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Cheaper options to Hinkley, says industry

Theresa May has decided to review the proposed £18 billion Hinkley C project

As the UK government prepares to review the proposed Hinkley Point C nuclear power station, the industry stresses that there are cheaper alternatives. **Junior Isles**

The UK can meet its energy and climate change targets even if the proposed Hinkley Point C nuclear power station is not built, a new report concludes – and alternatives work out cheaper.

Late last month, Britain's new Prime Minister Theresa May put a hold on the proposed £18 billion plant to carry out a review, with a decision expected in the autumn. The unexpected announcement came hours after EDF finally gave the project the green light after years of delay, primarily stemming from its huge cost.

The new analysis, by the Energy and Climate Intelligence Unit (ECIU), finds that a mixture of established approaches including wind farms, cables connecting the UK grid with other countries and gas fired power stations, together with measures to manage demand, would save the UK around £1 billion per year while keeping the lights on and meeting climate targets.

ECIU director Richard Black said the report shows that while Hinkley C could form part of the UK's future energy mix, it is not essential.

Black said: "Our conclusion is that it's not essential; using tried and tested technologies, with nothing unproven or futuristic, Britain can meet all its targets and do so at lower cost. So if Mrs May decides to go ahead with Hinkley, all well and good – if she decides not, or if the project stumbles at a later stage, we have alternatives."

The report found that the UK:

- Could bring as much electricity into the grid as Hinkley would generate by building as few as four big wind farms (additional to those that will be built anyway), or building three additional interconnector cables;
- Could negate the need for at least two-fifths of Hinkley's electricity by cutting waste – using electricity more efficiently and productively;
- Could supply Hinkley's 3.2 GW of peak demand through demand-side response (additional to improvements that will be made anyway), additional interconnectors, or additional gas-fired units generating at peak times – or a mixture of all.

The report adds that all of these alternatives on their own work out cheaper than Hinkley. It stated:

- Enhancing energy efficiency and demand-side response would save energy and therefore reduce bills;
- Replacing all Hinkley electricity with additional offshore wind farms would cut the average household bill by £10-20 per year;
- Replacing all Hinkley's peak-time output with gas fired units would save £16 billion in infrastructure costs.

The changing energy landscape has made the rationale behind Hinkley C become increasingly questionable over the years.

ECIU Energy Analyst Dr Jonathan Marshall said: "The UK's energy infrastructure is ageing and increasingly unreliable, so clearly we need to replace bits of it; and there's no doubt that nuclear reactors generally supply low-carbon electricity reliably.

"But electricity systems are changing rapidly across the world, and it's striking that figures such as the former head of National Grid and his Chinese counterpart have said recently that 'always-on' baseload generation is the way of the past.

"And I think our report illustrates the reason why things are changing – increasingly, smart, flexible and

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Hornsea Two approval highlights appeal of EU offshore wind

The recent approval of the UK's Hornsea Project Two offshore demonstrates the continuing appeal of Europe's offshore wind sector.

In August, Dong Energy received development consent from the UK's Business and Energy Secretary Greg Clark for the 1.8 GW wind farm, which will be the largest in the world. The project, located off the coast of Yorkshire, could meet the electricity needs of around 1.8 million UK homes per year.

RenewableUK's Chief Executive, Hugh McNeal, said the government's consent was a "vote of confidence in the UK's world-beating offshore wind market".

Wind power is currently delivering over 12 per cent of the UK's electricity. This is expected to increase to 20 per cent by 2020, with offshore wind alone providing 10 per cent. Offshore wind costs have also fallen dramatically in the past few years, and it is on course to become competitive with new nuclear and gas.

Clarke said: "The UK's offshore wind industry has grown at an extraordinary rate over the last few years, and is a fundamental part of our plans to build a clean, affordable, secure energy system. Britain is a global leader in offshore wind, and we're determined to be one of the leading destinations for investment in renewable energy, which means jobs and economic growth right across the country."

Accounting for around half of the EU's 11 GW of offshore wind capacity, the UK represents a large chunk of the growing investment in European offshore wind projects.

Seven projects reached final investment decision this year, financing a total of 3.7 GW of new capacity. The UK accounted for nearly three-quarters of the new investments.

At the end of July WindEurope reported that Europe's offshore wind sector generated a total investment of €17.5 billion in the first six months of this year. It is a figure that WindEurope expects to continue growing.

Giles Dickson, CEO of WindEurope, said: "The record investment numbers show a clear industry commitment to offshore wind. We expect installations will pick up significantly in 2017…"

In August 8.2 Consulting confirmed that it had carried out due diligence services for Masdar, which is considering an investment in a 1.5 GW portfolio of different offshore projects in the European market. Masdar, Abu Dhabi's company investing in renewable energy projects, already has stakes in two large UK offshore wind farms: London Array and Dudgeon.

Despite the rosy outlook, however, Dickson warned that challenges remain. The volume of new grid-connected installations in the first half of 2016 was 511 MW, 78 per cent down on the same period in 2015.

He said: "… there are a lot of challenges out there still on offshore wind. Not least the uncertainty over future volumes and regulation in many key markets for the period after 2020. We're a long way from being able to say "job done" on offshore wind."

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renewable equals cheap and reliable," he said.

Michael Grubb, Professor of International Energy and Climate Change Policy, Institute for Sustainable Resources, University College London, UK, agrees. He was part of the Climate Change Committee, which in 2008 recommended that the government develop capability for a new generation of nuclear stations.

In a letter published in the *Financial Times* he wrote: "…it was projected that a new nuclear fleet could have many years of operating to provide baseload electricity 24/7. But the dramatic expansion in renewables makes it implausible that the UK will need any such baseload power by the time Hinkley Point could come on stream, let alone for the subsequent 35 years of its fixed-price contract."

Grubb says need for Hinkley is "implausible"

Greenpeace claimed that a recent survey of business chiefs by the Institute of Director showed strong opposition to Hinkley C and solid backing for renewable energy.

Greenpeace UK executive director John Sauven said: "The government's welcome review of the project should include comparing the falling costs of reliable renewable power, such as solar and offshore wind, alongside investment in energy efficiency, battery storage and interconnectors. The only conclusion that the government can logically draw is that due to the huge leap forward in innovation and falling costs, renewable power and energy efficiency is the way for the UK to meet its carbon targets and create new jobs."

Offshore wind in particular is seen as a key alternative as costs continue to fall. Commenting on the matter, Head of Offshore Wind at the Crown Estate, Huub den Rooijen said: "As the Committee on Climate Change urges government to consider alternatives if there are delays to renewing our nuclear fleet, we should remember our seabed is a powerful energy asset."

Den Rooijen went on to say that offshore wind construction costs have come down by more than 40 per cent in the UK alone and, by 2025, industry and government expect UK prices to be comparable with new gas generation at around £85/MWh.

The latest tender for the 700 MW Borsesele 1 and 2 projects off the Netherlands will see power supplied at €87/MWh (about £80/MWh) – significantly lower than the £92.50/MWh that EDF will be paid for electricity from Hinkley Point C.

The Labour Party believes the project as it stands is a "bad deal" for consumers. The party's Shadow Energy Secretary Barry Gardiner said though his party supported nuclear power in principle, delays and cost overruns meant the project needed to be urgently reviewed.

He noted that that the National Audit Office had raised its estimate of cost to billpayers from £6 billion to £30 billion and that costs were index-linked to increase further.

Post-Fukushima report scheduled for March

- New report will cover tougher nuclear regulations
- Japan restarts fifth plant as it ratifies Paris Agreement

Junior Isles

Japan's Nuclear Commission will compile a white paper on nuclear energy for the first time since the release of the 2010 report was halted in the wake of the Fukushima disaster in March 2011. The last nuclear energy white paper to appear was the 2009 edition.

The 2016 report, to be released by the Japan Atomic Energy Commission next March, will cover the tougher nuclear regulations the country has introduced and changes in the environment surrounding nuclear power in the wake of the meltdowns at the Fukushima Daiichi nuclear power plant.

The new white paper, which will adopt a neutral tone, is expected to become an annual report or record on the lessons of the nuclear disaster and issues surrounding peaceful use of nuclear energy.

Following the Fukushima crisis, the government body has faced criticism over its role in promoting nuclear power and for failing to provide clear management. Its operations have since been scaled down and the number of its commissioners has been cut from five to three.

The commission has been separately preparing a paper on basic thinking on nuclear power use, simplifying the framework for nuclear energy policy it had been releasing prior to the accident.

Using the paper as a guideline, the nuclear commission will urge ministries and agencies involved to implement specific policies, according to the office.

Japan closed all of its nuclear reactors in the wake of the Fukushima meltdown but is now in the process of gradually bringing them back on line. Last month, it announced the restart of its fifth reactor under new government rules adopted following the meltdown.

In August, Shikoku Electric Power Company, the operator of the Ikata nuclear plant about 700 km southwest of Tokyo, said it began pulling out control rods of its No. 3 unit to resume operations. Currently, the reactor is the only unit in Japan that uses uranium-plutonium mixed oxide fuel.

Minister of Economy, Trade and Industry Hiroshige Seko welcomed the restart of the reactor, saying: "It is an important step forward in securing a well-balanced energy mix and a stable power supply."

More than 40 workable commercial reactors in the nation remain idled for maintenance or safety checks and their restart is key to Japan meeting its climate change commitments.

Japan, along with New Zealand, recently announced its intention to ratify the Paris Agreement. This means 57 countries, accounting for 57.88 per cent of global emissions, have now ratified the Paris Agreement, or promised they will by the end of 2016.

If these countries keep their promises, the Paris Agreement will become an international law. The treaty needs to reach 55 countries and 55 per cent of global emissions to become effective.

The target could be reached by October 7, which would enable the agreement to be in place before COP22 in November 2016, in Marrakech, Morocco. Once the treaty is in place, all countries will be bound to it for four years.

In her first interview since succeeding Christiana Figueres in May, the UN's new Climate Chief, Patricia Espinosa, said: "Now is the time for ratification and for implementation."

A special event will be held on 21 September for leaders to present their ratification officially to UN Secretary General Ban Ki-Moon.

Battery storage boom supports distributed energy growth

The battery storage market is showing strong growth in line with the growing use of distributed energy resources (DER), according to recent research reports.

According to IHS Markit, the global energy storage market is expected to double from 1.4 GWh added in 2015 to 2.9 GWh this year, while grid-connected energy storage capacity will surge to 21 GWh by 2025,

Over the next decade, lithium-ion batteries will become the mainstream energy storage technology, and more than 80 per cent of energy storage installations will include the technology by 2025, says IHS Markit.

According to the IHS Markit Grid-Connected Energy Storage Forecast Database, Japan and the US will be the largest energy storage markets, generating a third of market revenues totalling $50 billion over the next decade. In Australia and Japan, energy storage penetration is expected to exceed 5 per cent of installed power capacity in 2025, underscoring the growing role that energy storage will play in grid stability, renewable integration and overall energy management.

Half of all energy storage installations will occur behind the meter, driven by self-consumption and back-up needs. Eight countries will each have cumulative behind-the-meter storage power exceeding 1 GWh, including Japan, China and the US.

Germany is also another major market. A separate report from GTM Research called 'The German Energy Storage Market: 2016-2021', says Germany's energy storage market will grow elevenfold in megawatt terms between 2015 and 2021 to reach an annual value of $1.03 billion.

According to both GTM Research and IHS, the residential sector is a major driver for battery storage.

"Germany already possesses one of the world's largest residential energy storage markets," said Brett Simon, GTM Research energy storage analyst and author of the report. "A number of variables, including declining feed-in tariffs, high electricity prices, and the KfW 275 programme are fuelling substantial interest in residential energy storage for self-consumption." KfW 275 programme is an incentive for energy storage systems paired with new or existing solar installations.

Marianne Boust, principal analyst, IHS Markit said: "Looking ahead to the future, half of all energy storage will come from households and businesses seeking to control their energy consumption, which will massively disrupt the traditional business models from established utilities and large equipment manufacturers."

A new report from Navigant Research forecasts that DER capacity is expected to drive $1.9 trillion in investment from 2015 to 2024. In the coming decade, most countries are expected to see more DER capacity additions – largely in the form of solar PV, generator sets, and energy storage, with the ratio of DER capacity deployment compared to centralised generation expected to reach 5:1 by 2024.

