

The winds of change

Interview with Michael Hannibal,
CEO of Siemens Gamesa

Opec's new deal
But is price volatility
here to stay?

A bright future?
Malaysia is pushing
forward

Cyber security
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Technology challenge
Bolder policy
needed

Energy technologies mapped out

Much bolder policy decisions are needed if technology is to help us reach our climate goals, says the IEA

Strong political support and the right market conditions will be needed to drive technological development and improve global access to electricity, the International Energy Agency (IEA) says.

In its latest [Energy Technology Perspectives \(ETP\) 2017 report](#), which outlines how technology and other trends will reshape the global energy sector in the next four decades, it says we need to be investing in stronger and smarter infrastructure. This includes transmission capacity, storage capacity and demand-side management technologies to build efficient, low-carbon, integrated, flexible and robust energy systems.

However, existing government policies are not supportive enough to achieve long-term global climate goals, the IEA analysis concludes.

Out of the 26 clean energy technologies—which in addition to power generating technologies also includes transport biofuels, building construction and lighting—only four were on track to meet climate objectives. These are solar PV, onshore wind, energy storage

and electric vehicles.

Where policies have provided clear signals, progress has been substantial according to the ETP's Tracking Clean Energy Progress report. However, many technology areas suffer from inadequate policy support.

"As costs decline, we will need a sustained focus on all energy technologies to reach long-term climate targets," said IEA Executive Director Dr Fatih Birol. "Some are progressing, but too few are on track, and this puts pressure on others."

ETP 2017 presents three pathways for energy sector development to 2060: the Reference Technology Scenario (RTS); the 2°C Scenario (2DS) and the Beyond 2°C Scenario (B2DS).

The RTS reflects the world's current ambitions. While it represents a significant shift from a historical "business as usual" approach, the IEA says it does not achieve the global climate mitigation objectives.

More ambitious decarbonisation requires effort and political commitment. ■

China takes leadership role at Clean Energy Ministerial

Energy transition is being led by emerging nations

The leadership role in the [Clean Energy Ministerial \(CEM\)](#) will not come from OECD countries, it was stressed at the organisation's eighth meeting in Beijing, China.

According to the CEM, countries such as India, Mexico and in particular China will take the lead in the global transition to a cleaner energy system.

Christian Zinglensen, Head of the CEM Secretariat, said the Beijing meeting shows that "political efforts are catching up with realities on the ground".

"I look at metrics such as where global aggregate energy demand is taking place now and in the next 5, 10 15 years—it will all be in developing or emerging economies," Zinglensen said. "I also think about where the aggregate renewable capacity is taking place—China alone is accounting for about 40 per cent of that."

The meeting also saw the launch of the Advanced Power Plant Flexibility Campaign. Flexibility is critical to integrate wind and solar energy into power systems and the campaign

aims to build strong momentum and commitment from participants to make power plants more flexible. The campaign will cover all forms of dispatchable power plants, particularly coal, gas, hydro and bioenergy.

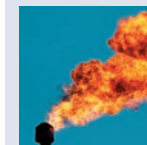
The CEM is a partnership of 25 key countries, including most of the G20 economies, representing 90% of clean energy investment and working together to accelerate the global energy transition. Its work essentially focuses on the deployment of technology in realising the transition.

CEM8 was held alongside the second Mission Innovation (MI-2) forum, an initiative launched in 2015 to accelerate the pace of innovation and make clean energy widely affordable. MI-2 reported that most countries are on track to meet their commitment to doubling investment in energy research by the end of 2020. The Clean Energy Ministerial is a global forum to promote policies and share best practices to accelerate the global transition to clean energy. ■

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A campaign to end gas flaring, plus the role of technology in decarbonisation, and China's new floating solar project

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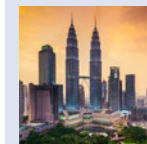
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The Organisation of Petroleum Exporting Countries has extended a deal to cut oil production. Will this be enough to regulate the market?

