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The 6th Asian Ministerial
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A FRUITFUL DISCUSSION: HIGHLIGHTS FROM THE 6TH ASIAN MINISTERIAL ROUNDTABLE

By Dr Mohammed bin Saleh Al-Sada,
Minister of Energy and Industry of the State of Qatar

On 9th November, 2015 the Ministry of Energy and Industry of Qatar, in association with the International Energy Forum (IEF) and co-hosted by Thailand, successfully concluded the 6th Asian Ministerial Energy Roundtable (AMER6) in Doha. This Roundtable was hosted by Qatar under the patronage of His Highness Sheikh Tamim Bin Hamad Al-Thani, the Emir of the State of Qatar. This prestigious gathering was inaugurated by His Excellency Sheikh Abdullah Bin Nasser Bin Khalifa Al-Thani, the Prime Minister of the State of Qatar, with the objective of enhancing cooperation in the field of energy between Asian countries.

The Roundtable focused on important energy issues and challenges which were discussed in the form of plenary sessions under the following themes: “Oil markets: a new normal or just another cycle, and what it means for Asia”; “Gas and coal in Asia’s energy mix: interactions and uncertainties” and “Delivering on the clean energy agenda: prospects and the role for policy”.

The event was attended by Energy Ministers and high-level delegations from twenty Asian countries, as well as the chief representatives of six international organisations. This Roundtable provided a good opportunity to review and reflect on the consequences and prospects of the energy market in the aftermath of the last year and a half of extreme challenges and turbulence in the energy sector.

The participants of the Roundtable reached agreement on many key issues, such as:

- The importance of continuous international dialogue between consumers and producers of energy as the only

way for all nations to reach their development goals.

- The current market instability will not last forever, and all parties have to take the required actions to sustain investments in the energy sector to meet future energy demand and strike a market balance.
- Asia remains a vital engine of growth for the world’s economy, and will remain so for the foreseeable future. The demographic changes will have increasing influence on future energy demand.
- All available resources are needed to meet future growth in energy demand. It is becoming increasingly evident that world economic stability is dependent on stable and transparent Asian energy policies.
- It was acknowledged that every nation has the right to development and growth, in line with their national visions, to meet the aspirations of their peoples and contribute to the betterment of their communities.
- It was reaffirmed that energy security is an essential component of any economic development dialogue. Therefore the role of international organisations and agencies needs to be made more active in order to achieve this.
- There was agreement emphasising the importance of reducing mankind’s carbon footprint, and the important role played by natural gas in the transition to a decarbonised world. In this context the use of natural gas as a clean and affordable source of energy was emphasised. Natural gas will play a critical role in the climate change negotiations at COP21 in Paris.
- It was highlighted that coal continues to be less expensive than gas, even in the current low oil price environment, making it difficult to reduce the rate of emissions produced by coal-fired electricity generation.

Delegates endorsed the proposal of the Kingdom of Saudi Arabia delivered by HRH Prince Abdulaziz bin Salman Al-Saud, to establish an Asian Energy Efficiency Knowledge Sharing Framework, under the auspices of the IEF.

At the end of the Roundtable, participants agreed that active dialogue is of paramount importance in order for our nations to achieve their development goals. Participants from various nations also presented their own energy scenarios and viewpoints, which were well appreciated by those present.

On behalf of the Government of the State of Qatar, I would like to thank all those involved in the event for their positive contributions, which made possible the realisation of the goals of this meeting, and the IEF Secretariat for all their efforts. ■



Dr Mohammed bin Saleh Al-Sada addresses AMER6



AS ASIA GOES, SO GOES THE WORLD OF ENERGY

By HE Aldo Flores-Quiroga
Secretary General, International Energy Forum (IEF)

All eyes are on Asia. It is shaping the future of the world economy and becoming the new centre of gravity of the global energy sector. Regional investment and trade flows to and from Asia have registered historic highs in the last decade and created what is perhaps the most dynamic regional energy market anywhere. As Asia goes, it seems, so goes the world of energy.

A region as diverse as this one defies easy categorisation, but the general trends in the relationship between its energy producers, consumers, and transit States are apparent. The Middle East, Siberia, Central Asia, and Oceania are the powerhouses of supply. East Asia is the main source of demand growth. In between lie countries whose production and consumption are smaller by comparison, but whose demand is growing rapidly to fuel economic growth. The energy trade and investment relations of these countries help to articulate transactions between producers and consumers across the vast Asian expanse.

The evident complementarities that follow from these trends are paving the way for an updated version of the fabled Silk Road, in which energy flows will play a much more significant role amidst the growing regional trade in goods and services. Asian demand for oil, gas, and coal has grown to levels unimagined only a decade ago, thanks to rapid economic growth, the expansion of the middle class, and urbanisation. Investment in and production of fossil fuels from the Middle East and Central Asia has increased accordingly to meet this higher demand. Interregional trade flows transit increasingly lengthy and complex supply chains, passing through a variety of logistics hubs and negotiating potential choke points ranging from the straits of Hormuz and Malacca, to the narrows of the Bosphorus.

The growing interdependence among the countries in Asia is getting stronger even as supplies from other regions of the world, most notably Africa and Latin America, gain ground, and as prospects continue to improve for greater participation of North American supply in global energy flows. Wind and solar power

expansion in just about every country in the region point to a more diverse and sustainable energy mix. In the coming years Asia will invest more than Europe or North America in power generation with renewable energy sources. Based on its economic momentum and ability to innovate, it may well become the world leader in the development and deployment of clean energy technologies.

What does all this mean for Asia's energy markets and the relationship between its producers and consumers? How are current energy market trends shaping policy and investment decisions in Asia's various sub-regions? How should governments and companies craft their strategies in the face of the uncertainties presented by the current oil market cycle? How will the energy mix evolve in response

The growing interdependence among the countries in Asia is getting stronger even as supplies from other regions of the world gain ground

to growing interest in the environmental footprint of the energy industry? What are the prospects for successful fuel-switching whilst avoiding negative impact on economic growth rates? How can international cooperation complement national policies to improve the energy security of producers and consumers in the region while taking into account similar aspirations in the rest of the planet?

The 6th Asian Ministerial Energy Roundtable is an opportunity to shed light on these and other questions through an open exchange of views among the Ministers of the region. I am delighted this dialogue is taking place in Qatar, a bastion of the global energy industry and a true champion of the energy dialogue. I am certain this Ministerial meeting will continue to advance our understanding of today's fast-evolving energy market for the benefit of global energy security.

Welcome to the 6th Asian Ministerial Energy Roundtable! ■





THE LONG TERM HORIZON

By HRH Prince Abdulaziz bin Salman Al Saud
Vice-Minister for Petroleum and Mineral Resources, Saudi Arabia

Globalisation, together with stronger trade and financial ties, means that each nation's prosperity has become closely intertwined with that of the rest of the world. This cannot be seen more clearly than in the area of energy. Rather than *independence*, the world of energy is one of *interdependence*, where the security of supply – and that of demand – are two sides of the same coin. In such an interdependent world, a constructive dialogue between consumers and producers is essential to promote trust, cooperation, information exchange, and a deeper understanding of each other's policies. The Asian Ministerial Energy Roundtable has become a key feature of this global energy dialogue.

The recent months have been, without doubt, very unusual, if not unique, for the oil market. After years of relative stability, the oil price started falling in the second half of 2014, losing more than 50 per cent of its value in a relatively short period of time. The sharpness and the speed at which the price fell has fuelled many analysts' imaginations, with some explaining the fall in the oil price in terms of conspiracy theories and geopolitical games. Others consider the current changes to be structural in nature – where we have entered a 'new oil order' with oil prices staying at this level, or falling even lower, for a long period of time; the cost curve for oil shifting downwards; the US shale producers assuming the role of the swing producer; and OPEC as an organisation playing no, or only a limited, role in market stabilisation, with some even going so far as declaring the death of OPEC. Virtually every oil price cycle in the past has generated its own narrative; this one is no different.

Despite their fundamental flaws, such narratives often dominate the energy discourse and tend to shape market expectations and beliefs. For a major reserve holder, oil producer, and exporter such as Saudi Arabia, our focus has always been on the long-term trends shaping the oil market. Rather than being a commodity in decline, as some would like to portray, supply and demand patterns indicate that the long-term fundamentals of the oil complex remain robust.

One fundamental flaw in the current narrative is the tendency to compare the current price fall with that of the mid 1980s. But this comparison is simply misguided. Market conditions now are fundamentally different from what they were then. In 1985, global oil consumption stood at just over 59 mb/d and the available spare capacity was at a historical level of over 10 mb/d, and the ratio of

spare capacity to global oil consumption was about 17 per cent per cent.

In 2015, oil consumption is estimated to reach 94 mb/d, while usable spare capacity, mainly held in Saudi Arabia, is estimated at 2 mb/d – in other words, a ratio of spare capacity to oil consumption of about 2 per cent. This is one of the few industries in the world that is operating at such a thin cushion. Spare capacity acts as an insurance policy against unanticipated changes in oil market conditions and is key to maintaining oil price and global economic stability.

There is another fundamental difference from the mid 1980s. Despite all the macroeconomic uncertainties engulfing the global economy, oil demand continues to grow at a robust pace and is set to increase by 1.5 mb/d in 2015, the strongest growth seen in the past few years. This is in contrast to the early 1980s where global oil consumption fell between 1980 and 1984 by more than 2.3 mb/d.

The current market fundamentals are different from those of the early 1980s and comparisons with that period are therefore misplaced

There may be some bumps on the road, and the phenomenal growth seen in the last three decades in Asia may not be repeated, as growth in oil demand will be moderated by efficiency enhancement and oil substitution efforts. But the petroleum industry should not lose sight of the fact that scale matters. Globalisation, industrialisation, urbanisation, and rapid development – all fuelled by energy – will continue to lift hundreds of millions of people out of poverty and to expand the size of the middle class from the current level of 1.8 billion to 3.2 billion in 2020, and to 4.9 billion in 2030, with the bulk of this expansion occurring in Asia. The new emerging middle class will be made up of people who are younger, and eager to increase their consumption. Such young demographics amidst rising income levels will keep energy demand on an upward trend.

The current low levels of spare capacity, together with the robust growth in demand, indicate that the current market fundamentals are different from those of the early 1980s and that comparisons with that period are therefore misplaced.

To meet the expected increase in demand, the world

needs all sources of energy – including oil, gas, renewables, nuclear, and solar. The Kingdom has always been of the view that there are plenty of resources to meet the projected increase in demand. The peak oil theories that dominated the energy discourse a few years ago – insisting that global oil production had already reached a peak – have proved to be simply wrong.

