, declared that: "It's like that old Bob Dylan song from the 1960s – "The Times They Are a-Changin". At least in our industry. We're in a brave new world, thanks to unconventional resources. What everyone once assumed was energy scarcity, looks more like energy abundance today". [10] While oil has reached its peak, unconventional resources (like shale gas, shale oil, oil sands etc.) are now in focus for exploration. What the CEO of ConocoPhillips meant by his quote is that, indeed the conventional fields of oil and gas have been exploited intensively and there would still be enough reserves left to cover the demand for at least 50 years, but the unconventional reserves represent the future.[11]

[10] See ConocoPhillips, The New Energy Landscape [accessed on 04.08.2014]

[11] See Conoco Phillips, The New Energy Landscape [accessed on 04.08.2014]

The considerable amounts of reserves available do involve immense problems as the cost of extraction and the related technology innovation are putting the economic efficiency under scrutiny.

Regarding the much mediatized risks involved with hydraulic fracturing, the ConocoPhillips chairman pledges that "there's risk that society won't see the shale revolution through to its full potential – due to misinformation and fear"[12].
He also recognizes that there is a tendency to shift between conventional and unconventional resources on the scale on national and international companies: "IOCs still want access to conventional resources held by the NOCs. But now, the NOCs are chasing the unconventional potential held by the IOCs"[13] (IOC stands for International Oil Companies and NOC for National Oil Companies).[14]

The following figure shows the mechanics of shale gas extraction and in particular the challenges that are involved with this process. Especially, the low permeability of the rocks (restrains the gas flow) poses a dilemma for energy producers.
The reason why it is so difficult to capture shale gas is depicted schematically. The first part of drilling is the vertical drilling. This is followed by pumping water and chemicals into the ground at a high pressure that allows a better flow of the well. Further, the gas can be collected and wastewater is pumped back to the surface. [15]

Even though this is a rather simple explanation of how hydraulic fracturing is performed, it still permits the oversight of significant risks that may be involved with such drilling. First of all, chemical substances are pumped into the ground that can pollute the underground water which is poisoning several entities on different layers.

[12] See Conoco Phillips, The New Energy Landscape [accessed on 04.08.2014]

[13] See Conoco Phillips, The New Energy Landscape [accessed on 04.08.2014]

[14] See PPDM, The Professional Petroleum Data Management Association [accessed on 04.08.2014]

[15] See visual.ly, Natural Gas (2012) [accessed on 25.07.2014]

From the figure it becomes obvious that the well turns from vertical to horizontal. Even though the technology has been improved, it is evident that it is much more challenging to implement than conventional vertical drilling.

Figure 5: Shale Gas Formations

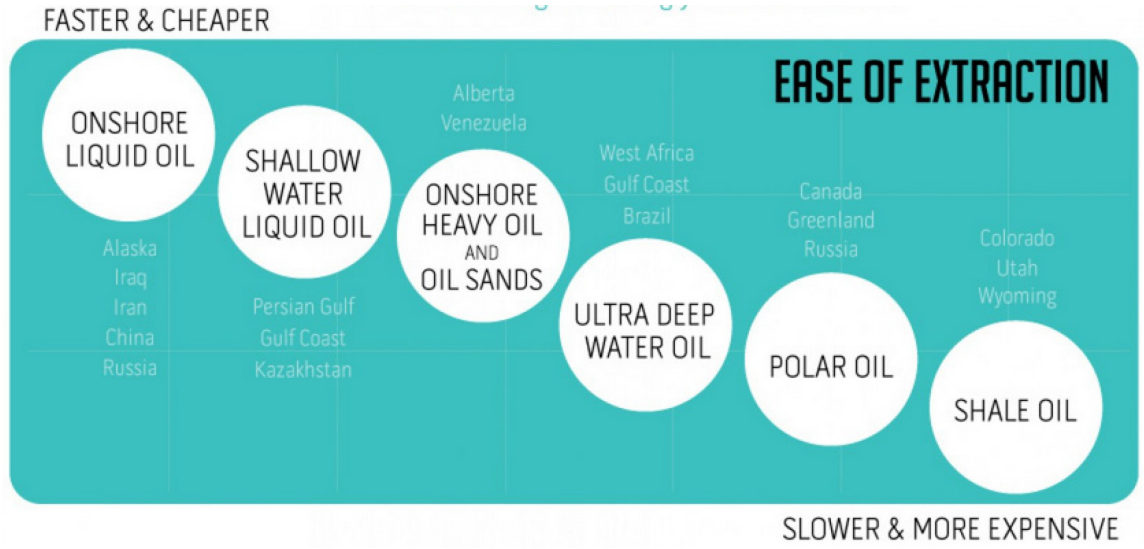
Source: visual.ly, Natural Gas (2012) [accessed on 25.07.2014]

To support this, showing the difficulties of extracting shale gas, Canadian scientists have also compiled a graph in order to rank the different energy reserves by ease of extraction. As shown, the fastest and cheapest way of extraction is onshore liquid oil (found mostly in Alaska, Iraq, Iran, China and Russia). [16]

[16] .See visual.ly, Canadian Oil Boom (2012) [accessed on 23.07.2014]

The technology exceedingly becomes more complex and expensive as the drilling has to be done in demanding rock formations. As seen here, extracting shale oil is the most expensive example and requires the most time out of all the oil formations that are listed.

Figure 6: Ease of extraction of oil and gas



Source: visual.ly, Canadian Oil Boom (2012) [accessed on 23.07.2014]

In a complex analysis of the development of the oil and gas sector, it needs to be taken into account what experts predict regarding consumption, production and pricing. The following figure mixes both forecasts and critique of the mechanism.

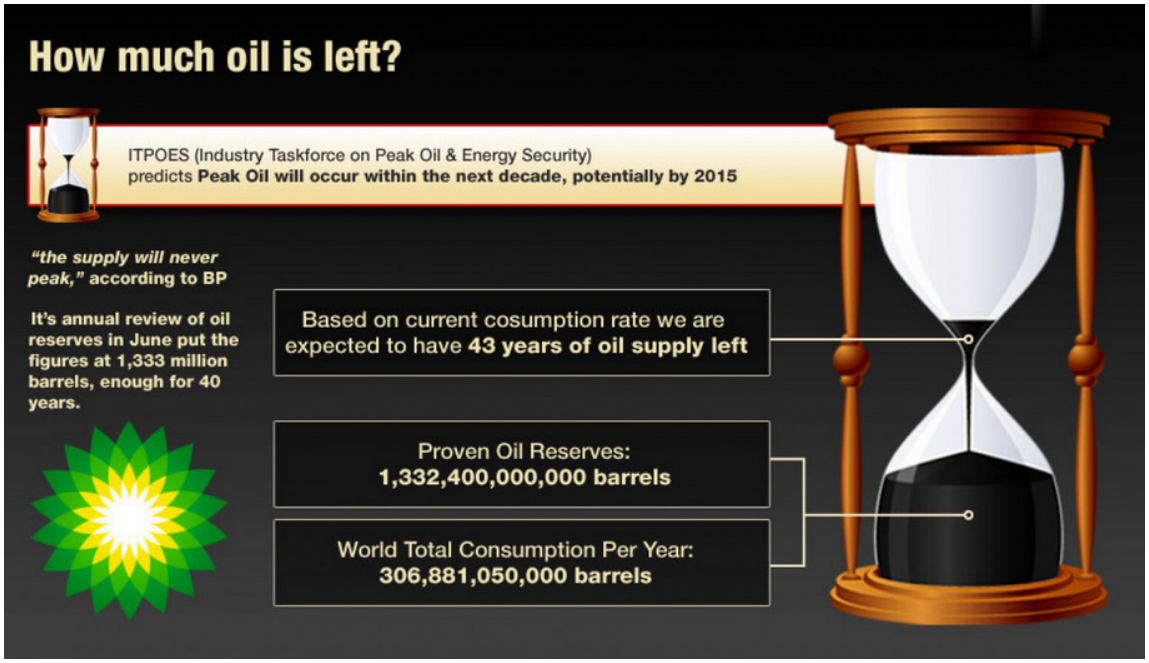
BP has declared that "supply will never peak" [17], a statement which is contested by many experts in the field. In fact, the graph below provides a clear and simple picture of the current situation, by showing the remaining and consumed reserves through a modified sand glass.

The association for the Study of Peak Oil & Gas USA (ASPO) has compiled with the support of Randy Udall in 2010 with the data provided by BP and the Oil and Gas Journal a list of the 12 OPEC countries and other 30 major oil and gas producers where their peak years are listed (for example Norway in 2001, the United Kingdom in 1999, Indonesia in 1994 and so on).

[17] See Leggett (2010) [accessed on 05.08.2014]

For some countries it is questionable. No explanation is given, however maybe peak oil is problematic to determine because of the potential of undiscovered reserves in those countries. [18]

Figure 7: Peak Oil



Source: visual.ly, Peak Oil Consumption - How much Oil is left? (2012) [accessed on 23.07.2014]

In the World Energy Investment Outlook published 2014 by the International Energy Agency, two scenarios involving the period of 2014-2035 are the foundation of their analyses.

First, there is a so called New Policies Scenario that calculates energy prognoses based on the already implemented policies up to now and the goals that were already set. The second scenario is called the 450 Scenario and models the energy portfolio in such a way that the upper limit is a restriction of the emissions that do not lead to a higher increase of global temperatures of 2 degrees Celsius. [19]

In further depiction, only the New Policies Scenario will be analyzed in detail, as it is based on current trends in the market and contemporary policies and thus it is perhaps more plausible. According to this IEA report, $40 trillion need to be invested until 2035 to secure the energy supply and another $8 trillion to improve the energy efficiency. It is of pivotal importance to invest both in securing the

[18] See ASPO USA, Oil Production by Country [accessed on 05.08.2014]

[19] See IEA, World Energy Investment Outlook, page 15 [accessed on 6.08.2014]

supply and increasing the efficiency in order to meet the growing demand for energy. [20]

The following forecasts were performed by IEA with intensive research. As soon as new information became available, the underlying cost estimates, based on energy company reports, bank documentation and other industries' expertise, were updated and re-simulated in the overall scenario. The development of the gross domestic product (GDP) is an input of the International Monetary Fund (IMF), whereas the most significant transformations are noted in China and India. [21]

The baseline or foundation of this simulation is the actual and current energy consumption and production. [22] These are all indications that this New Policies Scenario incorporates all current data that were available at this point in time, which suggests that it is a credible outlook for the future.

In next graph, a forecast of supply investment by type of energy until 2035 is depicted. As such, the total investment of $40 trillion mentioned before is allocated to the respective energy sources. It is instantly noticeable that the power sector will have the majority share in the energy portfolio mix (around 41%), with renewables contributing the most to the production of power (followed by fossil-fueled plants and nuclear plants). The second largest part of the mix are the oil products, contributing up for around 34% of the investment, with the upstream segment in the lead. Coal will represent only 2.6% of total investment and together with oil it will experience the slowest increase out of the existing resources. [23]

Natural gas, representing around 22% of the investment will grow faster than oil and coal (IEA prognoses by 44%) but still slower than nuclear (74%) and modern renewables (134%). [24]

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[20] See IEA, World Energy Investment Outlook, page 22 [accessed on 6.08.2014]

[21] See IEA, World Energy Investment Outlook, page 22 [accessed on 6.08.2014]

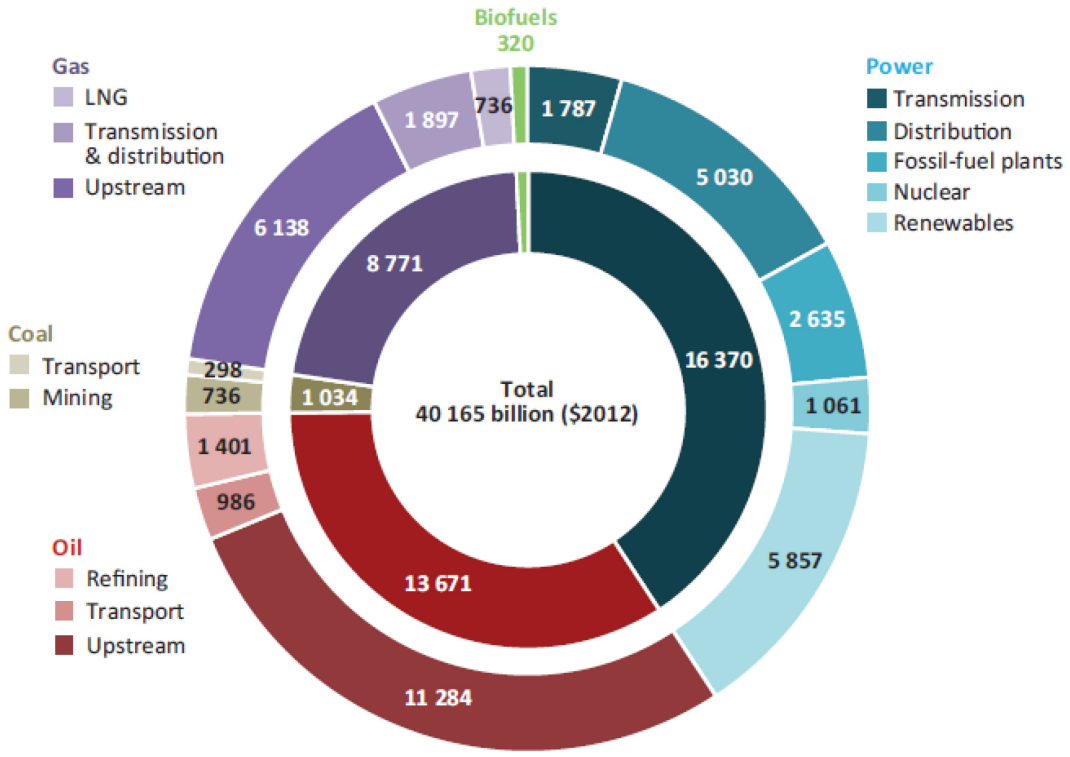
[22] See IEA, World Energy Investment Outlook, page 22 [accessed on 8.08.2014]

[23] See IEA, World Energy Investment Outlook, pages 23-24 [accessed on 8.08.2014]

[24] See IEA, World Energy Investment Outlook, pages 23-24 [accessed on 8.08.2014]

The subdivision and the respective absolute shares of these enumerated energy resources can be approved and, if necessary, analyzed in further detail. The most relevant information to be elaborated from this prognosis is that until 2035 the majority of the investment will be directed to generate, transport and distribute power from fossil fuels or from renewable sources.

Figure 8: Cumulative global energy supply investment by type



Source: IEA, World Energy Investment Outlook, page 23 [accessed on 25.07.2014]

After depicting the investment focus of the business sectors in the next decades, it is also crucial to investigate which industries will try to improve their energy efficiency the most.

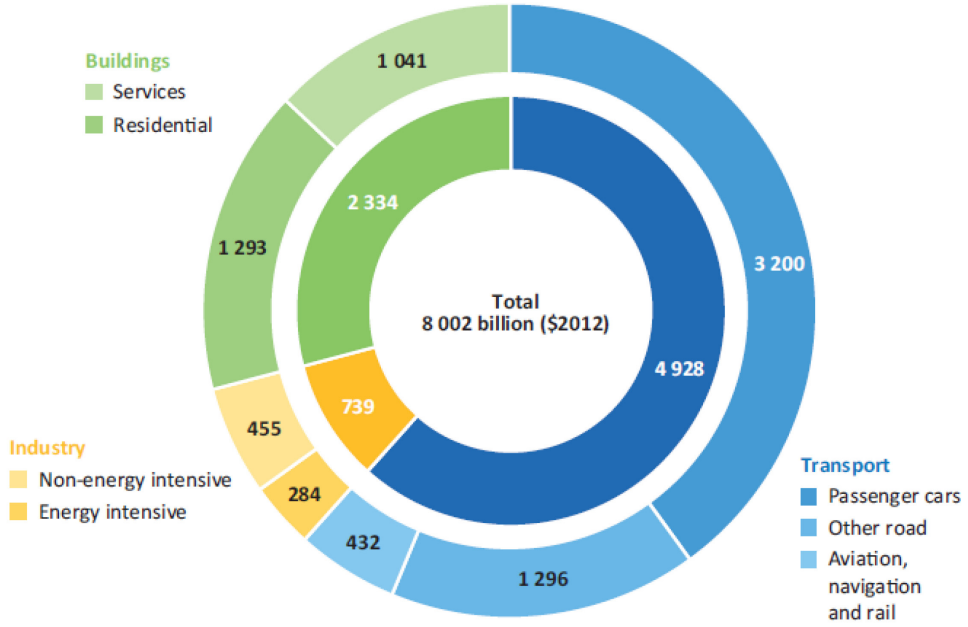
As mentioned at the beginning of the chapter, around $8 billion will be invested until 2035 to improve the efficiency of energy products, whereas around 62% will flow in the transportation sector, with passenger cars having notable improvement.

