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NEW DELHI 2018

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GLOBAL ENERGY TRANSITION: AN ENHANCED ROLE FOR THE DIALOGUE

By H.E. Sun Xiansheng,
Secretary General, International Energy Forum (IEF)

Global energy security is a phrase we hear often, but what do we mean by it and why is it more relevant now than ever? In the past, the meaning centered around access to energy and fossil fuels. Today, energy security is more about adaptation. It is no secret that we currently find ourselves at a critical energy juncture. From challenging oil prices to the rise of renewable technology, global energy security has taken on a new meaning.

Those states that adapt and transition to new energy realities are the ones most likely to succeed in the new energy era. Such adaptation can only occur through sustained global energy dialogue.

The need for this dialogue underscores the importance of the 16th International Energy Forum Ministerial (IEF16) that India will host under the theme "The Future of Global Energy Security: Transition, Technology, Trade and Investment," in New Delhi on 10-12 April 2018.

IEF16 will focus on how global shifts, energy transition policies and new technologies can influence market stability and future investment in the energy sector. Dialogue on how energy security has evolved will help producers and consumers navigate the energy landscape together. Such dialogue also helps secure an energy future that remains affordable, productive, sustainable and fair to all.

Electric armoured police bus and 8-seater electric car Hainan, China.

The new energy realities

Change and dynamism are at the heart of global energy trends, and the pace of change has become much more pronounced in the last decade. Energy disruption, geopolitical change and new market realities are transforming energy systems and the economics of energy on a global scale. Structural sectoral changes are shifting the energy mix towards lower carbon resources, driven by advancements in technology and accompanied by energy-saving measures and policies. An oversupplied oil market combined with burgeoning renewable technology and greater awareness of climate change are factors that continue to influence the global energy landscape.

Energy transition and energy efficiency are not new phenomena, but rather, a culmination of years of progress in renewable technology that has made alternatives to fossil fuels a viable option. The exponential growth of renewables is a reality. According to the International Energy Agency, global renewable electricity capacity will rise by 43 per cent by 2022, and the growth of renewable energy power is estimated to be twice the aggregated growth of gas and coal over the next five years.

Growth of renewable energy power is estimated to be twice the aggregated growth of gas and coal over the next five years

Future electrical production in Shanghai, China

Not surprisingly, China, India and the United States are expected to account for two-thirds of global renewable additions by 2022. Electric vehicles (EVs) are making in-roads, not just in OECD countries but in non-OECD countries as well, such as China. Renewables account for 30 per cent of electricity consumption of EVs by 2022, up from 26 per cent today.

The United Nations "Paris Agreement" was a major turning point that saw the entire world sign onto a climate change agreement. For the first time in 20 years, the world agreed to a binding, universal agreement on climate – a landmark statement on the issue of climate change. Such factors are adding momentum to the conversation around orderly energy transitions. Since then, international governments have taken steps to promote sustainability through carbon taxes, reducing coal use and decreasing methane emissions. Yet, a secure and orderly transition builds on sustained and substantial investment in all energy sources, including fossil fuel production, to promote economic development and meet the steadily rising global demand for energy.

Why is dialogue important?

These developments will undoubtedly impact how we approach energy diplomacy and how we define energy security in the coming years. They also raise questions about how we, as a global community, approach investment in a climate of uncertainty and volatility. Energy market stability will continue to depend on building trust among producing and consuming countries, whether it includes a role for certain countries to provide strategic spare capacity or facilitate pathways that ensure sustainable development and inclusive growth for all. This is only possible through sustained engagement in an ongoing dialogue to better inform policy and investment decisions in producing and consuming countries alike.

Strong, robust energy dialogue is a pillar of the IEF, and we continue to strengthen engagement with our international partners. We intend to continue this tradition at IEF16 with timely, relevant and engaging plenary sessions and roundtables. Based on the importance of these discussions and the delegations attending, I have no doubt that the IEF will become the platform of choice for the inclusive promotion of global energy interests and orderly energy transitions now and into the future.

In conclusion, I express my gratitude to the host country, India, and co-hosts China and Korea and all the IEF Ministers, captains of industry, government and industry representatives who have enabled this Ministerial to become a reality. It is your ongoing support and dedication that enhances the dialogue and helps broaden the IEF platform.

Welcome to IEF16. ■

INTERNATIONAL ENERGY FORUM

By H.E. Dharmendra Pradhan,
Minister of Petroleum and Natural Gas, Republic of India

The world is seeing a dramatic shift in the energy supply and consumption, one of the largest transitions in history. This is primarily driven by the following trends

• Consumption growth has already shifted to non-OECD countries such as the Middle East, Africa and developing Asia;
• Solar PV has become economical compared to all other energy sources and is changing the supply paradigm;
• Abundant availability of natural gas globally and with an increased share of LNG, natural gas is contributing more to the primary energy basket;
• The US will soon become the largest producer of oil and is predicted to meet a major portion of the additional oil demand in the next few decades;
• Coal will gradually go out of favour as a major contributor to primary energy in the OECD World and later in developing countries;
• The transport sector will see massive changes in the next few decades with the adoption of electric vehicles (EV);
• The World is committed to the climate change agenda based on COP21 agreement in Paris, so the energy intensity of the global economy will refocus on green energy and energy efficiency;

This transition in the global energy sector was rightly picked up as a theme in IEF 15. This forum of IEF underlines the producer-consumer dialogue and paves the way for discussions to improve global energy security.

Currently, India is the fastest growing large economy in the world. In the last quarter our GDP grew by 7.2 per cent. All leading agencies such as IMF, World Bank, ADB etc. are predicting India will grow between 7-8 per cent in 2019 and 2020.

The Goldilocks economy, with higher growth and lower inflation has returned to India.Our Government has been able to achieve this with fiscal prudence and a stable exchange rate. This macro stability is boosting both consumption and investment in the economy. India is also blessed with a demographic dividend, where the working age population as a proportion of total population, is one of the highest in the world. Our Government is boosting local manufacturing in industries such as textiles, petrochemicals, defence, engineering etc. through enabling policy measures. This is increasing our energy consumption further.

Last week I came across the BP forecast of energy, where India will be the fastest growing energy market in the next two decades. In fact, according to this report by the middle of the next decade, the incremental energy consumption in India will surpass even that of China.

We have also revamped our upstream policies and regulations and brought transparency and competitiveness to the sector. The bidding criteria has been changed to revenue sharing which will help reduce government intervention. We have also successfully awarded small fields to newer entities in India thus expanding the developers in the O&G upstream sector. The Open Acreage and National Data Repository (NDR) will help domestic and foreign companies participate in fields of interest and help increase the exploration interest in India's upstream sector. The Enhanced Oil Recovery Policy aims to promote the use of the latest technology in improving productivity of upstream fields.

Our Government believes in the integrated approach to energy planning. And, our energy agenda in India is inclusive, market based, and climate-sensitive. This we believe will go a long way to achieve the key energy related components of the United Nations Sustainable Development agenda:

1. Universal access to modern energy by 2030;
2. Urgent action to tackle climate change - in line with the Paris agreement;
3. Measures to improve air quality;

According to IEA, the world still has 1.1 billion people without access to electricity, mostly in developing Asia and Africa. By 2018 we aim to achieve 100 per cent electrification of all Indian households through a targeted program called, SAUBHAGYA.

Similarly access to clean cooking fuel is very important. Women benefit the most by adopting clean cooking. We have reached nearly 80 per cent of Indian households, providing access to clean cooking gas, jumping from 56 per cent in just last three years.

India's UJJWALA scheme, which aims to provide clean LPG cooking connections to 80 million poor households, has already reached almost 35 million connections in just less than two years since its launch in 2016.

India is also rebalancing its energy mix with a focus on natural gas and renewables. We are shifting directly from BS IV to BS VI fuels by April 2020, which is equivalent to the EURO VI standards.

We are soon going to launch a Vehicle Scrapping Policy which will help replace old commercial vehicles with cleaner and energy efficient vehicles. Our oil companies

are assessing all their investments keeping in mind the energy diversification strategies. All oil companies are investing in wind and solar capacities, they are investing in gas infrastructure and also thinking in the direction of investing in Electric Vehicles and Storage areas.

India took a lead in forming the International Solar Alliance with 60 countries having solar potential. If all eligible countries join the Alliance, then the cumulative installed solar capacity in ISA countries could surpass 700 GW by 2022. This would be more than 80 per cent of global solar capacity at that time. We, in India, are targeting to reach 100 GW of solar capacity by 2022 and going by the current pace, we are very much on course to do so.

The International Energy Forum (IEF) is a forum that provides a neutral platform for open and inclusive energy dialogue among 72 IEF member governments and industry stakeholders. We definitely want a balanced energy market where supply is not artificially curtailed and consumers pay a fair price for energy. IEF is one forum that tries to strike this balance and the members get to learn the best practices in the energy sector.

Cities in developing countries are struggling with local air pollution and are adopting several strategies to combat that. This includes a ban on old polluting vehicles, stricter emission norms, and promoting the use of less polluting fuels like LNG etc. China is ramping up it's use of LNG in long distance transportation. As of 2016, almost 4 per cent of their long distance vehicles had converted to LNG and they had opened up more than 3500 retail LNG outlets.

As we are all aware, we have Industry 4.0 dawning upon us with technologies and processes such as the Internet of Things, Artificial intelligence, robotics process automation, machine learning, predictive analytics, 3-D printing, virtual reality and so forth, changing the way industry will operate in future.

Our companies are also charting their paths to adopt the latest digital technologies to improve efficiency, increase safety and reduce costs.

Against this backdrop, we have a lot to ponder over the future of the energy sector and India provides the perfect setting for hosting this important event.

IEF16 will be held in New Delhi in April 2018. It aims to focus on new global shifts, transition policies, influential new technologies, market stability and future investments in the energy sector.

We will have a dialogue among Ministers and industry leaders on how energy security will evolve along energy transition, meet global economic, demographic, and environmental challenges.

The overarching theme of IEF16 is *"The Future of Global Energy Security"*. The IEF16 Agenda is structured around four key sessions that aim to address the most pertinent questions for the future of our collective energy security. This includes: Global shifts in the producer–consumer dialogue; universal energy access and affordability; promoting investments in O&G to meet future demand and maintain energy security and the co-existence of new and existing technologies.

I strongly believe that these dialogues would go a long way in benefitting our citizens in accessing clean, affordable and sustainable energy. ■

India has taken a lead in forming the International Solar Alliance.

WORK TOGETHER TO BUILD A COMMUNITY OF A SHARED FUTURE FOR MANKIND

By Nuer Baikeli, Vice-Chair of the National Development and Reform Commission, Administrator of the NEA, People's Republic of China

Nowadays, the global energy structure is in a historical process of accelerated evolution, the multi-polarisation of supply and demand has been further developed, and the importance of energy security has gradually expanded. The features of energy such as low-carbon, artificial intelligence, digitisation and monetisation have become increasingly clear. Traditional and non-traditional security factors have become intertwined and non-traditional security threats such as cyber security, climate change and ecological security have multiplied. Meanwhile, with the continuous growth in demand for natural gas and the increasing proportion of new energy that is accessed to the power system, the safety of natural gas and electric power has also played an increasingly significant role in energy security.

In the era of economic globalization nowadays, the security of all countries is interconnected and mutually affected, the global allocation of energy resources and the demand for mutual benefit and win-win progress have increased. More and more countries are making joint efforts through bilateral or multilateral cooperation mechanisms. The concept of energy security has moved from ensuring individual safety to collective security, and the international community has gradually become a community seeking a shared future.

At the beginning of last year, Chinese President Xi Jinping delivered a keynote speech entitled *"Work Together to Build a Community of Shared Future for Mankind"* at the United Nations headquarters in Geneva. He systematically expounded the concept of the community of a shared future for mankind in five aspects: partnership, security, growth, inter-civilization exchanges and the building of a sound ecosystem. It contributed Chinese wisdom and schemes to the reform of global governance system, and formed a broad consensus amongst the global community. He also pointed out the direction for safeguarding global energy security. All countries and people should enjoy energy security together, and all countries should make concerted efforts to handle the various issues and challenges properly.

First, insist on the principle of achieving shared growth through discussion and collaboration. We will give full play to multilateral cooperation organisations such as the International Energy Forum (IEF), which are helpful in promoting communication and cooperation among energy producers and consumers, as well as the stability of international and regional energy markets, so that all countries will form a consensus on a reform program of the global energy governance system through full consultation and make international rules through joint efforts. Let's adhere to work and do things together, and make sure that developing countries can participate more in the global energy governance system to obtain more representation and the right to speak matched with their status and influence, establish a fair and reasonable, healthy and orderly international energy governance system.

Second, insist on mutual benefit and win-win cooperation. Countries should seize the opportunity of the new round of scientific and technological revolution, promote joint R&D on important technologies and core equipment, give impetus to the cooperation on major projects, advanced standards and engineering services, and jointly enhance regional and global energy supply capabilities. China is willing to work with all other countries to increase investment, provide more technical support, promote the construction of cross-border energy connectivity, actively conduct construction and cooperation of regional power grids in an orderly manner, jointly protect the safe and efficient operation of the international energy corridors, enhance the level of regional security, and share the benefits of energy development.

Third, insist on green and low-carbon development. Energy security is not only to ensure energy supply, but also the supply of green and low-carbon energy. We should pay attention to friendly coordination with the ecological environment, and jointly push forward global energy transition. The Paris Agreement is a milestone in the history of global climate governance, and all parties should work together to promote the implementation of the agreement. China will continue to take practical actions to address the global climate change issue and fully fulfill its obligations.

China is ready to work with all stakeholders to build a community of shared future for global energy which is open, inclusive, and beneficial to all, and make continuously positive contributions to safeguard global energy security and maintain market stability. ■

PREPARING BAHRAIN FOR AN LNG FUTURE

By H.E. Shaikh Mohammed bin Khalifa bin Ahmed Al Khalifa,
Minister of Oil, Kingdom of Bahrain

The Kingdom of Bahrain has a long history of oil and gas. The country was the first Arabian Gulf state to discover oil in the Bahrain Field back in 1932. This field is still producing today, and from this field and the offshore Abu Safa'a field, shared with the Kingdom of Saudi Arabia, Bahrain's oil production is currently about 200,000 bpd. In 1934, Bahrain exported its first shipment of crude oil produced from the Bahrain Field to Japan.

