THE ENERGY INDUSTRY TIMES

October 2015 • Volume 8 • No 8 • Published monthly • ISSN 1757-7365 www.teitimes.com

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Climate change efforts intensify ahead of Paris

The WRI's Andrew Steer says prospects for a global deal have brightened

Countries are intensifying their efforts on climate change and sustainable development as they prepare to secure a deal at crunch talks in Paris. **Junior Isles**

Climate change rhetoric is ramping up as countries pull out the stops in an attempt to reach a global agreement on climate change in December.

On September 25th the United States and China released a Joint Presidential Statement on Climate Change. The Statement builds on last November's announcement by President Obama and President Xi of ambitious, respective post-2020 climate targets.

The announcement articulates new domestic actions, a common vision for success in Paris and significant climate finance commitments.

Notably, China confirmed that it plans to launch in 2017 a national emissions trading system covering power generation, steel, cement, and other key industrial sectors, as well as implement a "green dispatch" system to favour low-carbon sources in the electric grid.

Further steps to help accelerate the transition to low-carbon development internationally, include a new climate finance commitment by China of CNY20 billion ($3.1 billion) to help developing countries combat climate change.

The two countries also committed to deepening bilateral cooperation. This includes continued progress towards implementation of CCUS (carbon capture use and storage) projects with the selection of a site in China as the large-scale CCUS demonstration project announced last November

Andrew Steer, President & CEO, World Resources Institute (WRI) welcomed the Statement, saying: "These two major countries have found common ground on the three most critical elements of a strong agreement in Paris: a long-term goal for the transition to a low-carbon economy this century, creation of a process that builds greater ambition over time, and a transparent system that will instil confidence that countries will follow-through on their commitments.

"The prospects for a global climate agreement have brightened. Combined with inspirational messages this week from the pope, businesses and governments, we're edging closer to a strong outcome in Paris this year."

It was an important week for climate change and sustainable development. Pope Francis followed an address on climate change in Washington by opening a UN meeting in New York that later saw the adoption of new Sustainable Development Goals (SDGs).

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Extreme weather risks call for smarter solutions, says WEC

New approaches are required for the management and financing of energy infrastructures as companies and governments seek to meet the challenges of increased extreme weather risks caused by climate change, says a new report from the World Energy Council (WEC).

The report, 'The road to resilience – managing and financing extreme weather risks', highlights the need for a move from 'Fail-Safe' systems that only look at single assets to 'Safe-Fail' systems which take a systemic overview of the energy value chain and a more strategic approach to identifying vulnerabilities.

Extreme weather can significantly affect the various electricity generation options such as fossil fuels, nuclear power, hydropower and renewable energy. For example, plants located near coastal areas are at risk from more intense storms and sea-level rise.

The impacts can be on the plant equipment itself as well as on the demand side with associated impacts on revenue. Hot days increase the demand for power for air conditioning while also potentially diminishing the supply of cooling water for power plants and around the distribution network. In this case an increase in demand coincides with a decrease in supply, threatening grid stability.

At a time when energy systems are increasingly integrated, resilience is no longer only about returning single assets to full operation after a sudden event, says the WEC. "When interdependent parts of a system are blacked out, the system can become deadlocked. As Hurricane Sandy and other extreme weather events have illustrated, re-starting of the entire system can be delayed by days if such parts cannot be restarted autonomously," it states.

The WEC resilience project seeks to understand how entire energy systems can bounce back, and how they can prepare for future disruption and system stress.

According to the WEC, a 'smarter not stronger' approach or soft resilience can make energy supplies more secure, more reliable and can contribute to the quicker restoration of services in case of disruptions. Soft adaptation measures are increasingly complementing traditional hard resilience measures.

Christoph Frei, Secretary General of the World Energy Council said: "We are on a path where today's unlikely events will be tomorrow's reality. We need to be smarter and imagine the unlikely. Traditional 'Fail–Safe' systems, based on predicted events, no longer operate in isolation. New 'Safe-Fail' systems, which recognise that unexpected weather events are occurring and that systems which go down need smarter, not stronger, solutions."

The report notes that taking a systemic approach to identify technical risk naturally enables the development of innovative financing for the energy sector. "Shifting from historical mind-sets towards future-focused planning can incentivise private investors, who have otherwise considered energy too high-risk for traditional sources of financing," it stated.

Protecting energy infrastructure assets from extreme weather, notes the WEC, will add significantly to the estimated $48-$53 trillion in cumulative global investment needed in energy infrastructure by 2035.

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The SDGs aim to address the interlinked problems of inequality, hunger and climate change by 2030 through 17 key themes, including access to clean energy and building sustainable cities.

Although the 169 targets of the 17 goals have to be translated into policies around the world, the adoption is an important first step in a process that will be fully agreed by March 2016.

Commenting on the adoption of the SDGs, Yolanda Kakabadse, President of WWF International said: "Game-changing government decisions that benefit both people and the environment come along very rarely and never before at this scale and level of ambition."

She added: "For these goals to become a reality, decision-makers must demonstrate their intention to implement the 2030 Agenda and its Sustainable Development Goals is real, and make their efforts transparent through careful follow-up and review."

At the start of NYC Climate Week, leaders of sub-national governments spanning North and South America, Europe and Australia announced collective climate targets that would save 7.9 Gt CO_2e by 2030 – greater than the US's carbon emissions in 2012.

Despite objections from Poland European Union ministers finalised their negotiating position for this year's crucial UN's COP21 Climate Change Conference in Paris and pledged to reach peak carbon emissions by 2020.

As the host of the COP21 meeting, France is particularly enthusiastic for a deal to be reached. A recent survey by the joint Centre for European Economic Research (ZEM) and Grenoble Ecole de Management (GEM) Energy Market Barometers, showed 62 per cent of French energy experts do not expect a legally binding agreement to emerge from COP21.

At a special meeting in Paris in mid-September, French President François Hollande said: "France wants to set an example. We have already taken some steps like those mentioned by the ministers… but we have to speed up our efforts to become a carbon-free economy."

At the meeting, Energy and Environment Minister Ségolène Royal reaffirmed France's climate commitments and announced that it will end subsidies allocated to firms exporting coal power plants, which do not have carbon capture and storage.

September also saw Eurelectric publish a position paper that proposes five key recommendations for a successful COP21 outcome, one of which is to promote the role of market-based mechanisms including carbon markets and carbon pricing.

The recommendation came as the World Bank revealed that the number of carbon pricing schemes worldwide has risen from 20 to 38 since 2012, with South Korea opening its emissions trading scheme this year and Chile and South Africa planning to introduce taxes on carbon emissions.

The Bank said, however, the majority of schemes currently have prices that are too low to help them prevent catastrophic impacts of climate change.

Rachel Kyte, World Bank Group Vice President and Special Envoy for Climate Change, said: "There is a growing sense of inevitability... that there will be a price on carbon."

Alstom deal may be start of further GE acquisitions

The GE/Alstom deal is the latest move in an effort to bring GE back to its roots as an industrial company only. **David Flin** and **Junior Isles** report.

Almost one and a half years after announcing the initial bid, GE has been cleared by European and US anti-trust regulators to buy most of Alstom's energy business.

The deal is the latest move in the effort to bring GE back to its roots and puts the company well on its way to disposing of roughly $200 billion of assets, mainly in financial services.

European Commission (EC) approval of the acquisition was secured after GE agreed to divest some of Alstom's heavy-duty gas turbine business to Ansaldo Energia. This will include:

- Alstom's GT26 product line for new unit sales
- Alstom's GT36 technology development programme
- Alstom will cede two test facilities for these turbine models in Birr, Switzerland
- Services contracts for 34 GT26 units. The remainder of Alstom's gas turbine installed base of approximately 720 units will remain with GE
- GE will divest Alstom's Power Systems Manufacturing (PSM) business, which provides after-market parts and services for other OEMs' equipment.

This resolved the EC's concern that the original deal may have restricted innovation and brought about price rises by leaving Siemens as the only main rival to GE in Europe for gas turbines used in power plants.

GE said the final purchase price will be about €8.5 billion, with synergies of $3 billion in five years. GE has an installed base of around 1000 GW of base power generation. Adding the Alstom business adds another 500 GW of installed power generation to GE's portfolio.

Brian Langenberg, an industrial sector analyst, said GE had been forced to make more concessions than it had wanted, "but this still looks like a good deal".

He said the Alstom acquisition would give GE significant new technologies, particularly for coal-fired power generation, a huge new base of installed equipment to add to its service business, and an opportunity for rationalisation in gas turbines, its traditional core product.

GE recently announced that it would move 500 US jobs to Europe and China because it could no longer access financing from the US Export-Import Bank. The US government allowed the charter of the US Export-Import Bank to expire at the end of June 2015, and it is not clear whether EXIM will ever resume lending.

Because GE could access a credit line from France's COFACE export agency, supporting bids for international power projects, GE decided to shift production of any successful bids to Belfort, France.

Following the finalisation of the deal, Bloomberg Intelligence estimated that GE has at least $40 billion available for further acquisitions.

One likely sector is oil and gas. GE's $18 billion Oil and Gas Division is now its third largest industrial division, with about 12 per cent of GE's revenues, and 20 per cent of its industrial sales, up from 4 per cent of sales a decade ago.

Oil and gas was GE's fastest growing segment between 2009 and 2013, with sales growing 57 per cent to $15.2 billion. The Royal Bank of Canada has suggested that GE might bid for National Oilwell Varco, and that the drop in the price of oil could conceivably make BP a candidate for acquisition.

UK open to Chinese reactors

- UK calls for Chinese investment in the face of Hinkley C delay
- Flamanville pushed back to 2018

Junior Isles

The UK government says it is open to having China design and build nuclear reactors in the country as it seeks to woo Chinese investment for the proposed Hinkley Point C project.

Hinkley C has been delayed due to difficulty in securing funding. A Final Investment Decision has been delayed for more than two years and its owner EDF recently admitted the £24.5 billion project will not begin generating electricity until 2023.

Last month Britain's Chancellor George Osborne moved to inject some momentum into the project, announcing an initial £2 billion in government guarantees for the 3200 MW power station. Ministers also visited Beijing urging China to provide the money and knowledge to build the UK's next generation of nuclear power stations.

Britain's Energy Secretary, Amber Rudd, believes Chinese investment is vital for the country's future energy needs. When asked if she would be happy for China to design and build future stations, including one at Bradwell in Essex about 80 km (50 miles) from London, Rudd said: "That's absolutely fine. We welcome their investment and technology."

Ms Rudd argues that Britain's safety standards are so high that if China can satisfy UK regulators, Beijing can prove to the world that it is a reliable provider of nuclear energy.

Speaking to the *Financial Times*, she said: "They want their design up and running in the UK because we have such tough standards and regulations they can be confident that they are safe,"

Commenting on collaboration between Britain and China, David Elmes, a Professor of Practice at Warwick Business School said: "Now in discussion is not just China as an investor in the European-designed Hinkley Point reactor but one of the next reactors being Chinese-designed and built.

"This then becomes a question of whether the nuclear rebuild programme becomes a major step in Chinese industry going global, rather than just exporting to the world."

The British government sees nuclear as vital to bringing down Britain's carbon emissions and providing a stable electricity supply. However, the huge cost of Hinkley Point C has seen the project and the government come under heavy criticism. In Beijing, Rudd admitted the plant – scheduled to meet 7 per cent of the UK's energy needs – could add about £5 a year to the average household fuel bill.

Greenpeace UK chief scientist Dr Doug Parr said: "For all his obsession with fiscal responsibility, George Osborne is signing up the country for the ultimate rip-off deal. Instead of locking two generations of UK consumers into paying billions to foreign state-owned firms, Osborne should invest in the flexible, smart, and truly clean energy system that can power a 21st century Britain without leaving a pile of radioactive waste as legacy."

He said Osborne's announcement of a guarantee is a "PR smokescreen to give the impression that this project is moving forward when it's actually bogged down in a swamp of troubles".

EDF has had huge problems keeping to schedule and budget in building its new Areva-designed EPR nuclear stations in Europe.

Last month the company said it expected construction costs for its delayed Flamanville 3 nuclear reactor to reach €10.5 billion, up sharply from its previous estimate of €8.5 billion, and more than three times the initial budget of €3.3 billion. The company also said the start-up of the 1.6 GW plant in northern France, originally scheduled for 2012, but subsequently postponed to 2017, had been pushed back again to late 2018.

US and China still pushing CCS

The US and China have still not given up hope on carbon capture and storage (CCS) despite the slow commercial deployment of the technology.

At the end of August, the two countries agreed a deal to develop "clean coal" technologies in a move that could significantly reduce the fuel's impact on climate change.

The agreement between the US Department of Energy (DOE) and China's National Energy Administration (NEA) will see the countries share research as they develop technologies to capture the greenhouse gas emissions produced from burning coal.

The deal will include work on six advanced carbon capture, utilisation and storage (CCUS) pilot projects in China, research and development under the US-China Clean Energy Research Center, and the joint Fossil Energy Protocol signed in 2000.

Although acknowledged as the only technology that can remove carbon emissions from fossil fired generation and industrial installations, CCS has so far failed to live up to early hopes of widescale adoption due to poor economics.

After many years of research, Saskatchewan Power in the US opened the world's first coal-fired power plant retrofitted with CCS last year, but European utilities have struggled.

At the end of September Drax said it was pulling out of the prototype White Rose CCS project planned for its coal fired power station in North Yorkshire, UK. Capture Power, the project's developer, says it remains committed to the project.

Earlier, a shale gas industry-funded task force said Britain should use revenues from the shale gas industry to help fund the development of CCS projects.

"If a shale gas industry begins to develop at scale, CCS will become essential, and a CCS industry should be developed and grown concurrently," it said.

States lose legal challenge to EPA emissions plan

■ Request for temporary stay rejected ■ DOE funds solar initiatives

Siân Crampsie

The USA's Environmental Protection Agency (EPA) has won an early victory over legal attempts to block proposed new emissions regulations.

A federal court has denied a request by 15 states to put a temporary hold on President Obama's clean energy rules while they mount a full legal challenge.

The 15 states asked the US Court of Appeals for the District of Columbia to issue an emergency stay blocking the proposed rules, which EPA finalised in August and which would limit emissions of greenhouse gases from fossil fuel-fired power plants.

The rules are central to Obama's clean climate initiative, which has intensified in the run-up to the international climate conference in Paris in December.

The 15 states argued that they would be required "to spend significant and irrevocable sovereign resources now" to be in a position to meet a September 2016 deadline for submitting compliance plans to the EPA.

Further legal challenges to the plans are expected and analysts believe that court battles could take years. Some 17 states have said they intend to take legal action, and EPA administrator Gina McCarthy has predicted that lawsuits will ultimately be decided by the Supreme Court.

In a one-page order, the court said that the 15 states had not met the high legal requirements needed to win an emergency stay of a government regulation.

The court also rejected a request for an emergency stay brought by coal firm Peabody Energy Corp.

The states included some that are heavily reliant on the coal industry, either through mining or for power generation. They included Ohio, Michigan, Florida, Georgia and Nebraska.

New Jersey last month wrote to McCarthy at the EPA to request a stay of implementation and a proceeding for reconsideration of the rules.

State Governor Chris Christie said that New Jersey was the first "clean energy" state to file an objection with the EPA. "This is a fundamentally flawed plan that threatens the progress we've already made in developing clean and renewable energy in New Jersey without the heavy-handed overreach of Washington," Christie said in a statement.

The EPA has defended its plan to limit carbon emissions from power plants because of the health benefits it would bring as well as the impact on climate change.

Last month the US intensified efforts to boost the country's clean energy economy by announcing more than $110 million in funding from the Department of Energy (DOE).

Some $102 million will be made available for solar energy, including $50 million for projects advancing solar energy to reduce the total cost and enable new technologies to reach the market.

Atlantis and DP Energy join forces

Global renewables company DP Energy is to take an active role in developing Canada's tidal energy industry after it signed a deal with Atlantis.

The two firms have formed a partnership to develop a multi-turbine array at the Fundy Ocean Research Centre for Energy (Force) facility in the Bay of Fundy, Nova Scotia.

The deal will see DP Energy acquire a 50 per cent stake in Atlantis Operations Canada Limited (AOCL), which leases the berth at Force and which was awarded a 4.5 MW feed-in tariff by the Nova Scotia Department of Energy in December 2014.

Atlantis and DP Energy say they will work with Force, the Department of Energy in Nova Scotia, the local supply chain, business owners, the North American investment community and local stakeholders to develop the joint project, and expect financing and front end engineering design to be completed in 2016.

