

# THE ENERGY INDUSTRY TIMES

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The fallout from Brexit is unclear but pundits say the UK's vote to leave the EU will not leave energy unscathed. **Page 13**



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# G20 makes joint commitment on tackling climate change

IEA chief Fatih Birol says "international cooperation is vital"



Energy ministers from the Group of 20 major economies are taking coordinated action in an effort to reach the climate change targets set in Paris last year. **Junior Isles**

The need for global cooperation on tackling climate change was underlined in Beijing, China, last month at the second ever G20 Energy Ministerial meeting.

Opening the meeting, IEA Executive Director Dr Faith Birol said G20 economies must work together in the transition to a low-carbon future, noting that "international co-operation is vital for a secure and sustainable energy economy".

Dr Birol emphasised the challenge that all countries are facing in meeting climate targets under the Paris Agreement, pointing out that out of all clean energy technologies only electric vehicles, solar PV and onshore wind are on track for a 2°C scenario.

In a practical step towards achieving

the Paris goal, energy ministers agreed on a communiqué that emphasises the need for and routes to sustainable energy security and diversification of energy sources and the phasing out of fossil fuel subsidies and increasing market transparency.

More specifically, the communiqué formally recognises several technologies and approaches aimed at achieving the climate change goals set at the Paris conference in December last year.

Ministers adopted the G20 action plan on renewable energy and agreed to continue implementing the G20 toolkit of voluntary options on renewable energy deployment. They also encouraged cooperation on standards to accelerate smart grid deployment

and interoperability.

The communiqué also recognises the role of nuclear power in reducing greenhouse gas emissions for countries that opt to use it, and emphasises the need to ensure the highest standards of nuclear safety, security and non-proliferation.

On energy efficiency, ministers adopted the G20 energy efficiency leading programme and agreed to take the global leadership in promoting energy efficiency.

In his keynote address, Dr Birol also spoke of the "serious investment challenge" facing the energy sector. He said that a cumulative \$68 trillion would be needed across the entire energy sector to 2040, with two-thirds of that needed within G20 economies.

Meanwhile, a new report released by the International Renewable Energy Agency (IRENA) on the sidelines of the meeting provided policy makers, financial institutions and project developers with a range of options to help scale up investment in renewable energy. The report estimates that investment in renewable energy must double by 2020 and more than triple by 2030 in order to meet global climate and sustainable development goals.

Investment needs for the clean energy transition was a key issue addressed at the second Business & Climate Summit held at the end of June in London, UK.

Continued on Page 2

## European Commission releases latest outlook

The European Commission has released its latest outlook – the *EU Reference Scenario 2016* – which projects energy, transport and greenhouse gas emissions trends in the EU up until 2050.

According to the Commission, the Reference Scenario is a projection of where current policies coupled with market trends are likely to lead. The EU has set ambitious objectives for 2020, 2030 and 2050 on climate and energy, so the Reference Scenario allows policy makers to analyse the long-term economic, energy, climate and transport outlook based on the current policy framework.

The Reference Scenario is not designed as a forecast of what is likely to happen in the future but instead

provides a benchmark against which new policy proposals can be assessed, says the Commission.

Several main findings are outlined in the report:

■ Despite a projected decrease in EU fossil fuel production, net fuel imports will decrease and the EU's import dependency will only slowly increase over the projected period, from 53 per cent in 2010 to 58 per cent in 2050. This is mainly due to the higher share of renewable energy sources (RES) and significant energy efficiency improvements, while nuclear production remains stable.

■ The EU power generation mix will change considerably in favour of renewables. Gas maintains its role in the power generation mix in 2030, at

slightly higher levels compared to 2015, but other fossil fuels will see their share decrease.

■ There will be significant energy efficiency improvements, driven mainly by policy up to 2020 and then by market/technology trends post-2020. Primary energy demand and GDP will continue to decouple.

■ Decarbonisation of the energy system progresses, but falls short of agreed longer-term climate objectives. Total GHG emissions are projected to be 26 per cent below 1990 levels in 2020, 35 per cent below by 2030 and 48 per cent by 2050. The share of renewables in the energy mix will continue to grow, from 21 per cent in 2020 to 24 per cent in 2030 and 31 per cent in 2050. It noted that biomass and bio-

waste will continue to dominate the fuel mix of EU domestic renewable production, although the share of solar and wind in the renewable mix will gradually increase from around 17 per cent in 2015 to 36 per cent in 2050.

■ Energy-related investment expenditures increase substantially until 2020, driven by RES and energy efficiency developments. Overall energy system costs increase from 11.2 per cent of EU GDP in 2015 to about 12.3 per cent of EU GDP by 2020, also driven by projected rising fossil fuel prices. They stabilise at such levels until 2030, and decrease thereafter, reaping the benefits of the investments made.

See page 12 for graphical data produced in the report

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During the summit – convened by a network of partners that represent over 6 million businesses worldwide – business leaders looked at the scale of action needed. It is estimated that \$90 trillion needs to be invested globally in cities, land use and energy infrastructure – doubling current global annual infrastructure investment – between now and 2030 to help secure a low carbon, climate resilient economy.



**Gulliver: we are much closer to being able to implement the terms of COP21**

Discussing low carbon finance and investment, Stuart Gulliver, Group Chief Executive Officer of HSBC, said: “Six months on from Paris we are much closer to being able to implement the terms of COP21 than we were at the start. The barriers to investment are lower, the call to action is louder and there is a clear willingness on the part of business and investors to change their ways and adapt their business models.

“Investors want to invest in sustainable projects and reduce the carbon footprint of their portfolios. With better standardisation, enhanced disclosure rules and better incentives for issuing green bonds, the COP21 goals can be met, but we must continue to work in unison and at pace with the public sector.”

Business also urged governments to translate their ‘Nationally Determined Contributions’ into investment grade policy frameworks as soon as possible and to use carbon pricing as most the efficient way of achieving emission reduction targets.

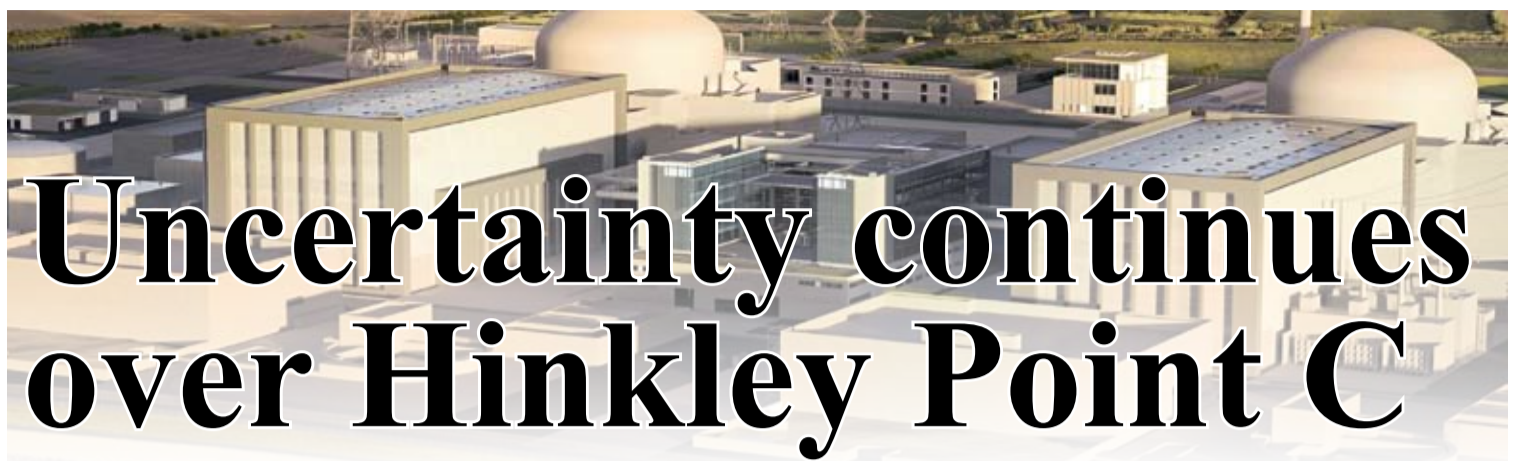
One highlight of the Beijing Ministerial meeting was the announcement that the European Commission is to step up its collaboration with China on emissions trading, with a new €10 million cooperation project.

The three-year project, which starts in 2017, will enhance EU-China cooperation on emissions trading and coincide with the launch of a nationwide carbon market in China, according to the EC.

As well as addressing challenges related to the setting up of a national emissions trading system, the new cooperation project will also establish a regular dialogue to discuss developments on emissions trading in China and the EU.

EU Climate Action and Energy Commissioner Miguel Arias Cañete said: “China is sending an important signal as we embark on our journey to implement the new global climate change agreement: that emissions trading is a cost-effective way to cut greenhouse gas emissions. The world’s second largest economy will be using emissions trading to reach its Paris pledge – and not in the distant future, but next year.

“With more than a decade of experience with the EU emissions trading system, the EU is well placed to support China. Cooperation between the two largest emissions trading systems in the world will send a strong signal to other countries as they prepare to implement their Paris commitments.”



# Uncertainty continues over Hinkley Point C

The future of the UK’s proposed Hinkley Point C nuclear power station remains uncertain even though EDF has finally approved the Final Investment Decision to build the plant.

Just hours after the plant won a narrow approval by EDF board members the UK government postponed a final decision until the early autumn.

The Final Investment Decision on the project had already been delayed by several years, putting it well behind schedule even before the start of construction. Hinkley Point C – the UK’s first new nuclear plant in 20 years, is scheduled to go online in 2025.

The delay in approving Hinkley Point had been largely due to concerns about the financial burden the plant will place on EDF as well technical concerns that have resulted in delays to the Flamenville project in France. Another plant of the same design in Olkiluoto Finland is also years behind

schedule and massively over budget.

Meanwhile, French unions have warned that EDF, which is 85 per cent owned by the French government, could be ruined by the cost of the £18 billion Hinkley C project. Others have also argued that the price the UK will pay for electricity is too expensive. The UK government has guaranteed a price of £92.50/MWh – more than twice the current market price – for the electricity Hinkley produces for 35 years. A recent assessment published by the UK government said the total lifetime cost of the power plant could be as high as £37 billion.

Following the news of the 10-7 vote by EDF board members, John Sauven, executive director of Greenpeace, said: “This deal was more riven with dissension in the EDF board than anyone expected. It’s unprecedented division and far closer than predicted. Countless experts have warned that for

British families this power station will be a terrible value for money. This is a bitter pill to swallow for hard up people who have been told that the government is trying to keep bills down while dealing with energy security and lowering carbon emissions.”

UK Business Secretary Greg Clark has now said the government will “consider carefully” before backing the project.

While the UK government’s delay may put a strain on political relations, the decision will be seen as sensible by many industry experts.

Nick Butler, visiting professor and chair of King’s Policy Institute at King’s College London, recently told the *BBC*: “The price of every other form of energy is falling. That includes gas, which is plentiful and wind and solar are both coming right down in price... We should step back and review it.” He warned of ‘being

locked into “a very high price for a very long time”.

Richard Black, director of the Energy and Climate Intelligence Unit (ECIU) commented: “With similar reactors in France and Finland seriously over time and over budget, France needs a Hinkley success if it’s to persuade anyone in the West that it’s still a serious player in the global nuclear industry.

“So it’s a risk worth taking for France; but is it for Britain?”

Just ahead of EDF’s board meeting Gerard Magnin, one of 18 board members, resigned, saying the Hinkley Point C project was “very risky”. He said: “Let’s hope that Hinkley Point will not drag EDF into the same abyss as Areva.”

EDF has net debt of more than €37 billion and planned to issue €4 billion worth of new equity later this year in order to shore up its balance sheet.

## Brexit threatens UK offshore wind

- Siemens re-assessing Hull expansion
- Dong “awaiting clarity”

### Junior Isles

The UK’s vote to leave the EU could threaten investment in offshore wind. This would be a blow to the UK and the entire offshore wind sector as Britain is the world’s biggest offshore wind market. It is expected to be worth £20 billion (\$27 billion) from 2010-2020, according to renewable energy industry body RenewableUK.

Despite the size of the market, however, the offshore wind industry is a difficult market to work in and the news that several players are re-assessing their future plans for the UK comes as no surprise.

Following the vote, German engineering giant Siemens said it was reconsidering plans for an expansion of its planned £160 million manufacturing plant in the port of Hull in north east England. A final investment decision on this move is due by the end of 2017.

Juergen Maier, the firm’s UK CEO, said that an existing blueprint to export offshore wind turbine machinery from the Hull hub was now up in the air.

He said: “Those plans were only beginning to happen and I expect that they will stall until we can work out exactly what the [new government’s] plan is, how we can participate in EU

research programmes, and until all the issues around tariffs and trade have been sorted out.”

“We definitely can’t wait until Article 50 has been triggered,” he said. “People will be holding off on major investment decisions and this is why we need to get together as soon as possible and see that a plan is put in place.”

Other offshore wind investors, including Britain’s SSE and Sweden’s Vattenfall, also said the vote had increased uncertainty and therefore investment risks. Dong Energy, the single biggest investor in UK offshore wind, said it would “await clarity” over the implications of the vote to leave the

European Union”.

Richard Slark, director at energy consultancy Poyry, said: “I believe we are looking at a 2-3 year hiatus in those large-scale energy projects where financing would be international.”

Some industry observers, however, are more upbeat believing that Brexit may provide a boost for UK renewables.

Planning experts at legal firm Pinsent Masons say that EU over-regulation which stifles new onshore and offshore wind developments could be watered down, while removing State Aid rules could encourage greater manufacturing of the infrastructure required for renewable projects.

## Germany reforms renewables law

Germany’s parliament approved a plan to reform the country’s renewable energy law by ending feed-in tariffs in favour of competitive auctions.

The reform, expected to come into effect in January 2017, is aimed at improving planning security for industry players and the government believes it will also help limit costs to economically necessary levels.

