

## **The Role of GCC's Natural Gas in the World's Gas Markets**

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*The objective of this research is to analyze the growth of natural gas and examine the role of GCC's natural gas in the world markets. The analysis shows that GCC countries have the second largest reserve in the world and expected to grow larger in the coming years. The share of GCC gas export also increased to 28% of the total world supplied in 2009. However, the expansion in gas power generations will drive the growth in natural gas and Liquefied Natural Gas (LNG) higher worldwide. Advances in liquefactions and technologies have driven the cost of LNG down by 30%; this will encourage the GCC countries to increase their production in order to fulfill the requiring demands. Even though Saudi Arabia had made it clear that it will not export its gas, at least in the short run, all signs indicate that the GCC countries have the resource capability to provide substantial gas supplies to Asia, Europe, and America for a long time to come.*

**Field of Research:** Energy Economics

### **1. Introduction**

Studies proved that natural gas is the fastest growing source of energy since the seventies and it will continue in the future as demands are projected to increase in all regions in the world. Natural gas is expected to grow at an average rate of 2.3% yearly until it reaches 156 trillion cubic feet in the year 2025. Share of natural gas among energy use will also grow from 23% to 28%. Because of its economical advantages, natural gas is an increasingly attractive source of energy in many countries and as petroleum was last century's and coal before that, no doubt, natural gas has an excellent vision for future demand and will be the fossil fuel of the twenty first century.

Currently, GCC countries, especially Qatar, Oman and UAE are among the major Liquefied Natural Gas (LNG) exporters in the world, which has a positive affect on their economies. These countries, include Saudi Arabia, Kuwait and Bahrain, store about 25% of world reserves of natural gas and this amount is no doubt that the GCC countries can ensure that continue to play a pivotal role in the global markets especially the LNG market, which increases the volume of trading day after day in the major markets.

On the other hand, some analysts say that demand for gas in the GCC countries will increase as a result of increasing internal development which requires more gas for power generation. This might lead to more gas import in the future and increasing gas shortage in the GCC countries and therefore, affect the supply of gas in the rest of the world.

The main objective of this research is to use economic analysis to analyze the growth of this important source of energy and examine the role of GCC countries in the gas markets.

## 2. Hypothesis and Methodology of the Study

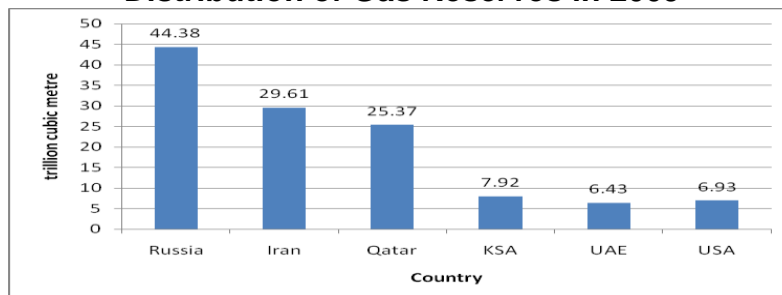
To test the hypothesis that the Gulf Cooperation Council (GCC) countries will have more role in the natural gas markets in the future, a descriptive economic analysis will be conducted. The methodology of the study consists of analyzing the natural gas industry and its growth in the world's gas markets. The analysis will include reserve, supply, demand, price, transportation, gas markets, and the demand for gas in the future.

## 3. Natural Gas & its Growth in the World

### 3.1 Reserve of Natural Gas

Reserves of natural gas are estimated to continue to grow around the world as a result of innovations in exploration and extraction techniques. In 2009, reserves are estimated to reach 187.49 trillion cubic meters compared to 148.55 trillion cubic meters (tcm) in 1999, growing at an average rate of 2.34 % annually. Former Soviet Union has the largest natural gas reserve in the world, followed by Iran in, and Qatar and Saudi Arabia in the third and fourth places respectively while UAE in the fifth place, figure (3-1). In total, GCC countries represent almost 23 % of world proved reserve.