The Bahrain Petroleum Company (BAPCO) was established in 1929. BAPCO operates a 267,000 bpd refinery, from which over ninety percent of its production is exported to international markets, primarily in the Middle East, India, the Far East, South East Asia and Africa. The refinery is undergoing an extensive multi-billion-dollar upgrade to modernise and expand its capacity to 360,000 bpd. The first commercial oil from Saudi Arabia was shipped by sea to the Bahrain refinery in the late 1930s, and a pipeline linking the two countries was built in 1945. This pipeline is being replaced with a larger one, as part of a US$300 million project. Both BAPCO and Saudi Aramco are working on the implementation of the new 350,000 bpd pipeline that will replace the existing 230,000 bpd link.

Bahrain has been producing natural gas from its Bahrain Field for its local consumption for power generation and water desalination and the industrial sector since the 1970s. This field is still covering the energy demand for the whole country. However, with the increase in gas demand from our expanding economy, as well as the need to meet the expanding requirements of the industrial sector, there is a need to secure further sources of energy for the country.

As part of endeavours to enhance Bahrain's hydrocarbon resources, the Kingdom is looking to increase output and production from our own oil field by developing the pre-Khuff deep gas.

Furthermore, by early 2019, Bahrain will enter the LNG club, when the new LNG import terminal will be commissioned to complement the domestic production of natural gas. The LNG terminal is being constructed at an offshore location around 4 km away from the existing Khalifa Bin Salman Port. It will have a production capacity of 800 million cu/ft a day. The terminal is being developed and will be operated by a joint venture known as Bahrain LNG WLL, which is owned by Bahrain's Oil & Gas Holding Company, NOGAHOLDING (30 per cent), Canda's Teekay LNG (30 per cent), South Korea's Samsung C&T (20 per cent) and the Gulf Investment Corporation (20 per cent). It is being developed on build-own-operate-transfer basis for a 20-year period. For the LNG import, NOGA is in the process of signing several Master Sales and Purchase Agreements with a number of LNG exporters.

Moreover, Bahrain is also preparing long-term plans for onshore and offshore oil and gas exploration. Work is currently underway on the preparation of developmental plans, which includes the drilling of wells, so that Bahrain will have three sources of gas; natural gas from Khuff formations, deep gas from Pre-Khuff formations and LNG imports.

On a strategic level, there is discussion of the importance to the Gulf Cooperation Council (GCC) countries to develop a pan-GCC Natural Gas Grid Project, like the existing GCC electricity network.

To achieve its ambitions, the Kingdom of Bahrain need not only focus on the development of energy resources, but also on the development of human resources. Investment in training, youth development and life-long learning are key elements in the success of any human resources strategy. The country leadership's directive to invest in the development of future leaders, and improve the performance of the national workforce, has contributed to Bahrain ranking as a leader in terms of human development in the Arab World.

In May 2017, The National Oil and Gas Authority (NOGA) organised the Second International Symposium on Human Resources Management in the Energy Industry, in collaboration with the International Energy Forum (IEF) and the Russian Ministry of Energy, under the title *"Human Resources Challenges, in a Changing Time in the Global Energy Sector"*. The event was successful in addressing productivity issues via training, development and investment in human resources development.

The Kingdom of Bahrain plays an active role within the IEF. NOGA is a member of the International Support Group and BAPCO is a member of the Industry Advisory Committee. Bahrain is a rotating member of the IEF's Executive Board. In addition, the Kingdom truly believes in energy and producer-consumer dialogue and seeks to enhance cooperation amongst the IEF members to achieve this goal. ■

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CANADA AND THE FUTURE OF GLOBAL ENERGY SECURITY

By The Honourable Jim Carr
Minister of Natural Resources, Canada

I would like to thank the International Energy Forum (IEF) and this year's co-hosts – India, China and South Korea – for the opportunity to share Canada's views on the theme of this year's IEF Ministerial: The Future of Global Energy Security: Transition, Technology, Trade and Investment. The Forum provides an excellent opportunity to stimulate international dialogue and policy cooperation in the midst of a global energy transition.

The theme is one that connects directly to discussions occurring in the meeting rooms of governments and industries around the world. Energy producers and consumers alike are considering new technologies, are developing new processes to optimise energy efficiency, and are paying closer attention to the impact of their decisions on the environment. Global energy markets are rapidly changing and the energy transition is well underway. It is the pace and scope that we continue to shape.

Canada remains steadfast in its commitment to the Paris Agreement. We understand the need to act now on climate change mitigation, both internationally and at home. Businesses all over the world are seeing the opportunities for clean growth and are investing in innovation – from greater use of clean electricity, to renewable energy, to zero-emission vehicles and sustainable technologies. Governments and financial communities have begun to shift investments to set the global economy on a clean-growth trajectory. Even as countries incorporate these new technologies into their energy infrastructure, oil and gas will continue to have an important role to play as the foundation of the energy sector.

Canada is blessed with an abundance of natural resources, including some of the world's largest oil and gas reserves, which allow us to be one of the world's leading producers of energy. Canadians are also amongst the world's largest per capita consumers of energy, as we use a lot of energy for heating in the winter and travel significant distances within the country. Together, these realities represent both innovation challenges and opportunities for Canada to ensure the secure, sustainable production and consumption of our energy resources. Our government has a clear goal: to be a leader in the clean-growth century by leveraging the fossil resources we have today to deliver clean-energy solutions for tomorrow. Economic development and investment in clean energy are not mutually exclusive, and will result in long-term benefits for all.

The Pan-Canadian Framework on Clean Growth and Climate Change is Canada's plan to meet our emissions reduction targets, grow the economy, and build resilience to a changing climate. The plan identifies actions that will allow us to meet or exceed our greenhouse gas emissions reduction target of 30 per cent below 2005 levels by 2030 while ensuring sustained economic growth. Further, Canada will host the Clean Energy Ministerial and Mission Innovation Ministerial meetings in 2019 in support of increasing investment and accelerating collaboration on the global clean-energy transition.

Canada is an attractive place to invest and to do business – and it is only getting better. We offer a stable, transparent and predictable investment climate, world-class energy reserves, proximity to global markets, a skilled workforce and strong science, technology and services sectors. During this year's IEF meetings, Canada plans to showcase its proposed new environmental and regulatory rules that will protect our environment, re-build public trust, respect Indigenous rights, strengthen our economy and encourage investment. This model will ensure good projects can go ahead in support of global energy security objectives, while creating new jobs and economic opportunities in Canada and abroad. We are advancing the sustainable development of Canadian oil and gas infrastructure, and moving forward with projects that will diversify our export markets.

In nearly every facet of energy, Canadian ingenuity is solving problems, improving lives and creating a cleaner future. In addition to our investments in new technologies in the oil and gas sector, we are also developing clean technologies to increase the supply of renewable energy from solar, wind energy and nuclear power as part of our energy mix, as well as encouraging the development of new and emerging energy sources such as wave, in-stream tidal, geothermal and biomass.

We are investing in energy efficiency and clean energy programs, in alternative transportation infrastructure, and in promoting cooperation on electricity across our vast nation. Canada's expertise in greener ways of developing natural resources can be part of the positive force for change around the world.

We look forward to advancing these shared energy priorities as we transition to lower-carbon economies, and increase trade and investment opportunities. Let us continue to be partners in leading the global transition. By working together, we can meet our international commitments on climate change, enhance global energy security, promote lasting trading relationships, and improve quality of life for our people. ■

THE FUTURE OF GLOBAL ENERGY SECURITY

By H.E. Carlos E. Pérez
Minister of Hydrocarbons, Republic of Ecuador

For over a quarter century the IEF has been a place where consumers and producers meet to understand each other's viewpoints, a stronghold for dialogue where we can come together and discuss questions such as: How can energy help create opportunities for all, regardless of nationality? How can we reduce inequality by providing reliable energy to our communities? How can energy continue to fuel economic growth? And how can the energy community ensure that this economic growth is sustainable and does not harm our planet?

In recent years the oil industry has been subject to many changes. As we like to say, change is the name of the game and with this in mind the joint effort, that started in the 15th IEF Ministerial Meeting, tackled head on the imbalances in the oil market. Today the work done by OPEC and non-OPEC producers is bearing fruit, and we are seeing a more balanced market. This is fundamental to avoiding cycles of price shocks where everybody loses and immense pressure is put on these people who are not able to cope with the swings of the market.

As oil producers it is our common duty to help create a world where everybody has access to secure, reliable and affordable energy. In every forecast oil is, and will remain, a fundamental part of the energy mix in the years to come (over 27 per cent by 2040 according to OPEC). Energy security will play a fundamental role in poverty reduction, as where there is electricity, heat and fuel, communities are able to flourish and unleash their full potential. Our job as change agents is to provide this opportunity to everyone around the globe.

We live in an era where there has been more data created in the past two years than in mankind's history, where communications are faster than ever and where the world is developing at a pace never seen before. These are truly amazing times, but nevertheless we also face the great challenge of climate change. The world has almost unanimously taken action against it and is outlining a framework under which we can start solving this problem together. In order to pursue the proposed 2° C pathway we view accountability, pragmatism and technology as the three essential pillars of success, where we have to focus our attention.

Every nation has to be accountable for their share of responsibility for climate change and in every measure agreed under the "Paris Agreement" there has to be a clear differentiation between developing countries, which historically have not been the main contributors to climate change, and developed nations.

A pragmatic approach to solving this problem is key. We have to understand that in order to be successful in this endeavour we have to take a multi-pronged approach where there will be need for investment in the de-carbonisation of fossil fuels as well as in renewables. Oil will be needed to ensure global energy security in the years to come, but it has to become more environmentally friendly. The investment drought in the oil industry since 2014, has also become an obstacle in attracting new investment aimed at reducing the impact of the oil industry on climate change. Because this industry has great potential in contributing to the reduction in CO^2 emissions, there is the need for coordination between the oil industry and climate fund, (future investments related to CO^2 reduction), and this is why we believe that these investments should be prioritised mainly based on their potential for emissions reduction regardless of industry or country. For example, in Ecuador we have already invested in around US$600 million reducing approximately 200,000 tons of CO^2 per year, but there still remains more than US$700 million in planned projects which are waiting for funding.

Technology development and transfer will be essential in achieving our reduction targets, we have to further develop renewables as well as reduce CO^2 emissions per energy unit generated by fossil fuels. Given the magnitude of the challenge we have to be conscious that there will be a need for cleaning up fossil fuels, we will need a "greener" oil. Technology and successful experiences have to be shared globally in order to replicate fruitful projects and multiply their scope and effectiveness.

It is clear that in an energy sector that is more interconnected then ever, and that faces broad challenges, the IEF provides a strong platform to further articulate joint efforts aimed at improving the wellbeing of nations and the environment. We believe that the IEF which has already been witness to historic decisions such as the Algiers accord, will continue to deliver such landmark moments and will continue to be an enabler of such necessary actions. We are looking forward to a successful 16th IEF Ministerial Meeting and would like to thank the Government of India for hosting such an important event. ■

THE CHALLENGE OF MARKET STABILITY AND ENERGY SECURITY

By H.E. Bijan Namdar Zangeneh
Minister of Petroleum, Islamic Republic of Iran

Having a glance at the history of oil prices, one may notice that the various oil price shocks and counter-shocks since the 1970s and the sharp cycles of investment are clear evidence that market adjustment mechanisms are not solely effective in dealing with many aspects of oil market problems. Rather, special attention should be paid to the importance of more focussed target-oriented dialogue and cooperation among producers and consumers in line with achieving global energy security. This is not achievable unless the world energy sector is depoliticised. Although some states do their best to merely secure their own national interests, the important point is that in the current era, interests of producers and consumers are intermingled, and their close coordination within the IEF neutral platform can lead to valuable achievements. In this regard, the role of IEF in minimising discrepancies between producers and consumers is vital.

The next decade is expected to see increases in energy demand that are to be met predominantly by fossil fuels, with oil set to continue to maintain its major role, particularly in the transportation sector. It is worth noting that by 2025, almost three-quarters of the increase in demand is expected to emanate from developing countries.

On the supply side, in the short-to-medium term, on the basis of detailed bottom-up data on upstream development plans overall, non-OPEC supply is expected to continue to increase- rising to a plateau of 63.6 mb/d by 2025. The key sources for the increase in non-OPEC supply will be the United States, Canada and Brazil. In the longer term, the balance of the global oil reserve base and the gradual depletion of non-OPEC reserves means that OPEC will be increasingly called upon to supply the incremental barrel, with its market share eventually set to rise.

As far as climate change issues are concerned, I. R. Iran has made significant efforts aimed at combating climate change, particularly in the area of GHG emissions reduction. To that effect, Iran has tried to enhance the share of natural gas in its energy basket to curb GHG emissions. Iran's Petroleum Ministry's calculations indicate that here gas had not replaced liquid fuel, the rate of GHG emissions in Iran would have increased by over 3%. It is noteworthy that the realisations of Iran's commitments in its INDC (4% non-provisional, 8% provisional) compared with BAU scenario (base year 2010) over 2020 to 2030 is highly dependent on receiving financial aid and technology.

Iran's petroleum industry share in GHG emissions is estimated to be between 15 to 20%, stemming mainly from gas flaring. Therefore, in line with achieving zero flaring, plans have been made to negotiate with IOCs and the private sector to implement projects aimed at collecting flare gas for power generation. Moreover, facilitating development of gas fields in countries where huge volumes of gas are available and production cost is low could potentially guarantee global energy security.

Turning to one of the core objectives of the International Energy Forum (IEF) energy security through dialogue, one can claim that investment plays a prominent role in achieving this objective. It is noteworthy that the long-term picture points to the need for increased investment in oil production capacity, however, the extent of the required capital is subject to considerable uncertainty, stemming from the wide range of feasible demand growth scenarios and contrasting views on the potential evolution of non-OPEC production.

Uncertainties over future economic growth, as well as the trend of development and diffusion of newer technologies, raise questions over the future scale of investment that will be required. This uncertainty, coupled with long lead times, inevitably complicates the task of maintaining market stability. Furthermore, future challenges faced by the refining sector in adapting to new regulations and product requirements suggest there is a risk that the downstream industry could become a prime source of volatility for oil prices.

Therefore, in view of the above-mentioned uncertainties, the challenge of market stability and ensuring energy security requires sufficient investment in the field where production cost is economically viable. Undoubtedly, reasonable oil price levels and preventing harmful fluctuations could secure adequate sources of investment. To that effect, the role of the IEF as a neutral platform which facilitates and fosters dialogue between producers and consumers becomes even more prominent and influential. The IEF efforts to gather together the two parties could bring about stability to the market.

