Natural Gas Industry in Iran

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Abstract

AT the end of March 2007, the remaining quantity of recoverable gas reserves in the country has been in excess of 28.3 trillion cubic meters that is the second gas rich country in the word. While the geological studies in certain geographical regions of the country have not been thoroughly conducted yet. it is likely to explore further reserves of gas in the future. Therefore a thorough and explicit planning knowledge is essential for utilization of this energy carrier. Iran is one of the largest gas rich countries in the world that production potentials exceed gas injection and domestic consumption requirements. Gas can be utilized as feedstock for petrochemical and refining products or exported through pipelines or as LNG. By injecting gas into oil reservoirs while increasing the oil recovery ratio of oil fields, gas storage from production of shared reservoirs into non – shared reservoirs is as well accomplished. Gas consumption in domestic markets and its substitution with oil products in addition to environmental benefits, will also result into the optimum consumption of these products and relieve the government from the heavy burden of existing subsidies and the heavy expenditures of importing these products into the country. To supply gas requirements, proper operation and appropriate production of shared reservoirs such as south pars with the objective of securing gas requirements and providing balance of supply and demand as well as utilization of maximum share in these reservoirs are other essentials towards development of this vital industry. Several energy experts and Iran's economy analysts believe that further expansion and utilization of natural gas is an essential element for sustainable development and this energy carrier is considered the superior fuel of the 21 century.

According to reliable estimations, natural gas in regard to its intrinsic characteristics and especially environmental suitability is one of the energy carriers that will attain the highest growth rate among other energy carriers with in the next two decades which itself is indicative for consumption growth of this substance in the global basket of energy consumption.

The need of the world's countries for energy sources along the enormous natural gas reserves in the country opens broad economical, political dialogue scene towards us and contributes an outstanding strategic significance to our gas resources.

Iran, regard to her geographical and political strategic situation. Can play a leading role in global gas supply and act as a bridge between the enormous Middle Eastern gas reserves with major gas consumption and demand centers in Europe and Asia Planning and policy making regarding the development of gas industry, it is essential to manage all aspects of gas from exploration and production to consumption, injection and exports and etc. is essential to be administered by the national Iranian gas company so that prepared plans could be implemented without being subject to

such problems as lack of coordination, parallel activities and organizational difficulties.
The Islamic republic of Iran having access to enormous quantities of gas reserves, towards attaining the appropriate disposition in regard to her volume of reserves should as well furnish the provision of absorbing the world's up to date technological capital , to compensate her remoteness from worlds gas markets.
The 21 century is the century of gas and our country potentially and in an exceptional manner, by adopting an organized strategy ,could portray the most natural and influential role for the people and the country's economy as well as in the region and the world.
The increasing global needs for hydrocarbon energies and related industries / encompasses one of the golden opportunities for our country.
In conclusion it is worth mentioning that within that the next 10 years Iran requires capital investment in excess of $50 billion in her gas industry to become capable of accomplishing objectives such as supply of domestic demands/provide the necessary gas for injection to oil wells / increase gas reservoirs/added value through transaction with industries and to realize proper disposition in regional and global gas market.

Preface

The country's gas reserves today is over 28 trillion cubic meters and in terms of calorific value equivalent to over 176 billion barrels of crude oil which this figure far exceeds the country's stated crude oil reserves for some 136 billion barrels and therefore with this account from the country's total hydrocarbon reserves 60% consists of natural gas and 40%crude oil that considering further oil reservoirs operating complexities and serious uncertainties concerning the actual quantity of these reserves and the existence of issues such as ratio of recovery and quantity of recoverable oil reserves and etc, the certainly of statistical information for the country's gas reserves will exceeds oil reserves statistics.
Iran holding 17% of global gas reserves is privileged with an outstanding and exceptional standing among gas rich countries. However Iran's market share does not comply with share of reserves and due to enormous investment expenditures for production and transmission of gas to global markets and remoteness from consumption markets and increasing domestic requirements ,Iran has not been able to achieve yet a standing in proportion to the quantity of her reserves in the global market.
The most apparent reason for the increasing significance of natural gas and its entry into the competition market of other energy sources is the statistics unfolding the increasing dependence of the global industrial sector to natural gas.
The quantity of gas utilized as a source of energy by various global industrial sectors has reached to44% and share of electricity in this sector as well is 13% in general based upon annual assessments, the share of natural gas in total energy consumption is 23%.
Analysts emphasize that the significance of natural gas in future will still increase due to its low pricing and minimal environmental polluting impact.
Natural gas market is constantly expanding and its dependency as a clean source of energy has also increased in different sectors.
Obviously these assessments have been submitted assuming current conditions and with consideration to the extensive research being implemented. If a major technological breakthrough takes place in this respect and especially the process of producing oil products from natural gas GTL turns in to a feasible process and

