



Interview: Alan Bollard, Executive Director APEC

“Energy used to be about security of supply. Now it’s about security of the environment”

Dr Alan Bollard gives press briefing  
Photo APEC

**The energy strategy of the member economies of APEC (Asia-Pacific Economic Cooperation), which represent 60% of world energy demand and include four of the five largest energy users in the world, has evolved from a narrow focus on security of supply to a much broader concern with security of the environment, says Dr Alan Bollard, Executive Director of APEC in an exclusive interview with World Energy Focus. “APEC used to be all about growth. Now it’s all about sustainable growth.”**

Alan Bollard, former New Zealand Reserve Bank Governor and Head of the Singapore-based Secretariat of APEC since 2013, does not hesitate when we ask him if there has been a change in attitude among APEC leaders when it comes to climate and energy. “Definitely! There is no political leader anymore who just talks about growth. Everybody talks about quality growth,

sustainability growth. We are trying to find out what that means.”

APEC, whose 21 members include some of the world’s largest economies (China, US, Russia, Japan, Australia, Canada, Chile, Korea, Mexico, Indonesia) is a bit of a strange animal among international organisations. It has no formal powers: it is a consensus-

driven, non-political group that works on the basis of voluntary agreements and focuses mostly on promoting economic growth and free trade. Yet in spite of this, or perhaps because of it, APEC has been able to achieve substantial results, such as the Environmental Goods Agreement concluded in 2012, [<http://bit.ly/1SMfQLs>] which led to a drastic reduction of tariffs on 54 “environmentally friendly goods”, including solar panels and wind turbines.

### TOP OF MIND

Energy has always been a prime concern of APEC since its founding in 1989, says Bollard. “We realised from the start as we aim to integrate

trade and investment, one of the key questions is that of energy. It was always going to be top of mind. Our economies represent 60% of world energy demand and include four of the five largest energy users in the world.”

APEC’s Energy Working Group [<http://bit.ly/1JFR6LJ>], notes Bollard, is by some measures APECs largest working group. It has carried out some 400 collaborative energy projects over the years and comprises two Energy Research Centres – the Asia Pacific Energy Research Centre (APEREC) in Tokyo and the new APEC Sustainable Energy Centre (APSEC) at Tianjin University, China. In March 2016 the World Energy Council was invited to join APEC’s Energy Working Group as observer.

“The way we work”, says Bollard, “is that we identify best practices around the region, share experiences, harmonise where relevant. There has been a lot of capacity building around the region.” As a result of its voluntary nature, APEC works very much like an “incubator of ideas”, says Bollard. “We try ideas, see if they work. If they don’t, we abandon them. There are no legal obligations. That’s how the Environmental Goods Agreement came about, which is now being picked up by the World Trade Organisation (WTO). There are quite a lot of things that the WTO picked up from our work.”

It was no coincidence, suggests Bollard, that the [> see page 2](#)

### FEATURE

[New paradigms for the nuclear energy sector](#)

A wave of innovation is sweeping across the nuclear sector – so much so that it is difficult for financiers to pick winners at this stage. But the biggest innovation may come in the form of a new investment paradigm that involves private investors much more than in the past, writes specialised nuclear energy reporter Dan Yurman. 3

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historic US-China Joint Announcement on Climate Change [<http://1.usa.gov/1LeZjgJ>] made in November 2014 by presidents Obama and Xi Jinping happened at an APEC event.

### PROFOUND CHANGE

Bollard notices a profound change in recent years in how economies throughout the region are approaching climate and energy issues. “The central issue for us used to be energy security. That is still important but it has broadened into a wider concern for security of the environment.”

This has partly to do with climate concerns. “Parts of the Asia-Pacific region are in the grip of a harsh El Niño”, notes Bollard. “This gives us a stark demonstration of what climate change might mean for us.” But it also reflects socio-economic changes. “We used to be a region with a lot of poor people. Now we have become a middle-income region. People have become much more concerned with environmental outcomes, energy efficiency, social expectations.”

As a result, says Bollard, we can expect to see fundamental changes in the energy sector in the Asia-Pacific region over the coming decades. For

example, in 2014, at the same meeting where Obama and Xi Jinping made their announcement, APEC leaders announced that they will double the share of renewables in the APEC energy mix in 2030 (compared to 2010). Already in 2011, APEC – which expects 34% energy demand growth in the period 2013-2035 – had committed to reducing energy intensity by 45% in 2035 compared to 2005 levels.

### LOW CARBON MODEL TOWNS

APEC supports this energy transition with research in its two research centres as well as with a great many concrete projects. One key initiative is APEC’s Low Carbon Model Town Project, which has cities across the region (in Vietnam, China, Thailand the Philippines and Peru) implement low-carbon development plans, with remarkable results, says Bollard.

The latest APEC energy initiative is the Global Lighting Challenge [<http://bit.ly/1So3LI6>], a programme to deploy 10 billion high-efficiency lighting products. It was introduced at the Paris climate conference in December last year and has just been officially endorsed by APEC leaders on 9 April in Taichung City, Taiwan.

And APEC works on many other issues as well, such as carbon capture and storage, regional grid integration, energy efficiency, smart grids and biofuels. The promotion of free trade in cleantech goods and services is also a very important part of APEC’s work. “After the Environmental Goods Agreement, which dealt with tariffs on goods, we have now started talking about environmental services”, says Bollard. “This means we have to look behind the borders – at regulatory and governance issues. We have a number of working groups now working on reforms and harmonisation in this space.”