While the share of renewables will be the same as set out in the 2014 EEG, only renewables installations that have won a tender will receive payments for the power they supply. Each renewable technology (photovoltaics, onshore wind, offshore wind, biomass) will have a tailored auction design although installations smaller than 750 kW (150 kW for biomass) will not be part of the auction system.

In addition, under the new EEG 3.0

a “deployment corridor” has been established that specifies how much renewable capacity will be built each year.

The deployment corridor for photovoltaics installations plans an additional capacity of around 2.5 GW per year, while the annual capacity volume to be auctioned is 600 MW. Remaining additions will come from small installations.

Lawmakers set the cap on annual auctions for onshore wind at 2.8 GW. Fluctuating tenders are now offered for offshore wind in order to control renewables installations over the next decade. The limit for onshore wind is expected to increase after 2020 to 2.9 GW a year. The offshore cap, which will apply from 2021-2030, will vary from year to year to ensure that Germany reaches its 15 GW wind energy

target in the next 15 years.

The annual caps also include repowering – the process of replacing old turbines with new, higher capacity models. This will be an important topic for Germany in the near future as one of Europe’s most mature markets and as wind assets come to the end of their life cycles.

Giles Dickson, Chief Executive Officer of WindEurope, said: “For onshore wind, the reforms set out clear volumes for wind energy deployment toward 2020 and beyond. This gives the industry a degree of certainty on investments and the opportunity to plan into the future.

“The same cannot be said for offshore where there is a lack of stability in the volumes. The build-out rate after 2020 will be uneven as the auctions vary in size from year to year.

The volumes are also less ambitious than other Member States such as the UK, which has committed to 1 GW a year to 2030 and the Netherlands, which will tender 1.4 GW this year and then a further 700 MW each year to 2020.

“The shift from feed-in tariffs to tenders is a trend we are seeing across Europe. Germany’s move was to be expected as Member States bring their support schemes into line with the European Commission’s state aid guidelines.”

Dickson added: “One of the biggest challenges facing Germany today is a lack of transmission infrastructure. Lawmakers must find a way to ensure that power generated in northern Germany from renewables such as onshore and offshore wind can be transferred to the power-hungry South.”

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# California makes solar strides

California has pioneered the creation of a low carbon grid but a plan to expand the ISO's operations could threaten the progress it has made in green energy, critics say.

Siân Crampsie

Environmental groups have warned against proposals to expand California's electric grid by integrating it more closely with other western states in the USA.

The California Independent System Operator (Cal-ISO) says that expanding its operations would reduce costs for consumers and help the state to achieve its goal of 50 per cent renewable energy by 2030.

Critics of the proposals, including the Sierra Club, say that the plan would include adding resources of PacifiCorp., which operates across the western USA and includes coal plant in its portfolio.

"Linking California's energy market with coal-heavy PacifiCorp. will increase coal pollution and could extend the lifespan of PacifiCorp.'s old and dirty coal plants for years to come," said Kathryn Phillips, director of Sierra Club California.

"If we don't do this right, it could undercut the incredible clean energy

and climate progress California has made," she added.

In a recent study, Cal-ISO said that its proposed expansion would save consumers \$1.5 billion. "The studies' conclusions mirror the preliminary results showing the benefits of expanding the ISO market, advantages we predict will only grow over time," said Steve Berberich, Cal-ISO's chief executive. "We believe the findings in these studies will help drive the formation of a new, more efficient, cost-effective, and greener Western electric grid."

In July Cal-ISO announced that renewables, for a short time, had met over half of California's electricity demand in mid-May. Total installed renewable energy capacity in California stands at 18 718 MW, including 8600 MW of solar.

Under Cal-ISO's proposal, PacifiCorp. would become a full participant in California's electricity market, joining Southern California Edison, Pacific Gas & Electric and San Diego Gas & Electric.

That would extend Cal-ISO's role as a manager of electricity beyond just California's borders into other states, including Oregon, Washington, Wyoming, Utah and Idaho.

Cal-ISO and PacifiCorp. promise lower electric rates from the deal and say it would make it easier to manage all of the new clean energy that would need to be developed to meet California's 50 per cent mandate.

In mid-July, solar power production in California hit a new record of 8030 MW – almost twice the amount of solar energy produced in mid-2014 and nearly 2000 MW higher than in May 2015.

"This solar production record demonstrates that California is making significant strides forward in connecting low carbon resources to the grid in meeting the state's goal of reaching 33 per cent renewables by 2020," said Berberich.

"California continues to lead the nation in adding clean resources to the system and writing a playbook for operating a low carbon grid."

# Cuba plans modernisation

A sharp rise in energy consumption and the prospect of energy rationing has highlighted the need for investment in Cuba's power system.

Official data shows that power consumption in the country rose by nearly five per cent in 2015, while a cash crunch and declining oil imports from Venezuela has forced the government to announce cuts to electricity and fuel consumption.

Many workers in the state sector have had their hours cut due to power rationing, *Reuters* has reported. Overall, power consumption grew by 32 per cent between 2005 and 2015.

The demand growth is being driven by the residential sector as well as the hospitality sector, with tourists being drawn to the country after its relations with the USA improve.

Last month Siemens signed a memorandum of understanding with Unión Eléctrica (UNE), the Cuban state-owned utility, designed to assist with the modernisation effort and build a closer technical cooperation between Germany and the Cuban state in matters of energy.

Under the terms of the agreement, Siemens and UNE will agree on the development of projects and services within the power generation, transmission and distribution, renewable energy and automation sectors. In recent weeks, both companies have been evaluating the current system and developed a country energy concept including recommendations on the development and optimisation of Cuba's power generation infrastructure and mix, Siemens said.

Havana: growing tourism is helping drive energy consumption



# IRENA and IDB assist renewable projects

Six renewable energy projects across Latin America and the Caribbean have qualified for technical assistance funds from IRENA and the Inter-American Development Bank (IDB).

The \$300 000 award will be distributed to projects in Argentina, Colombia, El Salvador, Haiti, Honduras, and Mexico and will assist the funding of a range of studies to advance their development.

IRENA and IDB said that they received 76 project proposals from 16 different IDB member states for

funding consideration. Proposals were submitted via the Sustainable Energy Marketplace platform, a virtual platform developed by IRENA that gives renewable energy project developers and investors a simple way to connect.

Projects that will be supported include a distributed solar photovoltaic (PV) generation with storage in Argentina, PV systems in educational institutions in Colombia, a wind power project in El Salvador and solar microgrids in Haiti.

# State bill sets ambitious renewables targets

■ Targets boost offshore wind ■ Fresh delays for Cape Wind

The US state of Massachusetts looks set to implement a series of ambitious renewable energy targets after the state senate passed a new energy bill.

The bill calls for electricity distribution companies to solicit long term contracts for at least 2000 MW of offshore wind by 2027. It also includes a more ambitious renewables portfolio standard (RPS) for retail energy suppliers, requiring them to purchase more onshore wind, solar, anaerobic digestion and energy storage.

"This bill puts the Commonwealth on a path to obtaining a clean energy future by establishing procurement goals for hydropower and wind energy, encouraging municipalities and consumers to increase use of zero emission vehicles, requiring home energy ratings for consumers when purchasing a home, and establishing a taskforce to develop a successor to the MassSave program to increase energy efficiency," said Senate President Stanley C. Rosenberg.

The bill was offered as an amendment to the energy bill passed by the state

house of representatives in June, which called for 1200 MW of long-term offshore wind contracts. The two versions will now be reconciled, and could put Massachusetts on track to reach an energy mix of 37 per cent renewables by 2030.

The bill would also help to kick-start the USA's nascent offshore wind energy sector, including the much-delayed Cape Wind project off the coast of Massachusetts.

Cape Wind is facing new delays to its 468 MW Nantucket Sound project after a federal appeals court ruled that regulators had not complied with environmental laws in granting its permits.

A three-judge appeals court in July overturned earlier rulings made by lower courts that had found regulators complied with environmental and endangered species laws in permitting the 130-turbine Cape Wind project.

Cape Wind said it was satisfied with the ruling and that it would return to the permitting processes that the appeals court said was insufficient.

Other offshore wind projects are moving forward, however, including the Block Island wind farm off the coast of Rhode Island, which is being developed by Deepwater Wind.

Last month GE announced it was completing the manufacturing of its first commercial series of Haliade offshore wind turbine nacelles, destined for Block Island.

Installation of the Haliade turbines at the 30 MW Block Island project will start in August, GE said. The project is scheduled to be completed this year, according to Deepwater Wind.

■ The USA is now the most attractive market for onshore wind energy in the world, according to Macquarie. While renewables incentives have been reduced in many markets, an effective seven-year extension to the production tax credit has increased visibility in the market, Macquarie said in a research note. In addition, development of the USA's transmission infrastructure will alleviate curtailment and enable development in high wind areas that were previously unviable.



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 Prof. Ali Sayigh Director General of World Renewable Energy Network (WREN)	 Rainer Hieshah Bahmet Vice President European Renewable Energy Federation (ERE)	 Professor John Boland Alphatech University of South Australia	 Dr. Jozsef Csoszdy Project Manager Winn Technology Corporation	 Professor Xiangjiang Thai Institute of Information & Computer Science Shanghai Jiao Tong University	 Lorena Aguilar Senior Advisor International Union for Conservation of Nature (IUCN) Gender Programme
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and many more

#### 5<sup>th</sup> IRES SPEAKERS

 Sudirman Said Minister of Energy and Mineral Resources	 Marwan Jafar Minister of Energy, Development of Equatorial Area and Transmigration	 Mohammad Naji Minister of Higher Education and Research and Technology	 Siti Nurhayati Minister of Environment and Forestry	 Ferry Muryawan Salsan Minister of Agrarian and Spatial Planning	 Baski Hasmudjaja Minister of Public Work and Housing
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# South Korea plans massive renewables investment

- Renewable targets increased as coal plants to close
- Businesses to explore overseas markets

Syed Ali

South Korea plans to invest a combined 42 trillion won (\$36.6 billion) in the renewable energy sector by 2020, according to the Ministry of Trade, Industry and Energy.

The decision to raise renewables quotas is part of a carbon reduction drive and comes as the government said it will also close 10 coal plants that are older than 30 years when their operational lifespan ends.

The renewables investment will allow the ministry to increase the amount of renewables under its sched-

uled Renewable Portfolio Standard (RPS) to 5 per cent in 2018 from a previous target of 4.5 per cent. The amount will increase to 6 per cent in 2019 and to 7 per cent in 2020, up from earlier goals of 5 per cent and 6 per cent, respectively.

The ministry said individuals would also be allowed to sell the electricity produced from their own solar panels, while large commercial buildings will also be permitted to install up to 1000 kW of solar capacity.

A detailed plan will also be drawn up to allow renewable energy businesses, including energy storage system

companies, to participate in the energy exchange market to attract more investment into the sector. In the current market arrangement, only Korea Electric Power Corp. (Kepeco) is allowed to buy and distribute electricity in the country.

"The government will lift unnecessary regulations and increase government support to foster the renewable energy sector," said Chae Hee-bong, Deputy Trade Minister for Energy and Resource Policies, in a press briefing. "It will also help those businesses explore overseas markets."

Kepeco recently said it aims to

increase the amount of exports to \$15 billion by the end of this year.

Under Kepeco's plan to facilitate exports, the company will double investment in research and development of its affiliated companies from 1 billion won (\$863 530) to 2 billion won. It also plans to create an online data service e-Market Hub, in association with the state-run KOTRA, providing corporations with information on the electricity market in other countries.

The electricity corporation also plans to inject 20 billion won to nurture 100 new start-ups.

## Taiwan looks offshore

Taiwan's Environmental Protection Administration (EPA) has approved a strategic environmental assessment (SEA) on offshore wind energy development in an important move toward developing its renewable energy sources.

In order to accelerate wind power development, the Bureau of Energy now calls for potential wind farm developers to obtain environmental approval by 2017, while an SEA on national wind energy development is needed as a basis for reviewing individual development projects.

The SEA review is aimed at establishing such a basis and clearing the path for commercial-scale wind farms. The SEA committee has earmarked 36 sites with large offshore wind power potential. Most sites are off the coasts of central Taiwan, and 60 per cent are in waters off Changhua County.

The government aims to increase the amount of renewable power generation to 20 per cent of the generating mix by 2025. Wind power is expected to make up about 40 per cent of renewable energy generation.

## Australia cabinet reshuffle aligns environment and energy

Australia's Clean Energy Council (CEC) says Prime Minister Malcolm Turnbull's Cabinet reshuffle and the alignment of the Environment and Energy portfolios is a smart step forward that recognises the significant policy relationship between the energy sector and Australia's climate change commitments.

Josh Frydenberg will now head the expanded Environment and Energy portfolio. Greg Hunt, the Environment Minister, will now move to Industry, Innovation and Science.

CEC Chief Executive Kane Thornton said combining the energy and environment portfolios made a lot of sense and the industry looked forward to working with Minister Frydenberg

to continue to transition Australia's energy sector.

"Australia has a big challenge and opportunity in transitioning its energy sector to a cleaner, more modern system, and it's critical that climate policy and energy policy are all pulling in the same direction," Thornton said. "Australia has some of the oldest and highest-polluting electricity generation in the world, and clear and coordinated policy is crucial to attract private investment in clean energy and deliver a reliable and low-cost energy supply."

"This can deliver billions of dollars in investment and tens of thousands of jobs into the future with the right policy settings."

## Philippines looks for balanced energy mix

The new head of the Philippines Department of Energy (DOE) says the country will need both coal and renewable energy (RE) to meet its power needs.

Following his swearing-in ceremony as Energy Secretary, Alfonso Cusi said: "We lack capacity for dependable power. We can't just merely rely on renewables for now... we cannot just discount coal."

Under the previous administration, former President Benigno Aquino III was targeting a fuel mix of 30 per cent from coal, 30 per cent from RE, 30 per cent from natural gas, and the remaining 10 per cent from oil-fired power plants.

