



New Dimensions
of Security
in Europe

IRAN AS AN ALTERNATIVE SUPPLIER OF NATURAL GAS TO THE EU

Draft Paper

Agnieszka Byrczek
Tiisetso Mogase
Antje Pfeifer
Tomas Rezac

April 2010

NewSecEU has been funded by the Lifelong Learning Programme of the European Commission
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which
may be made of the information contained therein.



1. Introduction

Energy Security can be described as “the condition in which a nation and all, or most, of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk of major disruption of service”.¹ But other factors such as the availability of the sources, the reliability of partners and the infrastructure are also influencing energy security.² During the last few years the European Commission started intense work on energy security in Europe. According to the Commission’s Green Paper on security of energy supply (November 2000), if no action is taken, the EU's energy dependency will climb from 50 per cent in 2000 to 70 per cent in 2030.³ Securing European energy supplies is therefore high on the EU's agenda.

Currently, 40 per cent of EU gas imports come from Russia, 30 per cent from Algeria, and 25 per cent from Norway, but some predictions state that by 2030, over 60 per cent of EU gas imports are expected to come from Russia with overall external dependency expected to reach 80 per cent.⁴ In recent years, supply of European countries with Russian gas was affected by the Russia-Ukraine dispute in winter 2006 and the disruption of gas supply in January 2009 to different amounts. These distractions showed that gas supply from Russia is not reliable in a sufficient and satisfying way. Furthermore, it became obvious that the EU Member states are dependent on Russian gas imports, but not as much as currently discussed. Especially the new Member States in Eastern Europe depend highly on imports from Russia. For example, Bulgaria relies to 100 per cent on Russian imports, Greece, the Czech Republic and Hungary to circa 80 per cent each, whereas Western Member States purchase their gas only to an amount of 20 per cent (France) to 40 per cent (Germany) from Russia.⁵

To avoid further disruption and lacks of energy, there are various ways to decrease dependency as a major threat to energy security, in particular via diversifying the sources of energy and suppliers as well as by investing in the new green energy. This paper focuses on the diversification of *energy suppliers*. According to current data, Iran has 1,045 trillion cubic feet of natural gas reserves and thereby is (after Russia) the second largest natural gas

¹ Barton, B. (2004): 5.

² Losoncz, M. (2007): 21-22.

³ *Geopolitics* (2007, online).

⁴ *Geopolitics* (2007, online).

⁵ Losoncz, M. (2007): 22.

reserves' holder in the world⁶, and Iran's export might progressively increase if investments in technologies and infrastructure in Iran are made.⁷ This makes it necessary to consider Iran as an additional supplier of natural gas to Europe, although being aware of the obstacles which cooperation with Iran in energy issues may pose. The nuclear program and thereby the violation of the Non-Proliferation Treaty are to be mentioned in this context. Nevertheless this paper is analyzing and evaluating the feasibility of Iran as a potential gas supplier due to the fact that other factors, additional to the political situation within the country, are relevant in the context of energy security. As mentioned above energy security relies on a number of various factors, such as the price stability and reliability of supply. Therefore, the paper will have a closer look from different angles at Iran as a gas supplier. Hence, this paper analyzes Iran as an additional supplier of natural gas from an economic, environmental and a political point of view, taking into consideration Iran's reliability.

The following second part focuses on the political level – the EU's demand of natural gas, as well as its strategies to achieve a sustainable, secure and competitive energy policy. Furthermore, the current relations between EU and Iran are discussed. In the third part the feasibility and reliability on Iranian gas is analyzed and evaluated. The fourth part will answer the question of economic costs. For that reason, the costs of importing Iranian gas compared to the import of gas from other supplying countries, esp. the prices of Iranian natural gas as well as the cost of transport, will be investigated. Furthermore, the environmental side-effects which arise mainly from the transport are analyzed in the fifth part. Finally, the question of whether Iran might be a feasible supplier of natural gas to Europe will be answered from these different points of view. This paper aims to evaluate the prospects of EU's cooperation with Iran in the field of gas supply. Thereby Iran is considered rather an additional than a compensating gas supplier.

2. Political achievability

European Union's demand for energy supply

Within the last decade the issue of energy diversification has become a huge topic and one of the most important priorities for European countries and the European Union to tackle. The overwhelming growing demand for energy combined with the heavy reliance on Russia as

⁶ Oil and Gas Journal (2010).

⁷ Bilgin, M. (2009): 4487.

the top supplier has led to the EU looking into ways of diversifying energy, the Caspian Sea region has been the area which has become of great interest in regards to alternative energy supplies. Iran has the second largest reserve of natural gas in the world; given its endowment with resources it could be a potential alternative for Europe and its states to diversify supplies.

The aim of the following passages hence is to look at energy in Europe and evaluate whether or not directing the diversification of energy towards Iran is politically achievable. The securitization of energy is one of the three goals which were outlined by the European commission's communication paper on energy policy (issued January 2007), within the paper the commission called for a 'sustainable, secure and competitive energy'. With that also came a proposal of the actions which will need to be taken in order to achieve and advance any of the three goals stated above. The event of the Russia-Ukraine dispute caused many problems within Europe; after energy supplies were cut by Russia, the EU further realised that their heavy reliance upon Russian gas could prove and had already proven to be a dangerous one. The incident further sparked intense debate on calls for a common energy security policy; the event did also however draw some needed attention towards countries in the Middle East to provide crucial alternative supplies.

As it is acknowledged around Europe, the EU and its member states have at this point in time failed to fully instigate a 'well-coordinated, comprehensive common energy policy' though some attempts to move forward have been made; further progress however is complicated mainly because of individual countries' national strategies which were of course formed independently in accordance to their own domestic needs. So it then becomes much more difficult to try and incorporate a common policy which will be of benefit to all without undermining any individual domestic policies.

