"Three pillars of the golden age of natural gas"

27th International Scientific & Expert Meeting of Gas Professionals
Opatija, Croatia, 9 -11 May 2012
PRESENTATION BY THE ENERGY CHARTER SECRETARIAT
(Dr. Dario Chello[1], Dr. Sedat Cal & Mr. Zafar Samadov[2])

1. Foreword

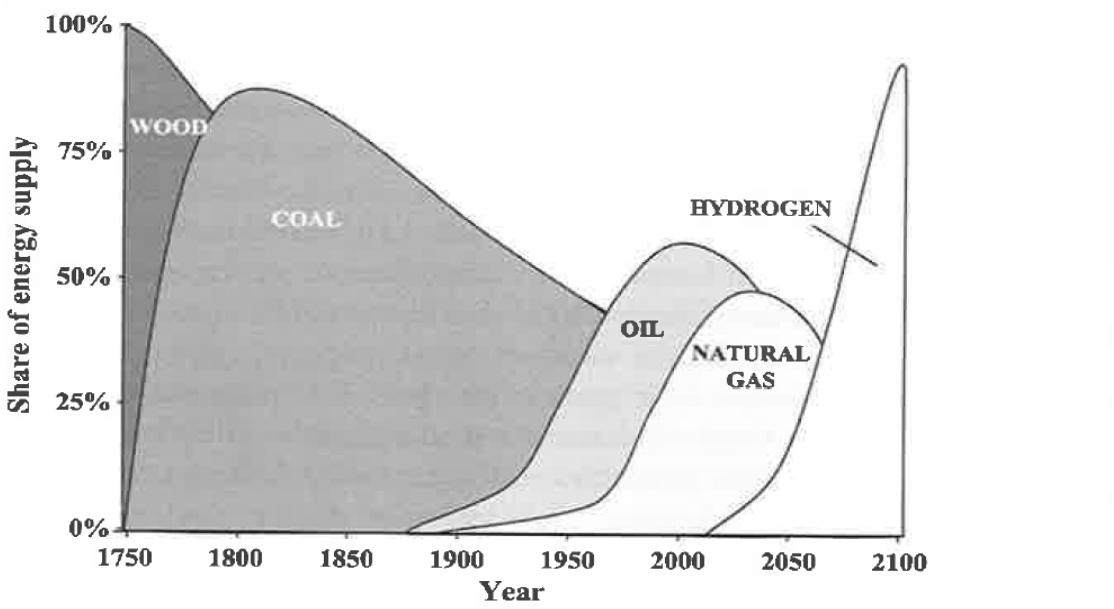
Wondering whether we are crossing a golden age of whatever fuel in the primary energy resources mix is not a novelty for the long story of energy security of supply. The diagram in figure 1, presented since a decade in many conferences, illustrates how the situation has evolved from a global energy system dominated by wood and other forms of biomass to the coal era, the oil era, the natural gas era and, finally, how we have been entering into the hydrogen era.[3] It is neither our ambition to support here this thesis of evolving into the hydrogen era, nor to have a peer review of energy outlooks which could justify shapes of the curbs in fig. 1. The diagram shows namely that natural gas shall play a dominant role in any energy mix in the next decades to come.[4] We would rather like to discuss three conditions that could

---

[1] Director. Energy Charter Secretariat. Brussels, Belgium.
[2] Investment's Senior Experts. Energy Charter Secretariat. Brussels, Belgium.
[3] We fully agree with the professor Mark Jaccard who underlines, in his "Sustainable Fossil Fuels" (Cambridge University Press, 2005), that a primary energy source is needed to produce the hydrogen. Therefore the diagram in fig.1 merges together primary and secondary energy sources, giving a misleading view of dominant energy forms.
[4] In January 2011 the International Energy Agency (IEA), the International Energy Forum (IEF) and the Organisation of the Petroleum Exporting Countries (OPEC) jointly hosted a Symposium on Energy Outlooks in Riyadh. The Symposium sought to identify the major similarities and differences between the IEA and OPEC's outlooks in terms of underlying assumptions, economy and demand and supply projections. The second Symposium was held in 2012, yet in Riyadh, on the 23rd and 24th of January.

underpin and effectively maintain the Golden Age of Natural Gas for the foreseeable future.