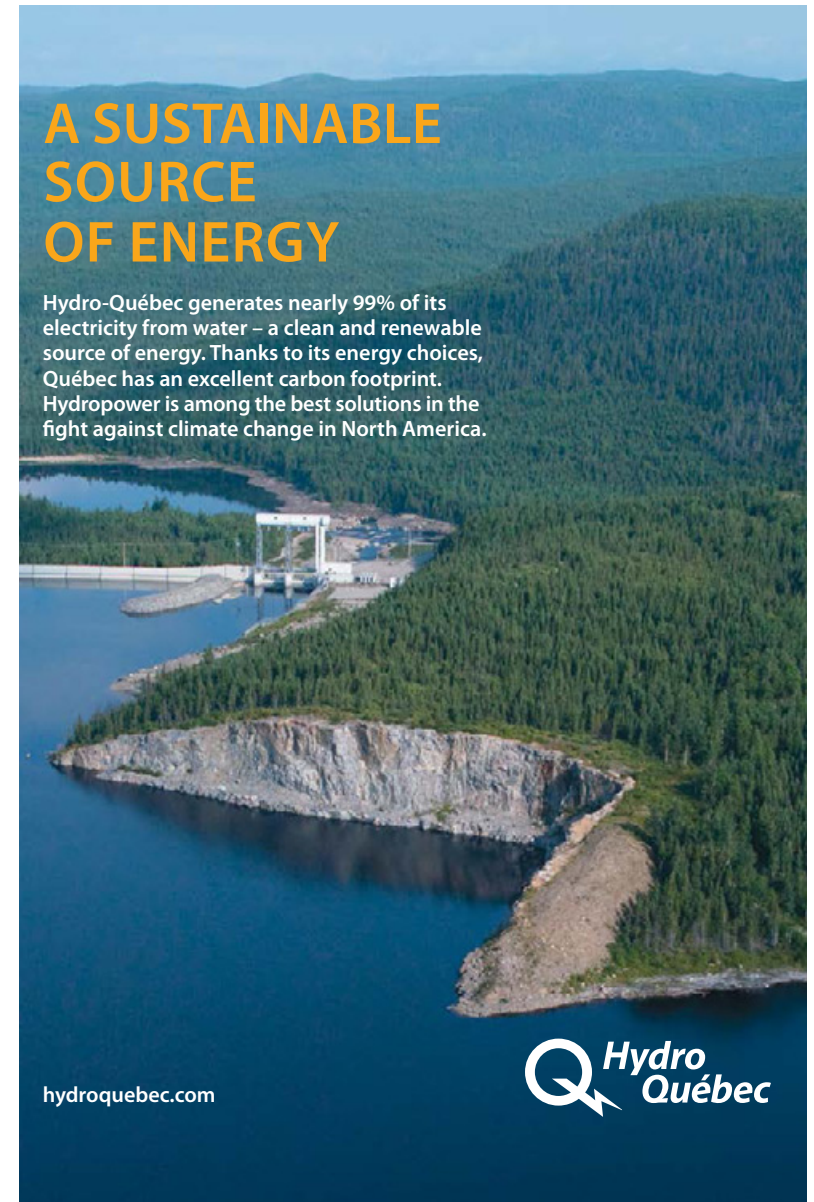
Bollard notes that “businesses worry less about tariffs nowadays, and more about common regulations, platforms and protocols. This reflects the fact that we are evolving from a primarily goods-based to a service-based economy where these issues are much more important.”

What has held APEC together throughout the years, says Bollard, is “our common interest in growing together”. To this is now added a “common interest in meeting the energy and climate challenge together. We know that the future is going to be very different from the past.” ●

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## New paradigms for the nuclear energy sector

Photo Idaho National Laboratory

**A wave of innovation is sweeping across the nuclear sector – so much so that it is difficult for financiers to pick winners at this stage. But the biggest innovation may come in the form of a new investment paradigm that involves private investors much more than in the past, writes specialised nuclear energy reporter Dan Yurman.**

In the U.S. and Canada more than three dozen firms [<http://bit.ly/1C8Gmma>], representing about \$1.3 billion in impatient investor money, are currently pursuing technological innovations in nuclear energy. These firms include large, big-name projects, with deep pockets, like TerraPower, and small startups like Terrestrial Energy. All of them are placing their chips on a comeback for nuclear energy driven by

the need to decarbonize the generation of electricity needed to power the global economy.

The involvement of these new investors signals a profound shift taking place from government-led, and funded, nuclear R&D to private sector-led efforts by people with strong entrepreneurial goals, often linked to a social purpose [<http://nyti>].

[ms/1MWfjQeJ](http://1MWfjQeJ). They want to make money from their inventions, but they also want to see nuclear energy used in place of fossil fuel power stations to curb CO<sub>2</sub> emissions.

So far most of the global spending internationally on advanced nuclear R&D has been taking place under the umbrella of the GEN IV program [<http://bit.ly/26iZiQv>] which centers on six advanced reactor types. Most of this work has been housed at various national laboratories functioning as sandboxes for scientists. By contrast, the business model the new developers have adopted comes out of the Silicon

### Touring a virtual nuclear reactor at Idaho National Laboratory

Valley model of development. The idea is to pull together a small team of world class experts to create new technological advances that can find acceptance in the market.