European research has for many years been looking at many different import routes of alternative gas supply, within those studies states such as Qatar, Turkmenistan, Algeria, Libya and Iran have been considered. It could then be said that in a sense it looks as if Europe is surrounded by a "sea of gas". So what then seems to be the issue? It would seem though that with all the choice that surrounds Europe, Iran seems to be an area of major interest. This may be due to its location and the fact that it is an important player in transit routes. With that in mind Iran seems to be a rather attractive option. However it is imperative that whilst considering Iran to become one of the primary suppliers of European gas energy, that we

consider the political and regional issues that not only affect Iran's economy but those that may also affect the European economy and the political setting, regional as well as global. One of the major issues that springs to mind is the insistence of Iran to keep its 'peaceful nuclear energy program', this has put the country at the top of international concern. With all that in mind the fact still remains that Europe needs some sort of solid solution for energy diversification and options seem to be scarce.

EU's relationship with Iran

Looking at Iran as an option for the EU to gain an alternative supply of gas energy from, it is important to analyze the relationship the state of Iran has with some European states and the European Union as a whole. It is recognized that in the sphere of international relations and politics, Iran is considered to be a state which should be dealt with in cautionary ways; regarding the supply of gas energy it is fair to assume that any relations or negotiations should be dealt with in the same way. However there are many political problems that come with incorporating Iran within Europe's energy security.

The European Union is in fact one of Iran's primary trade partners, accounting for nearly a third of its exports.⁸ The relationship between Iran and the EU has great potential for growth;⁹ however its development has been brought to a halt due to the ongoing problems related to the Iranian 'nuclear program'. The problems which currently exist in Iran are not just problems which affect the international community but they are also internal ones which affect the people of Iran and the country's surrounding neighbours. One of the biggest sources of concern which the European Union and the international community have is with Iran's 'friendly nuclear program'. Many view this program as a chance for Iran to develop a nuclear arms capability, although it should be acknowledged that Iran has stated that the sole use of the program is to develop energy supply and security for the region. However this still causes potential problems as this program is viewed as a major threat.

The program has been in violation of the resolutions which the United Nations have put in place and, most notably, the Non-Proliferation Treaty. Recently, US president Obama has initiated action on how to handle Iran; he recognizes that there is a lot of work to be done in order to get Iran up to the international standard and so has suggested that perhaps it is time

⁸ Natural Gas (online).

⁹ EU-Iran-Trade (online).

for Iran to show itself to be reliable partner and instead of focusing on the past they should all work together to move forward for a positive future. He stated: "Over the course of the last year, it is the Iranian government that has chosen to isolate itself, and to choose a self-defeating focus on the past over a commitment to build a better future ... We are familiar with your grievances from the past -- we have our own grievances as well, but we are prepared to move forward. We know what you're against; now tell us what you're for."¹⁰

As the USA is one of the EU's important partners, it would also be in our interest to develop (if any) a long term plan with Iran that would benefit Europe but also not insult our major trade and political partners. There are currently sanctions which have been put on Iran and it would seem that until Iran shows some measure of compliance, the political achievability of the task at hand (getting gas from Iran) remains a distant option. It is, however, also acknowledged that Iran has taken measures recently concerning its cooperation with the International Atomic Energy Agency (IAEA). Such progress is commended and represents a small step into opening up further negotiations and discussions with Iran about potential trade; they do still nonetheless need to implement all the measures set out by the IAEA. The willingness of Iran to cooperate may also soften the international community's eyes towards them.¹¹

Another issue which is also a main concern is the region's instability. Iran and its surrounding regions are often prone to conflicts and disputes, the question then is not whether or not this may interrupt the flow of energy at one point but how many times these interruptions will take place.¹² This would mean that Europe would still have an inefficient and unstable supply of energy, because due to such conflicts the reliability of any eventual gas supply comes under question. The tension within the region is also another major international worry, the conflicts are not just political or military ones they also involve the violation of rights of the people. And so, whilst considering these conflicts, the issue of terrorism and human rights violations also springs to mind. As the European Union does not want to be seen as supporting such actions, will investing further in Iran suggest that the EU is offering indirect support to an autocratic regime with some ties to transnational terrorism?

It is important that the relationships within Europe also be discussed. It should be taken into account firstly that the aim should not be to replace Russia as our major supplier of gas

¹⁰ Obama reaffirms Offer to talk with Iran (2010, online).

¹¹ IAEA and Iran (online).

¹² EU- Iran nuclear talks break down (2005, online).

energy; the aim should therefore be to *have options*. Whilst considering Iran as one of those options it is important to clarify to EU's existing major supplier that the EU does not attempt to replace Russia. During the past two years or so the relationship with Russia has been quite a rocky one, as it is well noted there have been problems with the reliability of supply which Russia can offer. It is not necessary to dwell on past events although it would be wise to learn from them and so find solutions which can prevent any future misunderstandings and difficulties. Yes there have been problems but on the whole it is only fair to say that Europe has received a rather reliable supply of gas.

In order for the EU to prosper in any plans involving an alternative gas supplier, it would be in its best interest to work close together with its current suppliers so that relations remain civil. Geographically speaking compared to Iran, Russia is relatively closer to Europe and so conflicts which may arise will be right on the EU's front door. In 2007 Putin stated "I strongly believe the full unity of our continent can never be achieved until Russia, as the largest European state, becomes an integral part of the European process. Today, building a sovereign democratic state, we share the values and principles of the vast majority of Europeans. A stable, prosperous and united Europe is in our interest. The development of multifaceted ties with the EU is Russia's principled choice."¹³

Since then economic and political cooperation between Russia and the EU has continued to grow through the continued work on the strategic partnership. The energy dialogue between the two is an important aspect of cooperation and that includes such things as the delivery of Russian energy products to central and to Western Europe and the parallel attraction of European capital investment to develop Russia's energy sector. Although relations with Russia may not be exactly where we would like them to be, there has nonetheless been some progress. Some further difficulties still exist however like the fact that Russia is yet to join the World Trade Organization, however it seems pretty clear that Russia is willing to take part in further dialogue of co-operation.

