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The fourth wave

Energy affordability is firmly on the table and is not going away. A. T. Kearney analyses the issues. Page 13



Final Word

With high energy prices, some not too smart words are flying around, says Junior Isles. Page 16



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Alstom recently introduced an advanced large scale circulating fluidised bed boiler. The boiler comes at a time when there is a growing need to burn low quality coal, especially in Asia. Page 15

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Warsaw talks signal bleak prospects for Paris

European Climate Commissioner Connie Hedegaard says "critical questions will be asked"

Climate change talks in Warsaw have done little to instil confidence that a global climate deal can be reached in 2015, and once again cast doubt on the UN process to deliver. **Junior Isles**

The acrimonious closing of the latest round of climate talks in Warsaw, Poland does not bode well for the meeting in Paris in 2015, at which climate change negotiators aim to sign an accord to combat global warming.

The two-week long 19th Conference of Parties (COP 19) talks were defined by bitter disagreements among nations, which saw environmental groups walk out before its conclusion in protest over the slow progress being made on paying for climate change.

With negotiators making limited progress in detailing how and to what extent wealthier nations will help poorer nations deal with the effects of climate change, Greenpeace and other groups – including Friends of the Earth

Europe, the World Wildlife Fund and Oxfam – stormed out saying the meeting was "on track to deliver virtually nothing".

In 2009, developed nations pledged funding of up to \$100 billion a year starting in 2020, but have been dragging their feet over the establishment of targets for 2013-19. A text drafted in Warsaw urges developed nations to increase aid.

The talks also produced a proposal for a "Warsaw mechanism", which would provide aid and expertise to developing nations suffering the disastrous consequences of climate change. Developing nations had insisted on a new mechanism even though developed nations had warned it would not

receive any separate funding.

The meeting was hit by other setbacks. Australia's conservative government fulfilled a campaign promise and introduced a bill to scrap the country's carbon tax, while Japan drastically scaled back its emissions target.

The moves drew criticism from developing countries, which say the world's rich countries have a historical responsibility for climate change and should take the lead in fighting it.

A group calling itself the 'Like-Minded Developing Countries' – which includes China, India, Pakistan, Malaysia, the Philippines, Saudi Arabia and Venezuela – wanted emerging nations to be able to continue burning fossil fuels since alleviating poverty

remained their priority. They insisted that developed nations – which have been creating greenhouse gases longer – bore a larger responsibility for fixing the problem.

The US and other developed nations, however, maintained that the main points of the agreement finalised in Paris in 2015 would be applicable to all.

As the conference drew to a close, talks nearly collapsed amid a last-minute disagreement between the developing and wealthier nations. India and China clashed with the US over what to call the targets countries are to propose in early 2015. In the end,

Continued on Page 2

World Energy Outlook highlights energy price differentials

The International Energy Agency's *World Energy Outlook (WEO) 2013*, launched in London, UK, last month says large variations in energy prices will persist through to 2035, affecting company strategies and investment decisions in energy-intensive industries.

The IEA's outlook notes that electricity price differentials are large, with industrial consumers in Europe and Japan paying on average more than twice as much for electricity as their counterparts in the US. "Even Chinese industrial consumers pay almost double the US level," it states.

"Lower energy prices in the United States mean that it is well-placed to reap an economic advantage, while

higher costs for energy-intensive industries in Europe and Japan are set to be a heavy burden," said Fatih Birol, IEA Chief Economist.

The report also reinforced the continued importance of fossil fuels in power generation and the changing axis of consumption in the global economy towards Asia.

Commenting after the publication of the WEO 2013 report, Paul Wootton, head of energy at global law firm Everheds, said: "The shale gas revolution in the US will enable energy-intensive industries to be more competitive. As the dramatic structural changes to the global market identified in the report develop, long-term energy contracts will become increasingly complex as

purchasers and suppliers seek to manage the balance of forward pricing risk between contracting parties."

The report also reinforces the increasing importance of renewables deployment and envisages that by 2035 it will approach coal as the most important energy source for power generation.

Birol commented: "If renewable policies do not change we expect subsidies to double to \$220 billion by 2035. A significant portion of these subsidies are already locked in and will help renewable energy growth. However, they will have implications for electricity prices." At the same time, he noted that fossil fuel subsidies are far higher and "are bad for everyone

– the climate and the poor".

The IEA stresses, however, that action to reduce the impact of high energy prices does not mean diminishing efforts to address climate change. The WEO says that energy-related carbon dioxide emissions are projected to rise by 20 per cent to 2035, leaving the world on track for a long-term average temperature increase of 3.6°C, far above the internationally agreed 2°C climate target.

Responding to the new report, Greenpeace UK deputy political director Joss Garman said: "This report shows that the world remains on course for dangerous levels of global warming, and that fossil fuel subsidies are rising instead of falling."

Continued from Page 1

countries agreed to go with “contributions” instead of “commitments”.

Those contributions, which the developing countries pushed for, will be at the heart of any global agreement on climate change struck in Paris in late 2015. They could take the form of curbs to the future growth in emissions, in the case of developing countries, and absolute reductions much tougher than those agreed up to 2020, for the developed nations.

“I think what this meeting signals is that, clearly, we have our work still cut out for us,” said Jake Schmidt, international climate policy director at the Natural Resources Defense Council. “It’s a hard-fought battle and it’s going to have to intensify in the next couple years.”

He added: “If we go to Paris and say we didn’t completely get this done I think... the world will draw the conclusion you really cannot trust the UN to deliver on this process.”

Commenting on the effectiveness of the UN process, European Climate Commissioner Connie Hedegaard questioned whether meetings should be held every year, and if there should be a narrower scope of each session.

“Maybe it would be time now to think if there should be themes for the conferences so that not each conference is about everything,” she told *The Associated Press*.

“I think that it has to deliver a substantial answer to climate change in 2015,” Hedegaard said. “If it fails to do so, then I think this critical question will be asked by many more.”

Jennifer Morgan, of the World Resources Institute was slightly more upbeat, noting that negotiators in Warsaw “delivered enough to keep the process moving”. She also praised national actions from expanding solar power in Germany to new wind farms in Brazil but cautioned that they are not enough.

US climate envoy Todd Stern noted that international action would not do the job of reducing fossil fuel use and increasing energy efficiency. “We all know that any policies that do those things fundamentally happen at the national level,” he said.

Notably, international efforts are increasingly taking place outside the UN climate framework. Governments are working together to cut funding for coal projects, reduce soot and other climate pollutants and to phase out fossil fuel subsidies.

China and the US this year agreed to work jointly on energy efficiency, carbon capture technology and other mitigation projects.

Speaking at the 4th Sustainable Innovation Forum, which ran alongside COP19, Achim Steiner, UN Under-Secretary General & Executive Director of the United Nations Environment Programme (UNEP) issued a call to world business and civil society leaders.

“Climate Action has to be centred on promoting effective partnerships between the public and private sector by helping to create dialogue and knowledge transfer between corporates, international governments and NGOs.”

Steiner called for effective partnerships



Investor confidence in renewables being destroyed

Policy uncertainty and a lack of long-term vision are damaging investor confidence in Europe’s renewable sector, **Vic Wiyman** reports.

Governments around Europe are destroying investor confidence in renewable energy and leading to investors going elsewhere in the world, according to the European Renewable Energy Council (EREC) industry association.

Renewables are suffering from European Union (EU) policy uncertainties and a lack of long-term targets, leaving the energy market open for less attractive technologies, EREC president Rainer Hinrichs-Rahlwes told the organisation’s biennial policy conference.

Latest European Commission figures show that more effort is needed by the UK, France and some other European countries if the EU is to meet its target of renewables accounting for 20 per cent of energy consumption by 2020.

The present figure is 13 per cent.

“The lack of long-term vision for renewable energy sources is the most important barrier,” said EREC policy adviser Isabel Cancela de Abreu.

Future EU renewables policy is uncertain. Early in 2014 the Commission will produce a policy package on renewables, greenhouse gas emissions and energy efficiency and potential EU targets for 2030.

There is widespread demand for 2030 targets, to stimulate investment. EREC wants a 45 per cent target for 2030.

The Commission will also produce a report on EU energy costs for a European Council competitiveness meeting in February.

Hinrichs-Rahlwes also criticised

subsidies for conventional and nuclear generation as unfair.

However, Michel Matheu, Head of Public Affairs at French utility EDF, rejected a suggestion that the contracts for differences given by the UK government for new EDF-led nuclear plants were unfair. “Contracts for differences are not subsidies,” he claimed, adding that the long-term rise in electricity prices would lead to negative differences and payments to the UK government.

He told EREC’s conference in Brussels, Belgium, that the £92.5/MWh offered for nuclear power was less than the £155/MWh for offshore wind turbine electricity, for example.

However, Keith MacLean, policy and

research director at the UK utility SSE, said that the new nuclear plants would begin generating at £121/MWh, while onshore wind would at that time be about half of that and offshore wind close to that. He called the UK government’s claim that the nuclear support was not subsidies “astonishing”.

However, the renewables potential was unlikely to be met without more help for the currently hard-hit sector, said Dolf Gielen, director of the technology centre of the industry group the International Renewable Energy Agency (Irena). “There is a need for more global action,” he said.

Gielen also noted that renewables investment worldwide would fall again this year, despite costs having fallen.

EU and US push CCS

■ ZEP report outlines measures for CCS ramp-up ■ CSLF adds projects to R & D portfolio

Junior Isles

Organisations in Europe and the US are again moving to promote the importance of carbon capture and storage (CCS) in the battle against global warming.

Europe’s Zero Emissions Platform (ZEP) recently published a report presenting the case for urgent action on CCS in Europe.

In its position paper, ZEP reflects on what should be considered an appropriate pace to scale up CCS demonstration between now and 2030 and avoid continued overall uncertainty, higher costs and the effects of carbon lock-in.

The report states that CCS offers a range of societal benefits including job creation and providing greater energy security by allowing Europe to use fossil fuels in a low-carbon way.

Although the benefits of CCS are clear, it has been slow to take-off due to low carbon prices, which have made it an economical option. It is hoped that strengthening the European

Emissions Trading Scheme will help boost carbon prices and speed up the transition from demonstration projects to commercialisation.

Charles Sothill, Senior Vice President and Chief Technology Officer at Alstom Power chaired the Committee that prepared the “Market Economics II” report, which demonstrates the long-term potential for CCS. He said: “Our model assumes that CO₂ price [using the value of the euro in 2010] will rise to €30/t in 2030 and €70/t in 2050. A robust and rising price of €30 is sufficient to drive CCS in 2030.”

ZEP recommends that in the short term the European Commission should implement “transitional measures” to aid deployment. The ZEP has modelled several transitional methods or incentives – including public grants, feed-in premia, CCS certificates and emission performance standards – to determine the effects of each incentive.

The US has made faster progress with CCS than Europe and continues to push development. At a high level

meeting in Washington DC, energy and environment ministers from the Carbon Sequestration Leadership Forum’s (CSLF) stressed: “We are convinced that the demonstration and global deployment of carbon capture and storage must be accelerated and we are committed to taking necessary actions individually and collaboratively to make this happen.”

The CSLF also added five CCS projects to its existing research and development portfolio. The new projects bring the total number of recognised projects over the past 10 years to nearly 40. Twelve of these projects have been successfully completed.

These projects provide the basis for international information sharing on some of the most important projects throughout the world covering all aspects of CCS.

Meanwhile, last month the US Department of Energy (DOE) awarded \$84 million to support 18 CCS projects across the country to help limit carbon dioxide emissions from coal-

fired power plants.

Yet projects continued to be plagued by high costs. It was reported last month that the 582 MW Kemper County coal gasification plant would take longer to build than originally planned. This project was one of two selected in the second round of the DOE’s Clean Coal Power Initiative.

The plant was expected to open in May 2014 but will not do so until the fourth quarter of 2014. The total cost has also more than doubled from the original estimate of \$2.2 billion in 2004, to \$5 billion.

Another CCS project that is yet to get off the ground due to rising costs, last month received positive news. Although a final recommendation is still pending, the DOE said that the FutureGen 2.0 power project in western Illinois should go forward. A final DOE decision on whether construction should start is expected by the end of the year. If it moves ahead, the plant is expected to start producing power in 2017.

Uncertainty and lack of expertise deters renewables investors

A lack of certainty in renewable energy policy and expertise of renewable energy projects are holding institutional investors back according to a new survey from Ernst & Young (EY).

Of the 75 North American and European major pension and insurance funds surveyed as part of the ‘Pension and insurance fund attitudes towards investment in renewable energy infrastructure’ report, 61 per cent have no current investment in renewable energy infrastructure.

Ben Warren, EY’s Global Cleantech Transaction Services Leader commented: “Although renewable energy

infrastructure projects will soon be economically viable in their own right, they are currently reliant on some form of subsidy to deliver returns. In the absence of stable policy and regulation, underlined by strong political support, long-term investors will find it difficult to buy-in to this sector.

“In addition, as our survey shows, pension and insurance funds need greater levels of expertise in the asset class. In particular in understanding the risk and return profiles of renewable energy infrastructure projects to properly evaluate their potential.”

Despite these difficulties, 38 per cent

of respondents who had made investments said that they had met their expectations, with one in three anticipating their renewable energy allocations will increase in the next three years, stated the report. Half of these anticipated an increase of over 10 per cent.

Onshore wind power projects were shown to be the most popular with investors, with 43 per cent stating that they have invested or are considering investing in these assets. Hydroelectric power projects ranked second at 38 per cent, closely followed by solar photovoltaic (PV) projects, at 32 per cent.

In a separate report IHS Inc. raised

its forecast of photovoltaic (PV) capital spending amid new signs that solar market conditions are improving and major suppliers are increasing production.

Global capital spending in 2014 by producers of photovoltaic (PV) modules, cells, ingots, wafers and polysilicon will rise by 42 per cent to reach \$3.3 billion. IHS previously expected an increase of 37 per cent for the year.

The projected expansion in 2014 will mark the end of a two-year period of contraction in spending that resulted from slowing growth and massive oversupply in the industry.

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Wind wins at A-3 auction

■ 900 MW of capacity by 2016 ■ Areva wins Angra 3 bid

Brazil is hoping that a recent auction of renewable energy capacity will help it to meet an expected rise in electricity demand in 2016.

The November A-3 auction awarded 25 year contracts for 39 wind farms and was also the first auction in Brazil to include solar power projects, although no solar bids were successful.

The country is also planning to boost its generating capacity with nuclear energy after Eletrobras Eletronuclear awarded Areva a contract to complete the construction of the Angra 3 nuclear reactor in Rio de Janeiro state.

The 39 wind farms awarded at the auction have a combined total capacity of 897 MW and are expected to begin operating in 2016. The average price of the bids was BRL124.43/MWh (\$53.69), lower than the ceiling price of BRL 126/MWh.

Solar energy in Brazil currently costs BRL200/MWh and so solar developers in the auction were unable to make the cut.

Of the wind projects awarded, 19 will be built in the southern Brazilian state of Rio Grande do Sul, and the remaining 20 projects spread over

four northeastern states.

GE said that it won 545 MW of orders in the auction, which was held on November 18, 2013. It says it will provide its 1.7-100 and 1.85-82.5 turbines for wind farms being developed by Casa dos Ventos, Eletrosul, Contour Global, CEEE, PEC, Rio Energy and Chesf.

GE will also service the wind turbines for ten years under operations and maintenance agreements.

In a deal signed with Eletrobras, Areva will supply engineering services and components, as well as the digital instrumentation and control

system for the reactor. The group will also provide assistance in the supervision of the installation works and the commissioning activities.

The project to construct Angra 3, a 1405 MWe pressurised water reactor, was restarted by the Brazilian government in 2006 to meet the country's growing energy need and balance the energy mix.

Brazil's government is keen to develop non-hydropower resources without increasing greenhouse gas emissions.

According to a new report from the

Observatorio do Clima, or Climate Observatory, a network of Brazilian environmental Groups, greenhouse gas emissions in Brazil are at their lowest in two decades.

Observatorio do Clima said greenhouse gas emissions amounted to 1.48 billion metric tons in 2012 compared to 1.43 billion metric tons in 1992. Their highest point was 2.86 billion metric tons in 1995.

The report measured gas emissions caused by deforestation, farming, the energy and industrial sectors and the burning of crop residues.

Obama to combat climate change by supporting clean energy



Obama's clean energy initiative will impact coal fired power projects abroad, but continues to face stiff opposition at home.

Siân Crampsie

The USA is to bring an end to its financing for coal-fired power projects overseas.

The US Department of Treasury has issued new guidance for multi-lateral development banks (MDBs) on the financing of new coal projects.