The fuel mix goal was aimed at

reducing the country's dependence on coal, and Environment Secretary Gina Lopez has been campaigning against coal mining and the use of fossil fuels.

The current Duterte administration, however, is looking to review current energy policies to create a policy framework that would stimulate balanced energy investments.

"Coal is more dependable and a more reliable source for baseload [power] than renewables. We can't be dependent on just a single source," Cusi said.

According to DOE data, 70 per cent of the 5000 MW of generating capacity that will be built by 2020 is coal-based.

## Bangladesh makes progress on power projects

- Ghorashal Unit 3 conversion to combined cycle
- Malaysia to build 1320 MW coal fired plant

Syed Ali

The Bangladesh power sector received a boost with the award of contracts to build two power plants that will help fulfil its commitment to bring power to all by 2021.

In July Bangladesh Power Development Board awarded a \$117 million contract to a consortium led by GE for repowering of Unit 3 of Ghorashal power plant, the largest power station in the country. The US-based company has formed the consortium with China National Machinery and Equipment Import and Export Corporation.

The project will see the replacement of an old gas fired boiler with a gas turbine and heat recovery steam generator to transform the existing plant to a 416 MW combined cycle plant. The station's existing steam turbine will also be retrofitted with GE's advanced reaction design steam turbine to suit the new steam parameters.

According to GE, this will be the country's first repowering project and will increase the generating capacity of the existing plant by more than 200 MW.

Deepesh Nanda, CEO of GE for South Asia, said in a statement. "GE

is proud to be a partner in building and expanding the power generation infrastructure of Bangladesh and is committed to helping the country achieve its energy goals of providing electricity to all by 2021."

The announcement came as Bangladesh confirmed that Malaysia would be responsible for developing a \$2.5 billion (RM10.1 billion) 1320 MW coal fired power plant in Maheshkhali, Cox's Bazar, Bangladesh.

Bangladesh State Minister for Power, Energy and Mineral Resources, Nasrul Hamid announced the decision when visiting Malaysian Prime Minister Datuk Seri Najib Tun Razak in Putrajaya, Malaysia.

Special Envoy for Infrastructure to South Asia, Datuk Seri Utama S. Samy Vellu, said Najib has expressed the government's gratitude to the Bangladeshi government for awarding the project on a government-to-government understanding.

"It's final. The Bangladesh Cabinet made the decision to award the project to the Malaysian government. Now, a Malaysian consortium will implement the project but it will do a feasibility study first," he said in a statement in Kuala Lumpur.

In 2014, Malaysia and Bangladesh signed a government-to-government memorandum of understanding (MoU) to implement the project. This paved the way for the Malaysian consortium to finance and build the power plant with the Bangladesh Power Development Board (BPDB). The Malaysian consortium and BPDB would have an equal equity shareholding in the power plant with a concession period of 21 to 25 years.

Samy Vellu said if the parties decided to go ahead with the project after the completion of the feasibility study, they will form a joint venture (JV) company and launch an international tender to appoint the engineering procurement and construction (EPC) contractor.

He said the project would be developed on a non-recourse financing basis and the JV would sign a long-term power purchase agreement with BPDB as the sole off-taker of power.

The feasibility study is expected to be completed within 6-9 months. This will be followed by a tender for the EPC contract, which is expected to take 3-6 months. Following financial close in 9-12 months, construction would take four years, said Samy Vellu.

# Brexit vote brings uncertainty to energy policy

One of the tasks of the new UK government must be to reassure energy sector investors, the industry has said.

Siân Crampsie

The UK's new government has made reassurances that the country will continue to be a leader on international climate change in the wake of the vote to leave the EU.

The new Prime Minister, Teresa May, told her Conservative MPs that continuing to implement strategies for a low carbon economy would be important because important trading partners in the post-Brexit world, such as India, China and the USA, were making huge investments in clean energy.

However, amid the political turmoil, investors are seeking reassurances about policy, stability and growth in the country's energy sector as a whole.

One of May's first steps as Prime

Minister was a cabinet reshuffle that saw the abolition of the Department of Energy and Climate Change (DECC), and the creation of a new government cabinet post covering Business, Energy and Industrial Strategy (BEIS), led by Greg Clark.

"The disappearance of DECC as a stand-alone government department will of course raise concerns that the UK is going to 'go soft' on climate change," commented Richard Black, director of the Energy and Climate Intelligence Unit (ECIU). "Greg Clark is an excellent appointment. He understands climate change, and has written influential papers on the benefits of Britain developing a low-carbon economy."

"Importantly, he sees that economic growth and tackling climate change are bedfellows not opponents – and now

he has the opportunity to align British industry, energy and climate policy in a way that's never been done before."

Paul Barwell, CEO of the Solar Trade Association, said: "It is a great shame that a department directly focused on the critical issues of energy and climate change is to close, but a joined up business, industrial strategy and energy approach could provide huge opportunities for solar in the UK, as can be seen in many countries across the world."

Black added that one of the most pressing tasks for the new government would be to restore the confidence of energy investors. "They're demanding consistency, transparency and long-term planning – and over the last year, they haven't had it," said Black.

Experts have also warned that the UK needs to consider how best to operate

its energy system within Europe but outside the EU in both legal and practical terms. Some 100 000 pieces of legislation need to be reviewed in the wake of Brexit, according to legal firm Norton Rose Fulbright. The latest market report from ICIS, meanwhile, indicates that gas and power prices for the forthcoming winter have already risen due to the collapse in value of the pound.

ICIS analysts have warned that because the UK is a net importer of gas and coal, which are traded in dollars, any prolonged post-Brexit sterling devaluation could lead to higher energy prices in the long term.

Environmental groups were reassured at the end of June when the government approved the fifth carbon budget, which spans 2028-2032, and which would see greenhouse gas

emissions in the UK cut by 57 per cent compared to 1990 levels.

The fifth carbon budget was recommended by the Committee on Climate Change and will set the UK on course to ensuring it meets its legally binding target of reducing carbon emissions by 80 per cent by 2050 compared to 1990 levels. The fourth carbon budget, covering 2023 to 2027, sets out a 52 per cent reduction.

RenewableUK said that the implementation of the fifth carbon budget was "especially welcome given the uncertainty caused by" Brexit. "It's a clear signal that the UK will continue to show bold leadership on carbon reduction. This will allow investment to continue to flow into renewable energy projects throughout the UK," said Hugh McNeal, RenewableUK's Chief Executive.

## Dutch tenders force price fall in offshore wind

- New zones to be tendered from 2017
- Dong sets record with Borssele bids

The Dutch government has identified two areas for new offshore wind farm development in a bid to boost renewables capacity and reach its target of 16 per cent renewable energy in the country's energy mix by 2023.

The Hollandse Kust Zuid (South) and Hollandse Kust Noord (North) offshore wind zones could result in the addition of 2.1 GW of new capacity to the Dutch grid.

Hollandse Kust Zuid, covering 356 km<sup>2</sup> in total, will be divided into four sites, each capable of accommodating 350 MW of offshore wind capacity, while Hollandse Kust Noord will consist of two 350 MW sites. Tenders for

the sites will be released between 2017 and 2019.

Competitive offshore wind tenders in the Netherlands have played a key role in reducing the costs of offshore wind.

Last month Dong Energy said it had won the concessions for the Borssele I and II wind farms with an average bid strike price, excluding transmission costs, of €72.70/MWh. There were a total of 38 bids for the concessions, according to Dutch media.

Dutch Minister of Economic Affairs, Henk Kamp, said: "Worldwide it has never happened before that an offshore wind farm can be built at such

low cost. The Dutch system in which companies have to compete with each other while the government regulates all conditions for building the wind farm has proven very successful.

"This reduction of cost represents a major breakthrough in the transition to more sustainable energy."

Executive Vice President and Head of Wind Power at Dong Energy, Samuel Leupold, said: "With Borssele 1 and 2, we're crossing the levelised cost of electricity mark of €100/MWh for the first time and are reaching a critical industry milestone more than three years ahead of time. This demonstrates the great potential of offshore wind."

## Bouchain breaks world record

A new power plant in France has entered the *Guinness Book of World Records* as being the world's most efficient combined cycle power plant.

The 605 MW Bouchain power plant consists of a GE 9HA.01 gas turbine, D650 steam turbine, W86 generator and a CMI boiler. It started operating in June as part of EDF's fleet and its record 62.22 per cent efficiency was verified by experts Bureau Veritas.

Joe Mastrangelo, President and CEO, GE Power Gas Power Systems, said: "On the efficiency side, the team has been working on this for more than six years. The results were verified under ISO conditions during the commissioning testing. It's a milestone for EDF and GE as well as France. But 62.22 [per cent] is the beginning... we have technology programmes that will carry that efficiency above 63 [per cent] with a march to 65 [per cent] by

the beginning of the next decade."

CMI said that it designed and delivered a heat recovery boiler able to meet the needs of GE's 9HA gas turbine technology, including the ability to generate significantly higher temperatures, outputs and pressures than usual, as well as the flexibility requirements of the market.

Built on a former coal plant site, the Bouchain power plant has been designed to meet the dual challenges of flexibility and efficiency for 50 Hz systems in a European context of intermittent renewable energies. Subject to frequent starts and stops, the power train is able to reach its maximum power in less than 30 minutes.

According to GE, the plant will operate for 2500-3000 h/year, making over 100 starts. It will produce 50 per cent less carbon emissions than the former coal fired plant.

## Vattenfall will fully fund EOWDC

Vattenfall has underlined its commitment to offshore wind with a deal to invest more than £300 million in Scotland's largest offshore wind test and demonstration facility.

Vattenfall has been developing the European Offshore Wind Deployment Centre (EOWDC), also known as the Aberdeen offshore wind farm, with partner Aberdeen Renewable Energy Group, and last month gave the green light to fully fund the innovative

92.4 MW, 11 turbine project.

Vattenfall will acquire the Aberdeen Renewable Energy Group's 25 per cent share for an undisclosed sum and become the 100 per cent owner of Aberdeen Offshore Wind Farm Limited (AOWFL), the company behind the European EOWDC.

The deal was announced just a week after AOWFL announced that it had selected MHI Vestas Offshore Wind to supply the wind turbines for the

project, located in Aberdeen Bay.

The £300 million EOWDC project will test and demonstrate cutting-edge offshore wind technology and will play a key role in industry efforts to cut the costs of offshore wind energy.

"Vattenfall's green light for the EOWDC underlines our long term ambition to grow our wind power capacity, including in the UK," said Gunnar Groebler, Senior Vice President and Head of Business Area Wind

at Vattenfall. "The UK government believes that wind power should continue to provide an essential part of the UK's low carbon electricity generation mix and so we remain committed to expanding our UK operations. In particular, we are confident that the new UK and Scottish governments will continue to support growth in offshore wind as the industry lowers the cost of energy significantly."

EOWDC is due to start operating in

2018, after preparatory offshore works started off Aberdeen Bay earlier this year. Boskalis has been named the preferred offshore balance of plant (BoP) contractor for the construction and installation (EPCI) of the offshore infrastructure including the foundations and cabling, while engineering and infrastructure specialist Murphy & Sons has been named as preferred bidder to provide the onshore substation and associated cabling work.

# Cost reductions drive solar uptake

- World Bank, ISA mobilise investment
- Masdar, EDF plan Abu Dhabi solar bid

| Siân Crampsie

The international solar industry is poised for massive expansion thanks to dramatic cost reductions achieved by the sector in recent years.

The International Renewable Energy Agency (IRENA) says that the share of global electricity generated by solar photovoltaics (PV) could increase from two per cent today to as much as 13 per cent by 2030.

In a new report, IRENA shows that solar PV is the most widely owned electricity source in the world in terms of number of installations, and its uptake is accelerating. It also notes that in 2015 and 2016, new record low tariffs were set in auctions for solar capacity in the Middle East and South America.

"Recent analysis from IRENA finds that cost reductions for solar and wind will continue into the future, with further declines of up to 59 per cent possible for solar PV in the next ten years," said IRENA Director-General Adnan Z. Amin.

"This comprehensive overview of the solar industry finds that these cost reductions, in combination with other enabling factors, can create a dramatic expansion of solar power globally. The renewable energy transition is well underway, with solar playing a central role," he added.

In June, the World Bank signed an agreement with the International Solar Alliance (ISA), consisting of 121 countries and led by India, to collaborate on increasing solar energy use around the world, with the goal of

mobilising \$1 trillion in investments by 2030.

The World Bank has also announced that it planned to provide more than \$1 billion to support India's ambitious initiatives to expand solar through investments in solar generation.

"India's plans to virtually triple the share of renewable energy by 2030 will both transform the country's energy supply and have far-reaching global implications in the fight against climate change," said World Bank Group President Jim Yong Kim. "Prime Minister Modi's personal commitment toward renewable energy, particularly solar, is the driving force behind these investments."

According to IRENA, solar accounted for 20 per cent of all new power generation capacity in 2015. In the last five years, global installed capacity has grown from 40 GW to 227 GW, and that figure could reach up to 2500 GW by 2030.

Solar PV regularly costs 5-10 US cents/kWh in Europe, China, India, South Africa and the United States. In 2015, record low prices were set in the United Arab Emirates (5.84 cents/kWh), Peru (4.8 cents/kWh) and Mexico (4.8 cents/kWh). In May 2016, a solar PV auction in Dubai attracted a bid of 3 cents/kWh.

These record low prices indicate a continued trend and potential for further cost reduction, IRENA says. Solar PV also represents more than half of all investment in the renewable energy sector, it notes in the report, 'Letting in the Light: How Solar Photovoltaics Will Revolutionize the

Electricity System'.

According to the report, in 2015, global investment reached \$67 billion for rooftop solar PV, \$92 billion for utility-scale systems, and \$267 million for off-grid applications.

Further evidence of falling costs was revealed in June when Masdar and EDF said they would jointly bid to build a 350 MW solar power plant in Abu Dhabi.

The partners indicated that they would make their bid "as competitive" as the record low offer that won Masdar the right to build a new solar facility in Dubai. Masdar is currently in talks with at least three local banks to raise \$800 million for that project, according to local reports in June.

