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Improved coal plant efficiency can "keep climate goals alive"

Van der Hoeven: Climate change has "quite frankly slipped to the back burner" of policy priorities

According to the International Energy Agency, improving coal plant efficiency is one of four policies governments must adopt to get climate change efforts back on track. While the IEA's proposals for carbon dioxide emission reductions from coal plant are ambitious, industry argues they are achievable. **Junior Isles**

The International Energy Agency (IEA) says it is possible to "keep climate goals alive" without harming economic growth if governments swiftly enacted four energy policies.

The call to governments came as the IEA warned that the world is not on track to limit the global temperature increase to 2°C.

Speaking at the press launch of its latest report in London last month: '*World Energy Outlook Special Report, Redrawing the Energy-Climate Map*' IEA Executive Director Maria van der Hoeven said: "Climate change has quite frankly slipped to the back burner of policy priorities. But the problem is not going away – quite the opposite."

The report, which highlights the need for intensive action before 2020, presents the results of a 4-for-2°C Scenario, in which four energy policies are selected that can deliver significant greenhouse gas (GHG) emissions reductions by 2020, rely only on existing technologies and have already been adopted successfully in several countries.

New IEA estimates for global energy-related carbon dioxide (CO_2) emissions, which account for around two-thirds of global GHG emissions, reveal a 1.4 per cent increase in 2012, reaching a record high of 31.6 gigatonnes (Gt).

IEA Chief Economist Fatih Birol, the report's lead author said: "We identify a set of proven measures that could stop the growth in global energy-related emissions by the end of this decade at no net economic cost."

In the 4-for-2°C Scenario, global energy-related GHG emissions are 8 per cent lower in 2020 than the level otherwise expected. The four policies presented by the IEA are: targeted energy efficiency measures in buildings, industry and transport; limiting the construction and use of the least efficient coal-fired power plants; actions to halve expected methane releases into the atmosphere from the upstream oil and gas industry; and implementing a partial phase-out of fossil fuel consumption subsidies.

Notably, it said that limiting inefficient coal-fired power plants delivers more than 20 per cent of the emissions reduction while helping to curb local air pollution. In the IEA scenario, the share of power generation from

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China getting climate change effort back on track

Despite recent pollution reaching levels that have caused public outcry, China is taking positive steps to cut emissions and is softening its stance on agreeing to a cap on greenhouse gas emissions.

Following some of the worse levels of air pollution recorded in the country in recent years, last month China's Cabinet announced new measures to curb air pollution. The State Council approved 10 "tough measures to accomplish tough tasks", the council said in a statement.

These include a target to reduce pollution emissions by at least 30 per cent in heavy-polluting industries by the end of 2017 – a target that is more ambitious than any in the past.

The State Council said local governments should shoulder the general responsibilities for local air quality.

One of the mandates says heavy polluters like coal-fired power plants and metal smelters must release detailed environmental information to the general public.

The announcement on air pollution came as China prepared to launch its first pilot carbon market in Shenzen. It is one of seven cities selected in 2011 to test out emissions trading before deciding whether to launch a national scheme from 2015.

The Shenzen scheme will cover 635 companies whose combined emissions were just over a third of the city's total in 2010.

The International Energy Agency (IEA) last month praised China for its role in getting the world back on track in its climate change efforts.

"The most encouraging thing I find in the current five-year plan of the Chinese government is the energy intensity improvement target, and the push for renewable energies including hydropower," said Fatih Birol, Chief Economist at the IEA.

Birol pointed out that emissions growth in the country halved in 2012 compared to 2011. This is among the lowest rises in a decade, and marks the increasing effectiveness of policies designed to cut emissions and to improve energy efficiency.

China is also considering an outright cap on carbon emissions in its next five-year plan (2016-2020) and is studying what level would be appropriate.

Jiang Kejun, a carbon policy researcher at the National Reform and Development Commission (NDRC) said at the end of May: "I am sure China will have a total emission target during the 13th five year plan."