To summarize it is clear that having Iran as a secondary gas energy supplier seems like the logical way to go, however due to major political problems it seems unlikely that Iran is becoming an alternative supplier to Europe any time soon. Instead, the EU should look at trying to work closely with not only Iran but Russia and possibly the USA on a policy for the long term. Before considering them for such a big project it has to be ensured that they are

¹³ *Overview of EU-Russia-Relations* (online).

capable of dealing with Europe's demand. Since there have been many failures of the critical dialogue which the EU has tried to set up with Iran, this further complicates the situation and makes it difficult for Europe to be strategic partners with Iran concerning energy security. Bilateral trade with Iran could be possible in the long run if all issues are discussed and managed; whether or not they can provide a sustainable, competitive and reliable source of energy remains to be seen.

3. Reliability

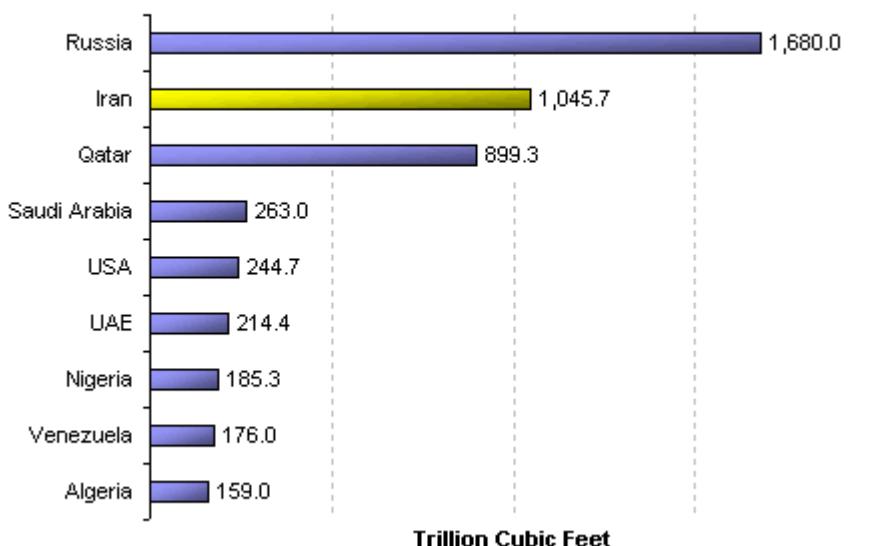
In studying the feasibility of gas import from Iran, one of the most important aspects is reliability, it means: can the EU rely on gas supplies as set out in a respective political agreement. Because this cooperation requires huge investments in extraction and pipeline development, the EU must be ensured that in return it will get long term gas supplies, predictable cooperation without changing the rules and without any political pressure. Therefore this part analyzes, whether Iran possesses enough accessible gas resources, and investigates the possibility of building a strong economic partnership with Iran.

Iranian gas resources

It is a fact that Iran has the second largest gas reserves in the world. According to the *Oil and Gas Journal*, as of January 2010 Iran's estimated proven natural gas reserves stand at 1,045 trillion cubic feet (tcf)¹⁴. The largest gas field South Pars is located in the Persian Gulf and shared with Qatar, it is also one of the largest gas fields in the world. The gas recovery factor of the field is about 70 per cent. Besides that, there are many other big gas fields like North Pars, Kish, Golshan and fields with unknown gas capacity like Tabnak, Kangan, Khangiran, Nar, Aghar. Moreover there is still very big potential of discovering new gas fields. According to *USGS – science for changing world*, new natural gas sources can be found in the area of the Caspian Sea, North East, Central Kavir, and the area starting from the Aghar and Dalan gas fields till Strait of Hormuz and Central Persian Gulf.

¹⁴ *Natural Gas* (online).

World Natural Gas Reserves by Country, January 1, 2010



Source: Oil & Gas Journal, Jan. 1, 2010

It is worth mentioning that Iran is the 4th biggest world gas producer. According to EIA data¹⁵ from 2007 the production level was 3,952 billion cubic feet (bcf). Compared to production in other countries the amount is high, but compared measured against the level of proven reserves, it gives only 0.41 per cent. So in 2007 less than 1 per cent of resources were used for gas production. Assuming that most of the resources are recoverable, and that there is a big possibility of discovery of new gas resources, shows us that Iran is one of the countries capable of supplying much larger amounts of natural gas in the future.

Although Iran has great (potential) production possibilities, it must be taken into consideration that gas consumption patterns show an ever increasing domestic demand. Taking once more data from EIA from 2007 it can be seen that the consumption level reaches almost 100 per cent of the production level. In 2004, Iran was even a net importer of natural gas: while 3,6 billion cubic meters (bcm) have been exported to Turkey, 5 bcm have been imported from Turkmenistan. Although Iran is the largest gas producer in the region, its production is thus nearly entirely dedicated to domestic consumption. That leads to two possibilities: Either Iran will increase the production level slowly and use its own resources (this view is supported by FACTS Global Energy that claims: ‘Iran’s natural gas exports will be minimal due to rising domestic demand even with future expansion and production from

¹⁵

Iran Energy Profile (online).

the massive South Pars project¹⁶) or large scale investments will be required in order to satisfy Iran's own needs, and start production for large scale exports. Taking the second option into consideration, it might be a good opportunity for Europe to invest in the region, thus making Iran in some ways “dependent” on such investments and further energy cooperation (and gas supply to Europe) through such a strategy.

Building an effective partnership

As Frank Umbach, a renowned expert on matters of energy security, states, Iran is the “real and potential gas supplier to the EU member states”¹⁷. Indeed Iran possesses sufficient resources, but can Europe rely on it? Can a country be trusted which has diplomatic relations only with roughly half of the states around the world, doesn't belong to many important international organizations, including WTO, obviously has an unstable, internally challenged political system, and is designated as being a state sponsor of terrorism by the USA?

This is an important aspect, because if Iran will provide an alternative source of energy for Europe (furthering its energy independence), it must be considered a reliable partner as well as one whose behavior conforms to some basic standards of acceptable or even good governance, internally and regionally. There are few aspects that have already been mentioned above that allow some skepticism regarding Iran as a “good partner”.