The move follows a pledge in July by the World Bank to limit financing of new coal-fired power plants to rare circumstances and will also increase pressure on other banks – such as the European Bank for Reconstruction and Development (EBRD) to follow suit.

The Treasury said in a statement new coal plants receiving support from US-funded MDBs would have to meet the same greenhouse gas requirements as the US Environmental Protection Agency's standards for new domestic power plants, which were announced earlier this year.

The World Resources Institute (WRI)

commented in a statement that the decision "holds real significance" at MDBs such as the World Bank, where the USA is the largest shareholder.

The move by the Treasury is a reflection of US President Barack Obama's drive to combat climate change by supporting clean energy.

"As developing economies embark on a journey towards a clean energy future, today's announcement marks an important step in helping them reach this goal," said Treasury Under Secretary for International Affairs Lael Brainard. "By encouraging the use of clean energy in multilateral development bank projects, we are furthering US efforts to address the urgent challenges of climate change."

The guidance issued by the Treasury ends financing for coal fired projects unless they are using the most efficient coal technology available and are in the world's poorest countries where no other economically viable alternative

fuel source exists, or they use carbon capture and storage technology.

WRI said that further clarification in the guidance is required to define "rare circumstances" and on what basis countries are assessed for their relative poverty.

On the domestic front, the US EPA's new rules on coal fired power plants drew widespread protests in late October, with thousands of pro-coal groups rallying in Washington, DC to voice their opposition to the regulations.

The proposed regulations call for future power plants to be able to capture between 30 and 50 per cent of carbon dioxide emitted. They would make it impossible for new coal fired power plants to be built, according to lobby groups such as Count on Coal.

The USA's coal sector is also under pressure from a rise in natural gas production in the country and there are fears that the country's coal sector faces collapse.

Mexico reforms set to stall

The Mexican government's plans to push through ambitious energy sector legislation by the end of 2013 could falter due to a busy legislative timetable and the complex and far-reaching nature of the reforms.

Opposition parties in the country have voiced their concerns over the lack of time available for debate over the proposals, which would open up the country's oil and gas sector to private participants as well as reform the power sector.

However the government says that the reforms are essential to the economic future of Mexico and wants Congress to pass the legislation by the end of the year.

The reforms are President Peña Nieto's most ambitious initiative in office so far and would require changes to Mexico's constitution, necessitating approval by a two-thirds majority in Congress.

The package would allow private firms to invest in oil and gas exploration and production projects via profit-sharing agreements with the government, and would also revamp the electric power sector by increasing the number of small-scale generators and making the state-owned monopoly utility Comision Federal de Electricidad (CFE) more efficient and competitive.

According to the government, electricity prices in Mexico are 30-40 per cent higher than in the USA, while gas prices are also higher.

The reforms will help reduce the cost of energy and help growth in the country's manufacturing sector.

Although opposition party PAN has backed the reforms, the ruling PRI party faces opposition from the PRD party.

The PRI party is expected to make concessions to win support for energy reform in Congress, including agreeing to a plan that would weaken the presidency and strengthen Congress' powers.

While the political debate continues, Mexico is already moving forward with regulations that will help the country to develop a robust market for smart grid technology.

CFE is in the final stages of developing a smart grid roadmap to help spur a market that will cumulatively reach \$12.1 billion by 2023, with annual spending ramping up from \$205 million in 2014 to \$2.1 billion per year in 2023, according to a new study released today by Northeast Group, LLC. This spending will be allocated across 17 smart grid market segments including smart metering, transmission and distribution network infrastructure and information technology.

"[Mexico's] government is working on developing a concrete regulatory framework and political leaders are looking to reduce electricity prices and incorporate small-scale generators," said Ben Gardner, president of Northeast Group. "Smart grid infrastructure will be necessary to enable these changes. Above average distribution losses and electricity consumption rates mean that there is already a strong business case for smart meter deployments in Mexico, with other smart grid market segments to follow."

Puerto Rico unveils new policy

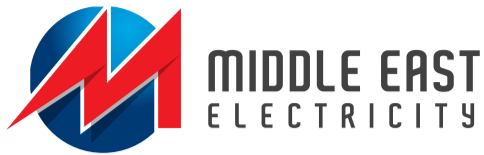
A new energy policy unveiled by Puerto Rico Governor Alejandro Garcia Padilla will reduce energy costs by 20 per cent in two years and 50 per cent in the next 12 years.

The plan includes a goal of transforming the Puerto Rico Electric Power Authority (PREPA) and introducing short-, medium- and long-term goals for the sector. Padilla also wants

to improve energy efficiency, promote energy independence and develop renewable energy.

The reforms also plan to establish a new regulatory board that will pass judgment on all power purchase contracts with private producers and examine rates to ensure that they reflect the true costs of producing, transmitting and distributing electricity.

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Tepco under scrutiny

■ Experts question ability to decommission ■ Government eyes greater state control over utility

| Syed Ali

Tokyo Electric Power (Tepco), the owner of the Fukushima Daiichi nuclear power plant, which was crippled following an earthquake and tsunami in 2011, has come under scrutiny as it begins decommissioning of the plant.

While experts are questioning the Japanese utility's ability to carry out the crisis cleanup operations, others are calling for Prime Minister Shinzo Abe to review a deal that saved Tepco from bankruptcy and instead put the Fukushima site and possibly the entire company under government control.

The Fukushima plant has had a series of mishaps in recent months, including radioactive water leaks from storage tanks. The incidents have added to concerns about the ability of Tepco to safely close the plant down.

Last month Tepco said workers started removing radioactive fuel rods from a pool at the damaged Unit 4 reactor building.

"The operation is an important step toward decommissioning the nuclear

power station, which would take 30-40 years," Tepco President Naomi Hirose said.

Unit 4 was offline at the time of the March 2011 disaster, and its core did not melt, as Units 1-3 did. However, hydrogen explosions severely damaged the roof and walls of the building and weakened the structure, leaving it vulnerable to earthquakes.

Tepco has since reinforced the building but experts said keeping so many fuel rods in a storage pool in the building presented a major safety risk.

Despite the successful start of this operation, experts are more concerned about retrieving fuel rods from the pools of Units 1-3 as well as the melted fuel inside them.

"Spent fuel has potentially a very large risk... I am personally more worried about (the handling of) it than the radioactive water problem," said Nuclear Regulation Authority Chairman Shunichi Tanaka.

Hirose has vowed to take "all possible measures" to ensure safety, while another senior official said it is "very

unlikely" that an incident will occur.

However, Hideyuki Ban, co-director of the Citizens' Nuclear Information Centre, an anti-nuclear power group, said: "It is quite certain that various kinds of troubles will occur, but I think Tepco has not prepared enough safety measures."

The US has offered help in the decommissioning. US Energy Secretary Ernest Moniz recently said he expects deepening cooperation with Japan over the cleaning up and decommissioning of the plant.

Tepco is also likely to receive financial help for the clean-up. Based on a key proposal endorsed by the ruling parties last month, the Japanese government is considering shouldering some of the costs for decontaminating areas outside the plant, which could reach Yen5 trillion (\$50 billion) and is planned to be paid by Tepco.

The move would be a massive relief to the utility, which is in need of funds to deal with compensation payments, plant decommissioning and decontamination of off-site areas.

The company has barely been kept afloat under a financial assistance scheme involving a state-backed fund created in the wake of the nuclear crisis. It also received a Yen1 trillion capital injection from the fund last year.

In light of its financial burdens, some believe an overhaul of the utility is unavoidable.

"I think it's inevitable," Yasuhisa Shiozaki, a member of the Abe administration told the *Financial Times* in an interview, referring to proposals for an overhaul that would see the state tighten its control over Tepco.

In a move aimed at managing the huge workload it is facing – ranging from the safety assessment of nuclear power plants to the supervision of Tepco's handling of the stricken Fukushima plant – the Diet last month passed a bill to scrap the Japan Nuclear Energy Safety (JNES) Organisation and integrate it with the Nuclear Regulation Authority.

The NRA was launched last year to enhance nuclear regulations in the wake of Fukushima. The main tasks

of the JNES include inspections of nuclear facilities and research on nuclear safety.

Last month the country also enacted a law to begin a drastic reform of the country's electricity sector. The government has been seeking to overhaul the power industry after the Fukushima disaster led to power shortages and exposed the vulnerability of the existing electricity supply system.

Japan has also been ramping up its use of renewables, which has attracted overseas investors. In November US firm First Solar said it will partner with Japanese companies and invest \$100 million to develop, construct, and operate solar power plants, mitigating Japan's dependence on nuclear and natural gas fuel imports.

Japan is expected to become one of the key solar markets due to its significant energy demand, with a government-set target to install 28 GW by 2020. Solar PV plants can be built quickly to help provide a solution to idled nuclear power.

Abe has eyes on Tepco



Indonesia aims to boost electricity capacity

Indonesia is aiming to increase generating capacity by 5000 MW per year in an effort to support economic growth.

Mr Jarman, the Energy and Mineral Resources Ministry director general for electricity, said that the country had added 4000-4500 MW of capacity per year since 2011.

"From 2014 to 2020, the average annual increase should gradually increase to 5000 MW per year," Jarman said, "If not, [economic] growth will be bottled up."

The government has been pushing the development of new power plants in an attempt to bolster energy security.

State-owned oil and gas company Pertamina recently said it is expanding into the electricity business and plans

to build power plants in several parts of the archipelago, including three industrial estates in West Java.

Hari Karyulianto, director in charge of gas affairs at Pertamina, said the company is aiming to become an independent power producer with the ability to supply up to 5 GW of electricity to the state electricity company Perusahaan Listrik Negara (PLN).

It said it would soon carry out feasibility studies for the construction of several power plants that are expected to generate hundreds of megawatts to meet growing demand for electricity in the country.

In addition to plans for gas-fired plants in West Java, Pertamina recently announced plans to build a biomass

plant costing \$180 million, also in West Java.

Meanwhile, Pertamina Geothermal Energy (PGE), a wholly owned subsidiary of PT Pertamina, says it will spend up to US\$2.29 billion to finance the development of eight geothermal power plants.

Indonesia has been embarking on fast-track power programmes to meet soaring power demand. The first 10 000 MW programme is largely based on coal fired generation while the second will see a big role for geothermal generation.

PLN recently said that the first 10 000 MW programme will be 70 per cent complete by the end of 2013 and finished some time next year.

Pakistan power deals boost generation outlook

A series of agreements reached last month will provide a valuable boost to Pakistan's flagging power sector.

In November foreign investors agreed to put in \$300 million over the coming months to convert some of Karachi Electric Supply Company's (KESC) oil-fired power plants into cheaper to run coal-fired plants, KESC Chairman Tabish Gauhar said.

"We stand ready to start work. Everything is in place. We are only waiting for the National Electric Power Regulatory Authority (Nepra) to give us a tariff now," he said. "Environmental studies are done and contracts have been signed with two Indonesian companies for coal supplies."

Work on the conversion project, which involves building new coal-fired boilers and auxiliary equipment, begins as soon as the government offers an electricity tariff, he said.

Earlier it was announced that two memorandums of understanding have

been signed between the Punjab provincial government and an international group of Germany, ALBA, for projects that would generate power from solid waste.

Also in Punjab, an agreement was signed between the Punjab provincial government and Canadian Solar Company for investment in a 500 MW solar project at Quaid-e-Azam Solar Park.

Meanwhile Qatari and Chinese companies are to jointly install four coal-based power plants at Gaddani (Balochistan) and Port Qasim (Karachi), with a power generating capacity of 2600 MW.

The projects are important in the country's plan to make greater use of coal. At the end of October the federal government, in principle, approved the multi-billion-dollar oil-to-coal conversion Jamshoro power project, despite incomplete environment and feasibility studies.



China's central energy authority has proposed to build more photovoltaic (PV) power stations in 2014 than originally planned as solar panel producers struggle in the face of dwindling exports.

The capacity of new PV projects to be built in 2014 will be increased from the previous target of 10 GW to 12 GW, the National Energy Administration said. The administration is now consulting with local authorities on the proposal.

China has an excessive supply of PV products in the domestic market after demand from major export destinations – the EU and the US States – faltered due to trade rows.

At the start of November the Ministry of Commerce said it will extend a probe into imports of European polysilicon, used for making solar panels, by six months – until May 1, 2014.

Beijing had been considering its own duties on polysilicon imported from

Europe as part of the dispute, as well as duties on imports of the material from the US and South Korea, to protect its domestic solar producers. In July, it went ahead with duties on the US and South Korean but did not act on EU imports while talks on the broader trade dispute were ongoing.

China and the EU resolved the broader dispute later in July, although some EU solar makers have challenged the resolution in court.



Subsidies under scrutiny

- Companies call for renewables targets, stable policy
- France reviews FITs

Siân Crampsie

The European Commission says that national energy subsidy schemes need to be examined and reformed to make sure that they are not adding unnecessary additional costs to energy for consumers.

The EU executive body has issued guidance to EU member states on state intervention in the electricity sector and warns that ill-designed or outdated schemes are distorting the market.

The documents show that EU taxpayers gave over €26 billion to support fossil fuels in 2011. Subsidies of €35 billion went to the nuclear sector in the same year, said the European Wind Energy Association (EWEA).

The Commission has advised that national support schemes for renewable energy should remain stable and should not be retroactively changed, advice that has also been echoed by several European energy companies in the run-up to the Commission's anticipated 2030 climate and energy strategy.

Last month EWEA led a group of eight European companies calling for

clear and cohesive policy signals in Europe's energy sector.

The group of companies, which includes Vestas, EnBW, Dong Energy and Gamesa, said that the energy industry's long investment cycles meant that policy certainty with "mutually reinforcing and coordinated targets" was essential.

It also stated that the continued deployment of renewable energy – which some utilities have blamed for rising energy prices – would cut the EU's fossil fuel import dependence, which currently stands at 53 per cent.

The group said in a statement: "A legally binding renewable energy target will reduce EU exposure to volatile fossil fuel prices. Hedging against such volatility is crucial as Europe's import dependence is set to grow to more than 80 per cent for oil and gas by 2035.

"EU citizens' quality of life and the EU's industrial competitiveness are too important to rely on external factors such as unstable oil and gas markets and volatile fossil fuel prices."

It notes that as renewable technologies mature, they will become less

dependent on support mechanisms. "Subsidies should be removed from conventional energy technologies and energy pricing mechanisms must be based on energy market dynamics only," read the statement. "This way we will achieve a fair and competitive market that is open to all energy technologies equally, restoring healthy price signals and enabling the full benefits of real competition."

At the end of October the French government announced that it would review feed-in tariffs for solar photovoltaic (PV) schemes in the country.

In a speech to the French electricity union, Philippe Martin, minister for ecology, sustainable development and energy said many of the support schemes had served their purpose in getting fledgling clean energy technologies off the ground.

"Existing support mechanisms necessary for development goals in renewable energy were introduced at a time when the means of production was under-developed," said Martin. "The feed-in tariff systems in place then had the merit of simplicity and led to a take-off of wind and including solar."

Ofgem rejects network price plans

The row in the UK over energy prices has deepened following an analysis of network charges by regulator Ofgem.

Network charges account for around 25 per cent of dual fuel energy bills and Ofgem said last month that electricity distribution companies are not delivering value for money.

The regulator has sent back plans from five of the six companies that own and operate Britain's local electricity networks and wants them to drive improvements that will help to reduce consumers' electricity bills. Only Western Power Distribution, which serves customers in South Wales, the Midlands and southwest England, had its proposed price controls agreed early by Ofgem.

Hannah Nixon, Senior Partner at Ofgem said: "We understand that energy costs are a big concern for consumers and we set a high target for demonstrating value for money.

"We are pleased that nearly all companies have pledged to cut bills, but we feel that most companies can go further in cutting their costs and ex-

pect to see further improvements when they resubmit their plans in March."

In a separate document published last month, Ofgem said that among the 'big six' energy suppliers, overall profits for energy supply and generation fell from £3.9 billion in 2011 to £3.7 billion in 2012. However, profits in supply to households and businesses increased from £1.25 billion in 2011 to £1.6 billion in 2012.

Energy companies have put rising energy bills in the UK down to the impacts of green energy policies, rising wholesale prices and rising network charges.

"Ofgem shows excess profits are the real source of soaring energy bills," said Frances O'Grady, General Secretary of trade union group TUC. "We also need to ask hard questions about why some ministers have been prepared to go along with energy company bosses in blaming green levies and help for the less well-off, when what has gone wrong is profit grabbing in a bust market."



PV sector set for rebound

Germany, the UK, France and Italy are expected to drive a rebound in the European solar energy industry in the last quarter of 2013, according to analysis from NPD Solarbuzz.

Together these four countries will account for almost 8 GW in 2014, equivalent to 75 per cent of the expected solar capacity to be installed in Europe next year.