Offshore construction is expected to start in 2017, the two companies said in a statement.

"We have now created a project development platform that the local supply chain can invest in, with confidence," said Tim Cornelius, CEO of Atlantis. "Coupled with the unwavering support of the Nova Scotian Department of Energy and the leadership of Force, AOCL will be an attractive investment proposition for project financers looking to make use of the feed in tariffs available for tidal stream projects in the Province."

Atlantis added that the partnership was an inevitable consequence of the consolidation that is occurring across the tidal power sector globally.

Brazilian auctions add new clean energy capacity

Brazil has garnered more support for the construction of new renewable energy projects in its latest rounds of auctions.

The country awarded 670 MW of projects in an auction held in late August, followed by over 800 MW of solar PV capacity at an auction in early September.

The first auction was dominated by wind, with 19 projects totalling 538 MW approved. The remaining 132 MW comprised ten projects using biomass, natural gas and small hydropower.

The facilities are expected to start commercial power production in 2018, and will cost around R$2.5 billion ($716 million) to build, *Reuters* reported the Brazilian regulator Aneel as saying.

The solar auction saw Enel Green Power, Canadian Solar and Conergy win the lion's share of the bids.

Enel Green power won three projects totalling 553 MW, while Canadian Solar was awarded five projects totalling 185 MW. SunEdison and Renova were awarded projects totalling 59 MW in the Bahia region, while Conergy won 54 MW across two projects in northeast Brazil.

Over 11 GW of projects had qualified to bid in the solar auction.

Enel Green Power will be investing a total of approximately $600 million in the construction of the three new solar facilities that will be completed and enter operation by 2017. It says that the auction has made it the largest solar power developer in Brazil.

"Brazil's auction was one of the most competitive in the world," said Eduardo Abreu, Conergy's General Manager in Brazil. "Of bids totalling 11 200 MWp, only 833 MWp were approved, making Conergy's projects among the top 7.5 per cent.

"The team's technical expertise enabled efficient site selection and project design gave the company a competitive advantage during the auction."

Conergy's two projects will each receive a 20-year power purchase agreement set at BRL 296/MWh ($82.57/MWh), indexed to local inflation (IPCA). It is set to begin construction of its two projects in the first quarter of 2017 for interconnection in August 2017.

Shale boom hits the brakes

Declining gas production from the USA's shale gas sector could start impacting the country's generation mix in 2016.

The boom in production of natural gas from shale gas deposits across the country has helped to feed a sustained rise in natural gas fired power generation in the last years. However, production is starting to decline amid weak oil and gas prices and the US Energy Information Administration (EIA) is predicting a fall in natural gas's share of the generation mix in 2016 due to higher natural gas fuel costs.

EIA last month reported that natural gas production from the seven largest US shale deposits will drop for a fourth straight month in October to average 44.784 billion cubic feet a day, the lowest since March.

The trend marks the longest streak of monthly declines in government data going back to 2007. Bank of America analysts said in a research note that supply of natural gas would finally fall short of demand in 2016.

EIA forecasts show that electricity generated from coal in 2015 will see a decline of 8.2 per cent compared to 2014, yet natural gas generation is set to rise by 14.5 per cent. For 2016 however, the EIA projects coal generation will see a small increase of 1.4 per cent and natural gas generation will decline by 3 per cent.

Coal fired generation has been in decline in the last year because of capacity retirements as well as competition from cheap, abundant natural gas. During the first half of 2015, coal accounted for 34 per cent of total generation, whereas it was 40 per cent during the same period last year, while natural gas accounted for 30 per cent, increasing from 25 per cent during the first half of 2014.

Solar energy is also on the rise in the USA, with installations now totalling 20 GW, according to the Solar Energy Industries Association (SEIA).

Residential solar grew by 70 per cent year-on-year according to an SEIA report. "The utility PV market continues to be the bedrock driver of new installation growth. And in the second half of this year through 2016, growth will reach new heights as a higher share of what comes online stems from projects procured purely based on centralised solar's cost competitiveness," said Shayle Kann, Senior Vice President at GTM Research, which helped produce the report.

The solar industry and GTM Research expect solar installations for 2015 to exceed last year by 24 per cent, or 7.7 GW, more than a third of the current US total.

Minister questions Indonesia power plan

A government minister is questioning the feasibility of plans to add 35 GW within five years. **Syed Ali**

Coordinating Maritime Affairs Minister Rizal Ramli has again criticised the Indonesian government's plan to add 35 000 MW of new capacity within five years.

Speaking at a press conference after attending a coordination meeting on electricity at the Coordinating Maritime Affairs Ministry office, Rizal said: "After we discussed the project, it seemed unlikely that we would achieve the 35 000 MW within five years. It could be achieved in 10 years."

He added that even if the 35 000 MW could be completed within five years, there would be 21 000 MW of excess power.

The minister further said that within the next five years, the most realistic target the government could achieve would be the development of power plants with a total capacity of 16 000 to 18 000 MW. This, he says, would be enough to serve state power utility PLN's peak burden until 2019.

The development programme, the major proportion of which will come from the private sector, is attracting a number of international developers.

In mid-September Qatar's Nebras Power and PLN signed an agreement for the construction of a 500 MW gas fired plant in Northern Sumatra.

At the start of the month a memorandum of understanding was signed between Energy and Mineral Resources Minister Sudirman Said and US Ambassador to Indonesia Robert O. Blake Jr.

Sudirman noted: "The government will give US companies the opportunity to support the 35 000 MW programme, and we will particularly encourage US companies to develop new and renewable energy power generation. This is a government-to-government deal and it will be followed by a business-to-business deal with PLN."

In late August Franky Sibarani, head of the Investment Coordinating Board (BKPM), a South Korean state-owned electricity company, revealed its interest in joining the tender for power generation projects in Banten and West Java. Each of the power plants will have a capacity of 2000 MW with total planned investment to reach Rp 80 trillion ($5.67 billion).

Pakistan determined to bridge power shortfall

Pakistan has reiterated its resolve to bridge the electricity demand-supply gap. Last month Finance Minister, Ishaq Dar said that over 10 000 MW would be added to the national grid by December 2017.

While chairing a meeting of senior officials of Ministry of Finance and Water and Power to review the current energy sector, Dar received an update from the Ministry of Water and Power on measures to augment the north-south gas pipeline, which he said is crucial for successful implementation of power projects. The meeting saw detailed deliberations on three LNG based power plants of 1200 MW each.

The meeting also focused on energy sector funding from development partners such as World Bank, JICA and ADB and emphasised efforts to expedite work on the Diamer Bhasha hydropower project.

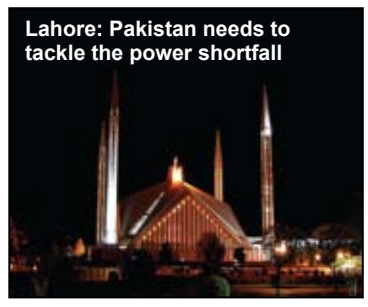
Dar particularly said he welcomed German cooperation in the renewable energy sector. In mid-September Germany's KfW Development Bank said it will loan €40 million to Pakistan for the rehabilitation of the Warsak hydroelectric power station.

China is also making investments that will help Pakistan bridge the generation shortfall. K-Electric Limited (KEL) recently signed a binding 'Joint Development Agreement', with the China Datang Overseas Investment Company (CDTO) and China Machinery Company (CMEC), for the development of a 700 MW (2×350 MW) coal fired power project at Port Qasim, Karachi.

Earlier last month, local media reports said around 5600 MW of electricity would come through five major projects under the China Pakistan Economic Corridor (CPEC) by the year 2017-18.

Chinese banks will fund the estimated cost of around $10 billion of these independent power producer (IPP) projects.

In late August Federal Minister for Water & Power Khawaja Muhammad Asif said that the first power project based on local coal from the Thar coal field would start producing electricity by 2018. The 1320 MW (2 x 660 MW) project is being developed by Shanghai Electric Group Company.



Lahore: Pakistan needs to tackle the power shortfall

Japan may limit coal fired generation

In a move to curb emissions, Japan is considering introducing a rule to limit coal fired power production from each utility to around 50 per cent of all fossil fuel energy it generates.

The rule, which would take effect in April, is part of the government's efforts to achieve a 26 per cent cut in greenhouse gas emissions by 2030 compared with 2013 levels.

With the retail electricity market set for full liberalisation next April, the proposed restriction is intended to prevent new entrants from developing a heavy reliance on coal.

Japan has struggled to keep a lid on greenhouse gas emissions following the shutdown of its nuclear fleet after the Fukushima disaster. With the country forced to increase its dependence on fossil fuel, in addition to increasing the use of renewables, there is a growing interest in clean coal technology.

At the end of August, Tokyo Electric Power Company, Mitsubishi Heavy Industries, Ltd., Mitsubishi Corporation, Mitsubishi Electric Corporation, and Joban Joint Power Co., Ltd. announced a letter of intent (LOI) for the development of two integrated coal gasification combined cycle (IGCC) in Fukushima.

The aim is to construct two 540 MW IGCC facilities in Fukushima: one at Tepco's Hirono Thermal Power Station and the other at Joban Joint Power Company's Nakoso Thermal Power Station.

Sri Lanka outlines expansion plan

The Ceylon Electricity Board (CEB) has submitted its Long Term Generation Expansion Plan 2015-2034 to the Public Utilities Commission of Sri Lanka (PUCSL) for approval.

The plan has been compiled based on the results of the latest electricity expansion planning studies conducted by the CEB for the planning period of 2015-2034.

At the end of 2014, Sri Lanka had a dispatchable installed capacity of approximately 3500 MW and recorded a maximum demand of 2152 MW.

According to the plan, coal will be the major source of power during the study period with its share reaching 40 per cent by 2020 and 60 per cent by 2034. However, the contribution from renewable energy power plants too will be considerable with a share of more than 40 per cent by 2025 and 35 per cent by 2034.

The plan forecasts 3528 MW of new thermal capacity. Renewable additions are forecasted at 1191 MW, mainly in the form of wind.

The total estimated cost to implement the expansions and additions to this 20-year base case plan is approximately $6.6 billion, including the cost of development of Non-Conventional Renewable Energy.

Meanwhile, the start of September saw the Asian Development Bank (ADB) approve a $200 million loan to support wind energy projects in the country. The finance will be activated in 2018.

Offshore wind to boost India's renewables drive

- Offshore wind policy approved
- SunEdison signs 2 GW solar agreement

Syed Ali

India has paved the way for offshore wind energy development including, setting up of offshore wind power projects and research and development activities with the approval of its National Offshore Wind Energy Policy.

With this approval, the Ministry of New & Renewable Energy (MNRE) has been authorised as the Nodal Ministry for use of offshore areas within the Exclusive Economic Zone (EEZ) of the country. The National Institute of Wind Energy (NIWE) has been authorised as the Nodal Agency for development of offshore wind energy and to carry out allocation of offshore wind energy blocks, coordination and allied functions with related ministries and agencies.

Preliminary assessments along the 7600 km long Indian coastline have indicated prospects of development of offshore wind power. With the introduction of the National Offshore Wind Energy Policy, the government is attempting to replicate the success of onshore wind power development.

India has over 23 GW of wind energy capacity installed and generating power.

The new policy will help the country in moving towards attaining energy security and achieving emissions targets.

India also has a massive solar programme. It aims to ramp up its solar power capacity target under the National Solar Mission by five times to achieve 100 GW by 2022.

Renewable energy firm SunEdison recently said it has entered into an agreement with Tamil Nadu government to develop 2 GW of wind and solar power projects in the state in the next five years. The company has committed to developing and constructing 15.2 GW of clean and cost-effective wind and solar power projects in the country by 2022.

In late August a senior government official said Madhya Pradesh is on track to enhance the solar power generation capacity to about 3000 MW in the next two years from the current 650 MW. In terms of solar power generation, Madhya ranks third in India behind Rajasthan and Gujarat.

Navitus disappointment another blow for UK renewables

- UK refuses consent for 970 MW offshore wind farm
- Report highlights falling investor confidence

Siân Crampsie

Plans for the development of a 970 MW wind farm off the south coast of England have been stopped in their tracks after the government refused consent for the project.

The move is another setback for the UK's renewable energy industry following recent government proposals to cut subsidies and came as Ernst & Young (EY) published a report indicating that investor confidence in the UK renewable sector was falling.

EDF and Eneco, developers of the £3.5 billion Navitus Bay offshore wind farm, wanted to install 120 turbines off the coast of Dorset and called the government's decision "disappointing". Stuart Grant, Project Director at Navitus, said: "We will now discuss the options available with our shareholders and update stakeholders in due course."

Energy Minister Lord Bourne, said that the wind farm would undermine the local tourism industry, which benefits from southern England's Jurassic Coast, a Unesco World Heritage Site.

Critics of the decision said that curtailment of the project could harm future projects by sending mixed messages to investors.

"The curtailment of an infrastructure project at such a late stage is disappointing," said Andy Taylor, Vice President of Energy at Schneider Electric. "The investment of time and resource in pre-planning and design work will have been significant, as the rights to develop this Round 3 wind farm were awarded in 2010."

Trade body RenewableUK called the decision "a missed opportunity" for both the economy and the development of offshore wind technology.

"The offshore wind industry is still determined to deliver the substantial pipeline of projects in UK waters which includes more than 5 GW of operational capacity and over 13 GW with planning permission," said Maria McCaffery, CEO of RenewableUK. "We're making good progress in driving down costs while the prices of imported conventional fuels remain volatile."

The Navitus Bay decision has added to the debate in the UK over support for renewable energy. The government has announced plans to cut or eliminate subsidies for onshore wind and solar farms, a move that the sector believes will decimate the industry.

EY said that the government's plans had caused the UK to UK drop out of the top 10 places in its Renewable Energy Country Attractiveness Index (RECAI) report. It said that the government had "sentenced the UK renewables sector to death by a thousand cuts" with its plans to cut subsidies.

EY added that the government's inconsistent approach to the energy sector could harm investment in other areas, including nuclear energy and other large infrastructure projects.

"Investors are currently trying to make sense of what seems to be policy-making in a vacuum, lacking any rationale or clear intent," said Ben Warren, Energy Corporate Finance Leader at EY. "Worryingly, this trend of inconsistent policy tinkering could also sour investor confidence in other areas, such as new nuclear, carbon capture and storage (CCS) and shale gas, as well as offshore wind."

Maf Smith, RenewableUK's Deputy CEO said: "Onshore wind is already the lowest cost low carbon option and offshore wind is ahead of target in its cost reduction efforts. But without long term clarity, projects will be delayed, investment will go elsewhere and consumer savings will be lost."

Dutch government fights climate ruling

The Dutch government is hoping to overturn a landmark ruling made by the Hague District Court ordering it to cut greenhouse gas emissions.

The government announced last month its intent to appeal against the court's verdict, which was made in June following a lawsuit brought by the Urgenda Foundation and 900 citizens.

The Hague court ordered the government to ensure that the country's GHG emissions are cut by 25 per cent below 1990 levels by the year 2020. A summary of the ruling said the Netherlands will achieve a maximum reduction of 17 per cent by 2020, which is below the standard figures of 25 to 40 per cent for developed nations.

The Urgenda Foundation and its co-plaintiffs said that the government has a duty of care to protect the population against the effects of climate change. The ruling could set a global precedent, said Urgenda, and was the first in the world in which human rights were used as a legal basis to protect people against climate change.

The government said in a letter to parliament that it would start taking measures to reach the target ordered by the court while it appealed. It said that it questioned the way in which the court assessed its policy.

Future of Ringhals reactors remains uncertain

Vattenfall says it has been unable to reach an agreement with E.On over the future of the Ringhals nuclear power plant in Sweden.

The Swedish utility in April took the decision to close reactors 1 and 2 at Ringhals between 2018 and 2020, instead of in the mid-2020s. However E.On believes it is too early to make a decision on the future of the reactors.

The two companies have been in talks since April. "We failed to reach an agreement," said Torbjörn Wahlborg, the Chairman of the Board of Ringhals AB and Head of Generation at Vattenfall, which has decided to stop ongoing investment projects in Ringhals that would have been implemented from 2017 onwards.

Vattenfall, the majority owner of Ringhals, cited low electricity prices and higher production costs as its reason for closing the reactors early. Sweden recently raised taxes on nuclear power production. "Unfortunately, the situation on the market gives us no scope for continuing to make the investments which will be required in the future," said Wahlborg.

"From our perspective we believe what we have told the board: that it is too early to determine a changed, definitive lifespan for reactors 1 and 2," Roger Strandahl, a spokesperson for E.On, told news agency *TT*.