In his paper, Umbach mentions that until 2030 the world energy demand will rise by more than 50 per cent and it will require the raise in gas production. “But this is only achievable if sufficient foreign investment is possible, if Iran and Iraq are free of sanctions and the entire region remains politically stable!”¹⁸ The crucial thing besides establishing the political base for a stable relationship for the reliability of gas supplies are actually foreign investments. This might make Iran more dependent and force this country to get into the global interconnected relations as a responsible partner.

Moreover EU countries would be (and are) not the first ones interested in an enhanced gas cooperation with Iran. During the last few years Iran started negotiations with different countries to provide them with gas supplies. The reliability of Iran as an economic partner has thus arguably been increased through several agreements, not least that one with Switzerland. The National Iranian Gas Export Company and Switzerland's Elektrizitätsgesellschaft

¹⁶ Natural Gas (online).

¹⁷ Umbach, F. (2010).

¹⁸ Ibid.

Laufenburg signed a 25-year deal in March 2008 for the delivery of over 5 bcm of gas per year¹⁹. The agreement with Pakistan about the "peace pipeline" is almost finalized; the planned date of signing the agreement is 9-10 March 2010²⁰. This project might be expanded into the trilateral cooperation Iran-Pakistan-India (IPI). IRNA also reported that Khomein Petrochemical Complex and Italian company Basell signed a 20 million Euro contract on the transfer of technology, and this is the first step to the future gas agreement²¹.

Worth mentioning is as well that Iran has a fairly good relationship with Turkey. This would actually be almost a "requirement" for any enhanced gas cooperation since the only possible pipeline-route that can transfer gas from Iran to Europe leads through this country, and the good and stable relations ensures the reliability of gas supply, as well as they might help avoiding a situation similar to what happened in 2006 when Russia cut off the gas supply to Ukraine. Iran and Turkey also have very close trade and economic relations. Both countries are part of the Economic Cooperation Organization (ECO), and the bilateral trade between the nations is increasing, especially in the field of energy.

Based on the information presented above, it can be said that the Iranian reliability is growing, and this country has potential to be a future gas supplier for the EU, but in the current situation, without any changes, the reliability is still questionable.

4. Economic costs

EU-Iran trade

Trade between UN members and Iran, as has already been mentioned, is subject to restrictions under sanctions imposed by the United Nations Security Council. Contrary to US sanctions, the UN however has not set out any restrictions on Iran's export. Thus, the EU under UN law is free to legally buy natural gas and oil from Iran.²² Although no EU sanctions are imposed on imports from Iran, there are obstacles for European energy companies, which make investing in Iran almost impossible. It is 1) the share of US investors in European energy companies: if a US co-owner can influence a decision making, it votes mostly against any investment in Iran; 2) European energy companies prefer to be on good terms with US

¹⁹ Press TV (online).

²⁰ *Iran to sign deal soon to sell natural gas to Pakistan* (online).

²¹ *Iran and Italy to sign Gas Export Agreement* (online).

²² As of March 2010.

companies and government and rather do not provoke them by investing in Iran (mostly to avoid some “secondary sanctions”).

The last verified data by the European Commission from 2008 shows the following volume of Iran-EU trade:

- EU goods exports to Iran 2008: 14,1 billion Euro
- EU goods import from Iran 2008: 11,3 billion Euro.²³

The composition of the EU's imports from Iran in 2008 was dominated by energy and energy related products (90 per cent). On the other hand, EU exports to Iran in 2008 were mainly machinery and transport equipment (54.6 per cent). EU imports from Iran make up approx. 0.9 per cent of overall EU's imports, which still is a considerable amount (e.g. China makes up 16 per cent of EU's imports).²⁴

Economic costs of Iran's gas for Europe

The natural gas market in Europe is not state-owned any more. Most of the European governments and the EU have no legal power to coerce the market to readjust its prices in any direct way. States can only set up specific conditions to steer companies to wished behaviour. For energy companies to invest, natural gas or any other product must firstly be profitable to buy from the desired region. Low total product costs are an allurement for big energy companies, only. Energy resources are regarded as “political weapons”, but this is valid only for resources kept in the hands of states, not private companies.

The total cost of gas includes several aspects: the first aspect can be simply represented as a price of a certain amount of gas. The second aspect is embodied by producer margins. The third aspect calculates transport costs. The latter is structured into costs derived from necessary infrastructure (pipelines, terminals for liquefied natural gas [LNG], gas compression terminals) and costs for operating and maintenance. This part of the paper assesses the development of the gas price for Europe in recent years and consequently compares it with Iran's gas price and its transportation alternatives such as PNG (Pipeline Natural Gas), LNG (Liquefied Natural Gas), CNG (Compressed Natural Gas) and NHG (Natural Hydrate Gas).

²³ EU goods import from Iran in 2008 (11.3 billion Euro) was comparable to the import from Australia (11.2 billion Euro). See *Australia – Trade. European Commission* (online).

²⁴ *EU- Iran –Trade* (online).

PNG, LNG, CNG, NHG basic comparison

Iran is a riparian state with potential of both, sea and onshore gas transport. Figure 1 on the right side shows us the respective economic costs of product transport according to the technology used.²⁵ According to Figure 1, PNG is the most economical up to 7,800 kilometers (km). Remme et al. find 3,000 – 5,000 km (depending on transport volume) as the limit.²⁶ Kjärstad & Johnsson set the limit even lower in 3,000 – 4,000 km.²⁷ Across a longer distance LNG is more economical.

CNG could be considered for short distance transport over sea, but is inefficient on long distances. NGH technology is still under development and its contemporary state does not enable its market utilization. For further research we limit ourselves to PNG and LNG, which are only profitable solutions nowadays in large scale exports.