The renewed growth indicates that the 18-month downturn affecting the industry is coming to an end. Quarterly photovoltaic (PV) demand from Europe is now set to stabilise at the 2.5 GW level during the first half of 2014, with moderate growth forecast in the second half, says NPD Solarbuzz.

"Following consecutive quarterly market declines going back to the start of 2012, solar PV demand from Europe is forecast to stabilise over the next three quarters," said Susanne von Aichberger, analyst at NPD

Solarbuzz. "The downturn in the European solar PV industry has now bottomed out, with the quarterly demand volatility of the past is soon to be replaced by more stable end-market dynamics."

At the end of October the French government said it would launch a tender for the installation of 800 MW of solar PV capacity next year as part of plans to increase renewable energy generating capacity and support the country's growing renewable industry sector.

Dramatic declines in solar PV demand in Germany and Italy caused Europe's downturn but the effect of this has been softened slightly in 2013 by strong year-on-year growth in the UK, Romania and Austria.

Last month Romania's National Regulatory Authority for Energy (ANRE) approved nine new solar PV projects to add to the country's current installed PV capacity of 553 MW.

Offshore wind scales up

- Milestones reached in new technology development
- UK reports record year

Wind turbine manufacturing companies are gearing up for the deployment of new, large scale turbine models in preparation for a major expansion in the offshore sector.

Alstom, Suzlon, and Gamesa last month all announced progress on key technological developments, while the European Wind Energy Association (EWEA) said that the offshore sector was poised for €123 billion of investment by 2020.

Alstom said that its 6 MW Haliade 150 turbine has been installed at a seaside location near Ostend Harbour in Belgium. The unit is the largest ever installed in an offshore location and is set for tests that will confirm its performance in offshore environments.

The Haliade 150 was commissioned onshore in March 2012 at Le Carnet in France and underwent successful performance testing, says Alstom.

Suzlon also announced plans to unveil its new offshore turbine, the

REpower 6.2M152, which has a rotor diameter of 152 m and a rated power of 6.15 MW. The company expects the machine to enter commercial production in 2015.

Meanwhile Gamesa said that its prototype offshore turbine installed in the Canary Islands produced record-high power generation. The G125-5.0 MW unit started operating in July and has since generated over 2 GWh of energy, says Gamesa.

All three companies are developing the large-scale turbines in order to help reduce the cost and installation times for offshore wind, the cumulative capacity of which is expected to reach 40 GW in Europe by 2020.

For this target to be met, however, EWEA says that investments of between €90 billion and €123 billion are required.

The industry group believes that equity and debt providers are willing to invest in the sector but are in fear of the uncertainty caused by changing

regulatory frameworks.

"By undermining investment stability, governments are putting green growth, jobs and a world-leading European industry at risk," said EWEA CEO Thomas Becker.

"Stable national frameworks and a binding EU renewable energy target for 2030 will be a green light to investors and ensure the industry continues to flourish," he added.

Germany and the UK are expected to lead the expansion of Europe's offshore wind sector. Trade body RenewableUK said in November that the UK's offshore sector enjoyed a record breaking 12 months from July 2012 to June 2013.

Installed capacity in the UK stood at 3321 MW at the end of June 2013, up from 1858 MW 12 months earlier – a huge increase of 79 per cent. The 1463 MW installed offshore marks the first year in which offshore deployment has outstripped onshore wind, reported RenewableUK.

President Vladimir Putin and King Abdullah II met in Moscow earlier this year

Jordan selects Russia for nuclear technology

Jordan is planning to break ground on its first nuclear reactor by 2015 after selecting a Russian firm as its preferred bidder for two planned nuclear plants.

The Jordan Atomic Energy Commission (JAEC) said at the end of October that Russia's state-owned Rosatom was its preferred vendor for the two 1000 MW nuclear power plants.

The exact siting of the reactor remains unclear, although reports indicate that the Jordanian cabinet has approved a location 70 km north of the city of Amman.

Rosatom and the Jordanian government are now in final negotiations over electricity pricing and the exact structure of the deal.

"We have entered the second stage of negotiations with Rosatom, which we hope will lead to a final agreement and secure the country's energy future," Jordan Atomic Energy Commission Chairman Khaled Toukan said during a press conference with the ministers of environment and energy Taher Shakhshir and Mohammad Hamed.

The officials said that the safety track record of the AES-92 model

VVER1000 reactor was a key factor in their decision. Rosatom's reactor export subsidiary AtomStroyExport (ASE) will be the supplier of the nuclear technology while Rosatom Overseas will be strategic partner and operator of the plant.

Rosatom beat a bid from an Areva-Mitsubishi Heavy Industries consortium that proposed using ATMEA1 technology for the two plants. Canada's SNC-Lavalin International had also been shortlisted in 2010 by JAEC.

Another key factor in Jordan's decision is Russia's proposal to take on 49

per cent of the plant's \$10 billion construction and operation costs on a build-own-operate basis. JAEC says that the plant will be operated as a Jordanian venture with public and private investors forming a utility shareholding company with Rosatom.

The Russian proposal mirrors an agreement struck between Russia and Turkey in 2010 for the construction of four reactors.

Rosatom is building four 1200 MWe AES-2006 units at Akkuyu in Turkey, a \$20 billion project.

More recently, the Turkish and

Japanese Prime Ministers signed an agreement for the construction a nuclear power plant at Sinop in Turkey by an Areva-MHI consortium.

Areva-MHI is proposing to build four Atmea1 reactors with total capacity of about 4800 MWe at a cost of some \$22 billion.

Jordan is planning to bring its first nuclear reactor on-line by 2022 in order to improve energy independence and shield its economy from fluctuating oil prices. The country imports around 97 per cent of its energy needs at a cost of over one-fifth of GDP.

GCC will power MENA growth

Demand for oil and gas in the six Gulf Cooperation Council (GCC) countries will rise by more than 50 per cent by 2030 as the region leads the Middle East and North Africa (MENA) in economic growth.

Forecasts from analysts IHS indicate that the GCC will account for 50 per cent of all economic growth in MENA countries within two years, but that major investments will be required in GCC energy infrastructure in order to fuel that growth.

According to IHS, GCC countries are looking increasingly to Asia for trade and investment. GCC economies could grow annually by four per cent in real terms through 2020, and trade with major Asian economies such as India and China is already rising.

Bryan Plamondon, senioreconomist, IHS Global Insight, said: "The Middle East has looked to Asia in search of economic growth, taking advantage of its geostrategic position between East and West.

"The energy-thirsty economies of China and India have become key trade partners for the GCC and wider Middle East, looking to Iran and Iraq for energy opportunities as well. But, future growth depends on how quickly

the GCC countries can diversify and embrace Asia. They have been quick so far. We will see how it continues."

Demand for natural gas in the GCC countries will rise more than 50 per cent by 2030, from 256 billion cubic metres (bcm) in 2011 to 400 bcm in 2030. At the same time, demand for oil from the GCC will also grow by more than 50 per cent by 2030, from around 4 million barrels per day (mbd) to more than 6.2 mbd.

In the United Arab Emirates (UAE), electricity demand is currently growing at an annual rate of nine per cent – three times the global average.

More than \$1 trillion of investments are needed by 2030 to meet demand for gas and electricity in the MENA region as a whole, says IHS.

"In addition to oil and gas, exports of petrochemicals, plastics and other goods to and from the GCC and Asia will increase in growing trade between the two regions in the next 10 years," Plamondon added.

"Development projects in the Gulf will spur the need for imports of machinery and equipment, transport, and infrastructure goods, opening the door for greater trade with Asian countries."

Oman gears up for 3 GW IPP

Oman's biggest independent power project (IPP), boasting 3000 MW of electricity generation capacity, could cost as much as \$2.4 billion, according to a key official of the state-run Oman Power and Water Procurement Company (OPWP).

The giant greenfield scheme, which will significantly ramp up generation capacity within the Main Interconnected System (MIS) serving much of the northern half of the country, is to be implemented during the 2017-2018 timeframe, according to Hilal al Abdali, Client and Contracts & Interface Manager at OPWP.

"This 3000 MW project is a very big power plant that will be developed within the MIS. It is likely to be

located either in one location or in two locations. We expect 1000 MW of this capacity to be ready by 2017, and the [remaining] 2000 MW by 2018. The expected cost, we think, is around \$2.4 billion," Al Abdali told delegates at a forum held in Muscat.

OPWP, a wholly owned subsidiary of the Electricity Holding Company (EHC), is the sole procurer of all new electricity generation and related water desalination capacity in the country under the sector law.

The proposed mega power project is the most significant of a substantial portfolio of at least eight new power generation and water desalination plants that are under various stages of development across the country.

In Musandam governorate, the government has plans to develop the region's first gas-based power plant of an initial generation capacity of around 100 MW. The project, estimated to cost \$200 million, is still under development, with efforts currently focused on securing a suitable site and fuel for the venture, Al Abdali said.

In Dhofar governorate, OPWP is overseeing the procurement of a new mid-sized IPP of 300 – 400 MW capacity. In conjunction with the procurement of this scheme, the existing power plant of Dhofar Power Company will be privatised. The Commercial Operation Date (COD) for the new IPP is slated for January 2018.

AES sells Cameroon assets

■ Continues exit strategy ■ Sells India, Polish projects

Siân Crampsie

AES has signed an agreement to sell its power generation and distribution assets in Cameroon as part of plans to narrow its geographic focus.

AES entered the sub-Saharan country in 2001 but will sell its assets to Actis, a global pan-emerging market investor, for \$220 million.

It has also signed agreements to sell its wind generation assets in India and its wind development pipeline in Poland, it said in a statement.

"We are very proud of what we've accomplished during AES' 12 years in Cameroon," said Andrew Vesey, Chief

Operating Officer of AES. "The company's overall contribution to the advancement of the country's power sector has been driven by the AES mission to improve lives and the relentless efforts of the AES-Sonel team."

"We continue to execute on our strategy of narrowing our geographic focus. With these sales, AES will have exited eight countries and 21 businesses and received \$1.4 billion in proceeds," said Andrés Gluski, AES President and CEO "We see our best opportunities in investing in our existing platforms, where we feel we have a long-term sustainable competitive advantage." AES-Sonel received the electric power

industry's most prestigious honour, the Edison Electric Institute's (EEI) 2013 International Edison Award for its programme to renew and expand Cameroon's electricity infrastructure. AES' efforts enabled a near doubling of the number of Cameroonian families with access to electricity.

In October 2013, AES agreed to sell 100 per cent of AES Saurashtra Windfarms Pvt Ltd (ASW), a wholly-owned subsidiary of AES, to Tata Power Renewable Energy Limited, a wholly-owned subsidiary of Tata Power. ASW is a 39.2 MW wind farm in Gujarat, India and commenced operations in 2012.



GCC will account for over 50 per cent of growth in MENA

Realising a smart vision

A 10-year partnership between Siemens and New Brunswick Power will see the implementation of a pioneering smart grid project that will allow the utility to shape its demand curve. The aim of the project is to enable NB Power to reduce peak demand and defer investment in new generation, produce less costly energy at peak times and thereby ensure low and stable rates for its customers.

Junior Isles



Few would disagree that smart grids are a must if we are to optimise the use of renewables in the grid and make the most efficient use of our energy resources. Yet many utilities, especially in Europe, are still struggling with the business case for implementing smart grid programmes. Not NB Power. The Canadian utility based in New Brunswick is teaming up with Siemens on a long-term programme that it says not only benefits its entire operation but also makes economic sense for the utility and its customers.

NB Power is an integrated utility, supplying electricity to nearly 400 000 residential, commercial and industrial customers throughout the Canadian province. It is connected to four other jurisdictions: Prince Edward Island; Nova Scotia and Quebec; as well as Maine in the US. With the ability to import or export more than 60 per cent of its 4000 MW grid capacity, the utility has a high degree of flexibility in the types of energy it can incorporate on its system.

Although it already has a very diversified generating portfolio, NB Power also has a renewables policy, where the target is to have 40 per cent of renewables on the grid by 2020. Currently, hydro, coal, oil and nuclear are all in the generating mix, as well as an approximately 1000 MW peaking heavy fuel oil (HFO) plant that is only used during the winter.

One of the utility's main goals is to

reduce its dependence on its costly HFO plant by reducing and shifting the demand through working with its customers.

Gaëtan Thomas, NB Power's, President and CEO explained: "We have a very electricity-intensive usage because of the weather, with most people using electric space heating. The reason we need a 4000 MW generating capacity is because we can peak at around 3200 MW in winter. However, load can be as light as 1000 MW in the summer. It's very expensive to keep a 1000 MW plant for just 10-20 days in the winter. So the business case was about saving around 630 MW of required generation in the future at a capacity factor of 30-35 per cent.

"By engaging our customers we can avoid more than \$1.3 billion net present value over 25 years on our system by deferring the requirement for new generation or refurbishment by 7-10 years. That's how you make the business case."

In line with this thinking, in July 2012 NB Power formed a 10-year partnership with Siemens Canada, for a multi-year Smart Grid Reduce and Shift Demand (RASD) modernisation plan. The plan will invest in technology and educate customers, offering businesses and residents more choice and control over their energy consumption.

The initiative represents an investment of about \$150 million over 10 years, but it is an investment that is

more than outweighed by the returns.

"When we say there's a NPV of \$1.3 billion, that includes the \$150 million investment. Every dollar that we invest in a programme like this is expected to return two," Thomas estimated. "It's a really wise investment and studies have indicated that future generation will be in the range of 12-15 cents/kWh if it is hydro, and could be more if it's [other] renewable resources. So you can spend 4-5 cents/kWh on programmes like this to avoid the new kilowatt-hours that would need to be produced."

Commenting on the business logic behind the partnership, Tim Gibson, Vice President, Smart Grid Division at Siemens Canada said: "One of the things about this partnership that is very attractive to Siemens is that NB Power has a very strong ROI [return on investment] and a realistic plan. We want to show the direct ROI benefits of smart grids and we feel NB Power is a perfect partner to do that with."

During the 10-year programme Siemens will support NB Power by helping the utility design and implement an end-to-end smart grid roadmap. The roadmap will start with building the technical foundation that is needed for implementing the solution. This will then be followed by the field deployment of the smart devices and smart meters to collect the data from those devices.

In addition to selling electricity, NB Power rents water heaters to its

customers, also carrying out the installation and repairs. It has achieved a high degree of penetration, with about 80 per cent of customers in New Brunswick renting water heaters from the utility. This is a significant load all year-round.

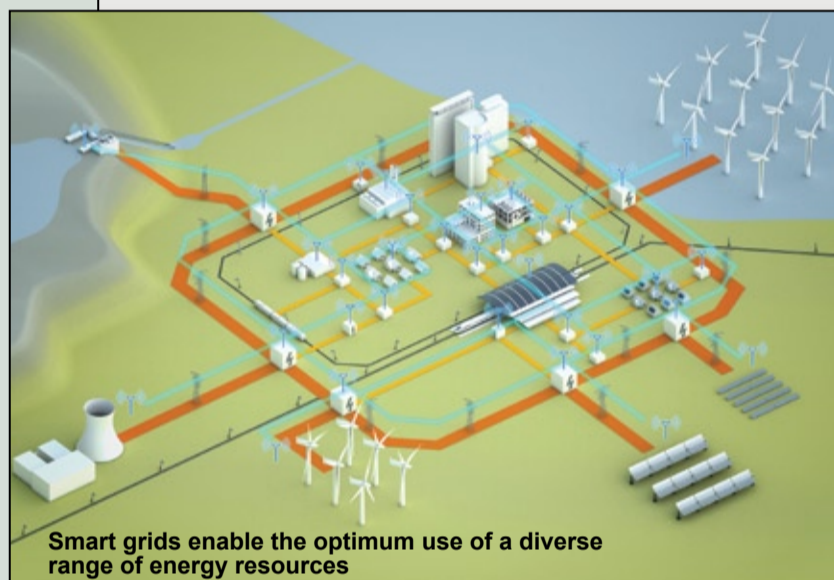
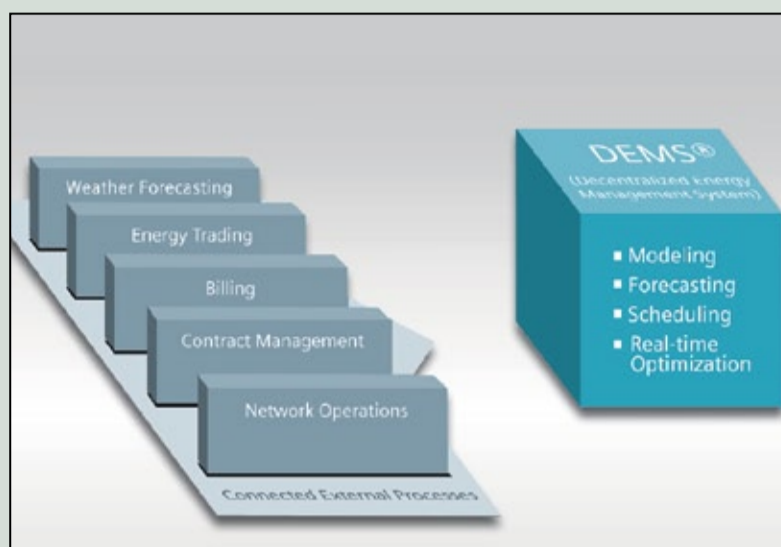
The company therefore plans to start by replacing existing water heaters with smart water heaters that could be turned on or off or have their temperature adjusted remotely to ensure they are charged off-peak. "There will be no requirement for the customer to do anything different," noted Thomas.