Further energy improvements will be made in the buildings sector (taking almost 29% of the total investment), whereas the residential buildings will have a slightly

higher increase in efficiency than buildings used for services. Lastly, around 9% of the investment will go to industry, with non-energy intensive industry having almost 50% more increase than the energy intensive business (284 energy intensive versus 455 non-energy intensive industry).[25]

The objective of this figure is to highlight what the business areas are that will be of major interest to improve on a technological level. There is already a trend in building high performance, climate protective electric cars and this is noticeable in the IEA prognosis as the passenger cars are shown to have the most significant increase in efficiency. Residential houses will also be built more resourcefully.

Figure 9: Cumulative global energy efficiency investment by end-use sector



Source: IEA, World Energy Investment Outlook, page 23 [accessed on 25.07.2014]

Furthermore, IEA has produced a table of actual demand levels for the years 1990 and 2000, for the year 2012 estimates are included and afterwards until 2035 prognoses in line with the New Policies Scenario. [26]

[25] See IEA, World Energy Investment Outlook, page 24 [accessed on 25.07.2014]

[26] See IEA, World Energy Investment Outlook, page 24 [accessed on 10.08.2014]

These figures have been measured and forecasted for energy sources like oil, gas, coal and the renewables like hydro-, nuclear-, bioenergy and others. On the right hand side of the table the annual average growth rates are calculated.

The highest growth rate by far is measured in the other renewables part and represents a 7.3% annual increase, whereas the pro rata quota increases from 0.4% in 1990 to around 4% in 2035 in relation to the total demand (nevertheless an increase that is 10 times higher than in 1990). [27]

The biggest part of the entire energy demand will still be covered by oil, which will represent only 27% of total demand in 2035 (compared to 31% according to estimated 2012 values). [28]

The second natural resource that will cover around 25% of energy demand in 2035 is coal that will have a slightly higher average annual increase than oil (0.6% versus 0.5%). On the third place is natural gas with the annual increase of 1.6% and around 24% of total energy demand. A lower share in the total energy mix will be taken by nuclear-, hydro- and bioenergy, but these three are the ones that have the highest average annual increase (after the other renewables). [29]

As such, nuclear energy and hydro energy will be further developed and increase by 2.4% respective 2.1% on an annual basis and thus steadily boost their significance for ensuring energy supply.[30]

In total, fossil fuels will account for securing roughly under 80% of total required energy (the level that was already reached in the year 2000). Out of that the majority (almost two thirds of it) will be supplied by Non-OECD countries (a considerable increase from the proportions registered in 2012). [31]

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[27] See IEA, World Energy Investment Outlook, page 24 [accessed on 10.08.2014]

[28] See IEA, World Energy Investment Outlook, page 24 [accessed on 10.08.2014]

[29] See IEA, World Energy Investment Outlook, page 24 [accessed on 10.08.2014]

[30] See IEA, World Energy Investment Outlook, page 24 [accessed on 10.08.2014]

[31] See IEA, World Energy Investment Outlook, page 24 [accessed on 10.08.2014]

Table 3: World primary energy demand by fuel and energy-related CO_2 emissions

	1990	2000	2012*	2020	2025	2030	2035	2012-2035**
Oil	3 231	3 663	4 158	4 469	4 545	4 600	4 666	0.5%
Gas	1 668	2 072	2 869	3 234	3 537	3 824	4 127	1.6%
Coal	2 230	2 357	3 796	4 137	4 238	4 309	4 398	0.6%
Nuclear	526	676	642	869	969	1 051	1 118	2.4%
Hydro	184	225	313	391	430	466	501	2.1%
Bioenergy***	893	1 016	1 318	1 488	1 598	1 718	1 848	1.5%
Other renewables	36	60	142	311	432	566	717	7.3%
Total (Mtoe)	8 769	10 070	13 240	14 899	15 749	16 534	17 376	1.2%
Fossil fuel share	*81%*	*80%*	*82%*	*79%*	*78%*	*77%*	*76%*	*n.a.*
Non-OECD	4 047	4 506	7 606	9 019	9 859	10 623	11 406	1.8%
OECD	4 522	5 292	5 271	5 478	5 461	5 455	5 484	0.2%
CO_2 emissions (Gt)	20.9	23.7	31.5	34.3	35.4	36.2	37.2	0.7%

* 2012 data are preliminary estimates. ** Compound average annual growth rate. *** Includes traditional and modern biomass uses. Notes: Mtoe = million tonnes of oil equivalent; Gt = gigatonnes; Non-OECD and OECD totals exclude international bunkers.

Source: IEA, World Energy Investment Outlook, page 24 [accessed on 25.07.2014]

It is of utmost importance to acknowledge the substantial annual growth in CO_2 emissions (of 0.7% per year) which according to the International Energy Agency exceeds the limit that would keep global temperature increases at the level of 2ºC.[32]

Parallel to the growing demand for energy (approximately 1.2% per year as depicted in the table above), the average annual investment necessary for recovering the needed resources and improving the processes involved with that have to be analyzed more intensively.

As such, the power sector will remain the most investment intensive, followed by oil and natural gas. Investments in coal will shrink to nearly half the levels in 2013 and biofuels will increase slightly on an annual basis. [33]

[32] See IEA, World Energy Investment Outlook, page 24 [accessed on 10.08.2014]

[33] See IEA, World Energy Investment Outlook, page 24 [accessed on 25.07.2014]

Table 4: Evolution of global average annual energy investment

	2007-2013	2014-2020	2021-2030	2031-2035	2014-2035
Oil	512	637	610	621	621
Gas	309	357	401	453	399
Coal	74	54	41	50	47
Power	616	713	729	818	744
Plants (all fuels)*	375	407	424	493	434
T&D	241	306	305	325	310
Biofuels	11	11	13	22	15
Total energy supply	**1 521**	**1 772**	**1 794**	**1 963**	**1 826**
Energy efficiency**	**130**	**212**	**385**	**533**	**364**

*Includes plants with CCS. **As described in the Introduction and Chapter 4, the methodology for measuring efficiency investment derives from a baseline of efficiency levels in different end-use sectors in 2012; the annual figure for energy efficiency in column "2007-2013" is therefore the figure only for 2013.

Source: IEA, World Energy Investment Outlook, page 24 [accessed on 25.07.2014]

Nevertheless, the most significant increase (due to technology boosts and political interests) is to be noted in energy efficiency investments: they will increase from an average annual level of 130 to expenditures of 360 in the period of 2014-2035 (representing a surge of almost 300%). [34]

[34] See IEA, World Energy Investment Outlook, page 24 [accessed on 25.07.2014]

3. Part 3: Characteristics of the oil and gas business

3.1. The major oil crises that shocked the world

During the past decades the energy markets experienced numerous changes and high volatility that were caused by a mix of factors and brought advantages but mostly disadvantages to the consumers and producers.

Since the beginning of the 1930s the U.S. had played a key role stabilizing the global demand for oil and its prices by strategically regulating and limiting the allowed production in their main oil fields in East Texas. [35] Together with Europe, the "Seven Sisters" stabilized the energy markets on a global level; their power was ensured by their sizes on the one hand but also by not supporting some oil enriched countries on the other hand, like Iraq or Libya thus leaving their potential unattended. However, towards 1970 the U.S. reached its peak oil and thus allowed for other players to enter the business and gain shares, one of them being OPEC. [36]

As Michael L. Ross stresses in his article in the Foreign Affairs magazine, the stability of the oil prices was only possible due to the combination of three specific reasons: "the dominant market position of the Seven Sisters, the excess capacity of the East Texas oil fields, and the Bretton Woods system of fixed exchange rates". [37]

The year 1973 represents a quite prominent one in the history of petroleum production as multiple forces joined, which ultimately lead to a great recession. The much known Yom Kippur war between Israel and the Arab states Egypt and Syria commenced and implicitly also between the supporting countries (U.S. and

[35] See Ross (2013) [accessed on 22.07.2014]

[36] See Andrews, Udall (2014) [accessed on 22.07.2014]

[37] See Ross (2013) [accessed on 22.07.2014]

Western Europe and OPEC). OPEC had declared a stop of petroleum export to the countries associated with Israel. [38]

The before mentioned mix between the reach of peak oil in the U.S. combined with the decline in the influence of the Seven Sisters, enabled the necessary power to the OPEC countries to stimulate an increase of oil prices, almost four times as high as they were before the crisis (from 3$/ barrel to almost 12$/ barrel). [39]

The effects were that the importing oil countries faced stagnation and inflation, promoting conservation programs and spreading information of depleting and insufficient reserves.

Meanwhile the governments of the OPEC countries generated windfall profits from the increases of the oil prices. However, even though the surpluses were considerably high, they vanished due to extreme overspending.[40]

In 1979 another crisis in the history of petroleum production started as a consequence of the Iranian Revolution and the begin of the Iran – Iraq war. [41] The Automotive News published in October 2013 that the cut in oil production was caused by the replacement of the Iranian Shah with Ayatollah Khomeini. [42]

This in turn created shortages in the U.S. of the supply of diesel and gasoline but also heating oil which resulted in long term price increases. [43]

Philip Verleger from the Yale University believes that this crisis had such an enormous impact on the U.S. economy because of the gasoline regulation that was in place and which allowed for any refiner to adjust his prices according to his costs. This meant, that if the refineries incurred steadily increasing costs of

[38] See Action Forex [accessed on 22.07.2014]

[39] See Ross (2013) [accessed on 22.07.2014]

[40] See Ross (2013) [accessed on 22.07.2014]

[41] See The Middle East Institute, Washington D.C. [accessed on 22.07.2014]

[42] See Sawyers (2013) [accessed on 22.07.2014]

[43] See Verleger [accessed on 22.07.2014]

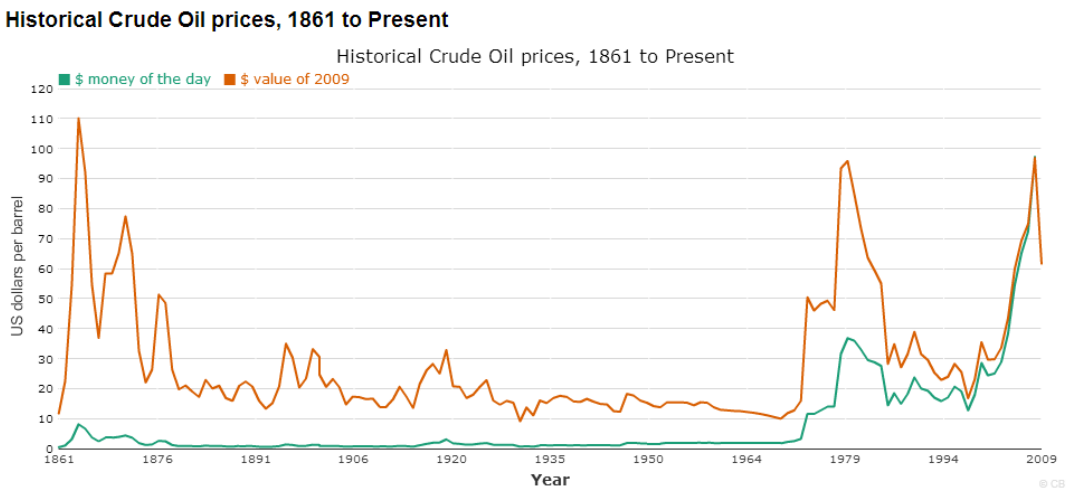
production, because of importing oil prices growth mostly from OPEC countries, then they were allowed to charge higher prices to U.S. consumers.

After a certain threshold it is no longer profitable to produce at all, another reason why a shortage in gasoline occurred. [44] He says: "At the peak of the crisis the gasoline lines were as long as or longer than those in 1974". [45]

The markets after the 70s were still not at ease, as struggles of market power drove them. The disputed and mediatized Enron scandal lead the U.S. in yet another recession and the financial crisis in 2008 played also its role on the energy markets worldwide.

Overall, the changes and volatility in supply and demand for oil but also the political interconnections and goals caused major shifts in the economy. The graph below depicts the historical development of the oil prices since the 19th century until the recent past. As expected, the oil price is adapting to current economic growth, but the years of the oil shocks show how immense the impact on the states was and how high the prices were allowed to increase, sometimes even more than 4 times as it was before the crises. Currently the oil price fluctuates at around 105 $/ barrel. [46]

Figure 10: Historical crude oil prices



Source: ChartsBin [accessed on 22.07.2014]

[44] See Verleger [accessed on 22.07.2014] see page 473

[45] See Verleger [accessed on 22.07.2014] see page 463

[46] See Market Watch (2014) [accessed on 23.07.2014]

This is an important indicator that oil is not just a product to ensure mobility or infrastructure it is a factor that drives the economic development up or down.

3.2. Subsidies as part of the oil and gas business

Before starting an intensive study about energy subsidies and their individual, national and global impact, a general definition of them ought to be offered:

A subsidy is "a benefit given by the government to groups or individuals usually in the form of a cash payment or tax reduction. The subsidy is usually given to remove some type of burden and is often considered to be in the interest of the public." [47]

A clear reproduction of total energy subsidies (in exact figures) is difficult to achieve for many reasons. First, they may be hard to categorize as energy subsidies (because of the numerous forms they can have) but mostly because this is a rather intransparent subject and many countries even refuse to deliver reports about these types of subsidies (further details about this will be offered in the next chapters).

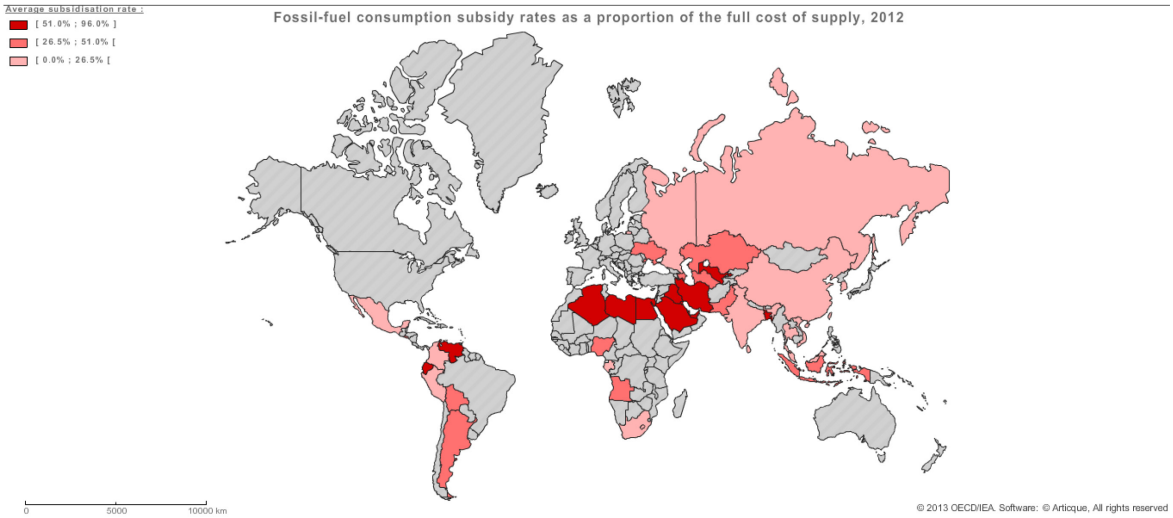
Nevertheless, estimations show that in the year 2011 approximately 500 bn USD were spent in fossil fuel subsidies worldwide [48] while IEA made an even higher and more accurate estimation of 523 bn USD. [49] This incapability to actually provide the real facts and expenditures are a proof to the above mentioned problem.