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Ending gas flaring

The World Bank launched an initiative aimed at eliminating routine gas flaring entirely by 2030. The “Zero Routine Flaring by 2030” programme, which links governments, upstream companies and development institutions, aims to wipe out the practice during routine oil production where burning excess gas takes place. In many cases, the gas could be used to produce power and to advance the sustainable development of producing countries. Even when this is not possible, flaring contributes to climate change by creating emissions of CO₂, black carbon and other pollutants.

Governments and oil companies which endorse the initiative will publicly report their flaring and progress towards achieving the initiative’s goals on an annual basis, which will then be reported by the World Bank.

It added that eliminating gas flaring can also help to end poverty and move toward a more sustainable energy path. ■

For more information and a list of participating governments and oil companies, visit <http://www.worldbank.org/en/programs/zero-routine-flaring-by-2030>.

75% of drillers at risk of cyber attacks

Three out of four oil and natural gas companies fell victim to at least one cyber attack last year, a report by consultancy Deloitte has found. The report, named “[Protecting the connected barrels: Cybersecurity for upstream oil and gas](#)”, said that while technology advances—such as Shell’s recent relocation of its operations from Argentina to a control centre in Canada—provide an opportunity for hackers, old equipment that must be retrofitted with cyber security is harder to defend against attacks. The

report’s authors found that their visits to many oilfields were “like something from the 1980s” with many bad habits in evidence, such as passwords written down on pieces of paper. The report suggested that the industry is not sufficiently concerned by cyber attacks because of a perception that it would be an unlikely target. But with the motives of hackers evolving, risks are rising fast, the report found. It also said that the cost of cyber crime is estimated to average about \$15 million in the energy industry today. ■



Floating solar panels soak up the sun’s rays

Floating solar

China announced the completion of the world’s largest floating solar project. The 40MW facility, in Anhui province, sits in a flooded former coal-mining town and is far larger than the UK’s 6.3MW plant, which was previously the world’s largest. It is part of China’s wider ambition to invest \$361bn in renewables by 2020. The current national plan calls for the proportion of non-fossil fuel sources in the provision of primary energy to reach 15% by 2020, and at least 20% by 2030. ■



Fast moving: The energy sector is changing

Short-term cycles, long-term trends

Global energy markets are already experiencing irreversible changes in both production and demand trends according to [BP’s latest Statistical Review of World Energy](#)

The company found that while global energy consumption grew by just 1%—compared with a 10-year average of 1.8%—this increase was almost entirely sustained by developing countries, especially India and China. The relatively low rate of demand can be partly explained, BP said, by the weak economic growth in China last year, driven by a slowdown in its iron, steel and cement industries. Global GDP only grew by 3%, its slowest rate since 2002. China surpassed the US as the biggest renewable energy producer in the world, while BP chief economist Spencer Dale said it was “the end of

an era” for coal, with the UK power sector celebrating its first coal-free day in April this year. Coal use in the UK has also fallen back to levels not seen since the industrial revolution 200 years ago. Worldwide, coal was at its lowest consumption and production levels since 2004. “There was a continued adjustment to short-term cyclical changes overlaid by gravitational pull from the long-run transition which is underway,” Dale summed up. That shift is one towards cleaner, low-carbon energy led by renewables, technological advances and environmental needs. ■



Opec extended its production cuts for the second time—now what?

The group and its partners will continue to restrict oil output for another nine months in an attempt to regulate the market and stabilise prices, but obstacles remain

Many in the oil industry eagerly watched as the Organization of the Petroleum Exporting Countries (Opec) and its partners outside the group met to discuss an extension of cuts to production at the end of May.

The decision to extend the cuts for another nine months followed an initial meeting in November, and an informal follow up meeting held in the margins

of the World Energy Congress 2016, when the cuts were originally agreed upon. The move was designed to tackle a glut of stock, and the effect this is believed to have had on oil prices.

Had they ended the deal as planned at the end of 2017, Saudi Arabia's oil minister Khalid al-Falih said, Opec's producers would have added "a large slug" of supply to the market, creating

another hefty build-up of stock.

Falih has said that Saudi Arabia would do "whatever it takes" to restore market balance. "All indications are solid that a nine-month extension is the optimum and should bring us within the five-year average by end of year," he said in the press conference after the meeting, held at the Opec headquarters in Vienna.