Figure 1 Trends of dominant energy forms[5]



2. The arguments in favour and some key figures

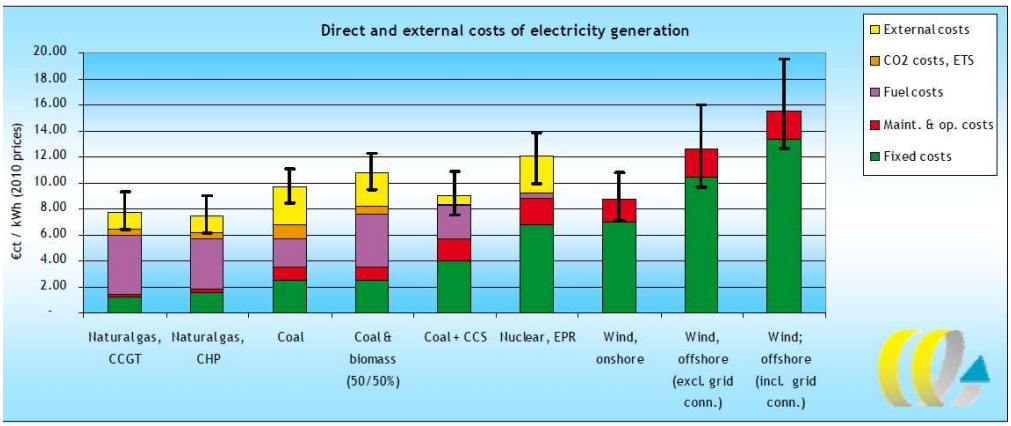
Everybody is aware about the merits of natural gas, which Bupp and Schuller have defined as the prince of hydrocarbons.[6] Unlike coal, natural gas burns clean, with limited CO2 and without sulphur emissions, nor its extraction and transportation cause environmental damage associated with the black solid.

[5] Source: Jaccard, Sustainable Fossil Fuels, op. cit., p. 10.

[6] I.C. Bupp and Frank Schuller in "Energy Future" report of the energy project at the Harvard Business School, New York, Random House, 1979.

Unlike nuclear power, natural gas poses no waste disposal problem and the decommissioning costs are, without any doubt, in favour of natural gas fired power plants. Finally, if we compare the costs of electricity generation including external costs, electricity generated from natural gas remains the cheapest.[7] Figure 2 shows the levelised cost of electricity with indirect costs included. These external costs included costs not paid by the operator but borne by the society, such as accident risk and liability and environmental damage.[8]

Figure 2 Costs of electricity generation including external costs[9]



For Europe, natural gas will continue to be critical for the transformation of the European energy system. In the Diversified Supply Technologies

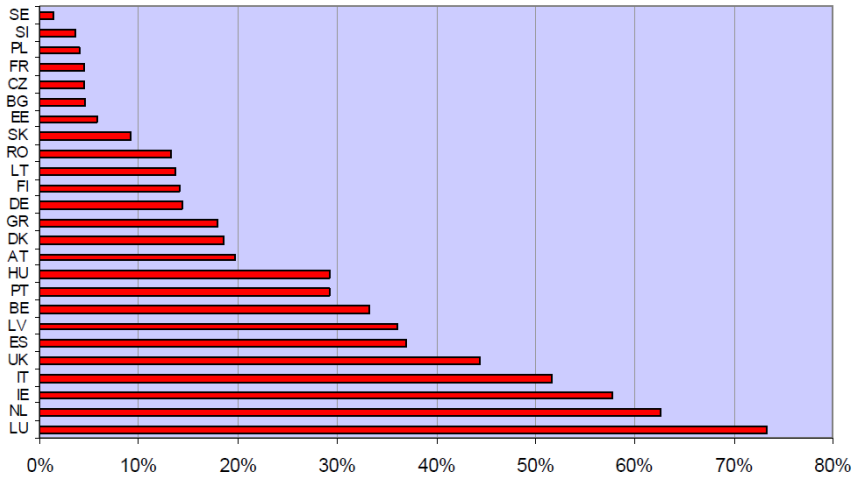
[7] Note that this holds for conventional natural gas, while, perhaps would not be the case for unconventional shale gas due to related improved external costs.

[8] The levelised costs represent the integral cost of power production by a particular technology over the plant lifetime, and comprise the capital costs, operational and maintenance costs and lifetime fuel costs, without government subsidies or other interventions.