By predicting the need for load in advance, and pre-heating smart water heaters before peak energy consumption periods, the system will turn the water heaters into thermal energy storage devices. By doing this, Siemens and NB Power hope to shift the province's peak load to other times of the day.

NB Power is also planning to install thermal energy storage units that can communicate with a remote intelligent load management system being designed by Siemens. "It will be the same idea as with the water heaters. We will provide the electricity to charge the units at night so that when the customers need them on-peak or off-peak, heat is available without placing a demand on the electric system," said Thomas.

The plan is to have about 150 MW of RASD load within five years. "This is equivalent to a diesel plant that is

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only used for an emergency or a coal plant in Nova Scotia, which we could replace by reducing and shifting demand in New Brunswick,” said Thomas.

Arguably, NB Power could have addressed the problem by reducing demand through the introduction of energy efficient products. Thomas stressed, however, this would not have been effective in reducing the peaks – an issue exacerbated by the addition of 300 MW of wind to its portfolio.

Thomas noted: “As we don’t have a lot of gas plant, we are caught having to regulate with our coal plant. This is very expensive to regulate with. What’s new about having a smart grid, is you maximise the usage off-peak.”

The utility sees two peaks per day, one in the morning and another in the afternoon. These peaks are costly for NB Power. Although it costs the utility around 20 cents/kWh to produce energy during these peaks, it is sold at only about 11 cents per unit. There are also valleys between the peaks where the cost of generation is actually lower, around 10 cents/kWh.

Thomas added: “So the idea is to use the water heaters and energy storage units essentially as batteries, where the aggregate of all the customer devices are used as a negative power plant on the grid.”

NB Power is also in the process of promoting electric vehicles, which in the future could be charged by cheap green energy at night when demand is low. This will help it deal with some of the revenue that would normally be lost as a result of not being able to fully utilise the power generated by wind power at night.

The ability to smooth out the load curve will help NB Power satisfy one of its key mandates – keeping rates low and stable over time.

“Apart from three provinces that have huge hydro resources, we have the lowest residential rates in the

country,” noted Thomas. “The RASD initiative is one of the most important means of helping us to maintain one of the lowest rates in the country by producing less costly energy at peak and deferring capital investment in generation. He added: “The cheapest kWh is the one you don’t produce. And if you can shift it from a high cost peak to a low cost value, everybody wins.”

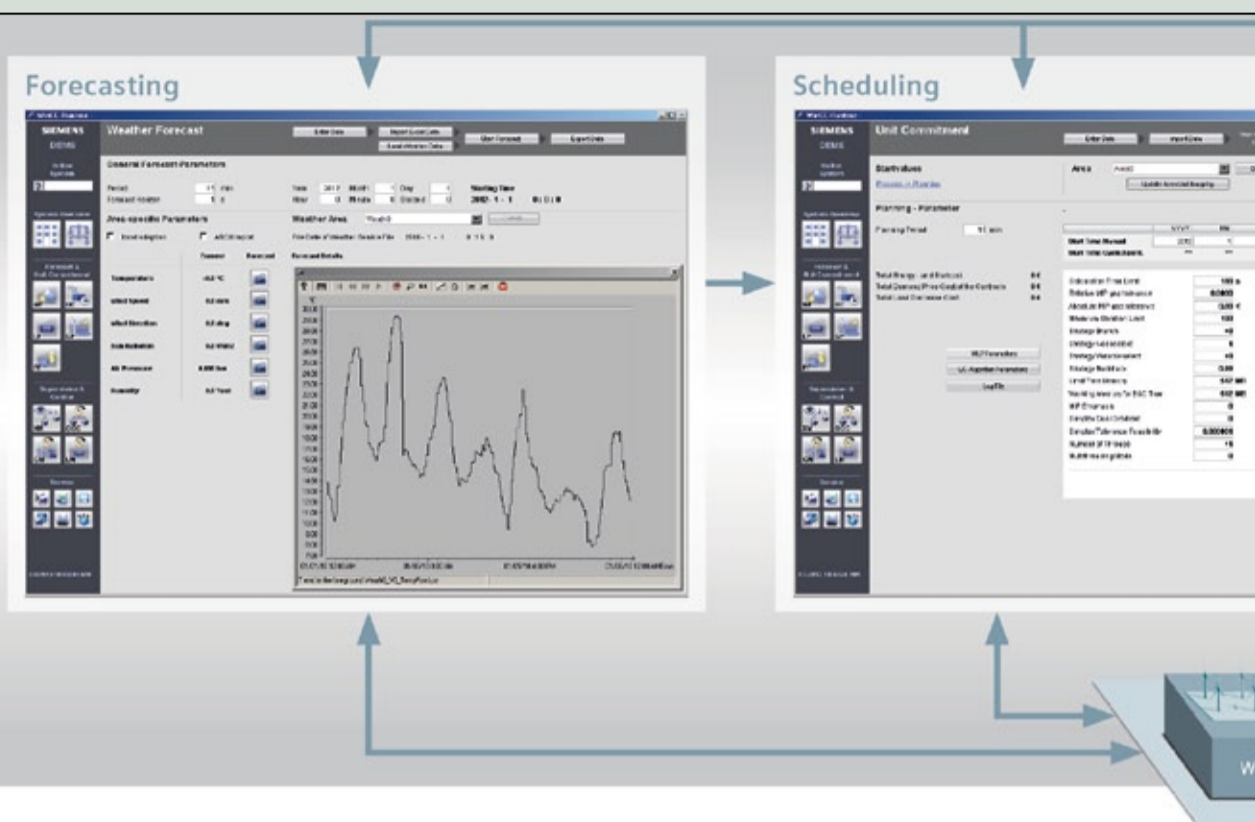
NB Power believes its approach is quite unique because it is able to look at the problem from an integrated point of view. Being an integrated utility gives NB Power an advantage in this respect. The utility had been split up in 2004 but in October this year was re-integrated into a single company, re-taking control of transmission.

Thomas believes that having a single company optimising all its resources – connecting customers to diverse energy sources – brings the best value for its customers. “This is about matching the needs of the customers to help them save money over time.”

The utility’s goal of optimising its energy resources to the benefit of its customers began with a previous initiative, which also planted the seed for the relationship with Siemens. Together with the Federal government, NB Power had invested \$32 million in a programme called Power Shift Atlantic, which was looking at how to bring more wind generation onto the grid.

Fredericton, the capital of New Brunswick and headquarters of NB Power, was very proactive in becoming a smart city. According to Thomas, this aligned closely with Siemens’ work in smart cities and infrastructure. “They had a similar vision to us and when they saw what we were doing, we began discussing the possibility of working together.”

He added: “Also, we wanted a partner that could do everything. There are



very few players that have the complete integration model. Although there is enough evidence around the world to show that the component parts of the smart grid work, it is the integration of all the parts that has to be done. And Siemens is the perfect partner to help us achieve that.”

Siemens is also excited about working with NB Power. Gibson added: “This is a very exciting partnership for Siemens and we expect big things from our team in New Brunswick.”

Under the partnership Siemens is providing engineering, consulting, project management, quality assurance, process support, and other services. In addition to these services, Siemens will be implementing an ‘Intelligent Load Management’ (ILM) solution. The ILM is based on two Siemens Smart Grid Software solutions: Demand Response Management System (DRMS) as well as the Decentralised Energy Management Suite (DEMS).

DRMS is Siemens’ enterprise demand response application. It automates utility demand management programmes for any consumer, commercial or industrial load. It can also monitor and control distributed generation and electric vehicle charging stations that could be implemented in the future. The system includes software solutions, either locally installed or remotely hosted, and distributed hardware solutions at the consumer premises.

DEMS helps combine distributed energy resources (DER) – including renewable generation and aggregated loads managed by DRMS – of any size into a virtual power plant or VPP. In doing so, the system takes into account all interconnections between electricity, thermal and cooling energy, gas and other energy sources.

Using diverse data such as load forecasts, current electricity prices, and weather forecasts, the system compiles and executes a coordinated dispatch plan for all units, which can be rapidly adapted through real-time optimisation.

The ILM solution (consisting of DRMS and DEMS) will be connected to various generation and load resources (such as the water heaters) in New Brunswick to allow NB Power to intelligently optimise and manage both distributed generation and load curves at the same time.

According to Gibson, the majority

of the work will occur in the first five years. “During this time, we will be rolling out the ILM solution and implementing the various customer programmes. These customer programmes include pilots for smart water heaters, in-home displays and smart meters,” he said.

NB Power is in the process of selecting partners to help rollout its smart water heaters pilot programme and the first demand response pilots will start in 2014. The DEMS VPP pilots will also start in 2014.

“We are on the verge of announcing that the ILM is now interfaced with a number of buildings, including our own, and we are aiming to begin pilots with about 4 MW of those loads by the end of the fiscal year in March 2014,” noted Thomas.

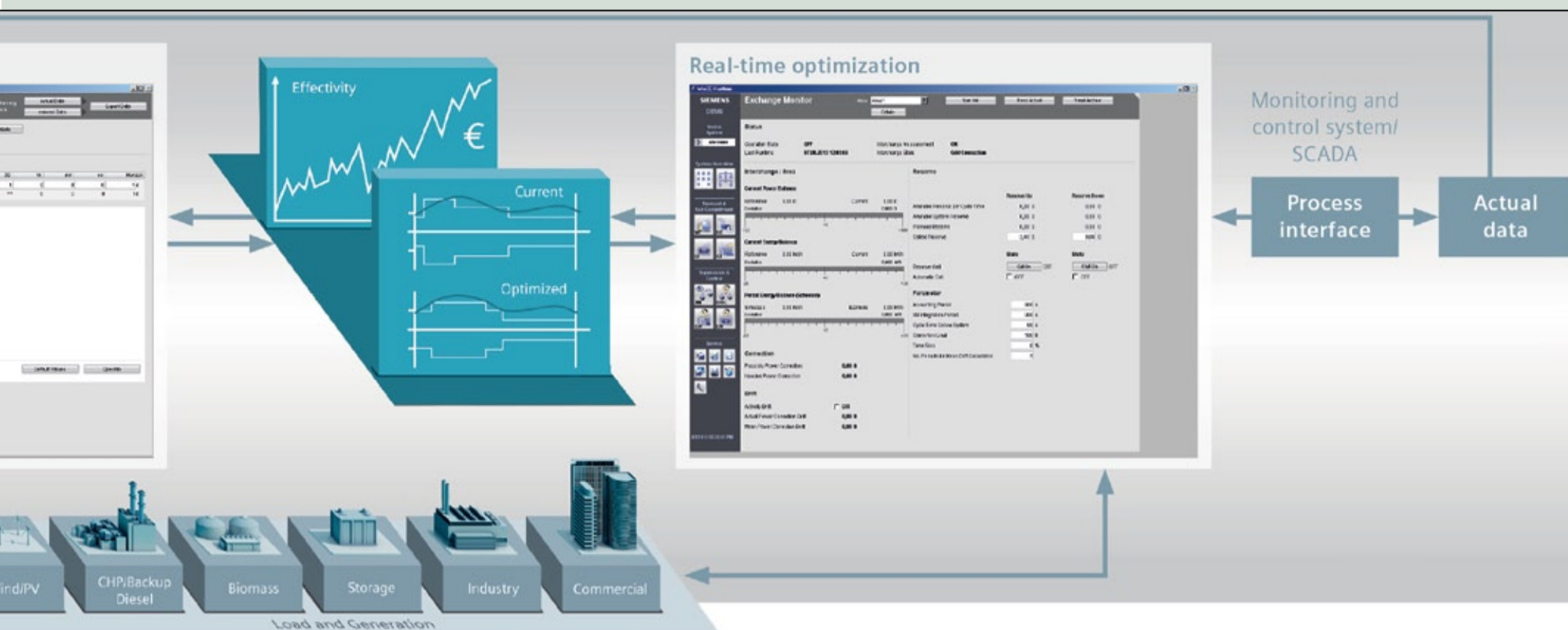
During the next 3-6 months NB Power and Siemens will be conducting lab tests in preparation for the start of the pilots. One of the ongoing projects is to test the VPP concept.

Bradley Wasson, NB Power’s Reduce and Shift Demand Programme Director said: “We are going through the first stages of integrating controllability of smart devices. We have an early version of a VPP working in a test environment and have been connecting different types of loads, such as light bulbs and other standard electrical devices, to make sure the core functions are working. So in the next three months we will be con-

Thomas: Every dollar that we invest in a programme like this is expected to return two



Special Project Supplement



DEMS helps combine distributed energy resources and aggregated loads managed by DRMS into a virtual power plant

necting the smart water heaters in the test lab to this VPP.”

Lab tests are currently focusing on the most fundamental functions. For example, communications between the smart devices and the VPP.

Wasson explained: “We will be testing the communications protocols between those two entities and checking that there is the correct handshaking between them. There will be information flowing back from those smart devices such as information on their status e.g. whether the device is on or off, its temperature setting etc.

“This information has to flow back to the VPP. As it will be encrypted, the utility will have to de-encrypt the communication signal, analyse the data and send that information to the correct internal system. That could be a billing system, customer care system or a customer support agent’s desktop etc. So this testing will be looking at these communications abilities, working through the decryption algorithms and testing all those points along that line to make sure they are all working as expected.”

Wasson adds that at the same time NB Power will be planning the pilots. In addition to testing the technologies the utility will also use the pilots to determine the processes for deploying the technology to customers e.g. how to carry out installation at site and train the customer how to use it.

Following lab tests, pilots will be rolled out in phases. Wasson says there may be 50-100 water heaters in

the first phase of the pilot, which could ultimately include up to 5000 water heaters.

“At this stage,” he said, “we will have the comfort of knowing that the technology works in the variety of cases we will see in the field. After that, we may replace 15 000 water heaters a year as part of a regular programme.”

NB Power has set up a programme management office, largely to coordinate activities between Siemens and NB Power i.e. the rollout of technologies that will underpin the smart grid infrastructure and develop organisational capabilities to take advantage of those technologies.

Wasson commented: “You don’t get any business improvement by just rolling out a technology; you have to do other things around it such as business process development, market development or enhancing the skills of resources. So our programme management office will not only execute the roadmap over the next 10 years, it has to determine what changes need to be made in the organisation for each of the technologies that are introduced in order to leverage them. It will manage how to roll the technologies out to our customers, work out what we might have to do to help our customers use them and all those sorts of things.”

As part of the agreement, in January 2013 Siemens opened a local office in Fredericton to house a Smart Grid Centre of Competence (CoC) and a new R&D centre. The approximately 40 staff at the office are busy handling the various projects and work packages that are underway.

“We have been implementing DRMS and DEMS in NB Power’s test lab and have been working with the utility on implementing various aspects of their roadmap including IT/OT [information technology/operational technology] standards, commercial and industrial demand response and residential demand response,” said Gibson.

He added: “Our R&D team is focused on the development of our DRMS application. We have application developers, testers, and quality assurance professionals on the R&D team who specialise in smart grid application development. This team is also guiding the research with the University of New Brunswick, announced in October of this year. They

are looking at integrating new load shifting models into demand response solutions in addition to load shedding. This will allow us to further exploit demand-side resources.”

Meanwhile, the CoC is the consulting, design, and delivery team for Siemens Smart Grid in New Brunswick. This team is focused on directly helping customers with smart grid projects and programmes. Eventually the team will support Siemens’ smart grid customers all over the world, but at the moment staff are primarily focused on NB Power.

John Cooper is Siemens’ management consultant responsible for the value management strategy i.e. managing the business impacts of the changes that are being made. He noted: “The overall goal is to transform the utility into a ‘utility of the future.’ That’s the big picture.”

“The traditional way of managing electricity is that resource follows load. Now we are moving into a new era where load follows resource. You look at the availability of resources and see what you want to have available, and you adjust your load accordingly. It’s a paradigm shift.”