The pendulum has now moved in the opposite direction, and expectations of ‘scarcity’ have been replaced with expectations of ‘abundance’. However, while the availability of resources has never been the constraint, it is also true that conditions must be put in place to provide the right incentives for the industry to explore and to develop these reserves in an efficient and timely manner. There is a sense of complacency and a misconceived perception that the challenges faced by the industry a few years ago – ranging from the small number of new oil discoveries, to the sharp rise in industry costs, to the difficulty in retaining talent, to the high decline rates in mature areas, and to the increasing complexity of developing new finds have all but disappeared.

The fast and sharp industry response to the current fall in the oil price, however, has shown clearly that the sustainability of investment and output growth cannot be achieved ‘at any price’. While it is true that underground resources are abundant, the technical and human resources, and the financial resources needed to develop these reserves, are not.

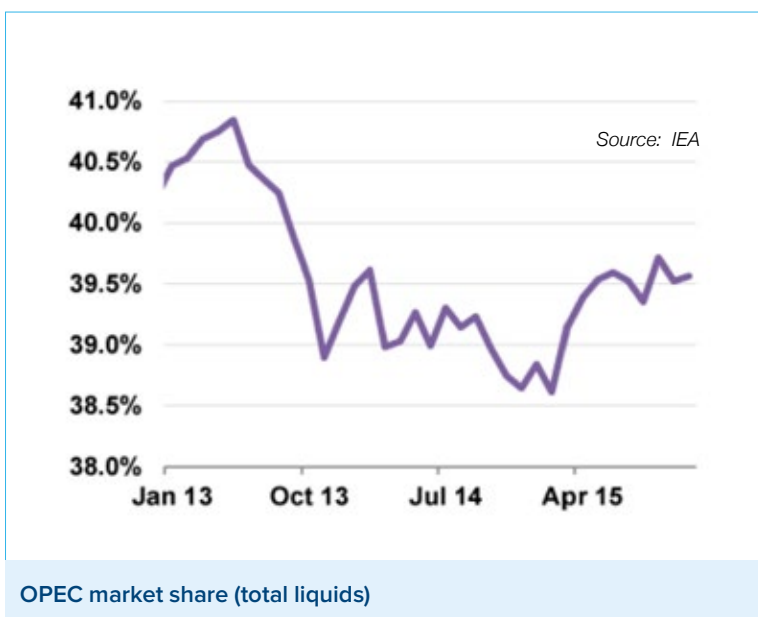
Both the industry and the supply chain remain highly vulnerable to sharp price movements. Around US\$200 billion of investments in energy have been cancelled in 2015, with energy companies planning to cut another three to eight per cent from their investments next year. This is the first time since the mid 1980s that the oil and gas industry will have cut investment in two consecutive years. The IEA describes the current decline as ‘the biggest in oil history’. Under increasing fiscal pressure, many governments in key oil producing countries are being forced to cut their investments in the energy sector and to revise downward their expansion targets. The impact of the recent cut in capital expenditure has not just been confined to oil exporters; it is also being felt in importing countries, where the decline in oil prices has increased the risks for firms in the Asian oil and gas sector, affecting their investment plans.

The potential impact of current cuts in expenditure on future oil supplies is both substantial and long-lasting. Nearly 5 mb/d of projects have already been deferred or cancelled. Also, the reduction in Capex at existing producing fields – including investment in enhanced oil recovery projects – will only accelerate the already high decline rates, especially in ageing offshore fields.

In fact, after three years of positive growth, non-OPEC supply is expected to fall in 2016; only one year after the deep cuts in investment. Beyond 2016, the fall in non-OPEC supply is likely to accelerate, as the cancellation and postponement of projects will start feeding into future supplies, and the impact of previous record investments on oil output starts to fade away.

An important part of the current narrative is that these cuts in investment and output can be quickly reversed when oil prices start rising again. This is attributed to the view that investment cycles are becoming shorter and the supply curve more elastic. But this is wishful thinking. Previous cycles have shown that the impact of low oil prices is long-lasting, and that the scars from a sustained period of low oil prices cannot be easily ‘erased’. During sharp downturns, the industry tends to lose talent, technical expertise, financial resilience, and the confidence to embark on new investments. Unfortunately, none of these adverse impacts on our industry can be quickly reversed.

The extreme price movements that we have



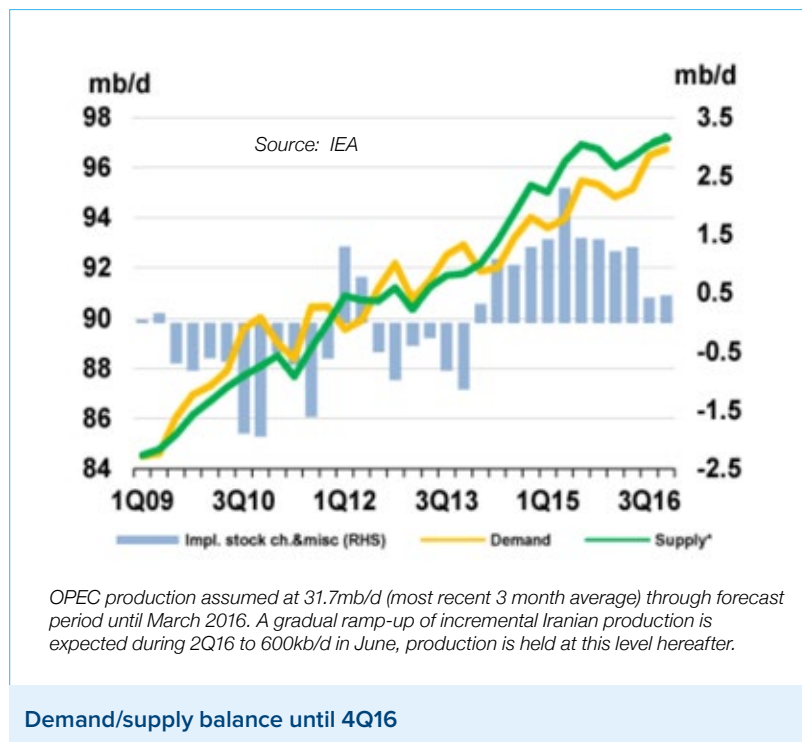
witnessed recently are very harmful for producers, consumers, and industry players. For producers whose economies are highly reliant on oil revenues, they undermine their development plans and complicate their macroeconomic management. For consumers, oil price volatility induces uncertainty in the general macroeconomic environment, reducing investment and capital formation, and undermining the viability of their energy policies. For the oil industry, sharp price swings make future planning extremely difficult, delaying much-needed investment in the oil sector.

The impact of such price instability is not just confined to the oil sector; the spillovers are being strongly felt in other parts of the energy complex – such as renewables and natural gas. This is because price instability undermines the viability of energy policies – of both producers and consumers – that are aimed at increasing the share of renewables in the energy mix, and enhancing energy efficiency.

As we saw back in 2008, high oil prices proved to be unsustainable, and the price fell sharply following the great financial crisis. But this works in the opposite direction. A prolonged period of low oil prices is also unsustainable, as it will induce large investment cuts and reduce the resilience of the oil industry, undermining the future security of supply and setting the scene for another sharp price rise. Just as the assertions, heard a few years ago – that the oil price would reach US\$200 a barrel – were proved wrong, so the recent assertion that the oil price has shifted to a new low structural equilibrium – will also turn out to have been wrong.

As a responsible and reliable producer with a long-term horizon, the Kingdom is committed to continue to invest in its oil and gas sector, despite the drop in the oil price. Concrete steps are also under way to reduce the energy intensity of the Kingdom's economic activity, through the implementation of energy efficiency schemes. Saudi Arabia has also taken steps to diversify its use of energy resources. These measures validate our belief in the strength of the long-term fundamentals of energy markets, and demonstrate the importance that Saudi Arabia attaches to maintaining its oil export capability and spare capacity.

Saudi Arabia plays, and will continue to play, a proactive



role in stabilising oil market conditions by building on its close relationship and ongoing cooperation with both producers and consumers, and through its effective and constructive engagement in OPEC and the IEF. However, in an increasingly interdependent world, achieving this objective is a shared responsibility. Both consumers and producers have a common interest in working collectively to achieve a more stable market; this is essential for sustaining much-needed investment and for ensuring a stable, secure, and sustainable energy system to the benefit of all. The International Energy Forum remains the only international energy body under whose umbrella both producers and consumers can cooperate on energy issues, exchange information, and gain deeper understanding of each other's energy concerns to enhance their common interests. The IEF should continue to organise Roundtable events and extend their reach to other regions.

Back in 2010 in Cancun, Mexico, I stated that the IEF 'is an embodiment of the shared views of producers and consumers and a recognition of the need for stronger, broader and more effective cooperation.' This cannot be more true than it is now, during these times of challenge and uncertainty. ■



LEARNING TO LIVE WITH THE 'NEW NORMAL'

Interview with HE Abdullah Bin Hamad Al-Attiyah, Chairman, Abdullah Bin Hamad Al-Attiyah Foundation For Energy and Sustainable Development

How do you see the issue of sustainable energy developing in a global context?

The simple fact is that the whole world is looking for sustainable energy supplies. This means that while LNG can play a big role in meeting energy needs, it still needs a backup, because like oil, it's a finite resource. So, looking ahead we in Qatar will focus on creating a good energy mix that is as sustainable as possible.

At the same time, we can do a lot more to produce clean energy by using the available technology. The role of technology in the future of sustainable energy will be key, given that the environmental implications of meeting the world's energy demands suggest that energy technologies with near-zero emissions will eventually be required to ensure such sustainability.

Accordingly, there is a pressing need for substantial research, development, and programmes aimed at launching advanced energy technologies.

Some of these technologies are readily available, including the technological revolution in power generation where natural-gas-fired combined cycle offers low costs, high efficiency and low environmental impact. Modern gas-fired power plants emit 50 per cent less carbon dioxide than coal plants and they are 40 per cent more energy efficient.

Regarding the impact of climate change and reducing emissions, it's a conflict between economic objectives and commitment. Many big countries such as China, Russia, Canada, and the United States are outside the Kyoto agreement because of the implications on their economies of reducing emissions. Canada has huge reserves of oil sands, Russia has oil and gas, and China has a lot of coal. There is talk that in December, in Paris, there will be a new agreement on emissions, but it will take 20 years: caps have been imposed every year, and yet we are still discussing how to reduce emissions; it is a very complicated issue.

What are the options for nuclear power in the Middle East?

The initial problem is one of cost. Unless the Gulf nations work together, nuclear is too expensive, so countries will continue to work on the basis of their individual needs.