E.On holds a 30 per cent stake in the Ringhals nuclear plant.

- Swedish wind power company Nordisk Vindkraft and Stadtwerke München of Munich, Germany, have inaugurated 48 wind turbines at the Sidensjö wind farm. At 144 MW, Sidensjö is one of Sweden's largest wind farms and is the largest built by Nordisk Vindkraft to date in Sweden.

Testing times for utilities

Depressed energy prices and regulatory changes are continuing to take their toll on European utilities.

Ernst & Young (EY) says that energy companies in the region experienced another 12 months of significant asset impairments last year, with power generation assets most affected.

EY's analysis of 16 leading European utilities shows total impairments of €22.9 billion in 2014, largely as a result of the rapidly changing environment in the energy sector. Generation assets represented the greatest share of impairments (75 per cent) with €14.6 billion. Exploration and production (E&P) assets were also hit following commodity price uncertainty with a total of €2.2 billion impaired in 2014.

"Europe's power and utilities companies continue to grapple with a changing energy landscape," said Charles-Emmanuel Chosson, EY's Global Assurance Power & Utilities Leader. "In 2014, depressed energy prices and evolving regulation added to the complexity companies already face and resulted in yet another year of significant impairments.

"Weak commodity prices led to the impairment of generation and E&P assets while regulations focusing on security of supply or reducing carbon emissions also drove impairments in many regions."

Last month, a subsidiary of Energeticky a Prumyslovy Holding (EPH) announced plans to close the Eggborough coal fired power station in Yorkshire, England. This follows similar decisions to close coal power stations by Scottish Power Limited in August and SSE plc in March.

Ratings agency Moody's said the plant closures would help to support power prices in the UK, but concerns have been voiced that the country could be left with inadequate power supplies. Jefferies, the investment bank, calculates that for 2016-17 just 53 GW of capacity will be available to meet forecast peak power demand of 56 GW in the UK.

According to EY, the continuing rise of renewables and improved energy efficiency keep adding pressure on conventional generation assets. Disruptive factors, such as the rise in distributed generation, and new developments in demand response and storage capacities could also have a resounding impact on asset impairment.

Chosson said: "Adapting to the changing energy world requires companies to think thoughtfully about capital investment. That means assessing tomorrow's value chain, identifying how they want to be positioned and planning how that translates into investments and asset rotation."

Depressed energy prices and evolving regulation resulted in another year of significant impairements for utilities, says EY

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Nuclear capacity set to grow

- Nuclear crucial to climate goals, says WNA
- IAEA gives Kenya the nod

Siân Crampsie

The World Nuclear Association (WNA) has called for the nuclear industry to take advantage of the positive momentum built in the sector over the last few years.

According to a new report published by the WNA, nuclear electricity is set to increase at a faster rate over the next five years than has been seen for more than two decades.

In addition, nuclear generating capacity could grow from today's 379 GW to 552 GW by 2035, said WNA. However, this would not be enough to keep pace with the demands set by long-term energy scenarios aimed at tackling climate change, it added.

The IEA's 450 Scenario sees nuclear capacity reaching 660 GWe in 2030 and going on to exceed 900 GWe by 2050.

Nuclear power currently contributes around 11 per cent of world electricity supply. In its report called *The Nuclear Fuel Report*, it modelled three scenarios for world nuclear generating capacity up to 2035, with capacity reaching 720 GWe in 2035 in its upper scenario.

WNA believes that challenges remain in the industry, including competition from other forms of generation and increased regulatory hurdles. Most of the growth in new capacity will occur in countries where electricity demand growth is strong, including China, India and Korea as well as in countries and regions where nuclear energy is not yet well established.

In August the International Atomic Energy Agency (IAEA) gave Kenya the green light to proceed with preparations for its first nuclear power plant.

IAEA experts spent one week in the country assessing its readiness to undertake a nuclear energy programme. It has asked Kenya to develop a legal framework.

Kenya views nuclear energy as a way of overcoming high fuel costs and reducing reliance on hydropower. It has outlined plans to set up several 1000 MW nuclear power plants, starting in 2023.

Other countries starting up nuclear energy programmes include the United Arab Emirates, which last month marked the start of construction on its fourth nuclear reactor in the Al-Gharbia region.

The UAE projects that nuclear energy will produce up to 12 per cent of its domestic needs. Its first reactor is due to start operating in 2017.

■ Ukraine's parliament has voted to unilaterally scrap an agreement to jointly build with Russia two reactors at the Khmelnitsky nuclear power plant in western Ukraine. Ukraine's Deputy Energy Minister Alexander Svetelik said Russia had failed "to fulfil the obligations under the deal", and that Ukraine would seek an alternative partner to complete the construction of No. 3 and No. 4 units at Khmelnitsky.

WTO rules against India in solar dispute

The Indian government could be forced to offer a level playing field to domestic and foreign solar panel manufacturing firms after the World Trade Organization (WTO) ruled in a complaint brought by the USA.

The Indian government has said it will appeal the ruling, which would force it to remove local content requirements and the offering of financial support to developers that use domestically manufactured solar panels.

WTO members are not supposed to insist on national content requirements that discriminate against foreign products. Governments are also required to provide "national" treatment, under which imports must be treated on a par with domestically manufactured products.

India has undertaken a programme to rapidly expand its solar energy capacity to reach 100 000 MW by 2022. The programme is also designed to attract foreign investment, and turn the country into a key manufacturing hub for solar energy products.

South Africa marks Medupi milestone

Eskom says that the start of commercial operation at the Medupi coal fired power plant has helped it to avoid load-shedding over the last few weeks.

The utility held a formal opening ceremony attended by South African President Jacob Zuma after the first of the power plant's six 794 MW units was handed over at the end of August.

It said in mid-September that it had been able to avoid load-shedding for almost five weeks, but warned that rising electricity demand in the coming summer months could put the system under strain once again.

Construction of Medupi started in 2007 and the power plant was due to be commissioned in 2011. The last of its units will start commercial operations in 2019, said Eskom in a statement.

Medupi will be the largest dry-cooled power plant in the world and is a key element of Eskom's capacity expansion plans alongside the Kusile power plant, which is due to be completed in 2020.

"The commercial operation of Unit 6 of the Medupi power station is a critical milestone in our effort to build new generating capacity to meet South Africa's rising electricity demand," said Eskom acting CEO Brian Molefe. "Our capacity expansion programme, which is the largest in our history, will increase our generation capacity by 17 384 MW, transmission lines by 9 756 km and substation capacity by 42 470 MVA once completed in the next five years.

"Since inception in 2005, the capacity expansion programme so far added 6237 MW of generation capacity, 5 816 km of transmission lines and 29 655 MVA of substation capacity."

Uzbekistan builds large-scale solar farm

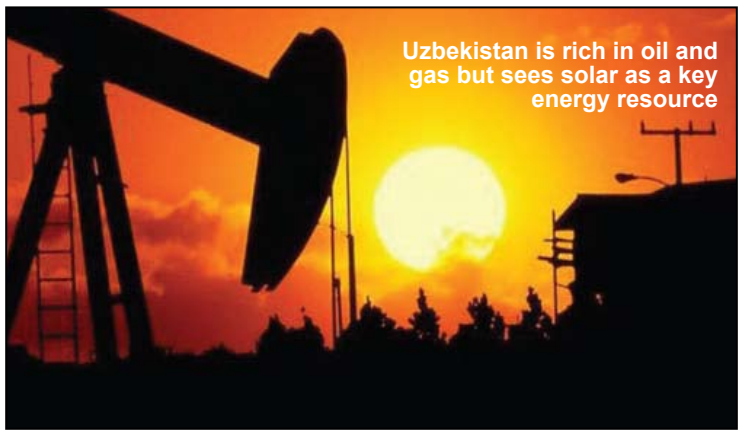
Construction of the first of three large-scale solar farms has started in Uzbekistan.

Uzbekenergo says that the three solar farms will add 300 MW of capacity to the country by 2020 and will cost $700 million to build. The plants will be built in the regions of Samarqand, Namangan and Surkhandarya.

The Asian Development Bank, along with the Uzbek Fund for Reconstruction and Development, is to jointly finance each of the three 100 MW solar plants, which will help the country to diversify its energy sources.

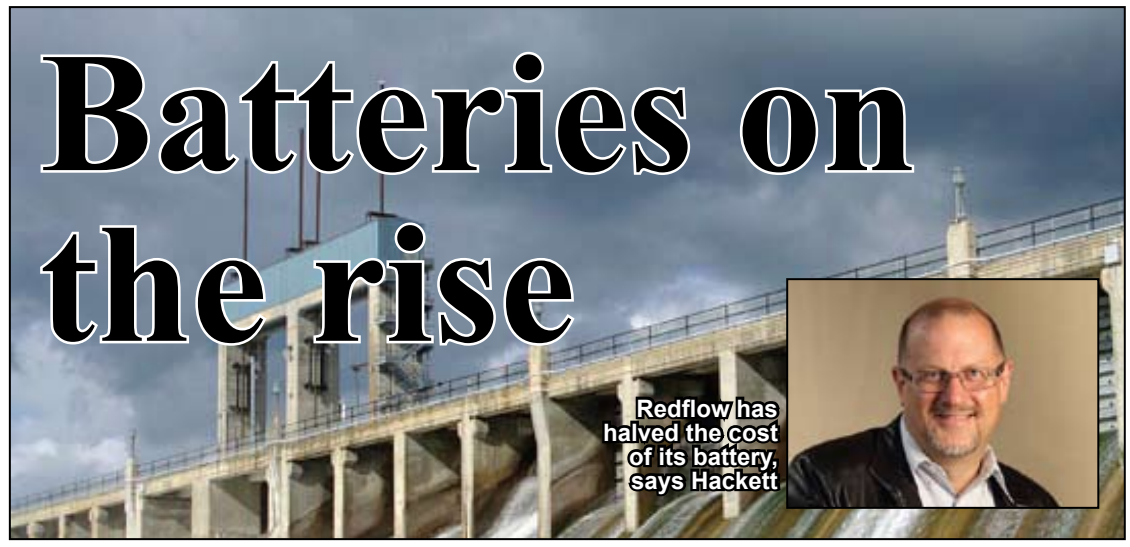
Uzbekistan is rich in oil and natural gas resources but has also identified solar energy as a key resource because solar irradiance is high.

Uzbekistan's solar energy potential is estimated to be almost 51 billion toe, compared to 9.2 million toe for hydropower and 2.2 million toe for wind.



Uzbekistan is rich in oil and gas but sees solar as a key energy resource

Batteries on the rise



Redflow has halved the cost of its battery, says Hackett

Governments are rolling out favourable policies to support battery storage technologies after recognising technological breakthroughs in the sector as well as the benefits of storage.

Research by Frost & Sullivan shows that with support schemes such as subsidies, preferential tariffs and targets, the grid-connected utility-scale battery storage market is growing rapidly.

The growth means that commercialisation of utility-scale grid-connected solutions will accelerate after 2017, bringing huge opportunities for companies that have the technological capabilities to compete.

Frost & Sullivan expects lithium-ion batteries to be the leading technology for grid-connected, utility scale systems over the next two to three years. Overall, the utility-scale grid-connected battery market earned revenues of $0.46 billion in 2014 and Frost & Sullivan estimates that this will reach $8.30 billion in 2024.

Other battery technologies are emerging, including lithium sulphur and zinc bromide (ZBM). In September, Redflow announced that it has decreased its ZBM battery cost by 50 per cent through technology improvements and a stronger manufacturing relationship with Flextronics.

Australia-based Redflow says it is now able to offer its naked ZBM product at a cost of US20 ¢/kWh throughput, down from 48 ¢/kWh just six months ago.

"Our ZBM battery is now the best priced energy storage product in the market and today's price per kWh is a game changer that should generate substantial amounts of interest among customers," said Redflow's Chairman, Simon Hackett.

Demand for battery products is being driven largely by the growth in renewable energy.

"Battery storage has the ability to impart flexibility to the grid across a variety of end-use applications," said Frost & Sullivan Energy & Power Research Analyst Ross Bruton. "Its greatest advantages are the provision of distributed, variable renewable energy firming and energy time-shift, and rapid short-term electricity balancing for ancillary markets."

However, demand for batteries is being tempered by barriers such as high costs, low technology maturity and a lack of a clear business case for storage projects, notes Frost & Sullivan.

Special Project Supplement

Securing Turkey's energy future from domestic lignite

Construction is under way at the Soma Kolin project in Turkey. The plant will be the largest in the country to use circulating fluidised bed technology to ensure economic power production from domestic low quality fuel. **Junior Isles**

The Samcheok Green Power Project will use the largest and most advanced supercritical circulating fluidised bed boilers in the world

In 2014, Turkey's power demand grew at rate of 3.7 per cent and is expected to grow by at least 4.5 per cent per annum between now and 2022, according to the Turkish Electricity Transmission Company. This is by far the fastest growing demand across the European region. However, meeting the need for new generating capacity is a challenge.

At the end of 2014, more than 30 per cent of the country's installed capacity was based on natural gas. At times, gas has accounted for more than half of the electricity generation. Reducing this high dependence on gas is a main priority.

While the country has significant lignite reserves, its lignites are ranked among the worst in the world in terms of quality. Ash and moisture content is very high and calorific value is low. But with the seventh largest lignite reserves in the world, estimated at around 10 billion tonnes, the government remains keen on finding a way of making greater use of its lignite.

Essentially, utilising such an indigenous resource would provide an economic path to greater energy security by reducing dependence on expensive gas imports from Russia and Azerbaijan.

Burning low quality coal is a challenge but one project, which recently got under way, looks set to show how Turkey can effectively use its vast lignite resources for power generation. The project being built near the town of Soma in the west part of the country, 135 km north of Izmir, will use two 255 MWe circulating fluidised bed (CFB) boilers supplied by Amec Foster Wheeler. Known as Soma Kolin, notably it will be the largest CFB project awarded in Turkey and the country's largest lignite fired plant.

Commenting on the rationale behind the new plant, Bogusław Krztoń, Account Executive CEE, Amec Foster Wheeler, Global Power Group said: "The government is spending a lot of money on [importing] gas, and is trying to limit the number of new gas fired plants. It is therefore encouraging local investors to look at energy resources such as hydro and indigenous lignite. The issue with hydro, however, is that it is very sensitive to weather conditions."

The government is therefore selling local lignite resources to private investors as a way of attracting investment in lignite fired power generation. The investor is obliged to open the mine first and then build a power plant nearby to generate and sell electricity to the grid.

"It is a significant project for us," said Krztoń, "as it opens the Turkish market for us in terms of future lignite fired projects."

Hidro-Gen Energy Import, Export, Distribution and Trading Inc., a subsidiary of the Kolin Group of Companies, is the private company that will own the Soma Kolin project. Kolin Group is a family-owned Turkish company that is active in infrastructure and energy projects. In addition to owning around 500 MW of mainly hydropower plants, it also owns gas and electricity distribution assets.

Although Hidro-Gen was aware of the use of CFB technology for generating power from lignite, its selection was not a forgone conclusion.

Selecting the most suitable technology was a carefully considered process. Tractabel Engineering from Brussels acted as consulting engineer, advising during the tender preparation and feasibility study. A number of EPC contractors were invited to submit proposals for the power plant.

Krztoń said: "Compared to some other developers in Turkey, Kolin acted very professionally. The tendering process was well organised and managed.

He recalled: "We took samples of the lignite, made analyses and showed the owner our references of brown coal fired CFB projects such as the Turow power plant in Poland. They were impressed with the availability of our CFB boilers, which have been working for several years. This helped convinced them that the most suitable boiler technology for such challenging fuel should be CFB."

Harbin Electric International Co. Ltd. (HEI) was selected as EPC contractor for the project, which in turn awarded the contract to Amec FW for the design and supply of the two CFB boiler islands including auxiliary equipment, as well as flue gas scrubbers for the project. The boilers will supply steam to two steam turbines supplied by Siemens.

Soma's CFB boilers are natural circulation drum-type boilers with reheat designed to utilise lignite with a design heating value of 6.77 MJ/kg. Fuel characteristics were a key consideration in the boiler design, for example in the bottom ash removal system.

An important selling point of CFB technology is its fuel flexibility. The quality and characteristics of lignite can vary from mine to mine. In fact quality can vary even when it comes from the same mine. This, says Amec Foster Wheeler, can be a problem for PC boilers.

"Different layers have different characteristics," said Krztoń. "It could be that after a few years of mining, you will reach a layer that has perhaps more ash or moisture and a different calorific value but a CFB boiler can still continue operating at full load with good reliability."