The CoC is using what Siemens calls its Smart Grid Compass methodology to design NB Power’s energy roadmap. Cooper said: “The Compass methodology is a consulting approach. It’s like setting out on a trip where you have to map-out where you are and work out where you are going. So first you have to document the ‘as is’ and then follow with the ‘to be’ i.e. what your aspirations are.”

This initial documenting is followed by a Routing Study, which is a comprehensive document covering 92 different projects over the course of 10 years. Each of these projects is designed to bring in more organisational capacity into the utility to manage the transformation.

The 10-year roadmap can essentially be divided into several stages, the first being to understand the demand side better. With a full understanding of the load, Siemens and NB Power are now building the technology foundation for communications between field devices and the utility. This will then be followed by the rollout of smart meters and smart devices.

Cooper said: “Step one is understanding load behaviour and consumer behaviour and beginning to integrate that. And step two is to start to integrate

devices and connections that will leverage the capabilities of the ILM.”

The third stage of the roadmap will involve the collection of ‘big data’ i.e. the massive amounts of data that can be collected from smart devices in the field. This will offer insights into electricity usage patterns and trends that will in turn enable NB Power to develop roadmaps for delivering future products as well as help its customers manage their energy usage.

The next phase, says Wasson, is to build “more sophisticated internal capabilities” such as outage management. Building intelligence into the network offers the ability to pinpoint the source of outages, allowing NB Power to fix outages faster.

The final stage of the roadmap is to deliver better management of infrastructure assets i.e. all devices between the substation and the customer.

RASD is of tremendous strategic importance to NB Power. In addition to ensuring low and stable rates and reducing the utility’s debt, the programme is also key to achieving its environmental goals. It will facilitate NB Power’s renewables target, which when combined with the 35 per cent nuclear capacity, will mean that the utility has a 75 per cent non-carbon emitting grid.

Understandably, NP Power and Siemens are excited about this pioneering project that will provide value to customers. With the tie-up with Siemens well documented in the local press, NB Power says it has already had interest from both residential and commercial customers hoping to be involved in the project.

“We are planning to contact customers almost immediately, certainly within the next month or two, although many of them have already heard about what we are doing. There is certainly a lot of pent-up of interest,” said Wasson.

The promising early results and the partnership with Siemens gives the utility a great deal of confidence that the project will be a success.

Wasson concluded: “We are very confident. At the end of the day, we have a world leader building the technology foundation. Also, within the utility we have a lot of talented people and engineering expertise, which we are bringing to the project. This is the most exciting thing that has happened in our near 100-year history.”

Siemens Canada’s Pierre Mullin (second from left) leads an international R & D team of 16 people responsible for the design and rollout of smart grid software. John Cooper (far right) is responsible for the value management strategy





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Companies News

Suntech restructuring in doubt

Plans drawn up by Chinese solar panel manufacturer Suntech to restructure its bankrupt business have been thrown into doubt by an objection to the plans lodged by administrators based in the Cayman Islands.

The liquidators want to block the sale of Suntech's China-based assets to Hong Kong-based Shunfeng Photovoltaic, a \$492 million deal that was agreed last month. They have written to Shunfeng notifying it of their objection to the sale because the assets are owned by Suntech's British Virgin Island-based holding company, Suntech Power Holdings.

Shunfeng's deal to buy Suntech's manufacturing facilities in the eastern Chinese city of Wuxi would position the firm as a key player in the global

solar photovoltaic (PV) market, which still suffers from overcapacity. The deal was in part brokered by the regional government, which also approved a cash injection of \$150 million into Suntech Power Holdings by Wuxi Guolian Development (Group) Co, an investment firm controlled by the Wuxi government.

The convoluted restructuring plan is the first among many anticipated in China's PV sector after the country's government said it would encourage mergers and acquisitions among firms in order to reduce overcapacity in manufacturing and return the industry to profitability.

The restructuring of Suntech – the world's largest solar panel manufacturer by capacity and a symbol of

China's rapid PV sector expansion and collapse – will set a precedent for other Chinese solar firms as well as test the Chinese government's treatment of foreign creditors in such cases.

Suntech's Chinese unit was forced into involuntary bankruptcy after its international holding company defaulted on a bond payment in March 2013. The local courts in Wuxi took control of proceedings and oversaw the deals with Shunfeng and Wuxi Guolian.

However Suntech's main manufacturing assets in Wuxi were placed into a holding company incorporated in the British Virgin Islands in 2005. That holding company is in turn owned by another holding company based in the Cayman Islands, where courts appointed an administrator.

RWE depends on cost-cutting efforts



German utility RWE says the outlook for 2014 is poor due to the challenging market conditions and competition from the renewables sector.

Siân Crampsie

RWE has intensified efforts to cut operating costs in order to avert further crisis in its conventional power generation business.

The German utility has announced that a further 6750 jobs will be lost as part of plans to save an additional €1 billion on top of the already announced savings targets.

Announcing the firm's third-quarter results, CEO Peter Terium said that the group's stable performance so far for 2013 was largely due to the one-off effect of a revised gas supply contract with Gazprom, and that RWE's reduced earning power – primarily in conventional power generation – would impact results in 2014.

"Our traditional business model is collapsing under us," Terium said. "We are putting all our efforts into overcoming the crisis by making huge cost reductions, organisational changes and with a clear strategic orientation toward the structural change in the energy industry."

Germany's largest power producer by capacity expects operating profit next year to fall as much as 24 per cent,

as gas- and coal-fired plants remain under pressure from competition with subsidised renewable energies. Electricity prices also remain eroded by slack demand and high fuel costs.

Other European utilities are also feeling the pinch. E.On warned last month that the market environment means its full-year profit would be at the low end of the range previously forecast, while GDF Suez announced impairment charges on its fleet of power plants and gas storage facilities.

RWE said that it would take around 3100 MW of generating capacity offline – equivalent to around six per cent of its capacity. E.On says it has shut down or left idle 6500 MW of capacity and may need to close more.

In November *Gas to Power Journal* reported that it had seen documents from the German regulatory authority, Bundesnetzagentur (BNetzA), indicating that it had received applications from utilities to close 30 power plants, equivalent to more than 6500 MW of capacity.

Five of these plants are owned by EnBW and have been declared vital to the system.

EnBW reported in November that

the low wholesale power prices and overcapacity in the German system would continue to erode its profits.

The overcapacity has been largely caused by the rapid expansion of renewable energy, say the utilities.

EnBW reported a doubling of its net profits in the third quarter to €43.6 million on revenues of €4.99 billion.

The third-largest German utility is trying to adjust to the market conditions by reducing overall investment and shifting capital expenditure to renewables.

Utilities have also been selling assets in a bid to generate capital for re-investment in green projects.

In November E.On agreed to sell a majority stake in the 207 MW Rodsand II wind farm in the Baltic Sea to Danish firm SEAS-NVE for €430 million. RWE has sold a 49 per cent stake in two UK onshore wind farms to Green-coat UK Wind plc for £70.6 million.

RWE also announced last month that it would stop development of the Atlantic Array offshore wind farm in the UK due to the technically challenging conditions of the project that would make costs "prohibitive in the current market conditions".

GE sells power rental business

APR Energy's decision to buy GE's power rental business will transform its business, according to the firm's CEO, John Campion.

Campion says that the \$314 million deal would create the world's leading fast-track mobile turbine power business as well as diversify its revenue base to new geographies and sectors.

Under the deal APR Energy will buy GE's power rental business for cash and a 16.5 per cent stake in APR. The two companies have also signed a supply and services agreement under which GE will continue to provide support to current and future clients of APR.

The deal will expand APR's mobile turbine power capacity to 1.2 GW and includes 520 MW of capacity and rental contracts that GE currently has in place in Canada, Iraq, Australia, the USA, Virgin Islands and Bangladesh.

Campion: creating a "world leader" in mobile turbine power



New markets help boost utility confidence

- Survey indicates confidence in growth
- M&A deals rebound

The outlook for economic confidence, credit availability and growth in the global utilities sector is growing thanks to improving economic conditions and opportunities in new markets, according to Ernst & Young (E&Y).

The firm's latest survey of power utilities executives indicates that while earnings remain under pressure in Europe due to weak energy demand and depressed wholesale energy prices, countries such as Brazil, India, Canada, South Africa and Chile are attracting investment.

Utilities are altering their businesses to reflect these conditions and the climate for mergers and acquisitions (M&A) activity will become more robust as a result, says E&Y.

Last month Moody's said that improved regulatory trends in the USA had improved the credit environment there and that it would review its ratings of most regulated utilities with a view to upgrading them.

The US utility sector's low number of defaults, high recovery levels, and generally strong financial metrics "provide additional corroboration for our view that ratings should generally be higher," Moody's said.

According to Matt Rennie, Global Transactions Power & Utilities Leader at E&Y, 67 per cent of the 203 global power and utility executives surveyed believe the economy is improving, compared with 47 per cent six months ago. In addition, half of power and utility executives say growth is their top priority, up from 40 per cent a year ago.

"We expect this alignment of core fundamentals for deal-making – economic confidence, credit availability and focus on growth – to favour higher transactional activity," said Rennie in a note.

According to E&Y, M&A activity in the global power and utilities sector has already started to rebound, with deal volume rising 25 per cent in the third quarter compared to the third quarter of 2012.

Deal value dropped slightly over the quarter from \$33 billion to \$31.7 billion, but is still a 67 per cent increase compared to Q3 2012, with nine transactions exceeding \$1 billion.

One of the main drivers of the increased deal volume during the quarter has been the continued market reform taking place globally, with privatisations and deregulation in liberalising markets in Russia, Australia, Japan, Nigeria, New Zealand, Turkey and Greece.

Political intervention, commodity price volatility, high-cost regulatory frameworks and unpredictable access to capital have prompted utilities to explore opportunities upstream and downstream in the supply chain in order to consolidate and secure revenues. During the quarter, a number of European utilities acquired energy efficiency and services businesses – the largest of which was French-based Schneider's acquisition of Invensys plc for \$4.6 billion.

Rennie said: "We are seeing changing fundamentals in a number of markets around the world prompting utilities to re-evaluate traditional models, narrow their focus on core operations, and optimise asset portfolios through non-core divestments and acquisitions of supporting vertical and horizontal services."

"While 2012 saw several utilities integrating upstream, for example through acquisitions of coal mines and gas production assets to consolidate fuel supply, we see downstream integration as a key focus going forward."

10 | Tenders, Bids & Contracts

Americas

GE wins 545 MW at Brazil auction

GE says it has won 545 MW of wind power capacity out of a total of 867 MW auctioned by Brazil in November.

GE will provide 1.7-100 and 1.85-82.5 turbines for wind farms developed by Casa dos Ventos, Eletrosul, Contour Global, CEEE, PEC, Rio Energy and Chesf in the Brazilian states of Rio Grande do Sul, Bahia and Piauí. GE also will service the wind turbines for ten years as part of an operations and maintenance agreement that includes an availability guarantee for the 26 wind farms.

In the November 18th auction, the new wind capacity was contracted at an average rate of R\$124/MWh (\$54/MWh). The Brazilian government held the auction to meet demand for the country's electricity needs in 2016.

Siemens commissions Peru plant

Siemens has commissioned the Santo Domingo de los Oleros simple cycle power plant in Peru after completing construction of the 200 MW facility in 19 months.

The natural gas fuelled power plant is owned by Termochilca SAC and will be serviced by Siemens under a long term service agreement. Siemens built the plant under a turnkey contract and there is an option to convert the plant to a combined cycle plant in the next phase.

Santo Domingo de los Oleros power plant is located in the Chilca district in Cañete province, 60 km south of the capital Lima. The plant is equipped with an SGT6-5000F gas turbine and a model SGEN6-1000A generator.

Golden West selects GE

GE is to supply the Golden West wind farm in El Paso County, Colorado, USA with 147 wind turbines after securing a contract with Golden West Power Partners LLC.

The US energy giant will provide its 1.7-100 wind turbines for the 250 MW project, which will help Colorado to meet its renewable portfolio standard requirements. The power from the project will be sold to Public Service of Colorado, an Xcel Company, via a 25-year power purchase agreement.

GE will provide start up and commissioning services and is finalising an agreement to provide operations and maintenance through a five-year operations support agreement for the Golden West Wind Farm. GE also will provide 24/7 remote monitoring and diagnostics through its remote operations centre in Schenectady, NY.

ABB modernises Lakewood controls

ABB has successfully commissioned a Symphony Plus control upgrade for the Lakewood cogeneration plant of Essential Power (formerly known as North America Energy Alliance) in Lakewood, New Jersey.

Lakewood is a combined cycle facility with a generating capacity of 246 MW. ABB has upgraded the Lakewood control room with the field-proven human machine interface (HMI) of the Symphony Plus family, S+ Operations, tailored to the needs of power generation industries.

ABB is also in charge of engineering, installation and field services. The selected solution enables each upgraded unit to operate at a high level of efficiency, reliability and availability, thereby extending equipment life and reducing maintenance and downtime.

MidAmerican starts wind projects construction

MidAmerican Energy Company says it has started construction on wind energy projects that will add over 1000 MW of wind energy capacity to Iowa's electricity grid.

The Des Moines-based utility plans to develop up to 1050 MW of wind generation by 2015 at five wind farms across the state of Iowa.

The utility has selected Siemens as the turbine supplier at all of the project sites. Siemens will provide its 2.3 MW wind turbine model for the projects, which will consist of a total of 448 wind turbines.

The two-year construction period will create about 1000 jobs in Iowa and establish 40 permanent jobs when work is completed. Electricity generated from the project could power an additional 317 000 households.

Alstom wins Los Humeros contract

Alstom has signed a contract worth €30 million with the Mexican Federal Electricity Commission (CFE) to build the Los Humeros Phase A geothermal power plant located in Chignautla, state of Puebla.

This power plant will have an installed capacity of 25 MW and will produce an average of more than 200 GWh per year of renewable energy, equivalent to the annual energy used by 40 000 people in Mexico.

The turnkey project includes all of the engineering, as well as the power plant construction, set-up equipment, steam turbine, turbo generator, systems control and high voltage electric substation, and related equipment. The power plant is expected to start operations during the second quarter of 2016, and will operate using heat obtained by drilling steam extraction wells at a depth of up to 3500 m.

Asia-Pacific

Thailand orders industrial gas turbines

Three independent power producers in Thailand have placed orders with Siemens Energy for the supply of industrial gas turbines for combined cycle cogeneration projects across the country.

Amata B. Grimm Power Limited (ABP), SSUT Co. Ltd. & PPTC Co. Ltd, and IRPC Clean Power Co. have ordered a total of 20 SGT-800 gas turbines. The power projects are part of the Thai government's programme to support small power producers.

Ten of the 50.5 MW gas turbines are for ABP; six are for SSUT & PPTC; and four will go to IRPC. Siemens will also supply five SST-400 industrial steam turbines to ABP.

Including installation and commissioning, the order value for Siemens is over €300 million.

Korea USC plants choose Emerson

Emerson Process Management is to install its Ovation control system at two 1050 MW, ultra-supercritical, coal-fired power generating units under construction at the Taean thermal power plant in South Korea.

The \$11 million contract was awarded by Daelim Industrial Co. Ltd., one of South Korea's largest construction firms and the primary contractor for the Taean plant. The two new units will boost the plant's capacity to 6100 MW, making the 10-unit power generating facility the largest in the country.

Ovation technology has already been selected for more than half of the 1000 MW ultra-supercritical units in Asia.

Europe

RES chosen for floating demonstrator

Seattle-based marine architect firm, The Glosten Associates, has appointed RES Offshore to provide expert support for its pioneering floating offshore wind turbine demonstrator project.

This project will demonstrate Glosten's PelaStar tension leg platform (TLP) floating foundation system at the deep water Wave Hub demonstrator facility in Cornwall, UK.

The project has been commissioned and funded by the UK's Energy Technologies Institute (ETI) and is designed to help accelerate the development and deployment of offshore floating foundation technology for the wind energy sector.

RES Offshore will provide a wide range of services to Glosten, including construction advice and operational strategy development, engineering design due diligence and turbine procurement management services. RES will also work closely with project partner Alstom, which is supplying its 6 MW Haliade wind turbine for this project.

Nordex wins Mynydd Bwllfa deal

Nordex has secured an order to supply nine turbines for the Mynydd Bwllfa wind farm in Wales.

The contract is the second for Nordex from Pennant Walters following a 52.5 MW order in 2011. Work on constructing the Mynydd Bwllfa ("mountain pass") wind farm will commence in October 2014 in South Wales near the town of Hirwaun.

After the wind farm goes into operation in 2015, it will be producing clean electricity for around 15 000 homes in this region, which was once a centre of coal mining and steel production.

Areva to service EDF nuclear fleet

Areva has been awarded a major services and solutions contract to support EDF in the maintenance and operation of eight nuclear reactors.