In conclusion, I wish all the best for India, the host of the 16th IEF ministerial meeting. ■

GLOBAL ENERGY MARKETS AND THE GROWTH OF THE ECONOMY IN IRAQ

By H.E. Jabbar Ali Hussein Al-Luiebi,
Minister of Oil, Republic of Iraq

First and foremost, I would like to thank Dr. Sun Xiansheng IEF Secretary General, The Government of India and all IEF member countries for the opportunity to enhance the development of relationships among energy ministers, industry leaders and heads of key international organisations. I expect a focus on how global shifts, transition policies and new technologies influence market stability and future investment in the energy sector. I do expect to discuss how we can secure an energy future by merging economic synergies and developing stronger ties among IEF member countries.

The Iraqi Ministry of Oil aims to strengthen and develop relationships with major international companies and industry leaders to meet the additional demand from global markets.

There are many investment opportunities inside Iraq and we pledge to secure proper working conditions for the companies that assist in implementing our investment plans for our oil fields.

The fierce competition for oil market share has driven oil producers to closely monitor the break-even price of producing a barrel of oil and to decrease costs to a minimum so as to obtain better positions compared to other oil suppliers. The operational cost of producing a barrel of oil in Iraq is considered to be low in comparison with other oil producing nations such as the US, UK and Canada, so Iraq is competitive on a global scale.

Recently, oil producers extended an oil output cut until the end of 2018 to deal with the oil glut, which is leading to a more balanced market and an increase in oil price to its fair value. Despite the fact that Iraq should not have been requested to cut its oil production, due to the extraordinary circumstances in the country. Iraq, as the second largest producer in OPEC, has confirmed its commitment to the cut agreement by implementing plans to reduce oil production. However, the ministry stands ready to satisfy any growth in global oil demand by maintaining spare capacity and improving export infrastructure, in addition to the implementation of modern technologies in oil and gas exploration and production.

Production facilities in Iraq are being rehabilitated and expanded in a timely manner. At the same time, many oil and gas fields are still in need of development. Investment in midstream and downstream projects is also still required.

Iraq is the fourth largest oil producer globally with confirmed oil reserves of more than 153 billion barrels in addition to further 25 -100 billion barrels of untapped reserves.

We can say that we have almost reached our target in oil field development and infrastructure expansion but we are eager to incorporate new technologies and achieve greater economic cooperation.

I would like to take this opportunity to give a brief outlook on gas resources in Iraq. Estimates indicate that Iraq holds approximately 133 trillion cubic feet of natural gas reserves, an endowment that would make Iraq the 12th largest holder of conventional gas reserves in the world.

More importantly, by 2020 the Ministry's goal is to produce 5,000 bcf of dry gas and 20,000 tons per day of LPG and 15,000 barrels per day of condensate.

The Ministry has started expanding seismic exploration surveys in Iraqi territory and territorial waters. The figures showed that although 520 geological sites are likely rich in oil; only one-third of them have been investigated.

I would also like to point out that we are looking at the possibility of extending pipelines to transport crude oil through neighbouring countries, which will add more opportunities for investment in Iraq.

I would like to draw your attention to the fact that Iraq has already started to sell its shipments of LPG, which opens the doors for future growth in the gas industry.

Moreover, Iraq has become the main supplier of operational fuel for all ships and tankers which anchor in Iraqi ports. Furthermore, we are carrying out an ambitious training programme for the preparation of specialised staff in this field to support this trend and further build the capacity of Iraq's officials, including the staff of Iraqi institutions and marketing entities.

The Ministry is also carrying out a plan to enhance our credibility and work performance to qualify for ISO-certification. This is expected to result in far better workflow processes.

Here we would like to refer to the restructuring of the National Oil Company and highlight its importance in the development of the oil industry in Iraq. The National Oil Company will be one of the leading companies in the region and the world; hopefully it will achieve greater performance in attracting investments.

Finally, I must underline the fact that the prosperity of Iraq depends, to a great extent, on its energy sector. ■

ENERGY DIALOGUE – BECAUSE IT MATTERS

By H.E. Terje Søviknes,
Minister of Petroleum and Energy, Kingdom of Norway

Twenty-six years ago, the second IEF ministerial meeting was held at Solstrand in the county of Os where I served as Mayor for seventeen years before being appointed Minister of Petroleum and Energy in Norway.

It all started in Paris in 1991, when the French government, supported by Venezuela, hosted the first dialogue meeting. The initiative was met with scepticism about a more multilateral approach replacing bilateral or regional cooperation. Many countries were staunch defenders of the principle of no interference in the market, claiming that the invisible hand should clear the market and set prices. It is good to see that after a difficult birth the dialogue has developed and grown.

The dialogue process took an important step further in the year 2000, at the IEF7MM, when Saudi Arabia and the then Crown Prince Abdullah at the ministerial meeting took the initiative to establish and host the IEF secretariat in Riyadh.

For decades, Norway has argued for the benefits of closer dialogue and improved cooperation between producers and consumers of oil. We have seen the need for international organisations if we are to reap these benefits. In the dialogue process, Norway has seen the advantage of being both an oil exporter and an industrialized western country, and we have seen that we have a role to play as a mediator. Norway has actively supported the dialogue process from the very beginning including the preparation for the very first meeting in Paris.

Why is the dialogue process important? First, because dialogue is a prerequisite for trust between the various players in the oil market, between the producers of oil and the consumers of oil. Access to energy is key to economic and social development. Petroleum resources are not evenly distributed and security of supply has often been an area of concern for importing countries. For petroleum producing and exporting countries on the other hand, the oil industry is a source of income and a key source for economic development. To these countries, security of demand is important. These interests are in no way contradictory. Stable energy markets are important for importing as well as exporting countries. Recognition of this fact and recognition of the interdependence and mutual interest between producer and consumer countries rather than competition has been the foundation for the dialogue process.

Through closer dialogue between producer and consumer countries and an exchange of views and information, uncertainty is reduced and predictability increases – This contributes to more stable energy markets. Investments in the energy sector are capital intensive and have long lead times. A more stable market and less uncertainty will promote timely investments to meet consumers' needs and demands at lower cost.

Prices have been a sensitive issue in the producer-consumer dialogue. Prices are, and must be, set in the markets. There is a broad acceptance today that a well-functioning market is the best means to determine supply and demand and allocate resources. The dialogue process has contributed to establish this acceptance, by fostering a better understanding between the different players of the importance of prices and their effect on both the supply and the demand side. This is beneficial for both oil consuming and oil producing countries in the long run.

Transparency and access to information is crucial for a well-functioning market. In that respect, the JODI project on oil statistics – and later also on gas – has been very important. However, there is still room for improvement. If we are sincere about the importance of stable markets, we must be willing to submit timely and reliable data. According to JODI, timeliness, coverage and reliability of oil data are at reasonable levels for the top 30 oil producers and consumers. The challenge now is to increase the coverage for other countries, to reduce the delay in data submissions and to further enhance the data quality.

The complexity of the oil market has increased with the closer link between the physical market and the financial market. In cooperation with OPEC and the IEA, the IEF has done an important job in focusing on that issue, fostering dialogue across market segments and improving knowledge about these specific markets and the interlink between them. The financial market will continue to be an integral part of the oil and gas market. It brings liquidity and offers tools for risk management. A well-functioning market presupposes knowledge, transparency and regulation.

The global energy dialogue is about interdependence between energy producers and energy consumers. Basically, we are facing many of the same challenges. In order to solve these challenges and ensure global energy security we need to have a common ground of understanding. Over the years, we have built that platform through the IEF and we need to enable that platform to solve the most demanding challenge facing us all today; how to supply affordable energy to support economic and social development and at the same time curb and reduce climate change. ■

KEY ENERGY SECTORAL POLICIES IN THE PHILIPPINES

By H.E. Mr Alfonso Cusi,
Secretary of Energy, Republic of the Philippines

In support of President Rodrigo R. Duterte's Am Bisyon Natin 2040 which envisions "a strongly-rooted, comfortable, and secure life for all Filipinos by year 2040" the energy sector put forward proposals in line with the long-term vision and aspirations of the Filipino people and for the country's development. The Department of Energy (DOE) laid down eight Energy Sector Strategic Directions that will set the tone for the Department's policy track over the next 22 years. These are: (1) ensure energy security; (2) expand energy access; (3) promote a low carbon future; (4) strengthen collaboration across all government agencies involved in energy; (5) implement, monitor and integrate sectoral and technological roadmaps and action plans; (6) advocate for the passage of the Department's legislative agenda; (7) strengthen consumer welfare and protection; and (8) foster stronger international relations and partnerships.

One of the sector's efforts in support of this vision is the issuance of Executive Order No. 30 on June 28, 2017, which established the Energy Investment Coordinating Council (EICC). Spearheaded by DOE, the EICC is tasked with streamlining regulatory procedures affecting Energy Projects of National Significance (EPNS) with the objective of attracting more investors to build energy projects and installations in the Philippines.

Another milestone policy initiative is the promulgation of the Department's Energy Resiliency Policy to ensure continuity in the delivery of energy services and safeguard existing energy infrastructure in the event of calamities. Since the Philippines is at high risk of natural disasters, the Department prioritised the creation of an energy resiliency policy which requires the energy industry to mainstream disaster risk reduction programmes into planning and investment. Relative to this policy, a task force on energy resilience was created to ensure that both government agencies and private institutions are prepared for the development and adoption of their respective resiliency programmes.

Cognisant that the country is endowed with various energy resources, it is fundamental to maximise the exploitation of these resources. This need is translated into the Philippine Conventional Energy Contracting Program (PCECP), a new transparent and competitive scheme for prospective investors to enable them to apply for service/operating contracts anywhere in the country at any given time. Currently, the DOE is supervising and monitoring 22 petroleum service contracts and 66 coal operating contracts which are a result of the previously conducted Philippine Energy Contracting Round.

The Philipinnes expects to produce 35 per cent of its power from renewable sources by 2040.

Furthering the development of the downstream natural gas industry, the DOE also embarked on the issuance of the Philippine Downstream Natural Gas Regulation (PDNGR) in December 2017 to institutionalise the rules and regulations governing the downstream natural gas industry in the country. This policy tackles infrastructure siting, design, construction, expansion, modification, operation, and maintenance as well as ensuring the continued operations of other gas-fired power plants once the Malampaya gas field runs dry. It also has the intent of promoting the use of natural gas to meet the growing energy demands in the Asia Pacific region and transform the country into a regional LNG trading and trans-shipment hub.

To accelerate the use of more renewable energy and develop the Philippine renewable energy industry, the renewable portfolio standards (RPS) mechanism for on-grid areas was approved in December 2017. With the RPS, electric power industry participants, such as generators, distribution utilities and suppliers are required to source or produce a specified fraction of their electricity from eligible renewable resources. The RPS mechanism targets a 35% share for renewables in the power generation mix by 2030 to 2040.

The Green Energy Option (GEOP) Rules, one of the mechanisms in the Renewable Energy Act, have likewise been endorsed by the National Renewable Energy Board (NREB) in August 2017 and presented for nationwide public consultation. GEOP empowers end-users with the ability to choose renewable energy for their energy requirements through the distribution utilities. ■

THE ROLE OF GLOBAL ENERGY DIALOGUE IN CHANGING ENERGY MARKETS

By Michal Kurtyka
Undersecretary of State, Ministry of Energy, Republic of Poland

While many changes are reshaping the global energy market, oil and gas combined together are still expected to dominate the global energy mix in 2040, with over 52 per cent of the share, as the OPEC's *World Oil Outlook 2017* indicates. Natural gas will play an increasingly important role in the global energy balance. Estimates show that gas will soon become the second largest primary energy source after oil (25 per cent share by 2040 according to the OPEC's report) and the 21st century is often named as an era of natural gas. Moreover, natural gas contributes to the decarbonisation of energy systems, which is a key challenge in light of growing global energy consumption. According to projections the significance of LNG will continue to grow and the sector is one of the fastest-growing segments of the global energy market.

Despite the continued dominance of hydrocarbons, energy markets are undergoing a substantial transformation. Current major trends are the increased importance of Asia, especially China and India, in global energy demand and consumption; for the United States' new role as a producer of oil and gas (insurgence of light tight oil and shale gas production); breaking hydrocarbons' monopoly in the transportation sector; the rise of renewables in the global energy mix and energy efficiency developments. As the production from natural, traditional sources declines, more investment will be needed. The IEA's *Oil 2018 Report* indicates that "each year the world needs to replace 3 mb/d of supply lost from mature fields while also meeting robust demand growth". We have to remember that investment requires not only substantial financial commitment (OPEC sees overall investment requirements in the downstream, upstream and midstream of US$10.5 trillion in the period to 2040) but also finding the right balance between current and future challenges to face both growing energy demand and the declining supply of fossil fuels.

The availability of new, more cost-effective technologies to explore next generation oil and gas finds (especially shale and tight oil and gas) will not decrease dramatically the share of fossil fuels in global demand in the near future. As the IEA informs in its *World Energy Outlook 2017,* "the shale revolution in the United States and new demand and investment trends in the Middle East and Asia are recasting traditional patterns of global oil trade, with global implications for energy security". According to the IEA forecasts in the *Oil 2018 Report*, petrochemicals remain the fastest-growing source of global oil demand growth particularly in the United States and China – as the report further informs – "about 1.7 mb/d, or 25 per cent, of our total demand growth to 2023 is taken up by ethane and naphtha".

There is no doubt that our economies, will for a while still rely on traditional energy sources such as coal, crude oil and gas which, in case of Poland, are crucial to its economic development. However, a transition to clean energy is essential in today's globalised world. The sooner we realise that the world must inevitably move towards cleaner energy, the better the chances we have to manage the global energy transition. This important step must be taken while respecting the national/local conditions of countries in transition. Poland has developed innovative, clean energy technologies with an ambitious goal of moving towards electromobility. In 2017 two strategic documents were accepted by the Polish Government the National Plan for Development of Electromobility and the National Framework Policy for Development of Infrastructure for Alternative Fuels in the Transportation Sector. At the beginning of this year the Polish Parliament approved the Act on Electromobility and Alternative Fuels. In order to develop electromobility in Poland we also plan to financially support the sector and a new act on this issue is being discussed by the Government.