refinery products are substituted by these manufactured products in the transportation sector, a major step forward will emerge in natural gas demand.
Furthermore / in respect to the environmental protection issues and agreements there will be more serious endeavors taking place to substitute the global basket of energy consumption with natural gas .
The estimations are also indicative that within the next two decades, global natural gas demand will further exceed other primary energies.
Natural gas in regard to intrinsic characteristics and especially environmental compatibility is one of the energy carriers that until year 2030 will maintain the highest growth rate among other energy carriers and this in effect suggests that the share of natural gas in global basket of energy consumption is gaining momentum. the Islamic republic of Iran in consideration to her geo- strategic disposition located among two regions with huge global natural gas reservoirs (the former Russia and Persian gulf border countries) / is considered the second largest gas rich country in the word (after Russia)
Obviously the second largest gas rich country in the word can not ignore entering the global society of natural gas exporters.
Therefore Iran possessing extremely rich natural gas reservoirs and also as the most economical/ secure and the most immediate gas transit route to global markets among regions countries especially the east Asia and European countries has an indisputable role in the region and it is reasonable to study the possibilities of natural gas markets.
LNG is considered a competitor of pipeline gas transmission to consumption markets. For short distance and bulk- market transmission cases usually utilizing pipeline has the least expenditures. In other words utilizing LNG is the most appropriate technology for transmission of gas within long distances.
Factors such as reducing LNG production expenditure increasing demands for imports of LNG and tendency of gas producers for economical production of remote gas reservoirs have impacted the increasing natural gas trade through LNG.
The consequences of these factors have impacted the global LNG trade by initiating a new trend that have had annual growth rate of almost 6.8% between years 1995 to 2005 (that is trade increased from 92 to 188.8 billion) . in year 1995 /there were 8 exporting and 8 importing LNG countries at global level while in year 2005 this number has altered to 13 exporting and 14 importing countries the capabilities of the gas sector in Iran's economy are quite obvious and it could be barely claimed that optimum utilization of gas resources and related industries will be one of the country fundamental issues for economical development during future decades. In any case / one can not disregard the very fact that utilization of these capabilities will depend on absorption of required capital and technology.
Iran intends to become one of the largest LNG producing countries in the world through annual production of 75 million tons of LNG The agenda of this plan includes construction of 5 LNG projects in the new region of Tonbak called (pars LNG), (Iran LNG) LNG and two LNG projects utilizing gas production from reservoirs of Golshan /Ferdos and north pars.
The (Iran LNG) project will liquefy 1940 million cubic feet/day (5o million cubic meters /day) from gas production of south pars phase 12. after project conclusion (Iran LNG) approximately 10 million tons of LNGWILL be produced annually that in regard to the expanding market to this product and approaching the commencement of this project in year 2012 and energy consumption transition from oil to gas /this project is expected to have a special disposition towards supplying global market requirements. in domestic sector the country's gas treating capacity with a growth rate

exceeding 10 % has also reached to440 million cubic meters / day and furthermore through utilization of south pars gas reservoirs phases 6 to 10it is anticipated that the country's gas production capacity will in crease to approximately 600 million cubic meters.

The national Iranian gas company left a track record in the area of transmission in year 2006 implementing 2900 kilometers of high pressure pipelines and 7 gas compressor stations which in effect considerably increased the stability and the consistency of the country's gas transmission system.

In this direction over 53 million people throughout the country have had the privilege for utilizing natural gas that represents 76% of the population.

The commencement of the national Iranian gas company's dispatching system operations that is one of the most advanced and extraordinary systems existing in the world in its own rights has provided more efficient supervisory capabilities for the national gas transmission system and increased security of supply and the reliability of the transmission grid especially during peak consumption periods.