**Figure (3-1)**  
**Distribution of Gas Reserves in 2009**



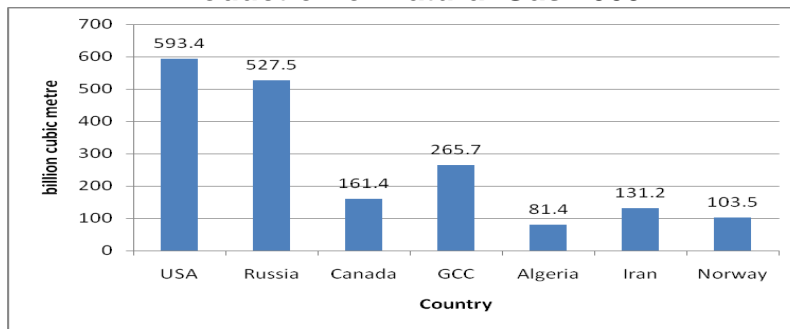
Source: Data collected from Statistical Review of Energy Report, 2010

### 3.2 Supply of Natural Gas

In today's economy, natural gas became one of the most important sources of energy to many countries around the globe. Advances in liquefactions and technologies have driven the cost of Liquefied Natural Gas (LNG) down by 30%; this encouraged many countries to increase their production in order to fulfill the requiring demands. In 2009, total world production reached 2987 billion cubic meter (bcm) and most of the gas produced came from regions such as USA, Russia, GCC countries, Canada, Iran, Norway, and Algeria, figure, (3-2).

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**Figure (3-2)**  
**Production of Natural Gas 2009**

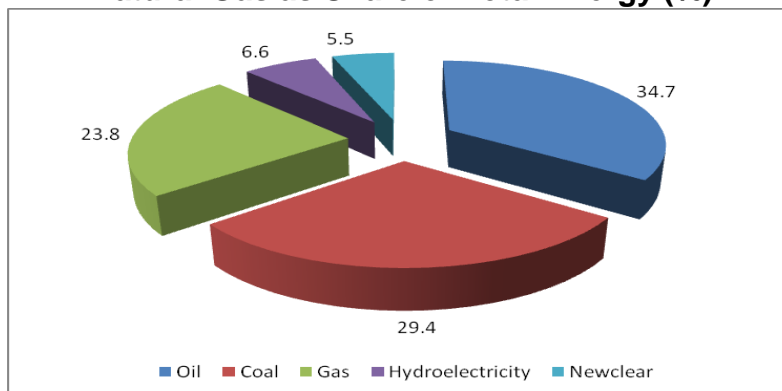


Source: Data collected from Statistical Review of Energy Report, 2010

## 3.3 Consumption of Natural Gas

Almost 24% of the world's energy consumption is devoted to natural gas. Figure (3-3) shows the share of natural gas compared to other sources of energy.

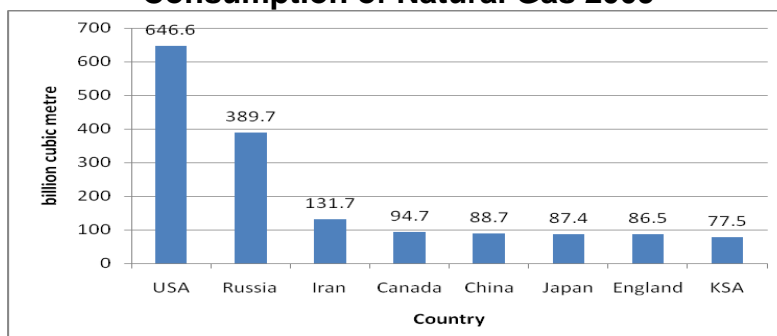
**Figure (3-3)**  
**Natural Gas as Share of Total Energy (%)**



Source: BP statistical Review, 2010.

During the last 10 years, the use of natural gas increased from 2321.3 billion cubic meter (bcm) in 1999 to 2940.4 billion cubic meter in 2009, registering an average growth rate of 2.4 % annually. Countries such as United States, Russia, and Iran registered the highest consumption in 2009, figure (3-4).