When burning lignite, the main design consideration is the ash content and the amount of moisture in the fuel. Robert Giglio, Vice President Strategy & Business Development, Amec Foster Wheeler Global Power Group, explained the challenge this presents to a conventional PC boiler.

"In a traditional PC boiler, you end up having to build a very large boiler since firstly, the moisture in the fuel produces more flue gas in the boiler and secondly the boiler has to be big and tall enough so that the fuel's molten ash has time to cool before reaching the coils in the top of the furnace causing excessive fouling and corrosion."

A tower-type PC boiler design, which is very tall and large is typically used for lignite. This is a key design difference between PC boilers for lignite and CFB boilers.

Further, the temperature in a CFB is 800-1000°C lower than in a conventional PC boiler, which means the ash does not melt. Instead, the ash is used to conduct the heat to all the surfaces. Because the ash does

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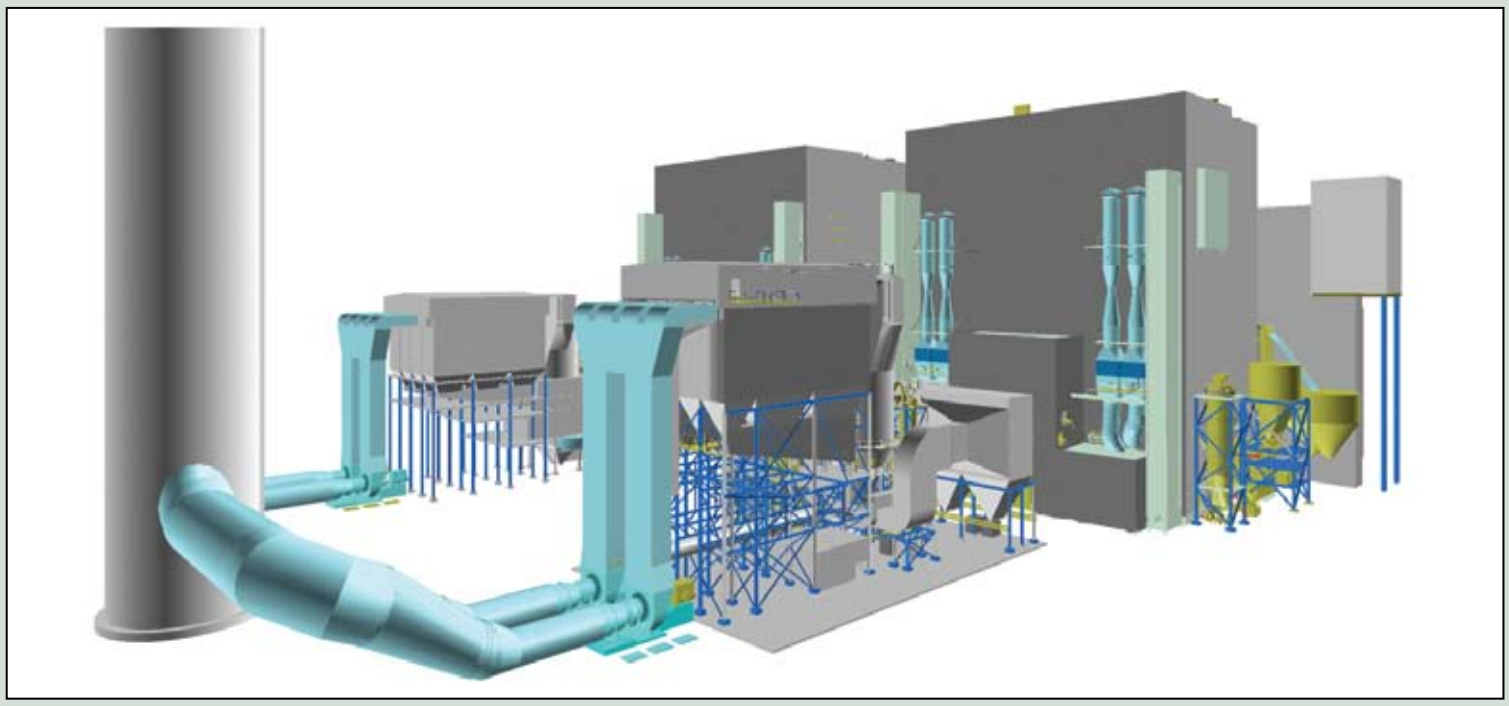


3D CAD drawing of the Soma CFB boilers

not melt, when it hits the surfaces it helps to keep them clean thus eliminating the need for sootblowers in the furnace.

This means a much smaller boiler can be built using CFB technology compared to PC technology, which in turn lowers the plant's cost.

This has a big impact on the long term integrity of the boiler. In a PC boiler, the superheater coils are usually hung at the top of the furnace. This area is the most exposed to the corrosive elements that have been vaporised from the fuel during the combustion process.

These coils tend to be the most vulnerable to corrosion because they have the highest metal temperatures. To withstand corrosion, superheating coils are often made from expensive alloys and need regular maintenance so they can be kept clean.

In a CFB boiler, the superheating coils are placed in what Amec FW calls Intrex heat exchangers, which are in the bottom of the furnace, where the hot fluidised solids reside. The coils therefore receive their heat from the hot solids, which are not molten or sticky and corrosive. Because the hot solids are fluidised with clean air, they are not subjected to the corrosive elements that are vaporised during the combustion process.

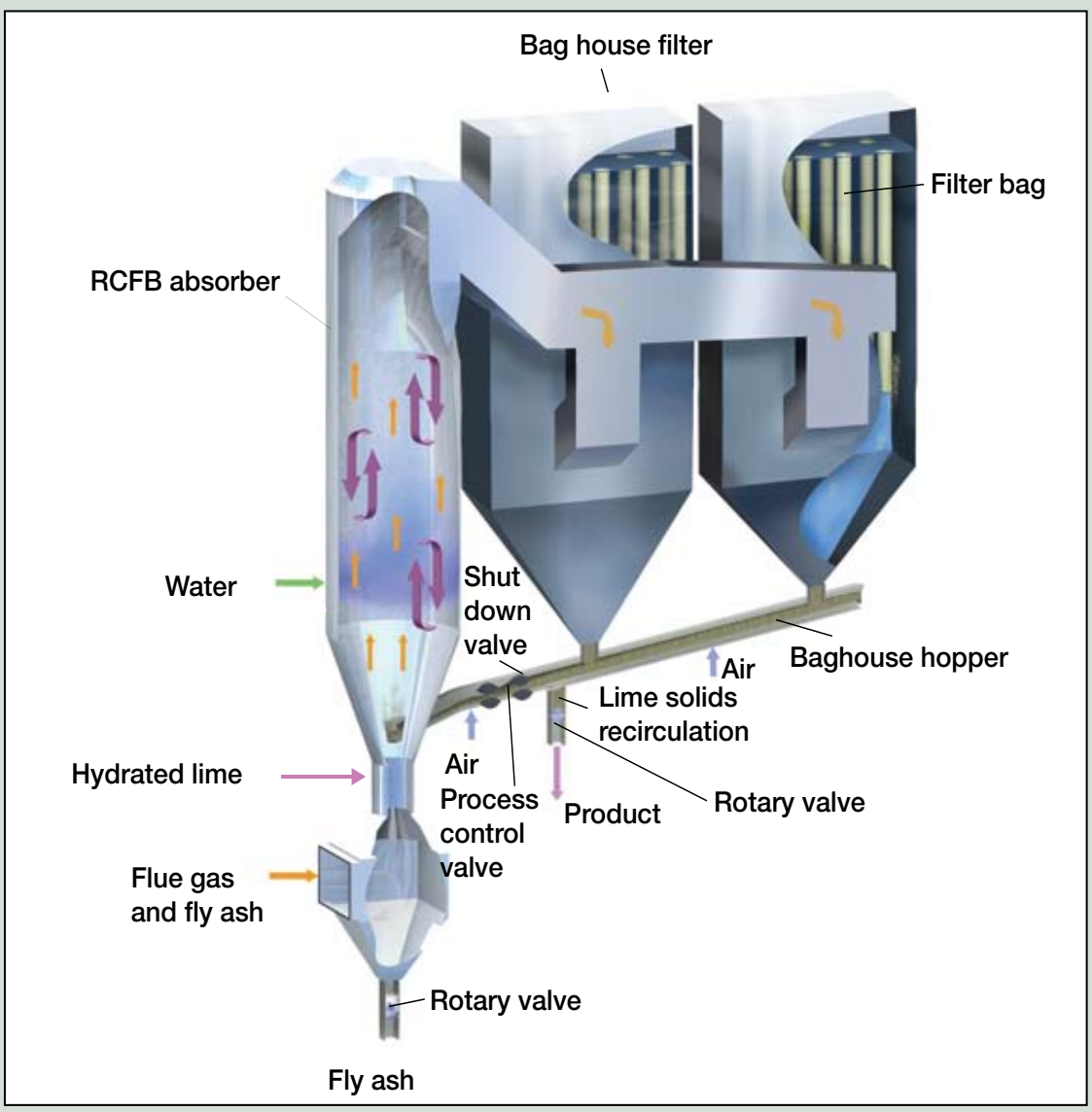
Giglio commented: "The benefit of this is the coils receive a high level heat transfer – many times higher than the hanging coils in a PC boiler because the conduction mode of heat transfer in a CFB has a much higher heat transfer coefficient. When you increase the heat transfer coefficient, you can transfer the same amount of heat with a smaller number of coils in a smaller box."

Another major difference between a PC and CFB is in the fuel's preparation. Coal and lignites have to be finely ground using mills before it can be fired in a PC boiler. Lignite requires special mills called beater mills, which, says Giglio, require a lot of maintenance and consume a significant amount of power.

"We don't use mills in our CFB design," he said, "because the CFB process allows us to feed coarsely ground fuel directly into the furnace. So we save a lot on maintenance, auxiliary power consumption and unit down time."

Yet even with CFB technology, adjustments have to be made when burning the very high level of moisture and ash found in the lignite to be used in Soma Kolin.

Drum coolers will be used to remove much of the ash from the boiler, as opposed to the traditional screw coolers. Six drum coolers drop bottom ash to redundant drag chain conveyors and further via elevators to the intermediate bottom ash silo.



Cutaway of the CFB scrubber

Key boiler design details at Soma Kolin

Design fuel data	**Lignite**
Sulphur (% d.s)	0.95
Nitrogen (% d.s)	0.53
Moisture (% a.r)	23.3
Ash (% d.s)	42.9
LHV (MJ/kg)	6.77

Boiler steam data	
SH flow (kg/s)	198.5
SH pressure (bar([a])	173
SH temperature (°C)	565
RH flow (kg/s)	173
RH pressure (bar[a])	53
RH temperature (°C)	565
Feed water temperature (°C)	262

Design performance	
Emissions*	
- NOx (mg/Nm³)	<200
- SO_2 (mg/Nm³)	<200
- CO (mg/Nm³)	<200
Particulate Matter (mg/Nm³)	<30

** Emissions are expressed in dry flue gases @ 6%O_2*

The capacity of the drum coolers is dimensioned so that one out of six coolers can be out of service with the maximum bottom ash flow rate.

While the use of drum coolers means the boiler also has to be larger than if a good quality coal is burned, the boiler is still much smaller than if a PC technology was selected.

Unlike PC boilers, CFB boilers do not require extensive backend clean-up to remove SOx emissions, since sulphur is captured directly in the furnace by limestone injection. However, due to the high ash content at Soma, Amec FW will use what Giglio calls a "polishing scrubber" in the backend. Although most of the pollutants are removed in the furnace, this captures any pollutants still remaining after CFB combustion.

The CFB scrubber (CFBS) is a multi-pollutant circulating fluidised bed scrubber capable of removing a wide range of pollutants from the flue gases of nearly any combustion or industrial process.

Boiler flue gas enters at the bottom of the CFB scrubber's up-flow absorber vessel. The gas mixes with hydrated lime and water injected into

Scrubber:
1. Electrostatic precipitator (ESP)
2. Duct between ESP and CFBS
3. Circulating fluid bed scrubber (CFBS)
4. Fabric filter with recirculating system

Lime dry hydrator (LDH)
5. Lime dry hydration (LDH) unit

Auxiliary systems
- Internal scrubber equipment
- ID-Fan
- Air blowers and compressors
- Silo for hydrated lime
- Silo for product silo
- Water storage and water injection system for CFBS
- Conveying system
- EIC for FGC and LDH system

Overview of the flue gas cleaning system at the Soma CFB power plant

the absorber, as well as recirculated solids from the downstream fabric filter. The turbulator wall surface of the absorber causes high turbulent mixing of the flue gas, solids, and water to achieve high capture efficiency of the vapour phase acid gases and metals contained within the flue gas.

An advantage of the CFBS is the ability to inject sorbent, independent of water. In spray drier absorber technology (SDA) sorbent is injected in slurry form, which limits the sorbent feeding due to concerns of the flue gas' dew point temperature.

In a CFB boiler, limestone injection is used to capture SO_2 from flue gas during combustion in the furnace. Overdosing of limestone leaves part of the calcium unreacted in boiler ash entering the scrubber. In recent years, Amec Foster Wheeler has advanced its CFB scrubber (CFBS) technology to use more of the unreacted calcium in the CFB boiler ash minimising both limestone consumption and ash generation at the power plant.

The CFB boiler's ash can also be conditioned separately in an external hydrator; the activated ash is then injected into the scrubber. This concept requires either pre-separation of fly ash upstream of the scrubber for hydration or recirculating fly ash from a particulate filter via the hydrator.

The CFBS' at the Soma power plant are equipped with two lime dry hydrators for conditioning the fly ash which is partially separated from CFB boiler flue gas in an electrostatic precipitator (ESP) located upstream the scrubber. From the hydrator the ash is fed directly to the CFB scrubber.

By utilising the fly ash in the integrated hydrator/CFB scrubber process, the required SO_2 control is fully achieved by injecting cheaper limestone in the furnace. Limestone consumption is minimised by optimising the SO_2 capture between the CFB furnace and FGD system.

Because the CFB boiler operates at a low temperature – around 850°C – NOx production is minimised avoiding the need for selective catalytic reduction (SCR). This again helps to reduce capex, opex and maintenance since there is no catalyst needed in the boiler.

According to Amec FW, the emission limits at the site of 200 mg/Nm^3 for NOx and SOx and 30 mg for dust, are easily achieved. Giglio noted: "Some of our designs get as low as 30 ppm (60-90 mg/Nm^3) on NOx and SOx."

Krztoń added: "Typically we do not need CFB scrubbers to get to the 200 mg limit at Soma. The sulphur content in the lignite is not that high – only around 1 per cent. But after discussions with the customer and their consultant, it was decided that scrubbers would be used to optimise limestone consumption. Also, there is a possibility that the sulphur content of the lignite could increase after a couple years of mining."

He also noted that it is also unclear how fast Turkey will begin implementing the European Industrial Emissions Directive (IED). "Now Turkey is thinking about implementing the Large Combustion Plant Directive, as Europe has. And Europe is now implementing the IED with lower limits. So Soma wants to be able to meet stricter limits in the future if needed. This solution gives them enormous flexibility in emission control for the next 20 years."

The economic benefits of having access to inexpensive local lignite are clear. The price of lignite in Turkey, depending on the mine, is in the range of €8-20 per tonne. This is around four times cheaper than hard coal delivered to Turkey, which is currently around $80/t. Amec FW calculates this could save around $30 million/y in plant operational costs. Over the 30-year lifetime of the plant this amounts to a $300 million saving in terms of Net Present Value.

It will not be long before Turkey begins reaping these benefits. Site preparation is ongoing and engineering of the boilers is well advanced. Erection works will start in January 2016 and commercial operation is scheduled for the end of 2018.

When Soma Kolin is completed, it will be the largest lignite fired CFB project in Turkey. Summing up the global significance of the project, Giglio said: "This sets the stage for other countries to produce power efficiently and reliably from low quality fuels. There are other countries, such as Germany, South Africa, India and Indonesia that have low quality coals and lignites, where CFB technology can bring high value. Soma is setting a new level for the use of affordable, secure, domestic low quality fuels for power production."

The Turow CFB power plant in Poland has been operating for several years

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E.On retains nuclear plants

Scrapping its plans to spin off its nuclear assets will enable E.On to keep its restructuring strategy on schedule.

Siân Crampsie

E.On has been forced to rethink its restructuring plans following a proposed new law in Germany covering liability for nuclear assets.

The German energy firm has abandoned plans to spin off its nuclear power plants but says that it remains on track to transfer its conventional power plants to a new unit, called Uniper.