In year 2006 a quantity in excess of109 billion cubic meters of gas has been consumed throughout the country having a growth rate of rate of approximately 12%.

In regard to budget absorption there have been in excess of 70 billion Rials ($5.6 billion and 21 thousand billion Rials) contracts concluded in the national Iranian gas company.

Moreover the national Iranian gas company has $ 19.7 billion worth of projects being executed and implemented in the framework of gas transmission pipelines /gas treating plants and underground storage projects.

Natural Gas Treating & Dehydration Capacity

The country's gas treating and dehydration capacity in the years 1996-2006 indicates as substantial increase of 297.8 million cubic meters / day. The natural gas treating and dehydration capacity during this period with average annual growth rate of % 13.3 increased from 142.2 to 440million cubic meter/day in year 2006. This increase is generally contributed to Fadjr, South pars, and Khangiran, Parsian and Sarkhun plants.

THE FADJR (KANGAN) plant capacity increase:

This increase has been implemented through optimization and capacity increase of existing units and utilizing the spare unit through buy-back gas delivery provisions. Which has increased from 79 million cubic meters / day in year 1997 to 110 million cubic meters / day in year 2000.

Sh.Hashemi Nejad (Khangiran) plants phase Two construction :

The operation for Khangiran plants second phase was commenced in year 2001 with capacity of 17 million cubic meters / day .increasing total gas treating capacity to 44.5 million cubic meters / day .

South pars Gas plant :

1-phases 2 and 3 went on stream in year 2002 with capacity of 57 million cubic meters/day.

2- Phase 1 of this plant with capacity of 25 million cubic meters / day started operations in year 2003.

3- Phases 4 and 5 of this plant with capacity of 58 million cubic meters / day went on stream in year 2004.

Parsian Dehydration plant:

The plant with capacity of 25 million cubic meters /day started operations in year

2003. for a capacity of 25 million cubic meters / day. The subsequent expansion phases of the plant include. 20 million cubic meters / day by NIGC and 37 million cubic meters / day by NIOC.

Gas transmission pipelines

Implemented high pressure natural gas pipelines in national Iranian Gas Company indicate construction of approximately 14584 kilometers of pipelines during years 1997-2006.

The average yearly activity during years 1997-2006 has been 1373 Kilometers while at the end of year 2005 total length of transmission pipelines reached 22000 kilometers.

Iranian Gas Transmission IV

Objective: Transmission of south pars reservoir and Parsian refinery gas production to northern regions of the country

(Pipeline construction is at final stages and only compressor stations remain to be installed)

Iranian Gas Transmission V (Asaluye – Agha jari)

Objective: Transmission of south pars sour gas production from phase 6, 7&8 to Khuzestan province for gas injection to oil fields

(Construction to be concluded in late 2007)

Iranian Gas Transmission VI (Asaluye-Khuzestan)

Objective: Gas delivery to Bushehr province, supply of gas demands for injection to oil reservoirs and supply of Khuzestan provinces gas shortages.

Iranian Gas Transmission VII

(Gas delivery project to Sistan & Baluchestan province)

Objective: Cities incorporated in the Project in clued the following 48 cities:

-17 cities in eastern regions of Hormuzgan and southern Kerman provinces

-31 cities in Sistan & Baluchestan province

Consumption forecast for year 2021 equal to 50 million cubic / day

Required funds: 2.6 billion

Supply source of funds: General governmental revenues or utilizing financing or buy back provisions.

Iranian Gas Transmission Viii

Objective: Transmission of new phases of south pars gas production to central and northern regions of the country en route Assaluye – Eastern Fars Province – Naien – Eastern Tehran – north eastern Transmission system.

Iranian Gas Transmission IX

(Export pipelines)

Objective: partial supply of gas Lorestan/ Kermanshah / Azarbayjan provinces and gas exports to Europe

Gas compressor stations

Towards maximum utilization of constructed pipeline capacities / increasing efficiencies at consumption points and the possibility to complete urban gas networks and export pipelines/ the design and construction of compressor stations are of significant importance.

In year 2006 / on the whole / 7 new compressor stations became operational which were: Dorahan 3/sirjan Abshirin/ (On sarkhun- Kerman pipeline) / Khoramdareh/ Hashtrud (on the second Azerbaijan pipeline) /and Neyzar & Ghom-1 and Marrand.