An optimum technology mix minimises overall generating cost to the nation. There are also benefits in terms of energy security and minimum environmental impact. However, nuclear has stringent institutional and legal requirements and poses serious and demanding challenges related to establishing and maintaining high safety in operation, as well as handling waste treatment

and management. It requires, therefore, long-term national commitment and enduring public acceptance.

A key aspect of pursuing sustainability is the cost of cleaner energies such as LNG. Where do you think prices are going to go over the next 20 years?

Like everything, this is an issue about supply and demand: the price of oil was low in the 1980s, then it went up, and now it is back down again. When we started to supply gas to the world in 1997 we were concerned about low gas prices. So we asked consumers to create a special model, a special price, but they did not want to, because oil prices were low. But now oil prices have fallen and gas has gone up, they want a deal: it is a cycle, and everybody is looking out for their own interests. Commodity prices are cyclical, and industry players always adapt accordingly. We can forget about oil going back to US\$100 a barrel for the next decade, and we can live with that as long as Qatar and the industry adapt to the new situation. The necessary steps have been taken, and the Qatari government has based its new budget on the price of oil being between US\$45 and US\$50 a barrel for the foreseeable future.

We can forget about oil going back to US\$100 a barrel for the next decade, and we can live with that

New LNG suppliers are entering the market, notably Australia. How will this affect Qatar's plans?

If newcomers like Australia start to open supply, they will only be able to generate cashflow, they will never generate a profit. It will be very, very difficult for new projects if the price of oil continues on its present course. No one can compete with us as newcomers: we have been in the market for the last 15 years or more and we already cover the whole cost of production and shipping, so we know we are in a very strong position. At the same time, a lot of oil producers are freezing gas projects. We are not worried about Australia. We have our market share, and we know the world needs more gas. Regarding prices, we have already committed to long-term contracts. At the same time, the Middle East lacks gas: Kuwait is building a new terminal, as are other countries in the region such as Pakistan and Jordan. We have the biggest LNG fleet in the world, and we have all the infrastructure. We have accumulated a lot of experience over the last 18 years, so

we can react quickly to spikes in demand from individual countries. In short, we are not worried about Australia: the global market is enormous.

On the plus side for LNG, changes in the energy mix will boost demand...

The outlook for the LNG market is likely to continue along similar lines to last year and this year. On the supply side, three new LNG trains, in Algeria, Australia and Papua New Guinea are now on stream. This is likely to add about 10 million tonnes to global LNG production – a 4.2 per cent increase.

On the demand side, two factors are likely to make global demand continue to outpace global supply. First, energy demand in Asia is expected to remain robust, even after taking into account a slowdown in Chinese growth.

Global LNG exports are unlikely to meet the growing global demand, leading to higher LNG prices. Additional exports are unlikely to materialise before then. In particular, the so-called shale-gas revolution in the United States is not expected to lead to additional LNG exports before 2020.

Countries like China, India, Indonesia, Malaysia, Pakistan and Thailand have just started to rely on LNG supplies for their energy needs, and this trend is likely to grow over the next few years. Second, China's rising pollution will mandate a switch away from coal to cleaner energy sources, particularly LNG and pipeline gas.

As the largest exporter in the world, Qatar is likely to benefit from higher LNG prices, resulting in large current account surpluses for years to come.

What are the goals of the foundation for sustainable energy development that bears your name?

The mission of the foundation is to help tackle challenges such as energy efficiency. I would like to see the foundation become the leading think-tank in the region and one of the world's main institutions in the areas of energy and sustainable development. We will advise governments and companies on how to build their own projects; how to cut the fat in their expenses; how to avoid market shocks; how to make the right calculations and how to plan ahead both in the short term and the long term.

We want the foundation to be a forum to discuss the issues, to try to read the future of energy and what the different scenarios are. So we will create roundtables and workshops to discuss oversupply, stocks, movement, and

how we can address the issues: how we see the market developing. We have to try to learn from the past, and to try to work out which energy mixes will work. We are even talking about what will come after oil and gas – in a hundred years they will have gone: it's only four generations. We are talking to everybody to join forces to deal with global issues. When we talk about sustainability we are also talking about geopolitics, wars, about the road map for the world. We face more problems than ever before, and we need to sit down to discuss how to deal with them.

How do you see the role of the International Energy Forum?

The International Energy Forum (IEF) was set up to help greater mutual understanding and awareness of common energy interests among its 74 members, who are from all six continents and account for around 90 per cent of global oil and gas supply and demand. What makes the IEF unique is that it comprises not only consuming and producing countries of the IEA and OPEC, but also transit states and major players such as Argentina, China, India, Mexico, Oman, Russia and South Africa. This means that the IEF can be a neutral facilitator of informal, open, informed and continuing global energy dialogue. By recognising their interdependence in the field of energy, member countries are able to co-operate under the neutral framework of the Forum, fostering greater mutual understanding and awareness of common energy interests in order to ensure global energy security.

What is more, the Forum's biennial ministerial meetings are the world's largest gathering of energy ministers. The scale and diversity of the organisation is a testament to the position of the IEF as a neutral facilitator and honest broker of solutions in the common interest. ■



The skyline of Doha, Qatar, host of AMER6



LOOKING BEYOND THE SHORT TERM

By HE Ali Al-Naimi
Minister of Petroleum and Mineral Resources, Saudi Arabia

The 6th Asian Ministerial Energy Roundtable meeting forms a vital part of the ongoing dialogue about the future of global energy. It is the most successful regional energy ministers' meeting and its success is an example to other nations. With consumer and producer nations represented, along with business and other interested parties, the IEF remains the only truly open, transparent and independent forum to discuss such issues. I expect reports of a lively debate of the key issues facing Asia and the global energy system.

The global economy has been buffeted over the past few years and major adjustments are taking place. Recovery varies in different regions, but whatever the short-term negative headlines, the global economy continues to grow.

The global oil market has not escaped the headwinds and, due to changing levels of supply and demand, the oil price has fallen from its historic high to where it is today.

Of course, for many Asian nations, current oil prices are welcome in the short term. Indeed, I believe levels of demand will soon reflect the attractiveness of the current prices. That said, it is not high prices or low prices that we want – and by “we” I mean producers and consumers – it is stability of prices. I hope this meeting will hear from Asian nations about what more they and the IEF can do to better achieve stability.

Whatever the short-term ups and downs, over the longer term, the trends are clear. Urbanisation continues, populations are expanding, prosperity is increasing, as is social mobility. All of this requires energy to power it and, in my view, this equates to oil demand growth.

Key to this is the role of Asia. My view has not changed. Asia remains a vital engine of growth for the world economy and I have no doubt it will continue in this role throughout this century. I certainly believe that Asia will – and should – assume a greater influence in global energy affairs, and again, I think the IEF remains the forum for this.

Asia remains a vital engine of growth for the world economy and I have no doubt it will continue in this role throughout this century

Like many global organisations, however, the IEF relies on active membership supporting its initiatives. I hope all Asian nations continue to support its work and contribute data where required.

Casting ahead, the world faces many energy challenges. Two great issues for today and tomorrow are access to energy and climate change.

While we are blessed to be here in Doha pondering often theoretical questions of dialogue, cooperation and 21st century socio-economic trends, the harsh reality of energy poverty is a daily challenge for billions of people. World leaders talk of de-carbonising the world economy while millions still rely on biomass for their daily heat and have no access to electricity. Progress and lofty ambitions are good, but we should not overlook the reality of life for many.

As far as climate change is concerned, I remain committed to the belief that technology can play a vital role and help reduce harmful emissions.

So, there is a lot to discuss at this event in Doha and I hope the dialogue is open, frank and constructive. ■



Urbanisation and population growth continue to underpin long-term demand



ENHANCING INVESTMENTS IN ENERGY INFRASTRUCTURE: RUSSIA'S PERSPECTIVE

By HE Alexander Novak
Minister of Energy, Russian Federation

Each country develops its energy sector on the basis of its national priorities and specific external factors, such as market situation, technological advances and trends in international energy and climate policy.

The world energy landscape is greatly influenced by the rapid development of technologies of energy production: the large-scale production of shale oil and gas and explosive development of the renewable energy industry in different regions of the planet are only two of the most illustrative examples of this change.

The shifts in global energy flows and the rapid development of unconventional energy resources require new functional stability, reliability, and long-term predictability of all elements of existing and newly-established energy chains, from production and transportation to energy efficiency. It is important for all market players to understand that this struggle for global and regional energy security leaves no winners and losers, but all will ultimately either win or lose.

Total investments in the hydrocarbon, renewable energy, and electric power sectors in the last 5 years are estimated at US\$1.5 trillion. By the year 2035, total investments in the energy industry and energy efficiency may exceed US\$48 trillion. Thus, in the foreseeable future the energy industry will continue to be one of the main drivers of the global economy, creating conditions for better quality of people's lives all over the world. The fact that energy has been included in the UN development agenda as a separate goal highlights its importance for global economic progress and sustainable development.

Trends in Energy Industry Development

The distribution of investment flows depends to a large extent on the trends of energy industry development, the most significant of which are detailed below.

The first trend is diversification of sources of energy supply, which includes reducing dependence on energy imports through developing renewable energy and, where possible, increasing domestic hydrocarbons extraction. The share of fossil fuels in electric power generation is decreasing, and new technologies for production of hard-to-recover reserves are being deployed throughout the globe. According to IEA forecasts, the share of electric power generated from renewable sources will increase from 22 per cent to 33 per cent, while the share of conventional energy will decrease from 78 per cent to 67 per cent around the world in 20 years.

The development of energy production technologies, along with high oil prices over the preceding 10 years, triggered the implementation of production projects in countries where hydrocarbons had not previously been produced – for example, in Israel (gas, 2013), Ghana (oil, 2010), and South Korea (gas, 2004). Successful experimental development of deep-sea gas hydrates have been conducted in Japan, which initiated discussion about the beginning of a new era in the use of hydrocarbons.

According to expert estimates, in 2014-2035, the volume of investments in renewable electric power will be twice that of investments in fossil fuel-based electric power generation (US\$5.8 trillion vs US\$2.7 trillion). The above-mentioned processes are significantly changing the established energy balances.

The second obvious trend in global energy industry development is enhancement of energy efficiency. This process not only makes it possible to keep down the growth of global energy demand, even in the conditions of output growth, but also helps to mitigate the consequences of various shocks caused by short supply of energy resources to world markets.

Over the last decade, GDP energy intensity has decreased by 15-20 per cent in almost all advanced countries. And

The IEF is uniquely placed to satisfy the interests of all global energy market players in a fair and mutually acceptable way

over the next 20 years, about US\$8 trillion of investment is planned in the energy efficiency sector (transport, housing & utilities and production). This will allow the world economy to develop at rates which exceed the dynamics of primary energy consumption growth.

