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Articles on Oil & Gas in the English section, in cooperation with IranOilGas.com

OPEC Price Band Mechanism

A Successful Experience is Repeated

By Behrouz Beikalizadeh

Oil markets have recently been experiencing severe oil price slumps. OPEC's basket price of US$140.73 per barrel on July 3rd, 2008, fell to as low as US$47.73 on November 13th, 2008. The price fall comes at a time when oil exporting countries are highly dependent on their oil revenues. Oil production and export hikes aimed at making up for the shortage of oil revenues at a time when the market is experiencing surplus production will certainly be followed by irreparable consequences. This is particularly under circumstances when declining trend of demand for oil as a consequence of global financial crisis underlies oil price downtrends. Other factors such as big boost in the storage of crude oil in the member states of the Organization for Economic Cooperation and Development (OECD), increase in surplus oil production capacity, ceasing of geopolitical tensions and fresh developments in the stock exchange markets should also account for the slipping oil prices. Meantime, surplus oil production capacity has increased due to exploration of new oil fields in the OPEC and non-OPEC oil producing states and the recent production cut by the OPEC member states has recessed some portion of production capacity, thus, removing the pressure lever that gave rise to higher oil prices. OPEC has learnt a lot from previous oil market panics and for that matter, the OPEC member states initiated to cut production on two different occasions in order to impede slipping oil prices. In their 149th ordinary meeting on September 9th and 10th, 2008, OPEC member states stressed observation and adherence to OPEC's September 2007 approved production ceiling of 28.8 million barrels per day. Also in the course of their 150th extraordinary meeting on October 24th, OPEC member states reached consensus over daily production cuts of 1.5 million barrels beginning from November 2008. Such a decision by OPEC failed to halt falling oil prices. It appears that the wide scale global economic crisis has diminished demand for oil beyond OPEC's intended oil production cuts.

As to what extent is OPEC planning to reduce its production rate is a question that requires specification of price targets. When oil prices

were at their peak, OPEC officials frequently proclaimed that they were not pursuing any price target and that oil market itself would best determine prices. At that time, restricted production capacity had made it impossible for OPEC member states to determine prices. In addition to that, high growth rate of global economy which had fostered demand for oil together with geopolitical tensions, unforeseen cut in oil and gas supplies from the OPEC and Non-OPEC oil producing states, high costs associated with the development of new oil fields and ultimately exchange market developments were all out of control of OPEC and assisted with the emerging price hikes. Today, however, when OPEC is experiencing hasty dwindling of oil prices, it can confine within production limits and somehow make up for poor prices. Production cuts in the absence of price target will prove to be futile. The key to the success of production adjustment plan is subject to the design of a mechanism that would reconcile production policies and price target.

How can OPEC concentrate its efforts on maintaining control over production and stabilize market? The response to this question would be possible if one takes a glance at the history of this Organization. In its 109th ordinary meeting in March 2000, OPEC unofficially introduced Price Band Mechanism to the market. Within this mechanism, in case OPEC's average basket price fell under US$22 for more than 10 successive working days, OPEC member states would be obligated to cut their daily production by 500 thousand barrels a day and in case this figure exceeded US$28 for 20 successive working days, OPEC would increase production by 500 thousand barrels a day. Although OPEC took advantage of this mechanism only once and increased production by 500 thousand barrels per day on October 31st, 2000, and gave up the whole idea in January 2005, introduction of this mechanism affected the market psychologically and stabilized prices assuring the market that OPEC was not inclined to change prices beyond specific limits.

OPEC can revive this mechanism under the present circumstances. Concurrent with OPEC's 150th meeting, the president of Venezuela announced that the Organization had to specify oil prices within the price band of US$70, 80 or even 90 per barrel. These statements reveal that at least some OPEC member states are well prepared to utilize this mechanism which is not intended to rule out market fluctuations, rather, it is meant to preserve price average within a specific band.

Should OPEC member states wish to restore Price Band Mechanism, they are recommended to introduce the following amendments to it:

1- Price target should be defined- by making use of OPEC's basket price- within a band that would make investment in the oil industry charming.

2- One month should be specified as the period for the calculation of price average.

3- Production adjustment date should be prior to the regulation of oil loading programs by the member states.

4- The already specified price band whether upward or downward should be observed and adhered to by all.

5-Scope of price band should not be very extensive for otherwise it would make no sense to implement such a band.

Within this mechanism, decision making should be activated automatically and communicated to the member states by the OPEC secretary general or president.

Why Bahrain Needs Iran's Gas?

By Afshin Javan and Gholam-Hossein Hassantash

Iran and Bahrain inked a protocol for energy cooperation in October when Iran's minister of petroleum visited the Persian Gulf Arab state. Bahrain is keen to invest in developing Iran's gas and its purchase. To that effect, Iran agreed in principle to deliver one billion cubic feet of gas a day to the sheikhdom. The memorandum they signed envisaged that Iran could increase its gas delivery if Bahrain demanded more. It has been also mentioned in the preliminary accord that the massive offshore South Pars Gas Field was the best source for Iran to pump gas to Bahrain.

The Islamic Republic favors neighbors over other countries as far as its gas exports are concerned. Energy talks between Tehran and Manama were launched in 2006 and the two countries signed a memorandum of understanding when President Mahmoud Ahmadinejad visited that country in November 2007.

The question here is to know how come a country with easy access to gas from other Persian Gulf Arab countries is such willing to buy Iran's gas. The question becomes much more serious in view of Bahrain's friendly ties wit the United States, specifically their cooperation in aluminum industry. Bahrain's Alba supplies raw materials for US aerospace industry. Has Washington given the nod to Manama for purchase of Iran's gas? Does Bahrain seek to diversify its sources of energy for security reasons? Or are ancient cultural bonds involved in Bahrain's interest in Iran's gas?

According to a latest report from the International Energy Agency in 2008, Bahrain sits atop

around 125 million barrels of crude. Its economy is heavily oil-dependent and two-thirds of its government revenues come from sale of crude and oil products. India represents the main market for Bahrain's oil. Bahrain also holds proven reserves of 3.25 trillion cubic feet of gas with its annual natural gas consumption standing at 11 billion cubic meters. In 2006, Bahrain consumed its total output for domestic purposes.

British Petroleum estimates indicate that Bahrain's gas reserves would be over in seven years if the current trend of consumption keeps on.

One can easily understand Bahrain needs natural gas to develop its power plants and heavy industries and supply fuel to its giant aluminum plant. Anyway, are Bahrainis ready to become dependent on Iran's gas against the backdrop of their alliance with the US?