Compressor stations under construction in year 2007

1- Khonj& Lamerd on IGAT-4

2- Safashahr on IGAT-4
3- Ghazvin on the second Azerbaijan pipeline
4- Marganlar on the Export pipeline
5- Nikpay (zanjan) – second turbine
6- Sh.Mohammadi (in khoozestan province)
7- Sh.Mostafavi (in khoozestan province)
8- Stations no.2 and Khonj 8 (on IGAT 8 According to the Transmission system Requirement Report)
9- Shahreza on IGAT-4

BUY Back Project – phase II

- Part (1) item (G) Clause 85 of the Islamic Republic of Iran's Third Economical social and Cultural Development plan .
- Part (1) item (y) and item (H) clause 29 of the country's year 2001 budget rule.
- LAW for Maximum utilization from technical engineering, productive, industrial and executive capabilities of the country for project execution and provide facilities to export services.
- Report NO 15/1-3424 of HE the Minister of petroleum to the Management and programming Organization for Economic Councils consideration.
- Ratification NO 1315/200-22652 dated 11/1/2001 of the National Iranian Oil Company's Board of Directors.
- The Economical Councils ratification NO. 34/2172 dated 28/3/2001.
- Tri lateral service contract of NIOC, NIGC dated 14/17/2002.
- Order NO 1351/200-23158 dated 18/11/2002 of the National Iranian Oil Company's Board OF Directors.

Project Specifications

- Project owner : The National Iranian Oil company (NIOC)
- Execution contractor : The National Iranian Gas company (NIGC)
- Financial contractor : T he Naftiran inter trade company (NICO)
- Net amount : $2,144 million
- Gross Amount : $2,385 million
- Execution period : 5 years
- Initiation date : 14/8/2002
- Repayment period : 6 years
- Repayment source: project incomes or items stated in item (a) clause 120 in Third plans Law.

Project Goals

- Gas Delivery to 2 million urban and rural households in the country.
- Construction of transmission pipelines for delivery of gas to 130 new cities.
- Gas delivery to 1500 industrial & major units.
- Gas delivery to 44 industrial cities.
- Gas delivery to 8 power plants.
- Generate natural gas consumption potential for 67 million cubic meters / day.
- Annual substitution of 186 billion liters of oil products by 25 billion cubic meters of natural gas towards exports and / or decrease of imports.

Project Items

- Completion of Parsian Gas Dehydration plants emergency section (Final capacity 48 million cubic meters / day.)

- Construction and completion of 12 gas compressor stations with 1108 total horse powers.
- Construction of 744 Kilometers of high pressure transmission pipe line in diameters of 40 to 546 inches.
- Construction of 3634 Kilometers of high pressure transmission pipelines in diameters below 36 inches.
- Gas delivery to villages in the country (204200 natural gas connections).
- To equip and train man power for project operation.
- Completion of remaining projects from the Gas Delivery buys back project phase1.

Irans Natural Gas Trade

The Turkmenistan imports contract for annual quantity of 8 billion cubic meters was signed in year 1995 and gas imports commenced in year 1997.
Implementing the project require construction of a 40 inches 60 kilometers pipeline from Iran

Of Turkmenistan border to Kordkuy

Gas Exports

The gas exports contract to Turkey was signed in year 1996 with the "Botas" company for annual quantity of 10 billion cubic meters.
To implement the export project, 253 Kilometers of 40 inches pipelines were constructed from Tabriz to the border city of Bazargan. Exports were commenced as of December 2001.

Natural gas under ground storage project

During year 2006/ the following four projects were under construction:

1- Yortsha – anticline aquifer
2- Sarajeh hydrocarbon reservoir
3- Talkheh-anticline aquifer
4- Central Iran

Main Activities in Research /Development & Technology Division

Holding the first national gas conference
Mid term planning by determining research in 7 following categories:

A- Energy optimization including 6 projects
B- Natural gas transmission / distribution & storage including 15 projects
C- Natural gas processing including 24 projects
D- Corrosion and industrial protection including 7 projects
E- Health /safety and environment (HSE) including 7 projects
F- Legal and executive management including 7 projects
G- Finance / economics 7 business including 7 projects

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