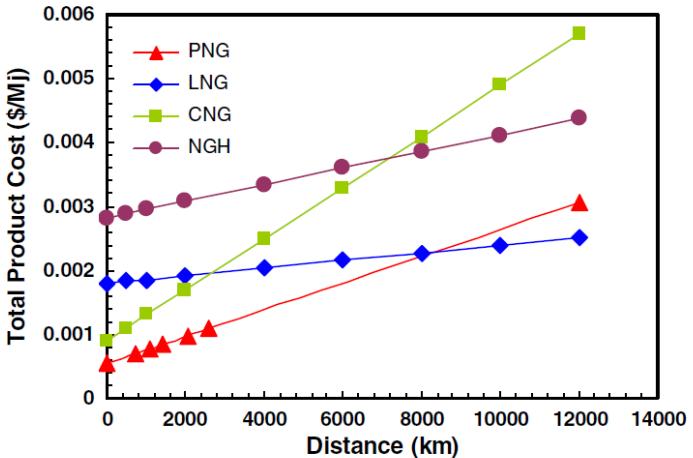


Figure 1: Impact of distance on the total product cost for different technologies (source: Najibi, H., et al. (2009): 2014)

Price of Iran's natural gas by PNG

The economical recovery of investment is derived from capacity of the exporting fields and from the size of the end market. In EU-Iran's case both conditions are met, Iran has the second biggest reserves of natural gas and the EU is one of the biggest markets in the world. Because capital charges make up more than 90 per cent of the total cost of gas transmission pipelines, the investment is not always viable.²⁸

The advantage of PNG lies in its simplicity. A pipeline and pumps in regular intervals are the only infrastructure needed for transport. There is no need for other processing facilities. Logically the cost of transport is rising with distance under linear function.

25 Najibi, H., et al. (2009): 2014.

26 Remme U./Blesl M./Fahl U. (2008): 1630.

27 Kjärstad, J./Johnsson, F. (2007): 869.

28 Najibi, H., et al. (2009): 2009 ; See also *Capital Charge* (online).

It is not possible to reckon a general price per km of a large-diameter pipeline, because its building cost is influenced by various factors such as technology used (ground pipeline, under-ground pipeline, under-sea pipeline), by terrain obstacles, by the steel market price and by security criteria correlated with passing specific areas.

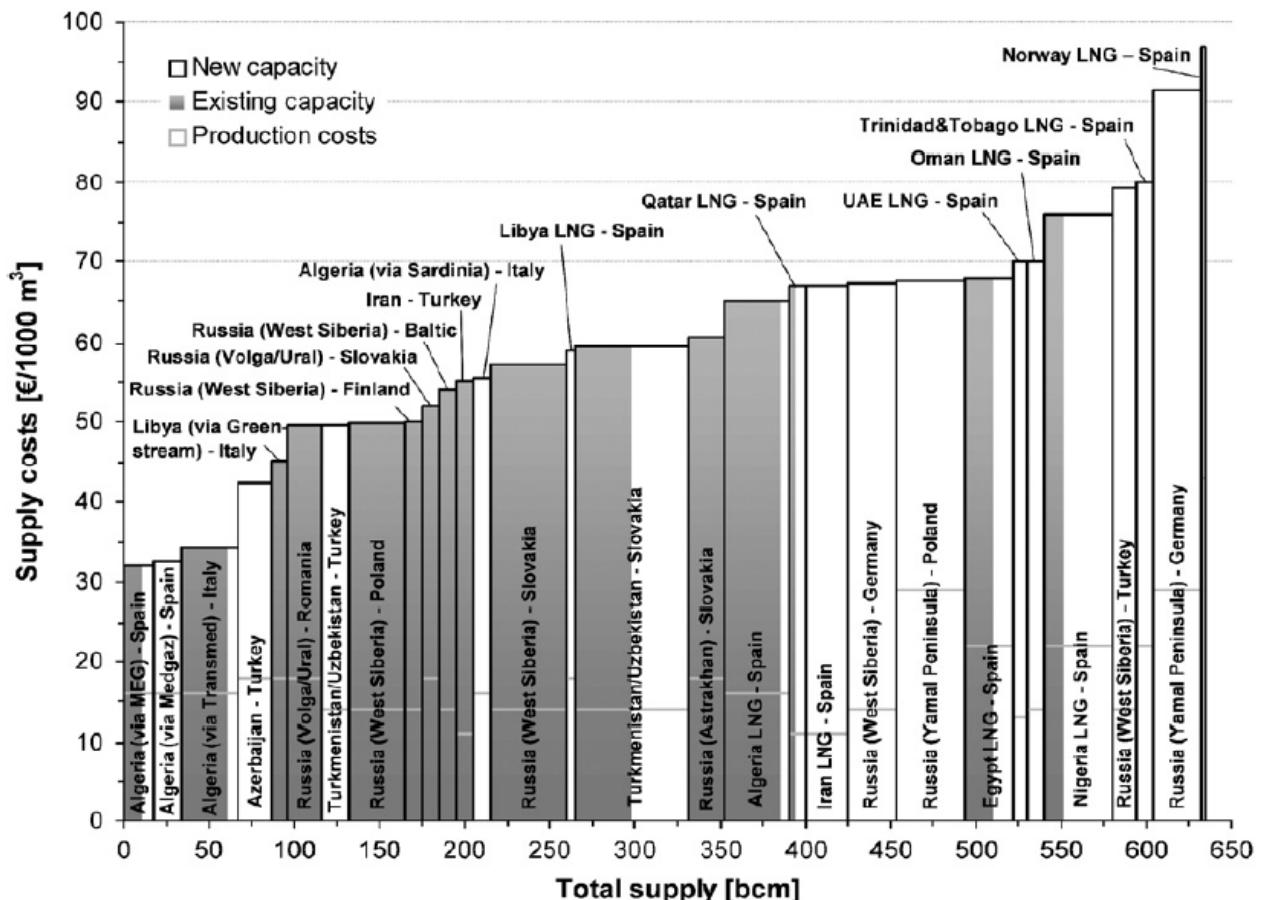


Figure 2: Supply cost curve for natural gas to Europe (source: Remme, U./Blesl, M./Fahl, U. (2008): p. 1632)

Independent from real gas prices (real prices are still changing – on British market gas prices almost tripled between 4/2007 – 4/2008 and fell even under 4/2007 level in 4/2009²⁹) looking in calculations as on relative prices comparison, one can see, that PNG (Iran-Turkey 55 Euro per 1,000 cubic meters [cm]) and LNG (67 Euro/1,000 cm) are competitive prices compared to the other options.³⁰ The grey fields indicating existing capacity are mostly more economical than Iran's options, however Iran's gas options are still cheaper than some existing supplies. Gas via the Nabucco pipeline project is not enumerated, because it is still

²⁹ Natural Gas Market Review (2009): 25.