[9] Mart Bles, Maarten Afman, Jos Benner, Martijn Blom, Harry Croezen, Frans Rooijers, Benno Schepers: Nuclear energy/ the difference between costs and prices. Delft, CE Delft, July 2011.

scenario,[10] for example, gas-fired power generation accounts for roughly 800 TWh in 2050, slightly higher than current levels showed in figure 3 (738.3 TWh in 2009, corresponding to the 23% of the total EU electricity generation in 2009 equal to 3210 TWh). The figure below shows that while certain countries in Europe utilise gas already in an extreme ratio, some others are barely making use of gas and thus present potential for increased consumption. This may be the case, for example, for France should there be changes in the country's political approach to existing nuclear facilities.

Figure 3: Share of gas in national electricity generation in EU27 in 2009 (in %)[11]



[10] No technology is preferred; all energy sources can compete on a market basis with no specific support measures. Decarbonisation is driven by carbon pricing assuming public acceptance of both nuclear and CCS. See also: "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and Committee of the Regions: Energy Roadmap 2050", adopted by the European Commission on 15 December 2011.

[11] Source: Eurostat, May 2011.

This situation could be modified depending on the availability of the Carbon Capture and Storage at industrial level as well as on the capability to improve the public acceptance for nuclear fission technologies, both of which are not easy to get realised in Europe in the short term.

The attitude towards nuclear energy across the member states of the European Union has been very heterogeneous after the accident at Fukushima Daiichi nuclear power plant in Japan, on March 2011.[12] While some countries started a nuclear phase out (Italy, Switzerland and Belgium) a declaration was signed on May 25 in Vienna by ministers and heads of delegations of Austria, Greece, Ireland, Latvia, Liechtenstein, Luxembourg, Malta and Portugal stating that "*nuclear power is not compatible with the concept of sustainable development and underlined their conviction that nuclear power does not provide a viable option to combat climate change*" and Johan Flasbarth, President of the German Environmental Protection Agency said that "*nuclear phase-out is doable and I don't expect unsolvable problems*".

In France President Sarkozy backs nuclear power, but his Socialist opponent, François Hollande, now well ahead in the polls, proposes cutting nuclear by more than a third by 2025. As one wag said, *forecasting is difficult, especially into the future*[13] and the recent story of nuclear energy is full of stop and go, renaissance and middle age, and serious financial, fiscal and monetary difficulties complicate so much the question depending on whether increasing the share of nuclear energy is or not the answer to Europe's energy challenges. In all circumstances and regardless of whatever shall happen, one thing is clear; it will be important to consider that global developments

[12] Dr. Paul Dorfman (University of Warwick), EC EESC Conference, Brussels, December 2011.

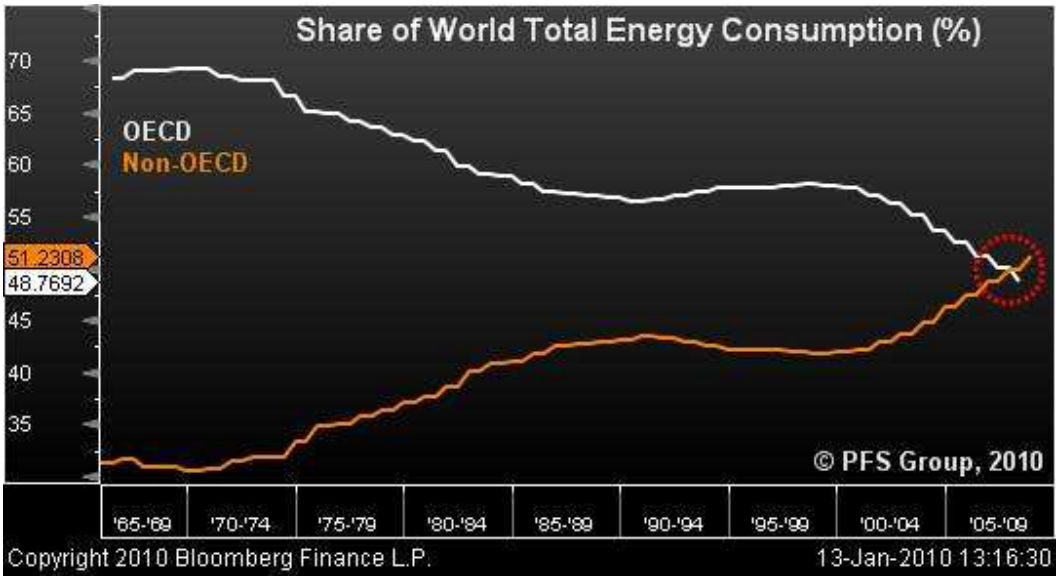
[13] Mark Jaccard (see note 3)

illustrate that the gravity of global energy system has been shifting to other corners of the world and as a result Europe has for some time no longer been the center of our galaxy!