[47] See Investopedia, Subsidy [accessed on 10.08.2014]

[48] See Atkin, Climate Progress [accessed on 10.08.2014]

[49] See Whitley, S. [accessed on 10.08.2014]see page 1

Figure 11: Fossil fuel consumption subsidy rates as a proportion of the full cost of supply



Source: OECD/IEA Software. Subsidy Index [accessed on 10.08.2014]

3.2.1. Excursus: The majority "shareholders"

The United Nations Environment Programme has also focused on creating a global picture of world energy subsidies but criticizes great impediments owing to the lack of reporting of countries or the significant number of forms in which they are granted (more details to this are provided in chapter 4.2.3). [50]

Regardless, there is a general consensus that these subsidies are more than just considerable worldwide. An identified trend (with few exceptions) states that most of the subsidies are granted in the non – OECD countries can be seen in the next figure – and primarily consumers benefit, meaning that they decrease the domestic fuel prices below the world market levels. [51]

Russia takes the lead between the non - OECD countries with subsidies worth almost 40 bn USD where mainly OAO Gazprom, the biggest natural gas producer and distributor in Russia, is charging its inhabitants lower natural gas prices than the ones requested when exporting to the other countries. [52]

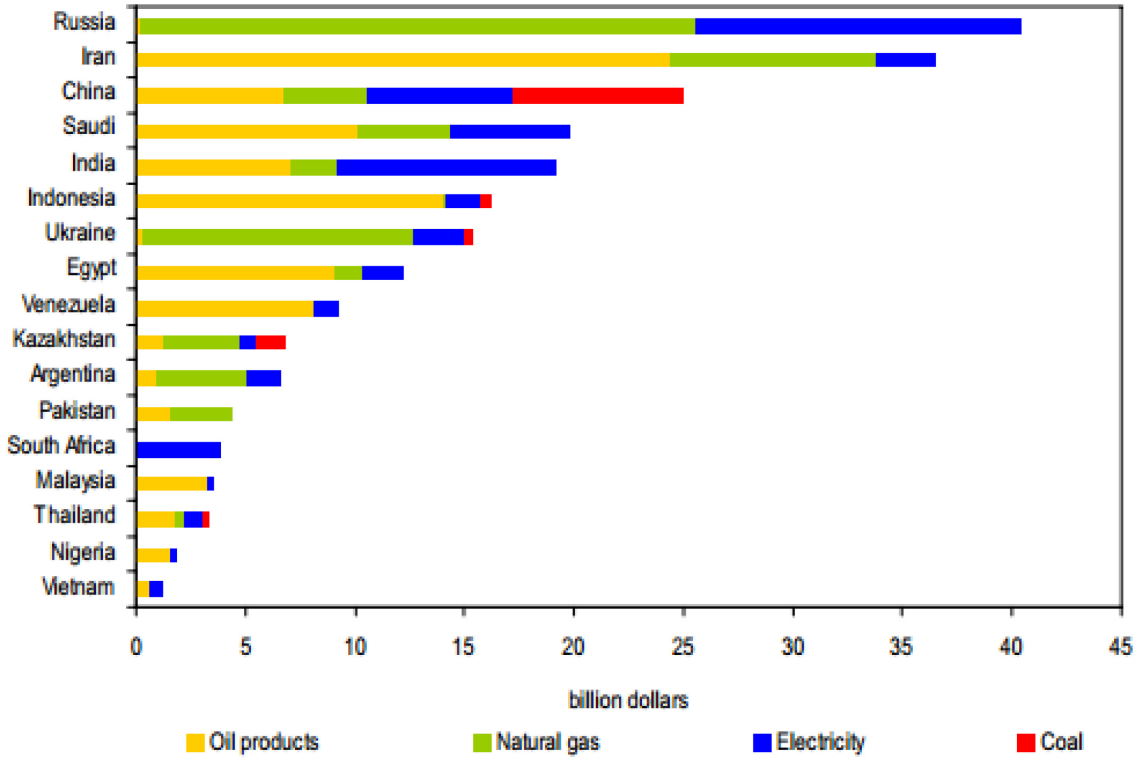
[50] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 10

[51] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 10

[52] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 10

This graph also depicts the quotas of subsidies per energy product and Russia grants consumer subsidies only for natural gas and electricity consumption. The runner up is Iran with the majority subsidies in oil products and about a quarter of them in natural gas and electricity. South Africa stands also out as it subsidizes only the electricity sector. [53]

Figure 12: Non OECD Energy subsidies



Source: United Nations Environment Programme (2008) [accessed on 10.08.2014]

In contrast, in the OECD countries producer subsidies are more common and they constitute mostly direct payments to energy companies or support them in their research and development activities. [54]

[53] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 11

[54] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 10

3.2.2. The Economics of Energy Subsidies

The functioning of energy subsidies and their effect on the economy and the environment can be shown through the following graph. This representation assumes that the production or consumption of energy products necessarily creates a certain level of environmental damage. [55]

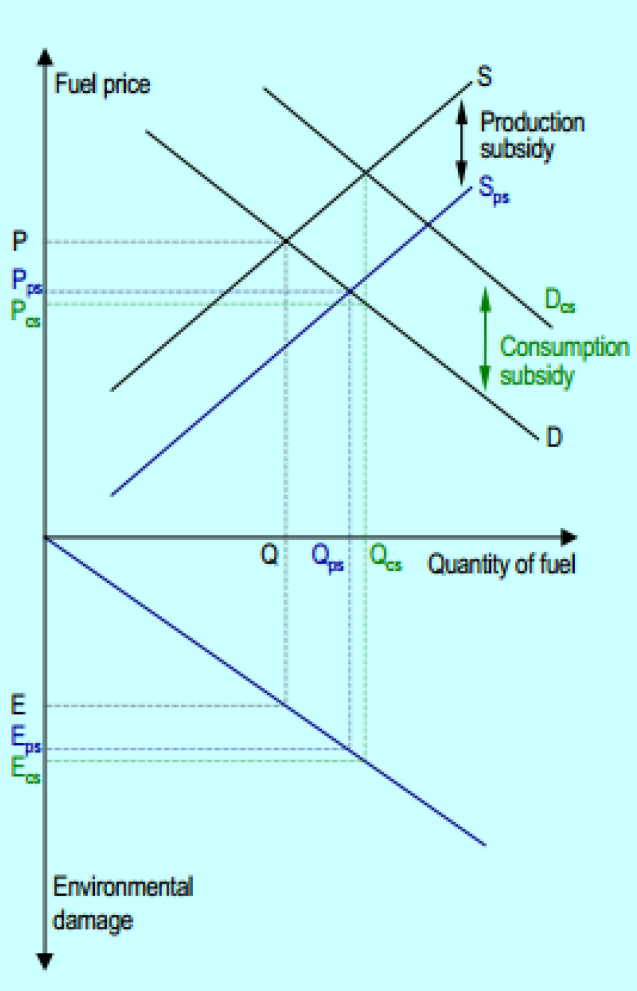
The starting point is at the equilibrium of the supply and demand curve where the Q units of fuel can be purchased at the price P causing an environmental damage E. If a consumption subsidy is introduced, the demand curve will shift from D to D_{cs}, which will, in turn, induce the price to fall to P_{cs} and the quantity to rise to the level Q_{cs}. Due to higher consumption of fuels, thus higher production, the environmental damage caused by this good will implicitly rise (to the level E_{cs}).

If a production subsidy is now introduced, it will generate a downwards shift of the supply curve (to S_{ps}), which will decrease the fuel price to P_{ps} and thus increase the demanded quantity of fuels. Therefore a production subsidy would also lead to a surge in environmental damage. [56]

[55] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 16

[56] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 16

Figure 13: Economic impact of energy subsidies



Source: United Nations Environment Programme (2008) [accessed on 10.08.2014]

This analysis shows that insignificant of the type of energy subsidy the impact on the environment is negative and depends also on a supplementary factor: the elasticity of the supply, demand and environmental damage curves.

To conclude, the less sensitive the supply and demand curves are to price changes, the less is the impact of subsidies on the environment.[57]

[57] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 16

3.2.3. *Forms of subsidies and their influence*

As stated before, subsidies are forms of government intervention with the objective to prevent and curb market failures. For this reason, depending on the specific market situation, governments decide between the numerous available intervention techniques. These and their effects on the respective stakeholders are listed in the table below.

Figure 14: Forms of subsidies

Government intervention	*Example*	*How the subsidy usually works*		
		Lowers cost of production	*Raises price to producer*	*Lowers price to consumer*
Direct financial transfer	Grants to producers	●		
	Grants to consumers			●
	Low-interest or preferential loans	●		
Preferential tax treatment	Rebates or exemptions on royalties, sales taxes, producer levies and tariffs	●		
	Tax credit	●		●
	Accelerated depreciation allowances on energy-supply equipment	●		
Trade restrictions	Quotas, technical restrictions and trade embargoes		●	
Energy-related services provided directly by government at less than full cost	Direct investment in energy infrastructure	●		
	Public research and development	●		
	Liability insurance and facility decommissioning costs	●		
Regulation of the energy sector	Demand guarantees and mandated deployment rates	●	●	
	Price controls		●	●
	Market-access restrictions		●	

Source: United Nations Environment Programme (2008) [accessed on 10.08.2014]

The first mechanism described is the most unrefined and straight forward meaning a direct monetary transfer from the government to the parties. This financial support may be granted to the producers of energy products causing them to have lower costs in the production line or directly to the consumers by lowering the price they have to pay. [58]

[58] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

Also a direct form of subsidizing is to offer energy companies preferential credit financing by e.g. lowering the interest rate, which in turn will also reduce the total costs. [59]

Another possibility of subsidizing energy is through the tax system. This assumes specific tax or royalty exemptions, any type of rebates, and accelerated depreciation of assets, all with the purpose of lowering the production costs. Tax credits depending on the targeted party, can create benefits both for producers and consumers. [60]

Furthermore, there is the possibility to restrict the trade in energy products by setting quotas and other technical restrictions all with the purpose of protecting the domestic production and raising the prices for external energy companies. [61]

The government can play an even more important and direct role lowering the production costs of companies by investing directly in the energy infrastructure, conducting public research and development but also by providing liability insurance and facility decommissioning costs. [62]

Last but not least, the government can decide to regulate the energy sector through different authorities. It can introduce certain price controls, for instance caps for energy prices to ensure that energy companies do not charge the consumers too high prices. Rate of return regulations would set a limit on the allowed return of the respective companies. [63]

In addition, if the government decides to restrict the market access, the competition is limited and monopolies can form which has a negative impact on the consumer prices as they generally charge too higher prices. [64]

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[59] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

[60] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

[61] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

[62] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

[63] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

[64] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

3.2.4. Government interaction

A particularity of energy subsidies is that they are generally kept "off-budget" [65] mainly due to political motives, reasoned by an explicitly published budget they could be targets for elimination in order to release the tax burden of the population.[66]

In an effort to create energy markets that are more efficient and transparent G20 committed at the 2009 Pittsburgh summit to rationalize the energy subsidies. At that meeting, President Obama announced the following:

"We commit to rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption. As we do that, we recognize the importance of providing those in need with essential energy services, including through the use of targeted cash transfers and other appropriate mechanisms. This reform will not apply to our support for clean energy, renewables and technologies that dramatically reduce greenhouse gas emissions." [67]

The basis of this reform were three major objectives:

- To ensure **fiscal savings** by shifting the subsidies granted to consumers (due to the surging oil prices) to combat poverty or other economic issues;
- To align government spending with **environmental goals** and focus on climate change;
- And to **reduce trade distortions** – removing subsidies the competition in the energy sector would increase allowing more efficient production. [68]

Despite of the 2009 excitement of the G20 leaders regarding this proposal, not many changes and improvements could be noticed since then.

In June 2012 a progress update report was published to provide an overview of the undertakings. In this report some major difficulties were identified.

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[65] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

[66] See United Nations Environment Programme (2008) [accessed on 10.08.2014] page 9

[67] See Eilperin (2009) [accessed on 10.08.2014]

[68] See Koplow (2012) [accessed on 10.08.2014] page 2

First of all, countries and their governments change their definitions of energy subsidies but not their policies regarding subsidizing. This is due to vague definitions provided by the G20 such as "inefficient subsidies". [69]

This resulted in many countries refusing to report the amount of expenditure being attributed as subsidies. This led furthermore to no elimination of subsidies until 2012. [70]

Below is an abstract of the entire list of countries depicted in this study showing some of the major players in the fossil fuel industry and how their governments reacted to the G20 decision in 2009. [71]

[69] See Koplow (2012) [accessed on 10.08.2014] page 2

[70] See Koplow (2012) [accessed on 10.08.2014] page 2

[71] Koplow (2012) [accessed on 10.08.2014] see page 10

Table 5: Self reporting status to G20

Implementation Strategy Included in G20 Annex Report *(Text shown is verbatim from Oct. 2011 "Progress Report to G20 Leaders," Annex 1)*	Commentary on G20 Self-Reporting	Reported:				Submission Trend, 2011 vs. 2010
		1. Actionable Subsidies Under G20 Phase Out?	2. Subsidy Items Even if Deemed "Efficient"?	3. Reforms Already in Process?	4. Accelerated or New Reform Plans?	
Russia - No inefficient fossil fuel subsidies. Working to gradually develop market pricing principles in the natural gas market and has proposed the preparation of initiatives to implement transition by 2015 from state regulation of wholesale gas prices to state of regulation of tariffs for gas transportation services.	Focus on reducing energy intensity of economy to world levels; little detail on specific subsidy policies provided in G20 reporting.	No	Yes; focus on market regulation and shift to adjustable price mechanisms.	n/a	Market reforms may be subsequent to G20 commitment	↑1/2 to 2 pages
Saudi Arabia	Earlier reporting noted below-market pricing as not a subsidy so long as higher than production costs.	Did not report	n/a	n/a	n/a	↓1/2 to 0 pages
South Africa	Earlier report stated the country had no inefficient fossil-fuel subsidies.	Did not report	n/a	n/a	n/a	↓1/2 to 0 pages
Spain* - National plan for strategic coal reserves envisages significant reductions in coal production by 2012. Further restructuring to be considered next year.	Only policy listed in 2011 is hard coal support, a reduction from listings in 2010.	No	Yes (1 item)	No	No	↓3 to 1.5 pages
Turkey - Will soon begin work with the state-owned coal mining company to develop a restructuring plan that will rationalize/phase out the subsidies the company has received through capital injections from the state budget	Restatement of 2010 report; progress in achieving objective is not evident.	Yes (1 item)	No	Proposed (1 item)	No	1 page in both reports
United Kingdom	One of only two countries that made no submission in 2010 either.	Did not report	n/a	n/a	n/a	No submittal in either report
United States - Needs to pass legislation to eliminate twelve preferential tax provisions related to the production of coal, oil, and natural gas.	Inefficient subsidies include only tax expenditures. The most detailed submittal of all G20 countries, but still quite spotty in subsidies captured.	Yes (12 items)	Yes (1 item)	Proposed (12 items)	No	↑8 to 11 pages

Source: Koplow (2012) [accessed on 10.08.2014] page 10

The first one in the list is Russia who declared that there are no inefficient subsidies but that they will focus on setting efficient market pricing mechanisms and regulate the gas transmission services. For this reason, no accurate description of existing subsidies or policies has been given.

Saudi Arabia did not report at all in 2011, there is just one remark from G20 that there is below market pricing in Saudi Arabia but it is still higher than the production costs, therefore it is not recognized as subsidy.

Turkey is planning to restructure the state-owned coal mining company and reduce the subsidies that it received from the government. However, as G20 claims, little change, if any has been noticed.

The U.K., same as Japan, has never delivered a report on their energy subsidies, not in 2010 and not in 2011.

The U.S. defined their inefficient subsidies as tax expenditures and plans to eliminate preferential tax provisions for coal, oil and natural gas in 12 states.

The list above has the objective to demonstrate that even if G20 decided to reform the energy subsidies and restructure the expenditure plans, not all countries abide to it. In order for this proposal to reach its goal, stronger incentives to report need to be implemented but also penalties for the ones not respecting the requirements and deadlines.

Even though it is obvious that reforms are to some extent desired in the G20 and slow steps are made into that direction, it is also of importance to mention numerous studies that have been conducted with the purpose to analyze the economic effect of subsidy reforms.

The next table is an extract from the research performed by GSI (Global Subsidies Initiative) who have listed common negative and positive impacts of energy subsidy reforms. As such, they have not identified any negative fiscal effects arising from amendments in subsidies but imply that are many positive fiscal repercussions, i.e. reduced expenditure, reduction in debt and higher income for state companies.

On a macroeconomic level, the impacts are more complex and interdependent. Subsidy reforms could lead to a better trade balance and current account but to achieve that many interconnections occur on a short, medium and long term. In consequence, on a short term period the GDP will experience a shock and inflation will rise, but then a medium term they will stabilize. In terms of supply and demand, on a short term basis the experts from GSI mention that the markets will be subject to higher vulnerability but in the medium or long term steadiness will be achieved as well as a decrease in fossil fuel demand. [72]

[72] See Beaton, Gerasimchuk et al., GSI [accessed on 24.09.2014] page 10

Table 6: Impacts of subsidy reforms

Negative		Positive
Fiscal		
		• Reduced expenditure, more "fiscal space" • Debt reduction • Higher income for state energy companies
Macroeconomic		
• Short-term shock to GDP • Short- or medium-term rise in inflation • Increased vulnerability to volatility	...but → ...but → ...but →	• Fiscal savings • Better trade balance and current account • Higher GDP growth in medium term • Prices fall by the medium term • Decreased demand for fuels
Governance		
• Risk of anti-competitive practices and insufficient competition in new fuel pricing market		• Increased energy security: decreased demand and more incentives for investment • Reduced opportunities for corruption • Reduced incentive for fuel smuggling
Businesses and economic sectors		
• Reduced international competitiveness of fuel-consuming sectors, e.g.: – Agriculture and fisheries – Energy-intensive industries – Transport services		• More stable energy supply, due to: – More level playing field – Improved finances of energy companies – Increased incentive to invest in energy production and infrastructure – Better incentives for energy efficiency
Households and social welfare		
• Overall regressive impact, if most subsidy benefits previously went to poor • Reduction in household incomes • Unemployment associated with affected business sectors • Increase in poverty • Risk of reduced energy access	...OR...	• Overall progressive impact, if most subsidy benefits previously went to rich

Source: Beaton, Gerasimchuk et al., GSI [accessed on 24.09.2014] page 10

Summarized, they identify many impacts that subsidy reforms can have (both negative and positive) and on many sectors, not just on a macroeconomic level. Of utmost importance is their analysis of the energy sector (almost on a standalone basis), indicating that reforms can lead to increased security of supply and stability of this business, mainly due to decreased demand and increase of investment incentives. Also a reduction in corruption opportunity is identified and increased energy efficiency. [73]

Overall, reforms affect the economy negatively on the short term but to improvements in the long term.