"World electricity demand is expected to grow by more than 50 per cent by 2030, mostly in developing and emerging economies," said Amin. "To meet this demand while also realising global development and sustainability goals, governments must implement policies that enable solar to achieve its full potential."

Reaching a 13 per cent share of global electricity by 2030 will require average annual capacity additions to more than double for the next 14 years. This increase could be achieved if governments updated their policies based on the latest innovations.

The report also recommends increased government support of continued research and development activities, the creation of a global standards framework, market structure changes, and the adoption of enabling technologies like smart grids and storage.

# Mainstream accelerates Lekela build-out



O'Connor: developing Africa's power infrastructure is one of the greatest challenges of our time

Mainstream Renewable Power says it will be able to accelerate the construction of 1300 MW of renewable energy capacity across Africa after gaining financial backing from the International Finance Corporation (IFC).

Mainstream's Lekela initiative, a joint venture with Actis, is building wind and solar farms in Egypt, Senegal, South Africa and Ghana. It has signed a \$117.5 million equity investment from investors including the IFC, the IFC African, Latin American and Caribbean Fund (ALAC) and the IFC Catalyst Fund, two funds managed by IFC Asset Management Company, Ascension Investment Management and Sanlam.

The funding package will help Lekela meet its goal of constructing over 1300 MW of badly needed new power capacity in Africa by 2018.

Eddie O'Connor, Mainstream CEO,

said: "Developing Africa's power infrastructure, giving millions of people access to power and enabling the continent's economic growth is one of the greatest challenges of our time."

"Renewable energy is the quickest and most cost effective solution to achieve this and Mainstream is dedicated to being the leading vehicle in delivering this on the ground."

Lekela is helping to fulfil the objectives of a series of key international initiatives, including the Obama Administration's Power Africa and the UN's Sustainable Energy for All, which seeks to achieve universal access to power by 2030.

Energy poverty has been recognised as one of the key challenges for Africa, with an estimated two thirds of people in Sub-Saharan Africa having no regular access to electricity.

# Gas holds its own in world of growing renewables

- Emerging economies and power sector drive demand
- Gas squeezes out coal and oil as green goals pursued

Natural gas will continue to play a key role in energy systems as renewable energy capacity grows worldwide, according to Cedigaz, the International Association for Natural Gas.

In its 'Medium and Long Term Natural Gas Outlook 2016', Cedigaz says that the growth of natural gas in energy systems will be driven by the implementation of energy and environmental policies aiming to shift away from coal and oil to cleaner fuels within the context of a gradually

decarbonising electricity system.

Cedigaz believes that primary energy growth will be moderate at one per cent per year to 2035 thanks to increased energy efficiency. Natural gas will be the fastest-growing fossil fuel over this period, with demand increasing at 1.6 per cent per year, driven by emerging markets where natural gas is making substantial inroads in power generation and industry.

In this scenario, natural gas will increase its relative share in the global

primary energy supply from 21.4 per cent in 2013 to 23.9 per cent in 2035. The power sector will be the main powerhouse behind gas expansion, particularly in markets such as China, the US, Russia, the Middle East and Africa.

In its projections, Cedigaz says it has taken into account countries' INDCs released ahead of COP21 in Paris last year. Greater efforts to deploy renewables and the use of increasingly efficient technologies means that the pace

of natural gas demand growth has been revised downwards compared with Cedigaz's projections released in 2015.

In Europe in particular, the 2030 Climate & Energy Package leaves little room for gas demand growth in volume terms. However, the share of gas in the power generation mix progresses at the expense of coal against the background of the rise of renewables, according to the report.

Cedigaz says that in the future, virtually all of the additional energy is

consumed in emerging economies and 85 per cent of gas growth comes from emerging economies. The US is the only industrialised market to record a significant growth in gas consumption in volume terms, thanks to the competitiveness of shale gas and the adoption of the Clean Power Plan. China and the Middle East lead the way in gas demand growth, accounting for respectively 27 per cent and 25 per cent of the incremental volume over the projection period.



# Firms build new energy storage ventures

Growing demand for energy storage solutions is leading battery technology and renewable energy companies to work together to capitalise on new opportunities.

| Siân Crampsie

In a sign of growing industry collaboration, ViZn Energy Systems and Alpha Energy have signed a strategic partnership to address the growing market for utility-scale solar energy systems coupled with energy storage.

Alpha Energy is a developer of turnkey renewable energy projects, while ViZn provides zinc and iron chemistry-based flow battery energy storage systems for utilities and microgrids.

The two companies will combine their expertise to offer turnkey energy storage solutions for large behind-the-

meter, grid-edge, and utility-scale front-of-the-meter applications.

According to Bloomberg New Energy Finance, the solar+storage market is expected to attract \$250 billion of total investment by 2040.

“ViZn Energy has engineered a very versatile flow battery that is able to perform both high power and long duration applications,” said Tom Bowker, Alpha Energy’s Director of Business Development. “Their unique, robust system can scale up from less than 100 kW to over 100 MW and its 20-year expected lifetime will provide competitive ROI, making it a great fit

for renewable energy projects that combine energy storage with solar, wind, or both.”

As part of its partnership with ViZn, Alpha will market and deploy a complete solution, including the battery, power conversion system and controls, integration and installation, project finance alignment, and ongoing asset management.

“We spent considerable time researching potential partners to create a turnkey energy storage system that can be easily commissioned and executed in the field,” said David Mintzer, Vice President of Business Development at

ViZn Energy. “Alpha Energy’s long track record of successful energy deployments that supply industrial-grade power solutions made them a natural choice to work with as we target the North American, European, and Latin American/Caribbean markets.”

Last month Sungrow, the world’s largest PV inverter manufacturer, announced the official start of operations at Sungrow-Samsung SDI Energy Storage Power Supply Co. Ltd., its new, \$170 million joint venture with Samsung.

The joint venture will provide complete energy storage system (ESS)

solutions incorporating lithium batteries, power conversion systems (PCS) and energy management systems (EMS) that can reach an annual capacity of up to 2000 MWh. It has already landed two contracts – a 10 MWh system and an 8 MWh system – Sungrow said.

The joint venture is a key part of Sungrow’s plans to expand its business. “Sungrow has always been committed to technical innovation, and we have strong faith in our ability to build benchmarks in the global energy storage market,” said Professor Renxian Cao, President of Sungrow.

## EDF moves in on wind in China

EDF has acquired a majority stake in UPC Asia Wind Management (AWM) in a bid to become a leading European player in the Chinese wind energy market.

AWM develops and builds wind energy projects in China. It operates 174 MW of wind energy capacity and is currently building a further 130 MW. It also has just over 1 GW of wind energy capacity under development, EDF said.

EDF has bought an 80 per cent stake in AWM. US investment fund Global Environment Fund (GEF) will retain a 20 per cent share.

EDF has identified China as a key growth market for its renewable energy business. It already has nuclear, thermal and hydropower operations in the country. “Our goal is to accelerate our low-carbon generation, with a diversified energy mix where nuclear and renewable energy balance each other,” said EDF’s chief executive Jean-Bernard Levy in a statement.

“Our development in high-potential markets, such as China is a full part of this dynamic process. This country where we have been present for more

than 30 years, is providing to the Group significant growth opportunities and we are delighted to boost our presence in renewable energy sources.”

Antoine Cahuzac, director general of EDF’s renewable energy division EDF EN added: “With the deal we are the premier European operator to set up in China, in what is an extremely promising market.”

China is targeting an installed wind energy capacity of 200 GW by 2020, requiring it to add an average of 15 GW of new capacity each year. EDF is aiming to install 200-300 MW per year in China, it said.

EDF’s acquisition of Hong Kong-based AWM brings its global installed wind energy capacity to over 10 GW.

EDF’s recently announced plan to strengthen its balance sheet is a positive move but carries execution risks, Moody’s has said. The ratings agency said that EDF’s plans would help improve its financial profile but would not fully offset the pressures from lower power prices, which are combined with a significant investment programme.

## Wärtsilä brings Greensmith on board

Wärtsilä has further strengthened its portfolio with a cooperation agreement with Greensmith Energy, a provider of energy storage software and integration services.

The agreement will give Wärtsilä access to Greensmith’s GEMS platform, the world’s most widely-deployed and proven energy integration software for grid-scale, behind-the-meter, and micro grid storage developments.

The move by the Finnish company follows its April announcement that it would add utility-scale solar plants of above 10 MW to its portfolio.

The move into solar has also enabled the firm to start offering solar-diesel hybrid power plants by coupling solar farms with its flexible Smart Power Generation power plants.

“Considering the market trends and our vision of being the best overall energy solutions provider, this partnership is a natural, yet significant step for

us in becoming an even more attractive market player,” said Javier Cavada, President, Wärtsilä Energy Solutions.

The combination of Smart Power Generation, solar PV and Greensmith’s integration capabilities will provide sustainable, reliable, and affordable power – particularly in countries and regions with limited or small-scale electricity grids, Wärtsilä said.

“We selected Greensmith Energy as a technology partner because of their extensive industry know-how and expertise in delivering safe and reliable grid-scale system integration solutions,” Cavada said.

Wärtsilä said in April that it would focus its solar PV efforts on Africa, the Middle East, Latin America and South East Asia. Its first project is a retrofit hybrid plant in Jordan that combines a solar PV farm with an existing 250 MW Smart Power Generation plant comprising 16 Wärtsilä 50DF engines.



# E.On targets September for Uniper float

- Restructuring on track
- Research agreement extended

E.On-spinoff Uniper is preparing for a September stock market listing.

The German energy giant confirmed that the flotation – scheduled for this month (September) – would go ahead thanks to overwhelming shareholder approval of the firm’s restructuring and the absence of legal action against E.On’s plans.

Shareholders had a one-month window after E.On’s annual general meeting in early June to challenge E.On’s plans to list Uniper.

E.On will initially list 53.35 per cent of Uniper’s shares.

E.On’s CEO Johannes Teysen said that Uniper’s flotation would enable the company to become “an independent company with a focused strategy capable of making full use of its strengths in the classical energy business”.

Uniper is the result of E.On’s remarkable restructuring plans that are designed to realign the core of its busi-

ness with a new era of energy.

Like other utilities in Europe, E.On’s power generating business has been squeezed in recent years by competition from subsidised renewables as well as a fall in electricity demand and prices.

The result is that the firm’s conventional fossil fuel plants are uneconomic and it announced last year that it would spin these off and refocus its business on renewable energy, networks and customer solutions.

Over 99 per cent of E.On’s shareholders voted in favour of E.On’s restructuring at its annual general meeting in June.

“We now expect the listing of Uniper to go ahead in September,” said Teysen. “We have convinced our shareholders that the transformation of E.On is the right response to the challenges and opportunities of the new energy world. It is a great motivation for us to focus all our efforts on turn-

ing E.On into a customer-centric provider of state-of-the-art energy solutions that improve customers’ lives.”

RWE is undergoing a similar split. It is spinning off its renewables, distribution and retail units into a new company, Innogy, and will list at least 10 per cent of it later this year.

In June E.On pledged to continue research in the grids and renewables sectors by extending an existing cooperation agreement with RWTH University Aachen by five years.

The goal of the joint venture venture is to examine potential energy savings and sustainable energy supplies and use the information to help develop new products and solutions for E.On’s customers.

The research is bundled at the E.On Energy Research Center (ERC) and focuses on renewable energy, power grids of the future and efficient building systems.

## 10 | Tenders, Bids & Contracts

### Americas

#### Voith awarded Priest Rapids contract

Voith has been awarded a \$60 million contract for site rehabilitation work at the Priest Rapids Dam in Washington state, USA, by the Grant County Public Utility District (GCPUD).

The contract covers the field installation portion of the ongoing 10-unit turbine rehabilitation project underway at the facility, located in Mattawa.

"This contract highlights our commitment to delivering increased reliability and improved hydraulic and environmental performance to the Priest Rapids generating station," said Bob Gallo, President and CEO, Voith Hydro, Inc.

#### Pattern orders Siemens wind turbines

Siemens has contracted with Pattern Energy Group LP to deliver, install and service a total of 141 wind turbines for the Broadview wind project in the USA.

The Broadview project combines two adjacent wind farm projects in New Mexico and Texas with a combined installed capacity of 324 MW. Siemens will provide its 2.3 MW wind turbine platform to the project, which is expected to start operating in late 2016.

Siemens has also signed a long-term service and maintenance agreement for the turbines, which includes Siemens' remote monitoring and diagnostic services. Siemens Financial Services Division (SFS) is supporting the project with loans totalling nearly \$100 million.

#### Wärtsilä awarded five projects in Argentina

Wärtsilä is to install five new power plants in Argentina as part of plans in the country to support the development of the national grid.

The Finnish company signed contracts for three power plants with Industrias J.F. Secco S.A. (Secco), and contracts for a further two power plants with two other Argentinian independent power producers.

The combined output of all five plants will be 382 MW, while the total value of these orders is estimated to be approximately €150 million, Wärtsilä said.

The three power plants for Secco, with a total output of 192 MW, are all based on Wärtsilä dual-fuel engines. Thirteen Wärtsilä 34DF dual-fuel engines are included in the deliveries for two of the plants, while four Wärtsilä 50DF dual-fuel engines will power the third plant. All three locations are in the Santa Fe province in central Argentina.

### Asia-Pacific

#### Valmet to deliver Patau-Patau solution

Valmet has won an order to supply automation technology to Sabah Electricity's Patau-Patau power plant on the island of Labuan, Malaysia.

Under the contract, Valmet will replace the power station's existing plant automation system with modern technology that integrates boiler, feedwater and turbine control into a single Valmet DNA automation platform.

The new automation system will be started up in July 2016. Valmet will carry out the project in cooperation with its local partner Pestech Technology Sdn. Bhd.

The Patau-Patau combined cycle power plant is the largest of Sabah Electricity's plants. The station

includes three gas turbines and one steam turbine, with a total power generating capacity of 112 MW.