³⁰ Remme, U./Blesl, M./Fahl, U. (2008): 1632.

not clear who will be the respective gas suppliers. If it is Iran, the recoverability of Nabucco would be possible with current market prices – as we can see from Figure 2, gas from Iran and Qatar has the lowest production cost among possible non-EU suppliers (11 Euro/1000 cm).

Price of Iran's natural gas by LNG

According to Kjärstad/Johnsson³¹ and Remme et al.³² pipeline length of 3,300 km is already within the limit where LNG support can be the cheaper option to PNG. Moreover LNG has the advantage of easier substitution in supply, higher competitiveness as a contract owner can sell gas wherever he wants, and easier storage³³. LNG terminal's storage spare capacity can be used for local market trading. The financial crisis³⁴ proved from the beginning of 2009 onward that higher competitiveness leads to lower prices. Lower demand (not increasing as predicted before) during the financial crisis caused a decrease in price. Expansion of the Isle of Grain terminal in Great Britain and confidence in the supply for Great Britain brought down NBP (National Balancing Point) HUB prices to \$4 per Mbtu³⁵ in April 2009, compared to \$12 in April 2008.³⁶ Together with improving gas network interconnection in Western Europe, prices are expected to fall in local markets. If oversupply and HUB trading of natural gas can have such a fundamental impact on total gas costs, LNG is a reasonable option of supply, because of its easier redistribution and redirection. Moreover LNG provides higher security of supply.

As mentioned before Iran and Qatar must be taken into account for its cheap gas supply costs. Despite reasonable gas prices, the main obstacle for big energy-related investments in Iran is rooted in US trade sanctions and in the influence of US energy companies respectively. Once political difficulties and sanctions in Iran are overcome, Iran will be economically one of the most feasible suppliers.

³¹ Kjärstad, J./Johnsson, F. (2006): 869.

³² Remme, U./Blesl, M./Fahl, U. (2008): 1630.

³³ Despite storage of PNG which is often quite expensive, and a need of new storage facilities. LNG can be stored within terminals, before gasification takes place.

³⁴ During the financial crisis the world gas supply exceeded world demand. It caused higher competitiveness among suppliers.

³⁵ Btu = British thermal unit, 1 MBtu 1 million Btu = 28.263682 m³ of natural gas at defined temperature and pressure.

³⁶ Natural Gas Market Review (2009): 28.

5. Environmental side-effects

Natural gas is the most ecologically-friendly fossil energy resource, thus an increased reliance on gas is a relatively environmental-friendly way of coping with future energy demands.

Pollutant	Natural Gas	Oil	Coal
Carbon Dioxide	117,000	164,000	208,000
Carbon Monoxide	40	33	208
Nitrogen Oxides	92	448	457
Sulfur Dioxide	1	1,122	2,591
Particulates	7	84	2,744
Mercury	0.000	0.007	0.016

Figure 3) Fossil Fuel Emission Levels - Pounds per Billion Btu of Energy Input
(source: EIA - Natural Gas Issues and Trends 1998).

While burning natural gas, it gives off less CO₂ than oil or coal (Figure 3). On the other hand, the exploration of not yet developed gas fields, gas extraction and in particular its transport may cause environmental side-effects and threats. These effects must be taken into account when considering the diversification of gas supply, and by that the reliance upon and eventual expansion of the use of natural gas. There are several ways to transport natural gas from Iran to Europe: via existing pipelines, via newly-constructed pipelines and as LNG.

Using pipelines in order to transport oil or natural gas is supposed to be the most effective way. Compared to other methods of energy transport, the impacts of pipelines to the environment are relatively small because environmental issues are addressed during the planning and construction process. The movement of materials and machinery, as well as the construction of pipelines may cause short-term damage to nature, but this has only little effect on the environment. In general, pipelines have much lower failure rates than other means of

transport. In case of failure, however, they may cause catastrophic damage. The integration of monitoring systems during the construction process may prevent major harm.³⁷

There are few existing pipelines connecting Iran to Europe, among them is the 2001 inaugurated, Iran-Turkey-pipeline between Tabriz in North-West Iran to Ankara in Turkey. But since its inauguration, the pipeline has been cut off several times due to technical problems and explosions (in October 2006 and in September 2007³⁸), caused by Kurdish separatist groups.³⁹ These kinds of disruptions may cause serious threats to the environment. Another way to export natural gas to Europe will be via the planned IGAT9-pipeline from the South Pars field to Bazargan (Iran). From there, it will be exported via the Nabucco Pipeline or the Persian Pipeline to the European Market. The negotiations for the IGAT9-pipeline with Greece, Austria, Italy, Germany and Switzerland have just started.⁴⁰ The Nabucco-Project was initiated by the Austrian OMV, the Turkish BOTAS Hungarian MOL, and TRANSGAZ. It is planned to transport natural gas from the Caspian Sea region to the Western European market. It would be an on-land route, starting at the Eastern borders of Turkey, crossing the Bosphorus strait and passing Eastern Europe till Baumgarten in Austria. On 13th of July 2009, Turkey, Austria, Bulgaria, Romania and Hungary signed an intergovernmental agreement as the legal framework on the Nabucco Gas Pipeline Project.⁴¹ Up to now, the construction work of the first section did not start due to missing promises of delivery which are necessary to run the Nabucco pipeline cost-effectively. Thereby the integration of Iran with its huge reserves of natural gas should be considered as an additional supplier to the Nabucco project.⁴² Iranian gas could be transferred through the Nabucco Gas Pipeline to Europe by 2017.⁴³ But until now no agreement could be reached with Iran.

