

A photograph of an offshore oil rig in the North Sea. The rig is a yellow and white structure on a concrete platform in the water. In the background, there is a large, snow-covered hill or island. The sky is overcast with grey clouds. The foreground shows a rocky beach with some snow and tall grass.

North Sea opportunities

Regional focus

Electric connections
Renewables and off-grid
for the future

Interview
Apex-Brasil President

Countries ranked
Energy Trilemma
Index 2017

Solar savings
Costs plummet

Technology and new business models boost electricity access

More people worldwide are getting connected for the first time with renewables and off-grid systems playing an increasing role, says International Energy report

A new IEA report found the number of people with no access to electricity fell to 1.1bn in 2016 down from 1.7bn in 2000. New technology and business models have been significant factors behind this progress—and clean energies and off-grid connections will account for a greater share of new connections in the future.

Since 2012, the number of people getting access to electricity for the first time has accelerated to more than 100m people per year. That is compared to 62m people per year between 2000 and 2012. At this rate, the number of people with no access to electricity is on track to fall from more than one billion today to 674m by 2030.

Developing countries in Asia have made significant progress, and the electrification rate in the region

reached 89% last year, up from 67% in 2000. According to the report, India is the frontrunner among developing Asian countries and will reach universal access well before 2030. China reached a full electrification rate in 2015, while 100m people in Indonesia and 90m in Bangladesh have gained access since 2000.

Latin America and the Middle East have reached 99% and 95% electrification rates, respectively.

Electrification efforts in sub-Saharan Africa outpaced population growth for the first time in 2014, leading to a decrease in the number of people without access in the region. Nonetheless, despite some progress in the last few years, the electrification rate in sub-Saharan Africa is currently just 43%.

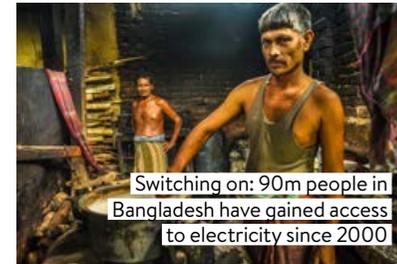
While several countries in the region, including Ethiopia, Gabon, Ghana and Kenya, are on track to reach universal electricity access by 2030, progress across sub-Saharan Africa is uneven. The number gaining access is failing to keep pace with population growth

in some countries. By 2030, roughly 600m of the 674m people still without access will be in sub-Saharan Africa, mostly in rural areas.

By 2030, renewable energy sources will power over 60% of new electricity sources — that is, people accessing it for the first time

Analysis on the IEA's database reveals that from 2000 to 2016 nearly all of those who gained access to electricity worldwide did so through new grid connections, mostly with power generation from fossil fuels. Over the last five years, however, renewables have started to gain ground, as have off-grid and mini-grid systems, and this shift is expected to accelerate.

By 2030, renewable energy sources will power over 60% of new access to electricity, and off-grid and mini-grid systems will provide the means for



almost half of new access, underpinned by new business models using digital and mobile technologies.

Since 2000, most new access has come from fossil fuels (45% coal, 19% natural gas and 7% oil). The technologies used to provide access, however, have started to shift, with renewables providing 34% of new connections since 2012, and off-grid and mini-grid systems accounting for 6%. The declining costs of renewables, efficient end-user appliances and innovative business models for access are all having an impact.

This combination of factors is set to transform the energy access landscape in the years to come, says the report, especially in rural areas. From now until 2030, new connections to the grid will bring electricity to over half of those that will newly gain access, and offer the most cost-effective means of access in urban areas. Meanwhile decentralised systems will be the most cost-effective solutions for more than 70% of those who gain access in rural areas. ■

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43%

Electrification rate in Sub-Saharan Africa

Solar costs ‘will plummet further’

The cost of producing energy from the sun will continue to fall over the next decade, helping to expand its popularity



Big boost: solar panels being fitted in Jiangxi, China

Solar power is booming, thanks to efficiency improvements and falling costs, and that looks set to continue, according to the International Renewable Energy Agency (IRENA).

The head of IRENA Adnan Amin says solar power costs will fall by 60% over the next decade and 80–90GW of new capacity will come online every year in that timeframe—enough to power 8bn LED lightbulbs.