The third trend that has to be considered by investors is a shift in the energy demand focus toward the APR (Asia-Pacific Region) and, first of all, toward the rapidly growing economies of China and India. Over the last 15 years, the global consumption of primary energy resources has increased by 50 per cent, and almost all this growth has come from consumption in Asia and the Middle East. In spite of a slowdown in Chinese economic growth, all world experts agree that a trend toward leading energy consumption in the APR will continue in the medium term.



Family photo of the Heads of Delegations attending the 14th IEF Ministerial in Moscow, May 2014

Contribution of the Russian Federation

As a major player in the energy market, Russia takes an active part in the processes of global energy industry development.

Thus, in spite of its plentiful hydrocarbon resources, Russia is working on reducing the economy's dependence on hydrocarbons in the interest of climate change control and technological base development. About half of new generating capacity in Russia is represented by hydroelectric power plants, nuclear power plants (NPPs), and renewable energy plants.

At the same time, Russian technologies for the construction of hydroelectric and nuclear power plants are much in demand, and competitive all over the world.

Today, 29 projects for the construction of nuclear power plant units of Russian design are being implemented abroad, with the participation of Russian companies. Among them are Kudankulam NPP in India, Ninh Thuan-1 NPP in Vietnam, Bushehr NPP in Iran, Akkuyu NPP in Turkey, etc. Russian hydropower equipment and technologies for hydroelectric power plant construction

are widely used on almost all continents – in particular South America, Asia, Europe, and Africa.

Other renewable energy sources (RES), such as solar and wind power generation, small hydropower and biomass power generation, are actively developing as well.

By 2035, in compliance with the Energy Strategy of the Russian Federation, RES-based electric power generation shall increase by a factor of 14 (from 2 to 29 billion kWh), and the installed capacity of the corresponding power plants shall increase by a factor of 23 (from 0.4 to 9 GW). Stage 1 of the 5 MW capacity solar power plant construction was put into operation in the Altai Territory last year, and the plant output will double this year, reaching a capacity of 45 MW.

The technological base of the industry is also developing. A new fast neutron reactor (BN-800) will be launched this year at Beloyarsk NPP in the Sverdlovsk Oblast. Russian atomic specialists gained a unique experience during the construction of this reactor. An interest in the Russian technologies of fourth-generation nuclear power plant units has been expressed by specialists from France, China, and other countries.

The construction of a plant for the production of new semiconductor heterostructure-based solar batteries began this year in Russia (in the city of Novocheboksarsk). Based on the discoveries of Russian Nobel Prize winner Zhores Alferov, the new technology (4 times more efficient than the conventional one) may become a new driver for the development of solar power generation. In this context, a leading role in the development of RES technologies in Russia is assigned to small and medium enterprises.

For Russia, improving the energy efficiency of the national economy is no less important than developing non-carbon technologies in the electric power industry. Within 20 years, Russia is going to reduce its GDP energy intensity and electric intensity by factors of 1.6 and 1.4 respectively, compared to 2014. With an almost doubling of GDP growth, the consumption of primary energy in Russia will increase by less than 20 per cent.

Since 2008, the energy efficiency of the Russian economy has increased by 8.3 per cent, and the dynamics of its growth in the industries of the fuel and energy complex is even higher (by 0.5 per cent per year).

A large contribution to the enhancement of energy efficiency is made by the programme aimed at increasing the level of utilisation of associated petroleum gas (it has increased by more than 12 per cent over 10 years – from 74 per cent in 2005 to 86.5 per cent at present) and by the modernisation of electric power facilities (equivalent fuel consumption for electric power generation has decreased by 5 per cent over 6 years – from 335.5g of equivalent fuel per kWh in 2008 to 319.9g in 2014). We estimate the total volume of investments in the energy efficiency sector before 2035 at US\$240 billion.

Finally, in response to changes in the geography of energy demand, Russia is implementing a set of measures to facilitate access to Russian energy resources for potential consumers, first of all, bearing in mind the expansion of energy supplies to the APR.

These measures include:

- Revival of the Northern Sea Route, which, in particular, will allow Russia to create new, shorter and far more beneficial routes for the delivery of energy resources;
- Development of the ESPO (Eastern Siberia-Pacific Ocean) pipeline system in order to increase oil exports in an eastern direction (according to the Energy Strategy of Russia, the volume of oil supply to APR markets should more than double by 2035);
- Implementation of the Eastern Gas Programme,

including the creation of four large gas production centres and the construction of gas pipelines toward China, the first of which is the *Power of Siberia*, which will help gas exports to the Asian market increase by more than a factor of 9 by 2035, from 14 billion cubic metres in 2014 to 128 billion cubic metres in 2035. The total volume of investments in the oil and gas sector before 2035 is estimated at US\$2 trillion.

- Elaboration of projects for electric power export to China, Japan, and other Asian countries, including power from East Russia's wind farm, which is being designed now. This export is expected to increase by a factor of 8 (up to 74 billion kWh) by 2035.

In each direction of energy industry development, Russia strives for close cooperation with foreign partners and invites investors from various countries of the world to take part in energy projects. In spite of the sanctions imposed on the oil and gas complex of Russia, all major foreign partners did not abandon their core assets in Russia and continue investing in them. For example, the share of foreign investors in the joint-stock capital of Russian public oil companies exceeds 26 per cent, and the total volume of investments in the oil industry in the last year (when the sanctions were already in place) increased by 10 per cent, to 986 billion rubles. At the same time, the share of foreign investors in some of the largest energy projects in Russia, such as Yamal LNG, Sakhalin-1, and Sakhalin-2, exceeds 40 per cent.

Destabilising Factors

Acting in line with the trends noted above, Russia, along with other energy market players, now faces a number of destabilising factors which make investment decisions more difficult to take. First of all, this includes high volatility of oil prices and political tension creating artificial barriers to investments and technological cooperation.

Today, we find ourselves in the middle of a crisis of the existing institutions designed for energy market regulation and the provision of global energy security. The expanded number of suppliers and the increased supply in the primary energy market are transforming the system of traditional links between suppliers and consumers. Suppliers' decreased role in the provision of energy security influences functions of such market regulators as OPEC or the GECF (Gas Exporting Countries Forum). As a result, the sellers' market becomes a buyers' market, which to a large extent disorients investors.



The Kosh-Agach solar power plant in Altai

In addition, investments may be influenced by:

- The raising of the key interest rate in the world's largest economies, which makes risky investments in high technologies (especially, in alternative energy) less attractive;
- Uncertainties with regard to the debts of some European countries and the slowdown of China's economy;
- Volumes of available spare capacity in the largest producing countries.

Political differences lead to outcomes which cause significant economic damage for all parties to the conflict. One recent example is the circumstances which led to cancellation of the South Stream pipeline project, originally intended to reduce the transit risks of gas supply to the countries of Southern Europe. There are also examples of artificial isolation of major energy market players through sanctions (Russia, Iran) or of the physical destruction of the integrated system of production and transportation of energy resources (Iraq, Syria, Libya). Apparently, in these cases it is probably more appropriate to talk of unfair competition and market repartition by illegitimate means.

Such actions have a negative influence not only on the current relations between countries and regions, but also on market configuration in the future: the implementation of important projects is delayed or cancelled, uncertainty increases, and investors quit.

It is expected that the volumes of investments in oil production throughout the world may decrease by US\$150-170 billion in 2015 (estimate: JPMorgan, September 2015). This is a bigger decline than in the crisis year of 2009,

when capital investment decreased by US\$57 billion.

This also significantly affects related industries, including science and research, and leads to downsizing. The decline in volumes of production caused by underinvestment may bring new energy shortages, which could cause an abrupt increase in energy prices and political turbulence.

Possibilities for Stabilisation

The volatility of prices and de-synchronisation of supply and demand in the oil market are to a considerable degree caused by insufficient dialogue and coordination of actions between producing and consuming countries. Under these circumstances, the international community needs to determine the right key points and understand what it can rely on to build mutual confidence.

In the energy industry, there is a need for a new stability based on various mutually beneficial partnerships capable of stabilising the situation and laying the basis for new and efficient investments in the industry.

In this regard, we cannot fail to recall the role of the IEF as one of the key elements in the international 'toolkit' aimed at maintaining efficient dialogue between energy producers and consumers.

Having been a global platform for such a dialogue for over 20 years, the IEF occupies a special position among international energy organisations, covering better market transparency, overcoming bottlenecks in the development of energy infrastructure and regulatory framework, and creating common approaches to the development of the global energy industry.

The IEF's unique potential is especially needed in the conditions of new global challenges to sustainable energy development, where only constructive and non-politicised interaction between energy-producing, energy-consuming, and energy-transiting countries can ensure a successful response to these challenges.

On May 15-16, 2014 in Moscow, the 14th IEF Ministerial Meeting took place under the theme '*The New Geography of Energy and the Future of Global Energy Security*'.

This 14th IEF Ministerial was another milestone in building the global energy dialogue, and progress in this dialogue is the only possible mechanism for satisfying the interests of all global energy market players in a fair and mutually acceptable way. Thus the role of the IEF must be strengthened, and its potential used for promoting stability in the oil market. ■



MALAYSIA GEARS UP TO MEET ASIAN PETROCHEMICAL DEMAND

By HE Dato' Sri Abdul Wahid Omar
Minister in the Prime Minister's Department, Malaysia

Under the Economic Transformation Programme (ETP) launched in 2010, amongst the Government initiatives to transform Malaysia into a high-income economy by 2020, is to create a more dynamic and progressive oil and gas industry. In line with this aspiration, the Pengerang Integrated Petroleum Complex (PIPC) developed by Johor Petroleum Development Corporation (JPDC), is a major step in adding value to the downstream oil and gas value chain. The project is located in the south-eastern part of Peninsular Malaysia in the state of Johor.

The PIPC will be developed on a 20,000 acre site at Pengerang in the Kota Tinggi district. The site benefits from a strategic location at the south-eastern tip of Johor with the following competitive advantages:

- A safe, sheltered area with a natural deep-water harbour of up to 24 metres' depth;
- Access to existing major shipping lanes;
- Proximity to target markets within Asia
- Proximity to an existing major trading hub;
- Availability of sufficient land for development.

PETRONAS' Pengerang Integrated Complex (PIC) occupies 6,242 acres of the land in PIPC. With an estimated cost of US\$27 billion, PIC is PETRONAS' largest downstream investment in Malaysia to date. The complex comprises a world-scale Refinery and Petrochemical Integrated Development (RAPID) complex with associated facilities, including:

- Pengerang Co-generation Plant (PCP);
- Re-gasification Terminal 2 (RGT2);
- Air Separation Unit (ASU);
- Raw Water Supply Project (PAMER);
- Liquid Bulk Terminal (SPV2); and
- Centralised and Shared Utilities and Facilities (UF).