In 2008 for the first time ever non-OECD countries surpassed OECD countries in terms of global energy consumption as the developing nations became more important than the developed countries in addressing global energy issues (see figure 4).

Economic growth and energy policies in non-OECD countries will be the key determinant of future gas consumption. A major expansion of gas used in China pushes domestic demand above 500 bcm by 2035, from 110 bcm in 2010.[14] Gas demand also expands quickly in other parts of Asia and Middle East.

Figure 4 Share of World Total Energy Consumption



[14] IEA - World Energy Outlook 2011.Chapter 4 – Natural gas market outlook.

Figure 5: Incremental primary natural gas demand by region and sector in the New Policies Scenario, 2009-2035.

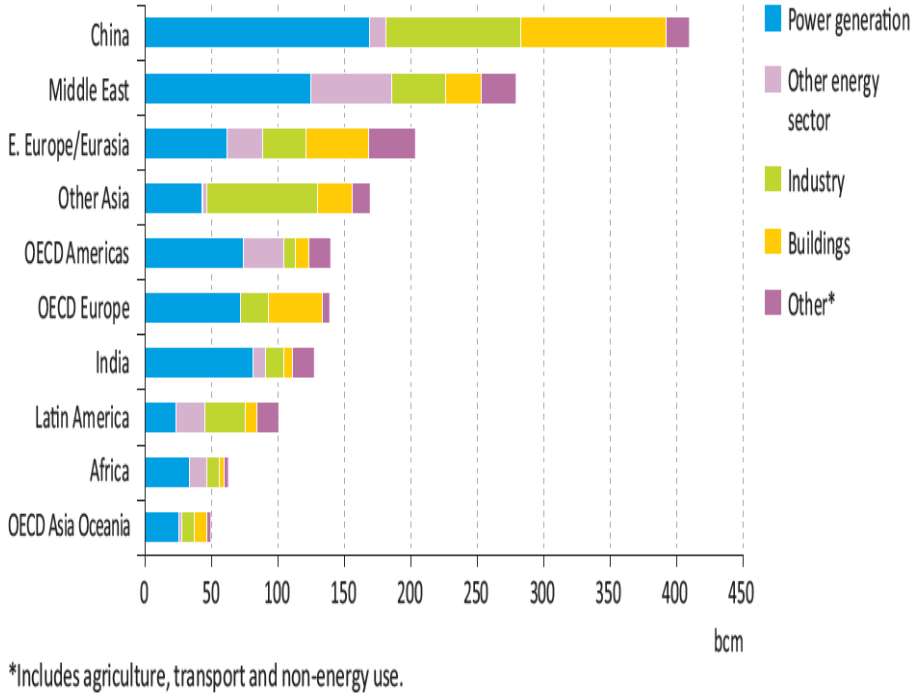
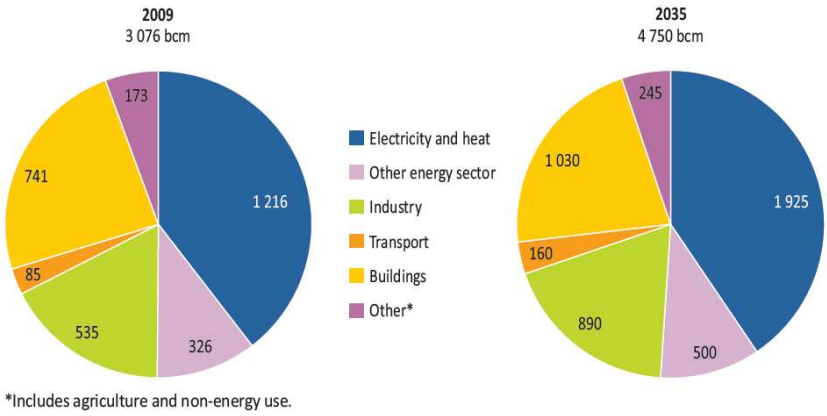


Figure 6: Primary natural gas demand by sector in the New Policies Scenario, 2009 and 2035.



3. The three pillars

Three pillars have, in our opinion, direct and significant importance to the possibility of maintaining the golden age of natural gas for a meaningful period of time. The first pillar is the availability of gas to satisfy growing demand at world level. The question is: how much gas do we have and at what price?