#### Gamesa reinforces India position

Gamesa has strengthened its market position in India's wind energy sector with orders for the supply of 460 MW at seven developments.

The company has been contracted to install a total of 230 of its G97-2.0 MW class S and G114-2.0 MW class S turbines, custom-designed for the low wind speed sites typical of India.

It will handle the turnkey construction of most of the developments, as well as the supply, installation, commissioning and management of the operations and maintenance services of the facilities.

The projects are slated for commissioning during the first quarter of 2017.

#### Orders to supply 1100 kV UHVDC equipment

ABB and Siemens have won orders to supply transformers and other key equipment for the Changji-Guquan UHVDC link in China.

The link will be the world's first 1100 kV UHVDC power link and will transmit 12 000 MW of electricity over 3000 km. It will be operated by the transmission grid operator State Grid Corporation of China (SGCC).

ABB will supply advanced converter transformers and components like bushings and tap changers. It will also supply the HVDC converter valves, DC circuit breakers, wall bushings and capacitors as well as provide system design support.

Siemens will also supply 1100 kV converter transformers, with a capacity of 587.1 MVA.

The link will transmit power from the Xinjiang region in the Northwest, to Anhui province in eastern China and will set a new world record in terms of voltage level, transmission capacity and distance. It will enter operation in 2018.

#### Ansaldo receives NTP for Indonesian projects

Ansaldo Energia has received Notices to Proceed (NTPs) for two contracts in Indonesia.

The first contract covers the supply of two AE94.2 gas turbines and two air-cooled generators with auxiliary systems for the 500 MW Grati-Pasuran combined cycle plant in Java. The customer is Lotte E&C, a member of the consortium that won the international call for tenders issued by state utility PT PLN.

The second covers the total refurbishment of a 30 MW geothermal plant located in Kamojang in western Java. Ansaldo Energia is acting as EPC contractor and supplying the steam turbine and associated air-cooled generator. The customer is PT PLN company Indonesia Power.

#### Gas turbines for 225 MW Myingyan power plant

GE has received a contract from Sembcorp Utilities to supply two 6F.03 gas turbines as well as the associated steam turbines and heat recovery steam generators (HRSGs) for the proposed 225MW Myingyan power project in Mandalay, Myanmar. Under the contract, GE will be responsible for the design, supply, and installation of two heat recovery steam generators (HRSGs) and a reheat steam turbine for the \$300 million independent power plant (IPP), which is scheduled to be commissioned in early 2018.

### Europe

#### Terna Energy orders Nordex wind turbines

The Nordex Group has obtained two new orders from Terna Energy SA for wind farm projects in Greece. Altogether the manufacturer will be supplying eight N100/3300 and two N90/2500 turbines. Both sites are located in a strong wind region near Athens.

For the 'Mougoulios' project the Nordex Group is to provide five machines from the N100/3300 series. In addition, Nordex will be equipping the 'Plagia Psiloma' wind farm with three N100/3300 and two N90/2500 turbines. Nordex will also assume responsibility for servicing the turbines for at least five years.

The wind farms are to be set up at the beginning of next year.

#### EDS wins Teesside network O&M contract

EDF Energy Renewables has awarded EDS Group, a high voltage engineering specialist, a contract for operations and maintenance (O&M) management of the high voltage network at the Teesside offshore wind farm.

The three-year contract, with a one year optional extension, will see Teesside come under the remit of the EDS Control Centre, through which EDS will manage the HV network 24/7 and carry out planned maintenance as well as providing fault location services and emergency repairs if necessary.

#### Doosan Babcock to aid Lynemouth conversion

UK-based energy engineering firm Doosan Babcock has been contracted to deliver the combustion and emissions systems for the biomass conversion of Lynemouth power plant near Newcastle in the UK.

This contract award is intended to help progress the conversion of Lynemouth power stations three 140 MW coal boilers from coal to biomass generation, and in turn lowering emissions of NOx, SO<sub>2</sub>, dust and CO<sub>2</sub>.

Under the terms of the contract, Doosan Babcock will deliver the complete scope of boiler works, including the modification of mills and electrostatic precipitators, and the replacement of fans, a low NOx, combustion system and ash handling systems. Once completed, the plant will consume approximately 1.4 million t annually of sustainable wood pellets for the next ten years.

### International

#### Poznań plant ready for upgrade

GE's Power Services business is to modernise one of three Zamech-made turbine generator sets at the Veolia Energia Poznań district heating plant in Poland.

The Veolia Energia Poznań station features one 65 MW Zamech unit and two 105 MW Zamech units. GE plans to increase Unit 3's output by up to 6 MW and also improve turbine efficiency by up to 6 per cent.

Additionally, to improve the turbine's operational flexibility, during periods when there is no demand for electrical power, the operator will be able to disconnect the low-pressure (LP) part of the steam turbine while it is in full district-heating mode. This will allow the operator to use thermal power for the pre-heating of district-heating water

only. The steam turbine modernisation outage at the Veolia Energia Poznań station is expected to start in May 2017, and the commissioning of the upgraded equipment is scheduled for August 2017.

#### Voith powers Uganda

Voith is to equip the Achwa River hydropower scheme in Uganda, it has announced.

The order covers design, manufacturing, supply and transportation as well as erection, testing and commissioning of all electro-mechanical equipment.

The hydropower plant is located in northern Uganda where river Achwa forms the border between the districts Gulu and Pader. With four vertical Francis turbines and vertical synchronous generators the power plant will have an installed capacity of 42 MW.

#### Botswana government approves CBM project

Botswana's Public Procurement and Asset Disposal Board (PPADB) has selected Tlou Energy Limited to develop a coal bed methane (CBM) power plant at Lesedi.

The 50 MW plant will be five times larger than the project Tlou originally designed and applied for, and will form a key element of Botswana's plans to develop 100 MW of CBM power.

Tlou says it is awaiting further details of the license award from the Ministry of Mines, Energy and Water. "Although we always planned to expand our project beyond the 10 MW initially envisaged as being fast-tracked for development, a 50 MW project is five times larger than expected and a fabulous result," said Tlou Acting Managing Director Gabaake Gabaake.

#### Valorem chooses RNRG

Renewable NRG Systems (RNRG) has supplied complete resource assessment packages to French developer Valorem to support their renewable energy project development activities in Africa.

Valorem is currently building a pipeline of five wind and solar farms at various development stages, totalling around 100 MW spread across various North African countries. The French company is also positioned as a service provider in Sub-Saharan Africa.

The complete systems selected include towers, data loggers complete with communications and autonomous power modules, Class 1 sensors, booms, and cables, as well as winches and ginpoles.

#### Wärtsilä supplies 161 MW Flexicycle plant

Wärtsilä has signed a major contract to supply a 161 MW Flexicycle power plant to Yamama Cement Company in Saudi Arabia.

Under the €115 million contract, Wärtsilä will develop and build a combined cycle power plant based on ten 18-cylinder Wärtsilä 50 dual-fuel engines and a steam turbine. The contract also includes a 5-year operation and maintenance management agreement and a 10-year spare parts supply agreement.

The power plant will be delivered in four phases. The first part will be delivered by the end of 2017 and the complete plant is scheduled to be handed over during the second quarter of 2019.

The plant will be Wärtsilä's first gas fired Flexicycle power plant in Saudi Arabia.



## Oil

# Crude price fails to move beyond \$50/b amid ample supply

- Global supplies increase in June
- Market share seems to be Opec priority

David Gregory

Crude oil prices flirted with the \$50/b mark in recent weeks, but have remained in the upper \$40/b range. The comments of “return to balance” and “absorbing the glut” in global oil supply have disappeared for the time being, as the International Energy Agency (IEA) reported in mid-July that global oil supplies actually increased by 600 000 b/d during June to 96 million b/d.

According to the US Energy Information Administration (EIA) the monthly average spot price for Brent crude rose by \$2 during June to \$48/b, which, it said, was the fifth consecutive and highest monthly average since October 2015. While the monthly average price increased in June, daily oil prices ended the month lower than they began, according to the EIA.

Significant outages in oil supply helped boost prices in early June, but by the end of the month concerns over future economic growth brought about by the United Kingdom’s decision to exit the European Union and

fewer supply disruptions in Canada set the scene for prices to decline.

In its July *Oil Market Report*, the IEA commented about how its monthly reports had been signaling that the oil market was returning to balance noting that there had been a major surplus in the first quarter of 2016 and that by mid-year it appeared that market balance would not be far away. However, it said “the existence of very high oil stocks is a threat to the recent stability of oil prices”.

In its June report the IEA forecast that the oil glut would be finished by the end of 2016 due to growing oil demand in Asia and oil disruption in many parts of the world, but it adjusted its tone in its most recent monthly analysis.

“Despite the regular upwards revisions to demand that we have seen in recent *Reports* there are signs that momentum is easing; and, although stocks are close to topping out, they are at such elevated levels, especially for products for which demand growth is slackening, that they remain a major dampener on oil prices,” it said.

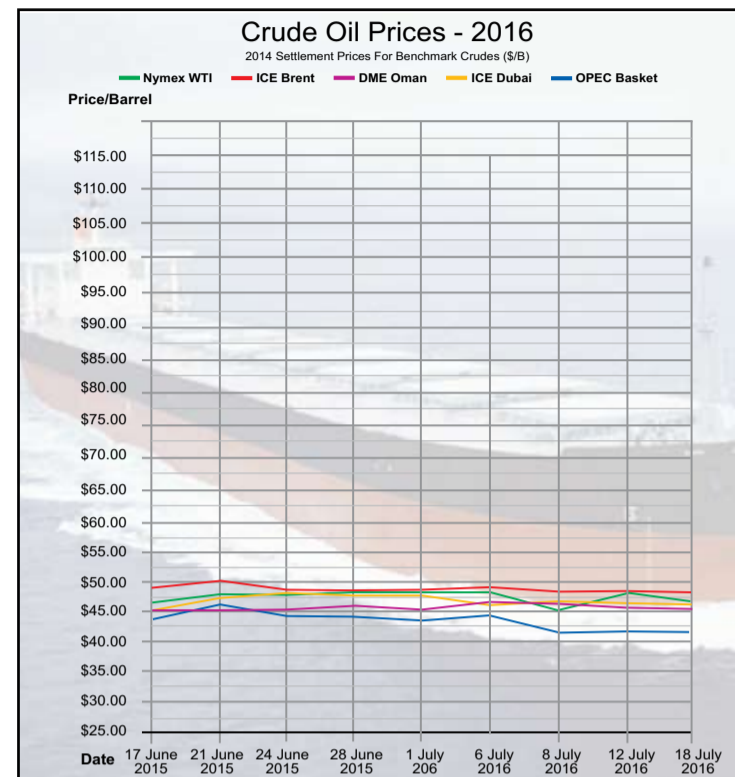
Such was the state of the market in

mid-July as prices declined due to ample supplies in the US. The EIA reported that while crude inventories declined by 2.3 million barrels during the week that ended July 15, gasoline stocks had increased by 900 000 barrels, the fifth time in five weeks, and this was during the US summer driving season.

Commentators attributed the rise to higher utilisation of crude by refineries, but they also saw a rise in crude inventories as refineries cut back on crude processing in the wake of rising gasoline stocks. Also, a slowing in the rate of decline in production cutbacks suggests that it will take longer for balance to return to the global supply/demand balance.

The IEA noted in its report that in coping with anticipated increasing demand at refineries, crude stocks could decline, “but there is a risk that, unless demand turns out to be stronger than we currently anticipate, product stocks could rise still further and threaten the whole price structure.”

Demand in both the US and China did not reach expected levels, and it is expected to slip in Europe as well.



Non-Opec production is expected to fall by an average of 900 000 b/d during 2016 but begin to make a comeback in 2017. Meanwhile, Opec production, added with that of other Middle East producers, is growing. The IEA noted that when US shale oil output was growing, it had become “fashionable” to speak of a time of lower reliance on traditional suppliers, the IEA said.

But it added that with Middle Eastern countries supplying a record daily amount of more than 31 million b/d in June, it is clear that the Middle East producers will remain essential to the oil market. Those producers’ market

share of global oil supplies is now at 35 per cent and suggests that even when US shale producers resume building output, they will still command a huge slice of the market.

Production from Saudi Arabia has gone from 10.25 million b/d in May to 10.45 million b/d in June. Its key political rival Iran has gone from 3.61 million b/d to 3.66 million b/d during the same respective months. Altogether, Opec oil output averaged 33.21 million b/d in June, up from 32.95 million b/d in April, showing again that market balance or price does not really seem to be the priority for Opec, but rather, market share.

## Gas

# Cyprus licensing round indicative of new efforts for East-Med

Major oil companies have participated in the latest licensing round to develop fields offshore Cyprus and Israel, yet the road still looks complicated.

Mark Goetz

For months it seemed that countries in the East Mediterranean region were keen to discuss their plans for their undeveloped and yet to be discovered offshore natural resources, but regional and domestic politics, low gas prices and a lack of committed markets – plus the cost of developing the discovered fields offshore Cyprus and Israel – kept holding back the bonanza that East Mediterranean gas was once proclaimed to be.

Then came the discovery of the Zohr gas field by Italy’s Eni in Egypt’s deep water offshore. Eni announced the discovery of some 30 trillion ft<sup>3</sup> (850 billion m<sup>3</sup>) of natural gas last August. This perked up the ears of governments in the region and is reported to have renewed the interest of international operators in the East Mediterranean, which had come to view the region as an invitation to a troublesome situation.

Zohr was discovered less than 10 km from the Egyptian-Cypriot maritime border in a geological formation similar to that in Cyprus Block 10 just a few kilometres away. Block 10 had been relinquished by France’s Total in early 2015 because it could not identify a low risk drill site, but after the Zohr discovery, Total approached the Cypriot government to ask it if it might restore the exploration license. Nicosia, citing European Union regulations, was unable to comply.

Cyprus, however, taking advantage of the excitement generated by Zohr launched its third offshore licensing round last February opening Blocks 6, 8 and 10 for international tender.