### SILICON VALLEY MODEL

However, unlike the Silicon Valley model, developing a new nuclear reactor design is not a one-to-two year rush similar to creating a new computer chip, mobile device, or platform for software as a service. For example, even the timescale for the development of a small modular reactor like NuScale's 50MW one, is in the range of 10-15 years, even though it is based on mature light-water reactor technology. It is still a question of how much patience investors will have for a much longer time to market.

One solution companies are pursuing is to form partnerships with public institutions that will give them access to the expertise – and the high-powered computers and simulation software – to solve difficult engineering design problems. Todd Allen, former deputy director of Idaho National Laboratory, and visiting fellow at the Washington D.C. based think tank The Third Way, believes that such public-private partnerships are the key to success for the new breed of nuclear energy entrepreneurs. He notes that there are different types or arrangements being pursued from cost- > see page 4

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sharing funding from the U.S. Department of Energy (DOE) to cooperative R&D agreements with national laboratories, universities, major nuclear reactor vendors, and not-for-profit technology labs and think tanks.

In a white paper [<http://bit.ly/1Toxsx3>] recently posted on the Third Way web site, Allen and his colleagues write that the nuclear energy industry "must adapt" to create a "culture of innovation" which will accommodate a new "range of new nuclear technologies of varying size and purpose." The federal government needs to share the road with nuclear innovators because it is no longer the only source of new ideas. "Today technology is developed through competition of ideas from many companies and institutions", notes the report.

Public-private partnerships and the creation of federally funded "innovation centers" are especially effective, Allen says, because they help give private actors gain access to materials testing facilities, and in developing and testing new nuclear fuels for innovative reactors.

Allen says the government's efforts are moving in the right direction. As an example he cites the recent site permit [<http://bit.ly/1PWTSjy>] granted by DOE to NuScale and a consortium of utilities in the western U.S. to build up to twelve 50MW small modular reactors on the site of Idaho National Laboratory.

Another initiative, called the Gateway for Accelerated Innovation In Nuclear (GAIN) [<http://1.usa.gov/20AgGxc>] was announced at a Third Way-sponsored nuclear summit [<http://bit.ly/22SUTzi>] held in Washington, D.C., in January. Its primary objectives are to provide nuclear innovators with the technical, regulatory, and financial support necessary to move new nuclear reactor designs towards commercialisation. Led by Idaho National Laboratory, in partnership with Argonne National

Laboratory and Oak Ridge National Laboratory, GAIN will work to integrate and facilitate efforts by private industry, universities, and national labs to develop, test, and demonstrate innovative nuclear technologies and to accelerate the licensing and commercialisation of these systems.

Additionally, the Obama administration has opened a \$12.5 billion loan guarantee programme [<http://1.usa.gov/1tR7RSK>] for advanced nuclear technology projects including covering the costs of design certification by the U.S. Nuclear Regulatory Commission (NRC).

**INNOVATIVE DESIGNS**

So what innovations are out there? A report on innovative nuclear reactor designs [<http://bit.ly/1T2TJMq>] published in June 2015 by the Third Way lists five major advanced design types with several variations for each of them. These include small modular reactors of the light water type, and more advanced types such as molten salt reactors, liquid-cooled metal (sodium, lead-bismuth) reactors, high temperature gas-cooled reactors using helium, and thorium-fueled reactors.

Two very different U.S. companies that are committed to bringing new reactors to the market are Terrestrial Energy and TerraPower. Terrestrial Energy, a small startup, is developing an Integral Molten Salt Reactor (IMSR) in Canada. Its key design feature is that the coolant is also the fuel so the reactor cannot melt down. The firm says the design will be ready for commercial customers within the next decade.

According to CEO Simon Irish, the IMSR represents a completely new paradigm for civilian nuclear energy. He calls it a "cost-competitive, scalable, grid-independent energy source" and touts its innovations in terms of safety and proliferation resistance. Customers could include > see page 5

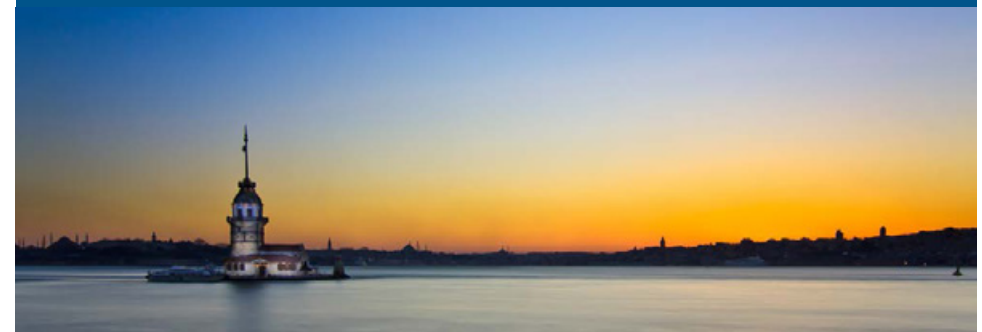


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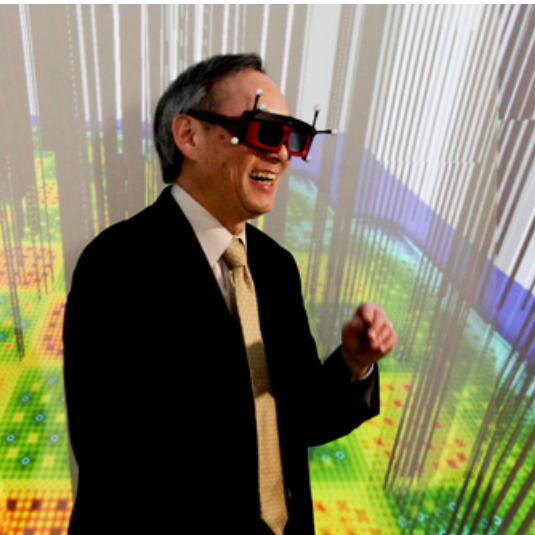
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**Former US Secretary of Energy Steven Chu visits simulated nuclear reactor core at Oak Ridge National Laboratory**

payer's dollars in 2015 flowed into support for renewables compared to nuclear. By comparison, nuclear energy provides two-thirds of current clean power. History clearly shows it can provide close to 100%."