Mackinnon Lawrence, senior research director with Navigant Research, commented: "The shift away from centralised generation is going to require grid operators to develop more innovative technologies and solutions."

German utilities optimistic despite losses

E.On and RWE, Germany's two largest utilities, are confident that restructuring moves will bear fruit despite posting heavy losses.

Both companies have been hit hard by Germany's switch from nuclear and fossil fuels to renewables. Electricity generated from coal and gas has been squeezed out of the market by heavily subsidised wind and solar.

E.On has responded by splitting into two. Conventional power generation assets and energy trading have been grouped under a new division known as Uniper (Unique Performance) to be floated in September, while the renewables, networks and customer solutions businesses remain with E.On.

In August, E.On reported a net loss of €3 billion for the first half of 2016, after writing off €2.9 billion on the value of its conventional power stations. The company, however, affirmed its forecast for full-year 2016, expecting group adjusted EBIT of €2.7 to €3.1 billion and adjusted net income of €0.6 to €1 billion.

Customer Solutions' adjusted EBIT increased by €131 million to €659 million, while Renewables' adjusted EBIT rose by €53 million to €254 million.

E.On's CEO Johannes Teyssen said: "The developments on the energy market demonstrate unambiguously that E.On chose precisely the right strategy; namely, to seize opportunities in the new energy world. Customers want innovative, renewable, and digital energy solutions. And that's exactly what they'll get from us."

RWE also reported a drop in earnings due to unexpected losses in its trading business, but said the turnaround at its UK supply business was beginning to deliver positive results.

Earnings before interest, tax, depreciation and amortisation fell by 5 per cent to €3 billion in the first half of the year.

Like E.On, RWE is restructuring itself, forming a new subsidiary for renewables, grids and retail called Innogy. Around 10 per cent of Innogy's shares will be listed on the market via capital increase before the end of the year.

The company said Innogy would see earnings before interest, tax, depreciation and amortisation (EBITDA) of between €4.1-€4.4 billion this year, and €4.3-€4.7 billion in 2017. This compares to RWE as a whole which is forecast to have a total EBITDA of just €5.2-€5.5 billion for this year.

Block Island prepares for launch

- Massachusetts law sets offshore target
- Dong makes Bay State application

Siân Crampsie

The USA's first offshore wind farm has entered its testing phase after completion of turbine installation last month.

Deepwater Wind said it installed the final turbine blade at the 30 MW, five-turbine Block Island wind farm off the coast of Massachusetts on August 18th and that it expects the facility to start generating in the autumn.

The completion of the project marks a new era for the US wind industry, with other offshore wind farms waiting in the wings and continued strong growth in the onshore wind energy sector.

Last month Danish utility Dong Energy applied to use 800 MW of interconnection capacity at Brayton Point in Massachusetts for its Bay State offshore wind project, which could have a capacity of up to 1000 MW.

Its application came as Massachusetts Governor Charlie Baker signed into law an energy bill requiring utilities in the state to sign contracts for 1.6 GW of offshore wind power.

The legislation is the first of its kind to carve out a specific target for offshore wind and was welcomed by developers such as Dong, who said it would enable the creation of a viable offshore market in Massachusetts.

"With this legislation, Massachusetts shows clear leadership in setting out a strong ambition for offshore wind," said Thomas Brostrøm, General Manager of North America, Dong Energy Wind Power.

"The offshore wind industry has the potential to create thousands of local jobs up and down the East Coast, and Massachusetts has positioned itself to be the leader in making the industry a reality. Additionally, this creates the right environment for competition between the developers allowing the best value for ratepayers for any offshore wind contracts awarded."

Wind capacity in the USA reached almost 74 GW last year, according to the Department of Energy (DOE).

In its *Wind Technologies Market Report*, DOE said annual installations increased by 77 per cent in 2015 to 8.6 GW, making wind power the most deployed generating source in the US.

The American Wind Energy Association (AWEA) says that the USA reached 74 821 MW installed wind power capacity by mid-2016 and there are now more than 18 200 MW of wind farms under construction or in advanced stages of development.

Growth in the sector has been driven by low technology costs and the Production Tax Credit (PTC), which is set to decrease for projects entering construction in 2017.

PG&E eyes energy management

Pacific Gas and Electric (PG&E) has announced plans for a pilot project in California to demonstrate the effective management of distributed energy resources in the grid.

The firm has brought GE on board to help implement the project, which will focus on maintaining reliable operation of the distribution network with the increase in distributed energy resources (DER) such as solar photovoltaic (PV) and battery storage.

Increasing DER penetration levels are expected to create operational challenges for utilities. However, through effective management of DERs, these challenges can be overcome and opportunities to utilise the flexibility of DERs for operational benefit realised, said GE, which will supply its Grid IQ Insight technology.

California is particularly advanced in the adoption of DER. PG&E has more than 2700 MW of installed distributed generation (DG) capacity and adds approximately one new solar customer every seven minutes. Other states are catching up, however.

Last month Consolidated Edison held its first auction to provide critical load relief on peak power days in New York City, while in Arizona, Tuscon Electric Power is to install a solar farm equipped with a battery.

Consolidated Edison said that the initiative would cut energy usage by 22 MW by 2018 during peak times, and enable it to defer the construction of a $1.2 billion substation.

One of the winning bidders – Demand Energy – said it would soon begin the installation of "multiple megawatts" of energy storage in New York City.

PG&E's pilot project will explore the use of DER flexibility to mitigate operational impacts on the distribution network, through a combination of solar PV and battery storage devices, in conjunction with smart inverter technologies.

By optimally matching energy produced locally from DERs with consumption, utilities are able to ensure grid reliability and power quality while reducing the need for additional grid reinforcement and capital expenditure and lowering energy costs for end users, GE said.

In Arizona, Tuscon Electric Power has tasked E.On with the installation of a 10 MW battery and 2 MW solar farm.

E.On will construct, own and operate the solar park under a ten-year deal with Tuscon Electric Power.

Bolivia progresses hydro plans

Bolivia is moving ahead with the development of a 3676 MW hydropower project.

State power firm Ende has awarded Italian firm Geodata a contract to carry out a technical design study for the El Bala project, planned for the Beni River in La Paz.

The $6 billion project would comprise two power plants – the 3251 MW Chepete plant and the 425 MW Bala project. The studies will take 15 months, according to state news agency *ABI*.

El Bala is part of a concerted effort by Bolivia to reduce its dependence on thermal power generation. Ende recently held a tender for the development of the 400 MW Rositas hydropower plant.


Bolivia is looking to hydropower to reduce its dependence on thermal generation

Chile tender cuts costs

- Mainstream to build seven wind farms
- Auction price lowest in ten years

Chile's government believes that energy bills could fall from 2021 following a competitive tender for power generating capacity.

The government said that the average winning price in the tender was $47.6/MWh, the lowest price since tenders started a decade ago. The tender attracted 84 bids for 85 000 GWh/year, almost seven times more than the 12 430 GWh that was awarded by the National Energy Commission (NEC).

Mainstream Renewable Power won concessions to develop 986 MW of generating capacity in the auction, while Endesa Chile won 6300 MW, including hydro, thermal and wind energy capacity.

The government said that following the tender energy bills would fall by 20 per cent from 2021. The average price was 40 per cent below the average price of $79.3/MWh reached in 2015 and 66 per cent below the average price of $130/MWh reached in 2013.

Mainstream will develop seven utility-scale wind farms in Chile with a total investment value of $1.65 billion, it said. The projects have 20-year contracts and will start operating by January 2021.

Chilean firm Besalco Energías Renovables will also build seven wind farms that will add 986 MW to Chile's grid.

Other wind power project developers in the auction included WPD, a German company that operates Malleco, Negrete and Santa Fe wind farms in Chile, and Acciona, which will build the 183 MW San Gabriel wind project in the Southern Araucanía region.

Ibereólica will develop the Cabo Leones project in the northern Atacama region, NEC said, while SunEdison won a bid to develop the María Elena solar project.

Thailand to open renewables bids

■ Bidding for 1000 MW of renewables ■ Projects worth over $1.7 billion

Syed Ali

Thailand's Energy Regulatory Commission (ERC) is opening bids for investors to develop renewable power plants with a combined generating capacity of 1000 MW. The renewable power projects will be worth an estimated Baht60 billion ($1.73 billion) over the next two years.

ERC commissioner Veeraphol Jirapraditkul said the ERC would open bids gradually throughout the second half of this year.

The projects include biomass power plants in the three southernmost provinces with a combined generating capacity of 36 MW. The bid was proposed in April and is under consideration by the ERC. Power purchasing agreements for this round are to be concluded this year, with the Provincial Electricity Authority (PEA) due to be the buyer.

Another bid for biomass and biogas power plants with a combined capacity of 400 MW nationwide is due to open in the third quarter.

The bid for solar farms under the state agency's project with a combined capacity of 400 MW was due to be issued in August. The ERC will also open bids for solar rooftop projects with a combined generating capacity of 100 MW. Electricity will be bought by the PEA and the Metropolitan Electricity Authority.

There are also bids for a combined 50 MW opened for power produced from industrial waste and another combined 130 MW of power produced from municipal waste.

Veeraphol said the ERC has been conducting public hearings on waste-to-energy projects in local communities since early this year.

Thailand generators are increasingly looking to grow their renewables portfolio – even those that have their roots in the fossil fuel sector.

In August, SET-listed coal miner Banpu Plc, Asean's biggest coal miner in terms of production, said it is poised to expand its renewable power business in the region as well as in Australia.

The company is aiming to increase its position in solar power, wind, hydropower and geothermal power plants.

The expansion will be via a subsidiary, Banpu Power Limited, which will increase its power-generating capacity to 2400 MW by 2018 with an investment of $110 million, said chief executive Mrs Somruedee Chaimongkol. Then from 2018-25 the company will raise generating capacity to 4300 MW with another outlay of $800 million.

"Renewable power in this region has high potential and we want to capture that with this business opportunity," said Somruedee.

Banpu has rebalanced its business from a coal miner into the power sector over the last several years to alleviate risks stemming from the steep drop in global coal prices.

Of the additional power generating capacity it has planned, some 1000 MW would be from renewable energy. That means renewable energy would comprise 20 per cent of its total capacity, up from 7 per cent.

Subsidy squeeze forces solar bankruptcies

Bankruptcies of companies involved in Japan's solar power generation sector look set to hit a record high in 2016 as the falling government subsidy squeezes profits and discourages new entrants into the sector.

According to Tokyo Shoko Research, which specialises in bankruptcy data, there were 31 bankruptcies at companies dealing with solar power generation for the six months through June, a 24 per cent jump from the same period a year ago. In 2015 there were 54 solar power-related bankruptcies for the year, up from 28 in the previous year.

Japan's solar industry growth accelerated in 2012 when utilities were ordered to buy a portion of their electricity from renewable power plants to help meet a shortfall in supply after the shutdown of its reactors following the meltdown at the Fukushima nuclear power plant.

The government had offered a 20-year subsidy to developers of new renewable energy plants through a feed-in-tariff (FIT). However, the level of FIT has fallen every year. This year the FIT has been almost halved from the initial 40 yen/kWh ($0.39/kWh).

"There were a series of new entries of solar power-related companies, which included sales of systems and construction works, when the subsidy was introduced," Tokyo Shoko Research said in a statement. "But weaker companies started disappearing as [the] FIT fell and competition increased."

Japan's solar power generation capacity was expected to be about 7.2 GW in the year to March 31, 2016, based on the number of panels sold, down from 9.2 GW in the previous fiscal year, according to the latest data from the Japan Photovoltaic Energy Association (JPEA).

"This year is going to be tough for the industry," said Masaaki Kameda, secretary general at JPEA.

Solar power generation in Japan will start increasing again from around 2020 due to falling facility costs, Kameda said.

Philippines eyes gas and renewables

The Philippines is eyeing gas and renewables as a solution to help ease power shortages in the short term.

In August the government said it is looking to build a 200 MW liquefied natural gas (LNG) fired power plant to provide emergency power to the Luzon grid, Department of Energy (DOE) Secretary Alfonso Cusi said.