The bidding round closed on July 22 and Cypriot Energy Minister Yiorgos Lakkotrypis told reporters that eight companies had submitted a total of six applications for the three blocks, including Block 6, part of which Turkey claims as offshore territory of its own as part of its continental shelf.

Lakkotrypis said he could not disclose the names of the companies that bid until he briefed the government the following week, but he did say that major oil companies had participated in the licensing round.

“Based on the goals and targets that the government had placed on this round, we are absolutely pleased with the outcome, being able to attract companies of the highest calibre that will be able to support Cyprus in its efforts for exploration and exploitation of its natural resources in the Cyprus exclusive economic zone (EEZ),” Lakkotrypis said during a brief press conference at his ministry.

Prior to the closure of the Cyprus round, Israel’s *Globes* online newspaper reported that Noble Energy and the Delek Group would participate in the licensing round. The two companies are partners in the offshore Aphrodite gas field, which was discovered by operator Noble in December 2011. The lack of a viable market in Cyprus,

costs of development and the low price of gas have kept that field from being developed. In January this year, BG Group – which has since been acquired by Shell – purchased a 35 per cent share in Aphrodite, located in Block 12, giving credence to reports that Cyprus was negotiating with Egypt to export its gas by subsea pipeline to the idle LNG plant at Idku on Egypt’s Nile Delta coast.

Noble holds 35 per cent of Aphrodite, and Israel’s Delek the remaining 30 per cent. If the *Globes* report proves true, then that would be a positive indication for Cyprus’ offshore potential.

Noble and Delek are also partners in all of Israel’s big gas fields, of which only the 10 tcf Tamar field is producing gas and supplying Israeli consumers. The lack of a regulatory framework and a dispute between the Israeli government and the companies over whether Noble’s and Delek’s ownership of numerous gas licenses constituted a monopoly that erupted

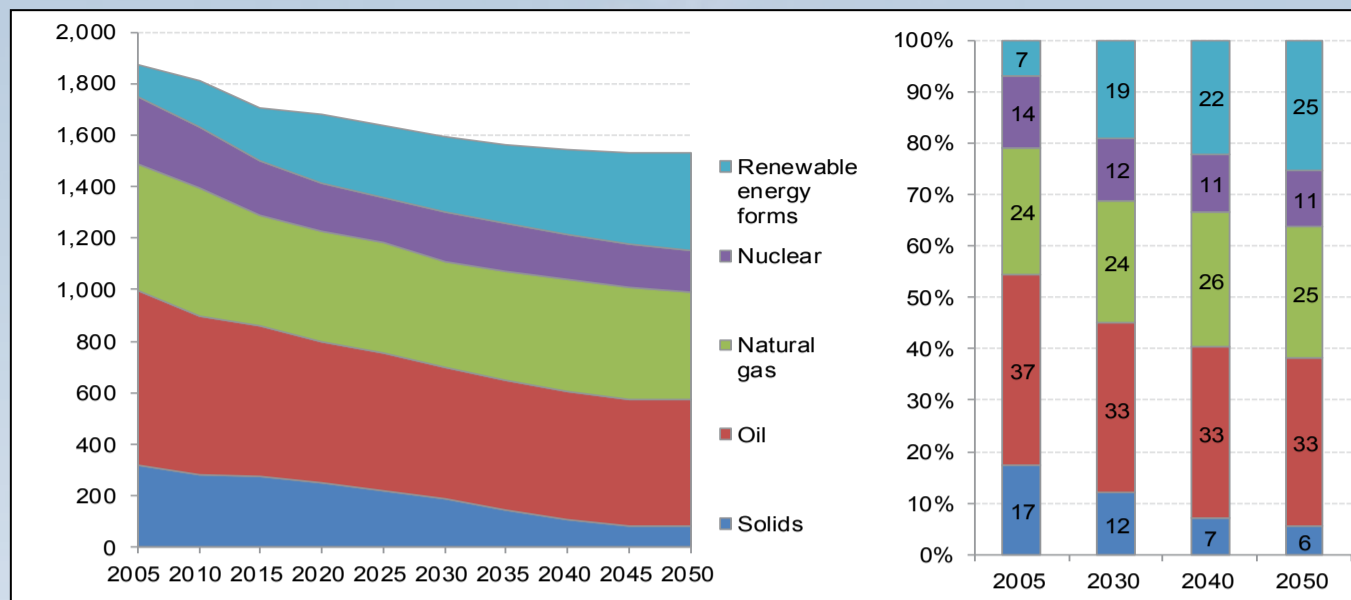
in late 2014 caused development of that giant Leviathan field, with a gas resource estimated at some 20 tcf, to be delayed until later this decade.

Things became complicated this summer when Israel and Turkey announced that they had overcome a number of long-standing differences and would re-establish relations after a six-year break. Immediately reports appeared about plans to sell Leviathan gas to Turkey via a subsea pipeline that would pass through Cypriot waters. As the Turkish army has occupied the northern half of the island since 1974, this proposal does not sit well in Nicosia and threatens to derail the improving relations that Cyprus and Israel have shared in recent years.

Cypriot President Nicos Anastasiades planned a visit to Israel in late July to meet with Prime Minister Benjamin Netanyahu to discuss the issue; that meeting could easily boost the summertime temperature in the East Mediterranean.

12 | Energy Industry Data

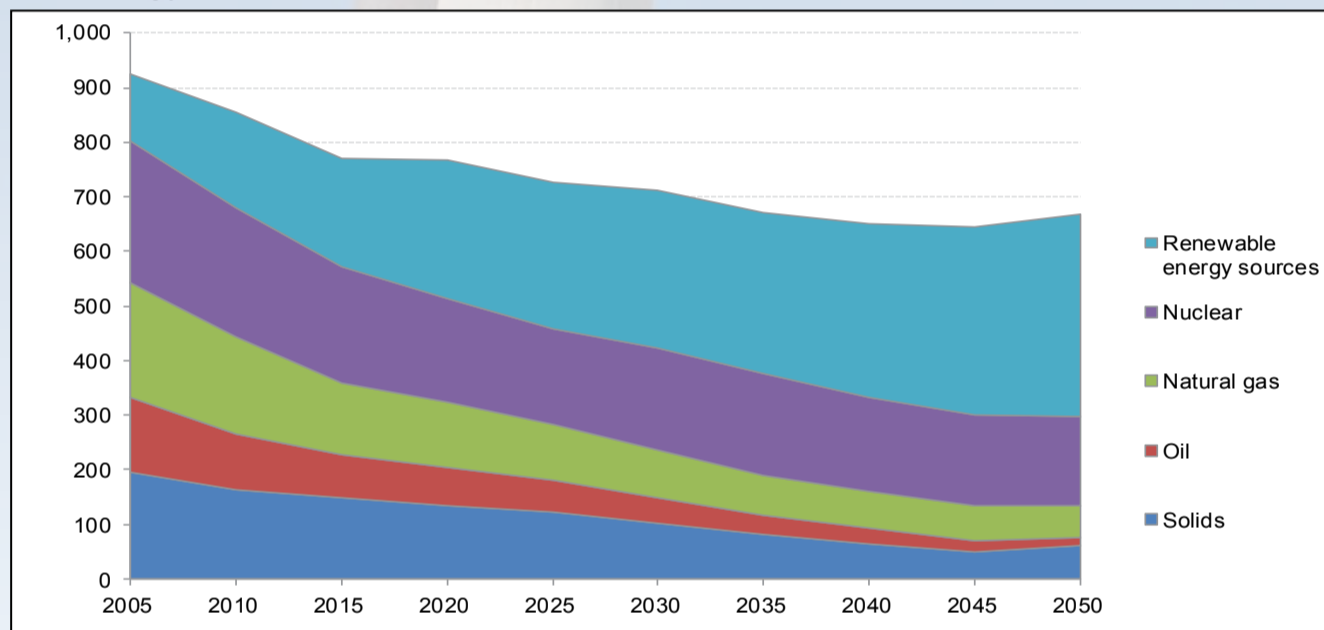
**EU28 Gross Inland Consumption (Mtoe, left; shares (%), right)**



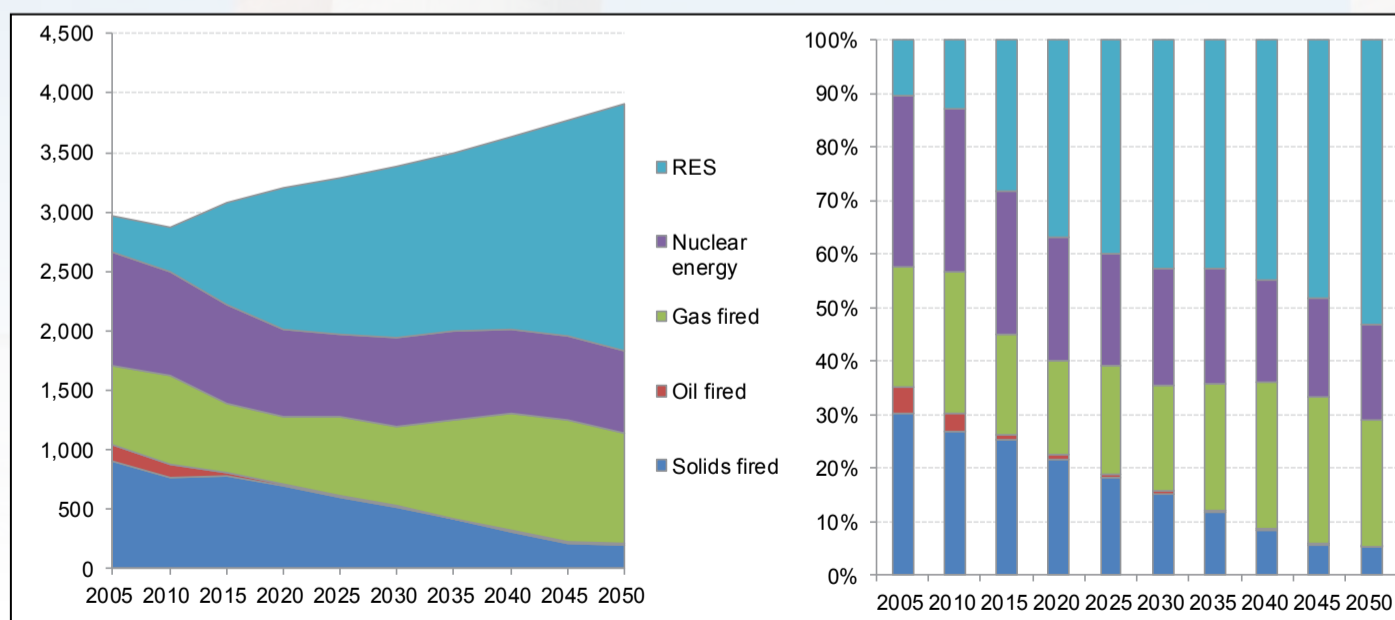
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**EU energy production (Mtoe)**



**EU power generation (net) by fuel (Mtoe – left, shares – right)**



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# Brexit will not leave energy unscathed

Across Europe, the energy sector faces a variety of challenges. The UK's decision to leave the single market adds another layer of uncertainty to managing these issues and planning for the future.

**Serge Colle and Tony Ward**

The UK's referendum decision to leave the European Union (EU) has shaken global markets and pushed the UK into a period of financial volatility and political uncertainty. The full ramifications of the decision at this stage are impossible to judge but will have long term implications for both the EU and the UK. As an integral part of the EU and UK economies, the energy sector will not escape unscathed.

It is early days, but, despite the initial market hiatus, most utilities are still trading above their year-to-date lows. Regulated utilities were also among companies least impacted. Volatility in commodity markets did, however, weigh on the power market, dragging down commodity-exposed stocks. Brent crude oil slipped to \$48-49/barrel and coal, gas and European power prices all followed the downward trend. But it's the long-term outlook that remains unknown.

Across Europe, the sector faces a variety of challenges: from replacing retiring electricity generation plants to improving energy security and reducing carbon emissions. The UK has been integral in this effort and in many respects has gone further and faster than the rest of the EU in delivering low carbon and renewable policies. The decision to leave the single market adds another layer of uncertainty to managing these issues and planning for the future.

Unpicking the UK from the EU in relation to the energy market framework, renewable and climate agreements, and infrastructure development and funding of key projects to ensure future energy security creates added complexity.

As it stands, the UK, as part of the EU and Internal Energy Market (IEM), is compliant with EU rules, the Third Energy Package and limitations on State Aid rules. The UK government will need to decide if it is better off withdrawing completely from the European energy framework or remaining closely integrated.

**Colle: In any scenario, the ultimate result will be a set of new trade arrangements and market rules that will define how the energy sector operates**



If it adopts a model similar to Norway and Iceland, both members of the European Economic Area (EEA) and European Free Trade Association (EFTA), the UK would remain part of the IEM and would face no material consequences beyond the loss of influence at the negotiating table.

Other options include adopting the Swiss model whereby the UK would have restricted but significant access to the common market on a bilateral basis. A third option, the Canada model, would see the UK have no access to the common market but would negotiate a separate free trade agreement with the EU. The final option comes into play if the UK and EU are not able to negotiate preferential trading terms. Under this scenario, access to the common market would be premised on World Trade Organization rules.

In any scenario, the ultimate result will be a set of new trade arrangements and market rules that will define how the energy sector operates.

And the elements that need to be considered do not stop here. The UK has a number of energy infrastructure projects that are eligible for EU funding. The primary concern, of course, is whether funding eligibility will be revoked and what the impact could be on project



**Ward: There is a lot at stake for the UK on the climate and energy policy front in a post-referendum world**

Freedom from this obligation could provide an opportunity for the UK to explore new options to meet its own long term decarbonisation targets. The government could choose a more opportune route to a low-carbon future that encourages innovation, provides jobs and invests in

continent. But with an estimated £100 billion needed to deliver the necessary infrastructure to keep the lights on in the coming decade, reduced investor confidence could be an additional concern to the already enormous funding requirement.