On the other side of the innovation spectrum, TerraPower, supported by the Bill Gates foundation, has developed the 1150 MW traveling wave reactor (TWR) [<http://bit.ly/1snLCI7>]. It uses liquid metal sodium as a coolant and depleted uranium as a fuel. Like the IMSR, the reactor's fuel cannot be used to make materials for atomic bombs.

In September 2015 TerraPower inked a deal with the China National Nuclear Corporation (CNNC) to build a half-size, first-of-a-kind unit in China. Once testing of the prototype is complete, the two firms will collaborate to build and export full-size units for customers worldwide. The timeline is that the prototype will be completed between 2018 and 2023 and the commercial units come to market within the next 15 years. It is plausible that some U.S. firms could be part of the supply chain for the exported reactors.

According to John Gilleland, Chief Technical Officer of Terrapower, when the firm first got started about ten years ago, its founders were not sure

that the technical concepts they were investing in could be taken the distance to a complete design much less a prototype. To achieve its objectives the company worked with the Department of Energy's national laboratories and several dozen other commercial and research centers. Its ability to leverage public-private partnerships was crucial for the company to get access to computer modeling and simulation capabilities, says Gilleland.

**RUSSIA AND CHINA**

David Hess, an analyst for the World Nuclear Association, says that of the advanced nuclear concepts being developed, the advantage of small modular reactors (SMRs) is that "they present lower barriers to entry for emerging countries. The small size of SMRs also makes them suitable for use in smaller networks or places where demand is flat or growing slowly. They could also be used for the incremental replacement of smaller fossil units."

SMRs will be easier to finance even if the cost per kilowatt isn't initially much different than larger light water units, says Hess. At 50MW, a unit might cost \$200 million assuming a cost of \$4,000/kW.

For major nuclear powers like Russia and China, fast reactors are central to their long-term nuclear energy plans. The advantage of these reactors is that they are able to reprocess spent fuel from commercial reactors and depleted uranium from enrichment plants. By putting this material back into useful

nuclear fuel, the volume of material that has to be sent to be stored at the reactor or in an interim storage facility is reduced.

"These advanced designs can dramatically increase the useful nuclear fuel resource and offer a way to reduce the existing volumes of used fuel, including depleted uranium from enrichment plants, which might otherwise be disposed of as radioactive waste", says Hess.

According to the World Nuclear Association, fast neutron reactors are more than just concepts. Many countries have built and operated fast reactors in the past with mixed degrees of success. Hess notes that "Russia connected a new 790MW fast reactor to the grid late last year. There are a huge number of potential configurations to a fast reactor." He feels there are "reasons to be confident that one or more will be found which overcome the technical problems of earlier designs and offer economics comparable to non-fast reactor alternatives."

So far the emphasis has been with state-owned corporations like those in China with their work on high temperature gas cooled reactors that use pebble bed fuel enrichment with helium coolant. Russia has reported progress in its work on the sodium cooled BN-600 and 800 fast reactors, and has committed the money to take these design concepts to the working prototype stage.

In the U.S. the Next Generation Nuclear Plant Alliance (NGNP), a business consortium, selected a conceptual design [<http://bit.ly/2474dSu>] developed by Areva for a high temperature gas cooled reactor. The first prototype could be built in the mid-2020s at a cost of \$2.3 billion. According the Alliance, the plant would be competitive with \$6 to \$10/MMBtu natural gas. Currently, gas is cheaper – but oil and gas prices are notoriously volatile. Nuclear power, if it manages to adjust itself to changing market conditions, could still has a long future ahead of it. ●

remote communities, such as those in the far northern provinces of Canada or island nations in the vast Pacific ocean. Other potential customers include factories for ammonia, fertilizer and hydrogen production, mining operations, petroleum refining, and desalinisation to name a few.

So far the firm has start-up funding commitments for \$10 million and another for \$5 million. Given that success to complete the design will require a great deal more money, CEO Irish says that what keeps him awake at night are disturbances in the policy environment among governments for support of innovative nuclear technologies. "The biggest challenge we all face is that today's market and policy realities disadvantage all baseload technologies. Ten times more tax-

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## Post-Paris: the world is starting on a new energy road

**The Paris Climate Agreement has been signed by 175 countries in New York, showing worldwide commitment to tackle the threat of global warming. Even more important perhaps are the actions that are being taken to make the goals of Paris a reality. These will have a huge impact on the energy sector.**

On 22 April, leaders from 175 countries signed the Agreement making this the UN Treaty with the highest number of signatures in one day in history. Signing is the first step in a three-stage process for the Agreement to enter into force into international law. It signals a country's political support for the Paris Agreement and its intention to align its domestic policies and to start the process of formally joining the Agreement.