A gas fired plant is faster to build and is a cleaner source of power than a coal facility, he said. The plant would be one of several potential new gas fired plants being planned in the country. The DOE has instructed the Philippines National Oil Co. (PNOC), the DOE's corporate arm, to conduct a feasibility study for the plant.

Cusi said PNOC is looking at its Batangas property for the LNG power plant, which will complement upcoming plants from the private sector.

Upcoming power projects include the 400 MW LNG plant of Energy World Corp. (EWC) in Pagbilao, Quezon; the 414 MW San Gabriel and 97 MW Avion natural gas fired power plants of First Gen Corp., both in Batangas.

At the same time renewable energy sources are also winning favour. In early August Lopez-led geothermal and wind energy company Energy Development Corp. (EDC) said it has been cleared to conduct grid impact studies (GIS) for seven potential wind projects in Luzon and Visayas with over 1.7 GW of capacity.

Manila Electric Co. (Meralco) also said it is looking to build its renewables portfolio. Meralco President Oscar Reyes recently said the company is looking to enter the solar industry with 50 MW of utility-scale, or ground-mounted, solar projects soon while also working on solar rooftop projects.

Last year, Meralco said it is pursuing renewable energy (RE) projects such as solar, wind, run-of-river and hydropower, as part of plans to diversify its power generating portfolio.

Meralco chairman Manuel Pangilinan had said the group will be spinning off a new unit for RE investments, a separate entity from the group's power generating unit Meralco PowerGen Corp. (MGen). The entity will be called MSpectrum, which will be the main vehicle for solar rooftop and utility-scale investments.

In the next three years, Meralco is targeting up to 100 MW from solar rooftops, of which 20 MW is being looked at in the first year of operations of MSpectrum.

Hinkley delay fuels energy policy debate

Prime Minister Theresa May's decision to review the contract for the construction of a new nuclear power plant has further damaged investor confidence in the UK's energy sector, business groups believe.

Siân Crampsie

The UK's decision to put the Hinkley Point C nuclear power plant on hold has added further confusion and chaos to the country's energy policy, unions and business organisations have warned.

The £20 billion ($26.4 billion) project, which is sited on the Somerset coast in southwest England, is intended to be a 3.2 GW power station based around two pressurised water reactors designed by Areva.

Last month the Institution of Chemical Engineers (IChemE), having initially praised EDF for making a final investment decision on Hinkley, expressed "grave concern" at new Prime Minister Theresa May's decision to review EDF's contract.

In a statement, IChemE said: "The delay brings further confusion to UK energy policy on top of a period of considerable upheaval that has seen the withdrawal of government support from wind and solar projects, a continued loss of coal-fired generating capacity, and the shock cancellation of a £1 billion capital grant for carbon capture and storage in November 2015."

IChemE added that the delay to Hinkley would also cast doubt on the UK's carbon reduction strategy, while engineering union Prospect said it was "chaotic and potentially disastrous".

Prospect deputy general secretary Garry Graham said the decision was "incomprehensible", and, seen in the context of other recent changes to energy policy, would send "a chill wind through the sector in terms of investor and business confidence" while energy margins continued to decline.

Business group CBI also expressed concerns about the impact of Mrs May's decision on business confidence. "The UK is facing a major investment challenge to ensure a secure, low-carbon and affordable energy supply," said Josh Hardie, CBI Deputy Director-General. "It's crucial that we see clear and timely decisions, and send a definite message that the UK is well and truly open for business.

"In particular, clarity is needed around the next Contracts for Difference auction and the post-2020 Levy Control Framework, to build investor confidence."

The Institute of Directors (IoD) recently released the results of a new survey showing that business leaders believe that successive governments over the past 16 years have failed to implement an energy policy that delivered secure and low-cost energy supplies.

A poll of nearly 1000 bosses showed that while governments have succeeded on renewable energy and low carbon targets, they had underplayed the importance of energy security and affordability.

The IoD says that energy policy in the UK "is creating all sorts of bizarre outcomes". However it did back Mrs May's decision to review the EDF deal.

"The IoD backs nuclear as a reliable source of low-carbon energy, but each project has to make economic sense. Hinkley Point C would generate reliable power for 5 million homes, but given the costs, the government is right to take one final look before signing off on the deal."

Reviewing the deal puts off addressing the UK's looming energy gap, however, according to the Association for Consultancy and Engineering (ACE). "The UK continues to face an unprecedented challenge to ensure energy supplies meet future demand and this will not be surmounted if projects continue to face the kind of uncertainty that has blighted Hinkley, which was due to begin generating electricity next year under the original plans," ACE chief executive, Dr Nelson Ogunshakin, said.

Poland dives into offshore wind

The Polish government has awarded an environmental permit for the country's first offshore wind farm.

Regional Directorate of Environmental Protection (RDOS) in Gdansk awarded Polenergia the permit for its proposed 600 MW Baltic Srodkowy III offshore wind farm in the Baltic Sea.

The $2.5 billion wind farm would consist of 120 wind turbines installed 23 km off Poland's northern coastline. Polenergia will now work on finalising the technical design of the wind farm and obtaining building permits.

Construction of the wind farm could start in 2019. Its development would provide the country's wind sector with a boost after new legislation introduced by the Polish government this year effectively prevents the construction of new onshore wind farms.

Macquarie closes on Tees REP

The world's largest new-build biomass plant is set to start construction after the partners developing the project reached financial close.

Macquarie Capital and Macquarie Commodities and Financial Markets announced the successful completion of £900 million ($1187 million) of funding for the 299 MWe biomass combined heat and power plant at Teesside, northeast England.

Partnering with MGT, Macquarie has commercialised, structured and financed the Tees Renewable Energy Project, through from development to financial close. Construction will start "imminently" and be completed by 2020.

Macquarie will own 50 per cent of the equity in the project, while Danish pension fund PKA will own the remaining 50 per cent.

Low carbon call for Horizon 2020

- New work programme rules
- Larne CAES funding award

The European Commission is planning to support the development of next-generation clean energy technologies, it has announced.

Through its Horizon 2020 research and innovation programme, the Commission has launched a €94.5 million call for project proposals aimed at advanced renewable energy technologies.

The call was issued as the Commission announced that it would release €8.5 billion in 2017 under the Horizon 2020 scheme.

However, it has outlined new rules for funded projects on research integrity and open science.

The recent clean energy call is seeking proposals by November on three key topics: new knowledge and technologies (€20 million); developing the next generation technologies of renewable electricity and heating/cooling (€64.5 million); and social sciences and humanities support for the Energy Union (€10 million).

The call includes ocean energy power generation technologies with the aim to increase performance and reliability of ocean energy subsystems, and to develop advanced ocean energy subsystems including innovative power take-off systems and control strategies. These would result in the decrease of the overall cost of ocean energy.

Under new work programme rules for Horizon 2020 projects, free online access to scientific data will become the norm, a move that the European Commission hopes will boost competitiveness and collaboration, and avoid duplication of work.

Grant beneficiaries will have to take measures to enable third parties to access, mine, exploit, reproduce and disseminate research data underlying their scientific peer reviewed publications free of charge.

- The Larne compressed air energy storage (CAES) project has been awarded an additional €8.28 million by the EU's Connecting Europe Facility (CEF). The award will support the drilling of an appraisal well as well as detailed studies into the design and commercial structure of the 330 MW energy storage scheme.

Eskom puts CSP contract on hold

■ Avon peaker start operating ■ Nordex commissions wind farm

Eskom says that a 20-year power purchase agreement (PPA) due to be signed with the developer of a concentrating solar power (CSP) plant has been postponed "until further notice".

Eskom had been due to sign the PPA with Redstone Solar Thermal Power Project at the end of July and said that the postponement was "purely on conditions precedent not being met".

The agreement would have seen Eskom buy 100 MW from the project for an estimated R50 billion ($3.5 billion) for the duration of the contract.

The Redstone power plant was selected under bidding window 3.5 of South Africa's Renewable Energy Independent Power Producer Programme (REIPPP). It is being developed by California-based SolarReserve and Saudi firm ACWA Power.

The project would consist of SolarReserve's proprietary CSP tower technology coupled with molten salt thermal energy storage that would enable 12 hours of full-load energy storage. The project site is in Postmasburg, Northern Cape province.

Redstone's developers planned to start construction in September, according to a recent report by Ecofin.

Eskom said that it expected to conclude PPA contracts for projects awarded under bid windows 3.5, 4 and 4.5 during the 2016/17 financial year.

SouthAfrica'sREIPPPwaslaunched in 2011, calling for the addition of 3725 MW of renewable energy capacity. Eskom says that to date, it has contracted for 3901 MW of renewable IPP capacity, of which 2145 MW has been connected to the grid.

Eskom says it is expecting 1030 MW from the REIPPP to be commissioned during 2016/17, including 504 MW of wind, 510 MW of solar PV, 4 MW of hydro and 11 MW of landfill.

Bringing new capacity online and implementing plant maintenance programmes has allowed Eskom to go one year without load shedding. Generating capacity was given a further boost when the 670 MW Avon power plant, the largest IPP in South Africa, entered commercial operation.

Avon is an open cycle gas turbine plant located in Shakaskraal, 65 km North of Durban in KwaZulu-Natal Province, and was developed under South Africa's gas fired generation peaker programme.

Meanehile, Nordex has announced the start-up of the 134 MW Amakhala Emoyeni wind farm, the firm's largest development to date in South Africa.

The wind farm is situated in the Eastern Cape Province between Bedford and Cookhouse, and consists of 56 N117/2400 turbines. As part of the turnkey installation, in addition to delivering and setting up the turbines, the Nordex Group was also responsible for laying the foundations and cables for the wind farm.

World Bank suspends Inga 3 funding

Development of the first phase of what could become the world's largest power project could stall after the World Bank withdrew its technical assistance funding.

The Inga 3 hydropower project will form part of the Democratic Republic of Congo's Grand Inga hydropower scheme – a 40 000 MW development on the Congo River.

The World Bank said that it had suspended disbursements of funding following "the government of DCR's decision to take the project in a different strategic direction to that agreed".

The World Bank in 2014 approved a $73.1 million grant from its International Development Association (IDA) for the project, consisting of Inga 3 Basse Chute development support and mid-size hydropower development support. It had already disbursed six per cent of funds, it said.

The funds were designed to finance a flexible suite of technical assistance, including strategic advice to the government, complementary studies, capacity building, and institutional strengthening. The project aimed to support a government-led process for the transparent development of Inga-3 BC as a public private partnership.

The World Bank says it is "continuing dialogue" with DCR's government about the implementation of the 4800 MW Inga 3 project with a "goal of ensuring that it follows international good practice".

Inga 3 consists of two phases – Inga 3 Basse Chute and Inga 3 Haute Chute. The Grand Inga scheme would be developed in seven phases, starting with Inga 3. It would cost an estimated $14 billion and flood an area of 22 000 ha, displacing some 35 000 people.

Egypt inks Saudi link approval

Egypt's parliament has approved a historic agreement aimed at linking the country's electricity grid with that of Saudi Arabia.

The approval follows a deal signed by the two countries' heads in November 2015 and reflects growing economic cooperation between Cairo and Riyadh.

The link would be made via overhead lines and submarine cables in the Gulf of Aqaba, as well as substations in Badr, Egypt and Madina and Tabuk, Saudi Arabia. It will be financed by a loan from the Kuwaiti Fund for Arab Economic Development.

The link would enable both countries to share electricity generating resources. The Egyptian Company for Electric Transfer will implement the substation and overhead lines in Egypt as well as the submarine link; Saudi Electricity Company will implement the infrastructure in Saudi Arabia.

The project will enable the exchange of up to 3000 MW of energy.

Paris Agreement list grows

The number of countries that have ratified the Paris Agreement has reached 23 with the ratification by Peru, Bahamas, Cameroon and South Korea over the last month.

This means that the climate agreement could enter into force this year. The Paris Agreement requires the ratification of 55 nations representing at least 55 per cent of global emissions for it to be enforced.