60%

How much solar costs will fall in next decade

IRENA’s forecast for solar power expansion is higher than an earlier one made by the International Energy Agency, which expects capacity to rise by 73GW every year over the next decade.

This growth will be led by China, as it relies on renewables to cut air pollution from coal-fired plants.

Amin also says Southeast Asia’s target of renewables comprising 23% of its power generation 2025 is “ambitious but achievable”.

IRENA also expects the cost of batteries—key to backing up intermittent solar power—to fall by 60–70% over the same period, giving a further boost to renewables capacity expansion. ■

North Sea discovery

Statoil announced the first new discovery of oil this year in the North Sea, off the coast of Scotland—a welcome boost to a rapidly declining region, where exploration activity is at the lowest level since the 1970s.

The find is believed to contain up to 130m barrels of crude. The company’s focus will now shift to the Arctic. Only one small discovery was made in the Barents Sea this year, but five new wells are planned for 2018. ■

Lebanon’s first licensing round ends

Lebanon reached a milestone last month as its first offshore bidding round drew to a close. A consortium comprising France’s Total, Italy’s Eni and Russian-firm Novatek submitted one bid on block 4 and one bid on block 9. Neighbouring Egypt and Israel have made huge offshore natural gas discoveries and Lebanon is estimated to have reserves of 95 trillion cubic feet of gas in place, but the process has long been delayed due to domestic and geopolitical uncertainties. ■

Nuclear back on track

South Korea plans to restart building work on two nuclear reactors, construction which was previously suspended—but construction plans for six others have been cancelled. President Moon Jae-in pledged to cut the country’s reliance on nuclear power before he was elected in May. But a survey has since shown the population is in favour of nuclear power. South Korea is the world’s fifth-largest consumer of nuclear power. Its 24 nuclear reactors generate a third of the country’s power. Alternative fuels such as wind and solar will be used to replace the 8.8GW capacity of the six reactors which will now not be constructed. ■

Oil disruptions down

Unplanned global oil supply disruptions fell to 1.6m barrels per day (b/d) in September, according to the US Energy Information Administration. The EIA says this was the lowest level since January 2012. Unplanned oil supply disruptions have fallen by more than 1m b/d in the past six months, as outages in Libya, Nigeria, and Iraq abated. ■

World Energy Focus—2017 Annual edition

The *World Energy Focus* is the official annual publication of the World Energy Council. Released at the World Energy Week in Lisbon and brought to you by *Petroleum Economist*, the 2017 edition features interviews and articles from CEOs, energy ministers and leaders from around the world about the energy transition and how innovation is driving change in the sector. Get a fresh and insightful perspective from international leaders into those policy, digital, decarbonisation and business models innovations that are taking us towards a sustainable energy future.

[Download the annual issue of World Energy Focus for free here](#)

News in brief

EPA BEGINS REPEAL OF OBAMA’S CLEAN POWER PLAN

The US Environmental Protection Agency has moved to formally kill the Clean Power Plan (CPP), beginning a lengthy process to dismantle the key climate regulation of the previous Obama administration. EPA Administrator Scott Pruitt will kickstart repeal proceedings on the rule, which limits carbon emissions from power plants and was explicitly designed to reduce the amount of coal burned across the country. The EPA says Obama’s CPP would cost \$33bn annually—a huge difference to the Obama administration’s estimate that the rule would bring about \$30bn a year in savings.

LOW COST RENEWABLES ‘CAN LIFT TANZANIA LIVING STANDARDS’

If it deploys 100% renewable power, Tanzania can provide access to reliable energy for all its citizens, while increasing living standards to the level of industrialised countries by 2050. A scientific study released by the Institute for Sustainable Futures (ISF) of the University of Technology Sydney (UTS), Climate Action Network Tanzania (CAN Tanzania), Bread for the World and the World Future Council (WFC) also reveals that electricity generated from renewable sources would be about 30% cheaper than from fossil resources in Tanzania.

PLAN TO EASE GAZA POWER CRISIS

The Palestinian Energy Authority has drawn up a plan to ease Gaza’s electricity crisis as the National Consensus Government takes charge of the Gaza Strip from Hamas. Gaza needs between 400 and 450 MW of power but currently has only 147 MW of supply, i.e. a deficit of about 70%.