The second step is to formally join (or ratify) the Agreement and 'consent to be bound' by its terms. Each country has its own legal processes. Some can work swiftly, through executive powers, like the US, others require approval of various legislative and parliamentary organs, like Brazil. Fiji, Paula and The

Marshall Islands were the first three countries to ratify the agreement. The third step: once a sufficient number of countries (55) covering a certain percentage of emissions (55%) have formally joined the Paris Agreement, it will enter into force. You can follow the signing and ratification process on this Paris Agreement Ratification Tracker Tool [<http://bit.ly/1VEOljJ>] from the World Resources Institute.

### FINANCIAL INITIATIVES

But the world is not waiting for countries to sign and ratify the Paris Agreement. It is already taking action.

First of all, investors and financial institutions have been making pledges to invest in cleantech and renewables and/or to refrain from investing in coal

### Sustainable development goals on UN headquarters New York. Source UN

projects or other fossil fuel activities. The Investor Platform for Climate Action [<http://bit.ly/1IAVTtb>] lists a number of the most significant initiatives:

- The Global Investor Statement on Climate Change
- The Institutional Investors Group on Climate Change (IIGCC)
- The Investor Network on Climate Risk
- The Investor Group on Climate Change
- UNEP Finance Initiative
- Asia Investor Group on Climate Change
- Ceres Shareholder Initiative on Climate & Sustainability
- Portfolio Decarbonization Coalition
- Low Carbon Investment Registry
- Carbon Asset Risk
- CDP (Carbon Disclosure Project)
- GES Carbon Risk Engagement
- Investor Expectations for Oil & Gas Companies

And there are many others. All told, these initiatives represent more than 400 institutional investors with \$24 trillion in assets under management. They typically ask for: carbon pricing, stable support for energy efficiency and renewable energy, support for innovation, phasing out of fossil fuel subsidies.

### COLLABORATIVE INITIATIVES

There are also a number of collaborative initiatives that work specifically to expand certain types of renewable energy:

- The Global Geothermal Alliance (GGA) expects to achieve a 500% increase in global installed capacity for geothermal power generation and a 200% increase for geothermal heating by 2030.
- The International Solar Alliance and the Global Solar Council, launched by India, aim to reduce the costs of solar energy and already have more than 120 members.
- The African Renewables Energy Initiative (AREI) comprises 54 African States that are planning to build at least 10 GW of new and additional renewable energy generation capacity by 2020 and 300 GW by 2030.
- The Global Lighting Challenge, an initiative of the Clean Energy Ministerial, aims to install 10 billion high-efficiency light bulbs.
- The Clean Energy Ministerial is a coalition of countries aiming to promote policies and programs that advance clean energy technology; its member countries represent 90% of clean energy investment and 75% of global greenhouse gas emissions.

### PRIVATE SECTOR INITIATIVES

Then there are some major private sector initiatives that are worth noting.

- The We Mean Business coalition consists of almost 400 companies representing over \$8 trillion in revenue plus 183 investors representing over \$20 trillion in assets.
- The RE100: leading multinationals committed to procuring 100% of their electricity from renewable sources. So far 58 companies have joined, including BMW, H&M, Nestlé, Nike,

- Microsoft, Google, Philips, Unilever, SAP, Tata, IKEA and Walmart.
- The Breakthrough Energy Coalition: some of the most powerful entrepreneurs in the world, including Bill Gates, Jeff Bezos, George Soros, Jack Ma, Richard Branson and Mark Zuckerberg, aim to protect the climate by investing in new low-carbon energy technologies.
- The Carbon Pricing Leadership Coalition brings together leaders from government, private sector and civil society to promote effective carbon pricing. Includes the UK, Germany, Mexico, Canada, Kazakhstan, and big energy companies like Shell, Engie, Enel, ENI, EDF, Sinopec and Total.

### CONCRETE INITIATIVES

The number of concrete projects coming out of all these initiatives is expanding every day. To give two examples, a group of eight banks and investors recently pledged \$7 billion for investments in clean energy and sustainable development. They form part of an initiative from Bank of America to raise at least \$10bn for investments in clean energy and sustainable development.