Several countries are making progress towards ratification while a further 20-odd nations have publicly stated their intentions to ratify. Nations that have stated their intention to ratify the climate deal include China, the US, Mexico, Canada and Australia. Russia, India and Saudi Arabia have also given positive signals with regards to ratification.

China and the US are set to jointly announce their ratification before the G20 summit in early September. China and the US account for about 38 per cent of global greenhouse gas emissions, according to the World Resources Institute.

Notably, Brazil's approval is also still pending. Approval of the deal at the national level would likewise be a significant step forward as the country represents over two per cent of global emissions.

In the UK, environmental group WWF has called for the government to ratify Paris in order to show that it remains committed to combating climate change post-Brexit.

"The UK and other governments agreed in Paris to pursue efforts to limit global temperature rise to 1.5°C, said Dr Stephen Cornelius, Chief Adviser on Climate Change at WWF-UK. "Following Brexit, the UK ratifying the Paris Agreement would show that the government remains serious about addressing climate change.

"By signing up, the UK could also tip the Paris Agreement above its entry-into-force threshold this year."

Wind firms ride wave of growth

The booming wind energy market is good news for wind OEMs, but an increasingly competitive market means that current strategies will determine future success.

Siân Crampsie

Strong growth in the global wind energy sector has enabled wind turbine manufacturers and project developers to record robust results in the first half of the year.

Nordex reported a 34.9 per cent increase in sales to €1484 million for the first half of 2016 with operating profits rising 55.4 per cent to €136.6 million, leading the firm to raise its earnings guidance.

The acquisition of Acciona Windpower in the second quarter of 2016 helped contribute to Nordex's order intake and will play an even more important role in the second half of the year, Nordex said.

Gamesa has also raised its earnings guidance for the year on the back of a strong 1H performance, which included record revenues and order intake and a 42 per cent increase in net profit to €138 million.

Growth has been strong in India, Latin America, Europe and the USA, according to the Spanish firm, which is undergoing a merger with Siemens Wind Power.

Elsewhere Danish utility Dong recorded a DKK 6.4 billion (€860 million) net profit for the first six months of 2016, up 129 per cent compared to DKK 2.8 billion net profit reported for the first half of 2015, largely driven by a strong growth in the company's wind power division.

The underlying profit, adjusted for one-off items, increased by 34 per cent, driven by a 68 per cent rise in wind power, Dong announced.

The global wind market is one of the fastest growing energy markets in the world, according to Navigant Research, and a rapid scale-up of wind turbine technology over the past decade has resulted in more efficient machines and a sophisticated, large-scale supply chain.

These factors have helped wind energy firms to grow, but the market is becoming increasingly competitive, says Navigant. This is forcing OEMs and developers to constantly work and develop strategies to maintain their market positions and growth rates.

A mix of qualitative and quantitative factors will determine success in the market, including product offerings, geographic diversification, strategy and execution, said Navigant, which recently published rankings of the world's top wind turbine OEMs.

Jesse Broehl, senior research analyst with Navigant Research, said: "Today's top-tier vendors are excelling by showing brisk activity throughout many global markets and have an exceptional command of manufacturing, supply chain, and business relationships."

Increasing competition has already driven several mergers in the wind energy sector, including Nordex-Acciona and the Gamesa-Siemens Wind Power deals.

Nordex said that the Acciona acquisition has already had a positive effect on its business, including the addition of new markets in the Americas and emerging markets. Installed capacity rose by 91 per cent to 1165 MW in the first half, while rotor blade output climbed by 98 per cent, Nordex reported.

Gamesa said it was advancing its merger with Siemens Wind Power, which was agreed in mid-June.

The proposed merged Gamesa-Siemens business would be headquartered in Spain and would bring synergies of around €230 million.

Navigant's wind power "leader board" puts Vestas, GE Energy, Siemens and Gamesa at the top of global wind turbine OEMs.

Its leader board is based on annual MW installed as well as their strategies and execution, product offerings and geographic presence.

Pension plans raise stakes in Cubico

Two of Canada's largest pension firms have bought Cubico Sustainable Investments Limited, signalling a continuing move by the pensions sector to invest in sustainable businesses.

The Public Sector Pension Investment Board (PSP Investments) and Ontario Teachers' Pension Plan have acquired an indirect interest in Cubico from Banco Santander, making them the sole ultimate shareholders of Cubico, on a 50-50 basis.

Cubico CEO Marcos Sebares said that the firm saw the deal "as an important endorsement" of its strategy and capabilities.

"We remain committed to supporting Cubico's management team as they execute on their strategy of delivering high returns in the renewables sector," said Andrew Claerhout, Senior Vice-President, Infrastructure at Ontario Teachers'. "Ontario Teachers' is proud to be supporting the continued conversion from hydrocarbons to clean and renewable sources of power. Cubico's flexible investment and acquisition approach fits well with Ontario Teachers' approach to private investments."

Cubico operates a portfolio of approximately 2 GW of assets spread throughout eight countries. Last month it acquired, in partnership with Plenium Partners, a 67 MW wind farm in Valencia from Spanish firm Enerfin.

Renewables offer "safe bets" for investors

Mergers and acquisitions focused on renewable energy and regulated assets lead a 105 per cent year-on-year increase in global power and utilities deals in the second quarter of 2016, according to EY.

EY's power transactions and trends 2Q 2016 report shows that deal values totalled $43.5 billion in Q2 2016 – down slightly from a strong first quarter of $44.4 billion. Deal volume grew 33 per cent over the same period in 2015 and 10 per cent over Q1 2016.

"Ongoing sector and global volatility continues to be at the forefront of investors' minds," said Matt Rennie, EY Global Power & Utilities Transactions Leader. "In the second quarter we saw this play out in the form of buyers seeking safe bets in renewables, where demand continues to rise in developed and emerging markets, and regulated transmission and distribution assets that offer stable, long-term returns."

Deals involving renewables and regulated assets accounted for 52.3 per cent – 67 deals – of total deal volume, with a cumulative worth of $13 billion.

Rennie added: "The trend toward investment in disruptive technologies is also gathering pace. Both utilities and non-traditional investors are shifting their focus to areas like distributed energy and battery storage. And, as consumer demand increases, more M&A will follow."

SolarCity agrees to Tesla takeover

Tesla says that it will create "the world's only vertically integrated sustainable energy company" through a deal to takeover SolarCity.

The two companies have agreed to a $2 billion all-stock offer under which SolarCity shareholders will receive 0.11 Tesla shares for each SolarCity one.

The deal values SolarCity's stock at around $25 per share and has led to concerns over a conflict of interest for Elon Musk, the business magnate who is co-founder and CEO of Tesla as well as chairman of SolarCity, which is run by his cousins, Lyndon and Peter Rive.

Electric car firm Tesla recently added domestic-scale battery storage technology to its product range and says that solar energy is a natural addition. "Solar and storage are at their best when they're combined," the firm said in a statement. "As one company, Tesla (storage) and SolarCity (solar) can create fully integrated residential, commercial and grid-scale products that improve the way that energy is generated, stored and consumed."

It added: "Now is the right time to bring our two companies together: Tesla is getting ready to scale our Powerwall and Powerpack stationary storage products and SolarCity is getting ready to offer next-generation differentiated solar solutions. By joining forces, we can operate more efficiently and fully integrate our products, while providing customers with an aesthetically beautiful and simple one-stop solar + storage experience: one installation, one service contract, one phone app."

The takeover would create cost synergies of $150 million in the first full year of closing, Tesla said. It also expects to be able to reduce costs for customers after the deal by lowering hardware costs, reducing installation costs, improving manufacturing efficiency and reducing customer acquisition costs.

Tesla expects the deal to close in the fourth quarter of 2016.

Americas

EDF RE confirms Vestas order

EDF Renewable Energy (EDF RE) has confirmed it has placed an order with Vestas for the supply of 160 MW of turbines for wind energy projects in the USA.

The latest order will add to the 2000 MW of Vestas wind turbines already installed in the USA by EDF RE, Vestas said.

"This order secures EDF Renewable Energy's ability to capture the full value of the production tax credit (PTC) by strategically deploying our versatile 2.0 MW platform on a variety of wind sites, delivering more cost-competitive wind energy to rate payers throughout the US," said Chris Brown, President of Vestas' sales and service division in the United States and Canada.

Nordex to build 66 MW in Brazil

Nordex is to install 22 AW125/3000 turbines in Brazil for EDF Energies Nouvelles' Ventos da Bahia I wind farm.

The 66 MW Ventos da Bahia I wind farm is located in the state of Bahia in eastern Brazil. The order is the first in Brazil for Nordex since its merger with Acciona Windpower.

GE powers paper factory

GE Power has been selected to provide an LM2500+ aeroderivative gas turbine for a new natural gas cogeneration plant at a paper mill in Mexico.

The new facility will generate electricity and heat for the factory, which is owned by Bio-PAPPEL and primarily makes uncoated woodfree paper in large rolls and cut size paper for printing and copying as well as notebooks for customers in Mexico.

Under the terms of the agreement, GE is supplying the LM2500+ gas turbine unit and a 20+ multi-year services agreement to help Bio-PAPPEL improve reliability and availability of the turbine as well as paper production. As part of the multi-year services agreement, GE will provide remote monitoring and diagnostics-based condition monitoring of the LM2500+ unit to help ensure the power plant's increased availability by extending intervals between maintenance periods.

The unit is expected to begin commercial operation in the first quarter of 2017.

Gamesa wins debut order

Gamesa has secured its first order from French renewable electricity firm Voltalia.

Gamesa will supply Voltalia with 27.3 MW for the Vila Acre wind farm in the state of Rio Grande do Norte, northeastern Brazil. The order comprises 13 of Gamesa's G114-2.1 MW turbines, which are particularly suited to Brazilian wind conditions of constant wind and low turbulence.

Asia-Pacific

Indonesia orders Wärtsilä multi-fuel power plant

Wärtsilä will supply a 23 MW Smart Power Generation plant to PT. Berkah Kawasan Manyar Sejahtera (BKMS), the developer of an integrated industrial and port estate project in Java, Indonesia. The turnkey order includes three Wärtsilä 34DF multi-fuel engines running primarily on natural gas, with heavy fuel oil as the backup fuel. The plant is expected to be operational in summer 2017.

The power station will feed baseload energy to both industrial and residential consumers in one of the largest industrial parks in Gresik, located in East Java, Indonesia.

Gamesa gains repeat order

Gamesa has entered a double agreement with Hero Future Energies, a leading independent power producer (IPP) in India.

Under the two contracts, Gamesa will undertake the supply, erection and commissioning of turbines for the 120 MW wind farm at Kalyandurg, Andhra Pradesh, and for a 50 MW wind project at Bableshwar, Karnataka.

Gamesa will provide its G114 2.0MW T106 turbines for the Kalyandurg project, and its G114 2.0MW T106 turbines for Bableshwar.

"Wind energy is the fastest growing renewable energy sector in the country and India has moved into 4th place in the global cumulative installations ranking," said Ramesh Kymal, Chairman and Managing Director, Gamesa India. "With the policy and private sector thrust falling in place, wind energy will surely become a mainstream source of energy supply and will play a leading role in de-carbonisation."

Capstone wins China order

Capstone Turbine Corporation has received an order for a C600 Signature Series microturbine for a microgrid project in Beijing, China.

Capstone distributor Beijing Haohai Power secured the order from a repeat end-use customer. It will be the first Capstone Signature Series microturbine installed and commissioned in China.

The new Chinese microgrid project will be anchored by a natural gas-fuelled C600S microturbine that will be installed in a CCHP application for a multi-energy complementary smart microgrid. The microturbine will operate in parallel with wind, solar and energy storage systems onsite to provide maximum environmental benefit and optimal return on investment.

IPP orders Suzlon turbines

Wind turbine manufacturer Suzlon Energy has won an order from an independent power producer (IPP) for a 58.8 MW wind power project in Dewas, Madhya Pradesh, India.

Suzlon will supply the wind turbines, and build, commission, operate, maintain and service the project for 12 years. The project will consist of 28 units of Suzlon's S97-120 m hybrid towers with a rated capacity of 2.1 MW each. The wind park will produce enough electricity to meet annual power consumption of about 32 000 local homes.

The plant is expected to be commissioned by March 2017.