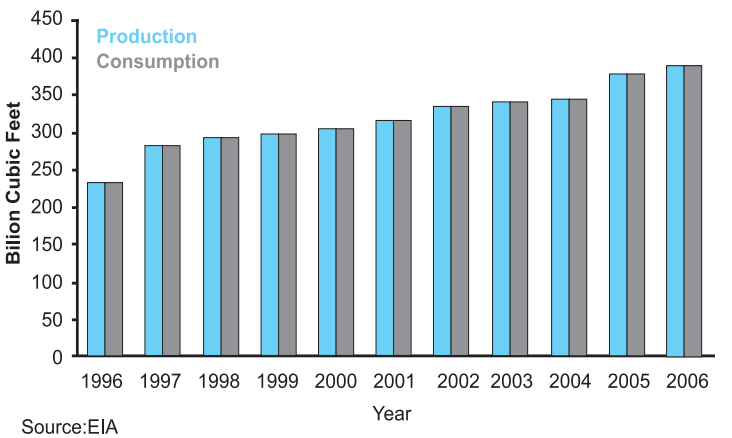
Bahrain has been seeking to import gas from the six-member Gulf Cooperation Council since 2002. The council groups Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. In 2002, Bahrain reached agreement with Qatar for 500 million cubic feet of gas, but the agreement is expected to be finalized in 2010. Up to that time, they need Iran's gas. Bahrain and Qatar have been engaged in border disputes in recent years and they may run into trouble in energy cooperation. Pundits do not rule out the possibility that Bahrain might be seeking to cause rivalry between Iran and Qatar in order to bargain over price.

Bahrain's national gas company Bangas was established in 2000 to supply gas to industries. The company is owned by the Bahraini government (75%), Arab Petroleum Investment Cooperation (12.5%) and Bahrain's Coltex, an affiliate of a US company. Therefore, Bahrain might be seeking to win concessions from the US through its overture to Iran.

Gas exports to Persian Gulf countries can result in improvement of trade between Iran and its regional neighbors. The Persian Gulf market is lucrative for Iran's gas mainly because their consumption hits its peak in the summer when Iran experiences its lowest gas use. But the South Pars field should not fall prey to sluggish talks. Bahrain would never value the interests of its co-religionist Qatar to those of Iran and protracted talks might play into the hands of Qatar in extracting gas from the South Pars, shared between Iran and Qatar. Qatar has certainly well thought-out plans for development of South Pars in the coming years and management of time is a very significant factor for Tehran.

The pricing formula is very important. Gas has to be sold at reasonable and fair price to Bahrain to avoid problems emerging in Iran's deal with the UAE's Crescent Petroleum.

Bahrain's Natural Gas Production and Consumption, 1996-2006



Source:EIA

Russia vs. OPEC:
Rivalry or Alliance

By Ali Reza Ghanbari

Iran as a founder of the Organization of the Petroleum Exporting Countries (OPEC) and its second exporter has played an important role in the cartel. The political-economic role of crude and its impact on the other countries' economies have added weight to the subject. However, after over a quarter of the century, Iran has decided to replace its representative in the cartel which would probably culminate in reviewing policies. In an exclusive interview carried by Eqtesad-Energy with the newly appointed representative Mohammad Ali Khatibi, he has shed light on several critical issues.

On October 22nd, 2008, the president of the Russian Federation, Dmitry Medvedev met and conferred with the Secretary General of the Organization of Petroleum Exporting Countries (OPEC), Abdalla Salem el-Badri in Moscow, Russia. Russian Energy Minister, Victor Khristenko was also present in the meeting where the two sides expressed their viewpoints concerning recent developments in the oil market. They further laid emphasis on mutual cooperation. Russian president, Dmitry Medvedev made reference to the strategic role the OPEC member states and Russia play as world's major producers and exporters of oil and energy and reiterated cooperation between OPEC and Russia. He further expressed his respective country's preparedness for attending frequent and extensive negotiations with OPEC for the purpose of guaranteeing a stable and foreseeable oil market. Medvedev noted the world economy's residing crisis and the disagreeable impacts this crisis has left on oil markets and stated that further cooperation between OPEC

and Russia was an urgent requirement at this juncture of time.

OPEC secretary general, Abdalla Salem el-Badri for his part elaborated both fundamental and superficial factors effective in oil price swings in the recent couple of years and making reference to the recent crude price crisis and its consequences on economies of oil producing countries, stressed the significance which is attached to oil market control and management. He also expressed certainty that his talks with the Russian party would assist with the promotion of cooperation between OPEC and Russia.

Russian president and OPEC secretary general expressed their concerns and worries about dwindling oil prices and the effects of lower prices on the oil sector in general and likely suspension of the residing as well as new oil projects.

On October 29th, 2008, Leonid Fedun, vice president of Russia's private oil major Lukoil, on the sidelines of Moscow-based Investment Conference expressed concerns about slipping oil prices and the impacts of such a trend on Russia's oil industry and stated that the future of Russia's oil industry and stable oil prices would largely depend on close Russia-OPEC cooperation and their clear consensus about production cut and oil market supply management. He further proclaimed that Russia was able and inclined to render support for OPEC's production cut by reducing its daily production by 300 to 400 thousand barrels per day.

Russia's deputy prime minister, Igor Sechin reported, on November 6th, 2008, of the likely inking of an agreement between Russia and OPEC member states in the course of OPEC's forthcoming extraordinary December meeting in Algeria and added that the said agreement had to be signed before any joint measures aimed at cutting production rates were drawn.

The news concerning this meeting and expressions made by the Russian and OPEC officials were widely reflected in the international media and circles, attracting the attention of political experts as well as oil and energy market analysts alike. Almost everyone is in pursuit of a response to the question as to what factor or factors underlie the switch in Russia's approach towards OPEC? The age-old rivals, who in a not distant past spared no efforts to gain a bigger share of the oil market, are now showing inclination for cooperation! Perhaps two key factors contribute to Russia's inclination towards OPEC and OPEC member states:

Crisis in Caucasus

The political disputes in which Russia and Georgia have been engaged for quite many years now, ended up in military conflicts between the two sides a few months ago. Unrests in the region were followed by the Western block and US's aggressive reaction. Being concerned about

Russia's hegemony over Central Asia, the West is now worried about Russia's domination on huge regional energy resources and prefers to prevent any challenges insofar as supply of energy from this region of the world is concerned. The west is reluctant to allow Russia to restore control over territories which were once within the terrain of the former Soviet Union and currently serve to be the pass for the transfer of Central Asia's crude oil. The Western block also threatened to boycott Russia. Strong objections to Russia still continue and the United States and her European allies keep on extending full support for Georgia. The US-Poland agreement for the stationing of US proposed Anti Missile Defense Shield in Poland or equipping Georgia with advanced armaments by the United States illustrate some examples of the Western Block's support for Georgia, hence, putting Russia into a rage.

It so appears that under such circumstances, Russia is introducing a change to its foreign policy in an attempt to avoid failure in the so called new cold war era. Thus, following the Caucasus crisis, Russia is now pursuing more vigorously, her strategy of expanding ties with East Asia and the Middle East. Relevant to this strategy, Russia is now showing more inclination towards OPEC. Russia shares a lot in common with many OPEC member states in terms of oil reserves, production and exports. Russia is home to world's seventh largest crude reserves and the first non-OPEC producer of oil. Russia is meantime, the second largest producer of crude in the world.

