

## **How Natural Gas Becomes the new Prize – Global Scenarios and Turkey**

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### **Abstract**

Twentieth century was the age of oil, despite all the turbulences and wars. The outlooks for oil for twenty first century are not that bright. The latest candidate for oil's throne is natural gas. But assuming the history of oil as a basis for understanding the natural gas futures, the transition may not be that smooth. This article briefly reviews the developments and tries to project possible outcomes through scenarios. Instead of typical Russian gas, transit rhetoric, the article looks more into other factors.

### **Introduction**

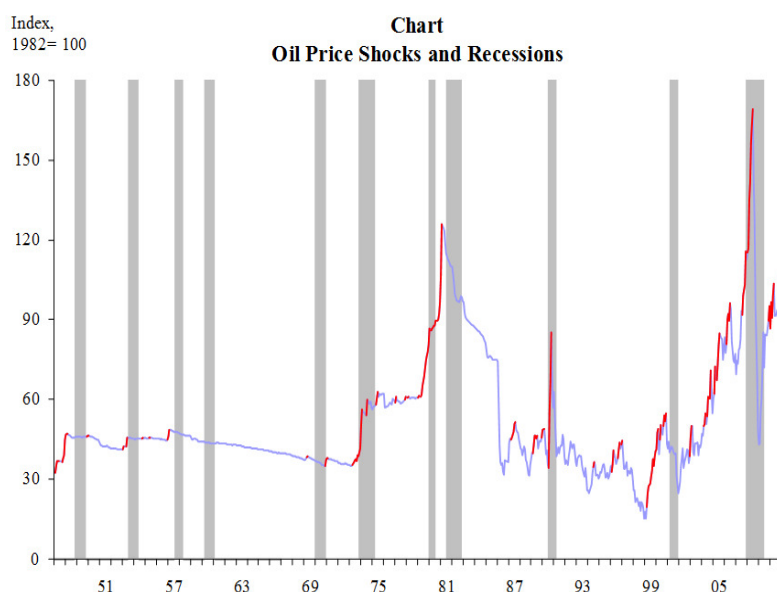
Since the early 20<sup>th</sup> century, human civilization has witnessed a surge in oil use and a concurrent increase in industrialization. Recently however, this industrialization is shifting mainly to the Asian countries coined by term “the rest”. “West” is producing less manufacturing goods but more services. This shifts the energy center of the earth towards Asia, since energy usage is more related to industry than services. The oil resources dwindle or less accessible and climate change discussions are pushing our energy realm into new dimensions. As the 20<sup>th</sup> century has been a century for oil, 21<sup>st</sup> century can be the century for natural gas. However this time there are important seismic shifts in world economy. The early signs of this can be seen as China becomes an important driver of renewable energy as well as the natural gas consumption. These and other developments will fundamentally affect the oil index based price formulation, spot prices and how shale gas revolution will shape the rest of the world. Turkey in this sense has the potential to use these winds of change in her favor. But there needs to be a better understanding of how world economies will evolve, how natural gas pricing will be affected and how this will impact natural gas demand. Since future cannot be forecasted but projected, through three scenarios ideas derived from this study will be presented to the reader.

### **Thumb rules**

An analysis starts with certain thumb rules and step by step deviates from these thumb rules and converge to realities. The first rule of thumb in this analysis is about the oil price hikes.

1. “Oil price hikes, increases the chances of economic crises in developed economies”

The logic behind this thumb rule comes from the Prof. James Hamilton's famous graph of oil price hikes and recessions in US economy. In the graph below red lines show oil price hikes and gray areas represent the recession periods.



Graph 1 – Oil prices and recessions (Prof. James D. Hamilton)

The reasoning from a microeconomic viewpoint is rooted in the spending habits of middle class. As fuel prices increase, there are fewer resources for other consumption items. Therefore consumption based growth dampens. In macroeconomic terms, most of the developed economies are net oil exporters and as the oil prices increase a larger wealth transfer between developed and developing countries happen.

Second rule of thumb is:

2. Every oil price peak is a possible indication of upcoming crises in oil exporting countries

The general reasoning for this thumb rule relies on how the oil exporting countries balance their budgets and transfer a certain amount of this wealth to its citizens. This rule of thumb also predicts more volatility in oil prices in the coming future.

The line of reasoning states that as oil prices increases, the rulers spend more on their citizens. State coffers require nearly constantly increasing oil prices due to increased spending and population growth. The need for infrastructure investments will increase, so more money will shift from fossil fuel exploration and development to other crucial or non-crucial infrastructure investments. If the oil prices collapses and does not recover around a year or 18 months (depends on country), it becomes unsustainable to preserve the current services and investments. Therefore the chain of wealth slowly deteriorates with alarming consequences on social unrest.