PV play for BHEL

Bharat Heavy Electricals Limited (BHEL) has secured an order for the construction of three 10 MW solar photovoltaic (PV) plants in India.

The plants are to be built for West Bengal State Electricity Distribution Corporation Limited (WBSEDCL) in Mejia (Bankura), Santaldih (Purulia) and Chharrah (Purulia) in West Bengal.

The order follows EPC orders for BHEL placed earlier this year for PV plants in Neyveli (Tamil Nadu) and Medak (Telangana) with a combined capacity of 80 MW.

Hornsdale turbines ordered

Siemens has been awarded a contract to supply, install and commission 32 wind turbines, each with a capacity of 3.2 MW and a rotor diameter of 113 m, for the Hornsdale Stage 2 onshore wind farm in South Australia.

The stage 2 wind farm is an extension to Hornsdale stage 1, for which Siemens signed a contract in 2015 with Neoen Australia, part of French renewable energy firm Neoen.

Hornsdale 2 will add 100 MW to the wind farm, and is due to start operating in mid-2017. Siemens will then be responsible for service and maintenance of the wind turbines within the framework of a long-term service agreement.

Europe

MHPSE to retrofit lignite power plant

Mitsubishi Hitachi Power Systems Europe GmbH (MHPSE) – in consortium with parent Mitsubishi Hitachi Power Systems, Ltd. (MHPS) and RUDIS d.o.o., the Slovenian plant constructor – will retrofit the 300 MW Ugljevik lignite power plant with a new flue gas desulphurisation (FGD) system.

The Ugljevik project marks the first retrofit of a coal power plant with FGD in the West Balkans. Installation of the FGD plant will enable reductions of 99 per cent of sulphur dioxide bringing the level below 200 mg/Nm^3 to meet the European "Industrial Emission Directive" (IED).

In the Ugljevik project MHPS and MHPSE are responsible for engineering and delivery of main components (including gypsum silo, fans and air compressors). Plant constructor RUDIS will handle installation and a number of ancillary lots. The plant is scheduled to start commercial operation in July 2019.

ABB supports 'smart network'

ABB has been awarded a contract by Western Power Distribution (WPD) to deploy an innovative flexible power link in Devon, southwest England, which will enable an increase in capacity without the need for infrastructure reinforcement.

Flexible power links are a key part of WPD's Network Equilibrium project, which is supported through the UK's Low Carbon Networks Fund (LCNF). The project, which is being led by Western Power Distribution, will operate as part of a trial across areas of southwest England,. It is designed to balance voltages and power flows across the electricity distribution system, potentially unlocking an additional 344 MW of power capacity locally.

It is estimated that deploying such flexible power links across the UK could release 1.5 GW of capacity by 2050.

Siemens supplies steam turbines

Siemens has received orders from customers in the UK and the USA for a total of nine compact steam turbines.

Dutch energy provider Kara Energy Systems B.V. has ordered three SST-040 units for biomass power plants in Great Britain, while the US-based company Airclean Energy in Seattle, Washington, has placed an order for six SST-110 compact steam turbines.

The orders underscore the growing demand for small units to serve distributed power generation solutions, Siemens said.

The three SST-040 turbines, designed to deliver an electrical generating capacity of between 300 and 420 kW, will be deployed in three biomass power plants in Great Britain. These power plants are scheduled to begin operation between November 2016 and February 2017.

The US company Airclean Energy is integrating the six compact SST-110 steam turbines into complete facilities. The turbines with an output of 3 MW each will be deployed in process steam systems at industrial facilities in the Midwestern US.

Taaleri orders additional turbines

Nordex has received a further call-off from its frame agreement with Finnish asset management company, Taaleri.

Under the deal, Nordex is to supply 11 additional N131/3000 turbines for the Kivivaara-Peuravaara wind farm. It will install them on 144 m tubular steel towers because of the wind conditions at the site, as well as equip the machines with an anti-icing system.

The order makes up the third phase of this wind farm, which will add 33 MW to the site.

International

Tajikistan orders Rogun switchgear

Siemens is to supply the gas insulated high voltage switchgear (GIS) for the Rogun hydropower plant in Tajikistan.

The power plant is part of the Rogun Dam project and Siemens' switchgear will protect the power generation and transmission systems in the hydropower station against short circuits and overloading.

Siemens will provide a 8DQ1 switchgear, covering a voltage range of up to 550 kV with 21 circuit breakers, and a 8DN9, covering up to 220 kV with four circuit breakers.

The 3600 MW Rogun Dam will be located on the river Vakhsh, about 100 km northeast of Tajikistan's capital, Dushanbe. It will be upriver from the Nurek Dam, which is currently the world's highest at 300 m. The Rogun Dam will have a height of 335 m.

The switchgear will be delivered and ready for operation by 2018, Siemens said.

B&V takes on WTE project

MBHE African Power has selected Black & Veatch to provide technical assistance for South Africa's first waste-to-energy (WTE) plant.

The 10 MW plant will be located in the Drakenstein Municipality, near Wellington in the Western Cape. Black & Veatch will serve as owner's engineers to provide fuel characterisation, front-end engineering and design (FEED), and tender support for the engineering, procurement and construction (EPC), operations and maintenance contracts.

The facility will use both wet organic fraction to produce biogas and the dry fraction of locally available municipal waste (MSW) in an effort to provide clean burning natural gas energy to the Drakenstein Municipality region.

In addition to providing a renewable energy resource, the waste management project will help address limited landfill availability by diverting up to 500 tons of MSW per day from the landfill to the WTE plant, reducing the waste volume by 90 per cent.

Oil

Despite recent market optimism, oil prices remain uncertain

- Saudi Arabia intends to protect market share
- Prices expected to stay within $40-$60/b range

David Gregory

We've been here before. Last spring there was much excitement in the oil market when it appeared that Opec and non-Opec countries would meet in Doha and come to an understanding that would freeze oil production and allow rising demand to sop up all the extra oil on the market and thus enable crude oil prices to move beyond those budget-destroying lows. Speculation about that meeting led to an increase in the oil price.

But the Doha meeting failed when Opec leader Saudi Arabia called it off after it became clear that Iran would not involve itself in a production-freezing deal. Market players were gravely disappointed as it failed to set oil back on a rising trajectory.

Now an Opec meeting lined up to take place in Algeria in September with a similar goal has revived prices with Brent crude exceeding the price of $50/b in mid-August. But no sooner had it reached that milestone than prices began to slip again.

To a large extent, the pick-up in the market was fed by statements made by Saudi Minister of Petroleum Khalid al-Falih who last June said that Saudi Arabia was ready to do what it takes to restore balance to the oil market. But in July, Saudi Arabia set a new production record of 10.67 million b/d, hardly action to bring balance to a market whose problem is primarily one of over-supply.

In an interview with the *Saudi Press Agency*, Falih said the output boost was due to the increase in seasonal demand – Saudi burns crude during the summer months for power generation – and "in part to meet higher demand" from its customers.

"Despite the bearish sentiment engulfing the market," Falih told the agency, "we still see strong demand for our crude in most parts of the world, especially as supply outside Opec has been declining fast, supply outages increasing, and global demand still showing signs of strength."

Falih repeated the Saudi position that a rebalancing of the market is already underway, but added that clearing crude and product inventories will take time.

He said the market situation would be discussed at the September meeting, including "any possible action that may be required to stabilise the market".

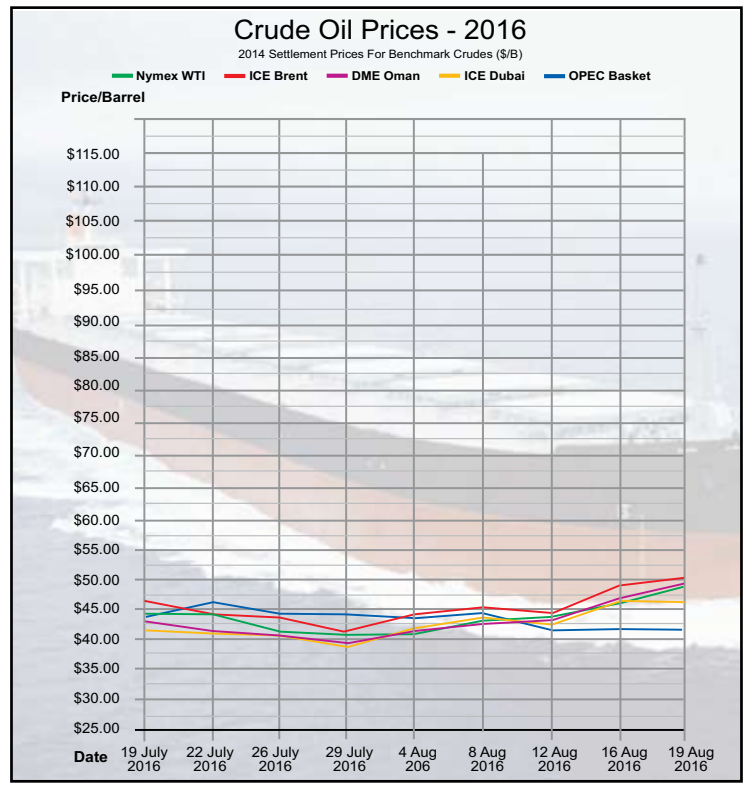
But many market analysts believe that Saudi Arabia is simply mouthing the words and has no intention of doing anything other than protecting its market share. The recent increase in prices has led a number of US shale oil producers to come back into the market. Low prices have seriously injured the US shale oil industry, which is apparently beginning to adapt to market circumstances as the US rig count rises.

The argument is that there is still a large volume of oil out there, despite data that may show some 'tightening'. In Opec's August *Monthly Oil Market Report*, the 14 members averaged an accumulative output of 33.11 million b/d during July, up by 46 000 b/d over the previous month.

Iraq oil production was put at 4.606 million b/d in mid-July, according to Opec data, up by 57 000 b/d over the previous period, while Iran, still working hard to recover from three years of international sanctions, saw production for the period at 3.620 million b/d, up by 10 000 b/d. This hardly suggests that Opec's big producers are trying to restore balance to a saturated market. There are other factors to look at: both Libya and Nigeria are producing crude below their capacities. In Nigeria, the government is facing insurrection in its oil regions, plus incompetence and corruption. In Libya, civil war has brought output down to under 300 000 b/d, while it has a capacity to produce 1.6 million b/d. Should circumstances arise so that either of those Opec members can produce at previously normal levels, there will be even more oil coming to market.

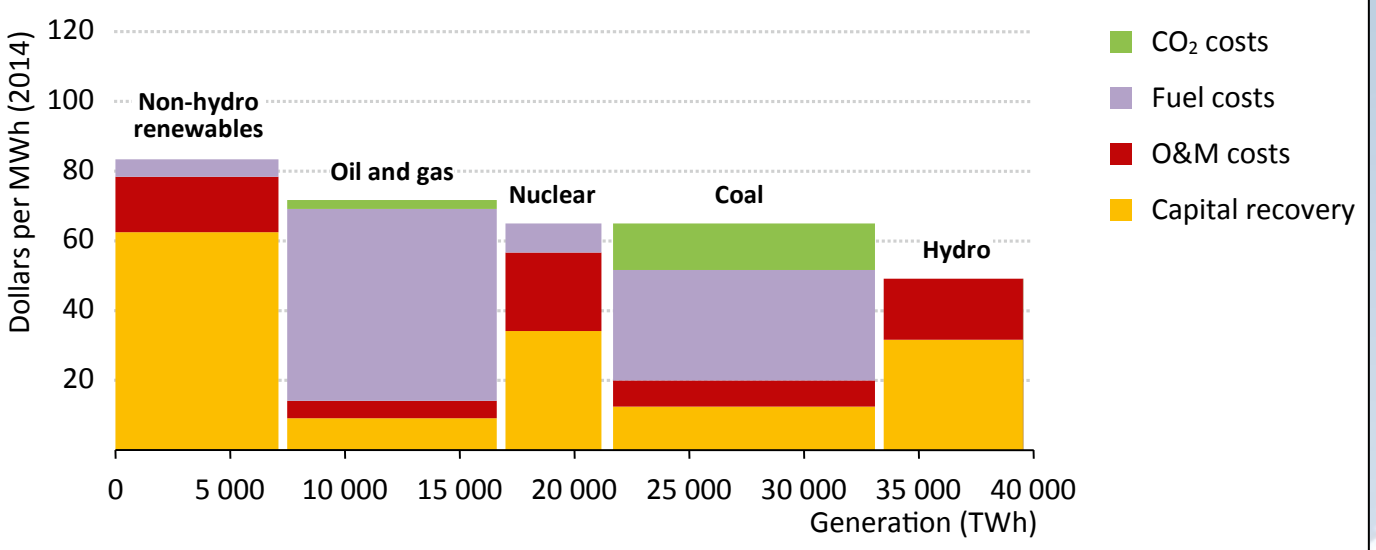
Then there are the US shale oil producers who are reported to be planning new wells to revive production as oil touches $50/b, but it is more likely to remain in the $40/b range for some time.