The Russians are planning to use OPEC as a lever to exert pressure on the Western world. Through partnership with OPEC, Russia is in search of empowering OPEC in order to reinforce the Organization's potential to influence oil market. Russians appear to seek to use oil as a weapon against the Western states. Perhaps through their association with OPEC, Russians are hopeful to further influence the oil market and win their political aspirations or at least force the West into adjusting her stance in the face of Russia.

Dependence on Oil Revenues

In recent years, Russia's economy has been under inevitable influence of oil and gas revenues. Oil price hikes since 2000, which encouraged Russians to jack up their crude production, injected huge petrodollars into Russia's economy. The nation's oil revenues in 2000 exceeded US$25 billion. This figure registered an annual growth rate of 8.9% and surpassed US$121 billion in 2007. The share of crude oil in Russia's overall US$354 billion exports in 2007 stood at 34.28%.

In 2005, Russia's minus-oil budget balance was -2.1% of the nation's GDP. This rate rose to -5.9% in 2008 and is expected to stand at -6% in 2009. Natural gas also plays a crucial role in Russia's

export revenues. Oil and gas price hikes in recent couple of years have affected the economy of Russia significantly. Thus, Russians have been worrying about sharp drop in oil prices in the recent few months, a downtrend which may continue in the months to come. In order to cope with these impeding changes and developments, the Russian government is now switching to the OPEC member states which share a similar headache with Russia. Russians plan to ink a cooperation agreement with the OPEC member states in order to avoid further price drops, for oil prices under US$70 a barrel will expose the Russian government to a huge budget deficit and a financial crisis that would impede many development projects and plans in that country.

Some of the Russian officials are likely to adjust their approach towards OPEC and replace cooperation policy with exploitation policy.

Meantime, unconfirmed news suggests that Russians may join the Organization of Petroleum Exporting Countries, although, for years now, Russia has served to be an observing member of OPEC. Perhaps this is naïve to assume that Russians are inclined to join OPEC permanently, because Russia's foreign policy strictly defies any obligations for the nation on the world arena. After all, Russians are reluctant to portray a third world picture of themselves by joining OPEC and deprive the nation of being accepted in western institutions such as the International Energy Agency. However, they are interested in signing an agreement with OPEC-at least periodically-in order to enhance the influence of the Organization on oil markets and prices. Russians are unlikely to continue cooperating with OPEC should they settle their problems with the West and return to the Western club.

Russia's inclination towards the world's only oil organization which produces over 36% of the world's crude oil may serve as a win-win game for both sides.

In case Russia, in harmony with OPEC's daily 1.5 million barrel cuts, reduces its crude production by 300 to 400 thousand barrels a day, the market will certainly experience new developments. And in the event, the oil market situation turns worse than what it is today, one can expect closer ties between Russia and OPEC.

OPEC is therefore expected to take advantage of this situation and convince Russians to adapt themselves to the policies of the Organization. The OPEC member states should contrive any agreement in such a manner that would facilitate long term and not short term cooperation. OPEC member states should also have an eye on transfer of technology. Russians have access to advanced technologies in the area of exploration and production of oil and OPEC member states are in dire need of these technologies for the development of their oil and gas fields.

Turkmenistan Jan-Sept gas output 52 bcm

Source: Reuters

Turkmenistan, Central Asia's largest natural gas producer, produced 52 billion cubic metres (bcm) of gas in Ja

nuary-September 2008 and exported 35 bcm, a government source said on Thursday. The government reports output figures rarely and irregularly.

"Output was 52 bcm and 35 bcm out of that was exported," the source told Reuters on the sidelines of an energy conference in Ashgabat. He gave no comparative data for the previous year.

Turkmenistan had said earlier this year it would boost 2008 output to 81.5 bcm from last year's 72.3 bcm but the country halted supplies to neighbouring Iran in the first quarter amid a pricing row that led to a cut in output in that period.

Turkmenistan and Iran are due to sign a new supply agreement next month.

Turkmenistan sells most of its gas to Russia's Gazprom but seeks to develop new fields and diversify exports.

Collapse in demand may halt refinery projects

Source: FT.com

More than four out of five refinery construction projects face cancellation as the worldwide collapse in fuel demand wipes out all but those developments with strong government backing.

In a report, Wood Mackenzie, the industry consultant, concluded that only 30 of the 160 refining projects announced since 2005, which should be completed in the next two to seven years, would now go ahead.

The sharp drop in the number of new refineries is related to the collapse in the refiner's profit margins, known in the industry as "crack spreads".

The scale of the cutback is the starkest illustration yet of the severity of the collapse in fuel demand and the effect on the refining industry.

Until a few months ago profit margins were strong and refiners were struggling to meet high demand. A widely touted supply bottleneck had been caused by the lack of investment in refining in the lean years of the 1990s.

Of the 30 refineries still on track, almost all have the backing of large national oil companies, which are set to provide 11m of the 12m barrels of new refining capacity expected to come on stream. Saudi Arabia's Saudi Aramco and China's Sinopec will in aggregate account for 2m of those barrels, according to Wood Mackenzie.

This will significantly shift the balance of power in refining away from the west, whose integrated oil companies and independent refiners have dominated the sector from the start more than a century ago.

Two-thirds of the refining capacity additions are expected to be in Asia and the Middle East.

Iran's gas not to turn into LNG in Qatar: Nozari

Source: Xinhua

Tehran will not export its gas to Qatar to be liquified in the Arab country's plants, Iran's satellite Press TV quoted Oil Minister Gholam-Hossein Nozari as saying on Tuesday.

Nozari made the remarks when referring to planned cooperation among Iran, Russian and Qatar in exploiting their abundant gas reserves.

"Iran agrees that Qatar and Russia will invest in South Pars gas field and LNG be produced in Iran on partnership basis," he said.

"We have agreed to set up a joint company to develop projects in the three countries or any other place in the world, but we do not accept that Iran's gas will be exported to Qatar to be turned into liquified natural gas (LNG)," Press TV quoted Nozari as saying.

Nozari's remarks came as a response to Russian daily Kommersant's report that "Russia's Gazprom, Qatar Liquefied Gas Company Ltd. and National Iranian Oil Co. (NIOC) aim to set up a venture to produce gas from Iran's South Pars field and liquefy itin a gas plant in Qatar's Ras Laffan Province."

Iran, Turkey continue gas discussions in Tehran

Source: IranOilGas.com

The Turkish minister of energy and natural resources Hilmi Guler arrived in Tehran on Saturday for a two-day visit and met with Iran's oil minister Gholam Hossein Nozary, before being taken on a tour of the South Pars onshore gas facilities at Assalouyeh.

After the meeting, Nozary told reporters that he discussed the development of phases 22-24 of South Pars gas field with Guler. He also clarified that if those negotiations were finalized, a 1,800 km long gas pipeline (IGAT 9) between Assalouyeh and Bazargan would be built jointly by the two sides.

Nozari also said "the transport of gas to European markets has been one of the matters discussed

in detail with Turkish authorities during the talks. Once the two sides conclude a deal to increase the daily flow, a major portion of this increment will be dispatched to European markets".