Arab spring cannot be considered wholly within this framework but the relationship between oil prices and other commodity prices has an effect on the narrative. Unfortunately the real problem lies in the lack of reserve capacity in the oil production.

Therefore it is possible to say that oil prices will be more volatile and consumer will look for alternatives to this century old fossil fuel.

**Natural Gas**

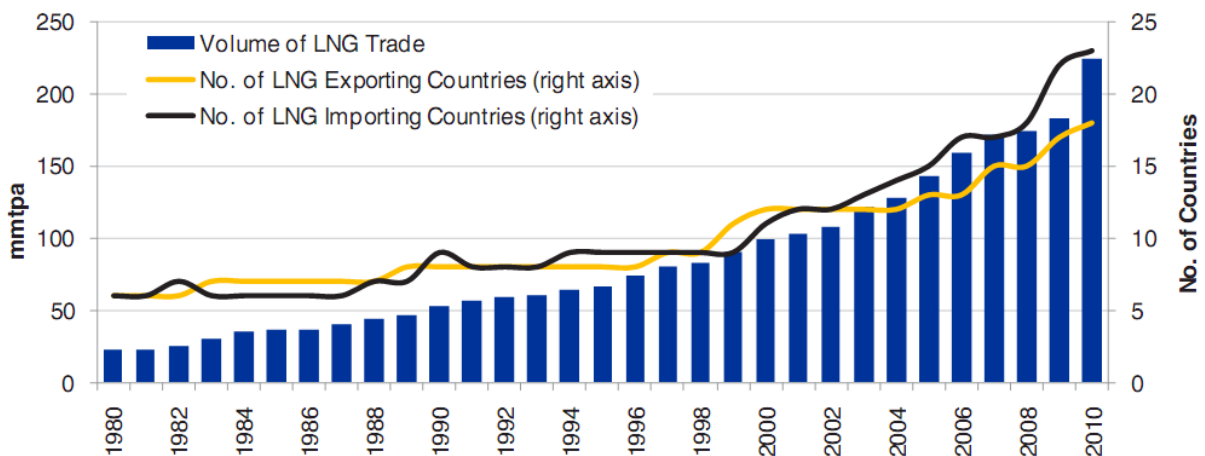
International Energy Agency’s flagship publication “World Energy Outlook(WEO) 2011” predicts an increasing share of natural gas. Oil’s share will decrease but will not be surpassed by natural gas until 2030-2040. Despite its popularity, natural gas prices will not be cheap.

\$/1000 m3 (*39.6)	2010	2020	2030
US	173.844	241.56	277.2
EU	317.196	376.2	399.96
Japan	432.036	463.32	487.08

Table 1- Gas prices from WEO 2011

In terms of natural gas demand, Asian demand is to hike from 341 bcm (billion cubic meter) in 2008 to 1244 bcm by 2035. European demand on the other hand will be expected to rise from 555 bcm in 2008 to 667 in 2035.

The other well known development has been the tragic aftermath of Fukushima disaster. Both Japan and Germany has announced retreat from nuclear. Assuming this policy trend to spread across the continent, there is a need for base load plants to replace nuclear. Coal is dirty, renewable are intermittent, natural gas emerges as the main candidate.