Russia also made its commitment plain. Although it has not fully delivered on the 300,000 barrels per day (b/d) cuts it promised, energy minister Alexander Novak, sitting next to Falih at the meeting, presented the cooperation with Opec in terms of restoring "stability" to the oil market.

To achieve this, Opec and its partners are focused on inventories—and Falih's urge to see the OECD's stockpile drop back to the five-year average. The nine-month extension would achieve this, he insisted. Analysts tend to agree, saying that, all being equal, the Opec cuts are enough to eliminate the overhang, probably in the first quarter of 2018 if not sooner.

What about shale?

Meanwhile, insiders are quick to point out that US oil production is surging.

Barclays's head of energy commodities research, Michael Cohen, said he expected Lower-48 onshore output would rise by 1.2m b/d this year. But his forecast could be under by 300,000 b/d, he said.

By contrast, Opec's most recent forecast expects tight oil producers to add just 0.614m b/d in 2017.

While accepting that the stock glut will take longer to clear than first thought, Opec has also lowered its price expectations. Last year, talk was of a price recovery, or "stabilising oil prices at a higher level". This time around, the cuts' purpose is to keep another slump at bay.

Nigeria's oil minister, Ibe Kachikwu, tweeted on 25 May that if Opec members observed their quotas, prices "should stay along the \$50 range". If

so, it's a price that will do enough to please other producers but little to increase Opec income.

As for the nine-month extension itself, the extra three months (added to what was expected originally to be a six-month rollover), are not hugely significant. The group will still meet again after six months and will assess what it needs to do then.

Assuming the cuts last the distance, it means Opec still needs to figure out an exit plan. If tight oil supply grows as quickly as analysts now expect, the expiry of the Opec deal at the end of March 2018, implying the addition of Opec's 1.2m b/d, could overwhelm balances again. ■

14

Member countries, including Saudi Arabia, Iran, Iraq, Qatar, Venezuela, Algeria, Indonesia, Nigeria, United Arab Emirates, Kuwait, Libya, Ecuador, Gabon, Angola

1960

The year Opec was founded by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela

96%

Average compliance rate across all Opec nations in April 2017 with proposed cuts



Growing demand, falling emissions

Malaysia is highly dependent on oil and gas, but the Southeast Asian nation has also set its sights on renewable energy

The Petronas towers dominate the Kuala Lumpur skyline

Malaysia—which also shares the island of Borneo with Brunei and Indonesia—occupies a strategic geographical position, ideally placed for budding trade routes between the Pacific and Indian oceans.

The imposing Petronas towers of its capital Kuala Lumpur are a symbol of both its economic success and a reminder that Malaysia is the region's second-largest oil producer, and the world's third-largest exporter of liquefied natural gas.

With a GDP which has steadily risen since the mid-eighties (and which will grow further by 4.9% this year alone, according to the World Bank) Malaysia's hunger for energy is expected to continue increasing. The International Energy Agency reckons the country's total primary energy demand will almost double by 2040, growing at an average rate of around 2% per year.

While fossil fuels are expected to remain the country's dominant source of primary energy over the next two decades, Malaysia has ambitious plans to expand its use of renewables in power generation to reduce its dependence on oil and gas and help to cut its carbon emissions.

The country aims to reduce its greenhouse gas emissions by 45% by 2030, from 2005 levels. Malaysian Prime Minister Najib Razak said in 2015 that 35% of the reduction would be on an unconditional basis and the remaining 10% would be conditional on receiving help with funding and technology from developed countries.

These pledges have helped Malaysia

to rise by three places in the World Energy Council's Trilemma reaching number 35 out of 125.

Its trilemma performance is balanced overall, scoring slightly lower in the environmental sustainability dimension, allowing it a final score of BBC.

Switched on

The government's [eleventh Malaysia Plan](#) which is set to run from 2016 to 2020—identifies rural electrification and renewable energy development as priorities for the Malaysian energy sector.

The share of households with access to electricity has increased, reaching approximately 98% by 2015.