It is estimated that the world had 6,609 trillion cubic feet (Tcf) of proved gas reserves in 2010, sufficient for 59 years of production at current levels. Natural gas is projected to be the fastest growing fossil fuel globally with increase of 2.1% p.a. The non-OECD accounts for 80% of global gas demand growth, averaging 2.9% p.a. growth to 2030.[15]

On the supply side the main regional contributors to growth are the Middle East (26% of global growth) and Former Soviet Union (19%). Significant incremental supply (11-12% of global growth each) is also expected from Australia, China, and the US.

LNG represents a growing share of gas supply. Global LNG supply is projected to grow 4.5% p.a. to 2030, more than twice as fast as total global gas production (2.1% p.a.) and faster than inter-regional pipeline trade (3.0% p.a.). LNG contributes 25% of global supply growth 2010-30, compared to 19% for 1990-2010. The use of horizontal drilling in conjunction with hydraulic fracturing has greatly expanded the ability of producers to extract natural gas from geological formations with low permeability, particularly shale formations.[16]

---

[15] BP - Energy Outlook 2030

[16] World Shale Gas Resources: An initial assessment of 14 regions outside the United States, 5 April 2011, www.eia.gov.

The US Energy Information Administration estimates 860 Tcf of technically recoverable US shale gas against 273 Tcf of today's proven reserves. If this estimate is correct, shale gas alone would provide the US with 40 years of its gas consumption at current rates.[17] Nonetheless, being technically recoverable does not mean that such resources are economically recoverable.

Anyhow, sustained growth of shale gas raises the prospect of LNG exports from North America by 2030 (5 billion cubic feet per day (Bcf/d). Outside North America unconventional fuels are at their infancy. However, numerous uncertainties could affect future production of unconventional natural gas resources. France has recently taken legislative actions to ban hydraulic fracturing in the country, and South Africa has placed a moratorium on hydraulic fracturing while investigating how best to regulate it to ensure that environment is protected.

On 27 January 2012 the European Commission published a study[18] on the licensing and permitting procedures for shale gas project. Based on a sample of four Member States (France, Germany, Poland and Sweden) the study concludes that there are no significant gaps in coverage in the current EU legislative framework, at least for regulating the current level of shale gas activities.

As regards possible areas for improvement of national regulatory frameworks the study especially considers it as problematic that currently public participation in the authorisation process for exploration projects is often

[17] Martin Wolf, "Prepare for a golden age of gas", The Financial Times, Wednesday, 22 February 2012.

[18] Prepared by Philippe & Partners, Report on unconventional gas in Europe, 8 November 2011.

rather limited. It also emphasises that regulations should provide legal certainty for investors.

Historically, natural gas prices in OECD and some Asian countries have been closely correlated to oil prices via long term supply contracts. On the other hand gas prices are set freely in a competitive gas market which is known as gas-to-gas competition. Differences in pricing mechanisms have led to differences in the actual level of prices. The growing share of LNG in global gas supply is expected to contribute to a certain degree of convergence in regional prices, but price differentials are expected to remain between US, Europe and Japan due to relative isolation of these markets from one another.[19]

The second pillar is the need for expanding transportation means to physically deliver gas to centres of demand. The question is: are present infrastructures sufficient to guarantee the supply-demand equilibrium throughout this golden age?

Our analysis starts with overview of last ten years to see what has been growth in transportation of natural gas at international markets. The most significant growth has been recorded in development of LNG trade. For example, LNG flows recorded the largest growth with a 21% increase in 2010, the operational start-up of new liquefaction capacity in Qatar being the primary reason. By comparison, pipeline trade increased by 7%.

In an effort to develop new natural gas resources many new pipelines are being built. These will deliver natural gas to new markets and increase its use. Bearing in mind that the pay-back time related to natural gas pipeline investments is around 25 years or so, depending on the availability of third

[19] OECD/IEA, World Energy Outlook 2011.

party access clauses, investors need to illustrate to their creditors a stable cash-flow and a stable market for their revenues at least during this long pay-back operation period.

Figure 7: Growth rates in natural gas transportation since 2000 with the total cross-border gas trade and the LNG trade:[20]