It is the first time policymakers have spoken publicly about such a plan and this shift in policy could be an important boost to talks on a global agreement to curb greenhouse gas emissions.

Jiang said that it was "very possible" China would drop its longstanding opposition to carbon caps for developing nations before the UN climate talks in Paris in 2015.

China's emissions cap would be linked to the existing cap on coal consumption. As part of its effort to cut emissions from coal fired plant, in May the National Energy Administration proposed to ban imports of low quality coal.

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renewables increases (from around 20 per cent today to 27 per cent in 2020), as does that from natural gas.

Speaking on the sidelines of the press conference Birol said: "Most of that 21 per cent [reduction] will come from India, China and East Asia. China is already doing a lot, having closed 70 GW [of inefficient coal plant] until 2011 and a further 8 GW in 2012."

He added: "The US is also doing work; the EPA has already put new regulations in place. They have banned the building of new inefficient coal fired power plants and there is now a discussion about existing inefficient coal fired power plants."

Milton Catelin, Chief Executive, World Coal Association said: "The IEA should be working with the coal industry and multilateral development banks to ensure the best available technology is used… If new coal-fired generating capacity added between 2000 and 2011 had used best available technology, cumulative emissions of CO_2 over that period would have been reduced by almost 2 gigatonnes. This is three times the expected effect of the Kyoto Protocol."

According to major power equipment manufacturer, Alstom, the CO_2 gain from tackling efficiency is significant. Its calculations show that adding an extra 4 per centage of points of efficiency to a coal-fired plant can equate to about a 12 per cent reduction in CO_2 emissions.

Giles Dickson, Vice President, Policy and Advocacy at Alstom, said to some extent the IEA's recommendations are "already leaning against an open door".

He explained: "There has already been, and is currently ongoing, a lot of movement towards supercritical or ultra-supercritical coal fired power plants across the world and more can be done here. It's going with the grain of policies in many countries, so we can see why they have come out with the recommendation."

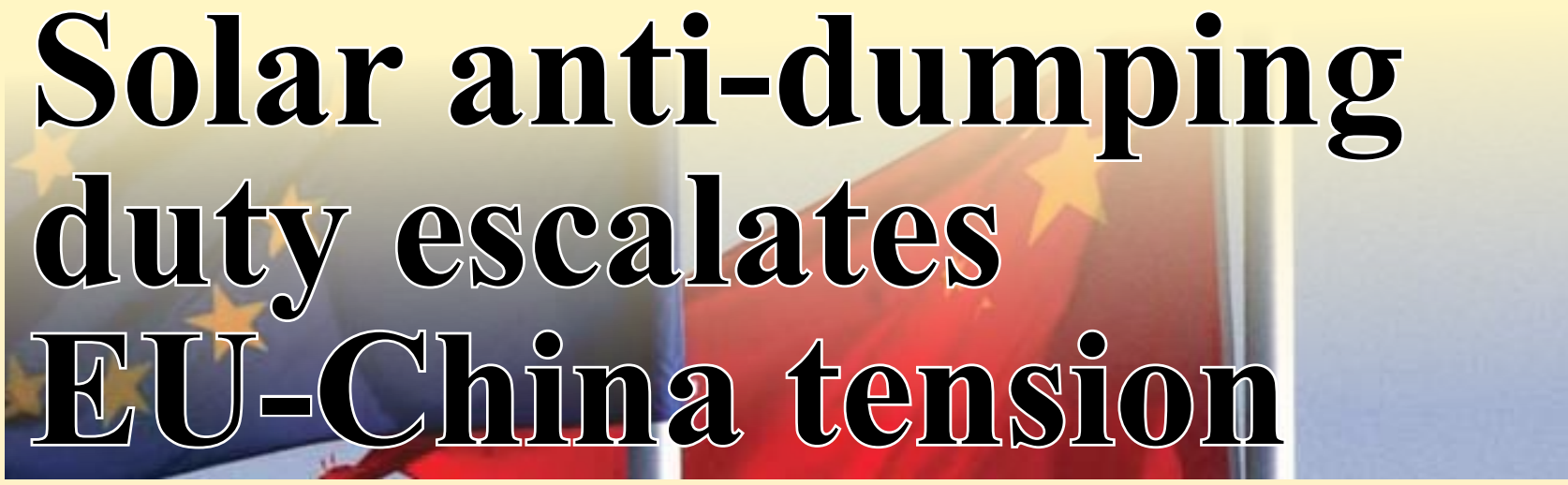
Dickson: targets are ambitious but achievable