Malaysia aims to complete the

electrification of the entire country by 2020. New power generation plants with 7.6 gigawatts of total capacity will be built to this end, and a number of grid interconnection projects will be implemented. New power plants will contribute to not only the improvement of energy equity but also enhance energy security and sustainability by replacing older, less efficient plants.

The country is also seeking to diversify its power generation mix, which will reduce its dependency on oil and gas. The potential of several alternative fuel sources is being examined by the government. The focus is particularly on biomass, biogas, geothermal and wind. Malaysia wants

Malaysia aims to complete the electrification of the entire country by 2020

to increase renewables' share of the total energy mix to 24% by 2050, from about 1% in 2011.

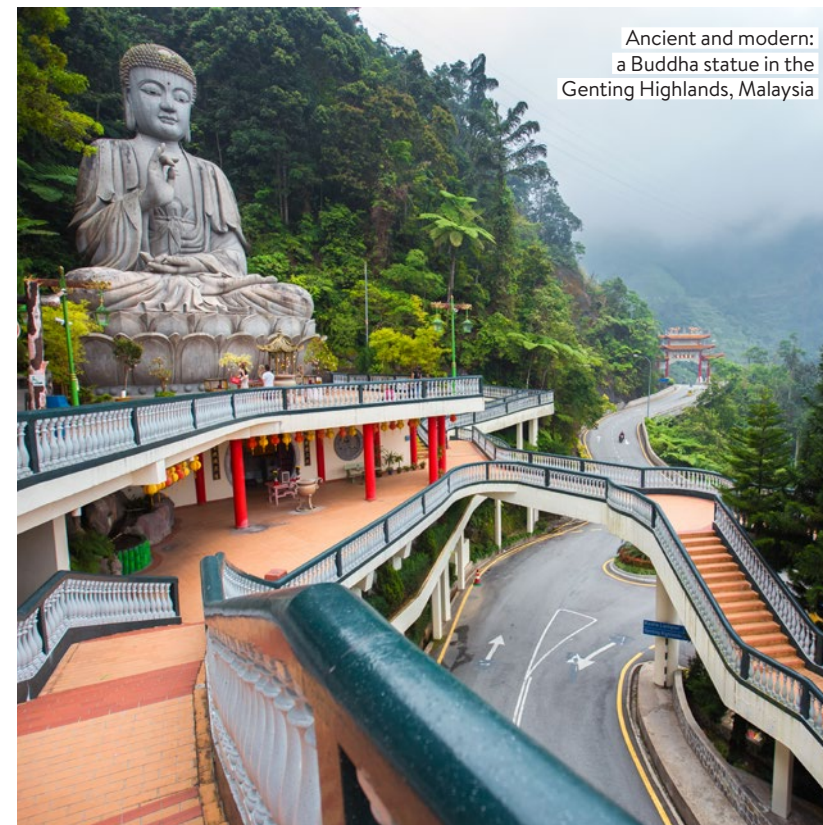
The target share of renewables in total power generation capacity is 7.8% in the Peninsular Malaysia region and the Sabah state on the east coast by 2020. The first geothermal plant is currently under construction in Sabah, and will start operation in June 2018. It will use energy generated from an active geothermal system centred around the dead volcano Mount Maria in Apas Kiri. In addition, the country is exploring the feasibility of wind as a reliable source of energy. Less good news for emissions targets is the construction of new coal plants, also planned to meet rising demand.