**Figure (3-4)**  
**Consumption of Natural Gas 2009**

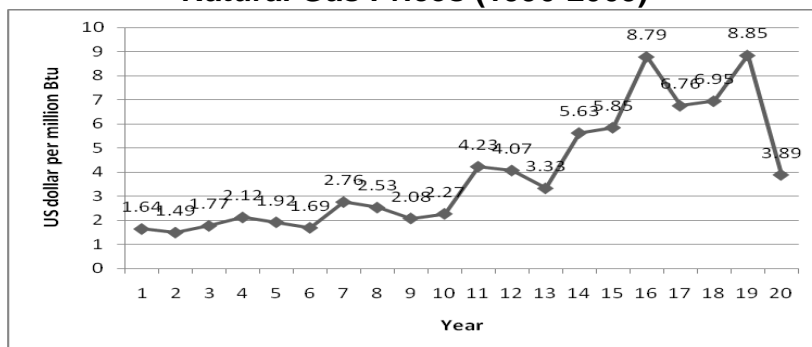


Source: Data collected from Statistical Review of Energy Report, 2010

### 3.4 Prices of Natural Gas

Prices for LNG usually expressed in US dollar terms, dollars per Million British Thermal Unit (MMBTU). Prices can be expressed on a free on board (f.o.b) or delivered ex-ship (d.e.s) basis. Most contracts in today’s transactions are f.o.b contracts, which give buyers more flexibility to trade surplus LNG cargos. Prices usually are higher in the Pacific than in the Atlantic basin, due to its high demand and lack of domestic supply. While price of LNG in the European and Asian Markets is linked to the price of a basket of substitute fuels, price in the North American Market is linked to the Henry Hub price. During the last 20 years, the prices of LNG imports increased from \$1.64 per (MMBTU) in 1990 to \$3.89 per (MMBTU) in 2009 increasing at an average growth rate of 4.4 % annually, figure (3-5).

**Figure (3-5)  
Natural Gas Prices (1990-2009)**



Source: Data collected from U. S. Department of Energy.

### 3.5 Gas Transportation

Although pipelines transport most of the gas traded in the world, especially in Europe and North America, LNG transportation is mainly by large tankers ranging from 25,000 cubic meters to 138,000 cubic meters. Transportation costs among regions depend on many factors such as the size of cargo, length of routes, cost of fuel, insurance, labor and administrative costs. They also depend on the length of the contract, and are usually larger for short-term contracts. These costs vary from \$ 0.19 per (MMBTU) for round-trips of 2000 miles to \$ 1.4 per (MMBTU) for 25000 miles trips.

## 4. Markets of Natural Gas in the World

### 4.1 The Asian Market

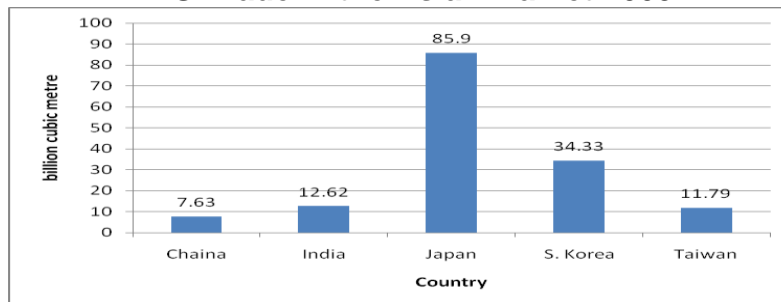
Although this market is considered the world’s third market that consumes natural gas, it is considered number one market in terms of using imported LNG, especially by Japan, which consumes about 35.4 % of the total world supply in 2009. Power generation is the main consumer sector of the imported gas. Countries such as Qatar, Malaysia, Indonesia, Australia, and Oman are the main exporters to this market.

Suppliers from outside the region have also made some remarkable recognition in the market including spots cargoes from Russia, Algeria, and Trinidad.

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In 2009, total import of LNG in this market reached 152.27 bcm, 62.7 % of world imports of LNG, distributed among the importing countries as shown in figure (4-1).

**Figure (4-1)**  
**LNG Trade in the Asian Market 2009**

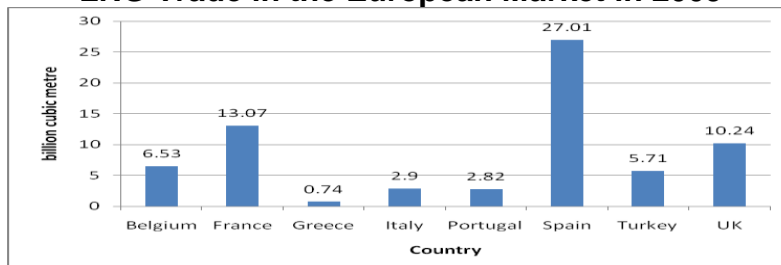


Source: Data collected from Statistical Review of Energy Report, 2010

### 4.2 The European Market

It is considered as the World's second largest consumer of natural gas. Residential and industrial sectors, which are followed by power generation sector, are the dominant users of this source of energy. In 2009, Pipe lines supplied about 82.3 % of the total gas required in the market, while 17.7 % is supplied in the form of LNG. Russia, Norway, Netherlands, and Algeria are the main pipelines source of gas to this market. They supplied about 78.2 % of the total pipe gas required, while Qatar, Algeria, Nigeria, and Egypt are the main suppliers of LNG to the market, they supplied about 56 % of total LNG required. Spain, Italy, France, Greece, Turkey and Portugal are the main LNG importing countries in this market; figure (4-2).