The IEA's target would require the idling of about 250 GW of existing plant up to the 2020 period. In light of what is already being done in places like India and China, Dickson says the IEA's recommendations are ambitious but achievable.

He noted: "About 50 GW is closing anyway due to the Large Combustion Plant Directive in Europe and measures elsewhere. However, there will need to be a big push to deliver this additional 250 GW. We see a clear push in China where the government has called on the five major utilities to invest in carbon capture and storage demonstrations."

In a statement released in mid-May China's National Development and Reform Commission (NDRC) said: "CCUS [carbon capture use and storage] will promote the transition and upgrading of high emissions industries such as electricity, coal and chemical… It has significant value to Chinese medium and long-term plans to combat climate change and promote low carbon development."

Solar anti-dumping duty escalates EU-China tension



Anti-dumping duties on Chinese-made solar panels sold into Europe will create market uncertainty in the coming months, says **Junior Isles**

The European Commission's decision to impose an anti-dumping duty on imports of crystalline silicon photovoltaic wafers, cells, and modules originating in or consigned from the People's Republic of China looks set to start a trade war between the two sides.

Last month EU trade commissioner Karel De Gucht lowered the 47 per cent punitive tariffs recommended by Brussels in May to just 11.8 per cent. The lower tariff, however, will only last until August 6 and reverts to 47.8 per cent if China does not respond to EU allegations that it is selling solar panels in Europe for below cost. The EU will issue a final decision on anti-dumping duties on December 5, 2013.

Chinese officials have rejected the EU finding that its companies are dumping panels into Europe and have warned of a trade war if the EU does not back down.

According to the *Financial Times*, China's premier Li Keqiang called EC president José Manuel Barroso to say "the case, if not properly handled, would hurt both the Chinese and EU interests".

Some countries within the bloc are opposed to the EC decision. In a news release from the Chinese Foreign Ministry, Dutch Minister of Foreign Affairs Frans Timmermans was quoted as saying: "The European Commission's decision to impose provisional duties on solar panels from China goes against the principle of free trade and the Netherlands is firmly opposed to it.

"I think we should find a compromise here… There are more things at stake than just one issue in the long-term relationship between the EU and China."

The German Federation of Industry (BDI) said it regrets the EU's decision and urgently appealed to both sides to find a "mutually acceptable solution".

Chinese manufacturers claim the tariff will be damaging to the industry.

Liansheng Miao, Chairman and CEO of Yingli Green Energy noted: "Punitive tariffs – no matter at what level – will inevitably lead to higher prices for solar products causing at least the stagnation of the solar industry in Europe. We therefore encourage the prompt resumption of talks between China and the European Commission."

Meanwhile, Trina Solar said it was "disappointed" with the European Commission's preliminary conclusion. "We disagree that we have dumped imports into the European market. The decision will negatively affect the European solar industry and is against the interests of the global solar market," said Ben Hill, President of Trina Solar Europe.

Others argue, however, that the EU decision although regrettable, is justified. Luc Graré Senior Vice President Solar Sales and Marketing, at European solar manufacturer REC said: "We wish there was fair trade from the beginning so that this whole thing was unnecessary. But the EU decision sends a clear message that things must be done in a fair way."