The cost of investments could increase and result in slower deployment of renewable generation and large energy infrastructure projects like interconnectors. Currently, nearly 4 GW of the UK's capacity comes from interconnection and the UK imported 6.5 per cent of UK consumption in 2015 (22.275 TWh out of a total 337.7 TWh). Bilateral agreements for existing interconnectors are in place but with import capacity projected to triple by 2020, there is a risk these planned projects are either cancelled or delayed. The extent of the impact on both costs as well as security of supply will be determined by how quickly the UK and the EU can agree on new rules and the relevant interconnection project model.

Companies with investment commitments in their home and international markets – from nuclear life extensions to building new generation capacity and rolling out smart meters – may need to recalibrate investment growth and strategies.

So what follows after the leave vote? There are still, and there will be for some time, many unknowns on what the UK's decision means for both UK and EU energy policy. In the short term at least demand for utility company services is not likely to change materially and the UK-based industry will continue to meet that demand. The new Prime Minister's decision to merge the Department for Energy and Climate Change into the Department for Business Innovation and Skills may, in practice, change little, but is nonetheless an unexpected consequence of the vote to leave.

In the longer term, investors as well as consumers will be watching eagerly as the new government clarifies its priorities and policies on a variety of issues.

*Serge Colle is EY's Global Power & Utilities Advisory Leader. Tony Ward is EY's Head of Power & Utilities for the UK & Ireland.*

**Whilst the referendum result could have been a reason to pause, the UK government has instead continued to move forward with its low carbon agenda**

deployment. This could, however, open the door for the UK to promote new technologies.

Looking beyond the potential impact on infrastructure, the UK's decision to leave the EU will also mean the end of membership of two energy regulatory bodies: the Council of European Energy Regulators (CEER) and the Agency for the Cooperation of Energy Regulators (ACER). To maintain its influence, the UK would also need to renegotiate membership with the European Network of Transmission System Operators for Gas and Electricity (Entso-G and Entso-E), which sets network codes.

The risk is that greater isolation from EU energy policy and frameworks could mean reduced influence for the UK on the rules governing a market on which it is becoming increasingly dependent.

Energy companies need to be mindful of the impact of Brexit on existing energy contracts and in particular their change in law provisions to ensure they continue to be effective, particularly in the case of benefits such as Renewable Energy Guarantees of Origin, which may now be removed.

There is a lot at stake for the UK on the climate and energy policy front in a post-referendum world.

The referendum result frees the UK government from its obligation to meet the EU-set renewable energy targets. In early July, the UK system operator laid out a number of scenarios about future energy supply. It projected that the UK is unlikely to meet the 2020 target of 15 per cent renewables until 2022 or, in a worst case scenario, in 2029.

low-carbon technologies. Whilst the referendum result could have been a reason to pause, the UK government has instead continued to move forward with its low carbon agenda, notably approving the fifth UK Carbon Budget for the period 2028 to 2032.

When it comes to managing climate change, some 80-90 per cent of the UK's environmental legislation is derived from EU legislation. But what's important to recognise is the UK's role in policy development. On the international stage, the UK is a leading player in determining EU energy policy, frequently pushing for more ambitious targets and helping to lead the European delegation at Paris COP21.

Given this stewardship, it could be expected that the UK will remain engaged and a leader in climate change issues. Currently the UK has the industrial emissions directive embedded in law and additional commitment to phase out coal generation by 2025. That said, the UK will have to renegotiate its own national emissions target under COP21, which could have implications for domestic policy goals presenting further challenges for a sector that is already having to cope with substantial subsidy reductions. Similarly, the EU may need to revisit its 2030 targets in light of the UK's withdrawal deciding to remove the UK's contribution completely or forcing Member States and companies to take on an even greater burden.

Energy security is another consideration. Being an island, the UK has long relied on its own natural resources with limited need for electricity interconnection to the European



TenneT's vision of an offshore island in the North Sea that will act as a renewables hub – the “spider in a North Sea web of offshore wind farms and international connections”

Entso-E has launched its latest Ten Year Network Development Plan (TYNDP). A major focus of the plan is on the development of the Northern Seas region, which is especially important in connecting and distributing the growing amount of offshore wind generation in the region. **Junior Isles** reports.

Every two years, Entso-E, the European Network of Transmission System Operators, publishes a Ten Year Network Development Plan (TYNDP). In its TYNDP2016, which forecasts transmission needs through to 2030, Entso-E identifies that €150 billion will be needed to enable the decarbonisation of the power sector. Of this, €80 billion is for projects already endorsed in national plans and/or inter-governmental agreements.

The main driver is the need to integrate the increasing amount of renewables, particularly wind, across Europe – it is expected that 40-50 per cent of Europe's generation will come from renewable energy

sources (RES).

Robert Schroeder, Entso-E System Development manager noted: “While there are some aspects concerning security of supply, the real dominant driver, more than 80 per cent of the projects, is RES integration. At the same time, it's about market integration – connecting different markets. The larger the market area, the more the possibilities to integrate wind.”

The ability to link different markets creates social and economic welfare due to the reduction of power prices. Although the capital needed to boost interconnections will increase consumer bills by about 1 per cent. It will however, reduce bulk power prices by €1.5-5/MWh, according to Entso-E calculations.

The Northern Seas region is one of the most important areas. It accounts for around 15 per cent of the investment, only second to Germany, which Entso-E says represents 20-30 per cent. The region is important, not just because of its wind resources but also because of its strategic location in connecting markets with different generating patterns.

TYNDP considers 25 individual projects that will be developed into a ‘global scheme’ where the meshing of offshore grids is onshore i.e. the substations are onshore. The infrastructure costs of creating a meshed grid are estimated at €12-25 billion but will create social-economic benefits of €2-3 billion/year.

Several scenarios are being considered for the future Northern Seas infrastructure. The TYNDP prefers a ‘modular step-wise’ approach to development of the grid that uses the latest onshore grid connection technology.

Schroeder explains: “An offshore meshed grid is under discussion, but at Entso-E we are more cautious and prefer to take it step-by-step.”

Schroeder notes that although there is significant political will to develop big offshore meshed grid concepts, they carry risks. He pointed out that Kriegers Flak near Denmark is under implementation but is facing significant challenges in terms of time, technology and cost. The Kriegers Flak area in the Baltic Sea has been chosen as the first place in the world to have a meshed offshore electricity

grid. The planned 600 MW offshore wind farm will act like a ‘Supergrid’, eventually being able to transmit renewable energy through power grids to Denmark, Germany and Sweden.

The merits of an onshore meshed offshore grid versus offshore meshing is an ongoing debate, one that has led to discussion of building an artificial island in the North Sea. This would in some ways be a halfway house – although out at sea it would still essentially use the onshore technology currently favoured by Entso-E. Schroeder says the concept will be “discussed in more detail” in the years to come. “It may be something you may see in the next version [of the TYNDP],” he said.

In June TenneT, a leading European electricity transmission system operator (TSO), with activities in the Netherlands and Germany presented the concept of building an island in the middle of the North Sea between 2030 and 2050.

TenneT's vision creates a basis, or point of departure, for a joint European approach up to 2050 and focuses specifically on developing the North Sea as a source and distribution hub for Europe's energy transition. The location for the island satisfies a number of suitability requirements. There is a lot of wind, it is centrally located and is in relatively shallow water. These criteria qualify the Dogger Bank as a location for the central hub.

TenneT's thinking is based on an island with a modular structure, with each module covering approximately 6 km<sup>2</sup>. This is big enough to provide space for connecting roughly 30 GW of offshore wind capacity. The island will be expandable by adding one or two modules of 6 km<sup>2</sup> each.

TenneT's presentation came just days after the European political declaration of June 6, 2016 on energy cooperation between the North Sea countries. TenneT CEO Mel Kroon commented: “It will be very important for the six European North Sea countries to be willing, in due course, to make their targets independent of national borders, which means agreeing that the electrons generated offshore must not necessarily be transmitted to their own country.”

Although the island is far out at sea, TenneT believes there would still be

cost savings, compared with other solutions. Firstly, considerable cost benefits can be derived from an island, as it offers a permanent place for people and resources.

As wind farms are built further out at sea, costs will be significantly higher – construction and maintenance are higher and wind farms must be connected via many relatively expensive, single direct current (DC) connections in order to keep losses low. By building an island surrounded by wind farms (at a relatively short distance), wind energy obtained far out at sea will assume the cost benefits of near-shore wind. The smaller distance will allow the use of cheaper alternating current (AC) connections.

The alternating current generated by the wind farms will be changed by converter stations on the island to direct current for transmission to the mainland of one of the North Sea countries. The advantage of this is that it will not be necessary to build converter stations on platforms in the sea, which again provides substantial cost advantages.

According to TenneT, the present utilisation of a connection between a wind farm and the mainland is around 40 per cent. This is because there is not always wind (or not always equally strong) and the wind turbines also have to undergo maintenance or repairs. The capacity utilisation can and must be greatly increased by giving the direct current connection the role of interconnector.

The transmission capacity of the direct current connection will then be used not only for the outward movement of wind energy, but also for electricity trading between the connected countries, creating a ‘wind connector’. As TenneT puts it, “in effect, the island will act as the spider in a North Sea web of offshore wind farms and international connections”. This, it says, will increase the utilisation of a connection between the wind farm and the mainland from roughly 40 per cent towards 100 per cent.

As offshore wind continues to grow across Europe, such developments will be crucial in ensuring that energy from wind farms is not only efficiently utilised but that it is shared between countries to the benefit of the whole region.

### Driving cable technology

The shift to bigger projects with more powerful turbines that will increasingly be located further offshore is driving the development of new higher voltage inter-array cables.

JDR Cables recently introduced a 66 kV inter-array cable to the market following 18 months of development. The design concept utilises its 33 kV array cable technology with “minimal changes” to operate at 66 kV.

Speaking at RenewableUK's Global Offshore Wind conference in June, John Price, Global Sales Director, Products and Services, JDR Cable Systems said that although there are higher rated cables for transporting power back to shore, “in terms of array cables, 66 kV is the limit”.

The limit, he says, is a result of technology versus cost. “You can put a high voltage export cable in as an array cable but its construction and the way it's built makes it cost-prohibitive to make it worthwhile. But if you look at the size of the turbines and the power they are transmitting, the sensible conductor voltage is 66 kV. You don't need anything higher; any higher just costs more money – 66 kV is the right level to capture the power and produce the right levelised cost of energy... The cable is available now, just ahead of when the market actually needs it. Projects are only now being tendered for 66 kV cables.”

Like JDR, Nexans and Prysmian are also introducing 66 kV cables all aimed at cutting the cost of energy from UK Round 3 projects. The Carbon Trust has calculated that a move to 66 kV cables could cut the cost of offshore wind energy by 1.5 per cent, which equates to a Round 3 cost of energy saving of up to £100 million per year.

The Blyth offshore wind demonstration project will be the first to use 66 kV inter-array cables. These will be supplied by Nexans and work is scheduled to start next year.

# A growing energy harvest

The largest dedicated straw fired biomass plant in the UK was officially opened at the end of May. **Junior Isles** looks at the 40 MW Brigg Renewable Energy Plant, a project that demonstrates the latest technology for burning straw and other agriculture-based biomass.



The Brigg Renewable Energy plant is now the UK's largest straw fired power station and confirms a growing interest in power plants that use agriculture-based biomass

Straw is an important fuel in terms of biomass resources. According to industry estimates, it accounts for 40 per cent of available biomass resources in the EU. It is therefore no surprise that the number of straw fired plants is growing and the technology used for burning straw and other agriculture-based fuels continues to improve.

A few months ago, a new milestone was reached in terms of straw fired power plants. On May 26th the UK marked the official opening of the Brigg Renewable Energy Plant in Lincolnshire, in the east of England. At 40 MW, the plant is the biggest such plant ever built in the UK.

Brigg, developed by leading British renewable energy company Eco2, is owned by BWSC North Lines Ltd (BNLL), a joint venture between PensionDanmark, Burmeister & Wain Scandinavian Contractor A/S (BWSC) and Copenhagen Infrastructure Partners (CIP).

The facility is based at a brownfield site once owned by the British Sugar works. Eco2 will sell power from the project to Statkraft under a 12-year power purchase agreement.

The £162 million project was built by BWSC under a turnkey engineering, procurement, and construction contract. BWSC is responsible for operation and maintenance of the plant under a 15-year operation and maintenance agreement.

It is the second such plant developed by Eco2 and BWSC – an almost identical plant in Sleaford, Lincolnshire was officially opened in November 2014.

The advantages of biomass are clear. Unlike variable renewable generating sources, it provides dispatchable carbon-free electricity. Like other biomass materials straw biomasses capture energy and CO<sub>2</sub> through the process of photosynthesis as they grow, and when burned as a fuel release only the same amount of CO<sub>2</sub> they captured, back into the atmosphere. Therefore unlike fossil fuels the carbon dioxide being released is not 'new'.

By using straw, the plant will make use of residue from the production of wheat, a market worth around £6 million to the local agricultural community. The ash generated from the operation of the plant can also be recycled to make fertiliser.

At full capacity Brigg produces

enough electricity to supply 75 000 homes and save about 250 000 t of CO<sub>2</sub> every year.

The plant will burn straw from several sources. In August 2015 BNLL signed a contract with the Worldwide Farming Partnership (WFP) to supply 30 000 t of straw in 2015 and 50 000 t every year for the remaining 12 years of the agreement. This represents 20 per cent of the straw needed for the plant to operate at full capacity. BNLL is also working with local and regional farmers for the supply of straw to the facility, which has sufficient storage for 60 days of operation.

Although Brigg is built for 100 per cent straw firing, it is designed to operate with up to 22 per cent wood

heaters using austenitic steel.

In Denmark, biomass boilers have been in operation on straw from wheat and maize since the 1980s. Over the years the design has been improved and the steam parameters steadily increased to reach today's standard of 110 bar and 540°C. This is considered as best available technology (BAT).