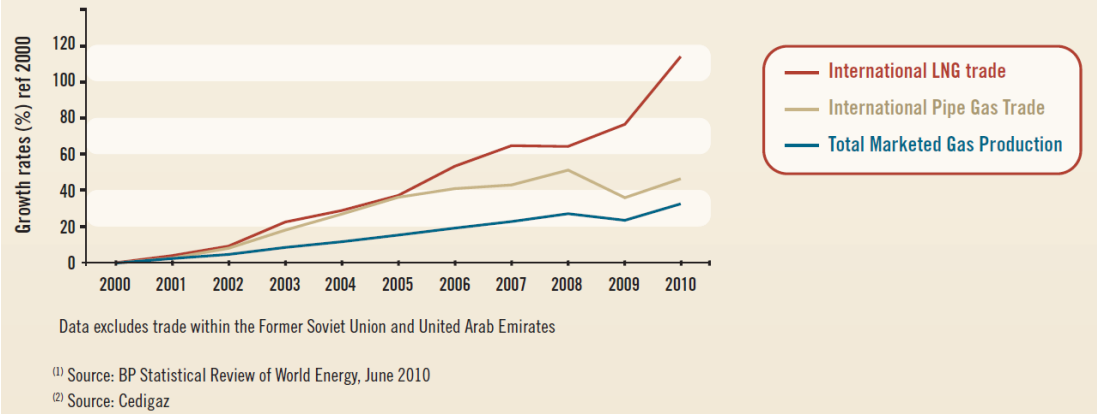
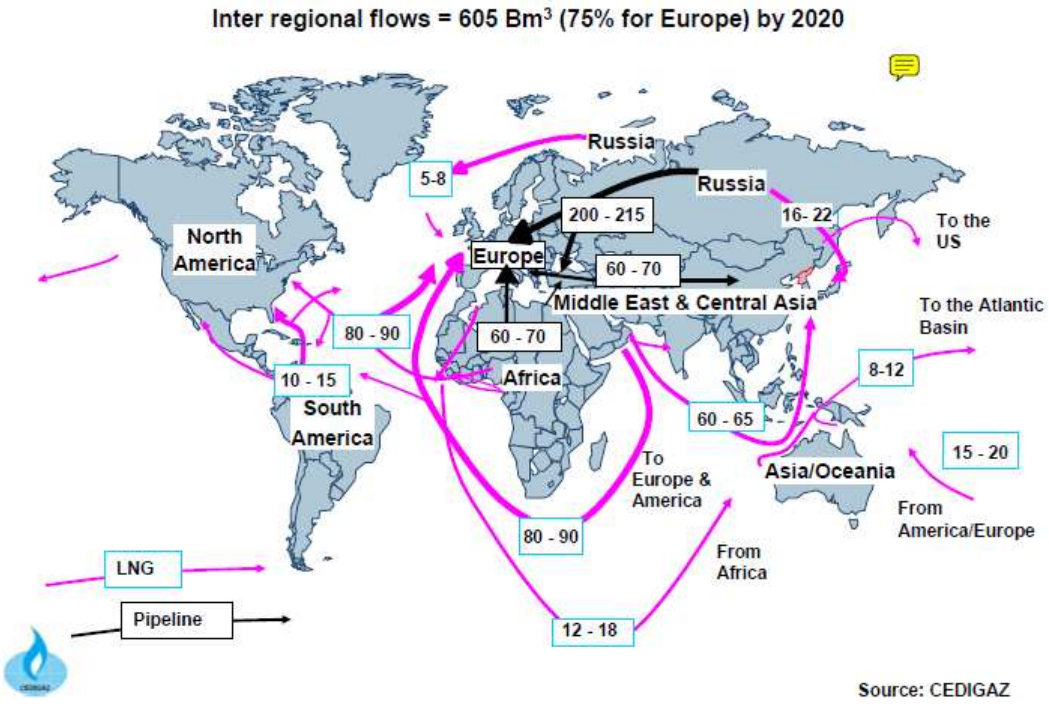


Figure 8: Projected growth in international trade of natural gas up to 2020



[20] GIIGNL, LNG industry 2011.

It is obvious that natural gas has a far wider market if converted to a liquid form because it is easier to transport. LNG enables countries without pipeline access to markets to produce gas and ship it to distant locations. Just a decade ago natural gas in some areas was considered to be a waste product and burned at the well site. LNG has changed it all and is transforming natural gas into a marketable commodity.

World natural gas liquefaction capacity nearly doubles, from about 8 Tcf in 2009 to 15 Tcf in 2035. Most of the increase in liquefaction capacity is in the Middle East and Australia, where a multitude of new liquefaction projects are expected to be developed, many of which will become operational within the next decade.

The third pillar is the need for significant investments to sustain the golden age of natural gas. The question is: how it will be possible to minimize the risks associated with energy-related investments and trade?