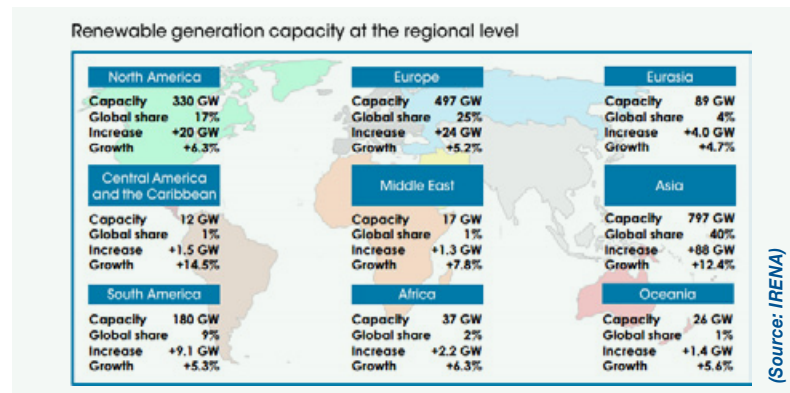
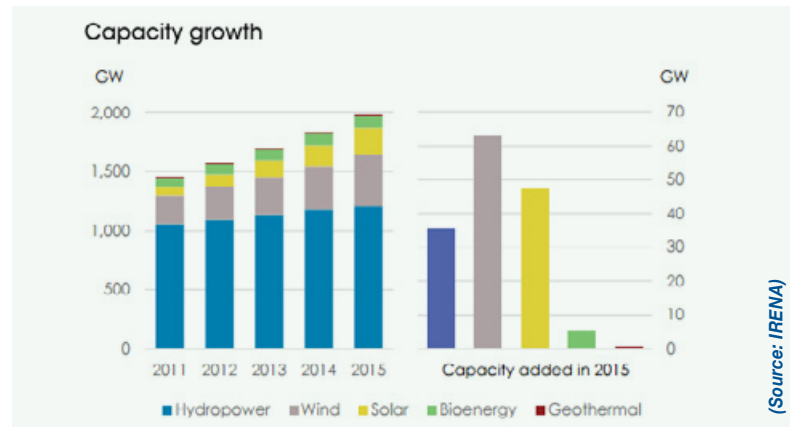
The World Bank vowed to increase by 50% its funding of clean energy projects by 2020. The World Bank Group Climate Change Action Plan calls for increasing from \$2.3bn to \$3.5 billion its direct funding of clean energy projects over the next five years. And there are many more similar examples. They will change the face of the global energy sector over the coming decades. ●

## Record growth of renewable energy capacity

**Global renewable generation capacity amounted to 1985 GW at the end of 2015, reports IRENA (International Renewable Energy Agency). 152 GW was added in 2015, a growth of 8.3%, the highest growth rate ever.**

More than half (58%) of the new renewables generation capacity last year was installed in Asia, which now has 40% of total renewables capacity. IRENA does not report total global power generation capacity, but

according to figures from the International Energy Agency (IEA), this amounted to 6163 GW at the end of 2014. Renewable energy represented 30% of global capacity which produced 22% of the electricity in the world. ●



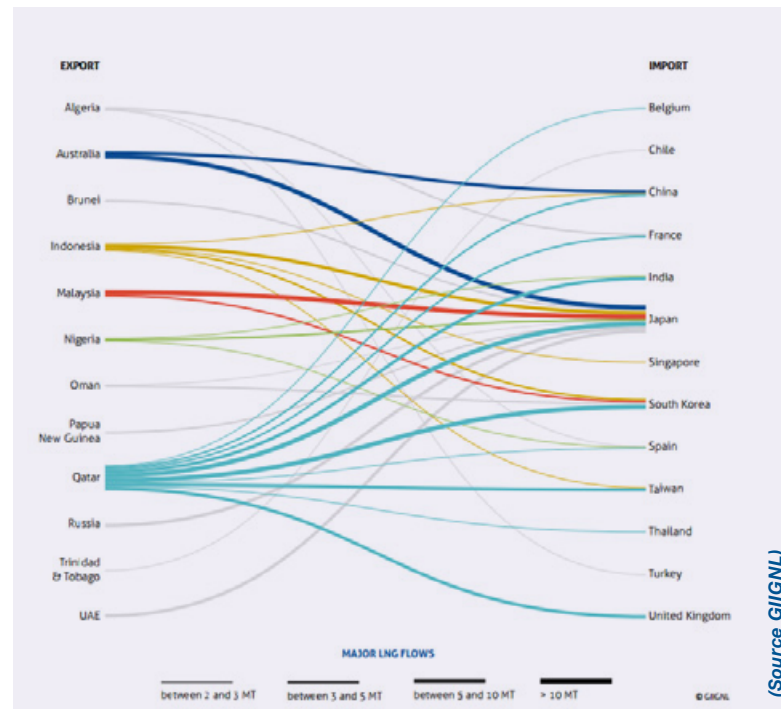
## Global LNG trade up

Worldwide LNG trade increased by 2.5% to a record 245.2 million metric tons last year, according to a detailed annual report [http://bit.ly/1Y0ky7E] from the International Group of LNG Importers (GIIGNL). 28% of this was traded on a spot or short-term basis, the same as the year before. 72% of demand came from Asian countries compared to 75% a year earlier. 32% was supplied from Qatar.

Despite these apparently upbeat figures, not all was well in the LNG market. Supply growth was lower than

expected. Supply from the Atlantic Basin declined, with Egypt and Angola not producing any LNG at all as a result of technical problems and Algeria's output down. Demand "wavered", said the report. In particular, demand in Japan and South Korea declined. In China LNG imports grew more than 5%, in Europe by 15.8%. Jordan, Egypt and Pakistan also increased their imports.

GIIGNL's president Domenico Dispenza wrote: "In a global context of lower energy prices and sluggish economic growth, the LNG industry is holding its breath for the impact of an export wave from the United States." ●



## NEWS IN BRIEF

### IMF: LOW OIL PRICE COULD DELAY ENERGY TRANSITION

Low oil, gas and coal prices could hold back a global shift towards lower-carbon energy sources, according to the International Monetary Fund. "The current low fossil fuel price environment will certainly delay the energy transition," the IMF said in its World Economic Outlook published in April.

### NUCLEAR SECURITY AGREEMENT ENTERS INTO FORCE

A key security agreement, once described by IAEA director general Yukiya Amano as the single most important step to strengthen nuclear security, is set to become legally binding after Nicaragua became the 102nd state to ratify it, reports World Nuclear News. The agreement on the Amendment to the Convention on the Physical Protection of Nuclear Materials (CPPNM), was adopted in 2005 and will become binding on 8 May 2016. It makes it legally binding for states to establish, implement and maintain an appropriate physical protection regime applicable to nuclear material and nuclear facilities under their jurisdiction.