Commenting on the potential impact of the anti-dumping tariffs Graré said: "Over the last two months we have seen Chinese manufacturers move their playing field from Europe into Asia but some manufacturers are still very much relying on Europe.

"I don't foresee a collapse of the market in Europe. Although there might be an increase in the module price, other equipment in the system such as inverters may see a fall in price. Therefore the total system price will not increase that much. There may be some uncertainty in the market until December, as developers question whether to build plants now at current module prices or wait."

Other industry observers essentially echoed this view. David Grindley of Savills Energy, a specialist in the field of solar park developments commented: "Although the first reading of the changes in anti-dumping tariffs on imports from China may initially be cause for concern, the longer-term reality is that this will likely bring about a negotiated compromise agreement and, ultimately, stability in the marketplace.

"In the shorter term, however, we expect to see fluctuations in panel prices and difficulties for developers looking to get hold of panels in large quantities."

According to information and analytics provider IHS, China's pending move to slap anti-dumping tariffs on imported solar polysilicon from key countries will generate a surge in pricing for this key raw material in June and July – but the size of the increase will be limited by market factors.

Lux Research recently said the global market for photovoltaic materials is poised to grow 52 per cent to $27.2 billion, up from $17.8 billion in 2012. As PV supply and demand come back into balance in 2015, margins will steadily improve and create new opportunities for innovative materials developers.

UK broadens its nuclear options

- Joint working group set up with Rosatom
- Hinkley Point C contract will last up to 35 years

A deal between the UK and Russia will broaden the UK government's options on selecting partners for its planned nuclear power programme.

In June, Energy Secretary Ed Davey struck an agreement with the deputy prime minister of Russia, Arkady Dvorkovich, to set up a joint working group between Rosatom and the UK on the future of nuclear power.

The deal could pave the way for the Russian state-owned nuclear power company to build plants in Britain.

Sergey Ruchkin, Rosatom's new representative in the UK, said: "On the working level, we have been in contact with our colleagues from the UK's Department of Energy and Climate Change and there is the potential at some time in the future, if the decision has been made, to enter the British nuclear new-build market."

He added that Rosatom was following the EDF deal closely. "We will learn lessons from EDF in this area," he said.

The agreement came as Britain remained locked in long-running negotiations with French electricity group EDF over the terms to build a new nuclear power station at Hinkley Point in Somerset.

MPs have warned that the government is being held to ransom by EDF because it is the only group bidding for the contract.

In late May, the *Financial Times* reported that EDF and the UK government moved closer to a deal as the two sides agreed that the contract for power generated from the new Hinkley Point C plant would last up to 35 years. It also said there was a "consensus" that EDF should be able to make a 10 per cent return on investment.

There was, however, still no agreement on the cost of the project or the 'strike price', the guaranteed long-term price for electricity produced from the plant. In February it was reported that the Treasury offered EDF a strike price of £80/MWh while EDF was holding out for just under £100/MWh.

Last month, however, the UK government agreed that the price for electricity would be fully linked to inflation.

Obama switches focus to climate change

US President Barack Obama is preparing to return his attention climate change with plans for reducing its greenhouse gas emissions.

During a recent address in Berlin, Obama said the effort to slow climate change required "bold action".

The statement came as the Obama administration prepared to outline new rules limiting emissions from existing power plants and other industrial facilities. Proposals would also see a tightening of energy efficiency standards and an increase in renewable energy use on federal land.

The plan, which could force dirtier coal fired plants to close, is likely to face strong opposition. The US Chamber of Commerce, the business lobby group, has already said the proposals would "weaken energy security and raise energy prices".

Frank O'Donnell, president of watchdog group Clean Air Watch, said that the issue of coal fired power plants needed to be tackled. "Everyone knows this is the giant environmental elephant in the room," he said.

The success or failure of the proposals will depend on the interpretation of the Clean Air Act, which gives the government the authority to act on greenhouse gases.