The new act on electromobility and alternative fuels will give a leading role to the central and local authorities in promoting these new trends. It imposes on both government administration and local authorities an obligation to have a minimum of 50 per cent (by 2025) and 30 per cent (by 2025) share of electric vehicles in the car fleet and a minimum of 30 per cent (by 2028) share of zero-emission buses in the public transport fleet. These innovative solutions will allow for the development of an alternative fuels market and the development of the electromobility market. Participation in the technological revolution, specifically the development of electric vehicles will allow Poland to create new industries and boost economic growth. Simultaneously, Poland will enhance energy security and improve air quality in cities.

Ensuring energy security today is also about ensuring the secure energy of tomorrow. Bearing this in mind, the International Energy Forum serves as an important platform for dialogue on all elements of the global energy market. New energy trends and developments require international cooperation and coordination, and the IEF's role remains significant in this field. By choosing the theme "The Future of Global Energy Security: Transition, Technology, Trade and Investment", the 16th IEF Ministerial positions itself in the centre of this crucial energy debate. ■

GLOBAL ENERGY SECURITY THROUGH TO 2040 – PROSPECTS & CONSEQUENCES

By H.E. Dr. Mohammad Saleh Al Sada
Minister of Energy & Industry, State of Qatar

Security of energy supply is important for both consumers and producers. While consumers focus on guaranteed access to affordable and reliable energy supply, producers continue to face challenges brought about by dynamic and often volatile market conditions and geopolitical tensions.

As for any commodity, the balance between supply and demand for energy is of great importance for the industry to survive. A 'win-win' situation is required for all stake holders; an imbalance, if not restored quickly, will be detrimental to all.

Population growth is and will remain, the primary driver of future energy trends, underpinned by the process of urbanisation. The current world population of 7.6 billion is forecast to reach about 9.2 billion by 2040. As the population continues to grow, so does the aspiration of the world to improve the quality of life and living standards.

It is observed that this population increase is accompanied by an exponential demand for energy. Global GDP growth currently averages around 3.4 per cent, growing to 3.7 per cent over the next two years. By 2040, global per capita GDP is estimated to increase by 80 per cent.

In order to meet this GDP growth, global energy demand is expected to grow at an average of 1.1 per cent per annum and it is the secure availability of affordable energy supply which will drive this development.

Fossil fuels have always been the dominant component of the energy mix and they will continue to be so for the foreseeable future. Today they meet about 81 per cent of global energy requirements. Despite the efficiency gains, the global energy demand is forecast to grow by 25 per cent between 2015 and 2040 and fossil fuels are projected to still have three-quarters of the share in the energy mix.

Renewable sources – wind, solar and biofuels – will see a combined growth of about 5 per cent per year through to 2040, when the share of non-fossil fuels is expected to reach about 22 per cent of the total energy mix.

Looking at Fossil Fuels, during the same period, oil and natural gas will continue to supply about 55 per cent of the world's energy needs. Oil will continue to provide the largest share of the energy mix, primarily to cater to the demand emanating from transportation and downstream chemicals sectors.

As it stands today, it is predicted that there will be a high demand for oil. In 2018, the IEA predicts an increase of 1.5 MBPD, reaching 99.3MBPD, whereas OPEC and the EIA expect the increase to be 1.6 and 1.72 MBPD respectively. Demand in 2030 is likely to go up to 109 MBPD.

Natural Gas Power Station on the Coast in Qatar

On the supply side, it is estimated that more than 80 per cent of new liquid supply is needed to offset the natural decline. Production is decreasing from mature fields, particularly in countries such as China, Mexico and Colombia. Without further investment, liquid supply will decline steeply. The IEA projects that, to meet the growth in oil demand, about US$10 trillion, equivalent to an average of US$400 billion a year of upstream investment is required between 2017 and 2040, to make-up for this decline.

Today, global oil resources are abundant, especially since technology has added tight oil, deep-water and oil sands resources to oil reserves. Producers are looking for adequate returns to invest and tap into these resources.

It is natural gas that is expected to have the highest increase in demand, primarily to meet the increasing needs of the electricity and industrial sectors. To meet this expected demand, an investment of about US$8 trillion would be required. The abundance and versatility of natural gas makes it a valuable, clean energy resource; it can help the world shift to a less carbon intensive energy sources, providing an ideal bridge to a low carbon future.

Consequently , natural gas is forecast to increase more than any other energy source. In the global energy mix, its share is etsimated to increase from 22 per cent in 2016 to 26 per cent in 2040.

Today, exploration, appraisal and development continue to falter. If the current lack of investment continues for few more years, it will begin to affect supply. Beyond 2020, the market may face problems if a course correction is not made at the global level. ■

THE FUTURE OF THE GLOBAL ENERGY PARADIGM – RUSSIA

By H.E. Alexander Novak,
Minister of Energy, Russian Federation

Throughout history, global society has witnessed fundamental economic and technological transformations in many of its industries. One can say with certainty that even today we find ourselves on the verge of such changes. These advancements have the opportunity to leave previous "technological revolutions" in the dust.

The Organization of the Petroleum Exporting Countries (OPEC) has been at the forefront of international energy dialogue since the early 1990s, when Member Countries, alongside other producers, as well as consumers, joined forces to initiate a very important platform for a producer-consumer dialogue and exchange through the establishment of the International Energy Forum (IEF).

As representatives of the global energy industry we all understand how momentous are the changes in the modern world and realise that we are witnessing not just short-term phenomena, but something that stimulates fundamental changes in the world of energy that will transform the entire international economic system and landscape.

No one could predict the current world energy outlook ten or fifteen years ago. Something that prevailed in the global oil society fifteen years ago was the "peak oil" theory, according to this concept mankind would reach an insurmountable rate of oil production for the foreseeable future. So, what is the current state of affairs? We are discussing "peak oil" again – but in another context – when the maximum rate of oil demand is reached, whereas oil supply is no longer an issue of concern.

We have witnessed a technological revolution. The past few years have seen a revolution in oil production technologies. New faster and less expensive ways of shale oil and gas extraction have emerged. This source has become another balancing factor in the market capable of reacting to changing market conditions within 3-9 months compared to 3-5 years as it was in the past.

The production cost has also decreased significantly. This has led to increasing volatility while the market is looking for a way to rebalance and stabalise.

For the moment, we can observe the explosive growth of renewables as well. The current annual investment into new solar and wind generation capacities amount to more than $250 billion. More funds are invested in renewables than in conventional generation. It was hard to predict that in many countries, solar and wind power plant generation costs would be competitive with conventional energy sources. It is obvious that the trend will continue – renewables will grow at high rates compared with other energy sources.

What are the key factors and challenges of the global energy transformation these days?

- New technologies will continue to change the market landscape, both in production and energy generation, as well as in the field of consumption.
- Moreover it is expected that fossil fuels will supply a great majority of the world's fuel consumption over the long-term.
- The globalisation of all key processes will continue to be a factor.
- Competition between energy sources will intensify, which will result in a reduction in resource rents.
- It is important to note that non-economic restrictions, destructive to the foundations of global energy security, are gaining momentum worldwide.

Technology development has led to an increase in oil production in many oil-importing countries and to the reduction of its cost. Perhaps one of the most striking examples is the rapid growth of light tight oil production in the US. I believe that the struggle for efficiency will enhance the competitiveness of more expensive methods of oil production in the future.

Another essential factor is the quick pace at which renewable energy is deployed. Could anyone back in 2000 imagine that the new installed renewables would top the capacity added from all conventional technologies and that investments in renewables would exceed those in conventional energy sources?

Nowadays the levelled costs of electricity (LCOE) for renewable energy technologies are continuing to decline (over the past decade LCOE declined by an estimated 70 per cent for solar photovoltaic (PV) and by 25 per cent for wind energy technologies), therefore renewable energy is becoming more and more competitive on a cost per kilowatt-hour basis compared to fossil fuel power.

Economic growth has finally become decoupled from energy consumption: robust investments in energy efficiency have begun to yield positive results. According to forecasts, the size of the global economy will double by 2040, at the same time global energy consumption will rise by no more than

30 per cent. Meanwhile global electricity demand is expected to increase rapidly, particularly given rapid industrialization in emerging economies, population growth, a rising middle class, expanding urbanization, and the widespread electrification of society.

Another factor is the acceleration of globalisation and increased interconnection of different energy markets (both between energy sources and different regions). Since the beginning of the 21st century the number of major oil producers (countries with a production level of over 4 mln barrels a day) has doubled, at the same time the number of major gas producers (over 100 bcm) has tripled. A striking example is the LNG industry, which is transforming natural gas markets from regional systems, to more globalised and interdependent markets, which consequently leads to the formation of a truly global natural gas market.

The globalisation of markets also leads to the globalisation of risks - changes on one side of the globe can seriously affect the other. Competition between different producers and various types of energy resources has grown even stronger. All this is happening not within centralised integratedframeworks or large government programs, but rather, within uncontrolled consumer collaborative processes, which are difficult to forecast. Renewables will allow consumers to choose whether to connect to a centralised utility or to organise energy supply in their own households through decentralised renewable energy solutions such as rooftop mantled solar panels or micro-cogeneration units in cellars.

Comprehensive digitalisation of all processes in the energy sector promises the most revolutionary changes which will enable the reshaping of the entire global energy landscape. Power consumption management which includes digitalisation, robotisation, artificial intelligence and the development of smart city innovative technologies is now one of the key directions of modern energy development.

Nowadays many experts state that the era of fossil fuels is coming to an end. We do not share such extreme views, which are based on the claim that there won't be a place in the new world for conventional energy sources and that they will somehow play a secondary role to renewables.

First of all, traditional energy is important since it provides physical stability and security. For instance a well-developed pipeline system in Europe will ensure fully digitalised and decentralised electricity flows.

Secondly, conventional energy has great potential for efficiency growth through digitalisation, flexible adjustment to the needs of consumers and decentralised management. An ideal digital model is built up in a way that as soon as a consumer presses the lever of a fueling nozzle, analysts based in an operational centre of an oil company will immediately receive information concerning the gasoline standard being pumped into the fuel-tank as well as the amount of crude oil to be produced, transported and then refined in order to meet the demand of a particular region.

In fact, global society has made a choice today in favour of sustainable development and the achievement of our common climate goals, which are simply unachievable without such an environmentally-friendly and abundant fuel as natural gas. It should be taken into account that the average greenhouse gas emissions intensity of a gas power plant are 40 per cent lower than that of a coal power plant, and 20 per cent than of an oil power plant. In practice, the CO2 emissions intensity of natural gas is lowered even further thanks to highly efficient gas power plants. As a result, gas power plants emit about two times less carbon dioxide than coal-fired power plants.

The share of fossil fuels in the global energy mix will definitely fall in the next 20-25 years – from 85 per cent to 70-75 per cent – however, taking into account population growth, vehicle fleet and energy demand growth rates, the total consumption will accrue. If we want to ensure a sustainable global energy supply, we will have to find a rational balance between conventional and new energy sources.

It should be said that while the spotlight has been focused on digitalisation, innovative technologies and smart grids, slightly less than half of the global population still does not enjoy access to energy. At the same time, experts commonly believe that the UN will not deliver on Sustainable Development Goal 7, which aims to ensure access to affordable and sustainable energy for all by 2030.

We, as many of our partners, count on the significant role of technological progress in the acceleration of SDG7's implementation rates. Clean fossil fuel technologies have great potential in ensuring the achievement of that goal. ■

THE FUTURE OF GLOBAL ENERGY SECURITY: SHARED COMMITMENT

By H.E. Suhail Mohamed Al Mazrouei,
Minister of Energy & Industry, United Arab Emirates
President of the OPEC Conference 2018

It is with great pleasure that I return to India, New Delhi, to participate in the 16th. International Energy Forum (IEF). Where better to discuss energy security than a country where energy demand is forecast to grow by more than any other in the period to 2040, propelled by an economy that will expand to more than five-times its current size, and by population growth that will make it the world's most populous nation.

The theme of this year's IEF Ministerial meeting, the future of global energy security, is both timely and relevant. While there is much talk of the energy transition, it remains evident that both alternative and conventional energies will play a pivotal role in meeting the world's energy needs. Total primary energy demand is set to increase by 35% in the period to 2040 and, if we are to meet this burgeoning demand, a broad array of energy types will be required. There is no single silver bullet.

With this in mind, it is important that we do not overlook the critical role that hydrocarbons will continue to play in powering our nations and our economies. While the global energy mix is diversifying – many companies and countries, including the UAE, are investing heavily in renewables, for example – oil and gas will still account for more than 50% of global energy use in 2040. Talk that the era of oil is ending is irresponsible and unfair to the billions of people still without modern energy services.

Strong economic fundamentals

We entered 2018 with robust market fundamentals; economic growth was around 3.7% last year, the strongest we have seen in a decade, and it is forecast to remain at a similar level throughout 2018. Global oil inventories are moving in the right direction, downwards, towards their five- year average as a result of the unprecedented alliance between OPEC and its non-OPEC partners. In addition, supply and demand is starting to rebalance, which has resulted in a more stable and sustainable oil price.

However, challenges still remain. More than a trillion dollars of capex cuts in recent years is reducing future discoveries and production at a time when OPEC's World Oil Outlook 2017 expects long-term oil demand to increase by 15.8m b/d, rising from 95.4m b/d in 2016 to 111.1m b/d in 2040. We must not walk blindly into another supply crunch.

OPEC's *World Oil Outlook 2017* estimates the required global oil sector investment to 2040 to be some $10.5 trillion. While global investments picked up slightly in 2017, and the same is expected in 2018, this is nowhere close to past levels.

The collective challenge that lies before us, increasing our overall energy production whilst delivering on our environmental commitments, cannot be addressed by an individual country or company. It will require collaboration and a shared commitment on an unprecedented scale.

To the surprise of many observers, a new model for collaboration has emerged. The historic 'Declaration of Cooperation', signed between 24 OPEC and participating non-OPEC producers at the end of 2016, provides a strong foundation on which we can build.