Uniper was to have included E.On's stakes in six nuclear power plants in Germany, but the company says that its management board could not move forward with this plan given the uncertainties over future liabilities for nuclear reactor dismantling.

E.On has also reported that it will post a "substantial" loss for 2015 because of impairment charges totalling high single-digit billions of euros.

These charges are because of Europe's low electricity prices, said the firm.

E.On will retain responsibility for the remaining operation and dismantling of its nuclear generating capacity in Germany, where it owns three nuclear plants outright and minority stakes in three others. The nuclear business will be managed by a separate operating unit called PreussenElektra, a brand name used by VEBA, one of E.On's predecessor companies.

"This decision safeguards us against risks to the implementation of our corporate strategy. We cannot and will not wait for possible policymaking decisions that could delay the spin-off of Uniper," E.On CEO Johannes Teyssen said, adding that the company therefore had to take prompt action.

E.On said that legislation separating liability for assets from management control would be "unacceptable" and most likely unconstitutional. However it would not wait for the outcome of "years of legislation", it added.

"Nowhere in the world is there a comparable precedent for separating asset ownership from liability and making this liability unlimited in duration and scope. Nevertheless, Germany seems determined to adopt this singular approach," Teyssen said.

"This decision will enable us to implement our corporate strategy and complete the spin-off process on schedule. It will create good prospects for our employees and establish a new, value-oriented organisation for our shareholders," Teyssen added.

E.On no longer sees its nuclear assets as strategic because of Germany's decision to phase out nuclear energy by 2022. This, coupled with a fall in energy demand across Europe, has put utilities' balance sheets under severe pressure and forced E.On to rethink its business strategy.

Last year it announced a decision to restructure its business by spinning off its nuclear and conventional generating assets into a new unit, while retaining responsibility for networks, renewables and customer solutions.

E.On says that its plans for spinning off assets into Uniper remain on track.

Earlier in September E.On said it would aggressively expand its solar business, targeting the USA as one of its main markets for growth.

E.On has a pipeline of around 1 GW of solar energy in the USA and is banking on US President Barack Obama's clean energy policies to enable it to develop this portfolio further.

In August Obama announced $1 billion in funding for loan guarantees for distributed solar projects, greater federal backing for the Property Assessed Clean Energy (PACE) programme, and a push for more solar installed atop military homes.

Dong plans IPO

Dong Energy is preparing to launch an initial public offering (IPO) in the next 18 months, it has said.

The Danish energy company announced that ahead of the IPO, it would continue to strengthen its position as a leading clean energy company with a diversified renewable energy portfolio and a distribution and sales business anchored in its Danish home market.

It added that it would conduct a strategic review of its oil and gas business because of the long-term outlook for oil prices.

The Danish state will retain a controlling share in Dong Energy, which will also seek to divest its gas distribution and oil and gas pipelines to Energinet.dk.

In August Dong announced that it had acquired the 4000 km^2 Hornsea Zone in the UK, including the rights to install up to 3 GW of offshore wind capacity.

It said that the Hornsea Zone would be crucial to its post-2020 pipeline as well as its plans to continue reducing the costs of offshore wind power.

In September Dong signed an agreement to divest 50 per cent of the German offshore wind project, Gode Wind 1, to Global Infrastructure Partners (GIP) investment fund.

Dong started the offshore construction works for Gode Wind 1 earlier this year.

The 330 MW wind farm will consist of 55 Siemens turbines. The wind farm and the neighbouring wind farm Gode Wind 2 are expected to be fully commissioned in 2016.

Emission schemes prompt carbon strategies

- Carbon pricing manages risk
- Investors under pressure over 'black' funds

Companies are increasingly including carbon pricing in their risk models in response to mounting pressure for a global pact on climate change.

According to CDP, an environmental data group, some 437 companies have reported the use of carbon pricing measures this year, a three-fold increase on last year.

Large firms such as General Motors, Glencore and Cathay Pacific now use carbon prices to assess the value of investments that could be affected by carbon taxes or other measures used to limit greenhouse gas pollution, says CDP.

Oil and gas firms have been using such measures for several years, but the growing awareness of potential imminent carbon limits means that firms in other industries have adopted the strategy to help mitigate risks as government-mandated emission schemes spread.

The CDP found the biggest surge in the number of companies reporting carbon price use over the past year was in Asia, where China is expected to launch a national carbon market within four years and South Korea has just introduced one.

Pressure is also mounting on companies, governments and other institutions to divert investments from fossil fuels to clean energy markets and distance themselves from lobbying groups that seek to undermine clean climate policies.

Arabella Advisors, working for campaign group Divest-Invest, says over 400 companies globally have pledged to divest from fossil fuels, with commitments topping $2.6 trillion. It says there has been a 50-fold growth in the last 12 months in commitments to divest from fossil fuels, including pledges from governments, pension funds, philanthropy, entertain-ment and municipalities in 43 countries.

According to the IEA, Bank of England and HSBC, there is a quantifiable risk to portfolios exposed to fossil fuel assets. Institutions that recently pledged divestment include the California Public Employees' Retirement System, the Norway Pension Fund, the Canadian Medical Association, the World Council of Churches, the Children's Investment Fund Foundation, the KR Foundation and the Leonardo DiCaprio Foundation.

"The science says 80 per cent of coal must stay in the ground, and we don't have the luxury of time if we are to keep the global temperature rise to below 2°C, said David Nussbaum, CEO of WWF-UK. "This move sends a strong signal to governments ahead of the Paris climate conference. Divestment opens up the political space needed for meaningful action around climate change."

Recent research from the University of Edinburgh Business School indicates that green funds are outperforming 'black' funds.

Its research analysed 1400 funds over a two-year period up to 2014 and found that green funds delivered comparative returns to mainstream investment funds as well as "significantly" outperforming funds with investments in fossil fuels.

"Our research shows these environmentally-friendly investments – which were once the preserve of ethical stockholders – are now delivering better returns than their peers, and attracting interest from a much wider community of investors," said Gbenga Ibikunle, who led the study.

Another campaign group, ShareAction, has led an initiative calling on nine major publicly listed companies to review their membership of lobbying groups that seek to undermine EU climate policy.

It says that a global coalition of 25 institutional investors with over £45 billion ($69 billion) in assets under management have written to BHP Billiton, BP, EDF, Glencore, Johnson Matthey, Proctor and Gamble, Rio Tinto, Statoil and Total expressing concern that the companies' declared climate policies are undermined by membership of lobby groups with a track record of obstructive lobbying on climate change policy.

Americas

Siemens supplies Keys Energy components

SNC Lavalin Constructors Inc., the EPC contractor for the 735 MW Keys Energy Center in Maryland, USA, has placed an order with Siemens for the plant's main components.

The Keys Energy Center will be owned and operated by Public Service Enterprise Group and is due to start operating in the spring of 2018.

Siemens will supply two SGT6-5000F gas turbines, one SST-5000 steam turbine, two air-cooled generators SGen-1000A, and the associated turbine I&C systems.

GE supplies integrated biomass solution

GE is to provide an integrated biomass gasification solution to power a bioenergy plant in North Fork, California, after signing a contract with Western Energy Systems and Phoenix Energy.

Phoenix Energy is constructing a series of bioenergy plants in California. GE's solution will include a 1 MW engine and biomass gasification system that will convert excess forest biomass to electricity, heat and biochar.

Phoenix Energy plans to commence operation of the North Fork plant in the fourth quarter of 2016. GE and Western Energy Systems also will provide technical support and service for Phoenix Energy's installed systems.

MHPSA turbine for Middletown CCGT

NTE Energy has selected Mitsubishi Hitachi Power Systems Americas Inc. (MHPSA) to supply a M501GAC gas turbine for the Middletown Energy Centre, a new combined cycle gas turbine (CCGT) power plant being built in Middletown, Ohio.

The Middletown Energy Center will be constructed, owned and operated by NTE, and has a planned completion and commercial on-line date of April 2018. The facility will produce 525 MW.

Asia-Pacific

Bergen gensets for Bangladesh steel mills

Rolls-Royce is to deliver eight gas gensets to a group of steel mill factories operated by the Abul Khair group in Bangladesh.

The gensets will generate 50 MWe and will be based on the medium speed 20-cylinder B35:40V20AG2 gas engine from Bergen Engines, a division of Rolls-Royce Power Systems.

Abul Khair group is expanding its manufacturing facilities for cold rolled steel sheet coils and coil galvanising. The Bergen engines will form the heart of an on-site captive power plant delivering reliable, electrical power for the steel operation.

The engines are scheduled to be commissioned in the first half of 2016.

Hyundai signs geothermal EPC deal

Hyundai Engineering has signed a $74 million engineering, procurement and construction (EPC) contract with Energy Development Corp of the Philippines to construct a 31 MW geothermal power plant.

Under the terms of the agreement, Hyundai Engineering will build the No. 4 power plant in the Bacon-Manito geothermal power generation zone located in Sorsogon Province in Luzon Island, 360 km southeast of Manila. The length of the project is 25 months after groundbreaking.

Siemens WTGs for Taiwan offshore wind farm

Siemens AG said it has inked an agreement to supply two wind turbines to Swancor Industry Co. Ltd.'s wind farm operating subsidiary as part of a project to build Taiwan's first offshore wind farm.

Formosa I Wind Power Co., which is fully owned by Swancor, is to start operating two offshore wind turbines with a combined capacity of 8 MW in Miaoli County in the third quarter of next year, with plans to add 30 units by the fourth quarter of 2019.

The company plans to invest a total of NT$22.6 billion ($689.8 million) on a wind farm project after receiving a grant from the Bureau of Energy in 2012 to build offshore wind turbines with installed capacity of 200 MW.

Swancor said it had secured NT$2.6 billion in bank loans to finance the installation of the two wind turbines and it is seeking to raise more funds for the remainder by issuing new shares and other financial tools.

ABB supports India's solar push

ABB has won orders worth around $18 million to provide plant electrification, automation and substation solutions for solar farms being built as part of India's solar energy drive.

Spread across the southern Indian states of Karnataka, Tamil Nadu and Andhra Pradesh, these projects will connect more than 850 MW of solar energy to the grid and will be among the biggest solar projects worldwide.

For the most significant project, a 648 MW solar farm in Tamil Nadu, ABB will provide a turnkey solution encompassing the design, supply, installation and commissioning of the power plant electrification and automation systems, the pooling stations and multiple substations. This includes two 230 kV and three 110 kV substations to connect the electricity generated to the local grid.

GE brings power to Sulawesi

GE is to provide four TM2500 mobile gas turbine generators for a project on the island of Sulawesi, Indonesia, as part of the country's plans to install more than 35 GW of new capacity by 2020.

The four trailer-mounted units will provide 100 MW of power and will be used for grid stability as well as meeting the expected increase in power demand in Sulawesi over the coming years.

The units are being purchased and installed by Pembangunan Perumahan (PP), the EPC management company for the project, and Indonesia's state-owned electricity company Perusahaan Listrik Negara (PLN) will own and operate the units.

Europe

Doosan Skoda wins Zabrze contract

Doosan Škoda Power has signed a contract with Fortum Power and Heat Polska Sp. z.o.o for the delivery of a complete turbo-set with an output of 75 MWe for a new power block in Zabrze, Poland.

The cogeneration plant is scheduled to be commissioned in the third quarter of 2018, supplying power and heat to 70 000 households in Zabrze and Bytom.

The contract includes the delivery and assembly of the district heater exchanger system along with the steam turbine and generator set.

Areva awarded E.On nuclear outage contract

Areva has been awarded a contract to perform outage services over several years at the Isar 2, Brokdorf and Grohnde nuclear power plants in Germany.

The contract includes maintenance and in-service inspections of the primary circuit components, opening and closing of the reactor pressure vessel as well as refuelling activities at the power plants, which are owned by E.On.

BWSC to build Cramlington CHP plant

Burmeister & Wain Scandinavian Contractor A/S (BWSC) has won a contract to deliver a biomass-fuelled combined heat and power plant in Cramlington, northern England.

Estover Energy is developing the 28 MW plant, backed by equity investors UK Green Investment Bank and John Laing Group plc. Barclays will provide the remainder of the funding as debt, 60 per cent of which will be guaranteed by the Danish export credit agency Eksport Kredit Fonden (EKF).

The Cramlington CHP plant will be the first reheat biomass plant in the UK. The reheat design means that steam is led through two heating processes and two turbines instead of one to improve fuel efficiency.

BWSC will deliver the Cramlington CHP plant in consortium with the Danish boiler supplier, Burmeister & Wain Energy A/S, and will also handle operations and maintenance for a 12-year period. Cramlington will be powered by a combination of virgin wood and forest residues from sustainable forestry and clean recycled waste wood.

Falck orders ten Nordex turbines

Nordex has received its 15th order from one of its key clients, Falck Renewables, it has announced.

Nordex will supply ten of its N90/2500 turbines for the Assel Valley wind farm near the southwest coast of Scotland. The contract includes the turnkey construction of the wind farm, including the civil and electrical infrastructure works.

Nordex has already started construction work on the Assel Valley wind farm, which is due to be handed over to the customer in October 2016. Following commissioning, Nordex will be in charge of servicing the turbines and associated works for at least five years.

Dong issues call for tender

DONG Energy Wind Power A/S has issued a call for tenders for the supply of offshore wind turbines for five projects.

The contracts will cover works in the form of a Turbine Supply Agreement and service and maintenance in the form of a Service & Warranty Agreement and potentially a Spare Parts Agreement for offshore wind farm projects in the Baltic Sea and the North Sea or other European waters.

The tender comprises up to five different sets of contracts covering the five projects.

Alstom strengthens HVDC portfolio

Alstom has been selected by Toshiba T&D Europe to supply its high voltage equipment for the power transmission interconnection between Italy and Montenegro.

The 415 km interconnection project is led by Terna, the Italian electricity transmission system operator, and Prenos, the Montenegrin equivalent. It will enable the transfer of energy between Villanova, Italy and Kotor, Montenegro.

Alstom will supply Direct Current (DC) wall bushings, disconnectors and optical transformers.

The Italy-Montenegro interconnection is Italy's first 1000 MW electricity bridge with the Balkan area. It will allow Italy to increase its energy importation capacity and will strengthen its role as an energy hub between the European Union and the Balkans. The interconnection will allow a diversification of energy sources and help Italy meet EU's requirements for increased renewable energy, drawing from Montenegro's hydropower plants.

Fugro to install Rampion offshore wind cables

Fugro has been awarded a contract for the installation and burial of array cables at the Rampion Offshore Wind Farm.

The development in the English Channel, 13 km off the Sussex coast, is being built by E.On alongside partners, the UK Green Investment Bank plc.

The engineering and planning will start immediately with installation being carried out in two phases in 2016 and 2017. Fugro will lay and bury 122 array cables with its construction and installation vessels Fugro Symphony and Fugro Saltire and use one of its two Q1400 trenching systems to bury the cables.

International

DEWA launches 800 MW solar tender

Dubai Electricity & Water Authority (DEWA) has officially tendered the contract for the next phase of its solar energy programme.

The utility has invited bids to develop an 800 MW solar PV farm at its Sheikh Mohammed Bin Rashid Al Maktoum Solar Park.

It will be commissioned in phases starting 2018, and DEWA will purchase the power under a long term Power Purchase Agreement (PPA).

Kuwait inks solar deal

Kuwait has signed a contract worth 116 million dinars ($385 million) with Spain's TSK Group for the construction of a 50 MW solar power plant.

The project will be built on a 100 km^2 site in Shagaya, a desert zone 100 km west of Kuwait City, near the borders with Iraq and Saudi Arabia. It will start operating in December 2017 and form a key part of Kuwait's plans to expand its renewable energy sector.

Kuwait is targeting the construction of 4500 MW of solar and wind energy by 2030.

R-R signs 15-year LTSA

Rolls-Royce has signed a 15 year long-term service agreement (LTSA) with the TSK Joint Venture company, which will operate and maintain the 100 MW power plant currently being built in Mozambique.

Rolls-Royce is delivering 13 gas-driven 20-cylinder B35:40 generating sets for the power plant, which is being built under an engineering, procurement and construction contract for Gigawatt Mozambique SA.

The LTSA will help ensure a reliable power supply, which is essential for economic growth in the region.

Oil

Oil glut continues as uncertainty persists

- Surplus to persist in 2016
- Price could fall to $20/B

David Gregory

Brent crude sank below $50/b in early September and West Texas Intermediate (WTI) has been below $50/b since mid-July. Economic indicators have analysts speculating that demand for energy might be slowing amid the continuing over-supply of crude oil – leading to a further decline in prices that will push production lower – thus leading to production destruction.