Fossil fuel surge

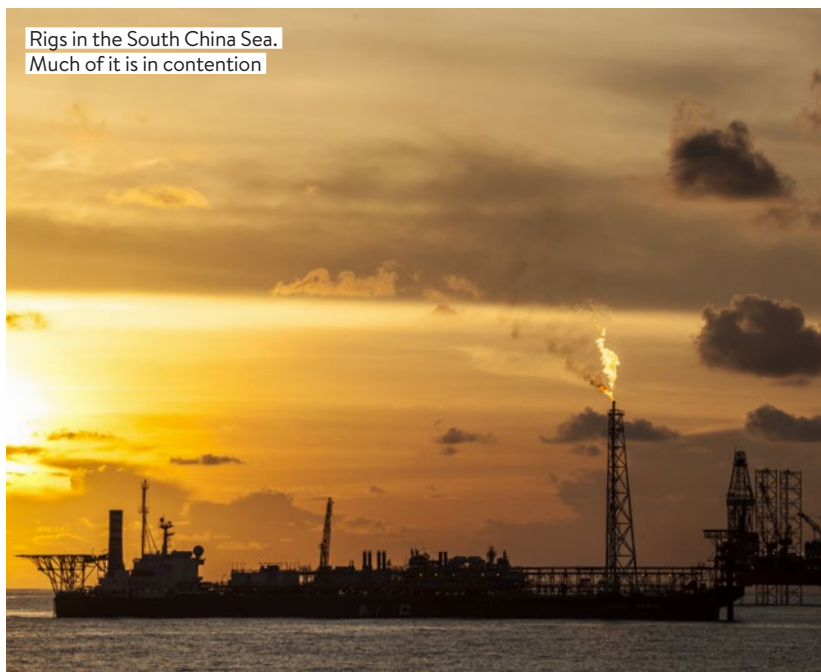
As the second-largest oil producer in the region Malaysia has been badly affected by the near 55% fall in oil prices over the past two years. Nevertheless, its oil output has increased steadily over the past five years, reaching 0.705m b/d in 2016, according to BP.

Last year the country's oil exports also surged to an eight-year high of 333,000 b/d.

Some of the region remains underexplored, due to territory disputes with neighbouring Indonesia. Both countries claim ownership of an area of the Celebes Basin, in the



Ancient and modern:
a Buddha statue in the
Genting Highlands, Malaysia



Rigs in the South China Sea.
Much of it is in contention

western Pacific Ocean, and potentially prolific deep-water areas of the South China Sea remain contentious.

Malaysia is the world's third-largest LNG exporter, after Qatar and Australia—and it has staked a claim as a technology leader too. Last year Malaysia's state-run firm, Petronas, brought online the world's first floating LNG platform, PFLNG Satu.

The facility is able to unlock gas reserves in remote and stranded fields which were previously deemed uneconomical to develop.

2020

The year by which all of Malaysia will have access to electricity

While more investment is being sought for its upstream operations, Malaysia is well-positioned to meet its surging energy demand and the transition to different energy sources over the coming years. ■

Good winds ahead

World Energy Focus talks to Michael Hannibal, chief executive of Offshore operations Siemens Gamesa, the company's renewables division, about what has driven its development and how the industry plans to continue to drive down the cost of renewable energy

Offshore wind power has come a long way since the first turbines began operating at Vindeby, Denmark, in 1991. That installation was recently decommissioned. With 11 turbines, each producing 450 kilowatts, it now seems a far cry from the large-scale turbines producing hundreds of megawatts at wind farms today.

But it is only in the last few years that the industry has seen an acceleration that has surprised even the most ardent wind power supporters. Not only has technology advanced but the wind sector has matured and industrialised to a level that has seen the levelised cost of energy (LCOE) reach its 2020 target level of €100/MWh (\$113.50) three years ahead of schedule. And there is more to come.

According to Hannibal, the industry has got where it is today through continuous innovation.

"From the early days, we developed platforms and evolved them to produce more and more energy. Then there would be a revolutionary step to the next platform," he says. "For example, the 2 MW turbine became a machine with a larger rotor and a larger rating to 2.3 MW; then there was the jump to the 3.6, which evolved to 4

MW through a larger and larger rotor; and then there was the revolutionary step to the 6 MW, which today is the platform for the 6, 7 and 8 MW units."

At the same time, the industry has gone from placing a handful of single turbines on the water to installing entire wind farms, with the commissioning of London Array in 2013 (including 175 turbines and 20 wind farms) marking the point where power plants were essentially being built at sea.

"London Array is so big that it can replace an entire onshore power plant," notes, Hannibal. "It has been a remarkable development. To come from small turbines to real power plants at sea has been an exciting journey to be on. It has happened over 20 years or so, with the real acceleration coming during the last 10 years."

Offshore wind power has developed quickly in terms of technology, scale and job creation while consistently beating cost reduction estimates.