It's still too early to say what any future agreement may or may not look like, and the scope that it will or could address. But through dialogue and engagement, at events like the IEF forum, I am hopeful that we can explore the shared commitment and actions that are essential; if we, collectively, are to deliver the energy security that will be essential in enabling the future growth, development and prosperity of our nations. ■

Oil production in the Red sand "Arabian desert" near Dubai, UAE

"NEW ENERGY REALISM" AND AMERICA'S GROWING ENERGY ABUNDANCE

By H.E. Rick Perry
Secretary of Energy, United States of America

A new paradigm has emerged in the United States which I call the "New Energy Realism." During the 1970s, there was a school of thought asserting that U.S. energy production had peaked and would decline over time, resulting in a permanent energy shortage. Even if new domestic reserves could be found, it was thought, the high cost of extraction and environmental impacts would render them of little value. Consequently, governments sought to impose draconian regulations on energy. These energy pessimists could not have been more mistaken. There never was a shortage of energy, only a shortage of imagination and a loss of confidence in our own ability to innovate.

This alternative view was subsequently vindicated. While Washington clung to a mindset of scarcity and regulation, something very different began to occur elsewhere. Across the nation, innovation revived. Much of it took place in the Department of Energy's national laboratories, but it did not stop there. In states like Texas, where I served as governor, taxes were reduced and regulations kept simple and transparent, providing people both the freedom and the incentive to innovate. And with innovation came a revolution in technology.

As a former Texas governor, I am proud that the breakthroughs in hydraulic fracturing and horizontal drilling – leading to America's natural gas boom – started in my home state. And as U.S. Energy Secretary, I am also pleased that our national labs helped make this technology possible, achieving great gains that unleashed every energy source we had. With science and technology leading the way, the results have been astonishing.

From fossil fuels to renewables, supply rose, costs fell, efficiencies increased, and energy diversity blossomed. And the same technology revolution that was producing energy more abundantly and affordably and from a wider range of sources than anyone thought possible was also making our fuels cleaner. From 2005 to 2017, the United States led the world in reducing carbon emissions, by 14 per cent.

Our energy progress has been plainly evident regarding oil output. U.S. crude oil production rose from 5.4 million barrels per day (bpd) in 2010 to 9.3 million bpd in 2017. U.S. progress in natural gas has been no less impressive. Production has risen from 59.4 billion cubic feet/day (Bcf/d) in 2010 to 73.6 Bcf/d in 2017. The United States is now the number-one combined oil-and-gas producer in the world.

There is further good news on the U.S. energy front. From tax reduction to regulatory reform, the Trump Administration has put Washington squarely on the side of energy innovation, technology, and advancement.

Consequently, U.S. policy now reflects the New Energy Realism. Rather than managing and regulating perceived scarcity, we are promoting abundance. Rather than accepting a false choice between economic and energy development and environmental protection, we are advancing both goals. Rather than choosing regulation, we are embracing innovation and the technological breakthroughs it unleashes. Rather than putting our thumb on the scale on behalf of one fuel over another, we back development of every energy source.

As a result, the United States is on the verge of energy independence and is on track to become a net exporter of multiple fuels. Already, the U.S. has become a net exporter of natural gas. After spending billions to build costly LNG import facilities to address a predicted domestic gas shortage, U.S. natural gas producers have now done a complete about-face, converting to export operations. To date, the U.S. has exported LNG to 27 countries on five continents. That includes India, signifying how the growing partnership between our two nations includes energy.

We are also increasing our coal exports substantially. These exports rose by an estimated 58 per cent in 2017 over the previous year, according to the EIA. In August 2017, the first shipment of U.S. thermal coal left the Port of Baltimore bound for Ukraine. This is clearly an outgrowth of the Administration's efforts to revive coal by applying our technology to make it cleaner.

We are also striving to revive civilian nuclear power. We are encouraging the construction of new plants in the U.S. and abroad. Technological advances are also driving renewables growth. Solar and wind energy costs have fallen, triggering increased electricity output from renewable sources. U.S. companies are actively selling solar and wind solutions worldwide.

We invite all nations to share in the New Energy Realism. We encourage them to spur innovation and to spurn overregulation. Rather than forsaking fossil fuels, we urge governments to join us in finding new ways to make these plentiful energy sources cleaner.

The US is eager to do its part by sharing our energy bounty and our energy technology with the world, so that everyone can be a part of this bright new era of energy progress. ■

ENERGY SECURITY IN APEC

By James Kendell
Vice-president, Asia Pacific Energy Research Centre (APERC)

Background

Like the International Energy Forum (IEF), Asia–Pacific Economic Cooperation (APEC) promotes dialogue among its member economies to achieve its goals and arrive at decisions on a consensus basis, giving equal weight to the views of all members. It operates as a cooperative, multilateral economic and trade forum and is the only intergovernmental grouping in the world committed to reducing barriers to trade and investment without requiring its members to enter into legally binding obligations.

Since its establishment in 1989, APEC has become an engine of economic growth and one of the most important regional forums in the Asia-Pacific. Growth has soared in the region, with real GDP increasing from US$ 19 trillion to US$ 42 trillion in 2015.

Energy security is one of the highest priorities of all governments in APEC in addition to economic growth and environmental protection. However, a clear definition of the energy security has not yet been set.

Most organisations define energy security as encompassing four common dimensions: availability, affordability, accessibility and acceptability (Figure 1). Availability is closely related to diversification of supply while affordability is closely related to the type of fuel chosen and price volatility. In terms of accessibility, infrastructure readiness plays an important role. Acceptability is linked to issues such as retail prices, environmental friendliness and social objectives.

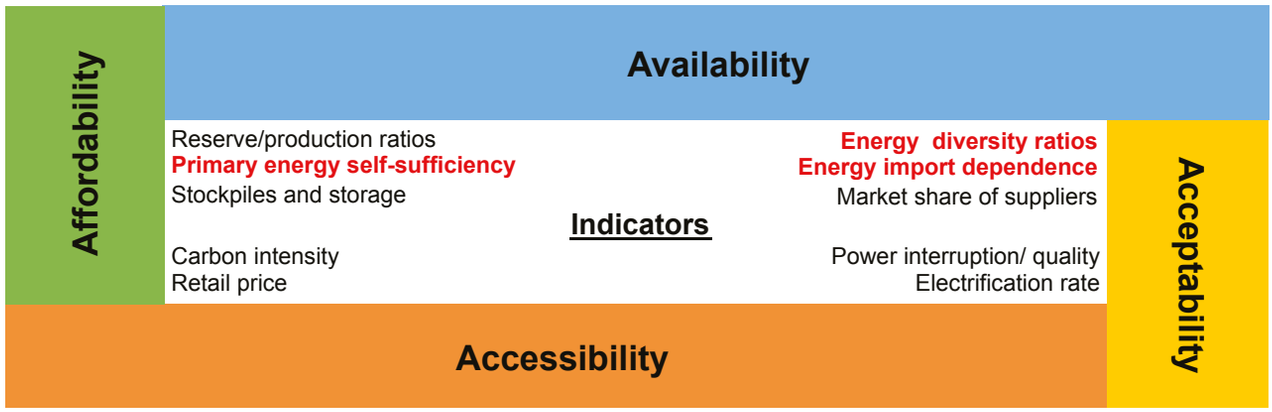
In 2007, APERC published *"A Quest for Energy Security in the 21st Century"* which focused on the energy security dimensions stated above and included indicators created to assess the situation at that time. In its 2016 outlook, APERC analysed three interrelated factors: primary energy fuel diversification, fuel input diversification for the electricity sector, and self-sufficiency of total primary energy supply (TPES). The latter assesses the level of domestic energy supply security, as measuring energy diversification alone may not provide sufficient insight. APERC's intention in creating the indicators was to support assessment of energy security, not to judge the level of energy security for any particular economy or to compare levels of security among economies. APERC recognises that energy security is unique to each economy.

APEC Energy Security Initiative (ESI)

In 2001, APEC Leaders endorsed the ESI in order to strengthen regional energy security, emphasising longer-term policy responses that address broad challenges facing the region's energy supply. The initiative focused on actions that are practical in a policy context and acceptable in a political context.

Improving access to data through the Joint Organisations Data Initiative (JODI) has been a key achievement under the ESI. Recognising that the lack of transparent and reliable oil market data aggravates price volatility, the APEC Energy Ministerial Meeting (EMM) took steps to address this issue. APEC joined five other international organisations—Eurostat, the IEA, OLADE, OPEC and the UNSD— in taking up the challenge and launched the Joint Oil Data Exercise in 2001. By 2002, the effort had evolved to become JODI. More than 10 years later, it is now evident that access

Figure 1. Dimensions of energy security



Source: APERC (2007).

APEC members share a common interest in ensuring future energy security, supporting a high quality of life for citizens.

to timely, accurate and reliable data supports sound and informed decision making in relation to the oil market. In 2012, JODI-Gas was permanently established for greater natural gas data transparency.

By 2008, there were 13 ongoing initiatives under the APEC Energy Working Group, including JODI, the Real-Time Emergency Information Sharing initiative and a programme for energy emergency responses. In 2014, the Energy Ministerial Meeting officially recognised four elements that are vital for energy security and sustainable development. These are: diversified energy supply and stable demand, safe energy transportation routes, innovation in energy technologies and effective forums to discuss energy policy.

Volatile prices raise concerns about short-term risks to economic growth and about longer-term ability to acquire sufficient energy to support development goals. While achieving energy security will mean different things to different economies, APEC members share a strong common interest in ensuring sufficient production at reasonable costs to support sustainable use, thereby supporting a high quality of life for citizens.

Physical integration or connectivity of energy flow as a mechanism for energy security in APEC has also been at the top of the agenda for the EMM. Several existing sub-regional power interconnections in APEC, such as the ASEAN Power Grid and North America interconnections, provide participating economies with more options for securing energy supply.

Conclusion

Energy security remains as an important issue in APEC. To sustain the ESI, APERC conducts oil and gas security exercises (OGSE), maintains an oil and gas security network (OGSN) and undertakes oil and gas security studies.

The OGSE aims to prepare member economies to respond to energy emergency scenarios. The OGSN, which is organized annually, provides a venue for sharing experiences on energy security measures among member economies. Oil and gas security studies provide the necessary analytical support to both OGSE and OGSN. ■

[1] *APEC (Asia-Pacific Economic Cooperation) (2018), How APEC Operates, http://apec.org/About-Us/How-APEC-Operates*

[2] *APEC (2018), How Has the Region Benefited?, http://apec.org/About-Us/About-APEC/Achievements-and-Benefits*

ENSURING INVESTOR CONFIDENCE THROUGH THE ENERGY TRANSITION

By Urban Rusnák,
Secretary General, Energy Charter Secretariat

In November 2017, I was in Bonn for the high-level segment of the COP23 conference where countries discussed what achieving the Paris Agreement goals would mean for them and what is required in terms of concrete action. What struck me about COP23 was the fact that most delegations were headed up by Ministers of the Environment – there was a notable absence of Ministers responsible for energy.

Yet we all know that in most countries the energy sector will have a major role to play in delivering the Paris Agreement commitments and striking the balance with energy security for each and every country. This will be impossible without significant scale-up of investment in clean energy resources and technologies alongside maintaining A level of investment in traditional resources. The Energy Charter Treaty, because of it technologically neutral scope, should play an important role to help facilitate this.

In my statement at the Ministerial Session of the 28th Energy Charter Conference in Ashgabat, Turkmenistan, I set out how I see the role of the Energy Charter Treaty in facilitating the energy transition and I believe that it is very relevant for the International Energy Forum ministerial meeting too.

To encourage sustainable energy investment, governments must have a long-term perspective and foster a commitment of mutual trust, legal stability, and policy predictability that goes beyond election cycles. Industry must have reassurance that the promises of today, will result in the honoured commitments of tomorrow. The Energy Charter Treaty was designed specifically for this purpose. Furthermore, through the projection of the rule of law in cross-border trade, investment and transit of energy, the Treaty strongly promotes open, competitive and liquid markets as well as energy efficiency – all of which offer huge potential to make the energy transition more affordable for countries.

There can be no doubt that the energy transition will have a massive global impact will massively impact. What we need are smart, balanced investments to create the conditions that help investors more effectively manage risks, such as high price volatility and stranded investments, which can potentially undermine energy security.

I would like to highlight the Energy Charter's *Energy Investment Risk Assessment initiative (EIRA)*. EIRA is specifically designed to help countries make smart regulatory choices of relevance to investors, and also of relevance to the energy transition. A key objective of EIRA is to ensure investor confidence is established and retained throughout the energy transition. EIRA allows us to advise countries on the approach they should take with regulatory reforms so that disputes between investors and states are prevented.

In essence, EIRA promotes a regulatory approach that mitigates risks for investors and states as much as possible. This requires states:

- to uphold their obligations,
- to develop markets and regulatory frameworks that are fair and well-managed,
- to give investors clarity on the direction and pace of policy change
- to resolve issues and disputes with investors as efficiently as possible.

The Treaty was established over 20 years ago and we now have much experience in the Treaty's application. The Treaty will be more effective if adapted for the future and with a larger membership. This is why we embarked upon a modernisation process some time ago. The adoption of the International Energy Charter in 2015 was a major milestone and the global response was significant, with near to 90 states and regional organisations signing this declaration so far. For non-member countries, signing this political declaration is the entry point of engagement with the Energy Charter Process and many new countries are now pursuing accession to the Treaty.

Existing members and accession countries have a common interest in ensuring that the Treaty is ready for the challenges ahead. We also have a duty to ensure that the Treaty facilitates rather than hinders the global energy transition. Recently, the Contracting Parties started discussion on how to proceed with the ultimate stage of modernisation; which turns the spotlight onthe Treaty itself. Under Romania's Chairmanship in 2018 our members will elaborate on the ideas for the future, interests and our commitments to modernise the Treaty. Any reforms should strengthen the Treaty's ability to successfully achieve its original purpose, and in turn, this should help facilitate Treaty membership expansion, benefiting all members through strengthened international cooperation.

The legal level playing field for international energy cooperation, created by the Energy Charter Treaty, complements the high level dialogue cultivated between energy producing and consuming countries by the International Energy Forum. Most of our members and observers are engaged in the IEF, which strengthens the case for even stronger interaction between both organisations. Indeed, our Energy Investment Risk Assessment initiative (EIRA) complements the IEF's Joint Organisation Data Initiative (JODI), for the purpose of strengthening energy security, which is our common goal. ■

DEVELOPMENT IN THE EAST ASIA SUMMIT REGION

By Hidetoshi Nishimura
President, Economic Institute for ASEAN and East Asia (ERIA)

The use of natural gas in the East Asia region has seen unsatisfactory growth in the recent decade, the average share of natural gas is far below the world average. This is because the competitiveness of natural gas is compromised by many factors. The relatively high price of natural gas compared to coal, and even renewables in some cases, is a factor. Renewables not only have policy support to lower costs, but also squeeze thermal power's share in the market. In addition, low carbon price or no carbon price at all make the incentive to use natural gas lower in this region.