PIC is set to further strengthen PETRONAS' position as a key player in the Asian chemicals market. The strategy is to focus on key growth areas of differentiated and specialty chemicals, intent on capturing the growing demand from automotive, pharmaceutical and consumer products sectors. Domestically, PIC will be able to meet Malaysia's demand for petroleum products complying with future legislative requirements on Euro 4M (Petrol) and Euro 5 (Diesel) specifications. PIC is currently progressing as planned, with the Ready for Start-Up (RFSU) date targeted for Q1 2019 and the commercial operations planned to begin by Q2 2019.

The following are the major projects to be developed in PIC:

Refinery and Petrochemical Integrated Complex (RAPID)

The RAPID project is targeted to increase and the volume of Malaysia's refined petroleum products and petrochemicals outputs and cater to Asia Pacific's demand for premium specialty chemicals. RAPID will be equipped with state-of-the-art technologies with a refining capacity of 300,000 barrels per day (bpd) and could produce three million tonnes per annum (MTPA) of ethylene, propylene and olefins products through steam cracking processes¹.

Pengerang Co-generation Plant (PCP)

The PCP is developed as a sophisticated, stand-alone utilities provider to RAPID and capable of generating 1,220 megawatt (MW) of electricity, of which 400MW will be supplied to the national grid system. In addition, PCP will also produce up to 1,480 tonnes per hour of steam to meet the demands of the plants within



Construction of the RGT-2 Regasification Terminal

¹ The steam cracking process is a petrochemical process in which saturated hydrocarbons are broken down into smaller, often unsaturated, hydrocarbons. Products from the steam cracking process will be the feedstock to produce premium differentiated specialty petrochemical products.

the PIC area. PCP's existing configuration presents a unique opportunity to generate electricity at up to 85 per cent efficiency.

Regasification Terminal (RGT-2)

RGT-2 will provide primary gas supply to RAPID, PCP and the Peninsular Gas Utilisation grid to expand the availability of gas for domestic demand, which consists of:

- A regasification unit;
- Two units of 200,000 cubic metre LNG storage tanks with a send-out capacity of 3.5 MTPA (490MMscfd) which could be expanded to 7 MTPA (900MMscfd); and
- A jetty to accommodate LNG vessel of sizes ranging from 5,000m³ to 265,000m³.

The current progress at site for RGT-2 is as in the photograph below.

Pengerang Deepwater Terminal (PDT)

The Pengerang Deepwater Terminal is another major oil and gas venture in PIPC to meet the growing need for storage capacity of crude oil and petroleum products in Southeast Asia and the Asia region. The project is being led by Dialog and is a joint venture between Dialog, Royal Vopak and the Johor State Government. It is being developed in several phases with capability to handle storage, blending and distribution of crude oil, petroleum products, chemical and petrochemical feedstock, products and by-products.

PDT Phase 1

The construction of an initial storage capacity of approximately 1.3 million m³ on 150 acres of reclaimed land consisting of 6 deep water berths at a cost of RM2.0 billion. It commenced operations in Q2 of 2014.

PDT Phase 2

Phase 2 is currently under development at an estimated cost of RM6.3 billion. Upon completion, the storage facilities will have a capacity of approximately 2.1 million m³ and a deep water jetty with 12 berths. PDT Phase 2 is anticipated to be commissioned concurrently with the RAPID refinery complex in 2019.

Conclusion

PIPC is one of the largest oil and gas investments in Malaysia in recent years. Successful construction and commissioning of the complex will put Malaysia in a strategic position to capitalise on the growing need for energy and petrochemical products in Asia for the next 20 years. It is envisaged Pengerang and Singapore could complement each other similar to Amsterdam-Rotterdam-Antwerp as a hub for refining facilities, independent storage and blending capacity to access the global markets. PIPC will spur the growth of the national oil and gas downstream sector, pushing Malaysia into a new era of technology and economic development of the sector. ■



Pengerang Deepwater Terminal: a joint venture between Dialog, Royal Vopak and the Johor State Government



OIL MARKET DEVELOPMENTS: AN ASIAN PERSPECTIVE

By HE Abdalla Salem El-Badri
Secretary General, Organisation of the Petroleum Exporting Countries (OPEC)

The past year and a half has seen much change in the global oil market landscape. Oil prices have fallen as crude oversupply and speculation combined to upset the relative oil market stability observed in previous years. In turn, this has led to a number of projects being cancelled or put on hold, rig counts falling dramatically, investment plans being revised, and redundancies being made. Moreover, patchy global economic growth, as well as geopolitical tensions in a number of countries and regions, has evidently also impacted the oil market.

These developments are a major source of unease for producers, but given the importance of oil as a global commodity that helps drive economies, many aspects should also be a concern for consumers.

From the consumer perspective, in terms of oil demand growth it is Asia that leads the way. Since 2000, Asian oil demand has increased by more than 40 per cent to stand at 30 million barrels a day (mb/d), whereas demand in both the Americas and Europe has fallen over the same period. Additionally, Asia is also a major importer of crude, given that its internal liquids production is around 8 mb/d.

Clearly, recent lower oil prices have been an economic boon to the Asian region. It has also provided a number of Asian consumers, particularly China, the opportunity to further fill their strategic petroleum reserves.

However, it is important to appreciate the need to look beyond the short term. In this regard there are a number of key questions for Asia. Firstly, what does Asia's supply and demand structure look like in the years and decades ahead? Secondly, how could current oil market developments impact the medium- and long-term supply and demand balance? And thirdly, what can Asia do to help counteract oil market uncertainties, and foster opportunities?

Looking out to 2040, global energy demand is expected to expand by around 50 per cent, with Asia seeing the largest increase. From the perspective of oil, OPEC sees global demand increasing to around 110 mb/d by 2040. Out of this, Asia is anticipated to see demand of close to 46 mb/d, an increase of almost 16 mb/d from 2015, as its population expands, economies grow, and given the huge potential to ease the plight of many of those billions in Asia who continue to suffer from energy poverty. With the region's supply assumed to decline to just over 7 mb/d by 2040, it means that Asia will need to import close to 40 mb/d of crude oil and refined products by then.

This underscores two important and linked factors.



Asian oil demand has increased by over 40 per cent since 2000

The first is that Asia will remain the main hub for oil demand growth. Putting this into some perspective, the demand increase in Asia by 2040 is projected to be more than double the increase in all other growing regions combined. The second is that Asian countries will see oil imports rising further in the coming decades. This further accentuates the importance of market stability to both producers and consumers.

The demand increase in Asia by 2040 is projected to be more than double the increase in all other growing regions combined

It is evident that the current oil market environment, while providing some benefits to consumers in the near-term, does highlight some longer-term uncertainties. For example, while producers are using the current situation to cut costs and improve efficiencies – all important to better streamlining the industry – it is vital that the industry has the capacity to make the necessary investments to meet future demand. In this



Many OPEC Member Countries and their NOCs are already involved in joint refinery and petrochemical ventures

respect, the recent wave of announced project cancellations and deferrals across the industry is a clear demonstration that wide price fluctuations have a detrimental effect on investments and can sow the seeds of future instability.

There is no doubt that there are enough resources to meet future oil demand, and from OPEC's perspective, despite the uncertainties, its Member Countries remain committed to making the necessary investments and finding ways to respond to the world's future energy needs.

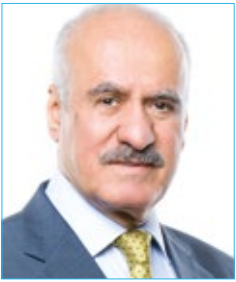
We need to recognise, however, the scale of what is needed. Oil-related investment requirements are estimated to be around US\$10 trillion between now and 2040. Thus, it is vital to keep one eye on the current situation, and one eye on the future.

For Asian countries, looking at both the uncertainties and opportunities, there will no doubt be a continuation of the trend to look for overseas acquisitions and projects to help secure supplies to meet their increasing domestic demand. And there is an expectation that many new refining and petrochemical projects will be located in Asia, so the region can reap some internal benefits from turning crude into products. In this regard, many

OPEC Member Countries and their National Oil Companies are already involved in joint refinery and petrochemical ventures.

And as the 6th Asian Ministerial Energy Roundtable underlines, dialogue and cooperation between producers and consumers will remain central to a sustainable energy future for all. At OPEC, we have long recognised the importance of dialogue and cooperation between producers and consumers, and all industry stakeholders. In Asia, we have recently conducted further dialogue with China, and later this year will hold a first dialogue meeting with India. Our Member Countries also have strong bilateral ties with countries in the region. Today, it is essential that we continue to strengthen our relationships in this increasingly interdependent world.

For energy, there is no more dynamic relationship than that between Asia and the world's major energy producers and exporters. Asia will continue to be the main energy demand growth hub in the coming decades and thus central to the world's leading energy suppliers. Future developments in the Asian region will have profound implications for people, businesses and nations everywhere. ■



SHAPING THE FUTURE ENERGY VISION

By HE Suleiman Jasir Al-Herbish
Director General, OPEC Fund for International Development (OFID)

With energy access a core component of their agenda, the new Sustainable Development Goals promise light at the end of the tunnel for the 1.1 billion people living without electricity.

When world leaders announced the Millennium Development Goals (MDGs) in the year 2000, they were united on the need for a development agenda that would take action and make real progress. With eight goals and 21 targets, the MDGs provided for the first time a clear guide – and a fixed timeframe – to disbursing development aid and informing policy in order to free people from extreme poverty, provide education, improve health and protect the environment.

What the MDGs did not address was the issue of energy provision, despite access to modern energy services being a catalyst to achieving all eight goals, including the very first: the eradication of extreme poverty and hunger. It was a harmful omission.

The good news is that recent years have seen a seismic shift in the way energy is perceived. Thanks to a resolute push by advocates, including OFID, energy poverty and its implications for sustainable development have slowly penetrated the global consciousness. As a result, the eradication of energy poverty has secured a prominent place in the post-2015 development agenda, where it is addressed in Sustainable Development Goal 7.

SDG7 has three main targets: ensuring universal access to affordable, reliable, sustainable and modern energy; substantially increasing the share of renewable energy in the global energy mix; and doubling the global rate of improvement in energy efficiency. It further sets out to expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, particularly least developed countries and small island developing states. The year 2030 marks the deadline.

Alongside the goals themselves, the SDG process also highlights investment needs, which amount to trillions of dollars. To reach SDG7 targets by 2030, around US\$1.26tr is required in annual investment – the equivalent of three times the current level. This includes US\$560bn in energy efficiency, US\$650bn in renewable energy, and just US\$49.4bn – or less than four per cent of the total – in energy access, making it the least expensive target to reach. However, this sizeable rise in investment requirements confirms the real need for more innovative financing vehicles, cost-effective technology solutions, and consistent and credible policies.