[73] See Beaton, Gerasimchuk et al., GSI [accessed on 24.09.2014] page 10

3.3. International Taxation of oil and gas giants

A closer inspection of today's oil companies reveals that most of them need to expand internationally. The reason for that is, that even if the country they are based in, is rich in oil reserves, they are rather quickly depleted, but investing in different countries with even larger oil and gas reserves and with more flexible governmental policies regarding the extraction of reserves, can get significantly more attractive.

Of course oil giants bring with their development and acquisitions worldwide economic advantages for themselves and the specific governments such as creating jobs, generating income that will be taxed and also lead to providing know-how to the guest country and company.

However, the biggest advantage is mostly reflected on the oil companies themselves: before making a final investment decision regarding a certain project they evaluate the political, economic and geo-physical situation of the respective country. Only if they agree with the country specific risks and uncertainties while prognosing rather large revenues from their investments, companies will actually undergo foreign investments. The advantage occurs when, faced with any kind of change that disrupts the planned outline of the specific project, the firm can easily disinvest or shift its production to another favorable location and take its human capital with it.

Parts of the generated revenues are undeniably taxed. The questions that arises are

- ✓ To what extent the revenues are taxed?
- ✓ Who actually benefits from them: the government and implicitly the people of that country (as it should) or the oil companies themselves?

For these reasons a detailed analysis will be performed to discuss the different transnational taxation methods that are in place in order to determine, who are the major beneficiaries and who are the "underdogs".

3.3.1. Transnational Taxation

The taxing task of transnationals can be a delicate process. As international companies undertake foreign direct investments in other countries, a differentiation has to be made between the income from the domestic and the guest country. Given that every country has its own tax regime, tax havens are created in which a lot of international companies want to participate.

For this reason a global tax regime should eliminate these discrepancies, however a worldwide policy accepted and implemented by every nation is problematic. Conventions of OECD and GATT try to reach a type of convergence, but there are still many steps to be fulfilled.

Deferral

As mentioned above, corporate income tax has different structures and characteristics in every country, but still four categories can be identified that are constant worldwide.

Taxing the worldwide income of a company could have no obstructions, but taxing the income resulting from foreign countries can lead to double taxation and therefore to a competitive disadvantage. [74]

For branches in a foreign country, deferral of tax may be allowed, meaning that the income will only be taxed, when remitted to the home company. Until then, it may be reinvested in the same foreign country. This type of income is known as Controlled Foreign Corporations or CFCs and they do not require control by the home company until actually remitted.[75]

Though, deferral does not come without disadvantages as this method actually creates an incentive to "park foreign earnings abroad". [76] Gresik also mentions the following to support his opinion:

[74] See Gresik (2001) [accessed on 15.08.2014] page 803

[75] See Gresik (2001) [accessed on 15.08.2014] page 803

[76] See Gresik (2001) [accessed on 15.08.2014] page 803

"Hines and R. Glenn Hubbard (1990) lend credibility to this concern with their study of income repatriation pattern based on 1984 returns which found that 84 per cent of all U.S. controlled foreign corporations paid no dividends to their U.S. parents. This figure corresponds to 62 per cent of all parent corporations in their sample." [77]

Double Taxation Rules

As soon as the foreign branch pays dividends to their parent company, they are financially termed "repatriated earnings" and have already been taxed in the host country. At this stage a "home liability" is created and the double taxation rules play a significant role from now on. [78]

The two most common measures of double taxation are either to exempt the foreign income from home taxation or to build a tax credit for host taxes. However, for proper implementation, the parent company is obliged to separate the foreign from the domestic income. [79]

Nevertheless, this method creates an incentive for one subsidiary or branch to cover the costs of another subsidiary or its parent, because by doing so, they "transform" domestic income into foreign source income and are then subject to another tax regime. [80]

Expense Apportionment Rules

The expense apportionment rules further explain and classify how the repatriated income from CFCs has to be handled.

[77] See Gresik (2001) [accessed on 15.08.2014] page 803

[78] See Gresik (2001) [accessed on 15.08.2014] page 804

[79] See Gresik (2001) [accessed on 15.08.2014] page 804

[80] See Gresik (2001) [accessed on 15.08.2014] page 804

Therefore, in the case of a home country that exempts foreign income (like Australia, Canada, France, Sweden and Germany) each unit of cost that is borne by the parent company reduces its global tax liability. [81]

In the case of tax credit (Japan, Italy, The Netherlands, U.K and U.S.) it gets "trickier". If the home tax is higher than the host tax, then such a cost shift does not affect the home tax liabilities. If however, the home tax is lower than the host tax, then an excess tax credit is created and the home country can grant the credit only up to the difference between the two tax levels. Even with this excess credit, the marginal home tax rate on foreign income in zero, so that the result is the same as when exempting the tax in the first place. [82]

In order to differentiate between foreign and domestic income, one can try to trace each unit of cost to ensure for which type of activity it occurred, or try to allocate with different financial ratios and formulas the costs to the correct actions.

Trade Policies

Trade policies that are created to provide more flexibility to the transnational companies in structuring their revenues. In this matter, the domestic income from a foreign corporation can either have the form of exports or royalties. As such countries can set up a number of formulas, how to calculate the export duty in accordance with the oil price (which will be further analyzed in the case of Russia) or set up percentage rates (as royalties) for the resources extracted from the ground. [83]

The governments are free to choose between these two possibilities. Royalties may seem more advantageous as the government receives a percentage part per extracted unit of oil, rather than charge the exported units (in case a foreign

[81] See Gresik (2001) [accessed on 15.08.2014] page 804

[82] See Gresik (2001) [accessed on 15.08.2014] page 804

[83] See Gresik (2001) [accessed on 15.08.2014] page 805

company explores a certain oil field and sells the extracted barrels of oil to local companies, the governments would not receive any export duty). [84]

3.3.2. Case Studies

It is challenging to pick out countries that are discussed in more detail, as each one has its particularity and own perception on how corporate income should be measured and taxed.

Nevertheless, a short list can be produced according to the importance on the global economy, the part played in securing the supply and recent changes that occurred in their governments.

The effects of taxation on a stable sector – Case of Russia

Russia has been one of the key players for covering the gas demand of Eastern Europe. In fact, the magnitude of its importance for Europe has just begun to get a clear shape, as the current conflict with Ukraine is still ongoing and endangers the stability of the world markets.

The Russian corporate income tax is 20% that divides itself in 2% for federal budget and 18% for regional budgets (which may be lowered depending on the taxpayers up to 13.5%) and is accompanied by a complex range of royalties for crude oil, natural gas and gas condensate. As an investment incentive, equipment used in the far north may be depreciated twice as fast and does not apply ring-fencing, meaning that losses from one projects can be offset against winnings from another project, regardless if it upstream, downstream or midstream. [85]

Further agreements are treaties to avoid double taxation with Argentina, Chile, Qatar etc.

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[84] See Gresik (2001) [accessed on 15.08.2014] page 805

[85] See EY Oil and Gas Tax Guide 2012 [accessed on 15.08.2014] page 425

Table 6: Russian tax calculation

Actual price per barrel (US$)	Duty per barrel (US$)
Up to $15	0%
Between $15 and $20	35% x (actual price – 15)
Between $20 and $25	$1.75 + 45% x (actual price – 20)
More than $25	$4 + 60%[160] x (actual price – 25)

Source: EY Oil and Gas Tax Guide 2012 [accessed on 15.08.2014] page 425

The table above is quite interesting as it depicts how the duty per barrel of oil is calculated. These rates are determined by the Russian Government and are changed every month. What is remarkable is that these formulas are scrutinizing defined only up to an oil price of $25. Especially in the lower ranges (from $15 to $20, then from $20 to $25) the formulas are different.[86]

It is noteworthy, that even though the duties are fixed every month, the thresholds for the oil prices stay the same.

The case of the United Kingdom

One of Europe's largest areas of hydrocarbon reserves is the North Sea. As it is bordered by many countries, such as the United Kingdom, the Netherlands, Norway, Germany and Denmark the governments of these countries have reached an agreement as to which part of the seabed belongs to which state. The specific region belonging to U.K. is named the U.K. Continental Shelf (UKCS) and the responsibility for it lies with the Department of Energy and Climate Change (DECC). This regulating agency is accountable for awarding oil exporting licenses and establishing the allowed amount and duration of oil production. [87]

[86] See EY Oil and Gas Tax Guide 2012 [accessed on 15.08.2014] page 425

[87] See Department of Energy and Climate Change (2013) [accessed on 15.08.2014]

The first exploration in the UKCS was done in 1964 and since then 33 billion boe were extracted from this region thus becoming a "mature petroleum province" [88]. This term is used to describe the following states:

a) "Falling average size of discovery and development
b) Declining production
c) Failure to replace depletion by new additions to reserves
d) Declining exploration interest" [89].

Some of these characteristics represent the UK Continental Shelf. Since the first discovery, major investments were made so that the infrastructure is now well developed ensuring future field developments and explorations, where pipelines and onshore and offshore processing facilities are already existent and operating.

Even though the known reserves (calculated as the sum of proven, probable and possible reserves) are decreasing, the full amount is still significant however not concentrated in specific areas. For this reason, oil companies have to weigh their possibilities to explore small oil fields or invest abroad. [90]

Subject to U.K. tax are permanent establishments (PE), so at first glance it would seem that non-U.K. residential firms are taxed by their home countries, but another regulation according to which a company, in order to have the right to perform upstream activities, has to have a PE on U.K. territory, so even foreign companies investing in U.K. are subject to U.K. tax. [91]

Currently the rate of the corporate income tax is 30% for ring-fence activities (upstream) and at 26% for non-ring fence. [92] A petroleum revenue tax of 50% for

[88] See Kemp; Stephen (2005), page 131
[89] See Kemp; Stephen (2005), page 131
[90] See EY Oil and Gas Tax Guide 2012, page 521
[91] See EY Oil and Gas Tax Guide 2012, page 521
[92] See EY Oil and Gas Tax Guide 2012, page 521

all oil and gas profits generated from fields that granted development permission already before March 16th 1993. [93]

Some of the further agreements between U.K. and other companies are listed hereby: foreign tax relief with Chile, double tax treaty with Oman, Qatar etc. [94]

The case of Norway – a changing landscape

Norway is and has been generally depicted as a stable state but recent events are drivers to change that viewpoint.

The tax regime of Norway is a rather simple but quite expensive. Therefore companies are taxed according to the area of activity (see table below). For example, oil and gas companies are subject to a 28% ordinary tax and a special tax of 50%, resulting in 78% tax for these companies. All other companies that do not relate to the petroleum industry are charged only 28%. No royalties are charged and also no ring fence is in place.

As a side remark, ring fence is a sector specific term regarding the splitting of the oil and gas activities in upstream, downstream and midstream production and accounting each area as a separate entity. If a ring fence is upheld then the losses incurred from e.g. exploration and production (upstream) cannot be subtracted from the revenues incurring in refining and marketing (downstream). [95]

In Norway the entire entity is being taxed and not just assets or licenses and thanks to the fact that there is no ring fence losses from offshore activities may be offset against revenues from onshore and reciprocal.

[93] See Department of Energy and Climate change (2013) [accessed on 15.08.2014]

[94] See EY Oil and Gas Tax Guide 2012, page 521

[95] See EY Oil and Gas Tax Guide 2012 [accessed on 15.08.2014] page 229

Table 7: Norway Tax Regime

	Oil and gas companies (offshore tax regime)	Other companies (onshore tax regime)
Ordinary tax	28%	28%
Special tax	50%	None
Total tax	78%	28%

Source: EY Oil and Gas Tax Guide 2012 [accessed on 15.08.2014] page 344

As of May 5th 2013 the government has decided to increase the special oil tax from 50% to 51% but only for new investments as an approach to increase the state budget in order to subsidies other Norwegian industries that are facing problems. [96]

Norway is a member state of the EU ETS scheme which means that all companies have to cooperate in lowering the greenhouse gas emissions. For upstream oil firms there is an additional CO_2 tax of NOK 0.49 effective as of January 1st 2012 and a fee of NOK 16.69 per kilogram charged on NOx emissions for 2012. The intention is to lower the emissions according to a specific schedule (such as 4000 tonnes annual reduction 2015, 4000 tonnes reduction by 2017 etc.) [97], agreement which was approved by EFTA Surveillance Authority (ESA) on May 19th 2011. [98]

For investments undertaken in foreign countries, depending on which country is involved, in the case of bilateral agreements, they may be subject to Norwegian tax - for example a double tax treaty with Qatar and Tanzania, a double tax relief with Trinidad and Tobago etc. [99]

The purpose of these case studies is to provide a short insight on how different states, which are pivotal for ensuring stability of supply worldwide, support or model the investment incentives in the oil and gas business.

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[96] See Hovland (2013) [accessed on 16.08.2014]

[97] See EFTA Surveillance Authority, Decision No: 144/11/COL [accessed on 16.08.2014]

[98] See EY Oil and Gas Tax Guide 2012, page 348

[99] See EY Oil and Gas Tax Guide 2012, page 348

Perhaps of more interest is an analysis of the U.S. budget proposal for 2015 as it has not only immediate impact but also focuses on a tax restructure with a special focus on the oil and natural gas sector.

President Obama presented in March 2014 his proposition for the budget for the full year of 2015 and the next ten years which includes many reforms, mainly increases in child support and social benefits at the cost of high income earners.[100] In a nutshell, his focus lies in an increased social state, as noted also in the citation below.

"Today, after 4 years of economic growth, corporate profits and stock prices have rarely been higher, and those at the top have never done better. But average wages have barely budged. Inequality has deepened. Upward mobility remains stalled. Even in the midst of recovery, too many Americans are working more than ever just to get by—let alone get ahead. And too many still are not working at all."[101]

The most significant reforms proposed are regarding the expansion of the earned income tax credit and child tax credit (refundable for working families depending on their income and number of family members) and automatic enlistment of employees into individual retirement accounts, changes that will require over 70 billion dollars investment over the next ten years. In order to cover these incurring costs, Obama aims to charge increased tax rates on high income earners, such as minimum income tax of 30%, increase of estate tax from 40% to 45% and a limitation on the deductable items. [102]

Businesses will also be affected. One intention of the budget is to raise enough revenues so that in the future the corporate tax for manufacturing companies can be lowered from 28% to 25%. However, immediate implications will be enforced starting with 2015 and the oil and natural gas sector is one that will endorse most

[100] See Lundeen, Pomerleau (2014) [accessed on 21.09.2014]

[101] The White House, The Budget Message of the President [accessed on 21.09.2014]

[102] See Lundeen, Pomerleau (2014) [accessed on 21.09.2014]

of the before mentioned governmental tax revenues. The new proposed budget will eliminate some provisions currently in place in the United States, such as recovering of intangible drilling costs, part of depletion provisions for oil and gas wells, deductions for domestic production, the international tax provision and an increase of the amortization period for independent producers to seven years. [103] These changes will generate approximately $ 97 billion in tax revenues, according to calculations of the American Petroleum Institute (API).[104]

Even though the President's intentions are well intended, this budget is highly debated by many parties especially by the American Petroleum Institute who argue that this plan will not create more jobs or more incentives for domestic petroleum and natural gas production, as the President Barack Obama suggests. By eliminating all these provisions, it will no longer be profitable for oil and gas companies to operate, reason for which jobs will be lost and the current advantage will be diminished. [105]

From the above depiction of current interest it can be understood that reforms are not easy to implement or achieve everybody's acceptance. First of all, the initiative must be taken by governments, but history shows that major changes are typically not desired by politicians for fear of not being reelected. The Obama Administration is set to help the middle and low income earners by taking in proportion more from higher paid people or from different business sectors that could sustain themselves. The reason why the decisions being made now in the United States are so compelling is because it seems that theory is put in practice and that an economic stability and equality is the main driver of politics.

Taxes represent a major revenue source for governments but also high cost factors for people. Creating a fully transparent system is not only difficult but maybe also

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[103] See Lundeen, Pomerleau (2014) [accessed on 21.09.2014]

[104] See American Petroleum Institute, FY2015 Budget Calls for Nearly $97 Billion in Targeted Tax Increases on America's Oil & Natural Gas Producers (2014) [accessed on 21.09.2014]

[105] See American Petroleum Institute, FY2015 Budget Calls for Nearly $97 Billion in Targeted Tax Increases on America's Oil & Natural Gas Producers (2014) [accessed on 21.09.2014]

not in accordance with political goals. Every reshape towards economic equilibrium can bring only benefits for the population, but first the intentions must exist to support such changes.