ERIA has estimated the potential growth of gas demand in ASEAN+India, and the necessary investment in infrastructure on the supply side. In estimating future gas demand, the key results of the demand side analysis are:

- Natural gas demand for ASEAN + India may grow by levels 2.3 to 2.5 times by 2030 compared to 2015. In absolute volume, the increase in demand is from 293 to 339 billion cubic meters.
- By sector, the power generation sector has the largest potential, followed by the industrial sector and residential sectors.
- By country, India has the largest potential, followed by Indonesia.

On the supply side, we have tried to identify the most suitable and feasible supply chain solutions. They are selected based on the size of demand, main uses of natural gas, technical constraints, geographical constraints, as well as available existing transport infrastructure, such as road, rail, and ports. Even considering existing and planned primary LNG terminals, still more primary LNG terminals are needed by 2030, whether conventional onshore LNG terminals or FSRU ships.

Our analysis also shows that primary LNG terminals in ASEAN can cover other countries' area. For saving capital costs, it is highly recommended that natural gas infrastructure could be shared. Estimated investment for additional LNG supply chain, including primary & secondary terminals, pipeline, satellite facilities and ISO containers, by 2030 is 81 billion USD altogether.

Thus, the expanded use of LNG in Asia will depend on two conditions: LNG's competitiveness against other energy sources, and sufficient investment in every part of the value chain. The following table summarises "who does what" to achieve these conditions.

Moreover, in ERIA's ongoing study on "LNG Demand in Asia", attention is paid not only to the issue of how to further facilitate the expansion of demand from the region, but also
- how to address challenges in the region that causes demand uncertainty. These challenges include:
- LNG is a "balancer" to meet the residual demand after coal, domestic natural gas, pipeline import gas and renewable energy are used for power generation
- The role of natural gas in the power sector is not well defined by governments. Making a long-term commitment to LNG procurement is difficult at this stage.
- Market liberalisation means companies are more cautious in making significant infrastructure investments or agreeing long-term contracts

ERIA proposes innovative policies as well as coordination between upstream and downstream parties to address major issues in the natural gas market for the region. Issues include, ensuring supply security, improving tradability and liquidity of the market, promoting the financing of infrastructure investment, increasing cost competitiveness and identifying benchmark prices for the region, controlling demand uncertainty, and establishing regional trading hubs. Innovative policies include how to enable or introduce innovative business models, more flexible contracts and pricing and more liberalised markets. Without policy coordination between upstream and downstream, these challenges will not be addressed in an effective and timely manner. ■

	Industry	Government
Producing country	• Adopting effective cost-reduction measures • Removing or relaxing destination clause • Creating a reliable price benchmark • Developing well-functioning market • Optimising supply infrastructure	• Developing well-functioning market • Improving investment environment • Optimising supply infrastructure • Supporting investment through public finance
Consuming country	• Adopting effective cost-reduction measures • Removing or relaxing destination clause and optimizing logistics • Creating a reliable price benchmark • Developing well-functioning market • Optimising supply infrastructure • Investing upstream by downstream players	• Creating a reliable price benchmark • Liberalising the domestic market • Providing a low-carbon policy • Developing well-functioning market • Encouraging natural gas use by government • Optimising supply infrastructure • Supporting investment through public finance

NATURAL GAS: THE FUEL OF CHOICE TO PROVIDE ENERGY SECURITY IN THE ERA OF ENERGY TRANSITION

By H.E. Yury Sentyurin
Secretary General, Gas Exporting Countries Forum (GECF)

Energy markets have undergone significant transformation since the GECF was established in 2001. The GECF has transformed in parallel, adopting its long-term strategy, and becoming globally recognised. The GECF has cultivated its mission of cooperation and dialogue, emerging as a global leader in gas market analysis and representing the interests of the world's largest gas exporting countries.

Today, the GECF comprises twelve full members and seven observer members, representing the world's leading gas producers. Our objective is to increase the global level of collaboration in promoting natural gas as a fuel of choice for the energy transition era.

Representing more than two-thirds of the worlds proven gas reserves, and almost half of global natural gas production, the GECF is open to dialogue with all. Our goal is to ensure global sustainable development and increase energy access to the world's most vulnerable populations.

The GECF has a special interest in the key theme at this year's IEF16 Ministerial meeting. At the heart of the GECF's long term strategy is the idea that a harmonised approach to global energy market development is key to promoting energy security.

The GECF countries want to craft a new understanding of energy security, one that holistically encompasses energy markets and identifies a position that is recognised and accepted by all market participants. We at the GECF believe that energy security should be reciprocal. We see the need for value creation in gas markets, support for investment, and the integration of technology.

Information exchange and dialogue are the primary mechanisms to achieve these objectives. The GECF is continuously working on our *Global Gas Outlook*, which aims to become a global reference for insights into gas market developments throughout the world.

The global population will reach 9.2 billion by 2040— an increase of 1.7 billion from today. This population increase will be paired with an 80 per cent increase in average GDP. These trends will increase energy demand both directly and indirectly. A growing population with more access to wealth will see a 33 per cent increase in the number of households relative to 2017, and a 60 per cent increase in the number of cars on the road by 2040.

Energy accessibility will become a top priority in the long-term. Most population and income growth will come from Asia and Africa. These two regions currently have the most limited access to energy and the largest fuel substitution potential. Biomass and waste make up 60 per cent of energy consumption in the domestic sector in developing Asia and 80 per cent in Africa, compared to less than 6 per cent in developed countries. The GECF believes that natural gas can meet the energy needs of these populations, while improving indoor air quality and achieving the targets outlined in Sustainable Development Goal 7: Access to affordable, reliable, sustainable and modern energy for all.

World energy demand is projected to increase by 29 per cent between 2017 and 2040, and global gas consumption will increase by 53 per cent over the same time period. This growth will be led by non-OECD Asia, followed by the Middle East and Africa as coal is gradually replaced by gas, renewables, and nuclear in light of environmental concerns.

Global electricity demand is expected to grow at an annual rate of 2.2 per cent between 2018 and 2040. Urbanisation and the associated increase in residential energy demand, coupled with industrial expansion, particularly in developing economies such as India, are the main drivers propelling this trend.

The global energy transition will not be without shocks and turbulence. Gas markets, for example, have been impacted by many recent disturbances, from the Fukushima disaster in 2011, to the Groningen cap in 2015, to the Baumgarten blast last December. However, the maturity and flexibility of natural gas markets have continued to ensure a secure energy supply, via well-integrated systems that have proven resilient to shocks. This was demonstrated in December, when the Baumgarten facility resumed operation later the same day, and prices stabilised within 24 hours.

In light of this year's IEF16 key theme, I would like to take this opportunity to highlight some of the most important aspects of gas market security. The GECF countries, are working to increase regional stability along main gas transit routes. Gas infrastructure is critical in delivering vital energy resources, particularly during winter months, and supply disruptions can have serious consequences for vulnerable populations.

Sustainable investment is a priority for the GECF countries and the energy industry at large. If we are to satisfy the energy demand growth projected in the GECF Global Gas Outlook, significant investment in infrastructure and resource development is necessary. Finally, extra-territorial application of laws and regulations that are not authorised by the United Nations, continue to threaten global cooperation during the era of energy transition.

There is a need for gas producers and consumers to establish a coordinated response mechanism to the risks outlined above. The IEF16 Ministerial provides the perfect platform to engage in dialogue on these, and many other vital issues, for energy market security. ■

FUTURE OF ENERGY SECURITY: TRANSITION, TECHNOLOGY, TRADE AND INVESTMENT

By H.E. Fatih Birol
Executive Director, International Energy Agency (IEA)

Playing out over several decades, a massive transformation of the energy sector is underway. The way we produce energy is changing, from the shale revolution to a shift toward low-carbon fuels. And the way we consume energy is also evolving, with rising electrification and an increased appreciation of the multiple benefits derived from energy efficiency. While there is a long road ahead, we are already witnessing the start of a dramatic and significant change in direction towards a more sustainable, lower carbon future.

Yet while the IEA strongly welcomes the steady march forward of renewable energy and clean energy technologies – in particular energy efficiency, a topic that is now a core aspect of the IEA's work programme – there still remains a need for robust investment in upstream oil and gas. As we noted in our recent *Oil 2018 Report*, the world needs to replace 3 million barrels per day of depleted production capacity every year. This is three times as much oil as the decline in demand that ambitious climate policies would deliver over the long term.

Regardless of climate policy, timely investment into oil and gas supply remains a cornerstone of energy security. Ensuring that our energy security goals can be met while at the same time recognizing that the evolution of the energy sector requires constructive dialogue and cooperation between a range of international organisations, industry and policy makers.

All of these sectors will be represented at this year's International Energy Forum Ministerial in New Delhi and I am looking forward to presenting the views of the International Energy Agency alongside all of our partners, including the Organization of the Petroleum Exporting Countries (OPEC), the International Renewable Energy Agency (IRENA) and of course one of the IEA's Association Countries, India.

The importance of India to the future of the global energy system cannot be overstated. For example, it is already leading the world on access to energy. Since 2000, India has provided access to electricity to half a billion people, reaching 82 per cent of the population, compared with 43 per cent in 2000. If this pace is maintained, India will reach universal access to electricity in the early 2020s – truly one of the greatest success stories in the history of electrification.

The IEA is proud to be working closely with India – indeed closer partnership with emerging economies is one of the cornerstones of our efforts to modernise the IEA. Over the last three years, we have made great strides in transforming the IEA into a truly global organisation, opening our doors to include dynamic emerging economies like China and India, which are seeing rapid energy demand growth.

Working with these countries benefits everyone, as together we can enhance energy security, produce more comprehensive energy data and improve energy governance. In addition to China and India, five countries have joined the IEA Association initiative since 2015 – Brazil, Indonesia, Morocco, Singapore and Thailand. Along with our newest full member, Mexico, the "IEA Family" of countries now accounts for more than 70 per cent of global energy consumption, up from under 40 per cent in 2015.

This broader perspective and reach allows us to take a truly global view of the changes underway in how we produce, consume and trade energy. We will need all forms of energy to meet the expected 30 per cent growth in energy demand seen through 2040, according to the central scenario in the IEA's latest *World Energy Outlook*. That is the equivalent to adding another China and India to today's global demand.

Recognising these challenges, last year we developed a Sustainable Development Scenario, which sets out pathways to achieving the key energy components of the UN Sustainable Development Agenda: universal access to modern energy by 2030, urgent action to tackle climate change and measures to improve air quality.

Meeting these parallel goals will require broadening our understanding of the new energies that are shaping this transformation as governments adopt policies that will help in the transition to less carbon-intensive economies. With such dramatic changes, ensuring market transparency on the basis of accurate data is more important than ever.

The IEA is well-placed to play a key role in these efforts. It is the only organisation with a truly comprehensive view of the entire energy system, with its analysis spanning all forms of energy, and all technologies. As such, we believe it is essential that stakeholders understand the dynamics and challenges involved, and we know that requires cooperation and coordination at all levels, from data and analysis to policy recommendations.

The IEA, OPEC and the IEF already work closely together through the Joint Organizations Data Initiative to improve the quality and frequency of data, the building block for any analysis and modelling exercise. Access to accurate data is critical and we take great pride in our participation in JODI, which now includes a gas database, a reflection of the growing role of natural gas in the years ahead. Yet, there is much more to be done to meet the large-scale shifts in the global energy system and to meet the demand of current and future generations.

I believe that by strengthening cooperation between the IEF, OPEC and other stakeholders, we can make a significant contribution to this process. ■

LNG – ENHANCING GLOBAL ENERGY SECURITY

By Menelaos Ydreos
Executive Director of Public Affairs, International Gas Union (IGU)

A global issue

Energy remains the lifeblood of the modern world, and a quick scan of our daily news outlets reminds us of the immense challenges that governments, policymakers, regulators and the energy industry itself have in mapping out an energy plan to a more secure, affordable and environmentally sustainable energy future.

The vital importance of a clean, stable, affordable and secure energy transition becomes even more stark considering the global economic, geopolitical and climatic instability we are currently experiencing. We're seeing unprecedented growth in the global population, as well as the urbanization of that population. The UN Department of Economic and Social Affairs predicts the world population to reach 8.5 billion by 2030, and to hit 9.7 billion by 2050 . This will lead to a substantial increase in the consumption of energy to meet the needs of the growing population, the rise of the middle class and the need to provide access to basic energy to those who do not have it today. As countries evolve into more developed economies, they demand more energy to meet the needs of the increasing number of technology-savvy populations and increasing number of industries. By 2040, the developing world is expected to account for 65 percent of the world's energy consumption, according to a report by the United States Energy Information Administration . This is a factor that must be taken into consideration early on in a nation's development if it is to maintain energy security.

Natural Gas and LNG in energy security

The mix of the fuels necessary for energy security is constantly evolving – there is no one ultimate solution and the current energy mix is more diverse than we've seen before. However, whichever scenario you envisage, natural gas must be present as a major contributor. As a cleaner and more efficient fuel that is abundant in supply, it will play an essential role in the future energy mix and will become increasingly popular versus traditional, more polluting fuels. In BP's *latest Energy Outlook (2018)*, most scenarios between now and 2040 point to gas consumption growing at a much faster rate than either oil or coal, "with its share in primary energy overtaking coal and converging on oil by the end of the Outlook" .

This increasing popularity is in part due to the cleaner and more economical nature of natural gas, but also partly due to the increase in the availability of liquefied natural gas (LNG). As the advantages of natural gas in the global energy mix become increasingly apparent to governments, industry and consumers around the world, LNG is becoming an increasingly preferred option. In the past two years, we saw a number of positive supply projects across the globe, such as Australia Pacific LNG starting commercial operation, US LNG coming on stream and the identification of over 879 MTPA of proposed project development concentrated in North America, East Africa and Asia Pacific.

On the demand side, LNG continues to show significant growth as a fuel of choice in new markets enhancing security of supply to existing grids that have limited in-country production, high electricity production costs, or as a need to fuel switch to a cleaner form of energy. This is no surprise given the impressive increases in investment into flexibility of delivery options, such as floating regasification units (FRSUs) to LNG bunkering.