Changing times

Switched on: Power generation is taking new forms

The World Energy Council's *World Energy Trilemma 2017* highlights distributed power as a way countries can balance energy security, sustainability and equity for the future

The global energy sector is going through big changes. At a time when consumption globally is increasing rapidly—with electricity demand set to double by 2060—the sector is being transformed by three major trends: decarbonisation, digitisation and decentralisation. And they are having a huge impact on both demand and supply dynamics. These trends are not only reinforcing each other but are helping to facilitate the growth of empowered consumers.

This year, the *World Energy Trilemma 2017* 'Changing dynamics—Using distributed energy resources to meet the Trilemma challenge', report looks at how decentralisation is affecting the energy transition and explains how distributed

energy resources (DERs) are playing a role. It also explores how these smaller power sources can help meet the 'energy trilemma' challenge: balancing energy security, sustainability and equity.

The report that will provide the foundations for discussions at COP23 in Bonn, where it will be officially launched on 15 November, finds that countries that do not take the necessary steps to integrate distributed energy resources will face heightened energy security risks, potential infrastructure problems and investment challenges.

DERs driving change

DERs—whether in the form of rooftop solar PV, aggregated generating capacity or electric vehicles—are

expected to play an important role in the future of global energy supply.

One of the report's key findings is that improved efficiency and falling technology costs are expected to further accelerate the importance of distributed generation, particularly renewables, in the energy transition.

More than 50% of energy leaders surveyed for the report said they expect a rapid increase in distributed generation—to a share of 15% or higher—of the installed generation capacity in their country by 2025. This represents a significant shift in the generating mix but there are large regional variations based on countries' current electricity grid structures and how their regulatory systems work.

Along with the increase in distributed generation, energy storage, including batteries, is becoming a key element of the grid of tomorrow, increasing efficiency and helping to stabilise prices. Over the past decade, storage installation projects have sharply increased and that trend is expected to continue over the next 5–10 years, as global energy storage capacities, along with revenues from utility-scale applications.

“Companies like Google and Amazon, or other companies providing services to the home, may decide that they will also provide energy by buying it wholesale and selling it on in a package or bouquet of services to consumers”

New players, new services

Sir Philip Lowe, Executive Chair of the *Trilemma 2017* report, says: “Through the application of renewable technologies, in particular solar and wind, there is the possibility of generating power locally for local consumption. There is also the possibility for those who are not utilities to both produce and consume... already the technologies needed for local production and consumption are creating a change.”

According to Lowe, increasing decentralisation and heightening focus on how energy is consumed leads to

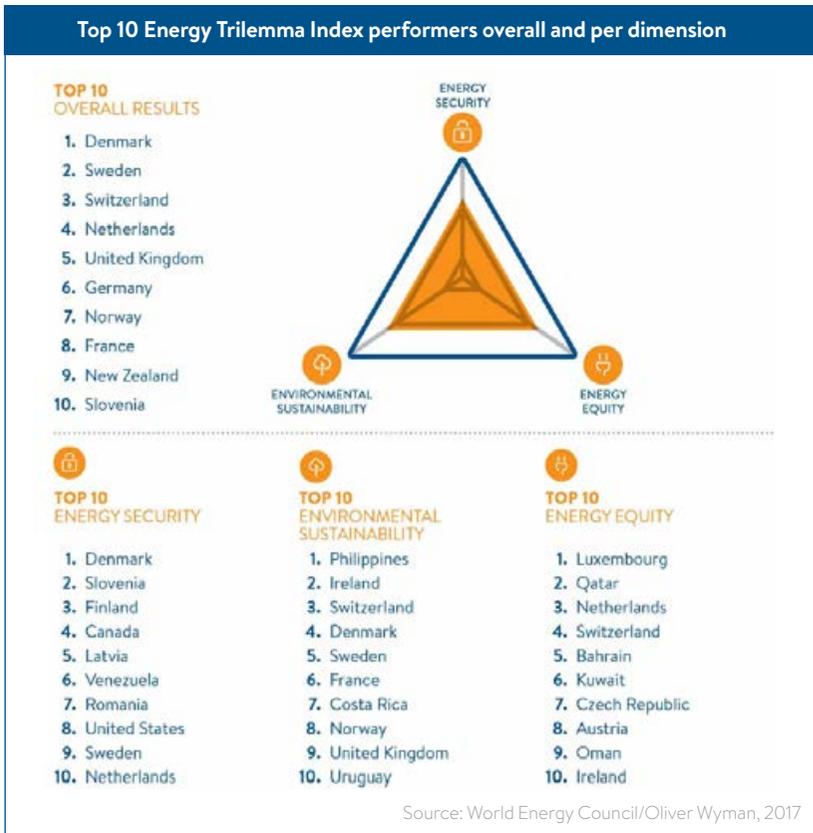
19.3%
Proportion of final energy consumption worldwide in 2015 made up by renewables

greater competition on the consumer side. “If there are more sources of energy locally, there is more choice for the consumer,” he says. “With digitalisation, there is also the possibility to better measure how power is used, and to consume it when it is cheaper.”