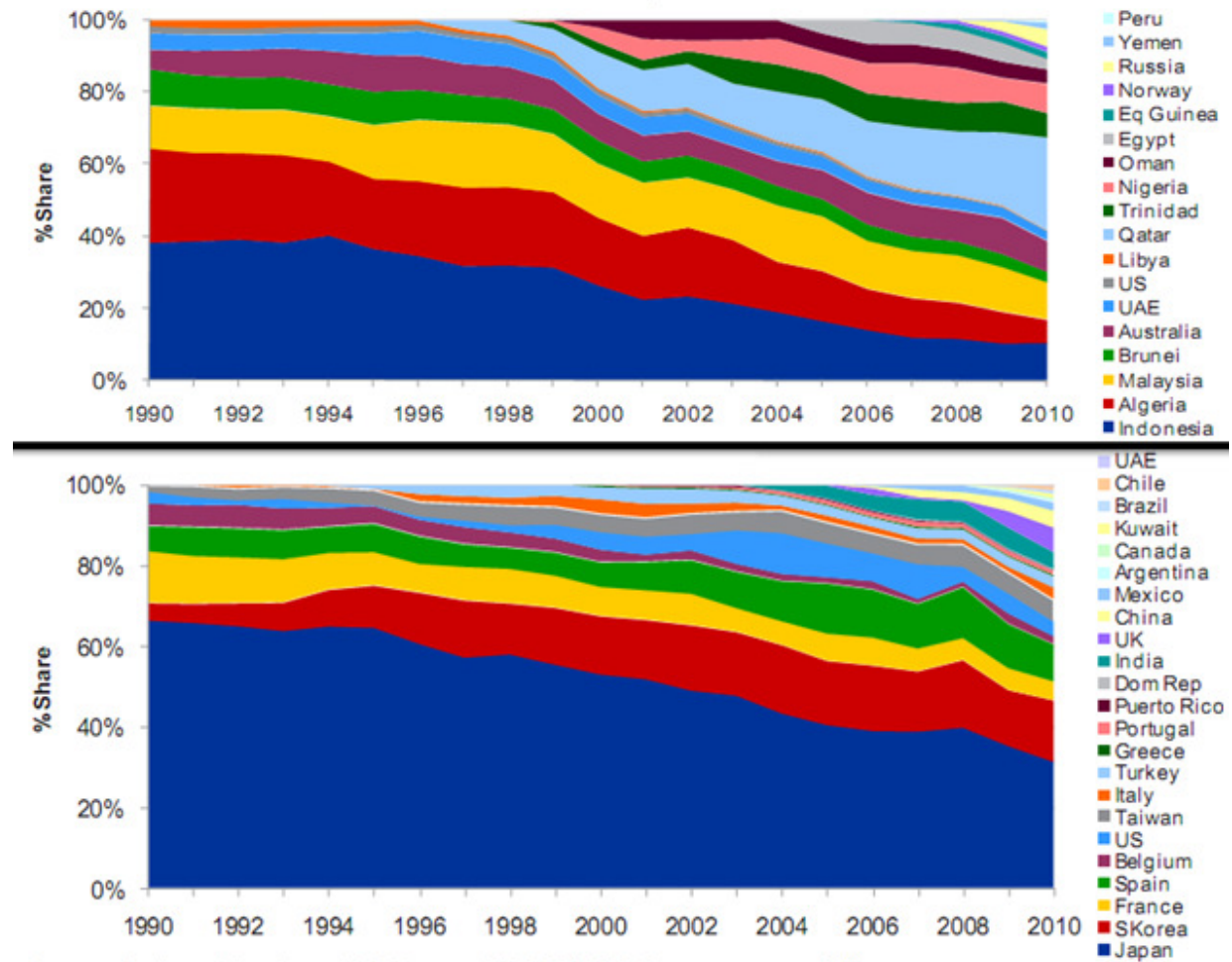


Graph 2 – Increase in LNG trade world wide

The sources of natural gas imports are either through a pipeline or LNG. Pipeline politics is not easy to analyze. To better understand the future of natural gas markets(more liquid), LNG developments are to be watched carefully and LNG is portraying a rapid development trend.

In LNG trade, there two trends that is obvious. The number of both exports and importers are increasing and the market is evolving in to a more competitive atmosphere. However the beneath the boot, there are

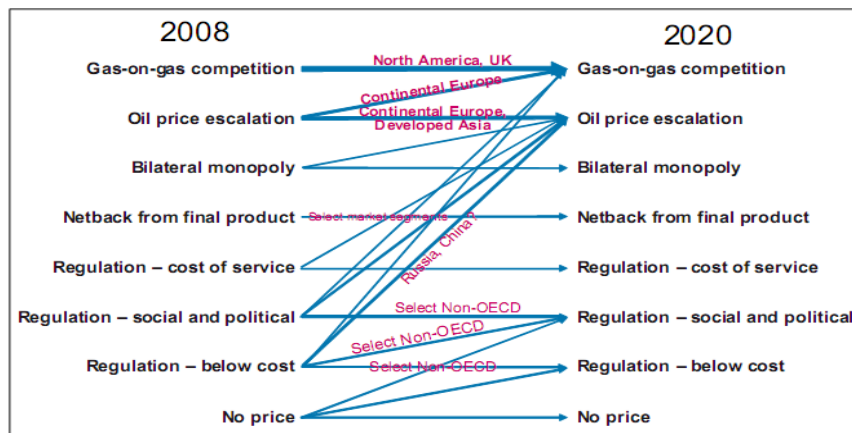
lots of factors affecting LNG market, such as need for long term contracts based on oil prices, investment problems and etc.



Graph 3- LNG market share of exporters (top), importers (bottom)

Therefore it is vital to elaborate how market prices are evolving. According to International Gas Union (IGU) report, pricing regime is converging in to two possible regimes. One is gas-on-gas competition and the other is oil price escalation.

While on gas-on-gas competition, prices are determined at hubs according to supply and demand, oil price escalations are based on oil price induced formulas.