### SAUDI ARABIA PLANS \$2 TRILLION POST-OIL MEGA-FUND

Saudi Arabia is preparing to create the world's largest sovereign wealth fund, reports Bloomberg. In an interview with Bloomberg, Deputy Crown Prince Mohammed bin Salman said the Saudi government will create a Public Investment Fund that will eventually control more than \$2 trillion and help wean the kingdom off oil. As part of that strategy, Saudi Arabia will sell shares in the parent company of Saudi Aramco, the world largest oil company.



## Thailand's blueprint for secure and affordable energy

**Thailand's Integrated Energy Blueprint (TIEB) sets the nation's energy policy goals over the next two decades, and prioritises energy efficiency, renewable energies and fossil fuel subsidy reform. However, fossil fuels are set to remain dominant in the energy mix with a projected increase in the share of coal-fired power. Increased regional cooperation is also on the agenda, through the recently formed Association of South East Asian Nations (ASEAN) Economic Community - a market of US\$2.6 trillion and over 622 million people.**

The TIEB is the first long term master plan for the energy sector in Thailand, aimed at a strategic balance between energy 'Stability, Prosperity and Sustainability' up to 2036. Overall, the Blueprint is aimed at diversification of supply, demand-side management and a pragmatic approach to fossil fuel use.

Dararuth Ritboonyakorn is the Executive Director of International Energy Cooperation Office at Thailand's Ministry of Energy and Secretary of the World Energy Council Thailand Member Committee. She has responsibility for international policy and strategy to promote

energy security, as well as sustainable development in Thailand.

According to Ritboonyakorn, "The energy issue is a continuing high priority for the Thai government, especially since the collapse of oil prices in 2014-2015 has negatively affected government revenue, and will decelerate investment in exploration and production of oil and gas energy resources in the future. The TIEB seeks to capitalise on a window of opportunity for Thailand, by using energy efficiency, renewables and clean coal to maintain our international competitiveness."

*Lopburi solar power plant Thailand  
Photo Asian Development Bank*

While Thailand is an oil and natural gas producer, the country increasingly has to rely on hydrocarbon imports to sustain its rising fuel demand. At present, natural gas powers 64% of electrical generation. Coal and lignite-fired plants produce an additional 19%, with the remainder from renewable, hydro and import.

Domestic crude oil reserves are declining in Thailand and the country imports a significant share (85%) of its total oil consumption, making Thailand the second largest importer of oil in South East Asia.

Ritboonyakorn says, "Looking to the future, fossil fuels will undoubtedly remain dominant in the energy mix."

### **BLUEPRINT FOR SUSTAINABILITY**

The TIEB consists of five master plans - the pillars of Thailand's energy development strategy. These are the Energy Efficiency Plan (EEDP), Power Development Plan (PDP), Alternative Energy Development Plan (AEDP), the Gas Plan and the Oil Plan.

Thailand is the largest coal producer in South East Asia. In 2016, the domestic use of coal will account for 19% of electricity generation. The TIEB's Power Development Plan (PDP) aims at increasing this share to 23% by 2036. Emissions from this sector will be

ameliorated by the use of three stage clean coal technology – pre-combustion cleaning, pulverized fuel combustion and dry low NOx burner, and post-combustion emissions reduction measures such as electrostatic precipitator and flue gas desulfurization. Ritboonyakorn comments, "High efficiency, low emissions clean coal technology is now on-stream, and Thailand is aiming at 23% 'clean coal' in the power mix by 2036."

"The challenge of increased use of coal in our plan means that Thailand has to support the innovation of clean coal technology to reduce carbon-dioxide emissions. In the PDP 2015, we estimate that we will reduce carbon-dioxide emissions per unit in the electricity sector to 0.319 Kg CO<sub>2</sub>/kWh in 2036 from 0.56 Kg CO<sub>2</sub>/kWh in 2013," adds Ritboonyakorn.

Along with coal, Thailand also anticipates a greater share of renewables in the future energy mix. The Alternative Energy Development Plan (AEDP) prioritises power generation from waste, biomass and biogas, with an overall target to increase the share of renewable energy to 30% of final energy consumption in 2036 (versus 8% today). The TIEB's Oil Roadmap aims at 20% use of biofuels by 2036 with a view to limiting imports and bringing in much needed income for Thailand's rural population.

Energy efficiency is also a top priority of the Ministry of Energy. The TIEB's energy efficiency plan aims at reducing the

energy intensity of the nation by 30% in 2036 (compared to the base year 2010).

Fossil fuel use is also being addressed through subsidy reform - part of a growing movement across the Association of Southeast Asian Nations (ASEAN) region. Diesel and biofuel subsidies are funded via the Oil Fund, a monetary reserve collecting revenues from levies on petroleum products during times of low or average international prices. When prices surge, the fund is used to subsidise prices and hence reduce price peaks for consumers. Reform of the Oil Fund is underway. According to Ritboonyakorn, we are drafting a new Oil Fund Act, which will promote the use of renewable energy, ensure subsidies for specific groups and prevent oil shortage."