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Nuclear struggles spell end of the renaissance

- SoCalEd closes San Onofre
- Exelon cancels uprate projects

Siân Crampsie

Power utilities in the USA are finding it increasingly difficult to justify capital expenditure on nuclear energy projects.

Exelon last month scrapped plans to uprate four of its nuclear energy reactors, while Southern California Edison said that it would close the San Onofre plant rather than carry out repairs.

Exelon had been due to increase the capacity of two units at the LaSalle plant in Illinois and two units at the Limerick plant in Pennsylvania by a total of around 350 MW.

In a filing with the US Securities and Exchange Commission (SEC) the company said that it would take a $100 million charge in the second quarter of 2013 for "the costs for these projects currently capitalised in property, plant and equipment".

It blamed market conditions for the cancellation of the uprates, which have become uneconomic amid low power prices and weak electricity demand growth in the USA.

Southern California Edison said in June that it would permanently retire units 2 and 3 of the San Onofre plant, which have been out of service since January 2012 following the detection of a leak in a tube in one of the steam generators.

The utility has spent $500 million on repairs so far but has decided that the regulatory hurdles and uncertainty over when the reactors could return to service mean that its "efforts are better focused on planning for the replacement generation".

Other nuclear energy plants have also suffered setbacks because of market conditions. The Nuclear Energy Institute says that companies have announced the closure of 3554 MW of nuclear capacity so far this year.

In February, North Carolina-based Duke Energy Corp. decided to close the Crystal River nuclear plant in Florida after workers cracked a concrete containment building during an attempt to upgrade the plant in 2009.

The Kewaunee plant in Wisconsin shut down in May, after its owner, Dominion Resources, concluded that the region's low wholesale electricity prices no longer justified keeping it open.

Last month MidAmerican Energy decided against pursuing plans to build a nuclear power plant in Iowa, largely because of a lack of clarity over future carbon regulations and the lengthy regulatory processes involved in new nuclear plant construction.

The situation is in stark contrast to a few years ago, when the nuclear power sector appeared to be undergoing a rebirth.

Supported by economic growth, rising energy prices and the prospect of legislation to control carbon emissions, utilities began to draw up plants for making billion-dollar up-front investments in new nuclear reactors.

However the economic recession and the failure of the Obama administration to enact climate legislation has made nuclear investment more uncertain. The 2011 nuclear accident at Fukushima further compounded the sector's issues, while a surge in production of gas from unconventional sources in the USA has led to a fall in energy prices.

In June the *Los Angeles Times* reported that the Obama administration is considering a plan that would address climate change and limit carbon dioxide emissions from power plants. Specific measures have not yet been defined, but an announcement could be made in mid-July, said the report.

Project will treble Mexico PV capacity

- Mexico attracts renewables investment
- Geothermal investors lack confidence

A 30 MW solar photovoltaic (PV) project set for construction in Baja California Sur will be the largest plant of its kind in Latin America and will treble Mexico's installed PV capacity.

The Aura Solar I plant is Mexico's first utility-scale solar project under a power purchase agreement (PPA) contract between a private company and Comisión Federal de Electricidad, Mexico's federal power company.

It will be built by Martifer Solar for Mexican project developer Gauss Energía. Gauss CEO Hector Olea said in a statement that the project would "open the way for the development of the photovoltaic sector" in Mexico.

The project is being funded by local development bank Nafin, the International Finance Corporation and Corporacion Aura Solar.

Mexico has excellent solar energy potential and this, coupled with the country's renewable energy targets, is starting to attract serious investment.

In May Toronto-based JCM Capital said it had established a company in Mexico to invest in utility-scale solar energy projects. German PV firm Gehrlicher Solar also said that it would pursue opportunities in Mexico.

Mexico has set renewable generation targets of 20 per cent by 2016 and 35 per cent by 2035.

The country's geothermal sector is also set for growth, although analysts believe that the government should alter regulations to give potential investors more confidence.