Talking to the reporters Guler said: "Turkey is planning to increase the amount of gas it purchases from Iran not only for Turkish needs, but also for European consumers. Iran's gas will be exported to European customers through pipelines across Turkey".

He also noted that Turkey currently imports 27 million cubic meters of natural gas from Iran daily, adding that the new deal will ensure the flow of 23 million more once it is agreed by both parties".

In related news, the news agency of Iran's oil ministry has quoted managing director of NIOC Seifollah Jashnsaz as having revealed that Turkey was considering investing $ 12 Bln in developing phases 22-24 of South Pars.

Jashnsaz too believed increasing the volume of gas export to Turkey was a possibility.

Switzerland's Elektrizitaets Gesellschaft Laufenburg (EGL) had signed a gas purchase contract with National Iranian Gas Export Company (NIGEC) in March 2008.

According to this 25-year contract, EGL will receive 0.5 bcm/y of Iran's natural gas, starting from 2009, at Bazargan, the border crossing with Turkey. The said volume will gradually increase to 5 bcm/y by 2012.

Maximizing Production from Shared Fields

In an Interview with Managing director of West Oil & Gas Company

Mohammad Reza Nafari

West Oil & Gas Co. (WOGC) is one of the three subsidiaries of the Central Iranian Oil Fields Company (CIOFC). It is responsible for the oil and gas production in the western part of the country. The company has an exceptional importance due to holding shared fields with the country of Iraq. By producing 164,000 barrels of oil per day and daily output of 7 million cubic meters of gas during the first half of 1387 (21 March-21 September), WOGC managed to go ahead of the anticipated planning in the Iran's Perspective Document. The execution of the company's development projects is still under accomplishment in the 6 operational zones of Cheshme-Khosh production and de-salting units, Dehluran production unit, Naft Shahr production and de-salting units, Sarkan/MalehKuh production unit, Sarajeh production unit in Qom , Tange-Bijar and KamanKuh production units. To receive more information about the situation of these projects, "Mashal" has conducted the following interview with the managing director of the West Oil & Gas Production Co., Eng. Mohsen Noori.

Mashal: At present, what is the share of WOGC in the production of oil and gas?

During recent years, important measures have been taken in order to increase in the output and especially from the shared fields. These measures have resulted in the increasing trend in the oil and gas production in the western region. We produced about 121,000 barrels per day of oil in 1385 (2006) reaching 156,000 barrels per day in 1386. The figure increased to 164,000 barrels per day in the first six months of the current year which is considered an important achievement in view of the shared fields in the western region. Also, by commissioning Tange-Bijar gas plant, 7 million cubic meters of gas has been produced in this unit and transferred to the national gas network. This level of oil and gas production can be increased by making more investment.

Mashal: What measures have so far been taken in order to increase oil and gas production?

Optimization of operational conditions and technical issues are one of our most important

plans. By timely maintenance in the operational units, we were able to increase the capacity and also raise the system's capability. The maintenance and employment of a turbo-pump at the Cheshme-Khush, repairing the pipeline from the Cheshme-Khush to Ahwaz and from Sarkan production unit to Afrineh pump station were among other measures to increase production of oil and gas. Also, the oil production had to be halted for a period of 20 to 30 days during basic maintenance work in the Kermanshah refinery this year. But we managed to lessen the time to three days. In the meanwhile, we repaired the line simultaneously. The damage caused to pipelines by water was another difficulty. Each year seasonal rainstorm and flood water afflicted part of the pipeline routes halting the transmission of oil in the regions of Sarkan and Dehluran. Because of this, since the beginning of 1387 (March 2008) the project to establish secure corridors for the pipelines was implemented. Currently, all these routes have been fixed by building fissures inside the mountain. Now we are not at all worried about water damage, springing leak in the lines and similar problems. Pipeline pigging through an 18-inch line from Cheshme-Khush production unit to Ahwaz was among other important measures carried out in order to get knowledge about the damaged points. In less than a month, a 20-inch line with a length of 80-km with the objective of increasing transmission volume will be replaced and the 18-inch line will be repaired. Another project was the establishment of storage reservoir in the Cheshme-Khush. In addition to other development measures, increase in the storage and processing have also been implemented. The second reservoir in this region is also ready to be delivered. At the Qom's Sarajeh, the activities for storage and gas injection into the reservoir were carried out for the first time in order to produce the gas in the cold seasons of the year. The West Oil & Gas Co. has another project to increase production by installing pumps in the well-head and bottom-hole of the shared fields such as the West Paydar field. The work to install these pumps has been started and they will become operational by the end of the year. Hopefully, the goal to attain 300,000 barrels per day by the year 1390 (2011) will be materialized by implementing these projects and in view of the 5-Year planning of the Perspective Document.

Mashal: Considering production of salty oil in the western region, to what extent is the capacity and capability in this region for desalting the oil?

At present desalting of 83,000 barrels of oil per day is being carried out by optimizing the conditions, basic maintenance of the facilities and usage of the suitable chemicals. Such desalting capacity has given us the chance to increase our production in the shared fields such as the West Paydar field. Also by increasing the capacity of these units in the fields of Cheshme-Khush and Naft Shahr, the possibility to produce salty oil and increase in the output can be provided. This matter will be materialized in the near future by putting into operation the desalting plant in Dehluran.

Mashal: How many oil fields and wells exist in the WOGC's region? Have you considered development plans in this area?

Currently, there are 60 oil wells located in the six operational zone of Cheshme-Khush, Naft Shahr, Dehluran, Sarkan/MalehKuh and KamanKuh. There are also four gas wells in the Tange-Bijar as well as seven wells in the Sarajeh

field in Qom. All the above mentioned wells are producing oil and gas. Drilling is also underway for two new wells at the MalehKuh and Sarkan. It is predicted that the production will increase by about 1500 barrels per day once these wells become operational. Drilling of one well in the Sarajeh field in Qom is also at the designing stage. It is to be noted that in case development wells would not have been drilled in the shared field of Naft Shahr, it would be impossible to produce from the field. This is because the field has been under production for the past 70-80 years and its production had to be halted in view of the characteristics of the reservoir. By drilling new wells, however, the field is still exploitable for us. Last year, this project was started by commissioning new operational unit and drilling more wells, rig installation, flow pipelines and surface facilities. These measures enabled us to exploit and produce from this field. Also, following drilling wells Nos.20 & 21 last year, the well No. 22 also became operational in less than a week this year setting a record in this respect. This trend will also continue in the current year.

Mashal: Due to the existence of sour gas in the Tange-Bijar, what measures have you been taken to exploit from this field and how much is its daily production capacity?

One of the most important actions taken by the West Oil & Gas Co. was commissioning of the Tange-Bijar gas plant. To this end, various training courses were performed for the employees by the HSE department due to the presence of sour and dangerous gas (about 40,000 PPM) in the field. This plant continuously produces gas at 7 million cubic meters per day. The increase in the output from the Tange-Bijar field will be feasible in the winter following exploiting from several wells under drilling, completion of pipeline links as well as increase in the Ilam refinery's capacity to receive gas.