4. Part 4: The Network

This part of the thesis will focus on the main channels of transportation of oil and gas, the importance and their significance in the global economy.
There are seven major channels (as it will be described in this next subchapter and also depicted in the picture below) that connect the world biggest oil producing countries with the rest of the consuming countries.

These channels have a high daily traffic, which is of interest to many parties. This means that not only the neighboring countries get a benefit out of the well-functioning of the transit, but also far located countries and in particular the major withdrawing countries, as an instability or conflict in those chokepoints can be a catalyst for a potential global financial crisis. For this reason, the major economies in the world contribute to ensure that transit in these regions flows uninterrupted.

4.1. The main chokepoints of the oil and gas industry

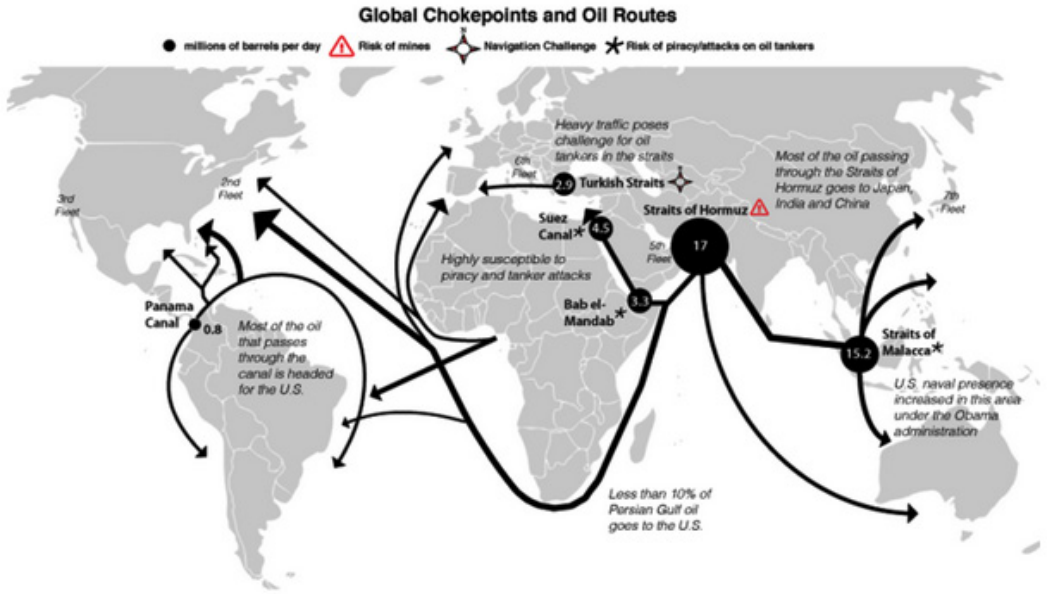
To ensure the security of supply, trade channels have been built, either seaborne or pipelines, while some of them have a greater importance than others, this is reasoned by the high amount of transit done on a daily basis.

In fact, Roger Stern, a professor at the University of Tulsa at the National Energy Policy Institute mentions that more than half of the oil supplied in the world is transported by ships. [106]

The next graph depicts the most significant chokepoints, indicating implicitly what straits are the most prone to political instability and concomitantly energy supply instability.

[106] See Ballout [accessed on 23.07.2014]

Figure 15: Global Chokepoints and Oil Routes



Source: Burgess (2013) [accessed on 23.07.2014]

1. The Strait of Hormuz

The focus immediately falls on the most prominent strait, the Strait of Hormuz, situated at the border between Iran and Oman. Roughly 17 million barrels pass through this narrow strait every day, corresponding to 20% of the world supply. Being of such great importance, it is of general interest that the transit in this region is performed without interruption or impediments. [107]

The largest oil recipients are the Asian markets that demand approximately 75% of the shipped quantities in the Strait of Hormuz, out of which Japan, India, South Korea, and China are the main beneficiaries. [108]

[107] See Burgess (2013) [accessed on 23.07.2014]

[108] See Lubin (2011) [accessed on 23.07.2014]

2. The Strait of Malacca

This Strait, of second utmost importance to the petroleum transportation, connects the Persian Gulf with the Pacific Ocean and is situated between Indonesia, Malaysia and Singapore.

It is the fastest way to supply the before mentioned four big consumers and Indonesia and therefore of high interest to many. The narrowest region is 1.7 miles long and thus represents a traffic intense area, since around 60.000 vessels are passing on a yearly basis. Given the high stakes, it used to be endangered by piracy attacks (not any more - increased security). Investments have been made to ease the transit in this strait by building a pipeline that would connect Burma with China and therefore release the traffic in the strait by 240.000 bbl/d. [109]

3. The Suez Canal

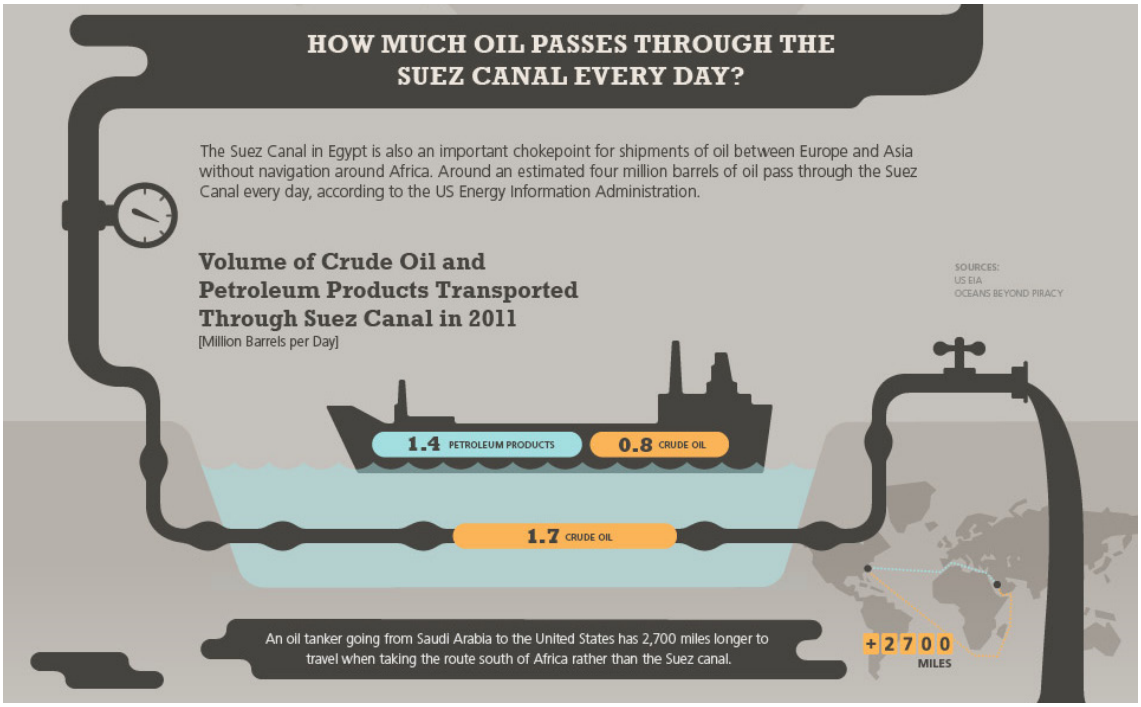
The third largest chokepoint connects the Red Sea and the Gulf of Suez with the Mediterranean Sea and allows for 35.000 ships to transit it per year, whereas about 10% of them are petroleum tankers. Because the Suez Canal is in a specific region just 1 mile large, some types of crude oil carriers cannot pass through it. Nevertheless, investments and restructurings are made to enlarge the Canal and allow for even more transit. [110]

The figure below also depicts what a great significance the Suez Canal represents in oil transportation and pricing: if an oil tanker from Saudi Arabia with destination U.S. would choose or be forced to travel South of Africa, it would have to navigate 2.700 miles (approximately 4.300 km) more than when going directly through this canal to reach its destination which would have tremendous economic disadvantages.

[109] See Lubin (2011) [accessed on 23.07.2014]

[110] See Lubin (2011) [accessed on 23.07.2014]

Figure 16: Oil passing through the Suez Canal



Source: visual.ly, Middle East Crisis Will the Oil Price rocket? [accessed on 22.07.2014]

4. Bab-el Mandab

Further to the Southeast from the Suez Canal is another significant point of transit connecting the Red Sea with the Arabian Sea, and on a bigger scale, the Mediterranean Sea with the Indian Ocean. This chokepoint facilitates transit of 3.3 million bbl/d, out of which around 1.8 million are transported to the North and pass through the Sues Canal as well. [111]

5. The Turkish Straits

Bosporus and Dardanelle connect the Mediterranean Sea with the Marmara Sea and then the Black Sea (from West to East) and are also major chokepoints in the world of oil trade. The transit depends mainly on the oil exports from Russia, Azerbaijan and Kazakhstan, although Russia has redirected lately its exports to the Baltic Straits. Nevertheless, around 2.6 million bbl/d pass from the Black Sea to the Mediterranean Sea ensuring enough traffic through these two problematic Turkish Straits. [112]

[111] See Lubin (2011) [accessed on 23.07.2014]

[112] See Lubin (2011) [accessed on 23.07.2014]

6. The Panama Canal

Despite of being a central connection between the Pacific and Atlantic Ocean and thus saving ships 8.000 miles of detour via Cape Horn, the Panama Canal does not represent a substantial transit point regarding oil trade because it is (at its narrowest region) just 110 feet wide and therefore not facilitating the pass for big oil tankers. Still, around 0.8 million bbl/d are shipped through the canal. Like the Suez Canal, investments have been made to make the Panama Canal larger which should be finished end of 2014. [113]

The table created by the U.S. Energy Information Administration comprises the above enumerated major chokepoints and some other major pipelines, depicting the transit volume in the years 2007 until 2011. Fluctuations between the years can be noticeable but the deviations are not significant.

There is no general trend (such as constantly declining or increasing transported volume through all canals) but it is visible, that the Strait of Hormuz permits by far the highest transit out of all canals and after 2008 the transported quantity decreased after increasing again to almost reach the 2008 volume. [114]

In the Suez Canal and the SUMED pipeline, crude oil products have experienced the same trend as in the Strait of Hormuz (with slight decreases in the years 2009 and 2010 and then a minor growth in the year 2011). [115]

The petroleum products transported through this Strait remained however at a constant level throughout the years. The Turkish and Danish Straits persisted at an almost constant level with slight deviations, however the Bab-el Mandab Strait

[113] See Lubin (2011) [accessed on 23.07.2014]

[114] U.S. Energy Information Administration, WORLD OIL TRANSIT CHOKEPOINTS [accessed on 24.07.2014]

[115] U.S. Energy Information Administration, WORLD OIL TRANSIT CHOKEPOINTS [accessed on 24.07.2014]

showed a noteworthy decrease in transiting oil shippers, from 4.5 in 2008 to 2.7 million bbl/d in 2010. [116]

Table 8: Volume transported through World Chokepoints (in mn bbl/d)

Volume of Crude Oil and Petroleum Products Transported Through World Chokepoints, 2007-2011

Location	2007	2008	2009	2010	2011
Bab el_Mandab	**4.6**	**4.5**	**2.9**	**2.7**	**3.4**
Turkish Straits	**2.7**	**2.7**	**2.8**	**2.9**	**N/A**
Danish Straits	**3.2**	**2.8**	**3.0**	**3.0**	**N/A**
Strait of Hormuz	**16.7**	**17.5**	**15.7**	**15.9**	**17.0**
Panama Canal	**0.7**	**0.7**	**0.8**	**0.7**	**0.8**
Crude Oil	0.1	0.2	0.2	0.1	0.1
Petroleum Products	0.6	0.6	0.6	0.6	0.6
Suez Canal and SUMED Pipeline	**4.7**	**4.6**	**3.0**	**3.1**	**3.8**
Suez Crude Oil	1.3	1.2	0.6	0.7	0.8
Suez Petroleum Products	1.1	1.3	1.3	1.3	1.4
SUMED Crude Oil	2.4	2.1	1.2	1.1	1.7

Source: U.S. Energy Information Administration, WORLD OIL TRANSIT CHOKEPOINTS [accessed on 24.07.2014]

[116] U.S. Energy Information Administration, WORLD OIL TRANSIT CHOKEPOINTS [accessed on 24.07.2014]

4.2. The significance of Spot Markets

Since 1970 three major spot markets (that are still in the lead and operate today) emerged: Rotterdam as a gate for Europe, Singapore for Asia and New York for the U.S. The reason why they were developed so early on is to enable higher security on the energy markets and also to allow oil companies to hedge their risks against oil price volatility [117], according to a study performed by Energy Charter, a global organization concluding of 54 member states (including the European Commission) with the aim of creating a common legal basis to ensure the security of energy supply and reducing the risks associated with energy trade. [118]

The main indexes that are traded on the above mentioned spot markets are Brent for Europe, Dubai for Asia and WTI (West Texas Intermediate) for the United States. Spot markets (or over-the-counter (OTC) markets) are conducted mainly between two parties over a computer network and do not automatically have trading floors. Furthermore, two pivotal financial markets emerged that allow purchasing futures and options, thus making the market much more flexible but also volatile.
These two markets are the NYMEX (New York Mercantile Exchange) and IPE (International Petroleum Exchange) that, according to Energy Charter, are the key triggers for the oil price setting. [119]

Izabella Kamiska makes an important comment in the Financial Times Alphaville about the functioning and importance of spot markets for energy prices:
"The reason the spot market is important, of course, is because it's where the ultimate price of today's oil (or any other commodity or asset) is determined. It's also where financial speculation must eventually meet physical reality. You may be able to sell your oil for $100 in the future, but if you have a burning desire to

[117] See Energy Charter, Oil Pricing [accessed on 11.08.2014] page 65

[118] See Energy Charter Homepage [accessed on 11.08.2014]

[119] See Energy Charter, Oil Pricing [accessed on 11.08.2014] page 65

get rid of your cargo today, and the spot market is trading at $80, that's the price you will get." [120]

Platts also explains why this statement is true in its report on "The Structure of Global Oil Markets" published in 2012. They sustain that most of the produced oil is sold under long-term contracts (typically one year contracts that are most of the times renewed). Spot markets play an important role for placing on the market the quantities that are left "un-contracted". Thus on a spot market the prices are set through supply-demand functions – with enough supply left, the final oil prices shrink, during a shortage in supply, they rise. [121] For this reason, spot markets have undoubtedly a crucial influence on oil prices and not only, basically on the entire economy.

Furthermore, it is also of high importance to understand how those before mentioned indexes and others are compounded, in order to thoroughly comprehend what a change in their levels can cause and to have a critical opinion on their development. For this, the report from Energy Charter should be taken as support.

According to Energy Charter, the North Sea Brent index incorporates all of the necessary requirements for this type of benchmark: it ensures the security of supply, it entails numerous types of oil sellers, refineries and consumers are highly satisfied. Brent is the main European benchmark, even though the Brent field in the North Sea is not the largest, but it allowed for a liquid market to evolve. [122]

On the other hand, the WTI (established already in 1983 as a reference for crude oil futures contracts) lacks not only in closeness to international markets but also in shortage of physical production - still a major success, trading high quantities

[120] See Kaminska (2013) [accessed on 11.08.2014]

[121] See Platts (2012) [accessed on 11.08.2014]

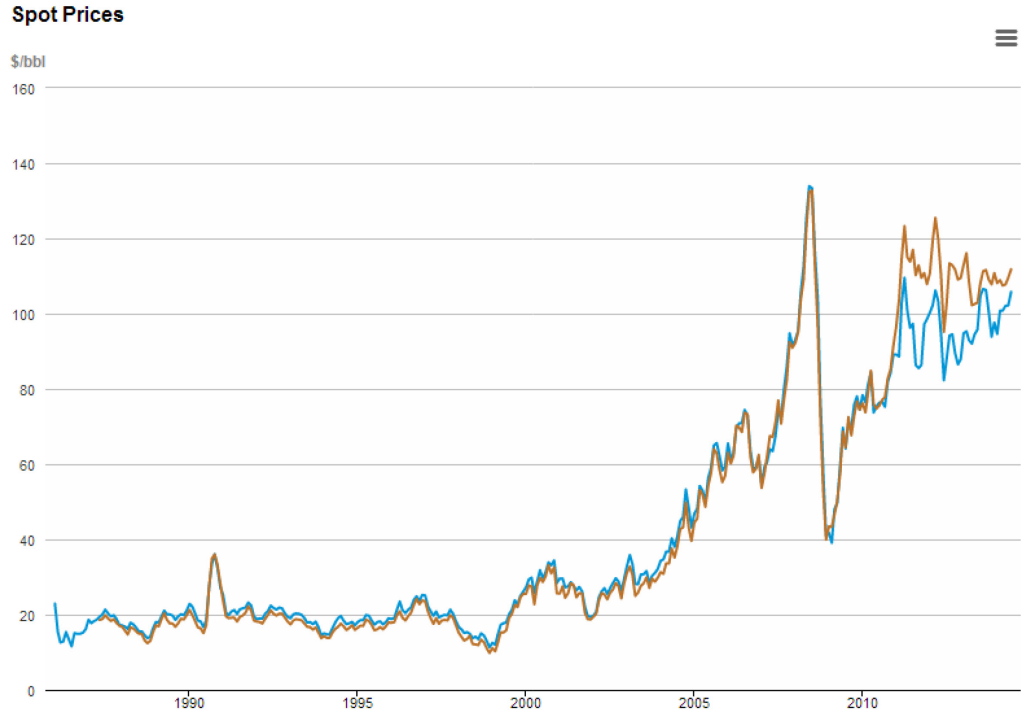
[122] See Energy Charter, Oil Pricing [accessed on 11.08.2014] page 70

of oil on NYMEX and thus gaining great acknowledgment in the energy world. [123]

These two benchmarks and their developments since January 1986 are depicted in the figure below, highlighting an almost exact surge between Brent and WTI until the end of the year 2010.
Afterwards Brent started to close on higher levels than WTI. The economic explanation for these events can also be elaborated as supply-demand progressions.