Hannibal says: "We have constantly forecast to say where we will be in five years, 10 years, etc. And basically the 10-year point has been reached within five years by bringing in elements such as bigger turbines and industrialisation.

"The new wave is digitalisation, where



175

Number of turbines
at London Array

Optimistic: Michael Hannibal, CEO
Offshore operations for Siemens Gamesa

computing power is being used on our backlog of data. Basically, how you run a turbine or wind farm offshore has moved from reactive servicing to proactive, and now with digitalisation, to interactive servicing. Here, we can look at a digital twin [model] of a turbine to model what will actually happen with the turbines.”

Challenges ahead

All of these developments have seen offshore wind take a role in the generating mix that is indisputable. Wind provided more than half of all renewables growth in 2016, said BP in its 2017 annual statistical review. Yet challenges remain if this rollercoaster progress is to continue. Policy, technology and manufacturing are all key areas that could present obstacles.

Hannibal says policymakers need to continue their drive. “They could fall into the trap of, say, stopping subsidies or volume tomorrow because they have proven they are now where they should be.

“If we want to make the [cost] curve price points and the drivers for those points sustainable, there needs to be a pull from society. To run stable production factories, developers have to be sure that projects are coming,” says Hannibal.

Manufacturers and developers essentially have to be sure that there are certain volumes in the market in order to make the investments needed that will keep bringing costs down.

Hannibal says that technology and manufacturing challenges go hand-in-hand. While the industry has been able to design larger and larger machines,



London Array could replace an entire onshore wind power plant

he notes that the size-to-weight ratio is not linear. For example, if the weight of a hub for a 6 MW unit is 50 tonnes, it does not mean that a 12 MW turbine hub will weigh 100 tonnes.

“When the weight to power ratio is not linear, you start to go against the thinking that bigger is more beautiful. So technology and manufacturing have to work together to determine where the real optimum is for the next generation turbines.”

This not only applies to turbines but to foundations, towers, vessels for installation, etc. While it may be possible to engineer and even build a very large turbine and even install a single unit, commercialisation and industrial

production may be too difficult, resulting in a high LCOE from the wind farm.

“This is the current challenge for the next technological step for offshore turbines,” says Hannibal.

In addition to the ongoing innovation in turbines, the last four or five years has witnessed notable advances in foundations. Prior to this, foundations were typically built one at a time in a shipyard.

“We came up with several foundation designs with the aim of having one that could be serially produced. With our concept you can do a lot of prefabrication so you can perform lean manufacturing and assembly of components,” Hannibal explains. “This

has challenged some of the other foundation manufacturers, leading to more innovation in the area over the last couple of years.”

He adds that because foundation manufacturers started later than the turbine manufacturers, there is still room for improvement in the area.

Driving down costs

Looking ahead, Hannibal anticipates several things coming together that will result in the LCOE from offshore falling to nearly half of what is today over the next decade or so.

For existing turbines, evolving technology will allow more energy to be produced from machines already

“The new wave [of innovation] is digitalisation where computing power is being used on our backlog of data.” Michael Hannibal CEO Offshore operations for Siemens Gamesa

installed. At the same time a new generation of larger machines, will cut costs further. The electrical grid system will also be a key area that will contribute to lowering electricity costs. Just over a year ago, Siemens introduced what it calls the Offshore Transformer Module (OTM). The much reduced size and weight of the lightweight AC grid access solution serves to lower capital spending by up to 40% and is expected to reduce wholesale energy costs by £1.7/MWh (\$2.2) in 2015 prices. The first OTMs have now been sold and will be installed at projects in the UK and Germany.

In servicing, using data from machines in the field is also expected to drive down the cost of energy.

Hannibal says the project developers will play a major role in improving efficiency. “They now have a good understanding of risk and opportunities. This has a positive impact on the LCOE. Also we are currently supported by the low cost of capital.”