It all remains very uncertain. A key indicator is the economic slowdown in China. Furthermore, shale oil producers are beginning to show signs that there are limits to how long they can stay in business while the price of crude continues to fall. Despite some slippage in the supply of crude in the US, that market remains well stocked with oil and oil products and prices are not expected to turn around there in the near future.

But it could be that the oil market is reaching that 'something's got to give' point: either demand must pick up or supply must fall before the market will stabilise and there is still no sign as to when that might be. In the meantime oil giant Saudi Arabia continues to pump all-out in an effort to force those who cannot cope with lower prices out of the market.

Some analysts are predicting that oil at $50/b is too cheap over the medium to long term to sustain production at current rates in non-Opec countries. They see US shale oil production falling and investment in conventional oil production being cut as low oil prices erase incentive for investment.

In its latest monthly energy report, the US Energy Information Administration (EIA) forecast that US crude production would decline through mid-2016 before growth resumes later next year. It reported that US crude production declined by 140 000 b/d in August compared to July output. The EIA forecast that US crude production would average 9.2 million b/d in 2015 and 8.8 million b/d in 2016.

On prices, the administration forecast that Brent will average $54/b in 2015 and $59/b in 2016 and that WTI would average about $5/b lower than Brent for both of those years.

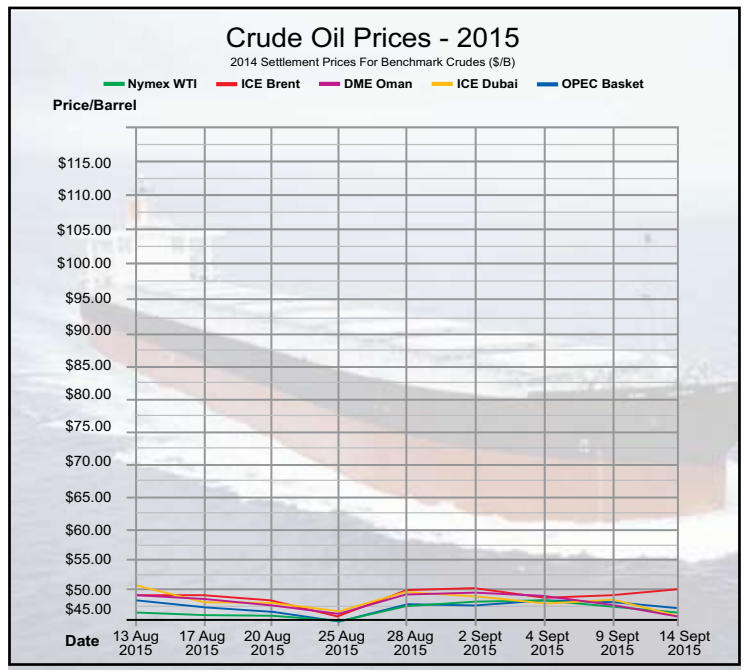
For its part, Opec is expecting oil prices to average around $80/b in 2020, according to *Reuters*, which commented on a meeting of Opec officials during which a mid-term strategy report was discussed.

The report predicts non-Opec supply declining over the next two years to average 58.2 million b/d in 2017. The organisation forecasts that non-Opec oil output will average 57.43 million b/d this year. Opec once supplied about 40 per cent of the world oil market, but this has fallen to about 33 per cent in recent years as new fields, particularly US shale oil fields, came on-stream.

Opec leader Saudi Arabia produced 10.265 million b/d during August compared with 10.361 million b/d in July and 10.564 million b/d in June, a record. Saudi Arabia's current crude oil stocks amount to more than 320 million barrels, according to recent figures released by the Riyadh-based Joint Organizations Data Initiative (JODI).

Saudi Arabia is not expected to veer away from its policy of maintaining a high production rate even though some analysts have predicted that there may be difficult consequences for the country's economy within a couple years if there is no price recovery.

Several Opec members have been feeling the pinch for some time and last month Venezuela proposed the idea of holding a producers' summit that would attempt to ease the supply glut and boost prices, but Saudi Arabia and other Gulf Opec members dismissed the proposal saying that it could prove to be a disaster if no agreement was reached.



As yet, no non-Opec producer has shown itself willing to cut production voluntarily.

Venezuela has pressed Opec for months for a production cut in an attempt to force prices up. The price of Venezuelan oil is averaging below $40/B and the country is facing serious economic problems.

Algeria and Iran have also supported production cuts, but with the prospect of sanctions against Iran being lifted, Tehran is now planning to boost output and has stated that it too will fight for its market share, especially in Asia. For its part, Iraq is making every effort to increase crude production as well.

For now, it appears that crude prices could go lower. Financial advisors Goldman Sachs said in a recent report that the market is oversupplied to the point that the price could fall to $20/b.

"The oil market is even more oversupplied than we had expected and we now forecast this surplus to persist in 2016. We continue to view US shale as the likely near-term source of supply adjustment," Goldman said in a statement, adding: "We now believe the market requires non-Opec production to shift from our prior expectation of modest growth to large declines in 2016."

Gas

Zohr discovery could change East Mediterranean gas game

A huge gas discovery offshore Egypt could help meet soaring domestic demand and is likely to rekindle interest in the region among international operators as well as European countries seeking a nearby source of energy supply.

Mark Goetz

Every now and then a gas field comes along that really does change the game. Azerbaijan's Shah Deniz was one, Mozambique's Rovuma Basin was another, and now the giant Zohr gas field, discovered by Italy's Eni offshore Egypt in August, has set the East Mediterranean on its head leaving the outcome anything but clear.

The gas resource at Zohr is estimated by Eni at some 30 trillion cubic feet (tcf), which is nearly the total of all the gas found offshore Israel, and boosts Egypt's gas reserves to more than 100 tcf. Furthermore, Eni says there is another hydrocarbon structure beneath Zohr.

In Cyprus, whose maritime border is less than 7 km from the Zohr well in Egypt's Shorouk Block, the discovery has generated speculation that Zohr may extend into Cypriot waters and that large gas deposits might be waiting to be found in the Cyprus offshore. So far only 4 tcf have been found offshore Cyprus, by Noble Energy in Block 12. Eni has drilled two dry wells in Block 9 and is expected to return to drill two more at some point in the future.

In announcing its discovery, Eni described Zohr as a "world class supergiant" and has expressed its desire to see the field prompt the creation of a regional hub that would supply Europe with LNG, but there are numerous hoops to jump through before that happens.

Currently two LNG facilities on Egypt's Nile Delta coast sit idle due to a lack of gas supply from Egypt. One is located at Damietta and is 40 per cent owned by Eni in partnership with Spain's Union Fenosa (40 per cent) and the Egyptian government (20 per cent). The other LNG plant is located at Idku and is operated by BG. Together they have a combined production capacity of 12.2 million ton annually of LNG.

US explorer Noble Energy and its Israeli partner Delek Group have signed initial agreements to supply these facilities with gas from the Leviathan (22 tcf) and Tamar (10 tcf) gas fields offshore Israel. But negotiations on those deals have been halted due to unresolved regulatory issues in Israel that have prevented development of Leviathan and stalled second phase development at Tamar. There also exists an initial agreement to supply a private Egyptian gas distribution company, Dolphinus.

Eni's announcement of the Zohr discovery was received as not very good news in Israel as it suggested that the new Egyptian gas find would pre-empt plans to export Israeli gas to Egypt. The fact that Israel is taking months to resolve its regulatory issues brought more complaints from government critics when news of the Zohr discovery broke.

The news worried Cyprus too. Noble and Delek are also partners in Cyprus Block 12 and they are expected to deliver a plan for development of the Aphrodite field within weeks. For more than a year Cyprus and Egypt have been discussing the possibility of shipping Block 12 gas to Egypt through a subsea pipeline. Cyprus is worried that its 4 tcf at Aphrodite might be an unworthy drop in the bucket compared to Zohr and the plan scrapped.

Zohr is the largest gas discovery made in the Mediterranean and according to Eni it could take $6 billion to $10 billion to fully develop the field. But that is an initial guess. More drilling at the site is scheduled to begin next year and a designated well will target the structure beneath the Zohr field.

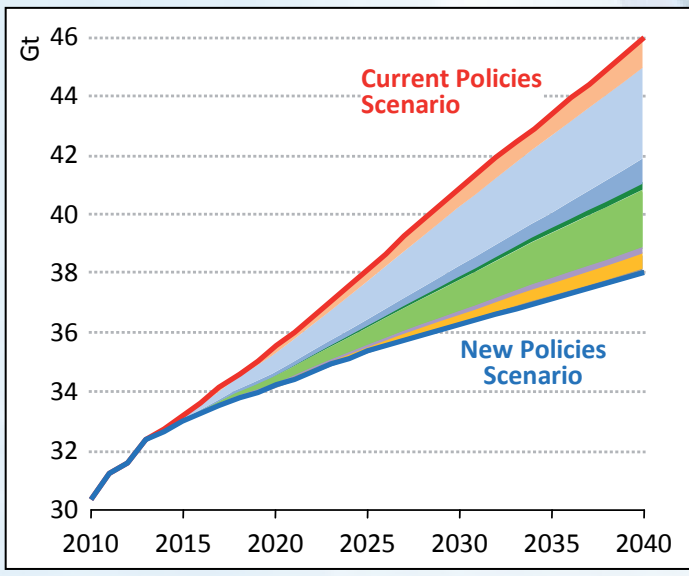
Eni CEO Claudio Descalzi told a Senate hearing in Rome that the 30 tcf estimate is "conservative and could be raised," noting the presence of a second, deeper structure. "We will see in 2016 when the exploration restarts," he said.

The key question is how it will change things for Egypt. Eni said the discovery, when fully developed, would satisfy Egypt's natural gas demand for decades, but first gas is not expected until 2020.

Egypt has been struggling with gas shortages since the January 2011 revolution. Following that, foreign operators were skeptical about further investment, and the country's high energy subsidies meant that the companies were not being paid to reflect the cost of production. As a result, the Egyptian government owed the firms some $6 million. That figure has been lowered to $2.9 million and should be lower still by the end of the year.

Egyptian officials say they expect Zohr gas to be used to meet soaring domestic demand, but Eni is also looking to create an international gas export centre. It will take years before real plans take shape, but companies now know for certain there is gas in the East Mediterranean. That alone is likely to rekindle interest in the region among international operators as well as European countries that seek a nearby source of energy supply.

World energy-related CO_2 emissions abatement in the New Policies Scenario relative to the Current Policies Scenario



CO_2 abatement	2020	2040
Energy service demand	19%	11%
End-use efficiency	46%	39%
Supply efficiency	9%	11%
Fuel and technology switching in end-uses	2%	3%
Renewables	17%	24%
Biofuels	3%	3%
Nuclear	3%	7%
CCS	1%	2%
Total (Gt CO_2)	**1.3**	**7.9**

World Energy Outlook 2014, © IEA/OECD, Figure 8.18 , page 312

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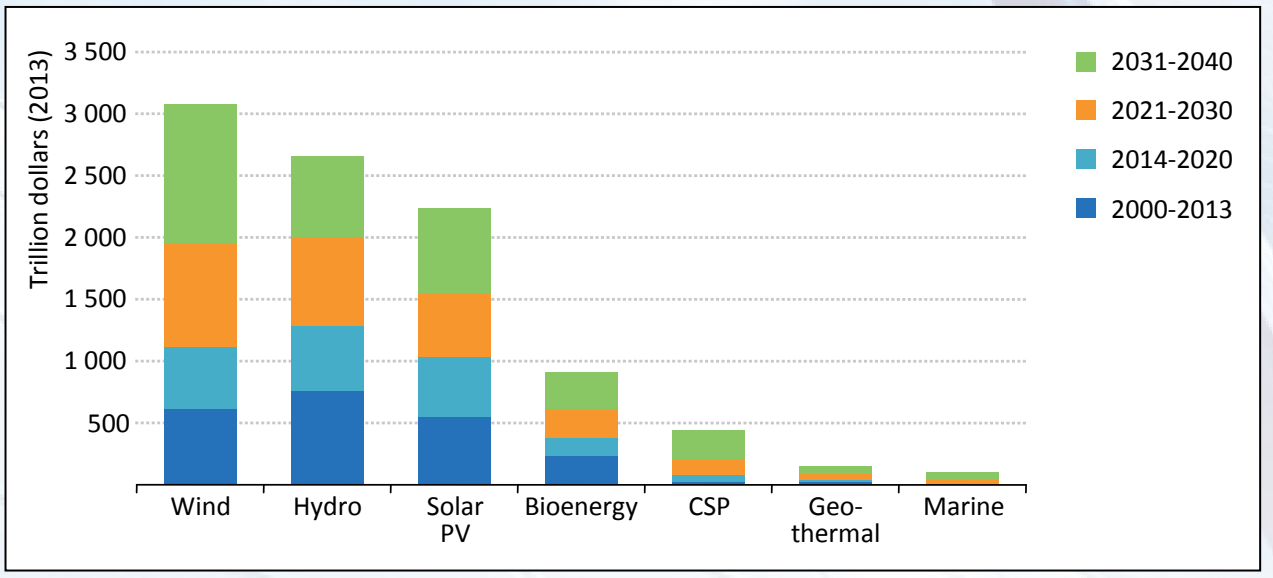
Global investment in renewables-based power capacity by source in the New Policies Scenario



World Energy Outlook 2014, © IEA/OECD, Figure 7.18 , page 272

Cumulative renewable investments by region and type in the New Policies Scenario ($2013, billion)

	2014-2025						2026-2040						2014-2040
	Hydro	Bioenergy	Wind	Solar PV	Other*	Total	Hydro	Bioenergy	Wind	Solar PV	Other*	Total	Total
OECD	**215**	**139**	**521**	**421**	**85**	**1 381**	**227**	**190**	**846**	**438**	**207**	**1 908**	**3 289**
Americas	88	69	166	136	44	503	91	86	329	174	59	739	1 243
United States	48	60	120	122	36	387	49	73	256	151	42	571	958
Europe	104	54	302	121	23	605	103	82	429	143	106	863	1 468
Asia Oceania	23	16	53	164	17	273	33	23	87	120	43	306	579
Japan	16	10	19	146	5	196	24	12	39	96	21	191	387
Non-OECD	**666**	**117**	**396**	**323**	**69**	**1 570**	**798**	**214**	**712**	**510**	**284**	**2 517**	**4 087**
E. Europe/Eurasia	42	11	16	7	2	80	69	39	38	12	5	164	243
Russia	24	8	5	1	2	41	41	30	13	2	4	90	131
Asia	397	77	331	248	26	1 080	439	120	522	325	120	1 525	2 605
China	211	46	264	167	12	700	90	61	348	146	80	726	1 425
India	73	13	51	53	5	194	172	19	103	124	22	440	634
Southeast Asia	45	10	7	19	8	89	88	16	26	34	14	178	266
Middle East	15	2	7	15	13	52	11	8	80	57	60	216	268
Africa	64	13	14	36	24	151	123	21	30	90	79	344	496
Latin America	147	13	27	17	3	207	156	26	41	26	20	268	475
Brazil	83	10	23	10	-	126	86	18	29	13	9	155	281
World	**881**	**256**	**917**	**744**	**153**	**2 951**	**1 024**	**404**	**1 558**	**949**	**491**	**4 426**	**7 377**
European Union	80	51	285	118	23	557	73	79	403	141	105	802	1 359

World Energy Outlook 2014, © IEA/OECD, Table 7.6 , page 273

Source: World Energy Outlook 2014

China's emissions challenge

China is reducing its dependence on coal fired power generation as it attempts to cut environmental pollution. It is a process that will take time and is having an impact on power generators and coal mining companies, alike.

Joseph Jacobelli and **Michelle Leung**

China's drive to shift its fuel mix from thermal coal generation, which used to account for four out of every five kilowatt hours consumed a decade or so ago, can be generally considered a success, albeit much remains to be done.

The success of China's efforts is demonstrated by the creation of cleaner power generation sources in the past ten years or so. Apart from hydropower, these were largely non-existent. As of July 2015, the nation's connected wind power generation topped 106 GW, gas generation was more than 50 GW and solar power around 35 GW. By 2020, wind should easily beat the 200 GW objective and gas and solar capacity should exceed the 100 GW target.

China is also placing an emphasis on increasing the amount of nuclear in the generation mix. During the period it managed to more than double generating capacity to over 23 GW despite the temporary moratorium after the tragic Fukushima event. It now targets at least 56 GW by 2020.