In Cushing, Oklahoma, where the WTI is delivered, the inventories were full for a longer period of time, pushing the oil price to an all time low whereas the conflict in Libya and therefore the shortage of production from that region boosted the oil price in Europe. [124]

Figure 17: Development of Brent and WTI over time



Source: U.S. Energy Information Administration, PETROLEUM & OTHER LIQUIDS [accessed on 11.08.2014]

[123] See Energy Charter, Oil Pricing (see page 70) [accessed on 11.08.2014]

[124] See Shenk (2013) [accessed on 11.08.2014]

4.3. Conflicts in the oil and gas supply chain

In the introduction to this chapter it was shortly stated that the harmonized functioning of the neighboring countries to these main canals is of pivotal importance for enabling stable and undisrupted economic development. This chapter aims to give a short overview, what the economic implications of a disturbance or stoppage in one or more of these Straits would be on a global scale, as well as introduce some mitigation measures that are available.

William Komiss and LaVar Huntzinger have conducted an intense study that was published in March 2011 entitled "The Economic Implications of Disruptions to Maritime Oil Chokepoints" that simulates the effect of transit disruptions in these channels on 30 countries (they did not obtain the required data for more). [125]

Their main verdict, after simulating different scenarios, is: should there be an interruption in the oil supply in the Strait of Hormuz and as a consequence the countries that hold large reserves and storages refuse to contribute and deliver to the needing countries, there could be major recessions, even in industrialized countries. [126]

The motives behind intentionally interrupting the oil supply are rather straightforward. The Middle East has long fought with political instability and intervening forces from all over the world. For that, getting an advantage like disrupting the oil transit may get appealing.

Komiss and Huntzinger confirm that the most common methods of terror are explosive mines (because they are cheap and easy to use) and piracy, although security measures in these Straits have improved in recent years, receding the number of attacks considerably. [127]

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[125] See Komiss; Huntzinger (2011) [accessed on 11.08.2014] see page 2

[126] See Komiss; Huntzinger (2011) [accessed on 11.08.2014] see page 2

[127] See Komiss; Huntzinger (2011) [accessed on 11.08.2014] see page 10ff

Probably the most significant and striking part of their study, is the chapter on risk mitigation of oil supply disruption. The first and easiest solution is using the network of pipelines that are already available and used only to a certain amount and the ones that are now in the building phase. [128]

A possibility of taking other maritime routs could also be recognized as a solution (with the disadvantage that other routes as the current ones will be much longer so that the transportation period will steeply rise) due to the incapacity of existing pipeline networks to transport the entire needed supply which is also supported by the following figure. [129]

Figure 18: Unused pipeline capacity for mitigating a disruption (mn bbl/d)

	Strait of Hormuz	Strait of Malacca	Suez Canal	Bab el-Mandeb Strait	Turkish Straits	Panama Canal
Pipelines	5	0	0.8	2.5	2.4	0.8
Percent	29	0	18	76	100	100

a. Information on pipelines reproduced from EIA [4].

Source: Komiss; Huntzinger (2011) [accessed on 11.08.2014]

This proves that only the Turkish Straits and Panama Canal can still transport the current transit quantity in case an emergent situation interrupted the normal flow. If the transit in the Strait of Malacca would be compromised, there would not be any pipelines in place that could permit a flow of oil to the importing countries.

Furthermore, building reserves and filling up the storages might also be a mitigation measure to alleviate the immediate crisis and boost in energy prices. Due to unavailable data, it is not possible to state exactly how much reserves each country is building up as a security measure, but it is certainly a means to protect oneself against abrupt reactions on the market in case supply shortages appeared. [130]

[128] See Komiss; Huntzinger (2011) [accessed on 11.08.2014] see page 18

[129] See Lubin (2011) [accessed on 11.08.2014]

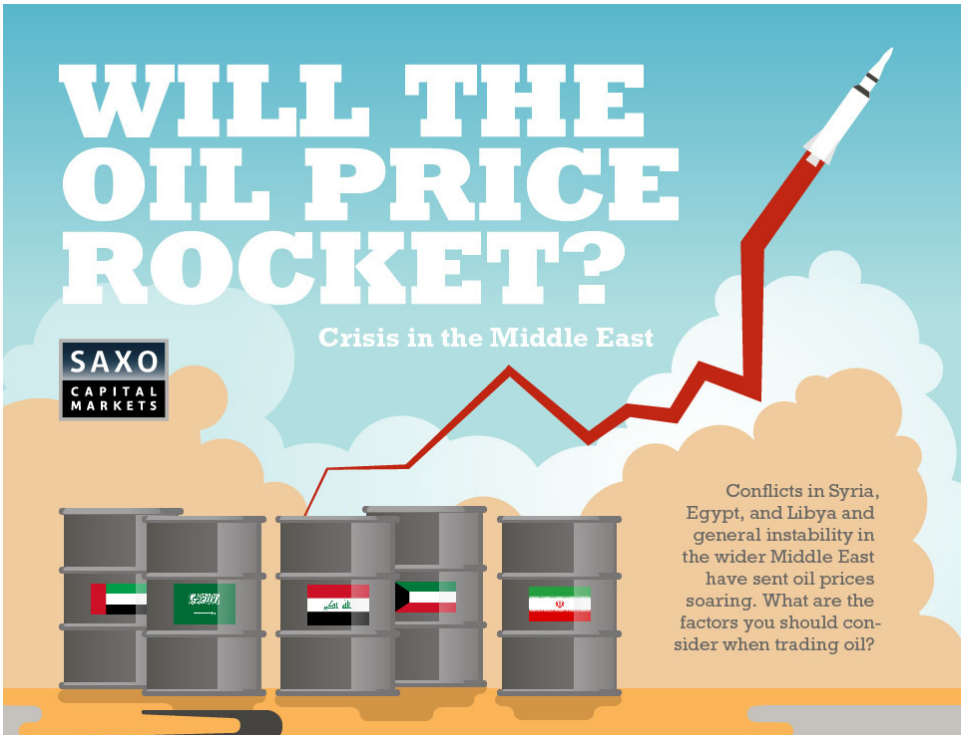
[130] See Komiss; Huntzinger (2011) [accessed on 11.08.2014] see page 21

Central circumstances with significant political impacts are two agreements described in the following lines. One of them is an agreement between New Zealand and Japan which establishes that in the case of an abrupt oil trade disruption New Zealand would pay Japan the spot market price and negotiated fees for the quantities of oil held by Japan for them. [131]

In 1975 the Second Sinai contract was signed by the U.S. and Israel, which states that in the case of an emergent situation, the U.S. has the obligation to offer Israel oil for sale for at least 5 years. [132]

Therefore, the political stability in these regions needs to be constantly monitored, because some disruptions in these channels can lead to repercussions all around the world. For this reason also visual.ly has dedicated various efforts to the question of: "Will the oil price rocket?"

Figure 19: Will the Oil Price rocket?



Source: visual.ly, Middle East Crisis Will the Oil Price rocket? [accessed on 22.07.2014]

[131] See Komiss; Huntzinger (2011) [accessed on 11.08.2014] see page 22

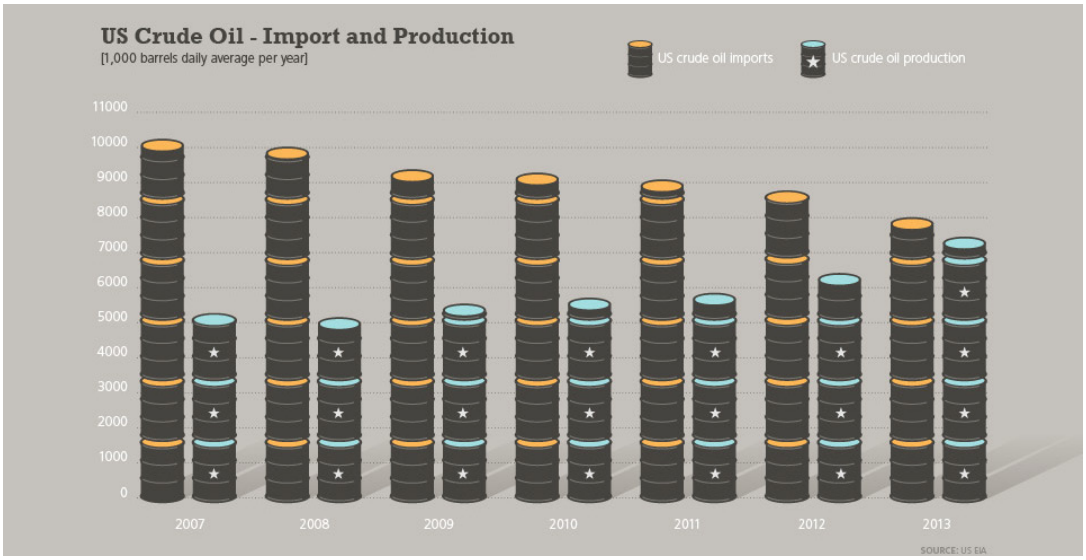
[132] See Komiss; Huntzinger (2011) [accessed on 11.08.2014] see page 22-23

5. Part 5: The rising force called the United States

5.1. The U.S. energy production development

It is essential to include the performance of the U.S. oil and gas market. As depicted in the files of visual.ly, there is a clear trend of decreasing oil imports and increasing oil production. In fact, the U.S. has increased its oil and natural gas production that much, that it beats Russia as oil and gas producer (as already stated in chapter I in the Introduction). [133]

Figure 20: U.S. Crude Oil – Import and Production



Source: visual.ly, Middle East Crisis Will the Oil Price rocket? [accessed on 22.07.2014]

The U.S. Energy Information Administration attributes this decrease in oil and gas imports to the following factors: firstly because of increased domestic production, high energy prices and increased energy efficiency resulting in lower demand for fuels. [134]

The surge in domestic energy production was mainly due to increased onshore oil production (primarily from tight oil formations) and from the combination of

[133] See Gold; Gilbert (2013) [accessed on 28.07.2014]

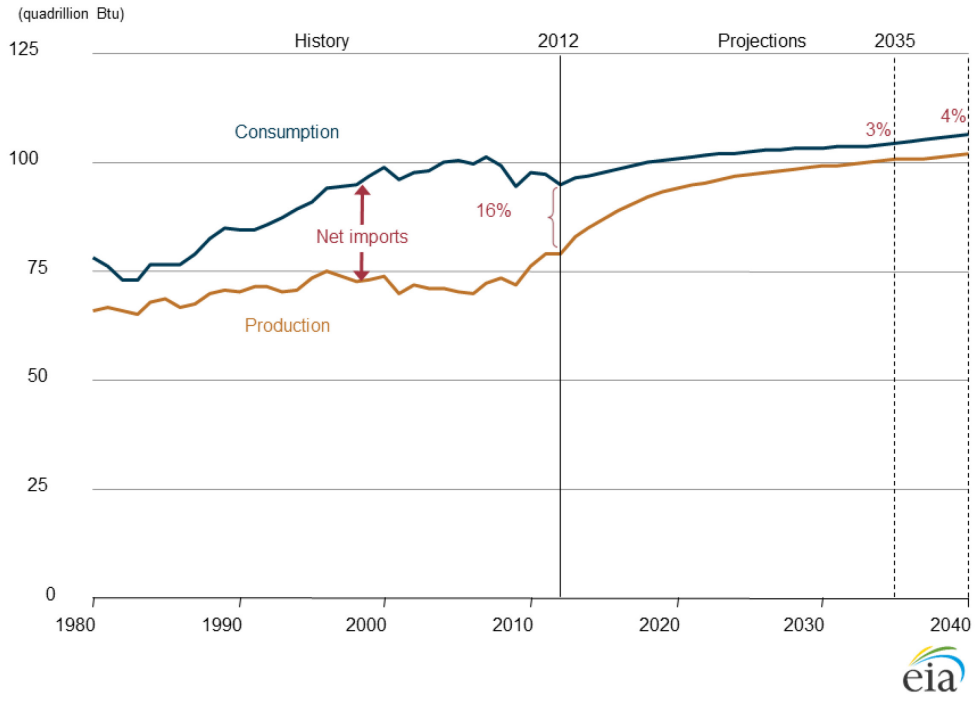
[134] See U.S. Energy Information Administration, AEO2014 EARLY RELEASE OVERVIEW (2013) [accessed on 28.07.2014]

hydraulic fracturing and horizontal drilling permitting shale gas to be extracted. [135]

Furthermore, the U.S. Energy Information Administration projected the development of domestic production and consumption, depicting a clear rising trend in the production even until the year 2040.

According to the U.S. Energy Information Agency, the net imports equaled in 2005 30% of the consumption, until 2012 at around 16% and will be only 4% in the year 2040. From the graph it can be noted that the year 2035 marks a peak in domestic production, with the minimum amount of 3% net imports of energy in the U.S., which are afterwards increasing until 2040 to 4%, indicating that the domestic production will decrease. [136]

Figure 21: Total energy production and consumption 1980 -2040



Source: U.S. Energy Information Administration, AEO2014 EARLY RELEASE OVERVIEW (2013) [accessed on 28.07.2014]

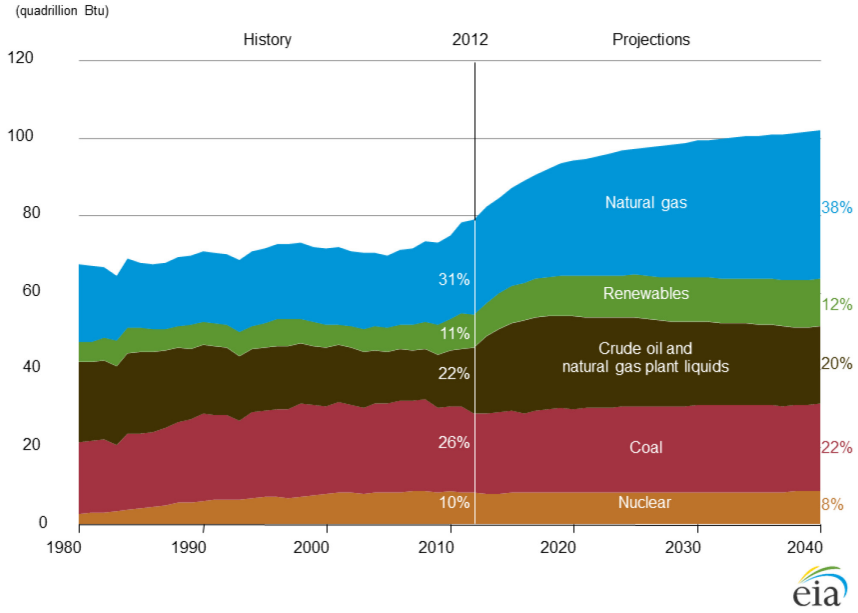
[135] See U.S. Energy Information Administration, AEO2014 EARLY RELEASE OVERVIEW (2013) [accessed on 29.07.2014]

[136] See U.S. Energy Information Administration, AEO2014 EARLY RELEASE OVERVIEW (2013) [accessed on 28.07.2014]

Concomitant, the U.S Energy Information Administration also made a prognosis of the U.S. energy mix and portfolio until 2040. As expected, there are downward sloping trends to be noticed regarding nuclear energy, coal and crude oil production, a slight increase of 1% over the period of 28 years in renewables and a significant increase of 7% in natural gas.