**Figure (4-2)**  
**LNG Trade in the European Market in 2009**



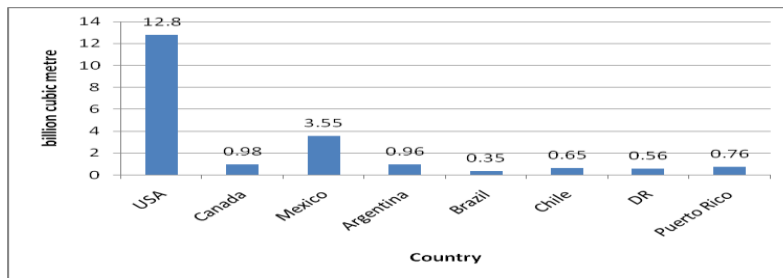
Source: Source: Data collected from Statistical Review of Energy Report, 2010

### 4.3 The North American Market

It is considered as the world's largest consumer of natural gas. It consumes about 30% of total world supply, especially in the industrial sector and power generation. Though this market is self sufficient in supplying its requirements through pipelines, which follows from Canada to the United States and from the United States to Mexico. Pipe lines supplied about 86.8 % of total gas required, while 13.2 % is supplied in the form of LNG. United States imported some of its requirements in the form of LNG, which accounted for 62.2 % of total LNG in the market, the largest importer in the market, followed by Mexico which accounted for 17.2 %, figure (4-3). Imports in this market have increased during the past years due to the decrease in costs of natural gas. In 2009, total import into the market reached 155.59 billion cubic meter (bcm), 17.8 % of world total.

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**Figure (4-3)**  
**LNG Trade in the American Market 2009**

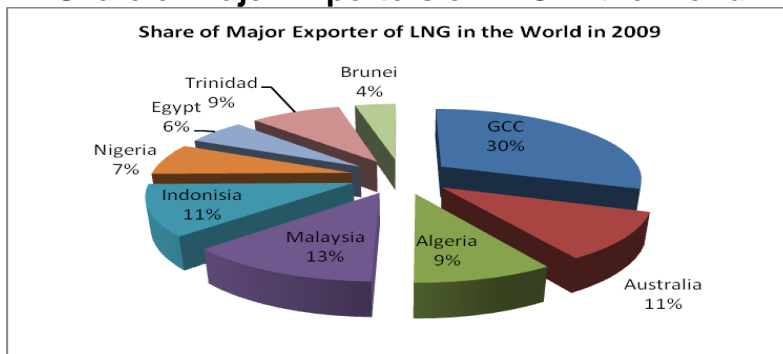


Source: Data collected from Statistical Review of Energy Report, 2010

## 5. Existing Markets for GCC's Natural Gas

Beside GCC countries, countries such as Indonesia, Brunei, Malaysia, Australia, Algeria, Egypt, Trinidad, and Nigeria are the main exporters of LNG in the world. In 2009, these countries exported 72% of total world export compared to 28% exported by the GCC countries mainly Qatar, Oman, and UAE, figure (5-1).

**Figure (5-1)**  
**Share of Major Exporters of LNG in the World**

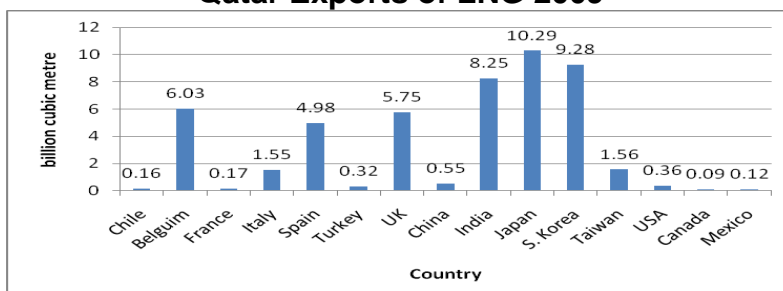


Source: BP Statistical Review, 2010.

### 5.1 Qatar

Qatar sells its gas in the form of LNG since 1996. Its markets are Asia, Europe and America. In 2009, its exports accounted for 20 % of the total world LNG trade, number one in the world followed by Malaysia and Indonesia. Figure (5-2) shows the major importers of Qatar's gas in the world.