The production capacity of the Tange-Bijar field will reach 10 million cubic meters in the second phase. The preliminary steps and studies for the second phase have already been started. The production capacity will be increased even more in the next phases. Since the country's western region is located at the end of the Trans-gas pipeline, the drop in pressure during winter is naturally predictable. So, gas production from the Tange-Bijar field would eliminate many problems related to gas usage in the west of the country as a cold region in the winter time.

Tange-Bijar is located at a distance of 70-km southwest of the city of Ilam. Meanwhile despite the need for the field's gas, the WOGC's viewpoint is that as long as any project can be problematic from the employees safety point of view, it should not be put into operation until all the unsafe issues are fully removed.

Fortunately in this project, we have a good relation with the project's executive and they provide their support to us during exploitation. They also eliminate shortcomings and problems which occur very well.

In the Tange-Bijar, complete safety equipment has been purchased for our colleagues. In addition, advanced warning systems have been employed.

Even the necessary training is carried out for the visitors and necessary equipment is provided for these people. The plan for NGL 3100 for gathering well-head gases and injecting them into the wells for improved oil recovery is also underway and will be implemented in a near future.

CO_2 Emissions Reduction through Energy Savings in Refining Industry

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Abstract

The major categories of emissions sources in the petroleum industry are process fugitives, storage tanks, loading I transfer, wastewater, incidents and combustion. Refineries need to establish emission inventories for all pollutants that are representative for all the facilities (process, utilities, storage etc...). Data for the entire site (e.g. refinery equipments + terminals + storage) should be used to determine all pollutant substances. This paper provides the methodology for developing an emission inventory for a petroleum refinery. This inventory will provide mainly guidance and tools for refineries to monitor and report CO2 emissions in a manner that will allow jurisdictions to determine whether annual emission limits are being achieved. CO2 emissions from combustion equipments such as heaters and boilers in the refining industry are investigated. Methods of CO2 emissions reduction through energy efficiency improvements are described.

Key Words: CO2 emissions, energy savings, petroleum industry, greenhouse gases

1. Introduction

The refining production quantities are currently affected by three trends: demand growth from the transport sector in general; expansion of the market for automotive diesel fuel at the expense of gasoline; a shrinking market for heavy fuel oil which industrial consumers are replacing gradually with natural gas.

These trends over the last decades have been towards more complexes refining installations partially following an increase in gasoline and gas oil demand. There is substantial interest in evaluating energy usage, economic costs and benefits, and ecological impacts associated with petroleum refining plants.

Energy and environmental intensity indicators provide an important tool to monitor and track crude oil processing facility performance. The refining industry must constantly adapt its output to meet the changing quantitative and qualitative needs of the marketplace. It is also subject to emission specification covering the product's sulphur content, aromatics, among others. Stricter sulphur and aromatic regulations for refined products are increasing the CO_2 emissions as clean products are more energy intensive to produce.

The specification of crude oil feedstock is necessary to properly assess energy use, emissions and economics of refining. For any individual refining unit, it is necessary to estimate the output on the basis of a given process configuration and crude slate and also calculate total energy consumptions and CO_2 emissions.

2. Greenhouse Gases in the Petroleum Industry

The most commonly reported greenhouse gases are those covered by the Kyoto Protocol: Carbon dioxide, CO_2; Methane, CH4; Nitrous Oxide, N2o; Hydro fluorocarbons, HFCs; Perfluorocarbons,

PFCs and Sulphur Hexafluoride, SF6. Greenhouse gas emissions from the refining industry arise from three main categories:

- Combustion emissions resulting from the combustion of fuels in boilers, furnaces, turbines, incinerators and flares
- Process emissions resulting from the physical or chemical processing of materials, typically gaseous or liquid hydrocarbon streams
- Fugitive emissions occurring from equipment leaks such as from seals, gaskets and valves

2.1 Methane emissions

Methane is emitted along with other volatile hydrocarbons through fugitive emissions from refining equipment, storage tanks and gas flaring systems. Methane leaks from equipment when methane and oil are separated during refining processes. When oil is transferred to storage tanks, methane is also emitted as vapours are displaced. During flaring of gases, unburned methane may also be emitted. The estimate of methane emissions in refineries (1995) are [1]:

- Fugitive emissions: 0.082 million metric tons
- Storage tanks emissions: 0.002 million metric tons
- Gas flaring: 0.002 million metric tons

2.2 C02 emissions

Refineries produce greenhouse gases through the combustion of fuels in process heating systems. Refinery combustion sources release VOCs and other substances. For a simple refinery, there are numerous sources of CO_2 emissions. These sources may include heaters and boilers, catalytic reforming unit regenerators and flares. Compare to fugitive emissions, the quantities of CO_2 produced through combustion are the predominant. In general, a refinery's emissions depend on the crude oil's weight (API) and the degree of cracking, determined by the product yield: a high share of light products (gasoline and diesel) requiring higher processing and more CO_2 emissions. In a simple refinery configuration, the most emitting process unit is the atmospheric distillation unit which treat all crude oil input. Its share in emissions is lower in more complex refineries. The amount of CO_2 released when fossil fuels are burned is dependent on the carbon content, density, and gross heat of combustion for the particular fuel. Different fuels are burnt for various refining processes, resulting in different CO_2 emissions per unit of energy use. CO_2 emissions for gaseous fuels are typically much lower than for liquid fuels.

The formation of CO_2 is dependent on many combustion conditions such as fuel type, amount of excess air, fuel and combustion air inlet temperature, burner design, combustion chamber design and gas residence time in the combustion zone. The amount of CO_2 formed from the fuel gas combustion in different equipment (boilers, fired heaters and flares) in a refinery will vary. It can be obtained from the combustion reactions.

For natural gas or refinery gas fuels, the complete analysis listing all the constituents is required, as well as any possible variations in gas composition. Correct and accurate fuel specifications are essential for predicting CO_2 emissions. Measurements of CO_2 concentrations in stacks, if available, can be also used to calculate CO_2 emissions from heaters and boilers.

3. Procedures for CO_2 Emissions evaluation

Refineries are facing new challenges and must put in place procedures for monitoring and verifying CO_2 emissions after the introduction of the new legislation concerning Greenhouse Gas Emissions Trading Scheme. These procedures include:

- Emissions monitoring & reporting
- Performance monitoring

- Emissions forecasting
- Emissions reduction
- CO_2 emissions evaluation

3.1 Emissions monitoring & reporting

Refiners will use when available an automated energy management system for their monthly reports, which are combined with energy gap calculations and CO_2 emissions calculations from the process units. Data for CO_2 emissions monitoring complemented with laboratory analysis are included in the management reports. The monitoring and reporting of CO_2 emissions require high levels of accuracy for the calculation of emissions.