The agreement covers a period of five years, with an option for two additional years, and relates to the provision of comprehensive site support services at the Chinon, Nogent, and Belleville nuclear power plants.

Services will include the coordination and performance of logistical, facility maintenance, handling, and lifting operations.

The contract will mobilise the experience and expertise of more than 400 group employees and will involve the creation of over 200 jobs.

Siemens wins orders with new 6 MW turbine

Dong Energy has placed an order with Siemens for the supply of wind turbines for the Gode Wind 1 and 2 offshore wind projects in the German North Sea.

Siemens will supply 97 of its new 6 MW offshore wind turbine model for installation off the island of Juist, 45 km from the German coast in water depths of up to 34 m. The order is the first for the 6 MW model in German waters.

Siemens will also service the wind turbines for a period of five years. Construction is planned to begin in the first half of 2015, with commissioning scheduled for the second half of 2016.

Gode 1 will have a capacity of 252 MW and Gode 2, 330 MW.

International

Alstom secures Saudi steam turbine deal

Alstom has secured a contract to supply four steam turbines for the Shuqaiq power plant in Saudi Arabia.

The engineering firm will supply four 720 MW steam turbine generator sets to lead contractor Hyundai Heavy Industries (HHI), which is building the 2650 MW power plant.

Alstom's €170 million contract includes engineering, manufacture, supply and field services for all steam turbines and generators, and will also include all direct control and auxiliary systems.

The Shuqaiq power plant will be located on Saudi Arabia's western Red Sea coast and will be one of the world's most efficient heavy fuel oil-fuelled power plants. It will play a major role in the Kingdom's plans to expand its power generation base.

Centrax helps drive Russian cogeneration growth

Centrax has strengthened its role in the fast-expanding Russian power generation market with the sale of two 5.2 MW CX501-KB7 gas turbine sets for district heating plants.

Both projects have been developed by a subsidiary of Gazprom and Centrax will be working alongside Russian EPC specialist General Energy Solutions (GES) to focus on delivering higher efficiency and energy savings through the use of new equipment. The CX501-KB7 package complements GES' range of products and broadens the range of options available to its clients.

Maintenance support for the packages will be managed by the Russian service centre of Centrax while GES will monitor remotely the technical and economic performance of the sets.

The first generator set will power a district heating plant on the eastern outskirts of Moscow, serving the rapid growth of the city while also replacing old heating plant. The second unit is for a district heating plant in Kirov, 800 km northeast of Moscow.

Metso, Turbine Services enter global partnership

Metso and Turbine Services Ltd. (TSL) have entered into a supply agreement under which the Metso DNA Turbine Automation system can be used on all future projects where TSL supplies turbine components and other materials.

Turbine Services Ltd., based in Glasgow, Scotland, is a global maintenance services provider for original equipment manufacturers' industrial gas turbines.

"This service partnership is significant for the owners and operators of industrial gas turbines, as it will provide the most up-to-date turbine control solution available that can be combined with any manufacturers' turbine technical know-how, support and services," said Juha-Pekka Jalakanen, Director, Plant Performance Solutions, Automation, Metso.

"Our strong capabilities complement Metso's control application expertise, forming a unique service solution for industrial gas turbine owners and operators," says Graham Taylor, General Manager, Turbine Services.



Oil

Prices fall as US production begin to impact supply

- Investors curbing long positions
- Brent to average \$103/b in 2014

David Gregory

Events in the Middle East and North Africa continue to influence crude oil prices, but since early October prices have been trending downward. Despite the continually raging civil war in Syria, which threatens to spread to neighbouring Lebanon, and despite continuing disruptions in Libya's crude production and exports, markets have paid more attention to reconciliation between Iran and the world.

The prospect of Iranian crude returning to the markets at some point in the future – in addition to the fact that markets are well supplied – has led to investors curbing their long positions.

In mid-November, West Texas Intermediate (WTI) crude was trading at around \$93/b and Brent was around \$108/b. US domestic crude production is building, promising to keep prices within the US manageable and thus enable its economic recovery.

The US Energy Information Admin-

istration (EIA) said in the November issue of its *Short-Term Energy Outlook* that US crude oil production is forecast to rise from 6.5 million b/d in 2012 to 7.5 million b/d in 2013 and to 8.5 million b/d in 2014.

"The continued focus on drilling in tight oil plays in the onshore Bakken, Eagle Ford and Permian regions is expected to account for the bulk of forecast production growth over the next two years," the EIA said, adding that crude imports to the US have been falling since reaching a high of 12.5 million b/d in 2005. The EIA said total liquid fuel net imports during October were the lowest since February 1991.

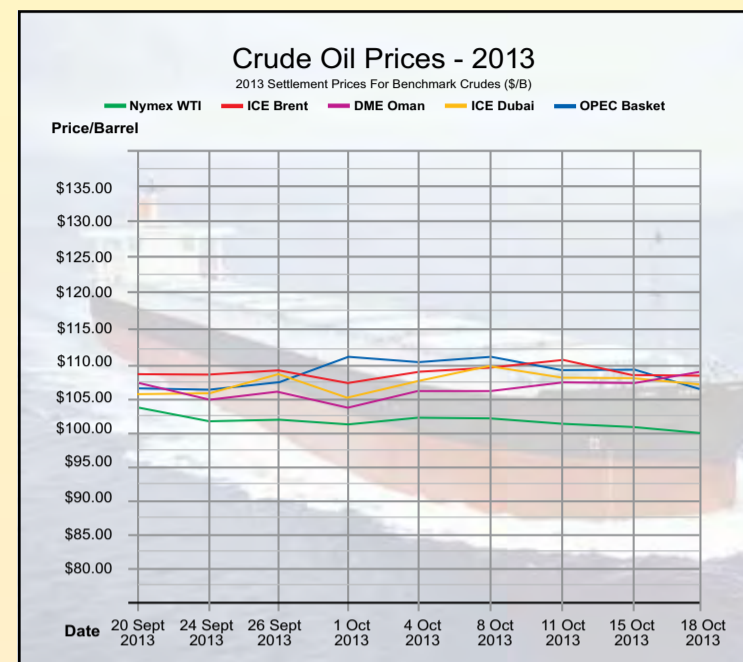
Crude imports averaged 7.57 million b/d during October. US domestic output averaged 7.74 million b/d during the month. The US remains the world's largest crude consumer and importer. But the EIA forecast that net import share of total US consumption would decline to 28 per cent in 2014,

"which would be the lowest level since 1985".

Commenting on the development, analysts were quoted in the *Washington Post* as saying that it is one reason to be optimistic about US economic growth prospects. Rising US oil production would mean a smaller trade and current account deficit and that the US would be less sensitive to increases in global oil prices, one analyst said. Another consideration is that the US is finally moving towards energy independence.

The EIA said the price of Brent declined from an average of \$112/b in September to \$109/b in October. It projected that Brent would average \$106/b in December and \$103/b in 2014. The average price for WTI fell from \$106/b in September to \$101/b in October, according to the EIA. It forecast a price of \$97/b for the fourth quarter of 2013 and an average of \$95/b in 2014.

Global oil consumption averaged



89.2 million b/d in 2012 and it would rise by 1.1 million b/d in both 2013 and 2014. Most of this growth would occur in China and the Middle East, while demand in the OECD countries would decline by 0.1 million b/d in 2013 and 0.2 million b/d in 2014.

The Paris-based International Energy Agency (IEA) said in the November issue of its *Oil Market Report* that world oil demand would grow by around 1.0 million b/d during 2013 to average 91.0 million b/d. It said that demand during 2014 would grow by around 1.1 million b/d to average 92.1 million b/d.

The IEA said global supplies rose by 0.6 million b/d in October to 91.8 million b/d. Non-Opec oil supplies rose to 55.53 million b/d. It predicted that non-Opec supply growth would increase by 1.3 million b/d in 2013 and by 1.8 million b/d in 2014.

Opec supply declined for the third month straight to 29.89 million b/d, the IEA reported. "Production has fallen below the group's 30 million b/d ceiling for the second consecutive month," the IEA said, citing lower production from Saudi Arabia, Kuwait, Nigeria, Angola and Algeria that more than offset increased output from Iraq, Iran and Libya.

The IEA noted that Opec ministers would meet in Vienna in December to discuss the market outlook for 2014, "when demand for the group's supplies is widely forecast to remain constrained by the relentless rise in non-Opec production." Nonetheless, the IEA said, Opec ministers "are expected to maintain their formal 30 million b/d production ceiling originally agreed in January 2012, with Saudi Arabia likely to calibrate output to market needs."

Gas

Russia, Ukraine deal staves off European supply concerns

A new gas supply agreement between Gazprom and Naftogaz Ukrainy has avoided a potential energy supply crisis in Europe.

Mark Goetz

Russia's Gazprom and Ukraine's state-owned Naftogaz Ukrainy avoided a potential energy supply crisis in Europe this winter by reaching a new gas supply agreement, shortly after Kiev announced it was stopping imports of Russian gas for the remainder of the year.

Faced with steep gas bills and demands from Russian state gas monopoly Gazprom that it pay up, Ukraine in early November announced that it had sufficient gas in storage to meet its needs and ensure the supply of gas to Europe. It then stopped purchasing Russian gas, saying that it had some 19 billion cubic metres (bcm) in storage.

Keen to maintain its image as a reliable supplier to Europe, Gazprom expressed its concern that Ukraine's actions could possibly create gas shortages for European states until Russian gas was again transiting

Ukraine. It said that Ukraine would be taking gas from storage, which put Europe at risk.

Gas disputes between the two states have brought shut-offs to Europe before. Ukraine has repeatedly asked Gazprom to reduce the gas price, which is around \$400/1000 m³. Russia says it can reduce the price to \$260 if Ukraine joins a Moscow-led economic organisation, the Eurasian Economic Union, but this would prevent the former Soviet republic from developing closer relations with the EU.

Ukrainian Energy Minister Eduard Stavitskiy said the new gas agreement was a comprehensive package. The two countries' prime ministers pledged that both sides would take measures to ensure uninterrupted supply of adequate volumes of gas in Europe, a Ukrainian government statement said.

Media reports said Ukraine had racked-up well over \$1 billion in late

gas payments to Gazprom and that Gazprom had threatened to demand pre-payment. With relations between the two countries slipping because of Ukraine's plan to sign an association agreement with the EU at the end of November, Kiev decided to stop buying Russian gas.

Russia supplies Europe with a quarter of its natural gas demand and Gazprom expects its exports to Europe to be the highest since 2008 due to fewer deliveries of LNG. Gazprom said in mid-November that it expects shipments to Europe to amount to 160 bcm during 2013.

Russian gas exports to Europe totalled 139 bcm during 2012 as demand slipped when European states began to import cheap coal from the US, where shale gas is replacing coal for power generation.

But Europe worries that it could become too dependent on Russia for gas and has turned to alternative sources, such as Azerbaijan, which

will deliver gas through the Southern Corridor beginning in 2019. The potential exists for Europe to also receive gas from the recent East Mediterranean discoveries in the next decade.

Ukraine, the main transit route to European gas markets for Russia, has also been trying to reduce its dependence on Russian gas due to price and the political influence that Moscow has as an energy supplier.

Ukraine bought 40 bcm of Russian gas in 2011, 24.9 bcm in 2012 and it expects to reduce this to 18 bcm this year. Ukraine has arranged to receive gas by pipeline from Poland and Hungary, and the EU is helping work-out a deal that will allow Ukraine to receive up to 10 bcm/year through the Slovakian pipeline system beginning as early as next year. Increased volumes from Poland and Hungary will just about meet Ukraine's 18 bcm/year demand.

Kiev has also recently signed shale gas exploration deals with Chevron

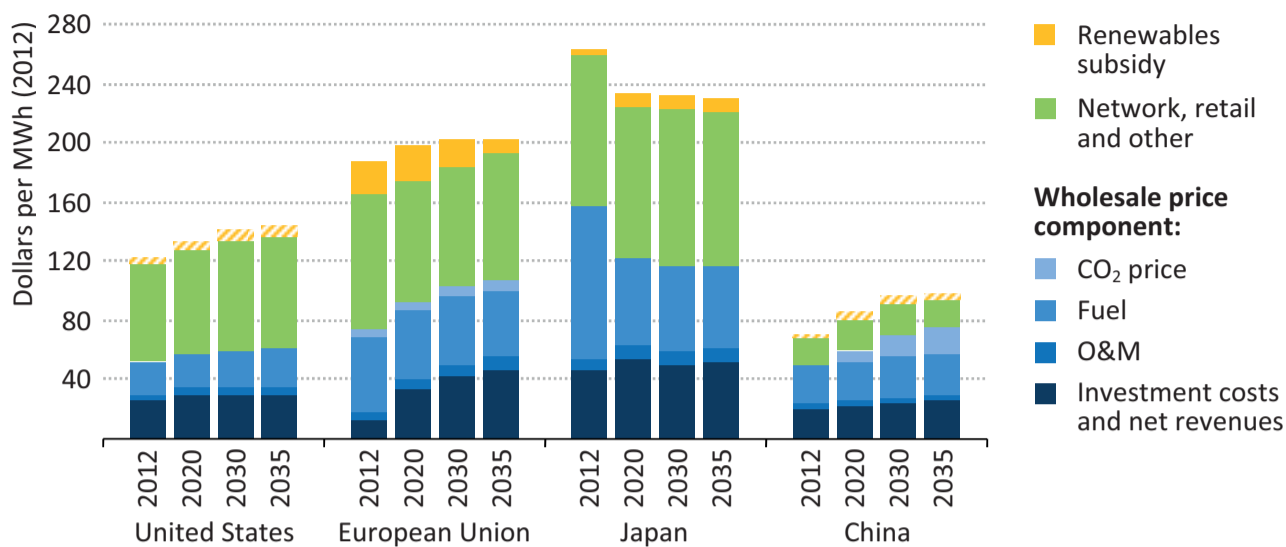
and Shell. Shale gas reserves in Ukraine are estimated to be substantial. It is also looking to explore for and develop natural gas resources in its section of the Black Sea.

Russia's gas trading practices have come under investigation by the EU. Gazprom is alleged to be overcharging customers and preventing the free flow of gas.

Speaking in Vilnius, Lithuania, in November prior to the EU summit there, EU Energy Commissioner Gunter Oettinger said Russia and Gazprom are the EU's most important partners with the EU energy market and that Brussels looks to continue a strong partnership, but he also voiced EU support for Ukraine's efforts to diversify its sources of supply and develop its own resources. He also said the EU is keen to continue to buy Russia gas through the existing pipeline system, suggesting that the EU wants to see Russia continue to use Ukraine as a transit state.