All of these factors lead to a prediction of LCOE reaching below €80/MWh in 2025. And Hannibal believes that with a sustained volume of projects, this could fall to around €50-65/MWh between 2025 and 2030. ■

2017 Executive Assembly 16–19 October 2017 Lisbon, Portugal

The Executive Assembly is the World Energy Council's annual general gathering of the global energy leaders' network. It convenes over 1000 energy leaders, from industry, governments, academia and others for ongoing dialogue on the challenges and opportunities facing the energy sector. Hosted by Portugal, the week-long event will allow for high level, exclusive CEO and Ministerial discussions, peer-to-peer interaction and sharing of best practice. The events' website can now be consulted for more information and members' registration <http://worldenergyassembly2017.org/en>



MEMBER COMMITTEE EVENTS

New Zealand Energy Panel 2017 – The Sector's Premier Pre-Election Event

2 August 2017

Wellington, New Zealand

The event, hosted by the New Zealand committee of the World Energy Council, will bring together the country's Minister for Energy and Resources, along with five other political parties representatives, to outline their proposed policies in the run up to the national general elections coming September. This is a unique opportunity to better understand where similarities and differences in energy issues policies might lie across New Zealand's political landscape: from upstream exploration and mining to downstream gas, electricity and transport fuel markets.

For more information, visit the website: <https://www.eventbrite.co.nz/e/energy-panel-2017-the-sectors-premier-pre>

election-event-tickets-34875658032?utm_term=eventurl_text

Gas & Energy Congress

23–24 August 2017

Santa Cruz, Bolivia

The Bolivian Chamber of Hydrocarbons and Energy (CBHE) will be organising the tenth edition of its Gas and Energy Congress. Bringing key actors from the energy industry, especially from the oil & gas sector, together with local, regional and international energy leaders and policymakers, since 2008, the Bolivian Gas and Energy Congress positions the country at the heart of the energy debate in the Latin American region and beyond. The two-day conference will reunite 20 international speakers and over 500 participants, including top level business executives from energy and service companies, political authorities as well as national and international media. The Gas and

Energy Expo, carried out in parallel to the Congress, specialises in welcoming the latest innovation in energy products and services with up to 100 stands and more than 2500 visitors.

For more information, visit the website: <http://www.boliviagasenergia.com>

World Energy Leaders' Summit: Energy in Transition — Leading through Change

12–13 September 2017

Mexico City D.F, Mexico

The World Energy Council will host the World Energy Leaders' Summit in Mexico on 12–13 September, which will form a highlight of a week of energy events co-hosted by Mexico's Secretariat of Energy. Under the theme Dialogues for the Future of Mexico 2017, the Summit will focus on Renewable Energy and Innovative Business

Models to Drive and Enable Change; Decentralised approaches to Balancing the Energy Trilemma; as well as Energy System Resilience and Energy Sector Reform. The Summit will bring together around 100 Ministers and CEOs from across the world to drive change and deepen understanding of the grand energy transition during a critical time for the sector

Participation is by invitation only, contact: <https://www.worldenergy.org/events/2716726e-2cb6-e611-80c3-00155d0511bf/>

During the same week, the Council will also host an open session on “Empowering Energy—Scaling up rural energy access through innovation”. Co-hosted by the Council, Oxfam Mexico and Barefoot College on 13 September, the session will explore the challenges and opportunities in bringing energy to rural areas and how new players and business models create synergies across communities. <https://www.worldenergy.org/events/78f523ce-5b4b-e711-80c6-00155d050ff0/>

International Summit for Electric Mobility

19–21 September 2017

Bogotá, Colombia

This event is aimed at creating a space for discussion and debate between government, private sector and academia for the development of electric mobility in the Latin American region. Electric mobility has been identified by the World Energy Council as a key element to achieve sustainable energy systems at national level and the potential of electric mobility in Latin American countries is extremely high. Feeding from one of the currently cleanest energy mixes in the world, and from the fast development for renewables integration, growth in demand for electric vehicles could potentially be fulfilled in a sustainable manner in the region.

For more information and registration, visit: <http://www.movilidadelctrica.org/>

ABOUT THE WORLD ENERGY 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. Find out how you can: 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: www.worldenergy.org/wec-network

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ABOUT WORLD ENERGY FOCUS

The World Energy Focus magazine is published monthly by *Petroleum Economist*. For more information, please visit www.petroleum-economist.com or www.worldenergyfocus.org

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