To set up systems for CO_2 emissions tracking, the following measures should be taken:

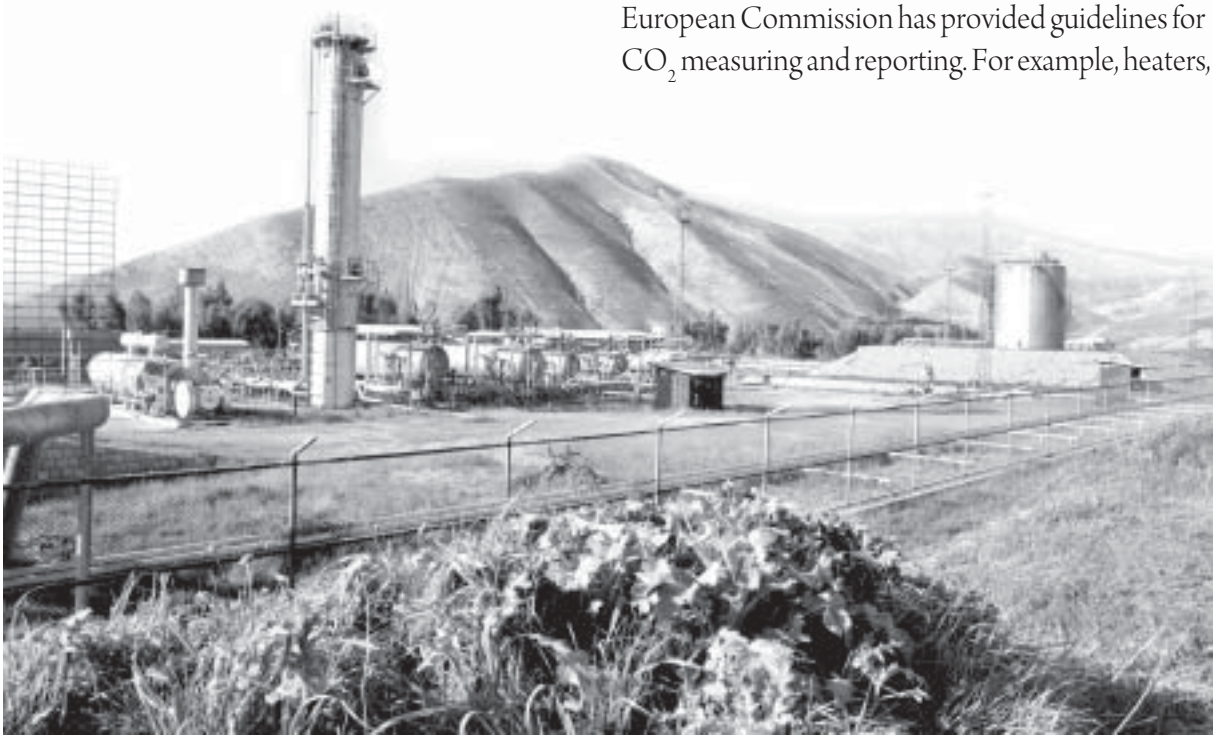
- Avoid large errors into flow meter readings by installing an on line gas density analyzers to accurately calculate fuel gas mass flow rate
- Perform regular laboratory analysis of fuel gas composition to establish the emission factor for fuel gas
- Improve instrumentation flow meter calibration and update control strategies

Reporting GHG emissions by the petroleum refining company is important to provide a clear picture of which emissions are emitted. Emissions reporting should be complete within each category. The accuracy required for reporting GHG emissions depends on the uses of the data being reported. The EU Emissions Trading Scheme will require the reporting of emissions at the installation level.

3.2 Performance monitoring

The GHG emissions performance monitoring for the petroleum industry consists in:

- Demonstrating continuous improvement
- Limiting the absolute level of their emissions
- Limiting the emissions intensity of their operations
- Reducing the quantity of gas flared or vented in the production of crude
- Improving energy efficiency
- Switching to self generated electricity with lower emissions intensity than purchased electricity The European Commission has provided guidelines for CO_2 measuring and reporting. For example, heaters,



boilers and flares fuel rates need to be measured with a 2.5% accuracy. The fuel gas to the process units needs regular sampling and analysis to determine their calorific values and emission factors. CO_2 emissions from combustion sources are based on fuel types (fuel gas or fuel oil) and can be determined from combustion reactions or by estimate using EPA AP-42 emissions factors [2]. The amount of gas flared and vented should be reported with the resulting reduction in CO_2 emissions

3.3 Emissions forecasting

Since the price of CO_2 allowance is volatile, one of the challenges refineries are facing is to develop methodologies and tools for prediction of CO_2 emissions ahead of time (demand forecasting), to reduce the level of uncertainty and support more economic trading decisions. Small errors in the prediction of emissions have a big impact on the requirement to buy or sell emissions. When available, an LP planning model and simulation tools can be used for CO_2 emissions forecasting. Based on future reduced allocations, there is a need for CO_2 forecasting. The refinery needs to start considering CO_2 reduction projects or begin actively trading CO_2 credits. Forecasting becomes important for the refinery if the marginal cost of CO_2 increases. At the current •20/tCO_2, the preferred model is to buy CO_2 credits rather than change refinery operations. At •60ItCO_2, the refinery should start to look for ways to reduce CO_2 emissions. At •100ItCO_2, the refinery should consider investing in CO_2 removal (sequestration or abatement) [3].

3.4 Emissions reduction

All refineries and plants that emit more than 25 ktpy of CO_2 were obliged to join the Kyoto community and respect their national allocation plans and given amount of credits. Refinery emissions typically range from 1 million tpy for a typical sized refinery to 3.5 millions tpy for a complex conversion refinery. Countries have to reach their Kyoto level in the target period of 2008 — 2012.

With already high energy costs and the introduction of more severe specifications for petroleum products and environmental constraints, refiners are under increasing pressure to develop strategies to reduce CO_2 emissions. The most cost-effective to reduce emissions is seen as energy efficiency improvements. Developing the optimum strategy to meet CO_2 emissions targets requires the evaluation of many different options. Some of these options involve very large capital investment decisions. The financial benefits of each option depend upon both energy and CO_2 prices.

3.5 C02 emissions evaluation

Quantification of GHG emissions from the petroleum industry is complicated by the wide variety of emission sources and the nature of the fuels consumed by the industry. A large fraction of the combustion emissions comes from burning hydrocarbon mixtures that are highly variable in composition. Estimates of CO_2 emissions based on the actual gas composition will provide the most accurate results. If the composition is not available, emission calculations should be made using mass based emission factors (mass of CO_2/ mass of fuel) and the actual mass of fuel burned or energy - based emission factors (mass of CO_2/ energy content of the fuel) and the actual amount of energy consumed.

Petroleum refining GHG emissions result primarily from combustion and process sources. Fugitive emissions are generally smaller than other sources.

The GHGs evaluation is limited to CO_2 because it is the principal GHGs emitted by the refining industry. Methane (CH4) emissions from controlled combustion sources are negligible compared to CO_2 emissions. Estimates of CO_2 emissions from petroleum refining can be performed as follows:

- CO_2 from combustion sources: thermal input (fuel input) based on metering or energy balances on heaters/boilers, fuel composition obtained from frequent spot sampling.