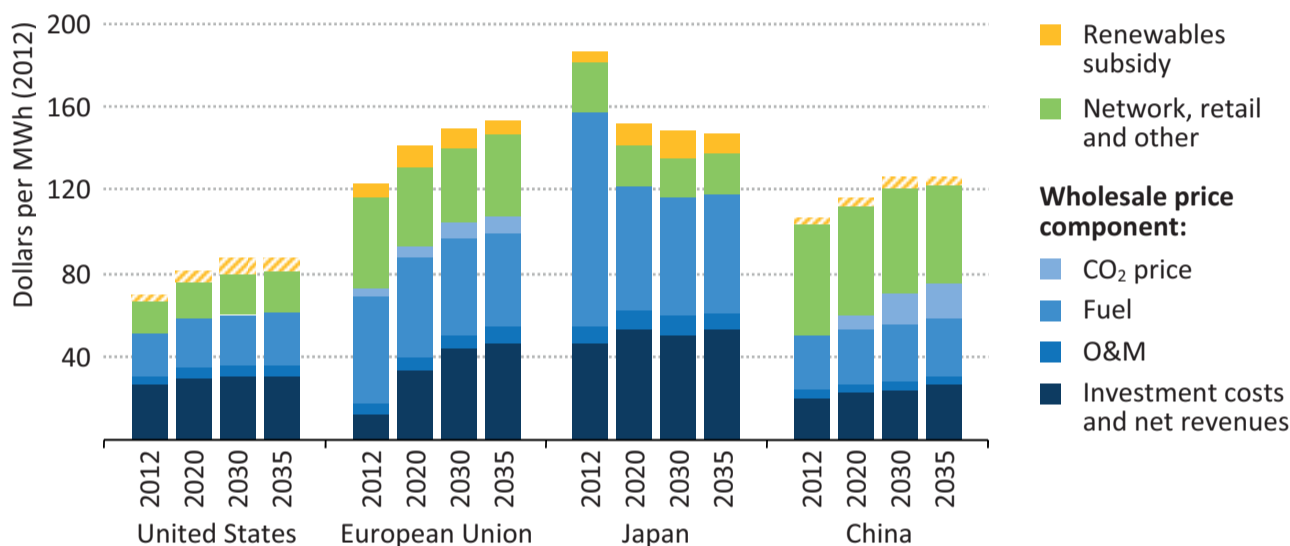
12 | Energy Industry Data

Average residential electricity prices (excluding taxes) by region and cost component in the New Policies Scenario



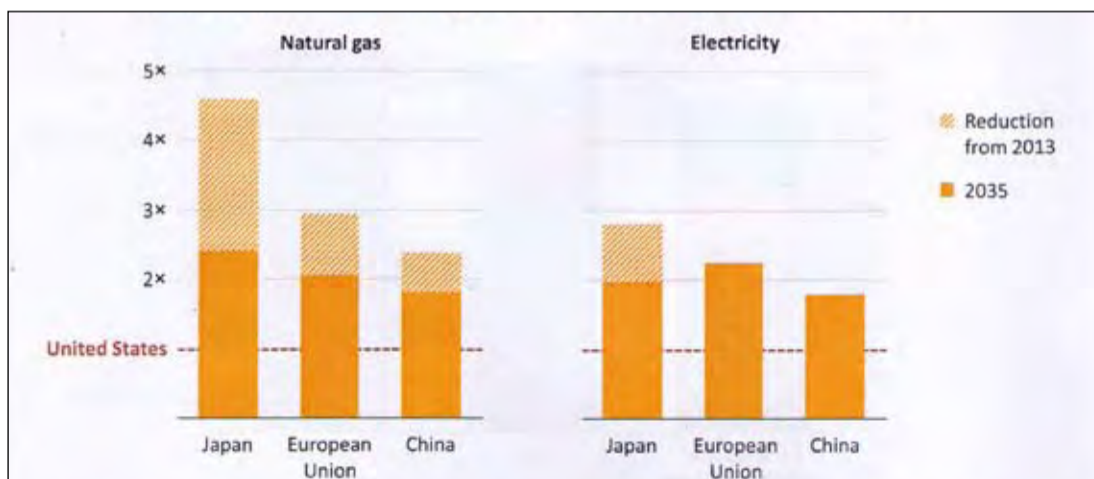
World Energy Outlook 2013 © OECD/IEA page 194, Figure 5.17

Average industry electricity prices (excluding taxes) by region and cost component in the New Policies Scenario



World Energy Outlook 2013 © OECD/IEA page 195, Figure 5.18

Ratio of industrial energy prices relative to the United States



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Learning to live in the fourth wave

The question of energy affordability in the UK is firmly on the table and is not going away. But while many proposals have been put forward, it is far from clear what should happen next. **Dr. Mark Powell**



Powell: affordability has become a real issue

Two years ago I found myself in the centre of a bit of a media storm after pointing out the huge costs associated with the UK's current energy policy. Policy had become unbalanced and in its almost total focus on hitting de-carbonisation and renewables targets had lost sight of the fundamental need to make sure that energy would also remain affordable for all.

Although it was not something others had not commented on before, I was somewhat surprised by the degree of venom that resulted, even culminating in a death threat from one of the more extreme groups. I pointed out that current policy was neither sensible nor increasingly affordable and suggested that if the UK kept going down this path it would find that affordability would become a bigger and bigger issue and would face a lot of problems as a result. Others said it was a pointless conversation since we

had signed up to specific carbon and renewable targets and that was the end of it.

I genuinely take no pleasure in seeing the industry that I have spent my whole life working with in the situation it now finds itself. We now stand at a crossroads. The question of affordability is firmly on the table and is not going away. Ultimately it will lead to changes in policy from the government and changes in strategy for energy companies.

Hundreds of minutes of news stories appear every day to remind us that energy affordability is a huge political and consumer issue. While many proposals have been put forward, it is far from clear what should (or will) happen next. No one would sensibly suggest that reducing our carbon emissions and increasing the role of renewables is not a good thing. Equally, no sane person can continue to suggest that doing so without a proper, long term plan and careful thought about potential consequences and costs would also be a pretty good idea.

If you look back you can see three main waves in energy policy evolution. The first wave saw nationalisation of the industry shortly after the war leading to a time of large national infrastructure building. We had mountains of coal and built a proper national energy system geared around large, and yes, highly polluting, assets.

Inevitably, as with most state industries, inefficiency, inflexibility and other problems led to the second wave of market liberalisation with the 1989 Electricity Act. Liberalisation ushered in huge increases in efficiency across all aspects of the system and saw the UK benefit from some of Europe's lowest energy costs. The EU clearly thought this was the way to go when they created the 1996 EU Directive to force competition at a European level.

As issues in global climate change took central stage, the third wave of green energy arrived, with the Kyoto protocol in 1997 and slow progress towards emissions trading and renewable energy targets. As part of this green wave the LCPD Directive was introduced in 2001 which is now shutting down several large coal and oil

plants in the UK.

The problems arrived in the move from the second to the third wave. Nobody really considered the issue of how to manage a sensible transition from a market based on economics to one where large volumes of generation had to be subsidised or supported by regulation. The difficulty of pushing the market towards green alternatives led to a proliferation of policy instruments which were heavily balanced in favour of carbon reduction but with little consideration for affordability and security.

There was much talk of managing the trilemma in terms of carbon, security and cost, but the reality is that we were actually creating two dilemmas.

Firstly the security dilemma – the industry looked to increase energy security by reducing dependence on fossil fuels but created a problem where reliable capacity was shut down faster than it could be replaced and now faces a real prospect of supply shortfalls.

The second dilemma is that the impact on affordability is creating a situation where we will see less public support for green policies due to the impact on costs. When push comes to shove, saving the planet for your grandchildren will take second place to feeding your children today.

At the core of these problems lie two fundamental issues. Firstly: the transition was not planned effectively enough to allow the volume of new assets to match the volume of assets that were being forced off the system. Beyond this the industry has been chasing two targets, which increasingly conflict with each other but have been presented as part of one strategy.

For the past year I have been asking a selection of people, from industry executives to policy makers a simple question – what is the point of the renewables target? So far, I have yet to receive a clear answer.

The logic of reducing carbon is clear, the logic for carving out a fairly arbitrary renewable target is less so. Ultimately, carbon targets should drive some renewables as part of a portfolio of many low carbon options, including CCS, nuclear and energy efficiency. The obsession with renewables targets, which most would agree we have no chance of hitting, could ultimately compromise carbon goals if public support for all things green continues to wane as the bills arrive.

For many, the third wave was about saving the planet. The problem is that renewables, at least in the short term, are not cheaper. This is not to say that we should not make the investment, far from it. But we have to recognise the costs and have a clear view on the best way to incur and spread them. It was an easy decision to put all the costs into the energy system but the scale of them in essentially regressive energy bills has meant affordability has become a real issue.

Since a large portion of energy costs are increasingly being driven by policy decisions (indeed UBS's recent report suggests that up to 95 per cent of recent prices increases are linked to green policy decisions). The result of this approach is that the poorest people are actually bearing a

disproportionately large burden of energy policy decisions. The green energy dream actually did not intend for this to happen but looking back with the benefit of hindsight it was inevitable.

The second unintended consequence is purely a factor of economics. Energy is a fundamental part of the economy. While the US has been bringing manufacturing back as the shale gas revolution has driven US energy costs down, it has also reduced emissions. Energy costs are relative and corporations are global so there needs to be an increasing focus on how energy costs are affecting businesses and industries – which is needed to drive economic growth and employment.

Finally it is important to look around us – global emissions continue to grow and the world is burning more coal now than it ever has. China and India are powering themselves with coal, more than making up for any gains we make in the UK. We may be leaking more than carbon to global competitors; we could be leaking jobs, income and prosperity.

We are where we are. Mistakes of the past are simply that – in the past. But the affordability horse has well and truly bolted and there is no point pretending that it has not. We have now moved into the fourth wave, the wave where affordability and security will take centre stage.

Whichever party forms the next government in two years' time will have to do something. Many instruments are available – from windfall taxes to price caps, to moving subsidies into general taxation to industry break-up. The risk of course is that the government ends up bashing the power companies and exacerbating the problems.

None of these actions will by themselves solve the problem. Attacking the power companies will become as popular a political sport as bashing the bankers has been. We need to re-think what we are doing and how we need to learn to live in the fourth wave. This will require a greater focus on driving energy efficiency, but this is not just a question of throwing money at smart meters and the green deal, all of which have simply increased costs to date.

It's about actively incentivising people and businesses to reduce their consumption. It's about having a proper conversation around the need for investment and being honest about the impact on energy costs. It's about challenging whether it makes sense to have a renewable target. It's about not playing politics but all parties forming a proper consensus. It's about not constantly attacking the power companies, who are not the architects of all of this.

Yes, the power companies have played their role in this and have not managed things as well as they should have. They need to also re-think their strategies and work out how to place affordability at the heart of all that they do – as do we all.

Dr. Mark Powell is Head of the UK Power and Utilities Practice at the global management consulting firm A.T. Kearney.

Sample list of current UK energy policy measures

Initiative	Description	Date applied	OBJECTIVE		
			Carbon reduction?	Affordability? (1)	Security?
LCPD	• Shuts down polluting combustion plants	EU: 2001 UK: 2007	↑	↓	↓
Carbon Floor Price	• Ramping up the minimum price of carbon emissions	Budget 2011 Applies 2013	↑	↓	?
Renewable Energy Target	• Mandates that 15% of all energy comes from renewables by 2020	2009	↑	↓	↓
Contracts for Difference	• Guarantees returns for renewable generation by subsidising prices below a strike price	Bill: 2012 Starts post 2017	↑	↓	?
Capacity Mechanism	• An auction based mechanism to ensure capacity is available when required	Bill: 2012 Starts 2018/19	-	?	↑
Emissions Performance Standards	• Capping the emissions performance of new power plants	Bill: 2012 Details TBD	↑	?	?
Nuclear Strategy	• Deciding the future of new nuclear power and addressing nuclear shut downs 2015 - 2023	Strike price for Hinkley agreed 2013	↑	↓	↑
Feed In Tariffs	• Provides feed in tariffs for small scale renewable power – mostly rooftop PV	2010 Revised 2012	↑	↓	?

A US template for UK shale?

With North Sea gas on the decline, some argue that UK shale gas is potentially a timely gift that should be exploited as it has been in the US.

Chris Faulkner

If they didn't know it before, people in the United Kingdom now know that they're in trouble, with a frightening gas shortage last winter and prospects of a repeat performance this winter.

It doesn't matter that the UK is the largest oil producer and second largest gas producer in the European Union; it has been importing both since 2004/2005 and yet nearly ran out of gas last winter because of its export contracts and declining production from the North Sea. The International Energy Agency (IEA) expects gas import dependency to continue growing from 60 per cent to 80 per cent in the European Union over the next couple decades.

This is why shale gas reserves are an incredible gift to the UK, which is suffering under higher energy prices and the threat of shortages due to political unrest among exporting nations. Higher energy prices are creating competitive disadvantages for manufacturers and other industries in the UK, along with higher unemployment rates.

The IEA says that European countries in the Organisation for Economic Cooperation and Development (OECD) saw electricity prices soar by 38 per cent between 2005 and 2012, at a time when electricity prices in the US were falling by 4 per cent, thanks to the American shale boom. Unemployment rates show a similar dismal pattern: around 12 per cent in the Eurozone while the US enjoys a four-year low of around 7 per cent.

A new report by the British Geological Survey (BGS) estimates UK shale gas at 37.6 trillion cubic metres, with a potential 13 000 billion cubic metres of recoverable gas. This is considerably higher than previous estimates, sparking renewed hope and debate about the UK's energy future.

The hope part is self-explanatory; the debate arises from the fact that shale gas is accessible only via a horizontal drilling and hydraulic fracturing approach.

Having gone from decades of oil and gas imports to a net gas exporter in the

span of only a couple years, thanks to fracking, the US can provide a template for the UK to follow to its own increased energy security. Like the US, however, the UK is already struggling with the pros and cons of fracking for precious shale resources.

Opinions in the EU are divided on the question of fracking, with some countries convinced of the dangers of this particular American export, they've banned it outright. The UK, however, which already has some of the most stringent environmental regulations on record, has had a more positive response.

Fracking technology will have to be adapted for the unique characteristics of UK shales, and additional infrastructure will be required

Chancellor George Osborne welcomes fracking with open arms and Prime Minister David Cameron has been in favour of simplifying regulations to speed up the permit process for fracking operations. However, as in the US, there's disagreement among government agencies, with the Treasury in favour while the Department of Energy and Climate Change is still on the fence. In the meantime, the EU is considering standardised regulations, including pre-drilling audits, which could turn the UK's potential gas boom into a bust.

On the face of it, uniformity and certainty of standards sounds like a great idea, but if these regulations pass, the additional time and red tape needed to get a fracking permit will put the brakes on a blossoming industry that otherwise has a very bright future. Not only would such standards create delays and increase costs to the extent that operators might be priced out of exploration and production activities, universal standards are a one-size-fits-all solution that actually doesn't fit the differing geologies from one region to the next.

The UK and others in the EU were understandably – though not literally

– a bit shaken when the first fracking tests were conducted a couple years ago, causing a series of earthquakes so small no one could feel them, but they showed up on seismic measuring equipment. The practice was halted in the UK, but ultimately the government lifted the ban, placing new requirements on operators to carry out a seismic survey and seismic mitigation plan before work can begin.

Currently, operators need a license from the energy ministry, an Environment Agency permit, and permission from the Mineral Planning Authority before they can begin drilling,

and then go through the same process before they can begin actual production.

On the plus side, the government has recently announced tax incentives for shale gas exploration and development companies, and is considering incentives for the communities in which fracking will occur.

That's not just an economically driven decision, but also one with an eye on environmental initiatives. Though that may not sit well with the anti-fracking lobbyists, the fact is that natural gas is a much cleaner fuel than coal, producing only half as much carbon dioxide.

Earlier this year, the US Environmental Protection Agency issued a report finding that methane emissions from oil and gas operations fell 20 per cent more from 1990 through 2010 than its previous estimates, at a time when natural gas production had risen 40 per cent, thanks to the industry's largely voluntary improvements in controls on pipelines, wells and other infrastructure.

Global coal use has actually risen 25 to 30 per cent in the past five years, as nuclear plant closing has forced Germany to turn to coal-fired electricity and China and India simply continue long traditions of high coal consumption. By 2020 a fifth of current UK power plants will be decommissioned in an effort to reduce carbon emissions and/or as they simply reach the end of their natural production lives.

With climatologists calling for a global reduction in carbon dioxide emissions of 80 per cent by the end of this century, natural gas is the only energy alternative that's already up to speed and ready to help many nations begin to work toward achieving that goal. Other energy alternatives simply aren't yet ready for 'prime-time', so while production and infrastructure for those alternative energies slowly comes up to speed, natural gas is the clear answer to bridge the gap between dirty coal and cleaner energy of the future.

While some activists are looking to America's fracking experience for evidence to support their claims against the practice, government officials and researchers are looking to America's fracking history for reassurance about the safety of fracking – and they're finding that reassurance.

Examining evidence from the US and other countries with fracking experience, Public Health England (PHE) concluded that the risks are low from properly run and regulated operations. The PHE review found that exposure to potentially harmful substances as a result of fracking was generally due to operational failure in a small number of cases. The PHE study was well-received by Energy Minister Michael Fallon and Professor of Petroleum Geoengineering at University of Leeds, Quentin Fisher, as more evidence of the safety of fracking.

Water UK will soon be releasing another report, which is rumoured to support the findings of PHE.

Even under a friendlier regulatory environment with increased incentives, shale gas production will not immediately solve energy supply issues in the UK. Though US fracking technologies will certainly provide a valuable starting point for operations in the UK, they cannot be directly applied to UK shales. Fracking technology will have to be adapted for the unique characteristics of UK shales, and additional infrastructure will be required.

Cost is also an issue in the UK – about double the cost of extracting gas from shale in the US. Investment will be critical for the UK shale industry to succeed, especially now in the early days of the UK shale industry. As happened in the US, the UK may well find costs going down as technologies for shale extraction improve.

The UK will have to handle its shale gas resources carefully if it hopes to achieve energy security. Hopefully, the North Sea will provide an example of what not to do with a nation's natural resources.

In hindsight, the problem with the government's handling of North Sea production was allowing itself to be locked into export contracts. If off-shore production of natural gas was restricted to UK use, the UK would have had a stable energy reserve rather than suffering the terrifying whims of politically motivated import interruptions and volatile market pricing.

Now, the UK has a chance to get it right with its shale gas reserves.

Those reserves should be treated as a vital national resource that can both stabilise energy prices in the UK, and, if the UK follows Norway's example, could provide a buffer against future economic downturns. Norway invested a portion of the proceeds from its North Sea production into a sovereign wealth fund, which helped it withstand the global economic crisis.