A number of analysts see the oil price as moving within the $40-$60/b range for the months ahead and possibly into 2017. At this point, the only thing that will set oil prices on a higher course will be some major development that perhaps the world really doesn't want.

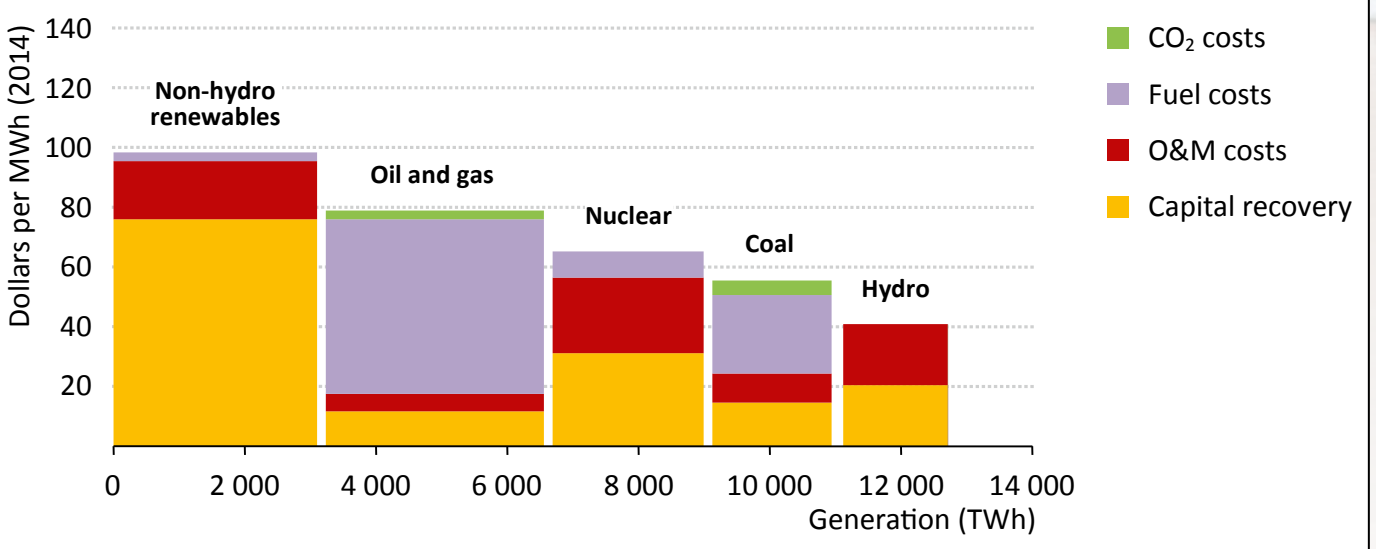


Total power generation costs in the New Policies Scenario, 2040

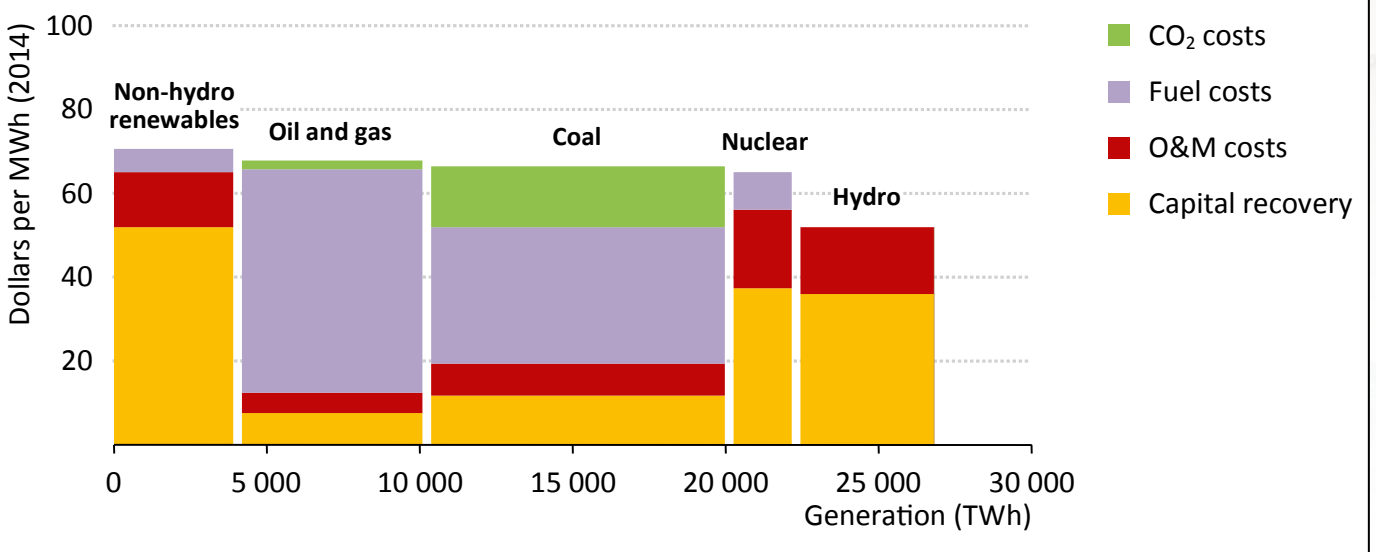
a) World



b) OECD



c) Non-OECD



Note: Capital recovery includes the annuity payments required to recover past capital investments.

World Energy Outlook 2015, © IEA/OECD, Figure 8.10, page 325

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Source: World Energy Outlook 2015

Re-inventing utilities for an insight-driven future

Utilities have a significant opportunity to re-invent their businesses using insight-driven transformation across the entire value chain. While the challenges associated with the transformation may make it appear daunting, the benefits are substantial. **Dr. Mark Powell**

Digital technologies provide immense opportunities for utility companies to offer new services and to change the way customers buy their products. Many UK utilities have adopted digital technologies to enhance customer experience. However, the span of influence for digital transformation covers a much broader value chain that also covers asset optimisation and management, energy consumption, field force optimisation and revenue and debt management.

British Gas' "Connected Home", which enables consumers to control their heating from mobile phones, is one example of digital disruption in utilities. Similarly, E.On has rebuilt its customer engagement using digital technologies to compete more effectively in the retail market. In water utilities, Northumbrian Water is deploying gamification techniques, or elements of game playing, on mobile apps to improve customer engagement.

These initiatives are the exceptions rather than the norm. Utilities are still a long way away from the ubiquitous exploitation of digital tools and technologies that could drive a step change in performance across many areas of the business. According to Capgemini's 'Big Data Black-Out' report, only 20 per cent of global utility companies have used advanced data analytics tools and techniques to drive business change, despite over 75 per cent of companies stating that the use of such approaches was increasingly crucial for their future business success.

Dr. Powell: "We are simply scratching the surface of what is possible with today's capabilities"

> "… only 20 per cent of global utility companies have used advanced data analytics tools and techniques to drive business change…"

We are simply scratching the surface of what is possible with today's capabilities. We know that insight-driven transformation can bring immediate benefits in many areas but this is an outcome – the effect, not the cause. In order to enable a digital enterprise model, utilities must first seek to exploit the nascent value in the vast amount of data they hold across customer, consumption, asset and other sources.

Insight-driven approaches have the potential to transform a huge range of utilities operational processes. The water industry, for example, faces significant challenges posed by an ageing infrastructure and increasingly stringent customer and regulatory demands. The integration of data aggregated from sensors, SCADA (Supervisory Control and Data Acquisition systems) and asset management systems, and blended with external data sources, such as weather data or river levels can enable the development of rich insights and advanced visibility on network leaks.

These insights can then be used to significantly reduce the time taken to predict leaks as well as enabling them to be found much more quickly on the network. This will enable the providers to deliver a much more advanced level of situation awareness, event and incident management, and better decision-making resulting in reducing the overall cost of water supply to consumers

Another massive challenge across all UK utilities is the growing levels of bad debt. According to Ofwat, bad debts in the UK water industry have increased from £1.9 billion in 2012 to £2.2 billion in 2014. Energy and water companies could make much better use of predictive analytics technologies to reduce these levels of debt. With their help it's possible to segment debtors based on their demographics, value of debt or past payment history and arrive at a propensity to pay score. Based on their propensity to pay, companies can roll out various interventions – whether it's immediate debt write-off, a tariff-switching plan or better payment plans.

You can go further than with conventional process-driven approaches to also develop highly customised collection strategies based on the customer specific response predictions. Through continuous monitoring of debtor responses to specific strategies and the ongoing refinement of the risk and propensity models, results can be constantly improved. The combination of these models with the results of marketing and advertising campaigns could ensure that customer acquisition strategies are optimised to acquire customers with low debt propensities.

Over the next four years, The Department of Energy and Climate Change has mandated the installation of 53 million smart meters in 30 million homes and businesses. The sheer volume of accumulated data from these smart meters is forcing utilities to rethink how they exploit this torrent of data. A recent study by C3 Energy suggested that the use of advanced analytics could deliver operational benefits of more than £200/meter per year.

Utilities have historically struggled with the accuracy of their customer and billing data, and the prospect of mass smart metering could present a considerable challenge. Today, utilities take a meter reading per quarter per premise which is four readings per year. With smart meters, it may be every 30 minutes – that's 17 500 meter readings in a year per meter which will generate a tsunami of data. A highly scalable analytics platform is therefore essential to capture and derive insights from this consumption data to forecast usage, help customers optimise their energy usage and improve performance in energy trading markets.

In addition to gaining insights on usage patterns, they can also improve fraud detection, predict maintenance requirement and monitor unbilled consumption identified by following the 'meter-to-cash' trail.

All of these insights gained from improving network operations, analy-sing usage and debt can be combined with customer data to deepen customer engagement. Many utility providers in North America have now begun analysing customer information through machine-based learning. Some are analysing customer behaviours, and defining customer segments by using predictive criteria such as willingness to pay for specialised services or susceptibility to switching or payment default.

British Gas uses an insight-driven campaign to deliver personalised offers to their customers. By using an insight rich customer portal, British Gas provides its customers with the ability to view a personalised breakdown of their energy use. This provides access to itemising daily, weekly, monthly and annual energy use. It breaks down likely spend into items like hot water, heating, lighting and appliances, and therefore offers insights which customers can use to make savings. Comparisons with similar homes in the area are also provided.

Thanks to big data and analytics, E.On was able to provide personalised advice and products to help customers control energy use and reduce their energy bill. EDF Energy has also used similar analytics to reduce customer churn, accruing potential savings of more than £30 million per year.

The delivery of insight transformation is not without its challenges – whether it is organisational barriers, cultural barriers, regulatory barriers or IT challenges. The focus needs to be on the articulation of clear business challenges that could be improved from the application of the advanced analytics tools and technologies now available. This also requires a different focus on the data that sits within the business itself.

In the world of insight, it is the integration of many different, often disparate, data sets that is the key to unlocking the insights that can drive a new level of business performance. We are moving away from the world of process-driven transformation to the world where the next level of business transformation will be insight-driven and data-enabled.

Utilities have a significant opportunity to re-invent their businesses using insight-driven transformation across the entire value chain. Challenges associated with this approach may make it appear daunting, but the benefits are substantial and have already been demonstrated by other insight savvy sectors such as retail and financial services.