Graph 4- Natural gas pricing methods and their possible evolution

All these changes are signaling a change in pricing regime of natural gas. As the history of oil prices show, whether it is pipeline or LNG, low prices deter investment and high prices dampen demand. Volatility harms both sides but stability requires concessions from both sides.

There are crucial parameters to watch such as how the developments in Syria will turn out, the Australian LNG development, shale gas in Europe(mainly Poland) and US. Syria is not discussed a lot, but there is a possibility that the gas fields found in Israel and Cyprus may continue on the Syrian part of sea shelf.

In terms of gas market pricing the main factors to watch is the developments in Asian gas markets. Australia is one of the keys to this market. For example Wheatstone LNG project in Western Australia is estimated to cost US\$29 billion and the project is already contracted to supply gas to Japanese power utilities. Chevron also invested US\$37 billion in Gorgon LNG project also in Western Australia. Also LNG from coal steam gas in Queensland had to be considered.

In terms of LNG capacities Gorgon has a capacity of around 15-16 million tones/year, Wheatstone 25 million tones/year and Queensland 10-15 million tones/year

Comparing this to developments around Cyprus, an LNG capacity of 15 million tones/year is expected, which requires 9 compressor units with a cost of US\$ 18-24 billion excluding the pipeline costs by sources. The earliest operation can be expected by 2017.

On the demand side however, the changes in transport fuels are key to natural gas development. Whether it will be electric or natural gas, it will indirectly or directly have a positive outcome on natural gas demand.

It is not easy to sum up all the trends but these are the major trends that are not discussed in detail but may have a significant effect on natural gas market dynamics.

### Scenario

In the scenario study, three main scenarios were determined

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1. Golden age
2. Tides
3. Recessions

In each scenario both oil prices and economic growths, oil price indexation, LNG, nuclear, electricity, transportation and the nature of contracts have been investigated. From these viewpoints, possible effects on Turkish market discussed.

In the “Golden Age” scenario, oil to natural gas change is smooth. The natural gas investments increase and market turns into a more liquid market. Oil prices slowly increase and allow for consumers adjustment to natural gas.

In the “Tides” scenario, oil prices fluctuate, volatility is high.

In the “Recessions” scenario, prolonged recessions dampen the investment environment. The crises spread to Asia and EU restructures its economy.

	<b>Golden Age</b>	<b>Tides</b>	<b>Recessions</b>
<b>Oil prices &amp; Economies</b>			
<b>Oil price indexation (OPI)</b>	 As shale gas and LNG investments surge, OPI not preferable.	 As the prices rise, spot prices, as they decrease oil price indexation is favorable	 Spot prices are not favorable over OPI
<b>LNG</b>	 Asian market rules.	 LNG market with long term contracts.	 LNG investments slow down
<b>Nuclear</b>	 Rapid phasing out of nuclear	 volatility slows down the phasing out	 No or very little phasing out of nuclear
<b>Electricity</b>	 More dependent on natural gas and renewable.	 Climate change issues are not that important	 King coal dominates.
<b>Transport</b>	 Increasing share	 No specific trend change, electric and natural gas transport is marginal	 “Recessions killed Electric car”
<b>Contracts</b>	 Buyers’ market	 Flexibility in take or pay contracts	 Formula changes happen, flexibilities increase

The effect of these scenarios on Turkey’s natural gas balance is various. In the golden age scenario a more diversified and vivid natural gas market exists. While on the recessions scenario the picture is not bright but helps Turkey to develop its own coal resources.

The most important conclusions from the scenario study are

1. Turkey's importance increases in all three scenarios albeit differences
2. The most cost effective transport route for gas resources around Turkey is through Anatolia.
3. A "Natural Gas Supermarket" in relation to Istanbul Commodity Exchange where suppliers meet with buyers around the world.
4. Both renewable and electricity stands on the shoulders of natural gas prices
5. A need for more risk averse and rapid decision making process.

## **Conclusion**

Oil price volatility within the geopolitical disturbances will pave the way for natural gas transition. The transition itself will transform the natural gas markets. LNG market dynamics are signaling what has been perceived as the seismic shift in the world economies, namely transition from West to Asia and China.

Therefore future is more uncertain than before. Purely speculating on Russian gas and European demand does not help to enhance our understanding on natural gas market dynamics. The paper however briefly reviews important aspects.

The price fluctuations are here to stay. The main reason for fluctuations is the delay between the supply and demand decisions and realization of investments. In this sense future may not be following one of the scenarios above but a combination of them both.

Turkey's main energy policy has to lean towards exploring possible natural gas sources whether off shore, coal bed methane, shale or others balanced between a framework to attract both buyers and sellers to trade in a natural gas market operated by her.

The ideas presented in these papers are personal and cannot be attributed to the institutions or organizations of authors relate with.

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