Mexico is the world's fourth largest geothermal energy market and the need to exploit proven reserves in existing fields has created robust investment opportunities, according to Frost & Sullivan energy and power research analyst Gustavo Stainoh.

However, the country's energy plan favours wind and combined cycle projects, and investors need more protection in the high-risk exploration phase of projects.

According to Stainoh, the installed capacity of combined cycle and wind power is expected to register a compound annual growth rate (CAGR) of 4.6 per cent and 7.9 per cent, respectively, between 2012 and 2025. Meanwhile geothermal's installed capacity is likely to grow at a CAGR of 2.8 per cent.

Mainstream sees further success

Mainstream Renewable Power has pledged to build 600 MW of renewable energy capacity in Chile by early 2016.

The Ireland-based renewable energy company has announced a joint venture with Actis, a global emerging market investor, to deliver wind and solar power projects that will help Chile to meet rapidly rising electricity demand.

The deal will enable Mainstream to accelerate the delivery of its projects in Chile, where it has a development pipeline of 3500 MW. Mainstream will own 40 per cent of the joint venture and Actis 60 per cent.

The collaboration is the second time the two companies have worked together, and Mainstream CEO Eddie O'Connor said that the company would consider replicating the deal structure in other markets.

Mainstream will develop and build the Chilean projects, which Actis will purchase at financial close. Mainstream will continue to manage the construction and support the operation of the projects on behalf of the joint venture.

Globally, Mainstream has a development pipeline of over 17 000 MW across four continents and is currently constructing wind and solar projects in Ireland, South Africa, Chile and Canada.

In 2012 Mainstream successfully bid and won three government tenders in South Africa for 238 MW of wind and solar projects, which are currently in construction. Actis invested $100 million in the projects, which are due to be operational in early 2014.

Energy demand is growing rapidly in Chile thanks to strong growth in the industrial sector, especially the mining sector in the north of the country.

Energy demand in cities such as Santiago has helped a strong growth

Edwardsport starts operation

One of the world's most advanced coal-fired power plants has started operating in Indiana, USA.

The Edwardsport coal gasification plant entered commercial operation on June 7 and will replace around 500 MW of existing capacity that is due to be retired due to new US Environmental Protection Agency (EPA) regulations.

"The average age of coal-fired plants on our Indiana system is 45 years, and this facility is key to modernising our system and filling the gap left by plant retirements," said Duke Energy Indiana President Doug Esamann.

The 618 MW IGCC plant will build up its availability gradually over the next 15 months. It uses less water than a conventional coal-fired power plant and will also produce byproducts such as sulphur and slag for the agricultural and construction markets.

Edwardsport is the first power plant to use IGCC technology on this scale and is the first coal fired power plant to be built in Indianan in more than 20 years

Nuclear remains key to economic growth

In an attempt to revitalise its economy, Japan is placing nuclear at the heart of a new economic growth strategy. The strategy was endorsed as the country also approved a bill to reform its electricity sector. **Syed Ali**.

The Japanese government made it clear that nuclear power will continue to play a key role in meeting future energy demand as the country prepared to introduce its new safety regulations.

In its economic growth strategy endorsed in June, the government said it would "move ahead" with the restart of reactors that have been idled since the Fukushima disaster and "work to win the approval and cooperation" of local governments hosting the facilities.

Although the business community, which has seen electricity rate hikes since the closures, has been calling for the restart of the reactors, the general public has not been so supportive. A reported 60 000 protesters took to the streets at the start of June to rally against the re-openings.

Commenting on the re-start of the country's idled reactors, Minister Akira Amari, who is in charge of the economic growth strategy said: "The government has the responsibility to proceed with the resumption of reactors that are confirmed safe [by the Nuclear Regulation Authority], but we do not intend to make light of the procedure for getting the nod from local people."