Reaching these steam temperatures and pressures is significant in that it allows suppliers to offer steam turbines with reheat options for higher plant efficiency. Brigg will use a 45 MW Geared Reaction steam Turbine (GRT) turbo-set supplied by Alstom (now owned by GE Power). This enables the plant to achieve an electri-

## In mid-July the Brigg Renewable Energy Plant hosted a visit from scientists and farmers to explore the use of Miscanthus as a fuel

chips as an auxiliary fuel.

At the heart of the power station is a natural circulation drum-type boiler supplied by Burmeister & Wain Energy (BWE), as the exclusive boiler supplier to BWSC. BWE's scope of supply also includes the straw feeding system and the selective non-catalytic reduction system (SNCR) to achieve the NO<sub>x</sub> emission levels specifically requested by authorities for this type of plant.

The boiler features a water-cooled vibrating grate, which is an integrated part of the evaporator system of the natural circulation boiler. The grate ensures homogeneous and stable combustion of untreated biomass and can handle fuels such as straw, wood chips, cotton residuals, olive cake, etc.

The main challenge in burning straw is the high alkali metal (potassium and sodium) and chloride content, which causes corrosion in the boiler and affects the slag characteristics. The boiler therefore has to be designed and optimised to operate with corrosive and stick ash caused by cereal straw combustion.

The softening or Initial Deformation Temperature (IDT) of straw ash is very low – approximately 750°C. For this reason, slagging will form and accumulate on the furnace walls and heavily on the boiler final superheaters. The superheaters are therefore designed as slagging super-

cal efficiency of about 34 per cent.

At the same time, the integration of the boiler with the flue gas treatment system ensures the plant satisfies the upcoming EU requirement for emissions that come into force 2020/21.

Following the successful commissioning and first few months of operation of the plant, the plant owners are already eyeing the potential for burning new fuels.

In mid-July the Brigg Renewable Energy Plant hosted a visit from scientists and farmers to explore the use of Miscanthus as a fuel for renewable energy and support ground breaking research into Miscanthus growing.

The visit marked the finale of the six-year 'Giant Link' project, a £6 million initiative that has successfully delivered new commercially acceptable varieties and raised awareness amongst the farming community of the opportunities that growing this crop has to offer. The project, led by DEFRA (Department for Environment, Food & Rural Affairs), DECC (Department of Energy and Climate Change) and BBSRC (Biotechnology and Biological Sciences Research Council) will now lead to the commercial development of seed-based varieties of Miscanthus, seen as the future of perennial energy crops.

This ground-breaking project aims to reduce the cost of Miscanthus

production and so make it a more economically viable option for farmers considering renewable energy crops. To meet governmental targets the UK will need to increase the area of land where bioenergy crops are grown by over 1 million hectares.

According to research commissioned for DEFRA (2012), this is readily achievable as the UK could grow up to 3.63 million hectares of short rotation coppice and Miscanthus without affecting food production, because these crops are ideal to grow on lower grade, marginal land.

During the visit BNLL highlighted why it believed energy crops are important to the Brigg Renewable Energy Plant as an auxiliary fuel to wheat straw, as it both extends the growing season and helps mitigate the risk of reliance on a single source of fuel. It also provided an opportunity for the energy plant owners to talk to interested farmers and better understand some of the issues they might be facing when choosing to start growing Miscanthus.

Colin Jones, Managing Director, BWSC North Lines Ltd said: "We are already committed to the use of this new crop and have contracts in place for Miscanthus to supply 10 per cent of our annual fuel requirement, with an option to increase this to 22 per cent once a consolidated local supply market is in place."

"Hosting this tour was really valuable for us and gave us the opportunity to explain why the plant has to have exacting quality standards for the fuel we purchase, to ensure there is no loss in power generation in the power plant. We are really excited to be exploring the potential of this new fuel and working with such an innovative research team."

Danish investors such as PensionDanmark already view projects like Brigg as ideal projects to fund.

Torben Møger Pedersen, CEO, PensionDanmark said: "We have found a model that provides PensionDanmark an attractive return with limited risk. The risk is limited by the fact that the majority of PensionDanmark's investment is in the form of loans and the bulk of earnings are regulated, with the costs fixed via long-term contracts."

Further developments in the field of energy crops can only serve to improve the attractiveness of biomass plants to other potential investors.



Junior Isles

# Keep calm and carry on

The situation is hardly as dire. Yet the message from many quarters following the Brexit vote is the same as a motivational poster produced by the British government in preparation for the Second World War.

The UK's decision to leave the European Union has seen sterling plummet to a 31-year low and resulted in its credit rating being downgraded. Meanwhile, there continues to be much speculation as to what it will mean for not only UK energy policy but for EU energy policy as well.

In true British fashion, many remain stalwart, even hopeful, in the face of what will clearly be a difficult time.

Matthew Williams, Partner and Co-Chair of European Energy at law firm, Orrick, Herrington & Sutcliff (Europe) LLP said: "We are generally reactive to what our clients are saying to us and at the moment, the majority are taking a very sanguine view of Brexit in terms of what it will look like, what the terms will be and

indeed whether or not we will actually leave."

The immediate issue for existing and potential stakeholders in the UK energy sector is the domestic political landscape, i.e. what will happen in UK politics in the coming six months. Will it be a continuation of current energy policy?

"What our clients are saying," said Williams, "is they want a strong signal from the UK government showing that it's business as usual in terms of overall policy in energy and other areas."

This is key for investor confidence. The government is certainly doing all it can to give assurances. It demonstrated its continued commitment to long-term climate change targets with the acceptance of the Fifth Carbon Budget. This, along with confirmation that auctions will go ahead this year to support renewables under the CFD framework, hopefully sends out the signal that no changes to the game plan are expected.

The move to swiftly install Home Secretary Theresa May as the new Prime Minister will go even further to calm fears. On the back the announcement, the pound, although still depressed, reached a one-week high against the dollar and the euro. May has also ruled out holding a general election before the scheduled date of May 2020 – a decision that will also provide longer-term certainty.

Looking beyond the UK, the impact on Europe is interesting, particularly in energy, simply because of the influence the UK has had on EU energy policy. Indeed much of the EU energy policy incorporated into UK energy policy contains a large amount of the policies originally exported from the UK to the EU.

Elisabeth Blunsdon, Counsel at Orrick said: "Where we [the UK] are now, is essentially the EU Third Package. Ofgem and DECC etc., are so intertwined with Entso-E, Entso-G, Madrid, Florence and all those regulatory development fora, that the contribution they make is extremely significant. The experience we've had here has been very valuable to Europe."

Certainly the UK has more experience with market liberalisation than any other country and the likes of UK regulator, Ofgem has been a leader in development of EU energy policy.

Williams added: "The UK has had a lead role in energy policy and regulation for a long time. So I don't think it's an area where you're talking about ripping up the rulebooks and starting again. The UK Electricity Act of 1989 is a good example of a piece of domestic legislation that has stood the test of time, whose fundamentals still hold despite everything else that has been going on with EU regulation."

While the UK's future status in Europe is unknown, its energy sector will no doubt continue to play a role in Europe. For example, National Grid will most likely continue to be part of Entso-E and Entso-G because of its interconnections.

"It is difficult to see that they would not at least continue to be at meetings," noted Blunsdon.

Indeed the whole area surrounding interconnections and energy trading is one that is receiving an understandable degree of attention.

Blunsdon points out that the energy trading side will be "very interesting". She noted: "The impact on the pure financials [trading] is already starting to affect energy trading here [in the UK]. Anyone trading in Europe will still have to comply with REMIT registration, etc., anyway... but how things will work going forward, we just don't know." REMIT is a EU regulation on energy market integrity and transparency that has been in force since December 28, 2011.

Speaking at a recent Parliamentary Select Committee meeting, Professor Michael Grubb, Professor of International Energy and Climate Change Policy at UCL said the big question he is unable to answer is: what will electricity trade look like if the UK leaves the single market?

"I wish I knew," he said. "I've talked to people in the business who are scratching their heads and I have been trying to think through the scenarios of what it would mean. Almost certainly we would continue trade as

there are huge mutual benefits... but there would be some efficiency lost to the trade."

With markets being what they are, it is unlikely that the move to overall physical integration of the European energy trading network will falter. "There may be a bit of a bump in the road," said Williams "but the way markets operate is to reach out to each other."

This is evident from the large upsurge in interconnector projects over the last five years – something that Williams believes is likely to continue to happen regardless of the UK's future relationship with the EU. Certainly it makes no practical or commercial sense for Brexit to mean that the UK becomes an island sitting outside a European trading system.

And while it is broadly believed that the cloud of uncertainty could stymie investment in interconnectors and other energy infrastructure projects, it is also possible that Brexit could lead to a new wave of investment from the US like that seen in the 1990s following UK privatisation.

Perhaps this was part of the thinking behind now ex-Chancellor George Osborne's recent visit to New York in an effort to strengthen UK-US trade links post-Brexit.

"In an environment where the pound is trading at below \$1.30, your dollar goes a long way," noted Williams. "Also, if there's a continued push towards low carbon, there's an awful lot of expertise and commercial know-how in the US in developing solar and wind, etc."

Mr Osborne was also planning to visit Asia. No doubt talks with China would have been top of the agenda. Securing Chinese investment for the proposed Hinkley Point C nuclear plant was part of £40 billion worth of deals signed between the two countries last October. It is crucial the two countries remain on good trading terms when Britain officially leaves the EU.

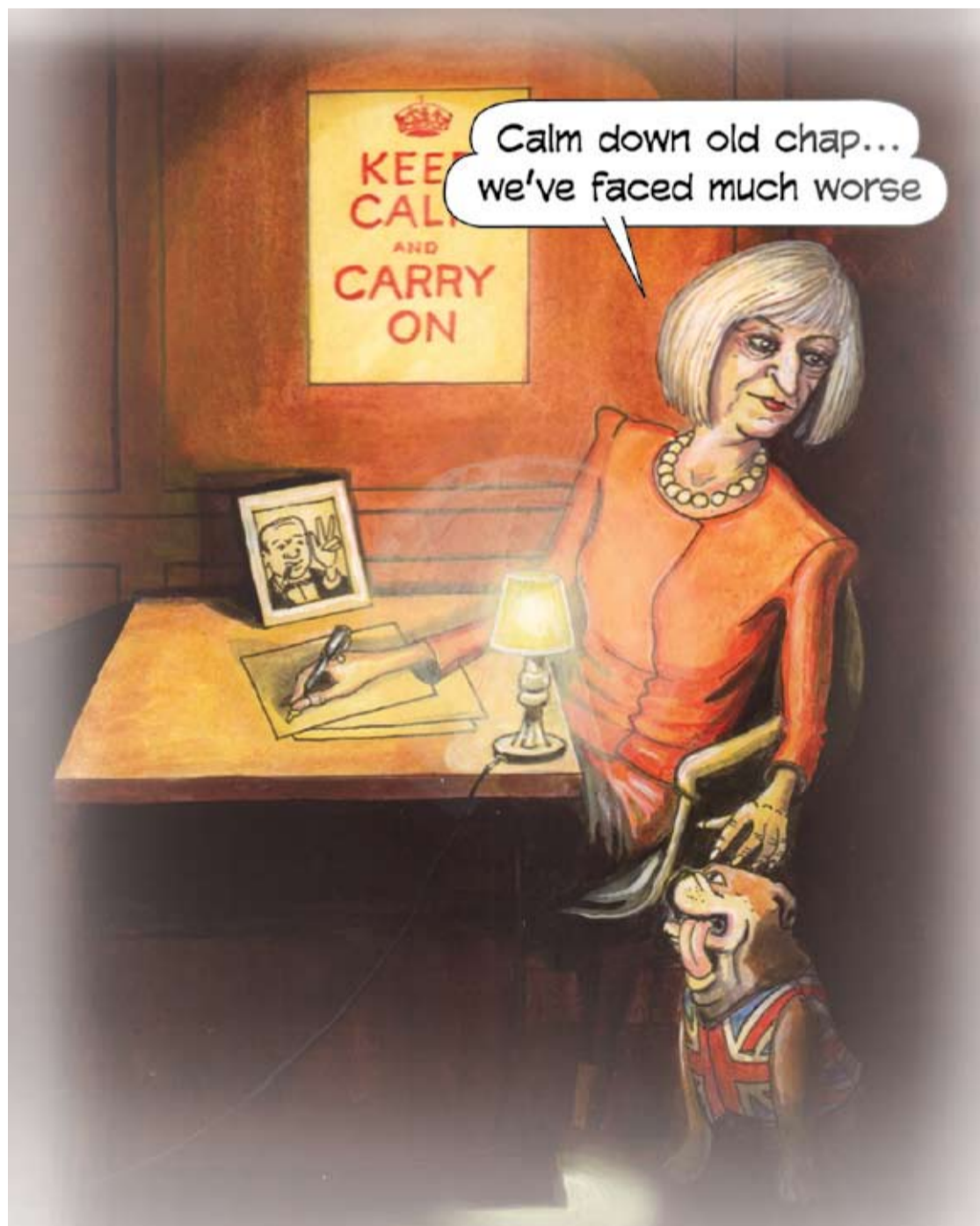
If EDF, the French government or the UK have lingering doubts about Hinkley, the Brexit decision arguably gives them a way out with less political embarrassment. There is little doubt the decision has not helped the project's prospects. If the plug is pulled on it, the question is whether China will remain keen on investing in the UK's nuclear programme.

Chinese companies have been robust in their view about political risk in other countries, having invested in many places where others have feared to tread. It is a quality that the UK may come to appreciate.

The falling pound brings problems for UK imports but if sterling continues to weaken, the UK will certainly become a more attractive investment proposition – as long as there is continuity and clarity in the regulatory framework.

As Blunsdon summed up: "What's needed now is some calm and some stability. If you look at the energy sector over the last 25 years, in some ways it just carries on anyway."

True words. Rules and regulations may change but physics does not. As long as people need power, electrons will flow. In the end, the energy sector will sort itself out, so let's all keep calm and carry on.



Cartoon jemsoar.com