### **REGIONAL ENERGY**

In the wider region, the establishment of the ASEAN Economic Community (AEC) in 2015 is a major milestone in the regional economic integration agenda consolidating a market of US\$2.6 trillion and over 622 million people. According to the TIEB, AEC integration will provide a 'catalyst for cross-country projects and infrastructure interconnections'.

Ritboonyakorn: "Connectivity across ASEAN is promoted not only for economic reasons, but also to build a shared ASEAN identity, which brings together the diverse peoples of Southeast Asia, develops mutual trust and understanding and engenders greater cohesion and solidarity." ●



## MEMBER COMMITTEE EVENTS

### Energy and Geostrategy 2016

**Madrid, Spain  
12 May 2016**

World Energy Council Spain will present the 2016 issue of the “Energy and Geostrategy” report series, published together with the Spanish Institute for Strategic Studies for the third time after 2014 and 2015. Speakers will discuss currently energy matters such as liquefied natural gas,

energy maritime routes, the impact of jihadism on the energy sector, oil prices, world geopolitics and the water- energy-food nexus from a global geopolitical perspective. These subjects will be examined in a panel discussion formed by the authors and the publication’s coordinator. The event is co-organised with the Spanish Ministry of Defense and it is aimed both at the public and private sector, as

well as the academia. Registration is possible by 10<sup>th</sup> May. The 2015 edition is available for download here [<http://bit.ly/1RNllox>].  
**Contact:** *Javier Jiménez*  
**E-mail:** [jjimenezp@repsol.com](mailto:jjimenezp@repsol.com)  
**Website:** <http://bit.ly/1UQIQCS>

### Energy Dynamics in a Changing World Tehran, Iran

**30 - 31 May 2016**

The 11th International Energy Conference (IEC2016) organised by World Energy Council Iran focuses on energy practice and policies. Sessions and workshops during the forum highlight dynamics in energy finance, structures and institutions, energy technologies as well as in energy and environment and economy. Registration is possible until 20<sup>th</sup> May.  
**Contact:** *Seyed Mohammad Sadeghzadeh*  
**E-mail:** [info@iranec.com](mailto:info@iranec.com)  
**Website:** <http://iranec.com>

### FOREN 2016 - Safe and Sustainable Energy Costinesti, Romania

**12-16 June 2016**  
The 13th Central & Eastern Europe Energy Forum (FOREN 2016) will focus on the main challenges, developments and opportunities of the Central and Eastern European (CEE) power industry for a sustainable development. World Energy Council Romania, the

organisers of the conference, expect up to 1,000 energy experts at the event. It offers a deep dive analysis of the CEE region, meant to further on contribute to the development of the “all-round education” in the energy field, and increase awareness for the role energy plays in our lives.  
**Contact:** *Dr Gheorghe Balan*  
**E-mail:** [foren2016@cnr-cme.ro](mailto:foren2016@cnr-cme.ro)  
**Website:** <http://www.cnr-cme.ro/foren2016/>

### Market Operations and Climate Change Acapulco, Mexico

**16-18 June 2016**  
The two major challenges of the Mexican energy sector, market operations and climate change, will be discussed at the 8th Annual Joint Congress of the Mexican energy associations, co-organised by World Energy Council Mexico. Confirmed speakers include Pedro Joaquín Coldwell, Energy Secretary, José Antonio González Anaya, CEO PEMEX and Enrique Ochoa Reza, CEO CFE. The event language is Spanish.  
**Contact:** *Pablo Mulás del Pozo*  
**Email:** [wecmex@wecmex.org.mx](mailto:wecmex@wecmex.org.mx)  
**Website:** <http://bit.ly/1VEhqRF>

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## ABOUT THE COUNCIL

The World Energy Council has been at the forefront of the energy debate for nearly a century, guiding thinking and driving action around the world to achieve sustainable and affordable energy for all. It is the UN-accredited energy body and principal impartial network, representing more than 3,000 organisations – public and private – in almost 100 countries.

Independent and inclusive, the Council’s work covers all nations and the complete energy spectrum – from fossil fuels to renewable energy sources.

## JOIN OUR NETWORK

Join the debate and help influence the energy agenda to promote affordable, stable and environmentally sensitive energy for all. As the world’s most influential energy network, the World Energy Council offers you and your organisation the opportunity to participate in the global energy leaders’ dialogue.

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- join a Member Committee;
  - become a Project Partner, Patron or Global Partner;
  - take part in annual industry surveys, study groups and knowledge networks;
- by visiting our website and contacting our team on: <http://www.worldenergy.org/wec-network>

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## 2016 World Energy Congress

**Istanbul, Turkey  
9–13 October 2016**

**With only 6 months remaining until the 23rd World Energy Congress kicks off in Istanbul under the theme “Embracing New Frontiers”, to date 183 speakers have confirmed their attendance. Confirmed speakers come from 63 countries and include 26 Ministers so far.**

The triennial World Energy Congress has gained recognition since the first event in 1923 as the premier global forum for leaders and thinkers to debate solutions to energy issues. In addition to the discussions, the event provides an opportunity for executives to display

their technologies and explore business opportunities.

Companies interested in sponsoring the Congress are welcome to contact the appointed marketing consultants from ITE Group plc, [vivian.linecar@ite-events.com](mailto:vivian.linecar@ite-events.com).

**For more information** not only on sponsorship, but also on the Congress, the call for papers (submission possible until 31 May 2016), and registration visit **the official congress website** <http://www.wec2016istanbul.org.tr/>  
Follow the Congress on **Twitter:** <https://twitter.com/WECongress>