The dark side of the world

There is no doubt that the greatest scientific achievement of the nineteenth century is the harnessing of electricity. Since the first electricity grid was built in San Francisco in 1879, the face of the Earth has transformed. People in developed countries take electricity for granted. However, this is not the case for all people. The widespread absence of modern energy access continues to hamper socioeconomic progress in developing countries worldwide.

Nearly 1.1 billion people – one in six globally – have no access to electricity at all, with sub-Saharan Africa, developing Asia, and Latin America the worst affected regions. This constraint compromises productivity and income generation, as well as learning, personal safety, healthcare delivery and many other aspects of daily life.

Lack of access to electricity is primarily a rural problem. Developing Asia has the largest number of people without electrification (675 million out of a regional population of 3.6 billion), while sub-Saharan Africa has the highest percentage of population without electricity (72 per cent). In these regions, more than 80 per cent of the people without electricity live in rural areas. Among the countries in developing Asia, India has the largest share (42 per cent) of people without electricity.

Ongoing economic expansion throughout Asia will drive rising world demand for energy over the next two decades at an average rate of 1.4 per cent a year

In addition, 2.9 billion people have no access to clean cooking facilities, relying instead on the intensified use of traditional biomass fuels. This practice produces indoor air pollution, which can have a severe impact on health if people are exposed to it for long periods of time, killing 4 million people every year.

Universal energy access: the solutions

Providing electricity to everyone is still an unsolved challenge from a global perspective. Central electricity generation with transmission and distribution is still considered as the most cost-competitive way of providing electricity. Though this might be true for most urban and densely populated areas, the situation in rural areas is different.



Solar photovoltaic energy technology will be the largest contributor to decentralised off-grid and mini-grid systems by 2040

With the reduction of inequalities lying central to the SDGs, the achievement of energy access for all is a must. At the core of this effort are the needs of rural communities and smallholder farmers, who need energy to increase productivity, provide light for education and stop indoor air pollution. Decentralised off-grid and mini-grid schemes are best suited to generating the energy for such communities. The main technologies available for these types of systems are diesel generators or renewable energy technologies, including solar photovoltaic (PV), and small hydro and wind systems.

Under its 'New Policies' scenario, the International Energy Agency (IEA) projects that by 2040, in both mini-grid and off-grid systems, solar PV will contribute the largest share (37 per cent in mini-grid and 47 per cent in off-grid) followed by diesel generators (32 per cent and 35 per cent respectively), then small hydro and wind and very small amounts of bioenergy. However, these schemes, in particular the mini-grids, face major implementing and operational hurdles related to socioeconomic, policy, regulatory, economic and financing issues.

Mixing it up

Looking at the global picture, the demand for energy is only going to get bigger by 2035. The global middle class is expected to double to nearly five billion, which means twice as many people will need commercial fuels for heating, cooling, mobility and manufacturing. Ongoing economic expansion throughout Asia will drive rising

world demand for energy over the next two decades at an average rate of 1.4 per cent a year¹.

When choosing mechanisms to design and deploy policies to meet future energy demand, policymakers need to look at cost-effectiveness. But it must be kept in mind that there is no one-size-fits-all solution. Advantage must be taken of the complete range of organisational and technical possibilities so as to be able to adapt to a given situation.

Renewable energy sources have witnessed impressive growth rates over the last decade, with global investment reaching US\$270bn in 2014. This phenomenal growth is taking place principally in developed and emerging developing countries; China accounted for almost two-thirds of the investment in 2014. By 2013, East Asia's total renewable power generating capacity was 457GW (more than 29 per cent of the global total), with China accounting for over 80 per cent of this amount². Various forms of policy and government support in these countries have sustained this growth.

It is clear that renewable energy sources have considerable potential to meet mainstream electricity needs. However, having solved the problems of harnessing them there is a further challenge: of integrating them into the supply system. Sun, wind, tides and waves cannot be controlled to provide either continuous base-load power or peak-load power when it is needed. To satisfy the growing energy needs of a growing global population, all energy sources – including traditional fuels – will need to be tapped. What we are looking at, therefore, is a global energy supply mix that is characterised by diversity.

The share of global power generation of non-fossil fuels, including nuclear, renewables and biofuels, is expected to increase to 38 per cent by 2035, from 32 per cent in 2013. Despite the market size of fossil fuels in power sector decreasing, conventional fuels will remain dominating the global energy mix in 2035 at 81 per cent, down from 86 per cent in 2013.

Due to its cleanliness and abundance, natural gas will certainly play an important bridging role when it comes to shaping our common low-carbon future. Indeed, according to all credible forecasts, gas will be the fastest-growing fossil

fuel and will meet as much of the increase in demand as coal and oil combined. Natural gas consumption is projected to increase 1.9 per cent a year, mainly as a result of an increase in demand from Asia. This will be met by rising conventional gas production, mostly from the Middle East and Russia, as well as about half from shale gas, of which the USA will account for three-quarters of the world's total supply³.

¹ BP Energy Outlook 2035

² Renewable Energy Global Status Report 2015, REN 21

³ BP Energy Outlook 2035

OFID LEADING THE CHARGE

OFID has been implementing energy projects for almost forty years. Since 2007, though, its efforts have intensified following a direct mandate from its Member Countries in the Solemn Declaration of the Third OPEC Summit. This mandate was framed in 2008 in Jeddah, with the announcement by the late King Abdullah of his energy initiative. OFID acting on this mandate crafted its energy for the poor initiative as a concrete action plan. Energy poverty alleviation has since become OFID's primary strategic focus, with activities carried out at both advocacy and operational levels.

During the transition from the MDGs to SDGs, OFID was one of the leading proponents of energy poverty eradication and the first to label energy access the '9th missing MDG'. In 2011, this pioneering role resulted in OFID joining the United Nations Sustainable Energy for All (SE4ALL) initiative and its advisory board. From this position, OFID has expanded its sphere of influence as a champion of energy poverty eradication, strengthening existing partnerships with the likes of the World Bank, the Asian Development Bank, CAF, and IFAD to find and fund solutions.

At an operational level, OFID has taken action to work with its partner countries to prioritise universal access to sustainable modern energy services. OFID considers both conventional and renewable energy sources to be viable and pursues both in the quest for solutions that will satisfy the basic energy needs of the poor.

OFID's efforts were boosted in June 2012, when its finance ministers issued a *Declaration on Energy Poverty* and committed a minimum of US\$1bn to help fund the EPI. One year later, following operational success and high demand from partner countries, this commitment was converted from a one-time obligation, to a revolving pledge.

Since 2008, OFID has expanded the number of energy projects in its portfolio, providing a total US\$2.1bn in financing through its various operating windows, including public, private and trade. Among other initiatives, this sum has included support to 65 projects with a combined total cost of over US\$20bn. Collectively, these projects provided more than 14,000MW of power and extended electricity grids by 32,000km.

In fighting energy poverty, OFID delivers a wide range of solutions to suit all kinds of circumstances. From large, capital-intensive investments to innovative, small-scale community schemes. From gas pipelines and power plants to solar lanterns and clean cookstoves. The technology utilised is based on need and not on any preference on OFID's part. The end-result – providing people with the energy they need to live safe, productive lives – is far more important than the fuel source.

IN ACTION ON THE GROUND

In Jordan, OFID has been part of the largest private sector solar initiative in the MENA region. A US\$25m loan provided

through its private sector window has supported the Jordan Solar One and Falcon Ma'an power plants. Together, the two projects have a combined capacity of 102MW and will generate a combined 98GW/h of electricity annually. The investments form part of a wider IFC-led programme – the Jordan Solar Seven Sisters – involving a total of seven solar installations.

Another private sector-financed initiative is the 'Fauji Wind Projects' in Pakistan. This joint effort with the Islamic Development Bank sees OFID supporting the construction of two wind farms which will add 100MW of power to the national grid. The project, which has a total cost of around US\$260m, will reduce the country's electricity supply gap and decrease dependence on expensive oil imports, while harnessing the country's renewable energy potential.

Through its public sector financing window, OFID has provided US\$30m to support the construction of a 225MW combined cycle power plant in Bangladesh. The project is integrating liquid fuel with gas to create a dual fuel facility, therefore partially mitigating the gas shortage obstacle. In this context, the project will contribute to closing the electricity supply deficit, creating a positive impact on the industrial development of the Chittagong district, and supporting and sustaining the socioeconomic growth of the country.

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BRIGHT FUTURE FOR THE BLUE FUEL

By HE Dr Seyed Mohammad Hossein Adeli
Secretary General, Gas Exporting Countries Forum (GECF)

The Gas Exporting Countries Forum (GECF) is a recognised intergovernmental Organisation with its key statutory objective to support the sovereign rights of its Member Countries over their natural gas resources, and their ability to independently plan and manage the sustainable, efficient and environmentally conscious development, use and conservation of these resources for the benefit of their peoples.

The Forum was established in 2001, in Tehran, and has been expanding its activities ever since, presently evolving into a fully-fledged intergovernmental gathering of 18 natural gas producing and exporting countries from all over the world, providing an important framework for the exchange of views, experience and information.

Our day-to-day activities include promoting discourse between all members of the energy community for the sake of stability and security of the supply and demand in global natural gas markets, advancing natural gas as the cleanest fossil fuel, monitoring sectoral economic/energy trends and developments, elaborating short- to medium- and long-term energy/gas outlooks, and facilitating the exchange of gas data.

GECF Member Countries have been producing, using and exporting gas for decades. The Forum includes members from the Americas, Africa, Eurasia and the Middle East. These countries have developed a great deal

of skills and technology, as well as a reputation as reliable suppliers, and are therefore ideally placed to play a pivotal role in the global energy markets.

The GECF's potential is immense, as its Member Countries collectively account for 65 per cent of the world's proven natural gas reserves. Furthermore, the Forum controls 66 per cent of Liquefied Natural Gas (LNG) trade and 64 per cent of the pipeline trade in natural gas.

Our organisation fully supports the development of producer-consumer dialogue as a cornerstone element of stable energy markets, based on the fact that in a globalising world, producers and consumers are becoming increasingly interdependent, due to trade expansion, technological enhancements in communications and interconnected financial markets. It is a place where, without transparent interaction between the parties, energy security may become an issue.

JODI – the Joint Organisations Data Initiative – is just one example of such successful cooperation between gas producers and consumers. Accordingly, the GECF's partnership with other international energy organisations such as APEC, EUROSTAT, the IEA, OLADE, OPEC and UNSD to create the JODI Gas World Database, under the careful guidance of the IEF and assuming our role of supervising the quality of gas data, is an important achievement and demonstrates the fact that the GECF is



Dr Seyed Mohammed Hossein Adeli speaking at the JODI Regional Training Workshop in Doha hosted by the GECF

expanding its role beyond its members and contributing to the global gas markets in a more effective way.