This graph is also in accordance to Conoco Phillip's CEO comment, that unconventional reserves will play a major role in energy production. Randy Udall, one of the biggest promoters of sustainable energy, having business responsibilities as president of the Community Office for Resource Efficiency (CORE) [137] and one of the founders of the Association for the Study of Peak Oil & Gas – USA (ASPO)[138] among others, also sustains this opinion, pointing out that exploration of conventional resources has gone back in the recent years and the unconventional ones have been delivering the needed energy. [139]

Figure 22: U.S. energy production by fuel 1980 -2040



Source: U.S. Energy Information Administration, AEO2014 EARLY RELEASE OVERVIEW (2013) [accessed on 28.07.2014]

[137] See Global Public Media, Randy Udall [accessed on 29.07.2014]

[138] See ASPO USA, Peak Oil Review (2009) [accessed on 29.07.2014]

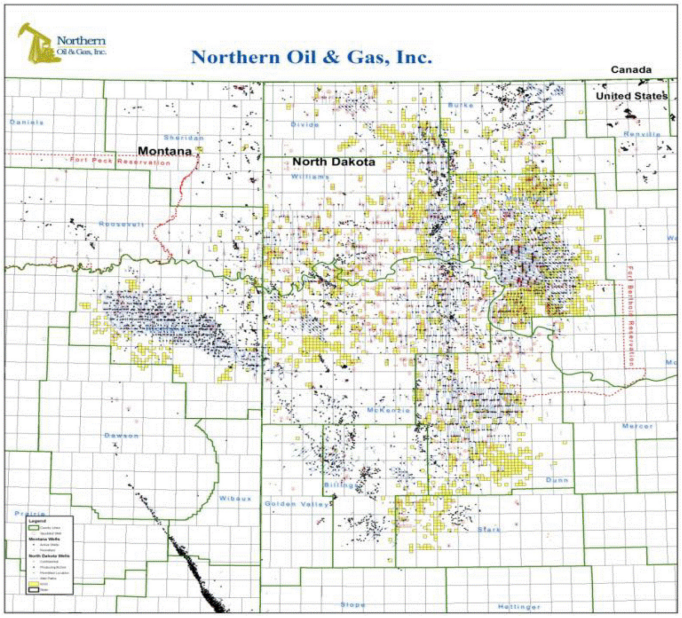
[139] See ASPO USA, U.S. LNG exports (2014) [accessed on 29.07.2014]

5.2. The risks of unconventional resources

Randy Udall also arguments in his keynote speech at the CRES meeting on March 21st 2013 that tight oil well and shale gas wells suffer from a "disease", as he calls it, of accelerated depletion. He acknowledged three risks in the U.S. oil and gas business that need to be analyzed intensely. [140]

First he focuses on the oil prices: "if they would decrease, then it would be no longer profitable to explore and extract oil" (accordingly). Secondly, he mentions the Bakken Field, situated in North Dakota, on which the wells are densely built. His question was: what happens when there is not enough place left to build additional wells? To make his point, he also showed a map of the Bakken Field, like the one below.

Figure 23: North Dakota oil wells



Source: Northern Oil and Gas, Inc. [accessed on 28.07.2014]

Furthermore, he mentions Richard Nehring, the designer of the database for Significant Oil and Gas Fields of the U.S.[141], who compared the U.S. shale oil production to Sisyphus. What he meant by that, is that since 1970, since the U.S.

[140] See Colorado Renewable Energy Society (2013) [accessed on 29.07.2014]

[141] See Nehring Associates (2013) [accessed on 01.08.2014]

had reached peak oil, they were able to fight depletion, managing to produce significant quantities.

However, in his opinion, the U.S. is now in a linear phase, thus it can only go downhill from now, like with Sisyphus except there is no going up anymore. [142]

What Randy Udall tries to emphasize and raise awareness on, is that if the U.S. builds such dense wells in the main field areas, they cannot maintain the same production line as it is in the present.

By his calculations, the Texan oil field produces with 800 wells the same quantity of oil as Kuwait produces with 35 wells.[143] Therefore, he makes a hint that after a certain amount of time, the U.S. will no longer be such a key player in the energy supply world.

[142] See Colorado Renewable Energy Society (2013) [accessed on 01.08.2014]

[143] See Colorado Renewable Energy Society (2013) [accessed on 01.08.2014]

5.3. The impact of the U.S. natural gas market on other markets

The U.S. has increased its natural gas production that much to a point where they have turned from being importers to exporters. This chapter will focus on the U.S. export restrictions and the impact that this surge in production has had on other major economies.

Before a detailed analysis can be performed about the U.S.' impact on other main economies, an overview of the prices for natural gas in some major countries can provide a clearer and quicker view on the circumstances. This next figure comprises the average development of natural gas prices in the United States, the United Kingdom, Germany, France and Japan. The focus is immediately set on the two extremes, the U.S. with the lowest natural gas prices (below 5 cents/kWh) and Japan with the highest prices for natural gas (of around 20 cents/kWh). [144]

The drop in the U.S. natural gas price was described throughout this thesis and is no revelation, however the rapid increase in the natural gas price charged in Japan represents a point of interest. Japan is currently the largest LNG importer, mainly due to the incapability to produce it domestically. [145]

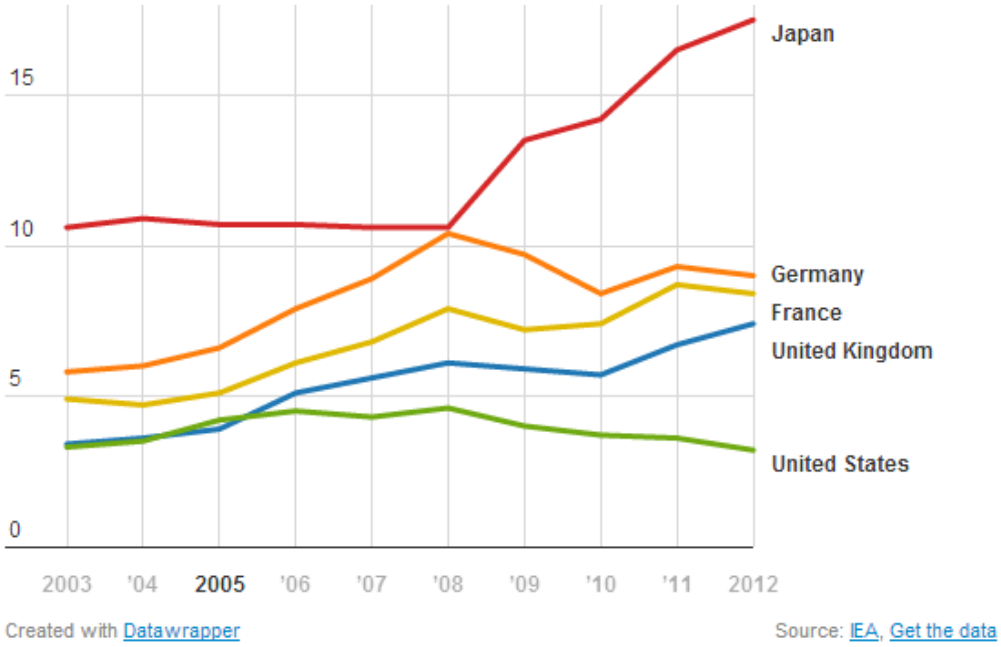
Secondly, the demand and shift to natural gas has followed after the Fukushima misfortune and the immediate crash of the nuclear energy production. In-between are the European countries lead by Germany with the highest natural gas prices out of the three of them (which has also followed a withdrawal from nuclear energy production). [146]

[144] See Wilson [accessed on 15.08.2014]

[145] See Wilson [accessed on 15.08.2014]

[146] See Wilson [accessed on 15.08.2014]

Figure 24: Average Natural Gas Prices



Source: Wilson [accessed on 15.08.2014]

Since 1938 the Natural Gas Act is in force in the U.S. and establishes each transaction from abroad or to foreign countries have to be approved by the Department of Energy (the DOE). The import/ export authorizations for natural gas can be short-term (or blanket authorizations awarded for two years) and long-term (awarded for a period longer than ten years). [147]

A further restriction (which is not official but observed in practice) is that FTA countries have more chances to be granted access to U.S. LNG than non-FTA countries. Beginning with 2013, 26 LNG projects were given the approval to export to FTA countries. Meanwhile just 4 projects were permitted to export to non-FTA countries, according to an article of Mondaq dated July 23, 2014. [148]

With the U.S. becoming such a major gas producer, many economists believe that the DOE should relieve the export restrictions and reach more trade partners. [149]

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[147] See Energy.gov, Natural Gas Regulation [accessed on 15.08.2014]

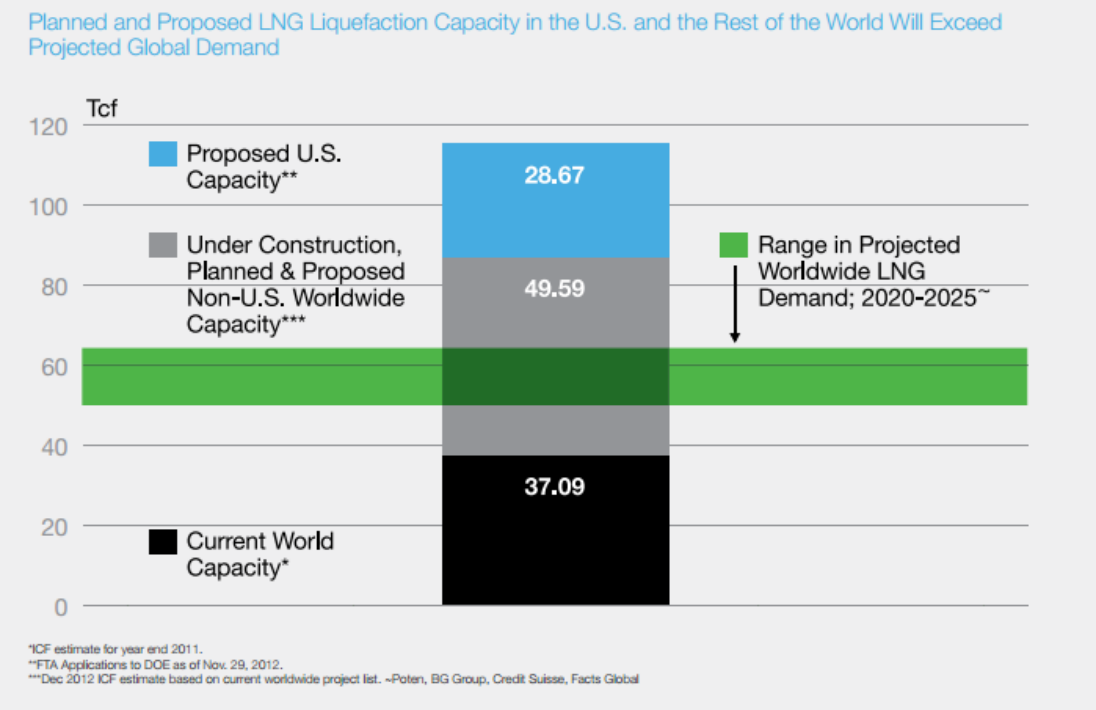
[148] See Atilkan (2014) [accessed on 15.08.2014]

[149] See Atilkan (2014) [accessed on 15.08.2014]

The American Petroleum Institute performed a global analysis on the outlook of LNG production. The green mark in the next figure represents the projected demand for LNG in the entire world (for the years 2020-2025) which is not yet covered by the existing LNG facilities.

However, when adding the capacity currently under construction and planned originating in other countries besides the U.S., that green mark is already over passed. Appending also the proposed U.S. capacity a total of LNG is reached, that surpasses the demand by almost 100%. [150]

Figure 25: LNG Production – Actual vs. Planned



Source: American Petroleum Institute (API) (2014) [accessed on 15.08.2014]

Therefore, the question of banning LNG exports is solved by simple supply-demand mechanisms. The existing facilities and the ones under construction more than cover the global demand so the prices will be set competitively. [151]

Daniel Yergin made an interesting comment on this situation:

"There are two points to be made now. First, the scale of American LNG exports

[150] See American Petroleum Institute (API) (2014) [accessed on 15.08.2014] page 4

[151] See American Petroleum Institute (API) (2014) [accessed on 15.08.2014] page 4

would be naturally limited by the competition from other existing suppliers around the world, as well as by new supplies coming from recent large gas discoveries offshore of East Africa and Israel. Second is a larger context. The U.S. is successfully pushing Japan to reduce its oil imports from Iran, one of its largest traditional suppliers. At the same time, Japan…is buying expensive LNG from both spot markets and traditional suppliers in the Middle East and Asia to replace nuclear power for generating electricity. How can America, having asked Japan to reduce Iranian oil imports, turn around and prohibit the export of surplus natural gas to this key ally?"[152]

With recent developments between Russia and Ukraine, the dependency of Europe on Russian gas has become of even greater economic interest and an ease of U.S. export limitations could possibly decrease that dependency.
In contrast, James Hamilton points out in his article from March 9th 2014 that even if the export bans currently in place in the U.S. were abolished, it would still take years until LNG terminals were built and until gas could be delivered to the end-customers. Furthermore, the dependency of Europe on Russia would undoubtedly be mitigated if more exports from the U.S. were approved, but a full release from Russia is rather far-fetched. [153]

In conclusion, the U.S. is definitely an economic force that seems to be growing steadily in the next decade, one that could definitely shape the energy landscape further, if regulative policies do not inhibit that.

[152] See American Petroleum Institute (API) (2014) [accessed on 15.08.2014] page 4

[153] See Hamilton (2014) [accessed on 15.08.2014]

6. Part 6: Close-up on the European Union

6.1. The Regulatory Agenda

In this chapter, the long-term investment approach set by the European Union is the main focus point. For this reason, the European Union will be seen as a whole, as one actor who is reaching out to accomplish its goal. It is of high significance what type of regime the regulatory offices impose, because that can shape the entire energy mix into something completely different than the present picture.

When new policies are set, different outcomes, investment requirements, scenarios need to be simulated. The International Energy Agency published in the "World Energy Investment Outlook" identified risks related to energy project investments. These should also be taken in consideration when setting new policies for member states, due to carrying decision making characteristics for investments in certain areas.

The first category of the identified risks is of political nature. According to IEA, these types of risks can vary depending on the respective country but also by ownership.
Currently, state-owned companies (firms who are more than 50% state-owned) hold more than half of the power generation assets in the world. In conjunction with their respective governments, they hold 70% of the entire oil and gas reserves. The pipeline and transmission networks are also dominated by state-owned companies.[154]

Some of the listed risks are topics that were discussed in this thesis already, such as conflicts and disputes between the populations of certain countries, tax regimes, environmental standards etc.

[154] See IEA, World Energy Investment Outlook (2013) page 32 [accessed on 17.08.2014]

Given that these types of risks cannot be controlled and altered by companies, profound knowledge of the political and legal basis of host countries is needed. Moreover, the stability and transparency of the particular governments are crucial aspects.