However, reducing China's reliance on coal will take time. Thermal power generation was 2456 TWh in the first seven months of 2015 compared to a total of 3221 TWh. Coal has helped fuel economic growth and it is unlikely if not impossible for the nation to completely stop using coal, although that would cut emissions of key pollutants by at least half.

Still, coal fired power capacity is being added more slowly than other energy sources. New plants are larger and more efficient, and plants bigger than 300 MW comprised 78 per cent of the total in 2014, compared with less than 30 per cent in 1995.

There has been a gradual reduction in coal's share of domestic primary energy production due to aggressive legislation such as the 2014 Environmental Protection Law and high profile targets announced by the central government. One commitment was to lower carbon dioxide emissions per unit of GDP by as much as 45 per cent by 2020 from 2005 levels, while raising non-fossil-fuel energy sources to 15 per cent of capacity.

The nationwide pollution crisis was caused by its rapid economic growth in the past decade as the resulting hunger for energy was satisfied by increasing coal fired power generation, which equipment suppliers and generators could build efficiently, cheaply and rapidly.

Stricter environmental standards for power producers has meant they have had to spend more on emission control equipment and related activities. Large national groups such as China Huaneng, China Datang and China Guodian have only received limited government support as they spend more on emissions reduction every year.

The China Electricity Council estimated that more than 50 billion yuan ($8 billion) was spent on flue gas desulphurisation (FGD) and de-nitrification systems, dust removal and similar measures in 2014. More than 90 per cent of Chinese coal plants had FGD systems at the start of 2015, and the amount of coal needed to generate 1 kWh fell by more than 20 per cent from 1995 to 318 grams.

In 2015, the country may meet its pollution targets as it cuts energy consumption per unit of GDP by 3.1 per cent. Demand growth is slow and usage rates of coal fired plants are low. Capacity of more than 4 GW is being shut – mostly power plants that are small, or old generating units. FGD units are being installed at coal plants and 70 per cent should have deNOx units that target nitrogen oxides by the end of 2015.

Coal fired power plant operators receive a subsidy of 8 yuan/MWh (US1.3 ¢/MWh) to offset the deNOx cost of 12-15 yuan, according to the China Electricity Council. Nitrogen oxide emissions cuts will also accelerate to 5 per cent in 2015 from last year's 3.5 per cent, the Ministry of Environmental Protection said in early 2015.

It also wants to cut sulphur oxides, ammonia and other emissions by 2 per cent. The reduction so far is largely due to making DeSOx and DeNOx equipment mandatory at coal fired power plants. At the end of last year, 90 per cent of plants had FGD systems while 50 per cent had DeNOx units. The ministry closely monitors the operation of these units at the central level as well as through its regional agencies.

Power generation is not the sole source of emissions from coal. A significant source of emissions is due to the use of low-quality, mostly unwashed coal. Most of this so-called bulk coal is burned in plants with no desulphurisation or denitrification equipment and by households.

High-sulphur coal generates 10 times more emissions and produced about 42 per cent of the nation's ash and 22 per cent of its sulphur, based on National Development and Reform Commission (NDRC) energy research data. Cost concerns keep many operators from using plants with FGD equipment.

China's overall emissions from coal could be sharply cut by 'coal washing', the separation of non-coal minerals or undesired adherent materials by using a liquid medium. Large suppliers such as Shenhua Energy typically wash their coal, while most small miners do not. Stronger government incentives could raise the washing rate from 60 per cent to 90 per cent, the level in some developed countries. Washing coal may remove as much as 80 per cent of the ash content and about 30-40 per cent of the sulphur content.

Stricter emissions targets targeting coal fired generation has also impacted the coal producers. Miners are complying with the government's push for lower emission coal plants to improve air quality. For example about 9.6 GW, or 21 per cent of Shenhua Energy's installed capacity, meets the low emission standards, and the company is shooting for 100 per cent within five years.

The dim outlook for coal and higher profitability of power generation are encouraging China's coal producers to invest more in electricity. According to the China National Coal Association, mining companies have therefore boosted their power capacity to 140 GW, a 17 per cent gain over two years, which was faster than China's overall capacity growth of 15 per cent in the period.

Shenhua Energy's revenue from electricity sales was 29 per cent of its total 2014 revenue, boosting its Earnings Before Interest Tax Depreciation and Amortisation (EBITDA) to 34 per cent, way above the average margin of 11 per cent for coal companies. This compares with an EBITDA average margin of 42 per cent for the country's power production companies.

With weaker demand for coal in China, its coal companies hope to increase exports to other power markets. This, however, faces several hurdles.

China's coal exports peaked in 2003 after it removed export-tax rebates and imposed quotas. The government in January slashed the tax from 10 per cent to 3 per cent in an attempt to stimulate exports. Still, shipments have remained weak in 2015 because of China's low-quality coal and high transportation costs.

In conclusion, it is undeniable that Chinese authorities are now open to recognising that a major cause of environmental pollution comes from over reliance on coal fired generation. With power being a key necessity for economic growth, the challenge for planners has been to identify ways to sharply reduce emissions from the electricity sector.

Strategies have revolved around boosting the growth of low or zero carbon energy, especially natural gas, nuclear, solar and wind in order to cut thermal coal in the fuel mix from almost 80 per cent of the total in 2014.

At the same time, the government has pursued tighter emissions standards for existing and new power plants. Large electric power generating companies such as China Huaneng and China Datang have been gradually reducing emissions by tightening standards at existing plants and constructing larger units, which have lower environmental impact.

While much is being done, in the coming years standards and penalties are most likely to become even tighter.

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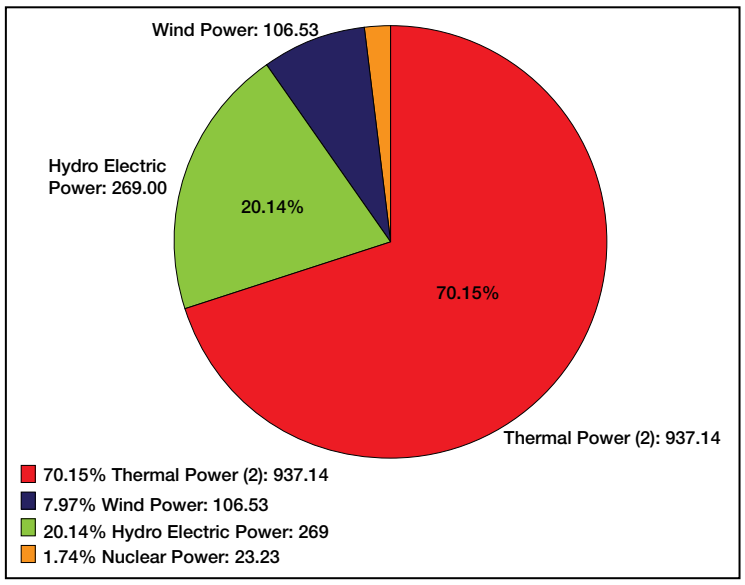
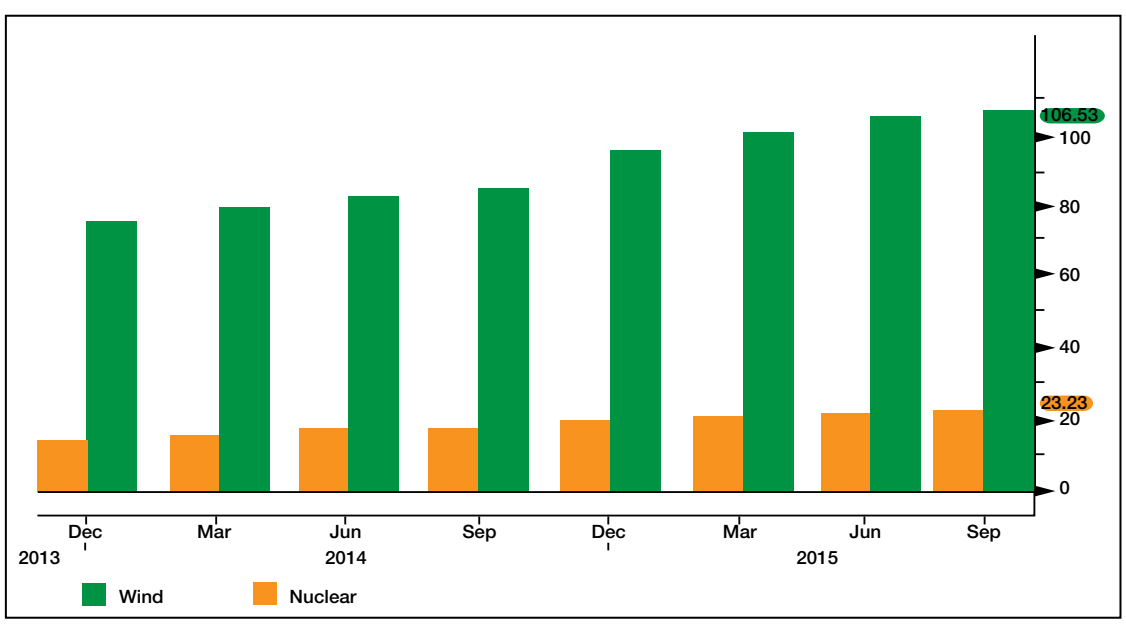
Breakdown of China's installed generating capacity (GW)

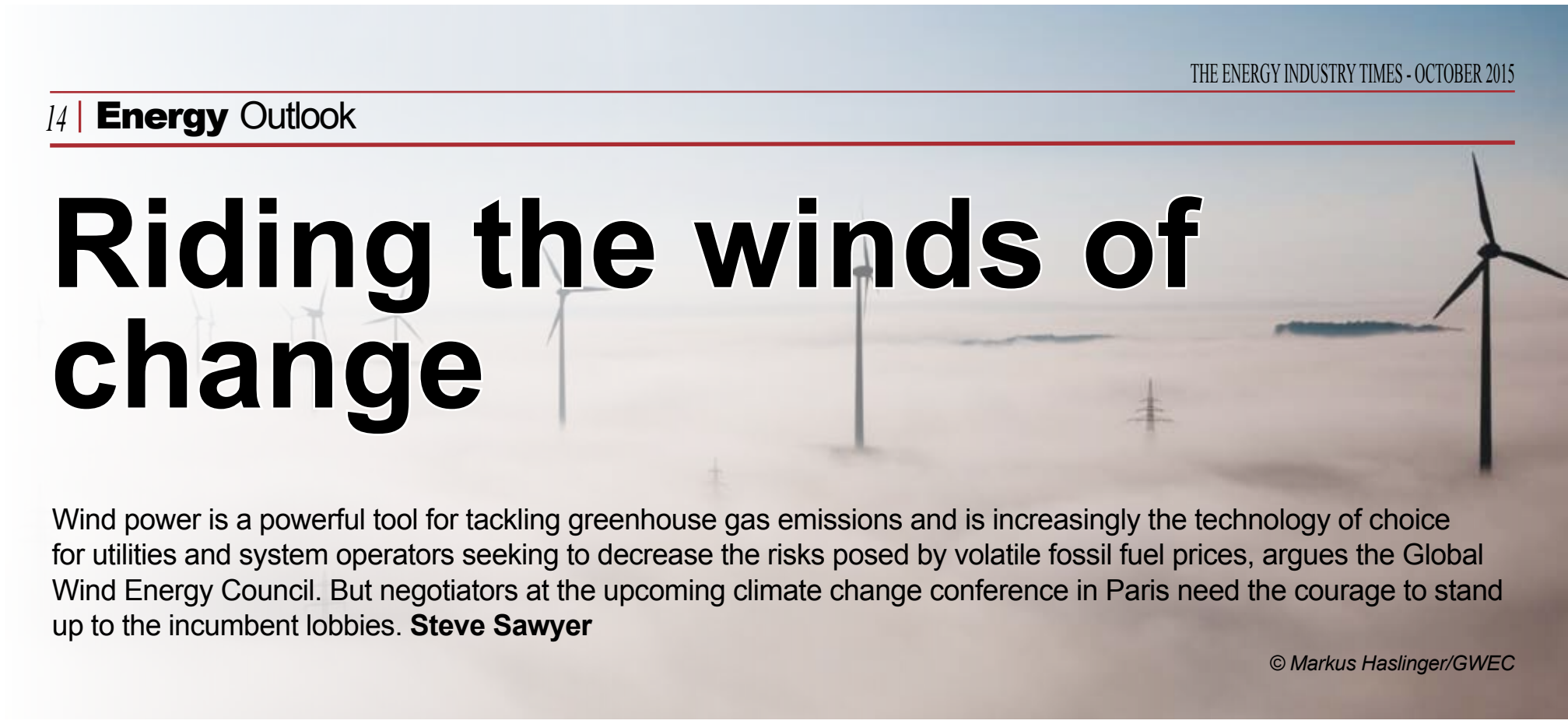


Cumulative rise (in GW) of wind and nuclear capacity



Source: National Bureau of Statistics, China; Bloomberg

Riding the winds of change



Wind power is a powerful tool for tackling greenhouse gas emissions and is increasingly the technology of choice for utilities and system operators seeking to decrease the risks posed by volatile fossil fuel prices, argues the Global Wind Energy Council. But negotiators at the upcoming climate change conference in Paris need the courage to stand up to the incumbent lobbies. **Steve Sawyer**

© Markus Haslinger/GWEC

With the next big international climate summit coming up at the end of 2015, it's useful to review where the global wind sector is at the moment, and what role the wind industry is already playing in reducing carbon emissions, while at the same time looking at how much more it could do with the right signals coming out of the COP21 climate change conference in Paris.

Wind had a very good year in 2014, installing more than 50 GW of clean, affordable power for the first time in a single year. This year looks like it will be a pretty good year as well, with the global market passing 400 GW of total installed capacity. This was welcome news after four years of essentially flat markets due to the financial crisis and associated economic slowdown.

Markets continue to expand across the world, with exciting new developments across Asia, Latin America and most recently in Africa. The market advance has been slow but steady across the OECD, with the exception of Chile, Mexico and Turkey where the growth has been robust, and disappointing performance in Japan and Korea.

The global market grew by over 16 per cent in 2014, to bring total installed capacity to nearly 370 GW, while the annual market grew by an astonishing 44 per cent, which in part reflects the recovery of a disastrous 2013 for the US market, but is mainly driven by the impressive 23 GW installed in China last year.

Sawyer: negotiators and politicians in Paris need the political will to put their money where their mouths are

The top 10 markets for cumulative installed capacity were relatively unchanged, except that Brazil has now joined the list at #10, and India has during the course of 2015 overtaken Spain for fourth place in terms of cumulative capacity, behind China, the US and Germany. Wind power generated about 40 per cent of Denmark's electricity in 2014, and the number of national and local markets where wind penetration is in double digits grows on an annual basis.

The German market outperformed the US for the second year in a row in terms of annual installations in 2014, but that situation is unlikely to continue into 2015, with a substantial recovery foreseen in the US market for 2015 and 2016. However, after 2016 the US is facing another potential policy vacuum of the sort which caused the down market in 2013. The main surprise in the annual installation figures for 2014 was the emergence of Brazil as the fourth largest annual market. Despite the economic and political difficulties in the country at present, Brazil looks to improve on its 2014 performance with around 3 GW of annual installations which will probably keep it in fourth place.

Asia continues to dominate global markets, fueled largely by China and India, although a number of new and potentially fast-growing markets are emerging in the Philippines, Viet Nam, Thailand and Mongolia, with the early signs of market activity in Malaysia and Indonesia. Asia passed Europe in 2014 as the region with the most cumulative installed capacity.

Despite policy uncertainty and low or no demand growth in a number of markets, Europe continues its steady march towards its 2020 targets, although an unhealthy reliance on a few markets such as Germany is a worrying sign.

North America, dominated as it is by the US, is the most volatile and difficult region to predict, which will continue to be the case as long as energy policy in the US relies on on-off politically driven policy shifts. However, both Canada and Mexico have shown strong growth and Mexico should become a major global market in the next few years as the energy market reforms get embedded in a new regulatory framework.

Latin America, led by Brazil, but with increasing contributions from Chile, Uruguay and a number of smaller markets in Central America and the Caribbean is beginning to make a strong showing, with plenty of opportunity for growth in places such as Colombia, Peru, Venezuela and Argentina.

Exciting developments in sub-Saharan Africa, led by South Africa, Ethiopia and Kenya have begun to unlock wind energy potential in that rapidly growing and power-hungry part of the world, while the North African markets in Egypt, Morocco and Tunisia are starting to move again after several years of political unrest.