The potential gains for utilities are substantial. We have barely scratched the surface of what is possible.

Dr. Mark Powell is Head of Insights & Data, Capgemini UK

Growing tide of optimism

There is growing optimism for the prospects of tidal power following grid connection of the world's largest tidal stream project. **Junior Isles**

An AR1000 launching at the European Marine Energy Centre, where a number of turbines have been tested

While estimates vary, the potential generating capacity of tidal energy is significant. Industry estimates put the global potential at as much as 120 GW. Argentina, Canada, China, France, India, Japan, North America, Russia and South Korea all have significant tidal potential, but it is the UK that is most promising.

With a tidal power resource estimated at more than 10 GW, the UK represents about half of Europe's potential tidal energy capacity. According to the Energy Technology Institute, tidal energy is capable of supplying 20-100 TWh of the UK's annual demand of 350 TWh.

Recognising the ability of tidal energy to help meet both its electricity demand and renewable targets, the UK government is providing support for the technology. It has said that tidal energy projects that are installed and operational by 2017 will be eligible for five Renewable Obligation Certificates (ROCs) as part of the Renewables Obligation scheme put in place to support the emerging renewables industries.

This type of support combined with significant tidal resources has seen the UK become the global leader in the sector. Recently the country reached a significant technical milestone in the development of this nascent industry with the start up of what is seen as a flagship project, not just for the UK but for the global tidal power market.

June saw the connection of the first turbines of the planned 398 MW MeyGen project to the distribution network, making it the world's largest energised grid connection of any commercial tidal stream array.

Tim Cornelius CEO of Atlantis Resources, said: "It is the world's flagship project. Its significance and importance cannot be underplayed. Governments globally are looking to the success of MeyGen to launch their own marine development policies."

The project is being developed by MeyGen Limited, which is 86 per cent owned by Atlantis Resources Limited. MeyGen Ltd was established in 2010 solely for the development of the tidal site in Inner Sound of the Pentland Firth – the body of water that separates the north Scottish mainland from Stroma Island.

When fully developed, the project will consist of 261 x 1.5 MW turbines capable of generating enough electricity to power 175 000 homes. Impressively, all the turbines will be installed in less than 4 km^2 of seabed.

Cornelius expects the cost of electricity from tidal stream generation to fall rapidly

Tidal turbines are very much like underwater wind turbines, except the rotors are driven by consistent fast-moving currents. Water, however, is 832 times denser than air and consequently tidal turbine rotors can be much smaller than wind turbine rotors. They can therefore be deployed much closer together and still generate equivalent amounts of electricity.

The project will be built in phases. Phase 1 will consist of a maximum of 86 turbines (86 MW). Employing a 'deploy and monitor strategy', the initial array deployed in the first two years will provide information on the interactions between the array and the environment and increase the understanding for subsequent phases.

Phase 1a, which goes live in September, consists of six 1.5 MW turbines – one designed by Lockheed Martin and three supplied by Andritz Hydro Hammerfest. These were connected to the onshore converter station built by ABB in June, and will begin feeding power into the 33 kV Ness of Quoys distribution network operated by Scottish Hydro Electric Power Distribution (SHEPD) in September.

Phase 1b, which will be a further 6 MW, will reach financial close by the end of the year. Phase 1c, consisting of 50 turbines or around 70 MW, is expected to reach financial close in 2017.

Phase 2, comprising the build-out of the remainder of the project, will be subject to a separate consent application. Each phase will go through tendering processes for onshore (grid connection and civil works), offshore (construction and installation of the foundations and turbines) and turbine supply packages. The project is planned for completion in the early 2020s.

As with any project, a venture of this scale is not without challenges. Notably, it was the first project to obtain full ministerial consent for offshore construction. Cornelius commented: "This took over five years of working our way through permitting and consenting… It was a process not without its challenges and its costs, but it was well mapped out," said Cornelius.

Over the last 10 years equipment manufacturers have been developing and trialling turbines, which Cornelius says has allowed Atlantis to "leverage off technical and environmental performance data". For example, MCT (Marine Current Turbines) has been testing for many years in Northern Ireland, while the likes of Open Hydro, Alstom (now owned by GE) and Andritz have been testing at the European Marine Energy Centre (EMEC) in Orkney.

Cornelius says that Atlantis is also benefitting substantially from the downturn in the oil and gas market, that has made "a very high quality asset" available at a reasonable price.

He explained: "We're using sophisticated equipment, i.e. offshore construction vessels, which de-risks the installation process. The foundations and gravity bases are installed using heavy lift vessels. After that, we have to be able to install a turbine quickly. The [turbine] installation process using dynamic positioning vessels has been refined to roughly a 90-minute process."

Although it is early days for the project, its benefits are already being recognised.

The part of the distribution network to which MeyGen is now connected is constrained and there is no additional capacity for other generators until transmission upgrade works are completed over the next few years. However, as a result of the predictable and cyclical nature of tidal generation, there is a unique opportunity for other energy projects to gain access to the grid when the MeyGen project is not generating at maximum output.

Just over two weeks after the first phase was connected to the distribution network, MeyGen announced that an agreement had been reached with a nearby wind farm development. Lochend Wind Energy Limited is developing a four-turbine wind farm close to MeyGen's onshore site in Caithness. The agreement will allow the wind turbines to deliver electricity to the grid when the MeyGen tidal project is not making full use of the available export capacity.

"The extra value of tidal power, is that it is so predictable," explained Cornelius. "We've been able to sell the other side of our curve. Because the peak output everyday is sinusoidal and shifts by just one hour a day, a nearby wind farm developer is able make its engineering and financial syndicate comfortable enough that there's enough spare capacity on our node in order to achieve financial close.

"We have priority dispatch when we are generating. When we are not, they can dispatch. This makes much more efficient use of the existing infrastructure. It allows us to bring on wind farms that would have been stuck at the back of a grid connection queue."

While there could be many more such deals as the number of tidal projects grows, for now the focus is to continue to develop projects and ultimately drive down costs.

Because the best sites are yet to be developed, Cornelius is predicting a boom in projects in the next five or ten years.

"We're at the same place that wind and solar were 10-15 years ago, where the world's best sites are yet to be developed. There are gigawatts of potential – there's a big difference between economic, extractable potential and gross potential – [but] with the development of infrastructure and policy, more and more of this resource can be economically harnessed," said Cornelius.

"With respect to the UK, we can see ourselves clear to at least a couple of gigawatts of potential installed capacity that will only be constrained going forward by access to grid and access to further development capital."

As the number of projects increase, the cost of electricity will no doubt fall in much the same way as wind and solar. Cornelius predicts, however, that costs could fall even more rapidly for tidal.

"We get the benefit of a lot of the infrastructure and technology developments that they have made but over a longer period of time. For example, HVDC, which has been refined for offshore wind, cabling techniques, drilling techniques, vessels that have made offshore wind more affordable – we don't have to do that development, they've done it all for us. We also benefit from the developments and methodologies used in the oil and gas market. We can benefit from all of these and adopt them from day-one."

The price of electricity from tidal is currently around £250-300/MWh. Cornelius said: "Within 100 MW, unlike the gigawatts afforded to wind or solar, that needs to come down the cost curve to about £155/MWh. With another 100 MW, that needs to come down to £100/MWh."

Notably, this goal could be reached within the next few years. "We want to index with offshore wind by 2020," said Cornelius.

If these cost targets are to be achieved, it will be necessary for the industry to develop a mature and sophisticated supply chain.

Cornelius concluded: "The UK has a real opportunity to own tidal power; it sort of lost wind turbine manufacturing and it lost nuclear but it can own tidal. So we are working hard to set up a full supply chain in the UK.

"Once tidal proves that it can generate highly predictable electricity day after day, it will become more investable."

Going soft on coal?

Software solutions can play a major role in improving efficiency and lowering emissions from coal fired plant. **Junior Isles** looks at how the sector could benefit from GE's acquisition of Boston-based software start-up, NeuCo Inc. and the subsequent integration of its software into GE's Digital Power Plant for Steam.

Hubco coal fired plant, Pakistan: NeuCo software is being delivered as part of GE's Digital Power Plant for Steam package

While renewables are fast becoming the energy source of choice for new electricity generating capacity in many parts of the world, coal is still very much in demand for new capacity in much of Asia. At the same time there is still a significant amount of coal fired generation in Europe and the US that will be in operation for some time – generation that is under increasing pressure to reduce emissions to mitigate health hazards and help achieve climate change targets.

Although much of the focus to cut coal fired plant emissions has been on developing and upgrading hardware and improving thermodynamic cycles, there is also an opportunity for software to play an important role in emissions reduction.

In April this year, GE Power acquired NeuCo Inc. (NeuCo), a Boston, US-based software and data analytics start-up company focused on improving fossil fuel fired power plants. The move will not only provide the opportunity to accelerate the deployment of NeuCo's software globally but also ties in with GE's plan to transform itself into a digital industrial company focused on the electricity sector.

With its software products that optimise coal boiler operation and reduce emissions, GE saw the acquisition as an opportunity.

Niloy Sanyal, Chief Marketing Officer, GE Power Digital Solutions, explained: "We saw it as a great opportunity for us, given we recently acquired the Alstom business. Plus there are the mega trends that are happening in the coal industry. Customers need to continue to be as efficient as possible and from a COP21 perspective, the challenges of meeting regulations is both an opportunity and a threat from our customers' point of view. So we expect a lot of investment in improving the emissions of coal fired power plants globally. And that's where the NeuCo acquisition made a lot of sense."

Although it has only been a matter of months since the acquisition GE says it has generated close to $100 million in leads for the software product. NeuCo already had 40+ customers in the US with more than 100 installations, giving GE a significant installed base. Since the acquisition GE has closed two deals, the most significant one being for a major coal fired plant in Pakistan.

In June, GE signed a contract to provide its digital industrial solutions for the 1292 MW Hubco power plant in Baluchistan. Commissioned in 1997, the plant has four 323 MW generating units and is the largest independent steam power plant in Pakistan.

The NeuCo software is being delivered as part of GE's Digital Power Plant for Steam package introduced in June this year. Powered by Predix, GE's cloud-based operating system built exclusively for industry, Digital Power Plant can be used to create a digital twin of any equipment inside a power plant, which can then be used to understand the true operational potential of that equipment.

By monitoring and analysing data from more than 10 000 sensor inputs across a coal plant, GE's Digital Power Plant for Steam helps plant operators make smarter decisions about how to optimally run their power plants, achieving better performance, and improved reliability while lowering environmental impact.

The package for Hubco includes a suite of software solutions that can enable the power plant operators to analyze and monitor operations across all touch-points in real-time and help identify any maintenance issues ahead of time, leading to greater asset uptime and reduced unplanned downtime.

NeuCo's product is a closed-loop boiler optimisation software that collects and analyses data primarily from the boiler in a coal-fired power plant. It collects hundreds of input parameters and sends 30-50 signals back to the distributed control system to adjust things such as valve settings or damper positions. The software, for example, can adjust the fuel/air mix inside the boiler in order to optimise the staging of combustion thus improving both emissions and efficiency.

The NeuCo boiler digital optimisation software typically delivers up to 15 per cent reduction of NOx emissions (thanks to the former Neuco product).

Including the NeuCo software within Digital Power Plant for Steam has the potential for other uses in the future. This is due to both GE and third-party developers being able to access the Predix platform to develop applications for the industry. Sanyal comments that there are now around 6000 non-GE developers that are developing applications for the platform.

GE says the NeuCo software is easily scalable and configurable in the Predix platform and plans to integrate it as a Predix-based application within less than eight months. This approach changes the way the software was being designed compared to when it was part of NeuCo.

"Now, it's suddenly open to a lot more innovation where customers and developers can extend the capability of the existing application," said Sanyal. Essentially, customers can now solve problems which GE either does not have an interest in solving from a commercial perspective or perhaps does not have the IP.

Sanyal gave an example. "A coal analyser is a critical input to improving a boiler. In many countries, especially in Asia, coal quality is a critical challenge, which customers feel is out their control. We are now solving the quality of coal issue, producing better insights on the mix of the coal, so you can optimise the boiler and many of the downstream processes much better.