**Figure (5-2)**  
**Qatar Exports of LNG 2009**



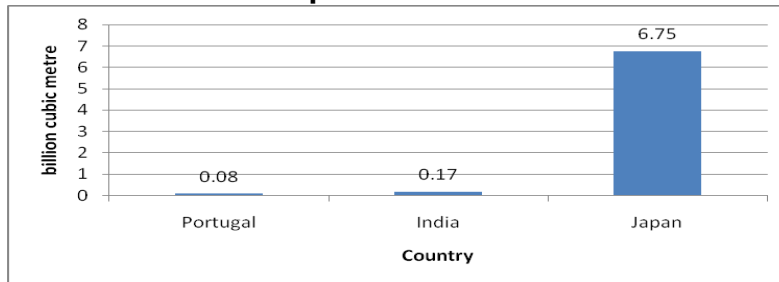
Source: Data collected from Statistical Review of Energy Report, 2010

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## 5.2 UAE

UAE is the first Gulf state to enter into the LNG business when its first plant came on line in the 1970s devoted mainly to export non-associated gas to Japan. Today UAE has no interest in expanding its gas exports, but instead it will imports gas from Qatar through the Dolphin Project. In 2009, its exports accounted for 2.9 % of the total world LNG trade, number eleven in the world after Brunei. Figure (5-3) shows the major importers of UAE's gas in the world.

**Figure (5-3)**  
**UAE Export of LNG in 2009**

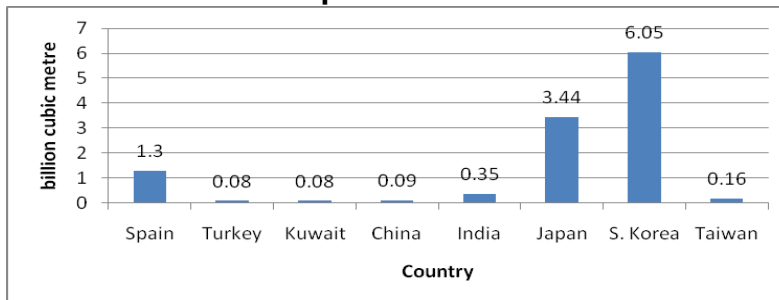


Source: Data collected from Statistical Review of Energy Report, 2010

## 5.3 Oman

Oman came to LNG business in 2000 when it first exported LNG to South Korea. Today, Oman is not only exporting LNG to S. Korea and Japan, but, with some occasional spot cargos, it invaded the European and American markets. In 2009, its exports accounted for 4.8 % of the total world LNG trade, number eight in the world after Egypt. Figure (5-4) shows the major importers of Oman's gas in the world.

**Figure (5-4)**  
**Oman Export of LNG in 2009**



Source: Data collected from Statistical Review of Energy Report, 2010

## 5.4 Saudi Arabia

Saudi Arabia had made it clear that it will not export its gas, at least in the short run, but rather Saudi Arabia announced that it has the interest in developing its gas internally to meet its power and water needs and for the development of its petrochemical industries.

## 5.5 Kuwait

Kuwait also is hoping to increase its use of natural gas both domestic and imported especially in electricity generation, water desalination, and petrochemicals. Kuwait already signed memos of understanding with Qatar and Iran for possible gas

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imports. This switch to natural gas would free up a substantial amount of oil for export.

### 5.6 Bahrain

With its 3.25 trillion cubic feet (tcf) reserves, Bahrain is producing natural gas to satisfy the needs of its largest consumer, the aluminum smelter, which is the largest in the Middle East. Bahrain's growing demand for electric power generation is likely to cause it to become a net natural gas importer in the coming years. In 2002, Bahrain signed a memo of understanding with Qatar indicating Bahrain's intention to buy natural gas from Qatar.

## 6. The Demand for Natural Gas in the Future

### 6.1 The Asian Market

It was estimated by the Energy Information Administration (EIA) that demand for natural gas in this market would increase to reach 475 billion cubic meter by the year 2010. Imports by the market are forecasted to double by the year 2015 as a result of increase gas power generation and strong economic growth. Supplying any deficiencies between quantities demanded and quantities contracted at that time, which estimated to be 229 billion cubic meter is subject to the ability of the original suppliers in fulfilling that demand and competition among new suppliers in the market.