- CO_2 from flaring sources: engineering estimates of gas flared i.e., using API flame length correlations and default factor for refinery gas.

The US EPA has developed a range of emissions factors for CO_2 emissions that can be used within the oil and gas industry. Table 1 gives the emission factors of refinery fuels [4].

The major refinery process unit operations that impact CO_2 emissions are the FCCU and the hydrogen plants. In a complex refinery, crude/vacuum heaters account for roughly one-third of the emissions and the naphta reformer furnace and the naphta hydrotreater unit account for up to one quarter. It is important to realize that CO_2 emissions from heaters and boilers are dependent on refinery fuel. For each ton of CO_2 production, 4.3 Gcal of heat is produced from natural gas and 4-4.8 Gcal from refinery fuel gas [3]. Table 2 shows CO_2 emissions from combustion of fuels (fuel gas and natural gas) in petroleum refineries (1996) [4].

4. Refinery C02 Emissions Reduction

Refinery CO_2 emissions mainly come from heaters, boilers and gas turbine assets. Reducing emissions from a refinery involves:

a) Operational improvements such as:

- Improved furnace efficiency through better excess oxygen control or modification of the convection section; increasing furnace and boiler efficiencies will lead to reduced fuel usage (energy saving) and hence CO_2 emissions
- Reduced molecular weight of furnace and boiler fuel, using natural gas instead of fuel oil

b) Reducing carbon concentration in fuel gas: most refinery fuel gas streams contain relatively large

amounts of 03+. By improving the level of LPG recovery, the fuel gas can be made lighter, which in turn results in fewer CO_2 emissions.

C) Reducing fouling in preheats train heat exchangers in a crude distillation unit will lead to improvement in heat transfer and saving fuel fired.

d) Pinch analysis can be applied to establish targets for energy savings through improved heat recovery.

e) Reducing losses to flare through improved control and flare gas recovery need to be considered.

f) Processing of lighter crude oil can provide an option to refineries in extreme circumstance to lower
CO_2 emissions.

Other ways of reducing CO_2 emissions involve investments include:

a) Addition of heat exchanger surface in the preheat train of a crude oil distillation units (atmospheric and vacuum) will increase the furnace inlet temperature and will lower fuel gas consumption (energy saving) and decrease CO_2 emissions.

b) Installing air preheat systems or waste heat boilers on furnaces

c) Installing compact heat exchangers (Packinox type) on reformer feed I effluent streams [5].

d) Removal and recovery of CO_2 from furnace flue gases: various technologies are available for CO_2 removal such as absorption and separation by membranes. The CO_2 recovered can be used as a feedstock in urea production, in food and drink manufacture, and for enhanced oil recovery in oil reservoirs. For refineries operating at maximum energy efficiency, a few projects could be considered for improvements:

a) For refineries that import power, there is an overall benefit in moving to high efficiency gas turbine base cogeneration systems. Installing cogeneration will increase net refinery CO_2 emissions, but will also reduce power import. Cogeneration is the most efficient form of stream and power generation for the refinery. A refinery cogeneration unit using natural gas discharges only 0.25 tCO_2/equivalent MWh [3].

b) Installing combined heat and power (CHP) in the process unit. This will replace or modify ODU heaters and reformer furnaces with an upstream gas turbine and will boost the process unit efficiencies. CO_2 recovery from the steam reformer could be considered for export to greenhouses, the food industry for carbonation, disinfectant or solvent, dry ice for cooling of fire extinguishing agent. In implanting a program for CO_2CO_2 emissions reduction, the following steps can be used:

c) Refiners are initially implementing energy efficiency programs that reduce CO_2 emissions. These programs define operational improvements and reduce the main energy waste. The implementation of an Energy Manager could also be beneficial. This can lead to an energy efficiency improvement and CO_2 emissions reduction of 5%.

d) Refineries should identify energy efficiency

Table 1: Emission factors of refinery fuels

tCO2 /t Crude	tCO2 /t J
Residual fuel oil	77.3
Diesel oil	74.0
Refinery gas	66.7
Natural gas	56.0

Table 2: $C0_2$ emissions for different fuels

	Mol weight (kg/kmol)	CO2 emissions (1000 tons)
Natural gas	17.5	46570.00
Refinery fuel gas	23.1	101526.25

projects at attractive payouts. For example, projects with increasing heat recovery as well as furnace and utility systems efficiency can be considered. A typical energy efficiency improvement of 15% reduction in CO_2 emissions can be achieved.

e) Further CO_2 emissions reduction can be obtained using hydrogen to enrich the refinery fuel gas. An overall CO_2 emissions reduction of about 25-35% can be achieved with this measure.

f) In this final step, an overall reduction of 60% requires a reduction in refinery capacity or the implementation of new technologies, investment in CO_2 sequestration methods and the production of hydrogen fuel and/or biofuels.

5. Refinery Energy Improvements

In the petroleum industry, energy savings are directly related to environmental CO_2 emissions reduction Higher CO_2 emissions costs will drive operation changes to reduce energy consumption and to improve overall energy efficiency across the refinery. The profitable way to reduce CO_2 emissions in the refining industry is through energy savings using the following techniques:

a) Process improvements: Increase process furnace efficiencies and use of higher carbon content fuels will save energy and reduce CO_2 emissions

b) Pinch analysis can be used to determine the minimum energy consumption of a process by identifying opportunities for energy savings, such as:

- Increasing steam generation
- More effective use of available steam levels
- Potential for low grade heat recovery

C) Optimizing the combustion process using Thermal Imaging Control of High Temperature Furnaces will increase energy efficiency resulting in fuel savings and CO_2 emissions reduction.

d) Controlling the combustion by assuring a

minimum of excess air for fuel combustion will improve the efficiency and decrease fuel consumption and CO_2 emissions

e) Installing air preheaters will increase the combustion air temperature which will improve energy efficiency in furnaces and boilers.

f) Direct heat recovery of a cogeneration unit can be used instead of the conventional fired heater or repowering fired heater. This will save utilities and reduce emissions.

g) Replacing shell & tube heat exchangers by a compact heat exchanger (Packinox type) will save fuel consumption by increasing the inlet furnace temperature. The furnace heat duty is lower, so less fuel is burned and less CO_2 is emitted.

h) Reducing flare losses: losses of hydrocarbons to flare are often no metered within the refinery and contribute directly to increase CO_2 emissions. Hydrocarbon losses (hence CO_2 emissions) to flare can be estimated from an overall carbon balance for the refinery, this calculation is highly inaccurate. To reduce such losses, it is recommended to install improved fuel gas control system and flare gas recovery systems.

To succeed in CO_2 emissions reduction through energy savings, the petroleum refining company should:

- Identify optimum long term strategy for CO_2 reduction
- Consider projects for saving energy and reducing emissions
- Develop a roadmap for investment in projects that significantly improve the site's overall energy efficiency.
- Include a "CO_2 constraint" in drawing up production programs and examining investment projects.
- An audit can be a start in looking at the business around CO_2 emissions.