New projects in Jordan and what may be the 'sleeper' market of the second half of this decade in Iran mean that this region is a key market for the future.

The Pacific region continues to be dominated by Australia which continues to move ahead despite an overtly hostile national government, whose prime minister has recently been replaced, although it is too early to tell whether or not that's going to make a difference.

The offshore sector continues to be an almost exclusively northern European affair, despite some movement in China, Korea and Japan and the first commercial project starting construction in the US during 2015. About 2 GW has been installed so far off Germany's coast alone in 2015, boosting global installations beyond 10 GW. Costs are beginning to come down in the sector, although it still has some way to go to be competitive.

Looking ahead, we expect about 53 GW of new installations in 2015, bringing the global total up to more than 420 GW by the end of this year. According to our annual rolling five-year projection, annual markets are expected to cross the 60 GW mark by 2018, with global totals reaching about 666 GW by the end of 2019.

In terms of technology, the developments continue to be incremental rather than revolutionary, with a focus on continuously decreasing the cost of energy. More efficient, larger, more reliable and more sophisticated turbines are being offered by manufacturers in Europe, North America, India and China, and new market entrants continue to join the competition to deliver the largest number of carbon-free electrons at the lowest possible costs, and through more sophisticated power electronics do so in a way which increasingly supports grid stability and flexibility.

Wind power costs continue to come down, although they vary widely due to a number of factors: wind resource, of course, but also the cost of capital and the regulatory and fiscal framework employed cause wide variations between markets. Among other places, in Brazil, Mexico, South Africa, Turkey, New Zealand, and some parts of China, the US and Australia, wind power is the most cost-effective means to add new capacity to the grid, and is increasingly the technology of choice for utilities and system operators seeking to decrease the risks posed by volatile fossil fuel prices and of course against (in most cases) future costs associated with air pollution and CO_2 emissions.

The largest machine now commercially available is the new Vestas V-164, with a nameplate capacity of 8 MW, and a rotor diameter of 164 m, but the quest for larger, more powerful machines continues, particularly for the offshore market. The other major development is a new generation of turbines developed for lower wind speeds, aimed at exploiting wind power in areas previously deemed uneconomical, but which are often closer to load centres where they are needed. Longer blades, smaller generators, taller towers and lower cut-in speeds are employed to create a situation where even at lower wind speeds, wind power can deliver commercially competitive power in an increasing number of geographies.

Integration of wind power is relatively straightforward in markets where demand is growing, as 'a rising tide floats all boats', but the challenge of integration becomes greater in the larger markets, both at a national and local level. New management techniques and market designs are under development to accommodate the increasing penetration of wind (and solar), whose marginal generation cost is effectively zero, and create market structures, which take maximum benefit from this fact, along with effectively rewarding more flexible generation.

So what does all this mean for Paris? Two things: first, governments now have at their disposal technologies to combat the climate crisis affordably, but the lobby from polluting incumbents remains strong and for the most part bound and determined to delay their obsolescence as long as possible; and second, the drafts of the treaty text so far have very little or nothing in the way of incentives for the market to invest in a clean energy future.

The negotiators and politicians in Paris will need both courage, to stand up to the incumbent lobbies, as well the political will to put their money where their mouths are. Both seem to be somewhat lacking at present, but the renewable energy revolution is under way and unstoppable. The question is whether COP 21 will help it go fast enough to save the climate.

Steve Sawyer is Secretary General at the Global Wind Energy Council (GWEC).

Reducing energy waste by building trust

Transformational as smart metering is to the energy industry, it is just one example of how technology can be used to improve the relationship between provider and customer. Having information on customers' energy usage is of little benefit if utilities cannot effectively track and analyse individuals' different needs, and tailor services accordingly.
Martin Dunlea

As autumn approaches, news headlines are focusing once again on energy consumption and its associated costs.

With older power plants closing and lower wholesale power prices making less efficient plants uneconomical, National Grid recently reported an increased risk of blackouts this winter, predicting that spare capacity on the system will drop as low as 1.2 per cent. To combat this shortage, a further 5 per cent of extra energy has been purchased from suppliers around the country, adding approximately 50p ($0.75) to every household bill.

While this may not seem much in terms of cost or capacity, it does suggest that more needs to be done to reduce energy consumption – either by turning off more lights or installing more energy efficient products. Persuading and empowering customers to reduce the amount of energy they consume could be the key to the future success and longevity in the sector.

In the past, consumers have resisted change when it comes to switching energy providers. Today, changing suppliers is considerably less complex. Rising energy prices mean that fuel bills are being prioritised on the household agenda, while market reforms are making it quicker and easier for customers to compare prices and deals between existing and new energy retailers.

The challenge facing energy providers is how to win new business while maintaining and growing the loyalty and commitment of existing customers. With more competition in the market, traditional factors such as cost and customer service continue to influence decisions, but if there is little differentiation between providers, consumers are likely to switch to suppliers who are perceived as proactively supporting customers in reducing their energy bills, managing consumption, or offering alternative forms of energy that better match their sustainable ethos.

With this in mind, energy firms must re-evaluate the way they manage and interact with their customers. Energy retailers must re-imagine the customer relationship and look for ways to significantly improve the overall customer experience. It is not simply about delivering kilowatts, but also about providing the means to improve energy efficiency and lower bills.

Technology is essential to such a strategy. Smart meters are an important part of this and a considerable step forward, but they are not an immediate solution and it will take time for them to become ubiquitous while national installation and public understanding around the costs and potential value of new metering technology are achieved. Utilities also need to work behind the scenes to develop more flexible offerings that reward customers for conserving energy and shifting their usage patterns to help offset peak consumption periods.

This further emphasises the importance of energy utilities developing more meaningful relationships with their customers. Trust between consumers and energy providers is not particularly high following years of price rises. Strengthening that trust must become a priority if suppliers want to successfully re-engage with their customer base. Educating customers about the potential benefits that smart meters bring is just one example of how the energy sector can not only engage, but regain trust and build more productive relationships.

Transformational as smart metering is to the energy industry, it is just one example of how technology can be used to improve the relationship between provider and customer.

Retail utilities should leverage big data analytics to engage in insights-driven customer interactions

Having information on customers' energy usage is of little benefit if utilities cannot effectively track and analyse individuals' different needs, and tailor services accordingly.

Utilities must therefore ensure that they have technologies that enable consumers to manage both their energy usage and – just as importantly – steer the services they receive. As energy prices become less of a market differentiator, the range of services and payment options offered will become more important factors affecting the decision to switch or stay with a provider.

While some consumers may want the certainty of a regular, fixed price for their energy to help them budget accurately, others consider low market pricing more of a priority. Some consumers may be prepared to pay a premium for green energy, while others with dual fuel homes may benefit from sourcing gas and electricity from different providers to secure the best possible deal. As it becomes simpler to switch providers, it is increasingly important that energy retailers are not only transparent about the different services and tariffs that they offer – a trend that is becoming more visible in the market – but also give customers the greatest possible control over the way that they use and pay for their energy.

Technologies that deliver rich insights derived from smart metering and data information provide the capabilities that enable energy retailers to deliver a range of personalised service offerings to each individual customer, and give them an opportunity to create and deliver truly innovative new services.

For example, analysing individual usage profiles will allow energy providers to offer customer-specific programmes that align with peoples' individual preferences, and therefore help ensure they consume intelligently on their own terms. In addition, one likely outcome of new advances in technology is the end of kilowatt-per-hour pricing. Rather than paying per unit of energy, households could be charged depending on what temperature they want their homes to be.

By managing and monitoring every aspect of their customers' energy consumption – from boilers to thermostats, meters to insulation – energy retailers will be well-placed to design bespoke energy plans, giving customers better control of usage and bills, and thus enable them to consume more economically and sustainably.

Data analytics provide utilities with a deeper understanding of their customer base, which will prove invaluable as they look to educate consumers and help them streamline their consumption behaviour. For their part, customers gain regular insight into their energy use; with real-time consumption data displayed directly in their homes, consumers can immediately see how much energy – and therefore money – they are using.

The roll out of smart meters will also bring utilities exceptional levels of control over the grid. By automating network management with new technologies, energy distributors will be able to adapt their services and operations to shifting network conditions in near real-time based on data they collect from customer meters. To add to this, instant feedback from widespread network smart meters will allow energy providers to spot warning signs for impending problems before they materialise, so they can take proactive action and avert issues before they impact customers.

In addition to the visible benefits that smart meter analytics can bring to customers, they also enable energy companies to deliver more accurate billing and drive exceptional customer service behind the scenes.

For legacy meters, issues of degrading accuracy with readings can take anywhere from months to years to identify and resolve. In most cases, these issues only come to the utility's attention when customers have flagged inconsistencies in their energy bills.

In the age of analytics, the timeline for detecting metering issues has reduced dramatically, which means utilities will be able to detect and repair faulty devices before customers see any effects on their bills. By facilitating a proactive approach to meter management, analytics tools help energy companies avoid many billing issues and strengthen their relationships with their customers.

It is worth noting that current regulations in the UK require utility network operators to aggregate or treat data so that such data can no longer be associated with an individual premises. This means distributors will have to plan their smart meter strategies carefully to maximise the value of the information they collect while remaining compliant with evolving privacy policies.

There is no crystal ball for the future, and we cannot exactly predict what the relationship between the energy retailer and customer will look like in decades to come. However, new service models, improvements in fostering trust among customers, and more sustainable energy options will all contribute to the building and changing of reputations.

Customer behaviour has also changed dramatically over the last few years. Digital interactions have taken over, accompanied by an explosion of mobile and social channels. Customers are increasingly using more than one channel for a specific transaction. People expect proactive communications, immediate answers to questions and issue resolution, and personalised recommendations delivered with consistency across their channels of choice.

The increasing availability and affordability of home energy management technologies is helping consumers to take matters into their own hands. Nowadays, it is critical for utilities to exploit their decades of experience in the sector to help customers get the most out of these technologies, whether they are mandated smart meters or discretionary technologies chosen by the customer.

To succeed in this challenging and evolving business environment, retail utilities need the capability to delight customers at all points of the customer journey with consistent, personalised, and rich customer experiences across all the interaction channels, including mobile and social. Secondly, retail utilities should leverage big data analytics to engage in insights-driven customer interactions with real-time proactive recommendations and solutions tailored to individual customer needs. Finally, retail utilities need business agility and effectiveness with flexible, end-to-end customer engagement processes that can easily and cost effectively adapt to market changes.

There is no better time for providers to utilise the technologies now available to realise the untapped value in their businesses, and thus improve network management and support energy conscious customers.

Martin Dunlea is Senior Director Utilities Strategy, Oracle

Pontificating about climate change

Junior Isles

Some argue that religion has no place in science. If you are Pope Francis, it is an argument that seems to have fallen on deaf ears.

While visiting New York last month on a six-day tour, which coincided with New York Climate Week, the head of the Catholic Church made climate change a key part of his message.

Although not the first pope to address the UN, Francis was the first pope to address the annual opening session of the body.

In remarks to the largest gathering of world leaders in UN history, the pontiff blamed environmental degradation on "a selfish and boundless thirst for power and material prosperity" that causes untold suffering for the poor who "are cast off by society."

Pope Francis took the opportunity to push his pro-environment message, framing the issue in moral terms stressing that environmental protection includes an "absolute respect for life in all its stages and dimensions".

"First, it must be stated that a true 'right of the environment' does exist," the pope said. "Any harm done to the environment, therefore, is harm done to humanity," he continued, adding, "human beings are not authorised to abuse it, much less to destroy it".

His message appeared to strike a chord with the UN. Marking an historic day for humanitarian and climate action, world leaders of the 193 United Nations members at NYC Climate Week formally adopted the new Sustainable Development Goals (SNDGs).

The adoption of the agreement, known as 'Transforming our World: The 2030 Agenda for Sustainable Development', is an important first step in a process which will be fully agreed by March 2016.

The SDGs are widely accepted as the strongest international agenda to bring an end to global poverty. They aim to address the interlinked problems of inequality, hunger and climate change by 2030 through 17 key themes, including access to clean energy and building sustainable cities.

WWF International said the "historic" 15-year plan is "the right deal at the right time" that commits all countries to ensuring food, water and energy security for generations to come.

Yolanda Kakabadse, President of WWF International said: "It's a history-making moment that could fundamentally change how we treat our planet and all of its people."

It is this moral argument the pope is hoping will weigh on the minds of climate change negotiators at COP21. Addressing the UN, the pope shared his opinions on the chances of success at the global COP21 climate talks this December.

"I am confident that the Paris conference on climate change will secure fundamental and effective agreements," he said.

"Solemn commitments, however, are not enough even though they are a necessary step toward solutions. Concrete steps and immediate measures are needed for preserving and improving the natural environment and thus putting an end as quickly as possible to the phenomenon of social and economic exclusion."

During the event UN Secretary-General Ban Ki-moon highlighted the pope's speeches on economic development and the environment, stating: "Your visit coincides with the Agenda to Adopt the UN Sustainable Development Goals, but that is no coincidence. […] Climate change is a principal challenge facing the world. This message is critical as we head toward Paris in December."

Climate Week NYC marked a week of positive announcements from business, sub-national government and civil society.

A number of globally recognised US businesses including Goldman Sachs, Johnson & Johnson, NIKE, Inc., Procter & Gamble, Starbucks and Walmart joined the RE100 campaign, pledging to source 100 per cent of their electricity from renewable energy to reduce CO_2 emissions and seize the business benefits.

When RE100 was launched one year ago by The Climate Group in partnership with CDP, there were 12 original corporate partners. Now 36 major businesses from around the world have joined the campaign.

Mark Kenber, CEO of The Climate Group said: "Research shows that the most ambitious companies have seen a 27 per cent return on their low carbon investments – no wonder new names keep joining RE100. Lowering risk, protecting against price rises, saving millions and boosting brand is what shaping a low carbon economy is all about. Today these companies are signalling loud and clear to COP21 negotiators that forward-thinking businesses back renewables and want to see a strong climate deal in Paris."

Such actions demonstrate that US businesses and government are serious about climate change and Pope Francis was only too ready to publicly support the cause.

While addressing Congress in Washington the day before the UN meeting, he called on leaders to take "courageous actions and strategies" to address and combat climate change.

There was a papal blessing for the Environmental Protection Agency's new emission control proposal. "Mr President, I find it encouraging that you are proposing an initiative for reducing air pollution," the pope said.

"I am convinced that we can make a difference and I have no doubt that the United States – and this Congress – have an important role to play," he said. His words echoed those of his encyclical, released in June, which extensively made the case for treating the fight against climate change as a moral issue.

Never missing an opportunity, several politicians and presidential candidates clamoured to align themselves with the pontiff's message, no doubt seeking to curry favour among the country's near 70 million Catholics in the run-up to next year's US presidential election.

Democrat presidential nominee Hillary Clinton wrote a Francis-themed column on climate change in the National Catholic Reporter (NCR).

"As a person of faith, a mother, and a grandmother, I am deeply moved by Pope Francis' recent teachings on climate change – to reflect and above all to act," she wrote. "We are rich, powerful, and blessed with many advantages. We must lead the charge."

Just days before Clinton's editorial, another Democratic presidential candidate Martin O'Malley, former governor of Maryland, also appeared in the NCR.

O'Malley wrote: "He is a reformer… he inspires millions of others… to act now to head off the devastation of climate change for the sake of our "common home", this one earth; and to reach out and help those most in need."

But not all are happy to see religious leaders taking a stance in the debate. Republican presidential candidate Jeb Bush, former Florida Governor is against Pope Francis' call to fight climate change.

"He's not a scientist, he's a religious leader," Bush said in a video posted by the Democratic opposition research group American Bridge.

During his campaign trail he told reporters in Virginia that he opposed President Barack Obama's climate policies and stressed that focusing on economic growth is more important.

Bush said while he respects the pope's opinion and that the pope "is not wrong", he believes Francis should stay out of political issues.

Bush, himself a Catholic, said: "Put aside Pope Francis on the subject of any political conversation. I oppose the president's policy as it relates to climate change because it will destroy the ability to re-industrialise the country, to allow for people to get higher wage jobs, for people to rise up."

Republican presidential candidate and former Senator Rick Santorum (R-Pennsylvania) also said that Pope Francis should "leave science to the scientists".

Perhaps someone should have informed Santorum that Francis holds a degree as a chemical technician and worked as a chemist before becoming a priest.

But whether Francis is a scientist or not is beside the point. Politicians are not scientists either but are never short of a word or two on climate change. He may not make the blindest bit of difference but as a citizen of planet Earth the pope is entitled to pontificate on climate change as much as anyone else.