Due to its enormous reserves of natural gas, Iran has the potential to be a large supplier of LNG. Until now, there are three main LNG projects in Iran: Iran LNG, Pars LNG and Persian LNG.⁴⁴ Liquefied Natural Gas is odourless, non-toxic and non-corrosive. Furthermore, LNG is almost pure methane as oxygen, carbon dioxide; sulphur and water are removed from the

³⁷ Dey, P./Ogunlana, S./Naksuksakl, S. (2004): 169-170.

³⁸ *Iran-Turkey pipeline blast cuts gas flow* (online).

³⁹ Kinnander, E. (2010): 10.

⁴⁰ *National Iranian Gas company* (online).

⁴¹ *Nabucco Gas Pipeline Project* (online).

⁴² *Das Luftschloß “Nabucco”* (online).

⁴³ *Nabucco pipeline project impossible without Iran* (online).

⁴⁴ *National Iranian Gas company* (online).

natural gas during the process of liquefaction.⁴⁵ In case of a LNG spill, there is very little chance of an ignition or an explosion because it is inflammable only in the right concentration of LNG vapor in the air and a source of ignition. Besides that, LNG being exposed to the environment, volatilizes expeditiously and leaves no residue on water or soil. That means it would not result in a slick. The liquefied natural gas will be exported via LNG ships. In general, the shipping industry is responsible for emissions of nitrogen oxides, fine particulate matter, sulphur oxides and carbon monoxide. LNG is transported via steam turbine ships or dual-fuel diesel engines ships. Both engines are capable of burning all kinds of fuel; oil fuel as well as boil-off-gas from the LNG load. The emissions of LNG ships depend on the fuel type used, whereas the most emissions are produced when both ship power systems burn fossil fuel only. The LNG ships emit least when dual-fuel diesel engine ships are plugged in to shore power on berth. In doing so, no fuel is burned and no emissions are generated.⁴⁶

To conclude, the transport of natural gas from Iran to Europe is a relatively environmental-friendly and safe solution. Due to the fact that most of the pipelines connecting Iran to the West are still planned or under construction, monitoring systems may be integrated to prevent natural damage. But, as shown on the example of the Iran-Turkey-pipeline, any eventual failure of pipelines may effect the environment. Furthermore, there are no risk assessments available up to now. Consequently it is not known whether and how far the construction of the Nabucco Pipeline may cause environmental threats, whereas the transport of natural gas as LNG poses only few threats to nature. Consequently, the environmental side-effects of the transport of natural Iranian gas are comparable to those ones from other supplying countries.

6. Conclusion

A pragmatic conclusion of this paper could be quite simple: Iran is not capable of providing gas for the EU. Although this paper proved that environmental threats from such an enterprise are very little and economic costs are relatively low, as the Iranian gas is one of the cheapest in the world. Still, there are fundamental obstacles of political and institutional character (apart from the fact that Iran does currently not have enough gas for its own consumption).

⁴⁵ *Liquefied Natural Gas (LNG)* (online).

⁴⁶ Afon, Y./Ervin, D. (2008): 6-8.

The contemporary impossibility of substantially increased gas imports from Iran, however, should not be the measure for any future relations. The EU should realize the fact that the demand for gas will grow and the “cheap” gas that European countries have contracted so far will not be so cheap in twenty to thirty years if European countries will get it then from the same suppliers as they do now. To maintain contemporary prices, the EU has to cooperate with big potential suppliers like Qatar or Iran. As it is not possible to set gas contracts with Iran now or in five years, it will not be possible in thirty years if the situation does not change. Hence, the EU should start to act now in order to prepare the ground for future decisions. It is widely observed and supported by influential pundits, that regimes can be changed and stabilized within decades rather than years. Now is the right time to improve the relations with Iran. The issue of nuclear proliferation related to Iran has been very hot and important for big players during the last decade, but the EU does not seem to be a big player in this light. The EU takes a stand to the issue, but it is not audible compared to US policy towards Iran.

Now it might seem that it is no more a question of gas, but rather of a more “traditional” foreign policy of the EU. This is true, but the potential of gas to influence foreign policy has to be taken into account. Gas does not necessarily have to be the aim of mutual relations, it can be a *tool* as well. As the EU is now experiencing natural resources trade interdependence with Russia, in future it could set up the same toward Iran. It is the same theoretical approach on which is the whole EU functioning and which says that the more extensive mutual trade is the lower is the possibility of war.

Even if the above mentioned approach would be considered legitimate there is still the problem of the realization of such a policy. The EU itself cannot forgive Iran all grievances and unacceptable policies toward third states, because first of all it would change very little in mutual relations, and secondly, it would destroy relations between the EU and the USA. Moreover, the EU cannot directly coerce a private sector, and by that the only relevant class of actors, which can invest adequate money in Iran. Luckily the situation is not so desperate. The EU can still send positive signals to smaller EU investors to invest in Iran. Spill over-effects between economic investments and foreign policy are the right solution for improving relations with Iran. A further aspect is the integration of Iran into international organizations, in order to enhance enforceability of law for foreigners in Iran – here the WTO is a good example. The EU needs to be diligent and may not ask first for immediate internal change nor start with huge natural resources-related investments.

To reach all the desired goals and to use the economic and politic tools correctly the EU need to cooperate with other major actors, especially with the United States. A common approach, an agreement on (smart) sanctions and their efficiency should be reconsidered. Non-cooperation and persisting sanctions could possibly make the situation in Iran even worse. Increasing mutual trade and political dialogue is the best way to avoid the emergence of a second North Korea. Until we have something to offer (money for gas, investments etc.) we can indirectly influence decision making in Iran. The lesser our interest in Iran's products and politics will be, the more closed the regime will become. Given a closer relationship, however, the question whether Iran in case of gas surplus would really want to sell big volumes of gas to the EU, would still remain somewhat open.