Table 9: Risks related to energy investment projects

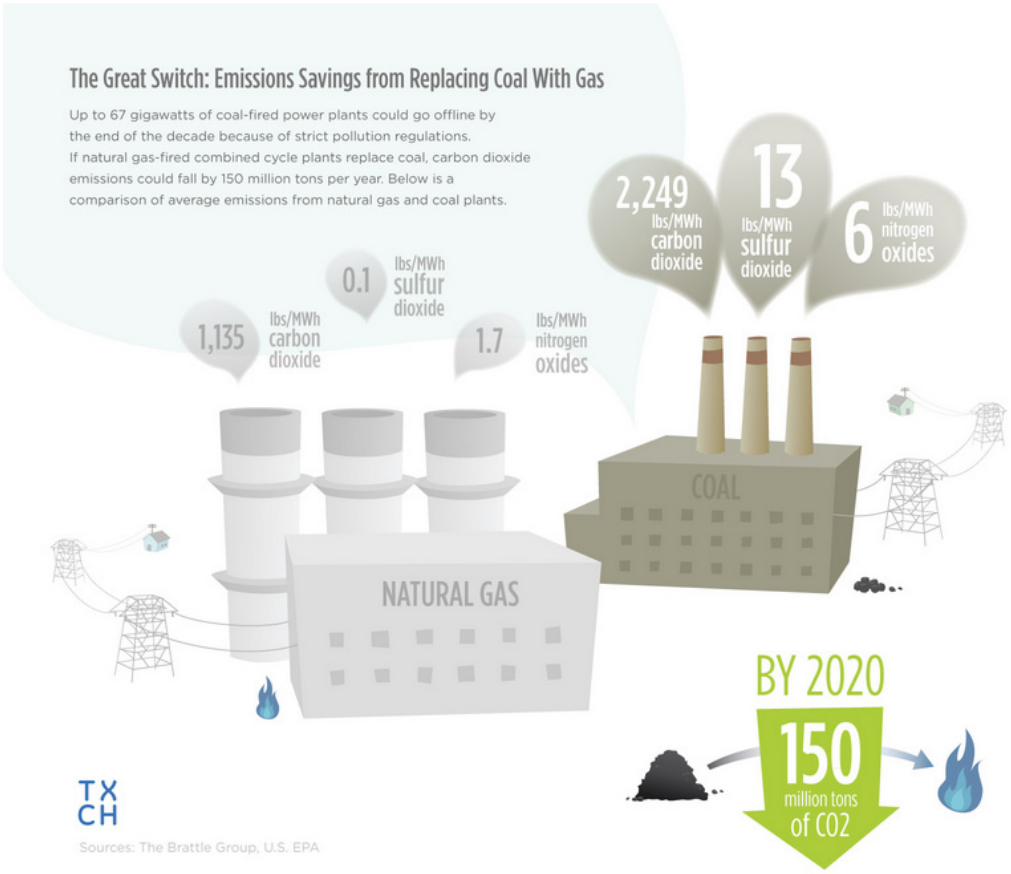
Category	Description
Political	*Risks related to:*
– Country	▪ Quality and resilience of political institutions and the legal system. ▪ Conflict or civil unrest affecting the safety and security of assets or personnel. ▪ Possibility of expropriation or nationalisation. ▪ Cross-border issues, especially where ultimate marketing of the output involves transit through a third country.
– Policy and regulatory	▪ Credibility and durability of energy policy frameworks or support schemes. ▪ Misalignment with eventual climate or environmental policies, e.g. carbon pricing or new emissions standards. ▪ Consistency and stability of the legal or tax basis for investment. ▪ Complexity of the business environment (e.g. for permitting, licensing, local content) and transparency of business dealings. ▪ Restrictions on currency convertibility or transfer of funds.
Economic	*Risks related to:*
– Market	▪ End-user prices held below costs of production (subsidies). ▪ Shifts in absolute or relative prices that undermine revenues. ▪ Declines in demand for the fuel or technology in question. ▪ Competition from alternative providers or technologies.
– Macro-economic	▪ Unstable or inflationary economic environment. ▪ Abrupt fluctuations in exchange rates, especially where costs/ repayments and revenues are in different currencies.
– Financial	▪ Rise in interest rates, where debt is based on floating rates or needs to be re-financed.
Project-specific	*Risks related to:*
– Construction and costs	▪ Project completion delays, low build quality, cost inflation or overruns.
– Partners	▪ Reliability and performance of consortia members or suppliers. ▪ Ability of off-takers to meet their obligation to pay for the produced energy. ▪ Mismatch of incentives and time horizons, e.g. between tenants and property owners for a building efficiency investment.
– Human resources	▪ Availability of necessary expertise and qualified labour.
– Environmental and social	▪ Possible climate impacts, e.g. water scarcity. ▪ Local pollution or other environmental degradation. ▪ Public opposition and relations with local communities.
– Operation	▪ Geological risk, e.g. smaller or more challenging resources than anticipated (for upstream projects). ▪ Uncertain future decommissioning or abandonment costs.
– Technological	▪ Lower-than-expected performance (e.g. in terms of efficiency, reliability) of chosen technologies.
– Measurement (for efficiency projects)	▪ Identification and quantification of the savings attributable to the efficiency investment.

Source: IEA, World Energy Investment Outlook (2013) page 32 [accessed on 25.07.2014]

The European Directive Nr. 27 of 2012 [155] unifies the efforts to create a sustainable energy future. The goal of 20-20-20 : A reduction of 20% of the CO_2 emissions, an increase to a 20% renewable share of the energy portfolio mix and a 20% increase in energy efficiency have to be achieved until 2020. As seen in the figure below a part of these goals are currently achieved with a change of resources – yet both are over peak (depletable). Currently new goals are discussed for 2030 with a focus on new technologies and an increased part of the energy efficiency regarding buildings, traffic and industrial production.

Momentarily the markets are stable as long as natural gas is steadily distributed to the network. The increase of gas in the energy portfolio is however quite costly in combination with the volatile addition of the renewables (wind, solar) and preceding contracts, that estimated price developments differently.

Figure 26:Natural Gas and Coal- Emissions perspective



Source: visual.ly, Emissions savings from switching coal with gas [accessed on 22.07.2014]

[155] See Official Journal of the European Union L 315 [accessed on 22.08.2014]

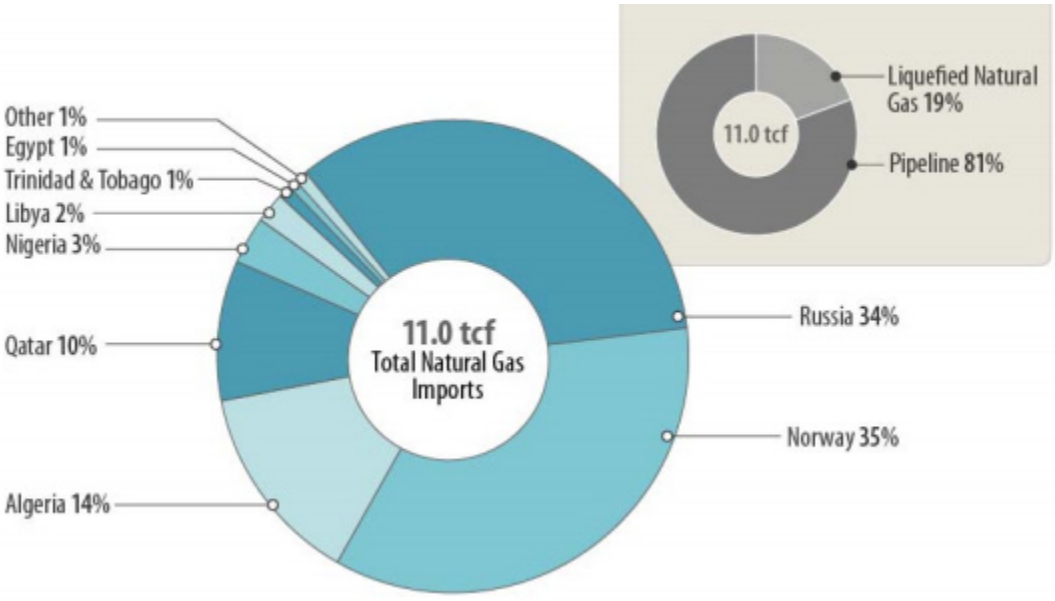
6.2. *Major suppliers of the European Union*

In order to fully understand how stable the security of supply is in Europe the parties/countries that contribute to it should be depicted.

The next figure, comprised by the Congressional Research Service, shows that Russia and Norway supply almost to the same percentage the European Union with gas, covering together almost 70% of the demand. Algeria plays the third significant role, supplying 14% of the required energy and Qatar 10%. The rest of the imports come from Nigeria, Libya, Trinidad & Tobago and Egypt. [156]

The LNG imports coming from the U.S. are incorporated in the 1% "Other" signalizing that currently there are no significant quantities of LNG being transported from U.S. to Europe. Out of the total natural gas imports of around 311 bcm (the equivalent of 11 tcf), 81% were transported through the pipeline system and 19% are LNG. [157]

Figure 27: 2012 EU Natural Gas Imports



Source: Ratner, Belkin, Nichol, Woehrel (2013) page 6 [accessed on 15.08.2014]

[156] See Ratner, Belkin, Nichol, Woehrel (2013) page 6 [accessed on 15.08.2014]

[157] See Ratner, Belkin, Nichol, Woehrel (2013) page 6 [accessed on 15.08.2014]

Not all EU countries have the same import needs and specifically, not all depend on Russian gas. For example, Spain has a high natural gas consumption profile that is completely disconnected from Russia. [158]
By comparison, Germany has the second highest consumption rate for natural gas in Europe and is Russia's biggest market, being entrusted with the supply of 34% of the necessary quantities. [159]

These are just two examples of prominent European countries that rely on external sources, whereas Germany seems to be too attached to Gazprom and be too sensitive possible changes in the price mechanisms. Other countries, such as Bulgaria, Romania, Hungary, and Greece have also contracted the delivery of Russian gas over a long term period so that dependency persists on more levels. [160]

6.3. Future possible suppliers

With the recently evolved conflict between Russia and Ukraine for the control of the peninsula Crimea [161], not only have there been peace interruptions on the European continent but also economic forces have joined to reevaluate the strategic position and opportunities that might arise on developing energy markets. For Europe it became clear that it is too dependent on the main supplier Russia.

In response to this conflict, EU has decided to adopt a new law with the purpose of sanctioning Russia. In this law, becoming effective as of August 1st 2014, Russian banks would no longer be authorized to raise any money on European markets, exports and imports of guns from/to Russia are forbidden and the export of technological energetic equipment needs to be approved by the EU. [162]

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[158] See Ratner, Belkin, Nichol, Woehrel (2013) page 6 [accessed on 15.08.2014]

[159] See Ratner, Belkin, Nichol, Woehrel (2013) page 6 [accessed on 15.08.2014]

[160] See Ratner, Belkin, Nichol, Woehrel (2013) page 11 [accessed on 15.08.2014]

[161] See Haaretz (2014) [accessed on 02.08.2014]

[162] See Lewis, Santa (2014) [accessed on 02.08.2014]

To show its support for Ukraine, EU has agreed to renounce the custom duties for a temporary period of time. [163]

The U.S. has set out bans for specific public officials for not searching for diplomatic solutions. Some of the targeted officials are Dmitry Rogozin, Valentina Matviyenko (both of them Russian political figures) and Viktor Yanukovych, the Ukrainian leader. [164]

Obama has also declared: 'We will continue to make clear to Russia that further provocations will achieve nothing except to further isolate Russia and diminish its place in the world." [165]

The U.S. has also banned the conducting of further business with the Russian company United Shipbuilding Corporation which is a defense company. The export of energy production equipment from the U.S. (same as Europe) is also under restraint. [166]

As a reaction to these sanctions, Russia has shown no drawback until now, in fact the deputy PM Dmitry Rogozin, who is in charge of the defense in Russia, said "Obama's decision to place sanctions on the United Shipbuilding Corporation are a sure sign that Russian military shipbuilding is becoming a problem for Russia's enemies." [167]

It is hereby noticeable that changes in Europe have taken place and will continue to occur. The sanctions set in force are only partly related to the energy sector, but it can be expected that Russia will respond with increasing their natural gas prices.

[163] See BBC News Europe (2014) [accessed on 17.08.2014]

[164] See BBC News Europe (2014) [accessed on 17.08.2014]

[165] See MacAskill, Traynor, Roberts (2014) [accessed on 17.08.2014]

[166] See Luhn (2014) [accessed on 02.08.2014]

[167] See Luhn (2014) [accessed on 02.08.2014]

7. Conclusion

This study incorporates different novelties of the oil and gas sector with the goal to identify trends in energy markets and possible deviations.

The latest movements focus on the development of unconventional resources and the public awareness of the opportunities that these technologies may offer.

The issue of economic stability and security of supply has to be discussed intensely, as it is of global interest. Probable catalysts are acknowledged (such as chokepoints, conflicts, significant oil producing countries etc.) and alleviating measures are elaborated to provide a complete risk management procedure (from identification to mitigation and elimination).
Continuous development in these particular fields is of utmost importance, as they are the "columns" of stability.

The topic of transnational taxation may be quite appealing, as it depicts a rather small percentage of the entire subject, but it still offers a grasp on the importance of having a global tax system, so that every type of investment, regardless of entity, produces the same effect on governments.

By setting various tax levels in countries, tax havens are created that attract beneficiaries. The related case studies portray three different regimes in countries that are geographically closely located nevertheless have contributed to substantially different corporate structures and economic growth.

Subsidies, either granted to producers or consumers, alternate the energy environment and set negative tendencies for the climate as they distort the balance or the theoretical equilibrium. Research in those fields is inconsistent as this characteristic is also the same associated with the reports of many countries, which willingly fail to create global (or even national) transparency.

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9. Annex

9.1. Annex 1a: Abstract

This thesis aims to provide a broad, complete outlook on the oil and gas environment, its historic maturity and future trends.

Regulatory objectives and market developments are put under scrutiny and the security of supply is different scenarios is tested. The network (seaborne or pipelines) is described in terms of availability and capacity and the price setting on spot markets is elaborated to determine its role in the overall business. Potential threats are identified and risk mitigation measures are extensively discussed to clarify their respective scope.

Two major parties and key determinants of the expansion of oil and gas markets direct the focus in the last part of the thesis: the United States and the European Union.

The United States has set the spotlight on unconventional reserves, thus boosting its production and transforming itself from net importer into an exporter.

The European Union has set itself environmental-friendly objectives but maneuvered itself in the middle of an increasing conflict between an EU neighbor and one of its main suppliers.

9.2. Annex 1b: Zusammenfassung

Das Ziel dieser These ist, eine grobe und komplette Übersicht der Öl und Gas Märkte, deren historischen Entwicklung und zukünftige Trends die sich etabliert haben, zu beschreiben und darzustellen.

Regulierende Aktivitäten und Marktfortschritte werden kritisch gepüft, während die Versorgungssicherheit in verschiedenen Szenarien getestet wird. Das Netzwerk (entweder über die Ozeane oder durch Pipelines) wird beschrieben, um die Verfügbarkeit und Kapazitätsauslastung festzustellen. Die Preissetzung auf Spot Märkten wird veranschaulicht und welche Rolle sie im gesamten Öl und Gas Business spielt. Potentielle Bedrohungen werden identifiziert und Vermeidungs-Maßnahmen werden ausführlich beschrieben, um ihre Reichweite klarzustellen.

Zwei wichtige Akteure und essentielle Auslöser für die Expansion der Öl und Gas Märkte werden im letzten Teil der These behandelt: die Vereinigten Staaten von Amerika und die Europäische Union.

Die U.S. haben den Fokus auf unkonventionellen Ressourcen gesetzt, somit deren Produktion massiv gesteigert und wandelten sich somit von Importeuren in Exporteure von Gas.

Die Europäische Union hat sich umweltfreundliche Ziele gesetzt, befindet sich jetzt aber in der Mitte eines steigenden Konfliktes zwischen einem EU Nachbar und einem seiner wichtigsten Gaslieferanten.

9.3. Annex 2: Curriculum Vitae

Andrada Simina Neagu, BSc

6th March 1989

Key Skills

PROJECT - MANAGEMENT
CONTROLLING
CONSULTING

Work Experience

01.09.'14- Business Unit Controller; **OMV Gas & Power GmbH**
Controlling Gas & Power
- Monthly reporting/ Quarterly/ Annual reporting;
- Mid term planning and budgeting.

01.07.'13 – 31.08.'14 Business Analyst**;** **OMV Gas & Power GmbH**
Projects and Finance Department
- Preparation of company evaluations;
- Revision and creation of financial reports;
- Preparation of Impairment Tests for power plants;
- Gas market analyses and interpretation of planning assumptions of power plants in specific countries, i.e. Austria, Romania, Turkey, Germany.

01.01.'12 – 30.06.'13 Project & Risk Management**;** **OMV AG**
Corporate Project Services Department
- Risk Management in capital projects – Selection and configuration of the only corporate risk management data basis;
- Risk Management support and single coordination of Risk Management activities in all projects of the portfolio;
- Creation and implementation of other Project Management Standards (i.e. Claim Management, Scheduling & Planning, Cost Estimation).

01.02- 30.12.'11 Project Support**;** **OMV AG**
Corporate Project Portfolio Management Department
- Review and maintenance of monthly and quarterly reports;
- Evaluation and update of the project portfolio of the capital projects in the funnel;
- Administrative work (travel itineraries, visa applications, calendar maintenance)

8.'11 – 3.'14 Sole proprietorship; language services
Performing of translations to German, English, Romanian

Education

1.3.'13 – Master Study: **Business Administration**
University of Vienna: Institute for Business Administration
Specialization: Public Utility Management
Energy- and Environmental Management

1.12.‘13 – *PMI – CAPM Training*
1.10.‘08 – Bachelor Study: **Business Administration**
30.9.‘12 Vienna University of Business and Economics (WU)
Specialization: Finance
Information Management

Trainings

1.10.’13 - Project Management qualification (according to PMI & IPMA standards)
5; 7.’13 Risk Management in Capital Projects (OMV)
10.’12 Cost Estimation in Capital Projects (OMV)
30–31.1.’12 Workshop „Communication und Conflict Management“ (zBp – WU)
9-16.1.‘12 Workshop “Conducting Effective Meetings” (zBp – WU)

Awards

WU Top 10% (among the university´s best students)

Languages

- Romanian: Native speaker
- German: C1 – C2 (Business fluent)
- English: C1 – C2 (Business Fluent)

Computer skills

Programming languages
- Borland C++
- Java; R
- Visual Basic
- Matlab

- **Controlling Software**
- HFM
- TM1

Standard software
- MS Office; MS Project

Others

Seit 9.‘07 Driver’s license B
31.5.‘11 Participation to the Social Impact Award with two own project ideas

Certifications

- English Certificate from the University of Cambridge, UK (CAE – Cambridge Advanced in English)
- German Certificate from Berlin, Germany
- Informatics Certification for Programming in C++
- Translator, Interpreter (authorized by the Ministry of Justice, Romania)