The focus on consumers and local systems has seen companies turning their attention towards providing better services to customers. One implication of this is that traditional energy companies will not be the only ones in the game. Companies that have more experience of dealing with consumer needs—be they households or businesses—will be part of the picture.

Joerg Staeglich, partner at Oliver Wyman, says: “Providers that can expand their offerings to include products that offer the latest technology to allow customers choice in how they access and consume energy or ways to simplify customers' lives such as digital home services will be the most likely to capture a competitive position in an increasingly crowded marketplace.”

“Companies like Google and Amazon, or other companies providing services to the home, may decide that they will also provide energy by buying it wholesale and selling it on in a package or bouquet of services to consumers,” said Lowe.



“It’s [about] how suppliers can provide everything the consumers need, as well as how consumers can choose best the services they need, including the energy they are buying.”

He explained: “For example, a farmer in Scotland who with his neighbours has built a wind farm and/or a facility to use animal waste to produce electricity, has the opportunity to have more secure, competitively-priced energy. But it may be that he and his neighbours also need to buy energy during periods where renewable sources are

intermittent. He may also need a lot of advice on how to minimise use of energy but also to maximise its use when the price is low. So the second challenge in addition to the greater emphasis on local systems and local networks is to measure energy more effectively.”

Government action

The trend towards decentralisation and a greater focus on consumer needs will change systems radically, the *World Energy Trilemma Report* says.

“Some will remain predominantly centralised but the vast majority will have a substantially increased share of distributed generation,” says Lowe.

While the transmission system will remain important, in a more decentralised setup the focus in the energy balance goes much more to the distribution network level. Such fundamental change will not all be smooth, and will call for some serious thought from governments.

In many countries, regulatory frameworks are trying to catch up

with technology options and shifting energy users’ demands. Policymakers must move quickly to seize new opportunities in meeting their countries’ energy needs. Staeglich notes that developing the right energy framework in the face of shifting technology won’t be easy and “energy will remain a space where political and technological disruptions meet.”

There will be new opportunities for policymakers coming out of the *Energy Trilemma*. This will require managing a greater diversity of market actors and

technologies without fragmenting the energy system. Provided governments and regulators allow and plan for it, empowered consumers can play a key role in the grand energy transition.

As Lowe says: “The other thing that is coming out of the report is that governments will have to think about how they plan and regulate to deal with this diversity—not to frustrate it but to encourage it. At the same time they must channel it toward the social and economic objectives they want to achieve.” ■

World Energy Trilemma Index 2017

The World Energy Council’s definition of energy sustainability is based on three core dimensions: energy security, energy equity, and environmental sustainability. Balancing these three goals constitutes a ‘trilemma’ and is the basis for the prosperity and competitiveness of individual countries.

The *World Energy Trilemma Report 2017*, prepared in partnership with global consultancy Oliver Wyman, along with the Global Risk Centre of its parent Marsh & McLennan Companies, tapped into the global insights of the traditional and emerging players in the electricity sector. Including policymakers, regulators, traditional utilities, large consumer/prosumers, and technology providers, it captures a wide range of views on the evolution of the energy sector.

The report identifies key focus areas for regulators and policymakers to

use of the *Energy Trilemma* and make progress on each dimension of it.

The *2017 Energy Trilemma Index* reveals signs of progress on all dimensions of the *Energy Trilemma*. Eight of the 125 countries assessed achieved a triple-A score, down from 13 in last year’s index. Efforts to increase resource productivity and manage energy demand growth will be key in ensuring a balanced *Energy Trilemma*.