Our undertaking to manage uncertainty in the energy markets and mitigate risks in planning the development of the gas industry is one of the key commitments of the GECF. It should be underscored that the natural gas industry is more capital-intensive than many other energy sectors, and requires stable revenues to ensure its survival and replacement. Consequently, security of supply cannot be envisaged in a volatile environment where investors may see their assets come under threat at any time.

Security of supply cannot be envisaged in a volatile environment where investors may see their assets come under threat at any time

Long-term partnerships and agreements, as well as fair natural gas prices, are key in planning gas supply investments and maintaining the market security that is essential not only for gas suppliers but also for gas consumers.

With energy analysts around the world predicting a global increase in energy demand, and in particular for clean and environmentally friendly sources – driven by a projected increase in world population, economic growth, technological development and global consciousness on climate change, as well as the need for sustainable development – the natural gas market is destined to keep expanding, and the blue fuel penetrating into ever more sectors of economy.

The role of natural gas in the battle against greenhouse gas emissions is gaining momentum, especially in anticipation of the upcoming COP 21, to be held in Paris later this year, which will be a crucial and decisive event if we want to leave our world a suitable place for future generations.

Reliability, abundance and availability, combined with its multiple applications across all sectors, are other key elements which give the blue fuel the potential to continue playing an important role in meeting the challenge of global energy demand, and helping the global community meet the established UN Millennium Development Goals.

For the purpose of deeper analysis of the natural gas future, we have recently launched the GECF Global Gas Model, a sophisticated tool which now enables us to forecast global gas supply and demand figures in the medium and long term, which are considered during the

development of multiple future scenarios in the framework of the Gas Outlook.

In terms of energy perspectives to 2040, we project that primary energy demand will continue to increase, while the market shares of oil and coal are expected to decline. Biomass, nuclear, hydro and renewables are all gaining share, but natural gas will benefit the most, ensuring the convergence towards global GHG emissions commitments.

Natural gas will have an increasingly important role to play in meeting not just power generation but also heating requirements, as well as a raw material and energy source in the chemical and industrial sectors.

In the transportation sector, the future of natural gas also looks promising – it is a much cheaper and cleaner fuel than petrol or diesel, and at the same time it does not require subsidies, like renewables, which also lack infrastructure – for natural gas refuel facilities are available in many regions, and their feasibility is not an issue.

Indeed, supported by the world's abundant natural gas resources, from both conventional and unconventional sources, the natural gas industry's ability to meet even the most positive growth forecasts makes the "Golden Age of Gas" look like an increasingly feasible outcome.

On the other hand, uncertainties remain for gas exporters over how future gas demand will play out, and over the amount that they will eventually need to supply – for many reasons, but not least related to the success of effective, low-carbon, environmentally friendly energy policies, thereby signifying a heavy burden of investment risk on producers.

Many of the issues addressed in this article will be discussed during the 3rd GECF Gas Summit, to be held in Tehran on 23rd November 2015, which will be the third high-level event held since establishment of the GECF Secretariat in Doha five years ago, demonstrating the continued support and commitment of the GECF Member Countries to the realisation of the objectives of the Forum and, again, highlighting the importance of gas in the global energy system.

Finally, I want to emphasise that the GECF is an open and transparent organisation, committed to taking on-board the opinions of all participants in elaborating plans for the future development of the Forum. We are sure that the GECF's platform will become the best place to work out mutually beneficial decisions in the gas domain, thereby ensuring stable and future-oriented world energy development. ■



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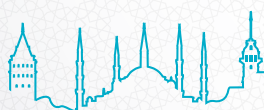
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GAS AND COAL IN ASIA'S ENERGY MIX: INTERACTIONS AND UNCERTAINTIES

By Dr Iván Martén, Global Leader Energy Practice,
Senior Partner and Managing Director, The Boston Consulting Group

In looking at the overall energy needs of Asia for the next 25 years, it is clear that coal and natural gas will both play a key role in the region's fuel mix. There are three simple reasons for this, what I like to call the "three As:" abundance, affordability and availability.

Both gas and coal are abundant, and gas is becoming even more so thanks to new technologies such as hydraulic fracturing (and more recently high pressure fracturing and re-fracturing), which has significantly increased natural gas production in the United States. As an example, the production of gas and associated liquids has tripled from 2011 to 2014 with the same number of rigs.

This abundance also makes gas and coal affordable. Gas prices have fallen drastically in the recent years because of increased supply, and coal prices have fallen, too, because more gas is replacing coal for electricity generation in the US.

And they are both available, meaning that their supplies are easily accessible in response to demand and largely secure. This guarantee of secure supply is an important objective for all the countries. Moreover both gas and coal are instrumental as the "base load" source of energy required to support renewable energy development.

The evolution of gas and coal in Asia

Let us take a moment to look at how the future for each of these fuels is likely to evolve in Asia.

Asian gas demand is forecast to grow at a compounded annual growth rate of 3.2 per cent, driven by its flexibility and government policy objectives such as climate change. As a consequence Asia will become the largest gas import market, surpassing Europe.

Meanwhile, coal will continue to play a relevant role in meeting Asia's energy demands – comprising the biggest share of the region's energy mix through 2040 – despite concerns about carbon emissions. Asia will accentuate its status as the largest coal import region, with continued intra-regional flows.

From an economic point of view, based on current average prices, coal is the region's most economical fuel for new power plants, excluding any subsidies for wind power. However, the situation varies greatly from country to country because the economics can be very different, especially for countries with domestic gas resources. Looking at the average power generation costs for coal- and gas-fired power plants, including capital and operating expenses, coal is more advantageous in countries such as

Japan, China, India, Thailand and South Korea. Gas, on the other hand, is more advantageous in countries such as Indonesia, Malaysia and Vietnam. Interestingly, Bangladesh, which traditionally had depended on domestic gas, is now eyeing liquefied natural gas (LNG) imports and the reintroduction of coal into its fuel mix.

The impactful role of regulation: COP 21

Cost, however, is only one factor in assessing the overall role that gas and coal will play in Asia's energy development. Government policies will affect the advantages of both of these fuels, as well as other energy technologies, through import tariffs, carbon prices and tax credits – all of which can be used to affect energy choices. For example, subsidies can make certain technologies cost-effective and can result in over-installation when compared with economically viable alternatives. Subsidies for oil and domestic natural gas in the Middle East and the Strategic Energy Plan supporting nuclear power in Japan are examples of this.

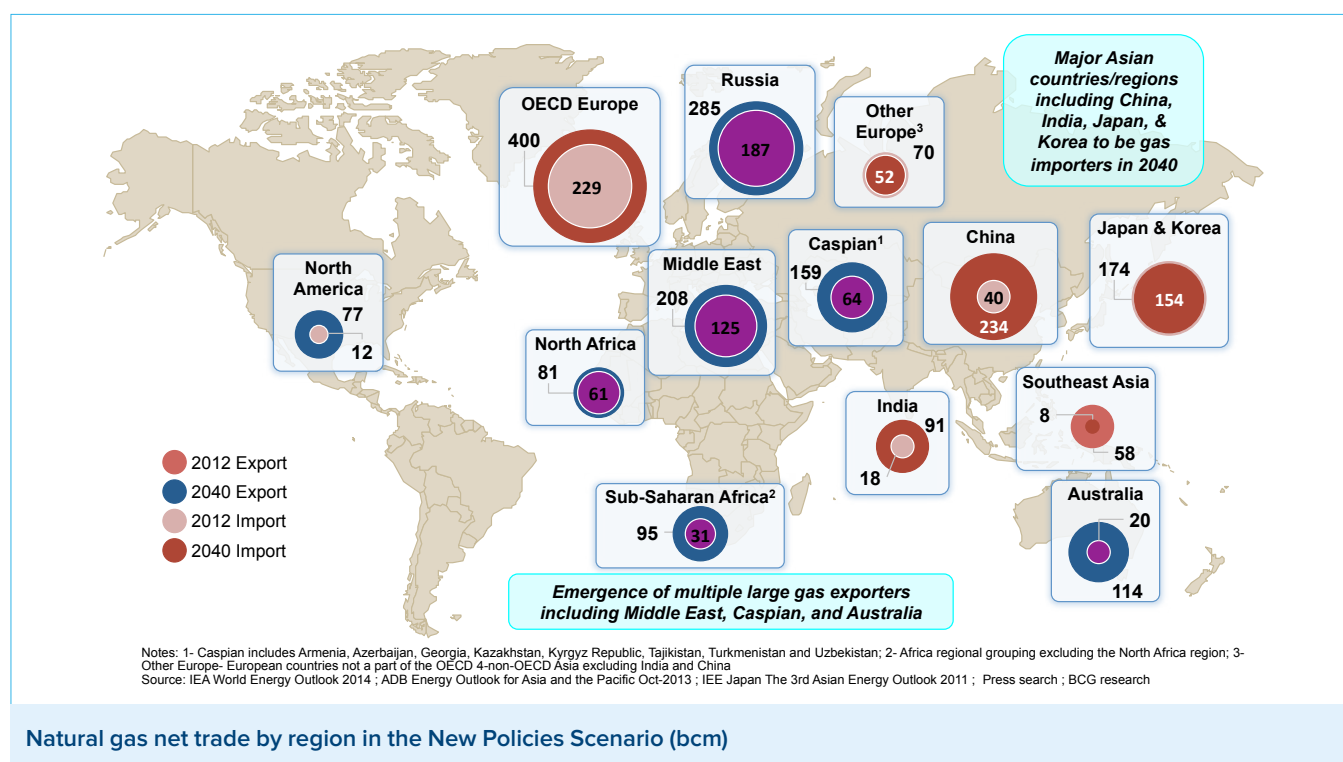
The current gas environment looks favourable for buyers in the short-term, but the long-term outlook is less certain

Network tariffs and positive cross-subsidies also can encourage too much installation of less cost-efficient technologies. On the other hand, negative cross-subsidies, such as assigning price to externalities such as carbon, can have the opposite effect. A change in the price structure can make the technology more cost-effective, as we've seen with the development of stand-alone photovoltaic solar in Australia.

The 21st session of the Conference of Parties, or COP 21, in Paris in early December could have a significant effect on the global order of energy economics. COP 21 represents the first opportunity for a renewed carbon protocol and could result in significant increases in official commitments that favor investment in gas over coal.