"We will open up the platform for other companies, partners and even customers, who could get the sensor data from the pulveriser or coal yard. The sample data could then be fed into the NeuCo optimisation product, which it doesn't today – coal mix is not an input to the boiler optimisation product."

While there will be a role for the application in Europe and the US, the greatest deployment will be in Asia – especially India and China – where coal continues to be the mainstay.

GE detailed the benefits for India in a White Paper entitled 'Powering India: Benefits of Digitization in Coal fired Power Plants'. It cites a study carried out by the Centre for Science and Environment on 47 selected coal-based thermal power plants across India, which found that the average efficiency of the plants having a capacity of 2000 MW or above was 32.8 per cent, one of the lowest among the major power producing countries.

Further, new regulations were introduced in December 2015 to limit NOx, SO_2 and mercury in addition to particulate matter (PM). Higher efficiency means lower coal consumption and thus lower emission.

In addition, for a 1 per cent improvement in heat rate of coal fired fleet, India has a potential of $167 million/annum saving in cost.

Typically, GE calculates that deploying Digital Power Plant for Steam in an existing 500 MW coal plant with 10 years remaining life typically delivers a Net Present Value (NPV) of up to $50 million. In a new plant, GE expects an NPV of $250 million over the 20-year life of the plant.

Sanyal says that it can share these gains with its customers. "We are not just positioning Digital Power Plant for Steam as a software product. The differentiation that GE can provide is that we can guarantee or share the gain with our customers. We closed the Hubco deal in less than three months, as it was a no-brainer for them. They didn't think they were buying software, they were buying an outcome. We offered to take care of the software and implementation and share the profit on every percentage point gain above the baseline heat rate.

"We've been experimenting with this business model for the last year or so and it has been a phenomenal success, especially in emerging markets like the Middle East and Asia."

The potential economic and environmental impacts of such software solutions cannot be understated. According to Sanyal, deployment of Digital Power Plant for Steam in the existing installed base alone can create $50 billion in value worldwide. Sanyal also noted that just one per cent improvement in the global installed base could remove 0.5 Gt of CO_2 globally.

In the context of COP21 commitments, especially in countries where coal continues to be a big part of the generating portfolio, lowering emissions from coal fired power plants is arguably the best action the industry can take.

Sanyal says customers and developers can now extend the capability of the existing NeuCo application

A chink in the Hink?

Junior Isles

It seems there is a chink in what was once thought to be the British government's cast iron commitment to building the Hinkley Point C nuclear power station.

As we went to press at the end of July, Britain's newly formed cabinet announced that it would postpone a final decision on whether to go ahead with the UK's first nuclear plant in a generation until the autumn.

The news came as a surprise to many. It was thought that government agreement would be a formality following EDF's long delayed but positive final investment decision. It appears it may now be a case of new Prime Minister, new rules; or at least a fresh pair eyes to scrutinise the deal.

Prime Minister Theresa May's decision to "pause" the project will cause concern for both France and China's governments.

Keen to support state-owned utility EDF, French President François Hollande said his government would shore up EDF's finances, as the debt-laden company struggles to raise the colossal fund needed to construct the £18 billion plant. France also knows Hinkley C will be an important showcase for its nuclear technology and will boost French industry by providing the opportunity to demonstrate that such projects can be built on time and to budget.

Choosing not to blindly follow the thinking of her predecessor, May says she wants to examine all of the "component parts" of the deal with EDF before deciding whether to give it the green light. She told Hollande in a meeting that she would "need time" to decide for herself on the project.

While the French government remained publicly upbeat following May's announcement, China has not been backward in voicing its surprise and consternation.

One Chinese official in the nuclear industry who was scheduled to attend the signing said: "We are really questioning what's going on. We were all set to go over when it was suddenly pushed back. It seems the UK government has a lot of doubts, we aren't sure where all this is coming from."

One area of concern for the UK government is believed to be the ramifications for national security.

Nick Timothy, May's joint chief of staff said Chinese investment in sensitive sectors raised security concerns, including the possibility that Beijing could close down nuclear reactors in Britain as a form of energy blackmail.

Last year, former Chancellor George Osborne said China's investment in Hinkley could lead to Beijing building its own reactors in Britain, including a project at Bradwell. Timothy, however, wrote at the time that the move could allow the Chinese "to use their role to build weaknesses into computer systems which will allow them to shut down Britain's energy production at will".

The UK is not the only country to cite national security concerns with regards to Chinese investment in national infrastructure energy assets. In August, Australia said it will not allow the electricity network in its most populous state to be sold to Chinese and Hong Kong bidders.

China's State Grid Corp and Hong Kong's Cheung Kong Infrastructure Holdings had bid for the 99-year lease of the nation's largest electricity network, Ausgrid, with the sale expected to raise more than A$10 billion ($7.7 billion) for the New South Wales state government according to some estimates.

But Treasurer Scott Morrison told the bidders their proposals to secure a 50.4 per cent stake in Ausgrid, which supplies power to more than 1.6 million homes and businesses, were "contrary to the national interest".

"Ausgrid's footprint includes critical power and communication services that Ausgrid provides," Morrison told reporters in Brisbane. "The national security concerns are not country-specific and relate to the transaction structure and the nature of the assets. At this stage, the government has not identified mitigations that would appropriately address these concerns."

In the UK, Sir Vince Cable also noted that May had security concerns with regards to Chinese investment in Hinkley and other national projects. He said that May raised objections to the Hinkley deal during the previous coalition government, in which he served as Business Secretary.

In an interview with BBC Radio 4's *Today* programme, he said: "Certainly, when we were in government, Theresa May was, I think, quite clear she was unhappy about the rather gung-ho approach to Chinese investment that we had, and that George Osborne in particular was promoting and, as I recall, raised objections to Hinkley at that time."

He suggested, however, that May's more critical approach was right "once you separate that out from a kind of general prejudice against Chinese investment".

Whether rightly or wrongly, the West is indeed generally wary of China. Sir Vince observed that the handling of Hinkley has been "very messy" and has "almost certainly ruffled the feathers of the Chinese".

It is certainly understandable why China would feel that way. Casting aspersions on China regarding its involvement in the UK nuclear industry and the implications for national security could be seen as unfair. After all, the West builds plants in China. Further, China could rightly ask why it is being singled out – of the six nuclear plants being planned in the UK, none will be owned by a British company.

May's decision is seen by some as part of a rethink on Chinese investment in the UK, an area that is of heightened importance at this point in time. Britain has to be very careful in striking the right balance with regards to its relationship with China and indeed the rest of the world, especially following the vote to leave the EU.

In an article published in the *Financial Times*, Liu Xiaoming, China's ambassador to Britain, wrote that relations with Britain were at a "crucial historical juncture".

The inference seems to be that a decision to pull the plug on Hinkley will seriously damage trade relations between the two countries. This could jeopardise the billions of dollars of trade deals signed between the two countries last year and equally importantly, any potential free trade deal post-Brexit.

Hinkley puts the UK in a tight spot and will be a severe test of May's political prowess. Abroad, her government is under pressure to maintain diplomatic relations and secure much needed investment, while at the same time it must look after the interest of domestic consumers.

The overarching reason for any decision on Hinkley should, however, be based on whether it makes sense in terms of security of supply, economics and climate change.

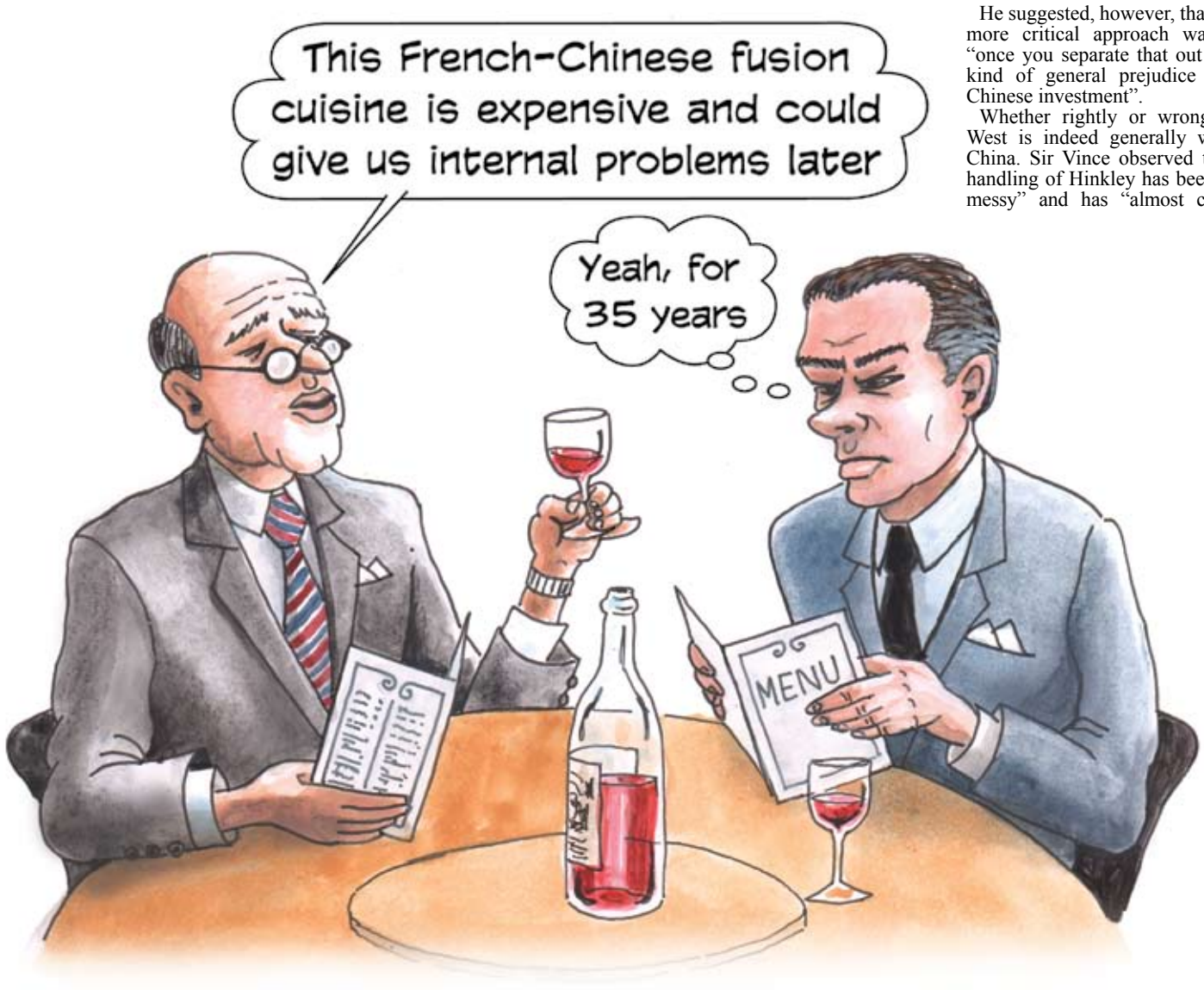
At the end of the day, the UK government has to ask itself which is more important: future international business relations or saddling the British public with higher than necessary electricity costs?

Times have changed since plans for new nuclear were hatched. Agreeing to an index-linked strike price of £92.5/MWh over 35 years for electricity from Hinkley Point C can no longer be argued to be a good deal. With the cost of offshore wind falling rapidly, the UK now has alternatives.

Michael Grubb, Professor of International Energy and Climate Change Policy, Institute for Sustainable Resources, University College London, UK noted that since the Climate Change Committee recommended a new generation of nuclear plants in 2008, the price of Hinkley has risen by 50 per cent while the price of major renewables (including offshore wind) has almost halved.

Following the recent approval of the Hornsea Two offshore wind project, the largest in the world at 1.8 GW, Dr Doug Parr, Greenpeace UK Chief Scientist said: "This is good news as the rapid development and falling price of renewable power is making it very clear where the future of the energy industry should lie. And it certainly isn't with propping up 20th century technologies like oil, gas and nuclear. This is yet another nail in the coffin for the rationale for Hinkley power station."

He may be right. However, if May decides not to kill Hinkley due to international political pressure, she must keep consumers at heart and at the very least review what seems to be an increasingly poor deal for the British public.



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