In the countries included in the Index, access to electricity and clean cooking fuels have both increased by 7%, to 87% and 75% respectively, since 2000. Meanwhile, cleaner fuels are being used to support energy access and economic growth, with renewables making up 19.3% of final energy consumption worldwide in 2015. A more diversified and low-carbon mix will help to improve energy security and environmental sustainability, but its positive effects

may be stifled by rising final energy consumption, which is forecast to increase by up to 46% by 2060.

This year Denmark, Sweden and Switzerland top the Index once more, with Denmark also achieving the highest score for energy security. While not in the top 10 overall, Luxembourg maintains its position for most equitable (affordable and accessible) and the Philippines is leading the way on the environmental sustainability dimension. In Latin America, Uruguay ranks the highest, while in the Middle-East, Israel outperforms its regional peers. In Sub-Saharan Africa, Mauritius performs best, and in Asia, New Zealand remains at the top of the regional leader board.

[The updated 2017 Energy Trilemma Index ranking will be available on 15 November at trilemma.worldenergy.org](http://trilemma.worldenergy.org)



Turning tide: The role of the North Sea in European economies is changing

Sea of possibilities

Collaboration will be the key to maximising the North Sea's remaining potential

After decades of prosperity, oil and gas production is in decline in the North Sea and reserves will be depleted within a decade, according to a new report by Edinburgh University.

This is despite a recent discovery by Statoil of around 25m recoverable barrels of oil close to the Scottish coast.

It's not all doom and gloom however. *The North Sea Opportunity*, a report published by the Netherlands Committee of the World Energy Council, highlights that there are opportunities to cut the costs of decommissioning and even open up new markets including wind and biomass.

“Oil and gas will continue to be an important source of energy for the foreseeable future,” said Dr Uwe Franke, Chairman of the German committee of the World Energy Council and contributor to the report. “But with more and more offshore wind farms being built, the North Sea region is also supporting the energy transformation in northwest Europe.”

The North Sea borders the United Kingdom, Scandinavia, Belgium, the Netherlands, Germany and France. *The North Sea Opportunity* found that the cost of decommissioning old oil

and gas assets there between now and 2050 will reach between €80–100bn (\$94–\$118bn). On top of that, €250–500bn (\$293–\$585) in investment is needed for offshore wind assets and related infrastructure between now and 2030. That figure could even be higher if planned projects for offshore wind are confirmed by those countries who have not yet committed.

So how can governments avoid the burden being put onto the tax payer of each nation? “Efficiency is key,” says Dr Franke. “Efficiency gains alone could lead to costs savings of about

25%
Amount of North Sea oil and gas assets which could be repurposed

€38bn for the realisation of offshore wind projects and about €27bn for the decommissioning of oil and gas platforms.”

Not all the old infrastructure from oil and gas will have to go to waste. About 25% of it could be used for other

purposes, including the storage of renewable energy and carbon capture.

There are also potential savings to be made, as identified in the report, by combining energy activities with other maritime operations.

The report's authors found that seaweed farming in offshore windfarms could be an important source of biomass—the equivalent of more than 10% of total Dutch energy consumption.

As yet, this is a relatively unexplored option, and substantial regulatory and supply chain challenges remain.

“The North Sea presents concrete business opportunities for those willing to harness its long-term potential, but it also increases the need for cooperation and coordination across borders and sectors,” Dr Franke says.

Working together

One of the difficulties of utilising these savings and new opportunities is that most activity is organised nationally rather than internationally—decommissioning is an example of this. Grouping several decommissioning projects together would allow the supply chain to organise itself in a more efficient way, the report says.

Jan Willem Velthuisen, chief economist for the Netherlands at PwC, led *The North Sea Opportunity* report. “You can do decommissioning in the



Growing: The North Sea has a vast potential for offshore wind capacity

smart way or the stupid way and now is the time to decide which it is,” he said, “We have shown that co-ordination will reduce costs, if companies go in together with government involvement.”

This could ensure a standardised process, where all projects were carried out in the most efficient way, and information shared between different stakeholders. Decommissioning is no small task, involving over 300 oil and gasfields, around 5,000 wells, more than 500 platforms and 10,000km of pipelines.

The *North Sea Opportunity* found that 99% of the costs associated with decommissioning are set to fall on Norway, the UK and the Netherlands. That makes it even more imperative that some form of collaboration is worked out for the citizens of those nations, which could ultimately see an increase in costs for consumers as companies look to recuperate their

losses between now and 2050.