The COP 21 objectives are more stringent than the 1997 Kyoto Protocol. For example, Kyoto set a goal of reducing carbon by 30 per cent below 1990 levels by 2020. COP 21 sets an emission target of staying below the "two degrees" scenario – lowering carbon output to keep global temperatures from rising by more than two degrees.

While Kyoto sought quantitative reductions in carbon



emissions by setting targets agreed to among a wide range of countries, COP 21 seeks to define national emission contributions for each country, taking into account its national circumstances. COP 21 also offers no support for emission reduction projects, rather than the possibility that existed under Kyoto of generating profits through emission reduction projects. Kyoto focused more broadly on fighting global climate change and proposed strategies based on mitigation, while COP 21 seeks to fight climate change locally as well as globally, and proposes strategies based on mitigation and adaptation.

This means that to the three A's of attractive energy options – abundance, availability and affordability – we must now add a fourth: acceptability. Quite simply, gas is greener than coal, and as a result, it is likely to be favoured by governments seeking to reduce carbon emissions.

As a result, it is expected to see more rapid growth in gas demand from China, India, Southeast Asia and the Middle East. If we analyse the dynamics by country or region, China is forecast to grow by 5.1 per cent per annum through 2040 reaching 603 billion cubic metres (bcm); India by 4.6 per cent, reaching 202 bcm; Southeast Asia by 2.4 per cent and the Middle East by 2 per cent, reaching 706 bcm.

At the same time, gas demand growth will be limited in Japan as nuclear regains market share and the country focuses on energy efficiency programmes. Eurasia, where gas already constitutes a large share of the energy mix, will continue to rely on large Caspian oil and gas reserves and depend on gas for energy security, but it is not likely to increase its already sizable market share. By 2040 we expect a demand of around 304 bcm. Meanwhile, in OECD Asia (Australia, New Zealand and South Korea), gas is the only fossil fuel for which demand is rising, but the gains are slight (0.5 per cent per annum) because of a heightened emphasis on renewables and nuclear power.

Increased demand for coal will come primarily from China, India and Southeast Asian countries. In China, coal demand will peak in about 2030 at 3,033 million tonnes of coal equivalent (Mtce) because of the slowdown in economic growth and policies to reduce carbon emissions. Rising electricity needs will drive coal demand in India, where the current per capita consumption is very low – about 900 kilowatt hours. We expect India to add 500 million tonnes of coal equivalent – almost doubling the current demand – by 2020. In Southeast Asia, reduction in gas subsidies in Malaysia and recent disruptions in the

gas supply in Thailand will push up coal demand in those countries by about 4.8 per cent per annum through 2040.

The implication for Asian governments

Having said all that, there are clear implications for the governments in the region and several questions open to discussion: How do consuming nations in Asia develop a long-term gas supply security strategy? In particular, what is the right balance between supply of pipeline gas from Central Asia and Russia and LNG imports? Can imports of electricity (rather than coal or gas) become a significant factor, given environmental concerns of China? Is coal supply security a challenge as well? Could the reductions in demand in Europe and the US impact the liquidity of the global coal market and create a need for bilateral contracts? Could technology changes reopen a global growth opportunity for coal? Are sustainability challenges likely to drive regulation revision and change relative merits of coal vs gas vs other energy sources?

Consuming nations in Asia must develop long-term gas supply security strategies. The current gas environment looks favourable for buyers in the short term, but the long-term outlook is less certain. Buyers, having multiple supply options and hence the ability to influence strongly contract terms, will probably push to move from oil indexations to Henry Hub to regional indices such as JKT or FOB Singapore and include price caps. But the limited

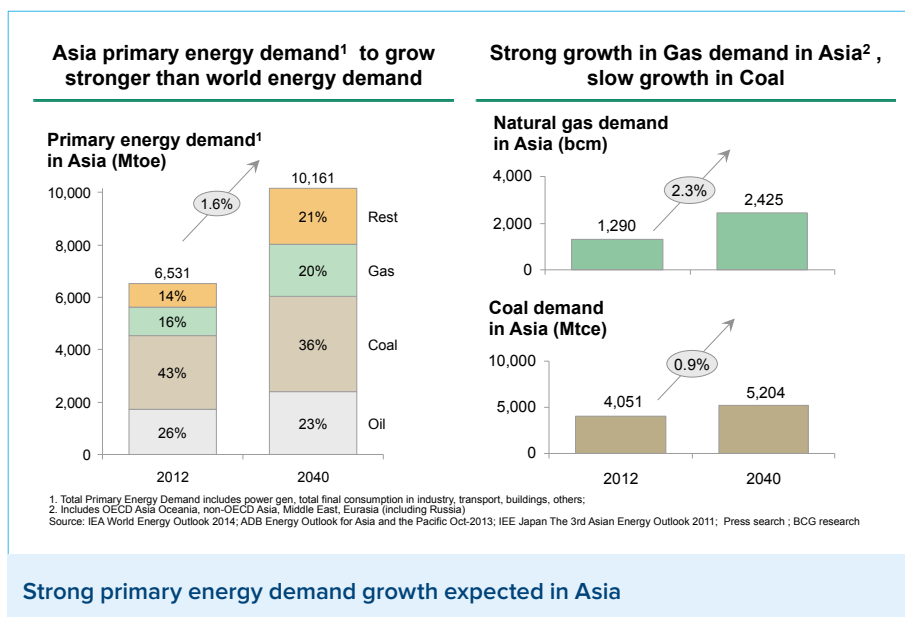
appetite for new long-term contracts may result in projects being postponed, limiting liquidity post 2020. This risk is probably one all parties should keep in mind as they define their strategies.

Finally, it is worth noting that the long-term and spot markets have pros and cons for producers and consumers depending on what criteria are considered – price, security, ability to plan ahead, and so forth.

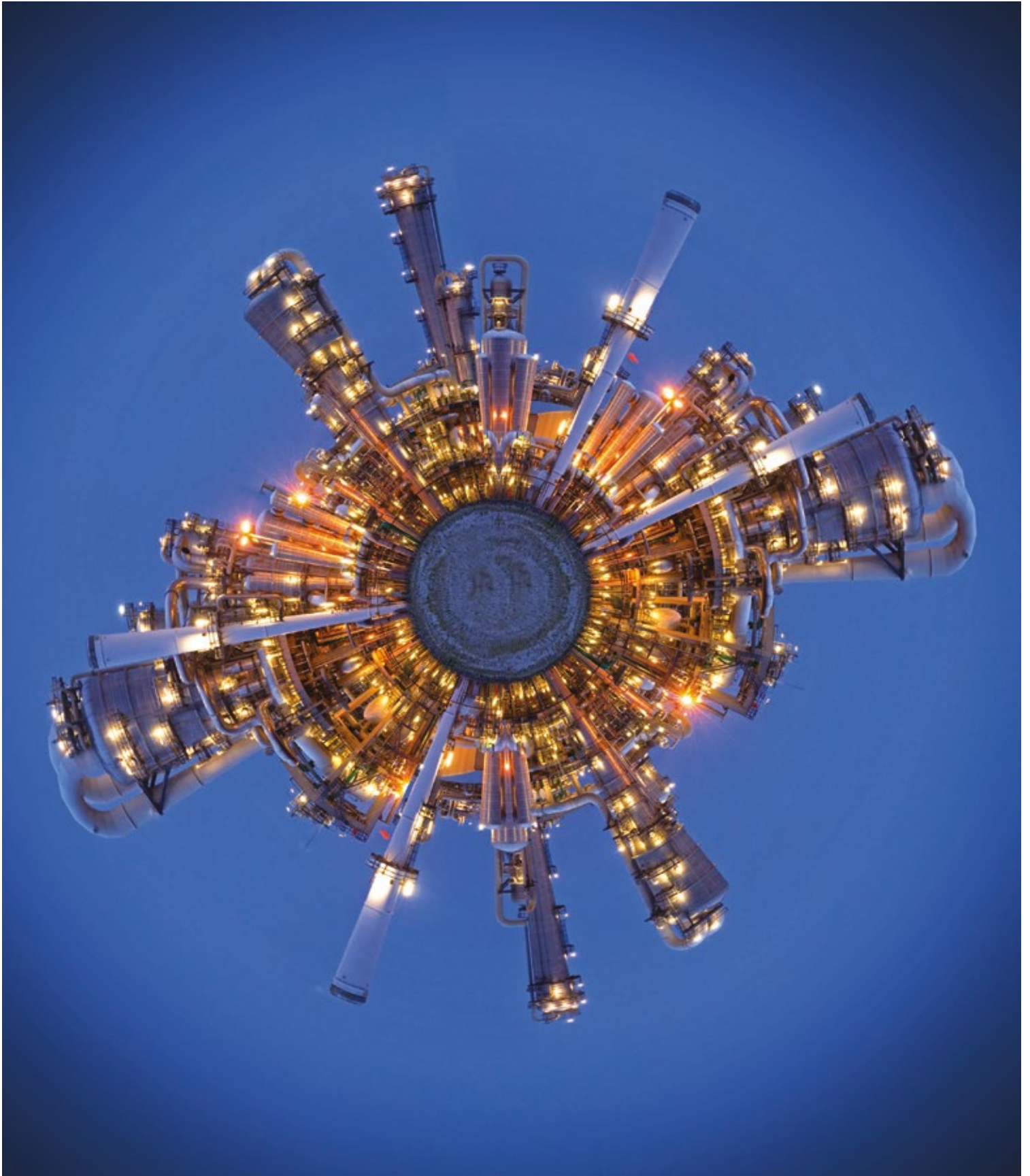
What is better for both producers and consumers is a combination of on the one hand long-term contracts enabling continued resource development for producers and supply security for the buyers, and on the other hand traded markets enabling efficient adjustment of supply and demand for both producers and consumers.

For coal, supply security is less of an issue. The relative abundance of coal will help to protect the supplies for Asian countries, although it underscores the need to maintain safe and efficient infrastructures. Also, the reductions in demand in Europe and the US could affect the liquidity of the global coal market. European and American participants have been the driving forces in creating the liquidity and price transparency that have benefited Asian economies. This will reinforce the need to develop long-term sourcing strategies, efficient regional coal trading platforms, bilateral contracts, and the reconsideration of vertical integration to ensure long-term supply and reinforce financial stability of the mines.

Unlike gas, technology is less likely to reopen a global growth opportunity for coal. Technology has always been a disruptive force in the energy industry, but the lack of current investment and progress in carbon capture and storage currently limits the role of coal going forward. Sustainability challenges are likely to drive regulation revision and change relative merits of coal versus gas versus other energy sources. Political and social momentum seems to favour further constraints on coal, as suggested by recent government declarations. Coal will nevertheless likely remain a more economical fuel for power generation, even with more significant carbon pricing, which will support growing demand in Asia. ■



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