References

- Afon, Y./Ervin, D. (2008): An Assessment of Air Emissions from Liquefied Natural Gas Ships Using Different Power Systems and Different Fuels, in: Journal of the Air and Waste Management Association 58, March, pp. 6- 8.
- Barton, B. (2004): Managing risk in a dynamic legal and regulatory environment, Oxford: Oxford University Press.
- Bilgin, M. (2009): Geopolitics of European natural gas demand: Supplies from Russia, Caspian and the Middle East, in: Energy Policy 37, pp. 4482-4492.
- Dey, P./Ogunlana, S./Naksuksakl, S. (2004): Risk-based maintenance model for offshore oil and gas pipelines: a case study, in: Journal of Quality Maintenance Engineering 10, 3, pp. 169-170.
- Javanmardi, J., et al. (2005): Economic evaluation of natural gas hydrate as an alternative for natural gas transportation, in: Applied Thermal Engineering 25, 11-12, pp. 1708-1723.
- Kinnander, E. (2010): The Turkish-Iranian Gas Relationship: Politically Successfull, Commercially Problematic, Oxford Institute for Energy Security, January 2010.
- Kjärstad, J./Johnsson, F. (2007): Prospects of the European gas market, in: Energy Policy 35, 2, pp. 869-888.
- Losoncz, M. (2007): Nabucco or Blue Stream? Securing Europe's Supply of Natural Gas, in: SüdostEuropa Mitteilungen, 03, pp. 20-31.
- Najibi, H., et al. (2009): Economic evaluation of natural gas transportation from Iran's South-Pars gas field to market, in: Applied Thermal Engineering 29, 10, pp. 2009-2015.
- Natural Gas Market Review 2009, Oxford: Oxford University Press.
- Remme, U./Blesl, M./ Fahl, U. (2008) : Future European gas supply in the resource triangle of the Former Soviet Union, the Middle East and Northern Africa, in: Energy Policy 36, 5, pp. 1622-1641.
- Umbach, F. (2010): Global energy security and the implications for the EU, in: Energy Policy 38, pp. 1229–1240.

Internet RESOURCES

- *Capital Charge*: <http://lexicon.ft.com/term.asp?t=capital-charge> (accessed: 17.3.2010).
- *Das Luftschloß “Nabucco”*, in: Der Standard, 26.1.2009: <http://derstandard.at/1231152919947> (accessed: 1.4.2010).
- *Delegation of the European Union to Russia*: <http://www.delrus.ec.europa.eu/> (accessed: 28.3.2010).
- *Overview of EU-Russia-Relations*: http://www.delrus.ec.europa.eu/en/p_210.htm (accessed: 1.4.2010).
- *Australia – Trade. European Commission*: <http://ec.europa.eu/trade/creating-opportunities/bilateral-relations/countries/australia/> (accessed: 16.3.2010).
- *EU- Iran nuclear talks break down*, in: BBC News, 23.3.2005: http://news.bbc.co.uk/1/hi/world/middle_east/4374485.stm (accessed: 1.4.2010).
- *EU- Iran –Trade*: <http://ec.europa.eu/trade/creating-opportunities/bilateral-relations/countries/iran/> (accessed: 27.3.2010).
- *E3+3 Statement on Iran’s nuclear programme*:
http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/EN/declarations/110306.pdf (accessed: 28.3.2010).
- *Geopolitics of EU energy supply*, 10.1.2007:
<http://www.euractiv.com/en/energy/geopolitics-eu-energy-supply/article-142665>
- *IAEA and Iran*: <http://www.iaea.org/NewsCenter/Focus/IaeaIran/index.shtml> (accessed: 13.3.2010).
- *International Energy Outlook 2009*: http://www.eia.doe.gov/oiaf/ieo/nat_gas.html (accessed: 28.3.2010).
- *Iran*, in: Carnegie Endowment for International Peace (US), Section on Iran:
<http://www.carnegieendowment.org/regions/?fa=list&id=123&gclid=CJa5yKTK46ACFQZslAodvGcuGA> (accessed: 30.3.2010).
- *Iran and Italy to sign Gas Export Agreement*: <http://www.globalresearch.ca/index.php?context=va&aid=7664> (accessed: 1.4.2010).
- *Iran country profile*, in: BBC News: http://news.bbc.co.uk/1/hi/world/europe/country_profiles/790877.stm (accessed: 27.3.2010).
- *Iran Energy Profile* (US Energy Information Administration):
http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=IR (accessed: 1.4.2010).
- *Iran to sign deal soon to sell natural gas to Pakistan*, in: Reuters News, 2.3.2010:
<http://uk.reuters.com/article/idUKDAH22464320100302> (accessed: 1.4.2010).

- *Iran-Turkey pipeline blast cuts gas flow*, in: Reuters News, 10.9.2007: <http://uk.reuters.com/article/idUKL1029395120070910> (accessed: 1.4.2010).
- *Liquefied Natural Gas (LNG)*: <http://www.naturalgas.org/Lng/Lng.asp> (accessed: 5.3.2010).
- *Nabucco Gas Pipeline Project*: <http://www.nabucco-pipeline.com> (accessed: 8.3.2010).
- *Nabucco or South Stream*, in: Global Politics: <http://www.global-politics.co.uk/issue9/matus/> (accessed: 4.3.2010).
- *Nabucco pipeline project impossible without Iran*, in: Tehran Times: http://www.tehrantimes.com/index_View.asp?code=160103 (accessed: 1.4.2010).
- *National Iranian Gas company*: <http://www.nigec.ir> (accessed: 5.3.2010).
- *Natural Gas* (US Energy Information Administration): <http://www.eia.doe.gov/emeu/cabs/Iran/NaturalGas.html> (accessed: 27.3.2010).
- *Obama reaffirms Offer to talk with Iran*, in: Global Security Newswire/NTI, 22.3.2010: http://www.globalsecuritynewswire.org/gsn/nw_20100322_6226.php (accessed: 27.3.2010).
- *Press TV*: <http://www.presstv.ir/detail.aspx?id=118315§ionid=351020103> (accessed: 15.3.2010).