With LNG increasing in both demand and supply, and LNG supplies greatly increasing the availability of gas around the world, there is an obvious role for it to play in significantly enhancing global energy security.

There are three key points that highlight its benefits, and speak to what makes it so perfectly suited to support global energy today and into the future.

Flexibility: Natural gas is an incredibly flexible source of fuel, in terms of supply and storage. In can be delivered via pipelines, via marine transportation, and often via a combination of both – increasing security of supply. As mentioned, we've also seen increased investment in storage capacities for LNG through FSRUs and bunkering, as countries and organisations recognise the benefits and look to shore up their energy supplies. This flexibility in supply proves especially useful during short-term events where demand peaks, and existing energy supply and infrastructure struggle to respond. Continued infrastructure investments combined with the substantial increase in LNG over the next few years will ensure that gas is available at an affordable price where and when it is needed.

Security of Electricity: This flexibility and the security of supply also leads directly into security of electricity supply for consumers and industry. Natural gas plays a particularly prevalent role in responding to and meeting electricity demand during peak periods, both in the winter and summer. Even very recently, we've seen record low temperatures in parts of North America and Europe,

Liquified Natural Gas continues to show significant growth as a fuel of choice in new markets

where gas has acted as the bedrock in the power fuel supply mix – meeting the demand and ensuring that the lights, heat and industry remain on. This reinforces the tremendous value that flexible, affordable, on-demand natural gas generation can offer.

Partner to Renewables: While many call for the immediate leapfrog to a world in which energy is provided entirely via renewable sources, this is not a viable approach. Renewable energy undeniably continues to make significant inroads into the market share of other fuels but can fall short when issues arise to create havoc in the energy supply (such as significant peaks in demand, combined with adverse weather conditions that impact supply from renewable sources). Natural gas is the perfect fuel to partner with renewable energy, providing the ultimate security of energy and electricity supply in a clean, efficient and cost-effective manner. Furthermore, locally produced renewable gas or biomethane add another dimension to energy security.

The energy transition needs to be carefully thought out. It needs to be rational and consider all factors, including costs to governments and consumers; reliability; security of supply; and environmental sustainability. LNG falls into all these categories and is rapidly becoming widely recognised as a more flexible fuel, available on a global scale and with easier and safer ways to transport it. The BP Energy Outlook scenarios show that LNG supplies will double by 2040. Combined with pipeline supplies, natural gas is perfectly positioned as a bedrock of energy security. Governments and industries must invest in the infrastructure needed to support it, and they must invest now. ■

UN DESA: http://www.un.org/en/development/desa/news/population/2015-report.html

US Energy Information Administration: https://www.eia.gov/todayinenergy/detail.php?id=14011

BP Energy Outlook 2018: https://www.bp.com/en/global/corporate/energy-economics/energy-outlook/demand-by-fuel.html

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THE NEED FOR INVESTMENT TO MEET GROWING ENERGY DEMAND

By H.E. Abbas Ali Al-Naqi, Secretary General,
Organization of Arab Petroleum Exporting Countries (OAPEC)

In the decades ahead, oil and natural gas are set to remain as the leading sources of energy for the conceivable future and to continue to provide the major part of the world's energy requirements. It also important to note that to meet the projected increase in global energy demand, enormous amounts of investments will be required. This underlines the necessity for a sustainable and stable energy market.

According to many energy related centers, energy demand will increase and hydrocarbons will remain as the main source of energy for decades to come. Investment and capacity expansion are essential to guarantee supply levels are sufficient and to permit producers to respond quickly and appropriately in times of unexpected supply constraints.

According to the latest data published by APICORP (one of OAPEC's joint venture companies), the committed investments in the Middle East and North Africa – a region which includes investments in energy projects currently under execution – are estimated at US$289 billion for the period of 2016-2020. The oil sector accounts for the largest share of these investments, at US$110 billion, with the majority of investment in upstream projects. Total committed power and gas investments are relatively equal at US$81 billion and US$76billion, respectively, followed by chemicals at US$22 billion.

In addition to the committed investments, there is an additional US$611 billion worth of planned investments in the energy sector for the five-year period. The power sector accounts for the largest share of investments, at US$194 billion. The oil and gas sector will represent US$190 billion and US$149 billion respectively, with the remaining investments in petrochemicals.

OAPEC member countries are pushing ahead with their investment plans to preserve their leading position as the key supplier of energy to the rest of the world. OAPEC members, due to their large hydrocarbon resources, will remain the main suppliers of oil and gas to the world for decades to come.

OAPEC member countries occupy a significant position in global energy markets, holding around 706.8 billion barrels of proven oil reserves in 2017, accounting for almost 49 per cent of the total world's oil reserves, and producing around 27 million barrels per day of crude and NGLs. OAPEC crude oil exports are estimated at 17.4 million barrels per day and oil products exports are approximately 4.1 million barrels per day, representing 29 per cent of world total petroleum exports.

As for natural gas, OAPEC members hold over 53.5 trillion cubic meters of proven gas reserves, which represent some 27.2 per cent of the world's total reserves and their marketed gas production is reaching a level of 547 billion cubic meters or 14.9 per cent of the world's total output. OAPEC exports of natural gas reached about 201 billion cubic meters, accounting for 18.4 per cent of the world's total.

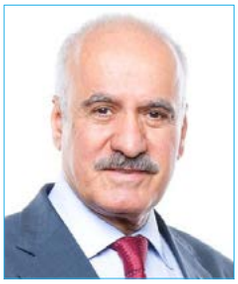
Hydrocarbons will remain the world's main source of energy for many decades to come.

The petroleum sector remains the engine of economic growth and development in most OAPEC member countries, despite efforts to diversify their economies away from hydrocarbons. Oil and gas exports generate the bulk of the foreign revenue needed to meet producers' import requirements and also generate the bulk of the government revenues needed to implement key developmental and social projects. OAPEC countries therefore rely on oil and gas exports to diversify and industrialise their economies, to achieve sustainable and stable economic growth and to create employment opportunities for the hundreds of thousands of workers entering their labor markets each year.

OAPEC's policy is centered around maintaining a stable oil market. In fact, our member countries, either individually, or through OPEC, are already bearing a great deal of responsibility and are willing to enact long-lasting market stability through cooperation with other oil producers.

I believe that the security of supply and the security of demand are two faces of the same coin. Security resides in the stability of the entire market and works to the benefit of producing and consuming countries. The need for enhanced energy security has to be seen from both supply and demand perspectives, which should be mutually supportive.

In conclusion, there is a need to co-operate between energy producing and consuming countries, as the industry needs regular, timely and sustainable investment to guarantee the security of supply to the global community. ■



ENERGY, THE SDGS AND THE NEXUS: OFID RECORDS

By H.E. Suleiman Jasir Al-Herbish,
Director General, The OPEC Fund for International Development (OFID)

The world is confronted with significant challenges in the way it manages and consumes its resources. Traditionally, energy, water and food have been looked upon —and managed—as if each existed in its own self-contained silo. Counter to this outdated concept, the Energy–Water–Food (EWF) nexus approach recognises the dynamic and complex interlinkages between energy, water and food security, all of which are key goals in the context of sustainable development. OFID is helping to overcome these barriers through innovative EWF-nexus projects that support the agriculture and water sectors by expanding access to modern energy services.

It also important to note that to meet the projected increase in global energy demand, enormous amount of investments will be required. This underlines the necessity of a sustainable and stable energy market. According to many energy related centers, energy demand will increase and the hydrocarbon will remain as the main source of energy for decades to come.

OFID's main objective as a multilateral development finance institution is to spur sustainable development in its 134 partner countries. To this end, we have committed a cumulative US$20bn over the past 42 years. That said, we are widely recognized in the international development community for our pioneering *Energy for the Poor Initiative* and our lead role in helping to secure a prominent position for energy access in the 2030 Global Development Agenda.

Despite the achievements of the MDGs, one of the most prominent shortcomings was the absence of energy as a distinct development goal. To highlight this omission, OFID initiated the campaign in international fora to advocate for the inclusion of universal energy access on the global development agenda. This campaign stems from a direct mandate from the heads of state of our Member Countries in 2007. Since then, our institution remains committed to using all resources at its disposal and pursuing every viable solution in a bid to make modern energy universally available. The strategic framework for these activities is OFID's Energy for the Poor Initiative, now in its 10th year of implementation, which is funded through a revolving endowment of US$1bn pledged by the institution's supreme body, the Ministerial Council, in its June 2012 Declaration on Energy Poverty.

OFID was pleased when energy access had finally gained the recognition it deserves. Embedded as SDG7 in the 2030 *Agenda for Sustainable Development,* access to modern energy services is now universally accepted as one of the most powerful catalysts for both human and economic advancement. Without energy, it is impossible to provide healthcare and education, end hunger, supply clean water, or, more broadly, eradicate poverty. The enabling power of energy access is strengthened by its direct links to the 16 other SDGs. This is well documented in *"The 2030 development agenda: Energy access a keystone"* (OFID Pamphlet Series 40, 2016, https://goo.gl/YfuYC4). Since 2008, OFID has committed more than US$3.5bn to energy operations, representing around 27% of the total value of all our commitments for the period. This amount leverages more than 200 operations worldwide, leveraging total value of over US$35bn.

The energy-water-food nexus: as he described as follows;

Energy sits at the core of our strategic framework, but it does not sit in isolation. Alongside it—and just as important—are the security of the water and food supply, both of which are essential to sustain a global population expected to increase to 9.7 billion by 2050.

Sustaining a growing population requires securing increasing supplies of energy, water and food, all of which are interlinked. Water is needed for almost all forms of energy production; energy is needed to treat and transport water; and both water and energy are needed to produce food and to transport and distribute it. Agriculture accounts for 70 percent of total global freshwater withdrawals, making it the largest user of water. At the same time, the food production and supply chain account for about 30 percent of total energy consumed globally.

As demand grows, there is increasing competition for resources between energy, water and food production, as well other sectors, with unpredictable impacts on livelihoods. How best to allocate resources between competing needs in order to support development is facilitated through integrated planning and decision-making.

Over the past four decades, OFID has co-financed countless projects in these three sectors, in a multitude of different settings across 120 countries. This broad and diverse experience has taught us that energy, water, and food are intimately linked, and that uncoordinated interventions in one sector can inadvertently create risks and uncertainties in another.

The interdependencies and interlinkages between the Energy-Water-Food (EWF) sectors are well-documented (see, for example *"The energy-water-food nexus: Managing key resources for sustainable development"* (OFID Pamphlet Series 41, 2017, https://goo.gl/Gs1AKf). In order to ensure that development takes place within sustainable levels of resource use, it is necessary to consider these interdependencies when formulating strategy and policy.

It thus became evident to OFID that for energy access

to take its full effect in sustainable development it has to be related to the food and water dimensions. The "silo thinking" of the past is no longer an option; there is a need for a new paradigm that views these issues as a "system." This means the implementation of a holistic approach that explicitly defines the links between the single components of the EWF nexus and understands the effect each one has on the others. This interlinkage is illustrated in the study *"Biofuels and Food Security"* (OFID Pamphlet Series 38, 2010, https://goo.gl/EFPiAo). This analysis highlights that taking over large swathes of land previously dedicated to food crops in favour of first generation biofuels significantly contributed to the global food crisis of 2007–2008, when shortages of basic staples and the consequent price hikes sparked hunger and ugly riots across developing regions.

To soften the negative effects of such shortages and to increase the synergy among all the related sectors, OFID is putting into practice the nexus-led sustainable development. By positioning the EWF nexus at the heart of our Corporate Plan 2016–2025, we have made clear our readiness to mobilise all means at our disposal to tackle energy, water and food security in an integrated way. Over the coming decade, we are committed to channelling 70 percent of our funding to these critical sectors (including transportation).

Guiding this strategy is our commitment to people-centred development, with poverty eradication as our driving and important goal. So, when it comes to the nexus, we are especially mindful of the people "on the front lines:" the roughly two billion small farmers and their families who depend on the land and its ever-dwindling resources for survival. For example, OFID cooperated with the Renewable Energy and Energy Efficiency Network (REEEP) to partially fund two energy access projects that also impact the water and food sectors. With nexus-led interventions, we can promote the development of climate- and resource-smart agriculture and potentially give these vulnerable populations the opportunity to escape poverty once and for all. ■

OFID-REEEP energy access program, Kenyan smallholder using solar powered pumps to irrigate his crops.

Photo - Jeffrey M. Walcottcom

THE IMPORTANCE OF RELEVANT, CONSISTENT, RELIABLE AND COMPARABLE ENERGY DATA

By Alfonso Blaco,
Executive Secretary, The Latin America Energy Organisation (OLADE)

The world faces long-term challenges of a surging demand for energy and a supply in process of huge transformation. The rise of new cost effective energy sources into the power generation mix; the gradual access and penetration of technologies that influence production, transport, storage and the way and efficiency with which we transform and consume energy; the existence of reserves of natural resources in many countries around the world that will result in a variety of different source in the future energy scenario; the incidence of environmental aspects associated with climate change that are a decisive factor for current and future energy infrastructure projects; the potential to optimise energy systems based on complementarity and integration; the greater participation of the private sector throughout the value chain of the energy sector, are some of the factors that are at the heart of this transformation and the focus of efforts of all the involved stakeholders.

These challenges can be addressed by forging value-driven partnerships that look beyond short-term economic and political volatility. These partnerships can drive rapid progress towards a secure and sustainable global energy system. And a key part of that system will be based on the way that coordination and collaboration takes place.

Energy markets also embrace a great dynamism that is revealed within the rapid changes in the structure of the energy matrix worldwide. The evolution of oil prices had a very different influence on the economy of exporting countries and those countries that are net importers of oil, modifying many of the structural aspects of the sector. The gradual electrification of energy demand, the substitution of liquid fuels in electricity generation, the growing penetration of natural gas as a source of higher efficiency for power generation and the support of energy generation from renewable resources, the participation of the private sector through business groups that operate along the entire chain; they are clearly key factors in the future evolution of the energy sector and on which we must work with a technical approach.

It is therefore a genuine and vital role of the IEF to support and accompany these processes facing the sector, identifying existing barriers and reducing gaps between countries. It is also the IEF's role to dynamise and promote the exchange of knowledge to achieve greater and better integration, bringing together and sharing the available resources of countries, identifying integration opportunities and promoting innovation as a key element to generate new economic activities associated with the sector.