Governments in Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway and the UK signed a political declaration in June 2016 on energy cooperation which provides a framework for cooperation between borders.

The fact that the agreement was signed after the UK's June 2016 vote to leave the European Union, signals a willingness from the country to work in tandem with members of the bloc even after leaving it, Velthuisen says.

The next step will involve converting that commitment into practical action. Velthuisen says talks have already begun with companies including Shell and DNV GL, the European Commission, and individual governments.

“There has been a wave of interest, such as conferences looking at offshore wind in combination with decommissioning, which we did not see a few years ago,” he said. “I am

under no illusions that this is going to be easy, but we can at least start with independently collected information.”

“You can do it the smart way or the stupid way”

The EU has promised to look at easing prohibitive regulations to make the process of collaboration on decommissioning and repurposing old assets an easier one.

Offshore wind has the potential to be developed in the North Sea. The report's findings suggest up to 250 gigawatts could be added by 2050.

But in a time of dwindling government subsidies for wind and solar in Europe, investment for that capacity will need to come from the private sector.

Dr Franke cites the He Dreiht offshore wind farm, a joint project

between EnBW and Dong Energy which was confirmed in April this year, as an example of things to come. It will be the first in the world to be built without government funding.

“A number of developments in the offshore wind sector have lowered costs significantly, but further cost reductions are needed for the technology to become cost-competitive,” he said. “However, government subsidies will play less of a role in the future.

Obstacles ahead

In some cases, the report's authors admit the technology needed to harness the potential they have outlined still needs to be developed.

In the case of repurposing old oil and gas assets to use for carbon storage or other uses, the idea is still at a very early stage of development and more pilot projects are needed.

Eni's rig-to-reef project, where old equipment was left at sea to become an artificial reef for marine life, and a pilot by Dutch operator NAM in which a gas processing platform was stripped down to install a solar array, were both cited as examples.

More work is needed, but for now, the message is clear as far as the report's contributors are concerned.

“Governments need to work closer together to realise the full potential of the North Sea,” Dr Franke says. “For example, a coordinated grid expansion is necessary for power from offshore wind to be distributed to where it is needed. This calls for an even stronger linking of regional markets, not least to avoid stranded assets and overcapacities.” ■

€80–100bn
Decommissioning costs between now and 2050

Brazil goes green

Despite having vast oil reserves and only slowly emerging from recession, the country is focusing on growth in its energy sector and renewables are key to its strategy

Slowly emerging from the worst recession in its history, Brazil is now trying to lure investors back to its energy sector but not for hydrocarbon exploration. Instead, the country is focusing on the launch of greener energy projects.

Last year Brazil added 9 gigawatts of renewable energy capacity, according to the International Energy Agency—a 43% rise from 2015's level.

This is an impressive feat considering Brazil's economic woes has led to the cancellation of renewable project auctions and power purchase agreements (PPAs) in the past year, putting the financing for such projects into doubt. The government awarded only 0.6 GW of new capacity from hydropower and bioenergy projects in 2016, low when compared to the 5–7 GW awarded annually 2013–15.

Growth in the sector over the past decade has been driven by a combination of auctions with long-term PPAs, and low-cost financing from the Brazilian Development Bank (BNDES). But more recently capacity growth has slumped—along with demand increases—due to the country's economic crisis.

Trade body Apex Brasil is aiming to kickstart financing again from bonds, private equity and NGOs. The organisation's president has made

recent visits to London and Singapore in a bid to drum up support.

Apex Brasil President Roberto Jaguaribe told *World Energy Focus* in London that Brazil has thousands of renewable energy projects which need infrastructure investment. Nevertheless, he is confident he will find the money needed.

"It (investment) is growing every year, from a few million at the start to billions of dollars. No one wants to lose money, not even for the best cause in the world," Jaguaribe said. "But being green is fashionable, it's very marketable."

The IEA estimates that Brazil will add 21GW of renewable energy capacity over the next five years. This increase has been revised down by over a third because of funding constraints during the economic crisis.

The country is blessed with abundant natural resources from which to harness renewable energy, including a coastline of nearly 5,000km and more than 300 days of sunshine every year in some states.

43%
Increase in Brazil's renewables capacity between 2015 and 2016

But Brazil's deputy energy minister, Paulo Pedrosa, said in July that the government would not be issuing new licenses for solar or wind power generation projects—the last one was given in 2015.