### 6.2 The European Market

It was estimated by EIA that demand for natural gas in this market would increase to reach 385 billion cubic meter by the year 2010. More than 60% of the gas consumed in this market will be diverted to the electric power generation, which will increase at an average rate of 3.6 % annually between 2002 and 2025. The share of gas utilization in generating electricity will increase from 14% in 2002 to 28% in 2025.

Import is forecasted to increase 40% of demand in 2015 and more than 50% by 2025 and it was estimated that most of the imported gas would be diverted for electricity generation.

Supplying any deficiencies between quantities demanded and quantities contracted at that time, which estimated to be 40 billion cubic meter is subject to the ability of the original suppliers in fulfilling that demand and competition among new suppliers in the market.

### 6.3 The American Market

North America's import capacity is expected to continue to expand between now and 2025 and more than 50 proposals to build new re-gasification facilities have been put forth. This gives clear indication that LNG trade will play a greater role in the market for years to come.



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The market is expected to counter major growth in LNG trade, especially after emerging as major LNG importer. If that happened, this would increase the share of the market and possibly dominate the international trade of LNG. USA alone is expected to increase its LNG share from 1 % in 2002 to 21 % (6.4 trillion cubic feet) in 2025.

Imports by pipelines from Canada to the USA is expected to decline in the coming years due to the strong growth in Canada's internal need for natural gas.

The gap between production and consumption in 2025 is estimated to be 8 trillion cubic feet (short).

LNG import estimated to increase significantly in the coming years surpassing imports by pipelines from Canada.

New LNG import facilities in USA, Mexico and Canada were expected to go on line by 2010. These would bring about 20 trillion cubic feet new import capacity to the region.

## 7. Research Findings

The previous analyses shows that natural gas is expected to grow at an average annual rate of 2.8% in the next two decades. Share of natural gas among energy use will also grow from 23% to 28%. The expansion in gas power generations will drive the growth in natural gas and LNG higher worldwide. The decrease in transportation costs, advances in liquefactions and technologies during the past decades have driven the cost of LNG down by 30%; this encouraged many countries to increase their production in order to fulfill the requiring demands.

On the other hand, the analysis indicates that trade of LNG is heading toward increasing competition in the coming years. Many countries are putting a lot of efforts to develop their natural gas resources either for their own domestic use or to compete for securing footholds in the world markets, as demand for natural gas is projected to increase.

The analysis also shows that GCC countries have the second largest reserve in the world after Russia, and expected to grow larger in the coming years. The last twenty years experienced the highest rates registered as 26 % and 25 % in the United Arab Emerits and Qatar, respectively. The share of GCC gas exports also increased to 28% of the total world supplied in 2009 compared to 25 % in 2005.

Although the analysis shows that Saudi Arabia will not export its natural gas, at least in the short run, instead it will use it for its internal development, Qatar shows to be the only one unaffected with the supply-demand imbalances and has the infrastructure and capacity to sell more long-term gas deals.

## 8. Conclusion and Recommendations

The large number of new terminals and projects that have been proposed around the world and the expansion of the existing ones, will no doubt, increase competition not only among original suppliers, but among new producers as well. The decrease in transportation and liquefaction costs during the past decades is also a sign for more

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competition between producers in the future. The cost advantage and location however, are likely to persist.

Many countries, especially in Europe, are seeking to diversify their gas sources as their demands are projected to increase in the future. This, no doubt, will open new opportunities for GCC countries and other producers to take advantage from such plans in the future.

Even though gas competition will increase in the future, all signs indicate that the GCC countries have the resource capability to respond to the increase of either local or global required demand. GCC countries will be benefiting from its huge gas reserve, strategic location, and the advances in liquefactions and technologies, which have driven the cost of LNG down, to play more role in the global markets by providing substantial gas supplies to Asia, Europe, and America for years to come.

To secure more footholds in these expanding competitive markets, GCC countries can generate more profits by opening their markets to more private investment to grow the capacity of gas production and supply of gas so that it can respond fully to the global transformations of the gas demand.

Also, GCC countries have to develop a special and flexible marketing strategy seeking the reduction in production and processing costs and focusing more in the larger modern tankers to counter for the problem of high transportation costs.

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### **Glossary of the abbreviated acronyms**

(GCC)	= Gulf Cooperation Council
(LNG)	= Liquefied Natural Gas
(bcm)	= billion cubic meter
(tcm)	= trillion cubic meters
(tcf)	= trillion cubic feet
(MMBTU)	= Million British Thermal Unit