It goes without saying that all infrastructure investments bear a wide variety of risks and energy investments pose inherently greater risks than others. These risks may vary from technological or financial risks to market oriented ones, yet the most noteworthy are those that relate to those with political nature. Business circles in the energy value chain have repeatedly underlined that they are well-prepared to cope with all the risks of the energy investments but except for one risk item: political risks. Putting it differently, the business community highlights that they are well-suited to shoulder all risks that are "*underground*" but are specifically concerned of the risks that are "*above the ground*", a metaphor which refers to the political risks.

Perhaps more importantly, gas business presents a uniquely different picture as regards the political risks since this business is heavily dependent on the availability of network connections (pipelines), for example, as opposed to

the oil industry with relative ease to store and transport without any prerequisite of an existing pipeline facility. Despite the increasing share of LNG in world markets, gas is still primarily traded by pipelines and thus gas business is more prone to the existence of political stability in a larger geography.

At this point we would like to bring your attention to the fact that the second pillar is strongly linked to the availability or existence of third pillar: The need for international framework setting rules and establishing rule of law in order to address political risks. This can be done either by bilateral legal tools or possibly through multilateral legal instruments.

Indeed, the Energy Charter Treaty (ECT) provides for the energy business what is most required especially for the gas industry: political dialog and level playing field for energy investments through binding and politically motivating set of rules.

4. Legal instruments that support and maintain the golden era of natural gas

The ECT[21] is one of the most successful examples as a binding multilateral instrument containing the key criteria of governance, namely sharing common rules. To date, the Treaty has been signed or acceded to by European Community, Erratum and fifty-one states, from the Eurasian geography, including both developed and developing countries and representing a fair share of OECD as well as non-OECD countries. It plays an important role as part of an international effort to build a legal foundation for energy security, based on the principles of open, competitive markets and sustainable development.

[21] The ECT was developed on the basis of the European Energy Charter Declaration of 1991. The ECT came into full legal force in 1998, upon its ratification by the member states.

Although the ECT covers a broad range of energy-related activities, its principal provisions are those regulating energy investment, trade and the transit of energy materials and products through States which are Parties to the Treaty.

Protecting foreign investments has been a hot topic for decades. Starting with the 1950s and in the wake of the new global economic order, investment protection has been covered mainly in the form of bilateral investment treaties (BITs). The first BIT was signed between Germany and Pakistan in 1959, but without any provision allowing investors have recourse to international arbitral tribunals. Yet, this missing elementary part in the chain and the vacuum created concerning investment protection has been filled by the investor-to-state arbitration provisions, and has been further bolstered by introducing into BITs the umbrella clause.[22]

The surge of BITs has, so far, created a spaghetti bowl of more than 3,000 agreements, signed bilaterally between the states under international law. There exist many similarities as well as critical differences in the BITs covering many different fields; for example, only some of them include the energy sector in their range of activities that can enjoy from the legal protection provided.

The ECT has thus fulfilled a gap arising from the need for a multilateral legal framework providing investment protection (Art. 26 & 27). This may invite an

[22] The umbrella clause provides that a contractual claim by an investor against a government under their respective contractual relationship is automatically turned into an investment treaty dispute under the relevant BIT signed between the country which has signed the contract and the country of the investor who has also signed the contract. Thus, the umbrella clause works to the functioning of elevating a simple contractual relationship into a level of the bilateral investment treaty (BIT) and therefore it is as such turned into a dispute under BIT law, that is, international investment law or so-called treaty law, and thus it is no longer a dispute based on the contract but the investment law that can be challenged in various international arbitration mechanisms such as ICSID Convention or UNCITRAL.

analysis about the functioning of BITs versus multilaterals as regards possible overlaps. Below are the main points, albeit not an exhaustive list.

One important feature of the ECT is based on its multilateral character. While BITs can be changed or replaced by the mutual will of the respective two countries, a multilateral legal instrument provides much more security and certainty for investors that would fall under multilateral legal frameworks such as the ECT. Furthermore, while BITs generally are valid for a certain period (normally between 10 to 20 years), the ECT as a multilateral legal framework has no limited duration.

Thus, parties to a BIT are obliged to make a commitment of between 10 – 15 years, while there are no such time limitations in the ECT.

Furthermore, the ECT has the widest scope available for the protection of investments as compared to the whole range of BITs. This is due to the fact that the term *investment*[23] in the ECT is defined in a wide scope. Therefore, on this account the ECT might be taken as a more advantageous tool than BITs, if not at a par, for the following reasons: first, there may be BITs which might not cover energy sector in their scope. Second, and more importantly, certain BITs may not even allow for the investor-to-state arbitration mechanisms. Nonetheless it should also be underlined that it is a remote possibility to come across with such BITs.