"There is no significant support from government, but we get close to 90% of our electricity from renewables in Brazil," Jaguaribe says. Most of this comes from hydropower which comprised 66% of the total in 2016, with fossil fuels and other renewables such as biofuels making up smaller shares.

Jaguaribe believes there are attractive opportunities for investors, even without the sweetener of government subsidies.

"The only question is why we didn't start earlier. But we can still go ahead and become a big player," he said.

Talks have already begun with the Climate Bonds Initiative (CBI)—a not-for-profit organisation aiming to increase liquidity in the green and climate bonds market to lower the cost of low-carbon energy projects—and the Green Finance Initiative—a UK government investment fund. Jaguaribe said Apex will also lobby Brazil's government to do more to encourage investment in green energies.

He identified wind power as a key area for growth, but there are obstacles. Another 6.5GW of capacity is expected to come online in Brazil in the next five years, the IEA says, though there are some grid connection challenges from remote locations. The relative weakness of the Brazilian real compared to the US dollar also makes turbines and other equipment expensive to import. However, hydropower's



New projects: Apex Brasil president Roberto Jaguaribe

450
of the top Fortune 500 companies are in Brazil

growth is expected to soar. The IEA forecasts Brazil will be the second-fastest growing market for hydropower between 2017–22. Only in China will capacity be added quicker.

Hydropower already makes up the majority of electricity generation in Brazil with its share forecast to increase from 66% in 2016 to over 68% in 2022, according to the IEA. These forecasts are based on the assumption that two large projects, Belo Monte and Baixo Iguacu, will be fully commissioned and online in that timeframe.

Biofuels boost

When it comes to biofuels, Jaguaribe is keen to stress that Brazil—the world's largest sugarcane producer—has been selling ethanol as a transport fuel since the 1980s and has made flexible fuel vehicles—vehicles which can run on more than one fuel, for example, both gasoline and ethanol—since 2003.

"Even when you fill your car with gasoline, it is still 25% ethanol and there is the option of 100% ethanol," he said.

Brazil aims to increase the share of sustainable biofuels in its energy mix from about 9% last year to 18% by 2030.

Jaguaribe admits this use of environmentally-friendly biofuels in transport has made the push towards electric vehicles less urgent than it has been in other nations.

One thing which might deter investors from Brazil's low-carbon sector is the perceived risk premium of doing business there, exacerbated by the Lava Jato (Carwash) corruption scandal which implicated the country's state-run oil firm, permeated to the heart of its government and spooked investors. But Jaguaribe stressed that international oil majors such as Shell, which have been involved in Brazil's upstream for more than 100 years, remain operating there.

"450 of the top Fortune 500 companies are in Brazil," he said. "I'm not going to say it is easy to do business in Brazil because that would be a lie, but those who are there stay because they know the benefits."

Recent changes to the rules for oil and gas exploration, including a reduction of domestic content requirements, are examples of how Brazil is becoming more open to outsiders. And it seems to be working.

ExxonMobil bid on eight blocks in the country's latest licensing round this month putting down a total of \$0.6bn in signature bonuses, a sign of faith in Brazil and its recent reform measures.

"We are back. It's a good signal," Jaguaribe said. ■

Africa Energy Indaba 2018 20–21 February 2018

Johannesburg, South Africa

The Africa Energy Indaba Conference is the World Energy Council's annual African regional event. The 10th edition will focus on key issues that impact the African Energy Sector. Delegates, drawn from all continents, represent an unrivalled combination of industry experts, project developers, financiers, energy users,

government officials and manufacturers. Based on the outcomes of the 2018 Africa Energy Ministerial Roundtable, the conference will help shape energy policy for Africa. Sessions under preparation will cover topics such as resilience, the impact of digitalisation, innovative funding, the role of the mini grid to improve rural access and regional projects.

[For more information visit
http://www.africaenergyindaba.com/](http://www.africaenergyindaba.com/)



Council of Canada in 2001 to recognise and pay tribute to a Canadian energy leader who has made a significant impact at national and international levels within the energy sector, the awards process culminates in a ceremony that will be held on November 16 at the InterContinental Toronto Centre.