The IEF acts as a neutral facilitator in the global dialogue of energy issues. Recognising their interdependence in the field of energy, the IEF has been cooperating under the neutral framework of the Forum to foster greater mutual understanding and awareness of common energy interests in order to ensure global energy security. The IEF has evolved into one of the most inclusive platforms for dialogue in which stakeholder meet on a regular basis to discuss issues of common interest pertaining to the global energy scene. Such a broad and diverse base, however, does not in itself guarantee a successful and constructive dialogue. Aware that there are very diverse interests, which are often very difficult to reconcile, a necessary condition for a successful dialogue is that despite their diverse interests, there is a recognition of shared aims and an awareness of the common challenges facing the future and the high degree of energy interdependence.

A visible and concrete example of success is the establishment of the Joint Oil Data Initiative (JODI). JODI remains the single most comprehensive attempt to collect monthly data from the energy sector worldwide providing a platform to raise awareness, promote data transparency and show the technical difficulties involved in improving the quality and reliability of energy data, its timeliness and sustainability. This has encouraged the IEF as the organization in charge of the JODI as well as its partners, at OLADE, to play an active role in improving data collection methods through providing advice and conducting capacity building sessions.

Off course, many challenges remain and many others are likely to emerge in the future. In OLADE we are committed to support, as much possible, both the IEF and the JODI initiative. That is why we try to participate in all instances that we can and continue promoting capacity building in our region with the aim of harmonizing methodologies and promoting the production of relevant, consistent, comprehensive, reliable, harmonised and comparable energy data.

I congratulate IEF on their work, look forward to moving in ever closer cooperation to underline the importance of the 'producer-consumer' dialogue for the greater benefit of all counties. ■

DIALOGUE IS MAKING A DIFFERENCE

By H.E. Mohammad Sanusi Barkindo,
Secretary General, Organization of the Petroleum Exporting Countries (OPEC)

In today's increasingly complex, globalised and interdependent energy industry, cooperation and dialogue have become indispensable for any stakeholder to accomplish its goals. In times such as these, it is simply not possible to go the distance alone.

The Organization of the Petroleum Exporting Countries (OPEC) has been at the forefront of international energy dialogue since the early 1990s, when Member Countries, alongside other producers, as well as consumers, joined forces to begin a platform for producer-consumer dialogue through the establishment of the International Energy Forum (IEF).

A preeminent platform for dialogue

Since its founding in July 1991 in Paris, the IEF has evolved to become the world's preeminent platform for promoting dialogue between global oil and gas producing and consuming countries.

Today, its 72 Member Countries, representing all six continents, encompass nearly 90 per cent of global supply and demand for oil and gas. The IEF is unique in that it comprises not only consuming and producing countries of the IEA and OPEC, but also other important transit states and major players, including Argentina, China, India, Mexico, Russia and South Africa.

OPEC continues to play a leading role in the IEF's activities, including the biennial Ministerial Meetings, the Joint Organisations Data Initiative and the trilateral programme of activities that were first agreed at the 12th IEF Ministerial in Cancun in 2010. This includes the annual IEA-IEF-OPEC Symposium on Energy Outlooks, the Workshop on Interactions between Physical and Financial Energy Markets, the Gas and Coal Market Outlook Symposium , as well as a number of other roundtables and workshops.

In the years since the IEF was founded, OPEC has expanded its dialogue activities to include platforms with the European Union, the Russian Federation, and more recently with India, China and a number of stakeholders in the United States.

Declaration of Cooperation

Additionally, since 2016, intensified dialogue between OPEC and non-OPEC producing countries culminated in the historic Declaration of Cooperation, in which 24 producers came together to help restore market balance and stability, in order for the oil market to emerge from one of the worst downturns in energy history, following an oil price plummet of nearly 80 per cent between June 2014 and January 2016.

At the 3rd OPEC and non-OPEC Ministerial Meeting on the 30 November 2017, the Declaration of Cooperation was extended for the entirety of 2018.

This unprecedented act of international cooperation has been exceedingly successful in bringing us closer to our goal of achieving a more lasting and sustainable stability. These landmark cooperative efforts have been recognized and acclaimed by the wider community, in terms of the dedicated commitment and transparency of all participants and the effective and full implementation of the decisions relating to the Declaration of Cooperation. The overall conformity of OPEC and non-OPEC participating producing countries averaged 107 per cent in 2017. Moreover, we have seen conformity levels improve further in 2018, with a record 133 per cent in January 2018.

Stronger together

Despite these extraordinary achievements, it is important to realize that, in the broader context, this is not solely about voluntary production adjustments. It is about so much more. This historic cooperation has turned a new page in this industry and transformed the way things are done.

This is about what can be achieved when stakeholders come together as a team to accomplish a common goal. It is clear proof that we are stronger when we work together; the potential for success is endless. No one can be an island in this industry; everyone is an inter-connected piece of this vital and significant global sector.

These 24 OPEC and non-OPEC participating countries are unified through the common principles of equity, transparency and fairness, and this has empowered them to stay the course and overcome the many challenges that have come their way.

This transformative process has not gone unnoticed in our industry. In fact, its overwhelming success has opened the door to all stakeholders in the energy industry to join us on this road to achieving a lasting and vital stability in the global oil market in the interests of producers, consumers and the global economy.

Looking forward, I see a bright future for this industry, but this time around, our success will not be built on individual gain, but rather on our united efforts to achieve oil market stability and economic growth through dialogue and cooperation. ■

SCARY NUMBERS

By Pierce Riemer,
Director General, World Petroleum Council (WPC)

We deal with Scary (high) numbers. As an industry that is what we have to deal with day by day to provide energy for all. And I mean for all. We are currently concerned about providing energy for the future population of the world in a sustainable way. There have been amazing increases in the share of renewables yet overall we still do not provide enough energy for everyone currently on the planet today. Just in my short lifetime, the world population has doubled from 3 billion to now over 7 billion people. So the first scary number is world population.

The UN has recently increased its estimate for 2050 to nearly 10 billion and to over 11 billion people by 2100. These are the average figures, hopefully it will be less but it could also be a lot more and all these people will need energy, food and water. And, thanks to scientific advances , all these people will be living a lot longer and by implicaton using more resources.

Energy leaders are increasingly acknowledging disruptive change. The one thing above everything else that is keeping global energy leaders awake at night is the impact of digitalisation on the future of the energy system. Industry leaders and policymakers across the globe are considering the impact of innovation with a mixture of excitement and unease.

The second scary number is the amount of energy we currently need just for our existing population. Looking at only the oil industry, we are close to providing the demand of 100 million barrels of oil every day. That is 100 million x 159 litres of product every day. Yet we do this on time, on demand, 24/7, 365 days a year.

And that's just the upstream business. Downstream then provides everything around us. We supply an efficient economic and regular supply to consumers – not just fuel for cars, rail, trucks, ships and planes – but also fuel for power generation, petrochemicals, polymers, lubricants fertilisers, pharmaceuticals. The list is endless.

If we look at some more scary numbers, we have over 1 billion people that have no access to any form of energy and we have 2.9 billion people who have no access to clean cooking fuels and instead use wood, charcoal, animal dung and other agricultural waste. This leads to over 4 million people (mostly women) dying every year prematurely due to illnesses attributed to air pollution from cooking. To put that in perspective, they are cooking, for many hours, in an environment that is the equivalent of smoking 400 cigarettes per hour. We are working with the OPEC Fund for International Development (OFID) and others on our Energy Access Platform to highlight all the good things that our industry is achieving in this area.

The world is not going to run out of oil or gas, or coal, anytime soon. We can largely forget about the notion of stranded assets on a worldwide basis and peak demand for the majority (or possibly a plateau) could become like peak oil; a distant memory. Over recent years the renewables sector has considerably reduced the cost of solar and wind, which will make that segment grow even faster than previously expected. For the future, with more scary numbers to come, we will need everything; all fossil fuels all renewables and even nuclear. Our challenge for the wellbeing of future populations is to continue to provide energy in a clean and sustainable way to all, and again, I mean all. We will have an energy transition that will certainly last longer than most short-term thinkers believe or understand, but this will challenge us to the extremes of our development in science, technology and innovation in providing clean energy.

Climate change is the third scary number and a challenge that is totally underestimated by many. COP21 in Paris was a great diplomatic coup but when you "crunch the numbers" we are nowhere near getting to where we want to be. Don't get me wrong, I'm not a climate denier – for most of my career in the fossil fuel industry (sometimes coal, sometimes oil and gas), I have always worked on environment and utilisation-based projects. I learnt that has we have to be realistic about the requirements for the future and how we will get there.

With vast populations relying on fossil fuel for the foreseeable future, it is our duty to provide this in a clean and sustainable manner. So, without any doubt (particularly with all the coal reserves in India and China) we will have to embrace carbon dioxide capture, storage and utilisation. We solved the acid rain issue in the 80s and started looking at CCUS seriously straight after that. Many years have now passed, and we need to move quicker with its continued development and deployment. Governments can also help is by providing clear, stable, long-term policy frameworks. For example, putting a price on carbon that treats all carbon equally, whether it comes out of a cement works, an industrial chimney, agriculture, a power generation plant or a car exhaust. This would help make energy efficiency more attractive and make lower carbon energy sources more cost competitive and also help to justify CCUS.

Globally, 2.9 billion people have no access to clean cooking fuels and instead use wood, charcoal and agricultural waste.

A carbon price incentivises energy producers and consumers to reduce their greenhouse gas (GHG) emissions. Pricing carbon obviously adds a cost to our products but would help provide a vision for future investment, a level playing field for all energy sources across geographies and a clear role and direction towards a sustainable future.

As an industry, we have our many critics and we all know we are not perfect, but:

- We are unbelievably good at what we do with unique time horizons
- We are essential for modern life and there is no escaping from that
- We are responsible for economic growth – we have been for over 150 years and will be for the next 100
- No energy = no growth = no advancement = no social progress
- We supply an efficient, economic and regular supply to consumers
- We need a level global playing field, fair taxes and regulation and Governments need to recognise the great and vital job that we do.

Our high tech and capital-intensive industry requires significant human and financial resources to succeed. Over the last few years, and so far this year, there has been a significant and continuing lack of investment. We have reduced costs considerably over the last few years and companies are now far more efficient than they were at US$100 per barrel. So, companies are in a far better place now and will need to keep these costs down. With reduced costs and the historic OPEC and Non-OPEC agreements in place we have seen a higher, more stable oil price which is encouraging and leading to more FIDs being completed. That said, the big challenge remains the important challenge of filling the gap caused by "minimal" investing for several years. This is an important challenge we must deal with, otherwise the global numbers will get even scarier.

The planet does not need saving. If we warm it up too much we will not exist. The planet and nature will always adapt to whatever we do, people won't. Our job is to keep our planet liveable and provide clean energy and products for the future wellbeing of all. ■

DISRUPTION AND NEW INNOVATION TECHNOLOGIES

By H.E. Christoph Frei,
Secretary General, World Energy Council (WEC)

The energy world is undergoing a Grand Transition driven by a combination of factors including the increasing pressure for decarbonisation, the fast-paced development of new technologies, an unstoppable digital revolution, emerging physical and virtual risks and changing growth and demographic patterns.

Energy leaders face and are increasingly acknowledging disruptive change. The one thing above everything else that is keeping energy leaders awake at night globally is the impact of digitalisation on the future of the energy system. Industry leaders and policymakers across the globe are considering the impact of innovation with a mixture of excitement and unease.

Innovation issues such as decentralisation, innovative market design, electric storage or blockchains are rapidly moving to the top on the list of CEO insomnia issues, while a more uncertain growth context and new physical and digital risks are posing ever greater threats to the energy sector, worldwide.

In such a context of acclaimed technology democratisation and a changing energy system we must re-think the role of the state and of companies in ensuring access to secure, affordable and environmentally sustainable energy. The World Energy Council's *World Energy Issues Monitor,* highlighted transition technologies, including renewable energies and energy efficiency, as top action priorities for energy leaders globally in 2017.

The world in which the Internet of Things and blockchains will enable direct and low-cost transactions between parties and between appliances is fast approaching, with at its core precisely recorded transactions in unfalsifiable ledgers that also open new possibilities for supply chain tracing and product labelling by fabrication origin, materials used or emissions caused.

A world where big data, machine learning, and artificial intelligence enable automated system analytics and instant demand response is very different from the analogue world where many leaders started their careers.

The next decade will begin to define the winners and losers of the energy transformation, making it crucial to understand the new realities for the energy sector now.

These new technologies not only change the way we operate the energy system but revolutionise the potential for a sharing and leasing economy through new platform solutions, which will affect traditional business models in energy and change the way we think about supply-demand interaction. Mobile technology with cloud support already today enable new financing models, such as micro-leasing schemes in the developing world and greater customer choice and control for all.

For infrastructure and system-critical companies the digital revolution doesn't come for free: they face broader exposure to cyber risks due to a greater number of digital entry points into the system and increased planning uncertainty resulting from lowering entry barriers for new players across sectors.

The key issue however, is the question of peak demand for fossil fuels. A combination of electrification of final demand and decarbonisation lead to plausible peak demand for oil before 2040 as illustrated by two of the World Energy Council's three exploratory scenarios. Electricity is "the new oil" and electrons are increasingly replacing molecules in energy supply within a shifting demand pattern. We see a doubling of electricity volume by the mid-century.

While oil demand is directly affected by future growth of electric mobility, the natural gas side is more complex. Gas has a great opportunity to replace coal in power supply and contribute to decarbonisation; Asia has great hunger for more gas. Gas may increasingly become part of a decarbonisation strategy.

Key uncertainties remain. How quickly will decreasing battery costs help electric mobility break through to the point where more electric vehicles will be sold than fossil based cars? UK, France, Norway, India, China have all announced aggressive targets – and China has given itself the objective to manufacture 80 per cent of the world's electric cars by 2025. Will CCS manage to come out of its lethargy and prolong opportunities for fossil based electricity? Will Asia's hunger for gas be tamed by dependency ceilings in a tenser geopolitical context?

80 per cent of our primary energy mix are fossil fuel based. About half of the world's capital is invested into energy and related infrastructure that support an essentially fossil based economy. That this is a big steamer, and will take time to evolve, is providing a wrong sense of comfort to those holding on to the past.

A rapid transition is underway and shale, photovoltaic or digital and platform revolutions are a new reality. Many argue that we overestimate what new technology may deliver in the first few years, and underestimate longer term results. After all – who knows better than oil what incredible power technology innovation has?. ■

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