With North Sea reserves on the decline (down by 1 million barrels per day last year for the first time since production started), the UK faces a precipice that threatens to inflict further suffering on an already struggling economy. Shale gas is giving the UK an incredible safety net, just in the nick of time.

Chris Faulkner is the Founder and CEO of Dallas-based Breitling Energy Corporation, the holding company of Breitling Oil and Gas and Breitling Royalties. The companies are in the oil and natural gas exploration, production and investment business.

Faulkner: Shale gas is giving the UK a safety net, just in the nick of time



Advanced CFBs just got bigger

Alstom recently introduced an advanced large scale circulating fluidised bed boiler. The boiler comes at a time when there is a growing need to burn low quality coal, especially in Asia. **Junior Isles**



Despite the pressure on coal fired power generation in the US and most of Europe, coal is expected to remain the most widely used fuel for power generation, especially in Asia. At the same time, coal quality is expected to continue its steady decline.

In line with these market developments, Alstom recently launched a 660 MW advanced supercritical circulating fluidised boiler (CFB) – a size not previously seen on the market.

Unlike pulverised coal boilers, CFB boilers are capable of burning a wide range of fuels, including lignite, low quality coals (below 2500 kcal/kg, with moisture content as high as 50 per cent and 40 per cent ash), petroleum coke, anthracite, biomass and refuse derived fuels.

Since their introduction, the size of CFB boilers has been steadily increasing. Following the successful operation of boilers in the 125 MW class in the late 1980s/early 1990s, the 250 MW Gardanne CFB boiler in France became the largest of its kind

in the world when it was commissioned in 1996. In 2006 Alstom commissioned the first 300 MW CFB demonstration unit in China. All of these operated at subcritical steam conditions.

Along with scaling up the size, manufacturers have also raised the steam parameters to increase efficiency and therefore lower emissions. Foster Wheeler began operating the first supercritical (SC) CFB in Lagisza, Poland in 2009. This 460 MW boiler operates at a steam temperature of 560°C and pressure of around 270 bar. The company is now in the process of delivering four 550 MW ultra-supercritical units for the Samcheok Green Power Project in South Korea. Meanwhile, China's Dongfang Boiler Works commissioned a 600 MW SC CFB in China in March this year.

These recent developments have led Alstom to bring its own offering to the large scale advanced SC CFB market.

Pierre Gauville, Alstom's CFB Product Director said: "These developments show the market is moving towards larger boilers with supercritical and ultra-supercritical (USC) parameters.

"Operators will need to burn coal of lower and lower quality, with high moisture and ash content or difficult-to-burn coal such as anthracite."

He added: "Large capacity CFBs with SC and USC steam parameters is the right technology to face this challenge. We are seeing some strong signs from the market. For example, we are therefore seeing some larger capacity CFB projects of 500+ MW in Turkey for burning lignite. There are also other opportunities in Asia."

India has huge coal reserves but will need to import additional coal from Indonesia and Australia. Japan is also importing more coal following the closure of its nuclear plants after the disaster at Fukushima. Essentially, this means there will be less high quality coal to go around.

Alstom's long experience with both pulverised coal boilers and circulating fluidised bed boilers makes it well-positioned to introduce a large advanced CFB boiler.

"Alstom is the industry leader in the ultra-supercritical technology, first applied to pulverised coal boilers with capacities of up to 1100 MW, and has been developing CFB boilers for the more difficult fuels since the 1980s," said Gauville.

However, the company says it was waiting for the right market conditions. With continuing strong demand for coal fired plant in China, India, Southeast Asia, and more recently increased demand from Japan, all combined with a potential fall in coal quality in the coming years, Alstom believes the time is now right to expand its boiler product portfolio by offering larger CFBs.

The company says the new boiler is the result of combining its two existing 300 MW CFB boiler designs – a single grate unit with rectangular furnace and its dual grate boiler that has a square furnace.

Gauville noted: "By combining the technologies we can provide boilers of 660 MW for lignite, with scaling up of the boiler dimensions that allows us to offer a reliable product."

Alstom began working on the concept around five years ago but only really committed to developing the unit just one and a half years ago, as changes occurred in the coal market. With the concept in hand and key patents already filed, development was swift.

"One and a half years ago, we started to address those typical issues: how to design the stiffening of the furnace, how to arrange the cyclones and fuel feeding system for offering high availability, how to increase the compactness to reduce the cost and how to make the construction easier," said Gauville.

But the main task was how to develop a product that is based on standardised modules. Gauville explained: "When we started, the focus was on this aspect. Modularisation allows us accommodate changes in [boiler] size or fuel. This essentially allows us to mitigate technical risk and deliver a reliable product, and reduce costs and lead-time when switching from one site to the next."

Alstom has introduced what it calls its 660 MW platform, which can achieve the necessary steam output for lignite B from four furnace modules. This unit has a steam throughput of nearly 2000 t/h. The same size and boiler structure can be used to provide a 900 MW boiler that runs on bituminous coal and/or anthracite.

Gauville added: "If you want a 330 MW boiler, you simply remove two of the modules, without any change

in the technology and the mechanical design"

The four-module design has four steam-cooled cyclones on two sides of the furnace. External fluidised bed heat exchangers are located below the cyclones. Evaporative heating surfaces designed like box columns are positioned in the core of the furnace. Steam is generated by a single pass of water going through the furnace enclosure and the box columns.

Fuel is fed from both sides of the furnace. Bottom ash is extracted from below the furnace using eight rotary ash coolers. Hot gases leaving the furnace and the cyclone pass through a heat recovery back-pass. A regenerative preheater recovers heat from the boiler flue gas, reducing flue gas temperature to around 110-120°C depending on the type of fuel.

The steam pressure at the HP inlet of the steam turbine is 275 bar. Main steam temperature is 600°C. Reheat steam temperature is 620°C. Gauville said: "We have a flexible design in order to vary the steam parameters. Sometimes it does not make economic sense to offer USC parameters if the cost of fuel is low. We can also offer SC steam parameters with steam temperatures around 565°C. The lower steam temperature avoids the need for expensive alloy steel for the pressure parts and so reduces investment cost."

With CFB boilers, NO_x and SO_x emissions can usually be kept within regulatory limits (150 mg/m³ for NO_x and 200 mg/m³ for SO_x) without the need for selective catalytic reduction (SCR) to limit NO_x or a wet FGD system for SO_x control.

If there is very strict emission legislation, however, a selective non-catalytic reduction (SNCR) system can be incorporated, where only ammonia is injected into the flue gas at the outlet of the cyclone. However, according to Gauville associated capex and opex in this case still favour an SNCR-based solution rather than SCR. "Referring to the investment cost only, there is roughly a factor of 10 between a SCR and a SNCR," he said.

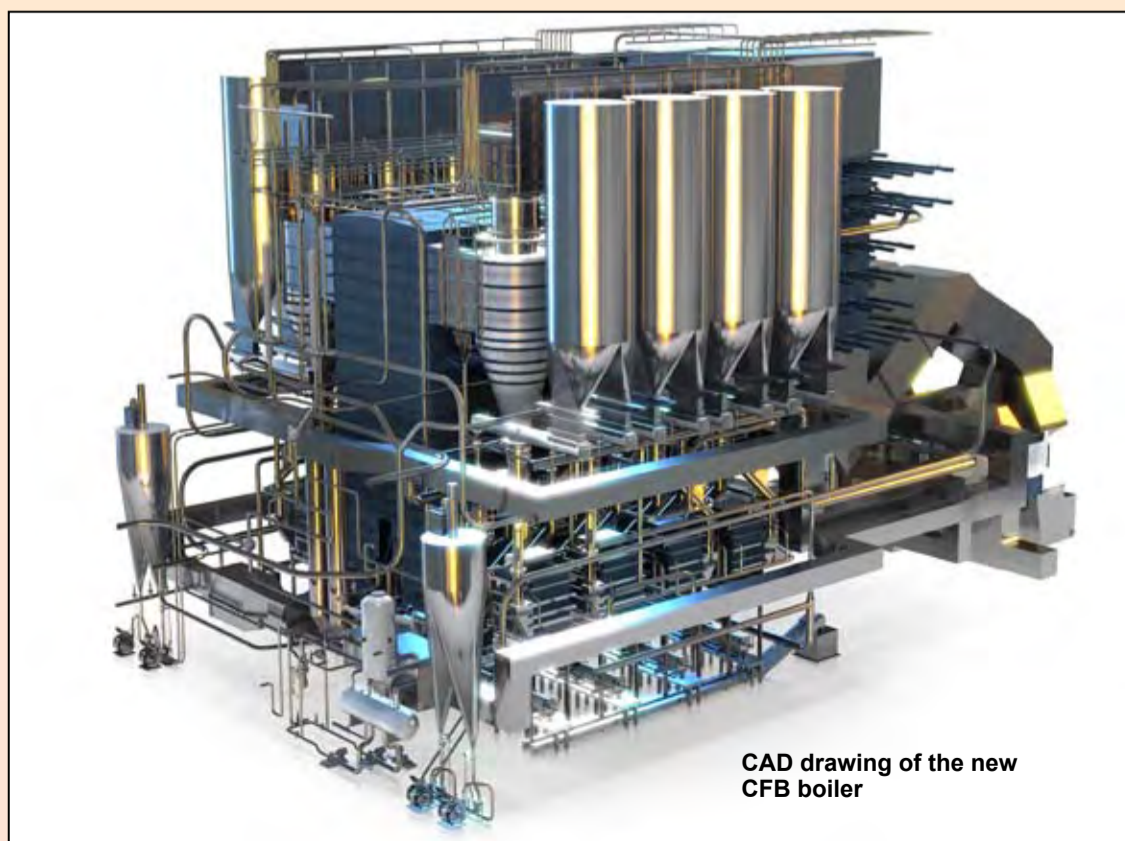
Meanwhile, around 95-97 per cent sulphur removal can be achieved by simply injecting limestone into the furnace. If a higher sulphur capture is needed or reduced limestone consumption is required, Alstom's proprietary NID dry scrubber can be used. "Using limestone injection instead of a wet FGD not only reduces investment costs but also reduces auxiliary power consumption," noted Gauville.

Looking forward, Gauville does not see Alstom's CFB boilers getting much bigger in size, at least not in the next five years.

He concludes: "We have a 660 MW [CFB] boiler for lignite and 900 MW for hard coal. This is typically the size the market is requesting and it matches our steam turbine size. We are at the beginning of introducing these larger 600 MW class boilers into the market. The next step might be CO₂ capture and sequestration when the market opens up."

Technical specifications

Steam output (t/h)	1820
Steam pressure (bar)	270
Steam temperature (°C)	600/620 (main heat/reheat)
Boiler efficiency (%)	> 90
Fuel consumption (t/h)	605
Limestone consumption (t/h)	75
Sulphur removal (%)	> 95
Control point	60% maximum continuous rating



CAD drawing of the new CFB boiler



Junior Isles

Time to cut the crap

With rumours of “getting rid of the green crap” in the UK and rolling back renewable subsidies, which some countries claim are harming economic competitiveness, one has to contemplate the potential impacts. Not only on climate change but also on the ultimate vision of transforming our entire electricity infrastructure into one based on smart, efficient systems that make the optimum use of our energy resources.

Fuelled by rising energy costs, anti-green sentiment is reaching fever pitch. Rightly or wrongly, several of Europe’s large utilities are latching onto green subsidies as a major driver of high energy costs. Green lobbyists have hit back saying that rising gas prices are to blame. The cost of upgrading grid infrastructure has also been held up as a major factor, at least in the UK. And more recently, a report by UK regulator Ofgem points toward the rising profit margins of the energy companies.

Whatever the reason, and no doubt it is a combination of all of the above, if the renewable drive stumbles as a result of green policies being used as the scapegoat, and the planned amount of renewables coming on to the grid

subsequently falls short of expectations, where is the overarching need for a smart grid?

Yes smarter grids with smart meters bring other benefits. They can provide utilities with new insight into their customers’ energy use to help them change their habits and save money. Certainly they offer the possibility of unlocking new value from the vast amount of information utilities can gain from the rollout of smart meters. No doubt the deployment of smart meters and smart devices in the field

will also help utilities to better manage their transmission and distribution networks. A smart energy infrastructure is certainly needed if the industry is to optimise its energy system and improve overall efficiency. The EU Energy Efficiency Directive has already mandated for 80 per cent of households in Europe to have smart

by 2020. But with consumers already feeling the pinch from high energy prices, politicians may also soon be asking whether those same consumers will be happy to bear the cost of rolling out a smart electricity system.

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Fortunately, for the smart meter industry the drivers vary massively from market to market. In the US, smart meters are being used to analyse both the consumption data and quality of the power arriving at the meter point to inform them of where they need to invest in their network infrastructure. Smart meters are also invaluable for general network management, for example in identifying and managing outages.

The turnout and discussions at this year’s *European Utility Week* in Amsterdam seemed to indicate that the smart metering revolution is gathering significant momentum, not just in Europe but globally.

Countries are at various stages of rolling out smart meters but progress is being made.

Tobin Richardson, Chairman and CEO of ZigBee Alliance said he was seeing a lot of interest in distributed generation applications for the ZigBee global wireless standard used for connecting devices.

He noted: “Europe has a lot of different markets and the US has a number of different markets, so in essence the US and Europe are very much the same and the issues they face are relatively similar. But different regulatory environments impact those markets differently, so you get a different pace of rollout in different places.”

Despite the different speed of smart meter programmes, industry players are convinced that smart meters make sense.

Mike Ballard, Senior Director Utilities Strategies (Europe Middle East and Africa) at Oracle believes there are benefits to be gained in all markets, although he acknowledges “some of those benefits will be gained over a longer period, while some are immediate”.

Italy has led the EU smart meter rollout. Its programme was driven by the need to understand customer usage and reduce ‘non-technical losses’ i.e. energy that has been consumed but cannot be assigned to a particular account.

“Although they spent billions on the rollout, they have been able to recover around half a million Euros a year that was otherwise untappable,” said Ballard.

But in markets like the UK and Germany, where non-technical losses are not an issue and there is not a high degree of network outages the drivers are different, the case may be less clear-cut.

“In the UK the drivers are more related to engaging customers with regards to energy use and preparing the market for the challenges around

balancing supply and demand. So it’s a long road for the UK,” commented Ballard.

To some degree, this was echoed by Benoit Laclau, Global Leader for Power and Utilities in Ernst & Young’s (EY) Advisory Business. He commented: “Each of the countries are progressing well, although at different paces and with slightly different approaches. From the UK point of view there’s a lot to do.”

The UK was scheduled to start the rollout of smart meters next year but in May this year the government announced that it would now not start until autumn 2015, and the completion of the national plan will be put off from 2019 to 2020.

EY says the announcement of a delay on the rollout was “not big news”. Alain Bollack, Director Global Power and Utilities Centre Ernst & Young noted: “It was just officialising a timeline that was much more realistic. The timeline was saying 2014, which everyone knew was not realistic. Even the new timeline is still quite aggressive.”

Laclau said he “would not be surprised” if there are further changes to the [new] schedule. “Some clarity is needed on a number of items. But for me, the real point is the uncertainty in terms of delivery of central communication and the potential risks that are reliant on that central communication system being established.”

Paul Eggleton is Head of Energy and Sustainability Solutions at Telefónica Digital, which in September won a £1.5 billion award for two of three contracts to provide cellular telecom services for the UK smart meter programme. He believes the UK is on track. “We will start end-to-end testing by the end of next year so that we have our solution with the DCC [central data communications company] finalised.”

Yet we have seen many a carefully laid plan unravel. The UK and Europe will probably manage a successful smart meter rollout but there is still a long way to go. There is around 30 per cent penetration of smart meters now and 75 per cent has been projected by 2020. Jeffrey Lund, Vice President of Business Development and Product Management at Echelon noted: “There is not a lot of time to shift two hundred million meters. Everyone seems to be waiting until the end to get started, which is never a good strategy.”

No doubt energy companies are grappling with the fact that markets are not static; the dynamics will change with issues like the advent of shale gas or the impact of changes in policy on investment in wind, solar or nuclear.

But while a business case may not look compelling today, shifts in the market could change the situation in a few years. The perspective of governments and the industry alike should therefore be based around a long term end goal.

As Ballard put it: “It’s a case of what kind of energy market you want to have. Do you want one that is responsive to those fluctuating drivers – whether it’s generation, distribution or demand changes? Smart metering enables utilities and customers to operate in a modern market.”

Ultimately, this makes sense. Hopefully the smart meter train will keep rolling, providing the basis for a smart grid and the vision of the future – regardless of some of the crap that is being peddled about the reasons for high energy prices.