The availability of the umbrella clause also functions as an additional important protection for investors, since this provision allows for commercial disputes with states to be elevated to the level of investment disputes under international law instead of remaining at the commercial level.

[23] Investment means every kind of asset, owned or controlled directly or indirectly by an investor (Art. 1 (6) of the ECT).

It is also noteworthy that trans-boundary energy projects are examples of the need for reliance on a multilateral legal instrument, despite the existence of the bilateral treaty expressly designed for a specific project. For example, in the Baku-Tbilisi-Ceyhan (BTC) Petroleum Pipeline Project the project documents have been structured not only in the context of bilateral treaties between the respective countries but also on the ECT framework.

Overall it should be emphasized that global energy security can be ensured by a regime of good governance, and a multilateral framework is best to address this need as compared to a bowl of thousands of BITs. Moreover, the Energy Charter process allows for a discussion forum, and its working group meetings allow the member states to closely cooperate on energy specific issues. Thus it can be asserted that the ECT process provides a good governance regime, since the term can be said to be associated with the concept of *autopoiesis*[24] and that the ECT process ensures interaction with the member states. Overall, it should emphasized that the ECT not only acts as a binding legal instrument through its binding provisions but also allows for a dynamic evolution into better improvements by way of its interaction with the constituent member states, and therefore is not a static legal instrument.

The ECT is supporting a sustainable energy dialogue and, above all, sharing common rules in order to achieve a common objective: the security of energy supply. Any governance should be based on a minimum set of binding rules, applied to all stakeholders subjected to it. Therefore, although there are critics of

[24] Autopoiesis means, literally, "*auto production*". Thus, it can be said that an autopoietic system is at the same time the producer and the product. This means that the Energy Charter Process creates an opportunity that member states take part in shaping energy policies under the ECT and sometimes even can amend the rules or provide feedback in policy discussions on energy issues, so that the investment protection mechanisms are not only a one-way effect tool but a platform for interaction, and it helps better the energy investments get realised.

the investor-to-state arbitration mechanism or rather more about its current functioning, it should also be underlined that the regime of the governance works only by sharing and respecting its binding rules.

Efficiency of any legal tool can be said to be measured against the empirical data that can be derived in the case of ECT from its effective use by energy sector stakeholders, namely the investors. In this respect the binding rules of the ECT have been used in 30 investment arbitration cases that have thus far come to the attention of the general public. Some of these cases have been finalized by the arbitral tribunals while others are still pending. Overall, one thing is for certain that the ECT plays a vital role in bringing a functioning international legal platform to the service of the energy sector for the benefit of all stakeholders.

Therefore, the ECT rules relating to fair and equitable treatment, national treatment, most favoured nation treatment, provisions relating to direct and/or indirect expropriation are all actively used by sector players towards creating a level playing field to ensure sustainable energy security though energy investments, trade and transit in all ECT constituency. Finally it should be underlined that the existing cases do not only take place against developing countries of the ECT range but also against developed countries, and as a result may be taken as a sign of effective impartial application of the ECT in its constituency without any perceived bias by any means.

5. Conclusions.

The question as to whether we are entering into the golden age of natural gas can be answered affirmatively yet may be challenged by some others. This kind of narratives has long been debated by many in the energy sector circles, and yet one can surely speculate that we are now into the natural gas era.

Nonetheless what is more important would be to lay down the prerequisites or depict the parameters of such a hypothesis. Therefore we suggest that there are three pillars to construct any viable argument regarding the so-called golden age of natural gas.

The foremost is the availability of gas to satisfy increased demand, to be followed by physical delivery to markets, and availability of proper legal mechanisms to promote investments into the supply chain. Recent developments have revealed that especially thanks to unconventional gas the reserves could significantly contribute to match global demand in the near future. While LNG share is also increasing, physical delivery of gas requires mainly pipeline transportation and as such is prone to be subjected to the adverse effects of political risks. Therefore, it is vitally important to have in place a functioning and reliable legal framework to promote investments and facilitate transportation of gas to demand centres.

The ECT is the unique multilateral legal framework for energy cooperation for all energy sector stakeholders by creating a level playing field. Existing arbitral cases may be taken as an example of how the ECT provisions work to the benefit of all parties in the sector through establishing binding rules and eliminating uncertainties.

To conclude it can be asserted that if one can refer to the golden age of natural gas this cannot get realised without an efficient legal framework already in place, and the ECT can help all sector participants significantly in this respect.

Brussels, 29 February 2012