6. Conclusions

Summarizing all the previously discussed emissions reduction measures lead to the following conclusions:

1. Environmental specifications are pushing for more CO_2 insensitive refining processes. CO_2 emissions increase following higher environmental specifications.
2. Refining companies should make commitment to reducing the environmental impact to plant operations. By improving pollution controls and energy conservation, refiners can reduce their CO_2 emissions
3. There is no straightforward methodology to allocate CO_2 emissions to final products. Appropriate estimation methodologies for refinery emissions should be used.
4. Accurate method to estimate emissions from combustion equipments such as refinery process heaters and boilers should be used to predict CO_2 emissions.
5. Potential energy savings in process units can be realized by reducing CO_2 emissions. Energy efficiency improvements will affect directly CO_2 emissions from heaters, boilers, turbines etc... With current high energy prices, it is important to note that CO_2 reduction through energy— efficiency improvements are very profitable.
6. It is crucial to understand how emissions trading will affect refiner's investment decisions.

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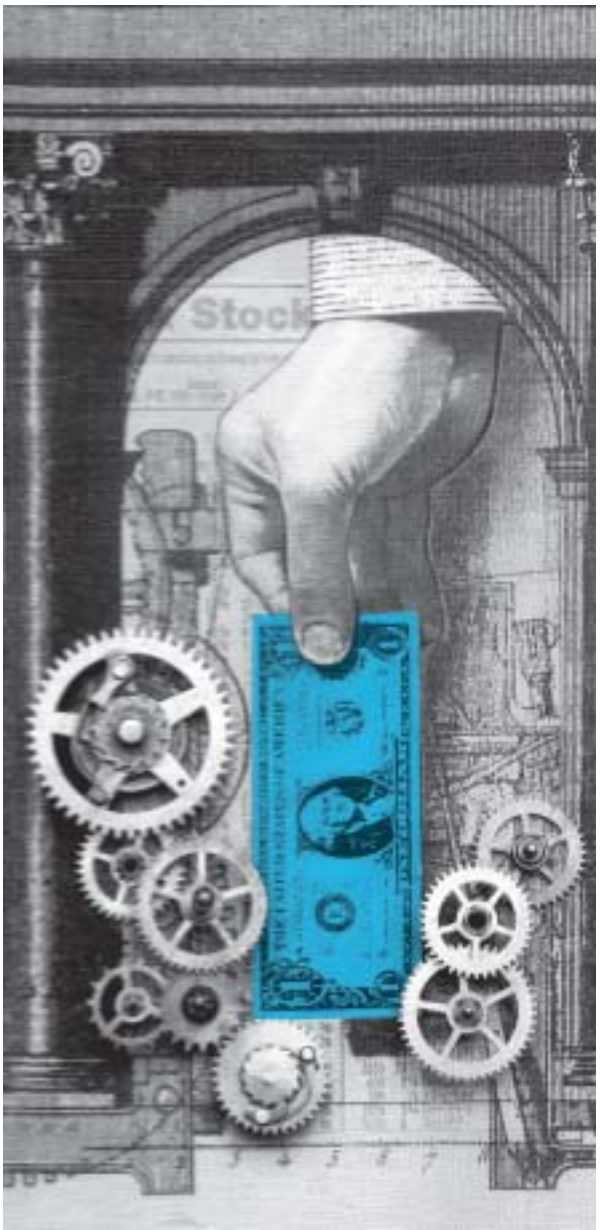
Energy Projects in Limbo after Credit Crunch

Source: Business UAE



There is a question mark over about half-a-trillion dollars worth of energy projects in the Persian Gulf that are in varying stages of completion, a US-based strategy advisory firm in global energy has said.

A worldwide slowdown in lending has put the completion of these energy projects in jeopardy, according to Raja Kiwan, an analyst with the Washington DC-based PFC Energy.

"Now that commodity prices have plunged on global recession fears and credit markets remain nearly closed, questions are being raised about the financing and economic rationale of many of the large projects still in the design and planning stage," Kiwan wrote in a market intelligence memo.

PFC has raised concern not only about energy projects, including refineries, but also industrial, infrastructure and real estate projects, altogether worth more than $3 trillion (Dh11.02trn).

Kiwan said: "Rapid growth in the GCC has been driven by large-scale investment in energy, industry, infrastructure and real estate. Until recently, higher oil prices and abundant liquidity fuelled an accelerating rate of investment growth, especially in the over-heating property market.

"The overhang of uncompleted and pending investments is massive. The total is in excess of

$3trn, the lion's share of it for projects expected to be finished within three to five years," he said.

Kiwan says it is hard to see how even the most buoyant market could absorb that much new housing and commercial development.

"Moreover, these investments are highly concentrated in the UAE, which alone accounts for $900 billion of the total. Saudi Arabia accounts for another $550bn, but much of that is for the kingdom's programme of industrial city development, which marks the one significant exception to the generally medium-term nature of these projects – many of the cities will be built out over the next 20 to 25 years."

While lower oil prices alone would have caused some of these deals to be re-examined, access to financing has become a far more serious obstacle, PFC believes.

The international financial crisis has caused a brutal reversal in liquidity conditions, and foreign banks, which had reportedly been providing as much as 70 per cent of the region's project financing, have quickly reduced their involvement – in a few cases even considering invoking material adverse change clauses in order to walk away from already completed deals.

There is a growing realisation that the situation is not likely to improve in 2009.

"There are regional banks that remain liquid and interested in project finance, but with existing commitments are in no position to make up the shortfall," Kiwan said.

"There are niches for Islamic institutions to fill, but these lack the size and expertise to take on a significant share of the market. Some project organisers have turned to non-Japanese Asian banks, most of which are still relatively unaffected by the crisis, for financing.

"This is a relationship with enormous long-term potential, but even healthy banks will be cautious about entering new and unfamiliar markets at a time of heightened risk, and too much cannot be expected from these lenders in the short term.

"Under these circumstances it has to be assumed that investment will slow, and that many of these projects will not go ahead, and others will be delayed.

Planned investments in upstream oil and gas development are expected to go ahead because they represent the core of the GCC economies and budgets.

"In the case of the largest producers, cash-rich national oil companies should be able to finance projects from their own balance sheets. Moreover, low development and production costs mean that project economics will continue to make sense at any plausible level for energy prices. The only exception to this general rule may be refinery projects, some of which appear to be motivated more by regional political considerations than by economics," said Kiwan.

This makes such refining projects strategic, "but in a different sense", and "potentially more vulnerable to delays" in the current difficult financing environment.

As slowing investment results in slower economic growth for the Persian Gulf countries, it will also mean a deceleration in energy demand growth for the region.

"Any scaling down in planned new investment spending should feed through directly to reduced oil consumption. Given the number and scale of projects currently under way, we continue to see fairly healthy demand growth of 5.3 per cent in 2009 to reach 4.43 mmb/d, down however from 10.8 per cent demand growth in 2008."