[For more information: http://energy.ca/energycouncil/canadian-energy-person-of-the-year-award-2017](http://energy.ca/energycouncil/canadian-energy-person-of-the-year-award-2017)

German Energy Day 21 November 2017

Berlin, Germany

Europe has set ambitious energy and climate policy goals but the variety of national interests continue to challenge the common joint energy and climate strategy. What are the new post-election energy policies in the UK, France and Germany? What kind of impetus should COP 23 provide to strengthen the Paris Agreement? What should each country's contribution be to secure a sustainable global transformation of our energy systems? These are some of the topics that will be discussed by global energy experts at the 2017 German Energy Day hosted by the World Energy Council's German member committee.

[For more information and registration:
http://www.weltenergiertag.de/veranstaltungen/energietag/](http://www.weltenergiertag.de/veranstaltungen/energietag/)

Energy futures: cyber security and financing emerging transitions 29 November 2017

Madrid, Spain

The annual event of the Spanish Committee of the World Energy Council (CECME), re-known for its dynamic format and strong international attendance, will focus this year on two key topics to the energy sector: cyber security and financing the energy transition in emerging countries. The event is organised by CECME and the Spanish Energy Club, with the valuable support of Real Instituto Elcano and CEPESA's sponsorship.

[For more information: http://www.enerclub.es/extfrontenerclub/img/File/indexed/cecme/Site/Site-Spa/21_eventoanual.htm](http://www.enerclub.es/extfrontenerclub/img/File/indexed/cecme/Site/Site-Spa/21_eventoanual.htm)

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

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GLOBAL EVENT

WEC at UNFCCC 23rd conference of the Parties—COP23

15 November 2017

Bonn, Germany

The global energy sector is undergoing significant transformations that will have an impact on the climate challenge. The World Energy Council and its network are taking an active role in COP23 to shape the global dialogue towards sustainable energy:

- > **Breakfast briefing** co-organised with BDI and ICC (by invitation only)
- > **UNFCCC official side event**, co-organised with the Estonian Environment Ministry (1.15pm Bonn zone, Meeting room 2) “Is the energy world more or less sustainable and how do leaders respond to the Trilemma challenge?” Join the high-level panel with energy and environment leaders for the launch of the World Energy Trilemma.
- > **Exclusive Dinner** “Collaboration and Innovation: Leading to a Sustainable Future” co-organised with Weltenergiertag-Deutschland (by invitation only)

[For more information and to register your interest contact \[mazzone@worldenergy.org\]\(mailto:mazzone@worldenergy.org\)](http://www.worldenergy.org)

MEMBER COMMITTEE EVENTS

Nordic Energy Forum

14–15 November 2017

Helsinki, Finland

The Finnish member committee of the World Energy Council hosts its regional summit, the Nordic Energy Forum. Responding specifically to the need for increasing international cooperation in the regional energy sector, the Nordic Energy Forum serves as a networking event and source for the latest information. Gathering participants from all over the Baltic Sea region and beyond, the two-day programme covers topics from European Union energy policy to electricity markets, transport and digitalisation. Speakers and panellists include leaders, policymakers and regional energy businesses as well as CEOs of Vattenfall, Fortum Corporation, Eesti Energia, GE Europe and Pohjolan Voima.

[For more information watch the video and register: http://www.energiamedia.it/4a-conferenza-nazionale-cyber-security-energia-roma-15-novembre-2017/](http://www.energiamedia.it/4a-conferenza-nazionale-cyber-security-energia-roma-15-novembre-2017/)

<http://www.energiamedia.it/4a-conferenza-nazionale-cyber-security-energia-roma-15-novembre-2017/>

4th National conference on energy cyber security

15 November 2017

Rome, Italy

The objective of the “IV Conferenza CSE (Cyber Security Energia)”, co-organised by the Italian member committee, is to verify, confirm and debate the significant shift towards greater security in its digital operations on which the entire Italian energy sector has embarked, following the global trend and local regulatory pressure.

[For more information and registration:
http://www.energiamedia.it/4a-conferenza-nazionale-cyber-security-energia-roma-15-novembre-2017/](http://www.energiamedia.it/4a-conferenza-nazionale-cyber-security-energia-roma-15-novembre-2017/)

2017 Canadian Energy Person of the Year

16 November 2017

Toronto, Canada

The Energy Council of Canada is pleased to announce that the 2017 recipient of the Canadian Energy Person of the Year Award is Mr Al Monaco, president and CEO of Enbridge Inc. Established by the Energy