In the wake of the Fukushima disaster, Japan has also moved to reform its power sector. The House of Representatives recently approved a bill that takes the first step of a planned major reform of a sector that has long been dominated by regional monopolies.

Under the current plan, the government intends to reform the power sector in three stages, starting from the creation of an independent entity that will be in charge of coordinating power supply and demand nationwide by around 2015.

It is also placing a greater focus on renewables. According to a recent report by research firm IHS Inc, Japan is expected to become the world's largest solar energy market this year, with the installation of new solar power systems more than doubling capacity. The estimated generation capacity of 5.3 GW to be added this year roughly equals the output of five nuclear reactors.

While the 6.8 GW of new solar power systems projected in China this year exceeds that of Japan, the high price of equipment is expected to make Japan the largest market in terms of value, the report said.

- Chubu Electric Power Co. plans to establish a joint special purpose company with Tokyo Electric Power Co. (Tepco) to build and operate a 600 MW coal fired power plant, according to the *Associated Press (AP)*. The deal, which would see Chubu selling electricity in the Tepco service area, would help break the regional monopoly system for regional power utilities, said *AP*. In an attempt to cut costs while dealing with the Fukushima Daiichi nuclear power plant accident, Tepco has invited bids to provide it with a total of 2.6 GW of generating capacity.

Pakistan load shedding a government priority

Converting existing thermal power plants to coal would not only help combat power shortages but would also bring down the cost of power generation and wipe billions off Pakistan's circular debt, says **Syed Ali**.

Frustrated by the rising power generation costs, uncontrollable subsidies and chronic power shortages, Pakistan's new government is launching four new power generation schemes. Under the plan, oil and gas-fired units at two existing plants will be converted to coal and two new coal-fired plants will also be built.

The conversions, costing Rs252.23 billion ($4.25 billion), will receive support and financial assistance from the Asian Development Bank (ADB). It will see the conversion of units 1-6 of the 1350 MW Muzaffargarh thermal power station and units 1 and 2 of the 450 MW Jamshoro power station.

The two new coal-fired power plants, each with a capacity of 660 MW, will cost of Rs155.23 billion, which will be supported by an ADB loan of Rs124.1 billion.

While the projects will help bridge the power deficit, the new government still cannot give a deadline for when load shedding will end.

Last month Minister for Water and Power Khawaja Asif said load shedding was "like piled up garbage of 13/14 years that could not be cleared immediately". He said it might take years and the first priority was to reduce the duration of load shedding.

Engro Corporation – one of the biggest conglomerates in Pakistan – believes Pakistan can start solving its problems by creating a single energy ministry by merging the oil, gas, water and power sectors.

"Pakistan's energy problems are difficult, but not impossible to overcome if the new government starts taking short- and long-term measures," Engro Powergen Qadirpur Limited Chief Executive Syed Muhammad Ali said while presenting a detailed report on the energy sector in Karachi on June 11, 2013.

"Pakistan can immediately increase power production by 2000 MW, for which it will have to divert oil [power] supply to more efficient power plants," said Ali.

It said shifting oil-based power plants to coal would not only bring down the cost of power generation but would also wipe off Rs175 billion from the Rs500 billion circular debt.

Pakistan recently said it is to borrow more than $5 billion to pay off the debt it owes to private power producers as well as fuel suppliers.

According to the Engro study, current power generation stands at 9000 MW, compared to demand for a whopping 15 500 MW, excluding the Karachi Electric Supply Company (KESC). This has resulted in a massive shortfall of 6500 MW, with the KESC supplying around 1500 MW against demand for 2000 MW.

Parts of Pakistan have remained without electricity for up to 20 hours a day this summer.

The study also said that a severe shortfall in gas production is imminent, as production growth has remained negative since 2006-07. In 2014, gas demand is expected to be 6.3 billion cubic feet per day (bcfd) against a supply of 4 bcfd.

Increased coal imports to reduce Indian power shortages

NTPC Ltd. (NTPC), Asia's second-biggest power utility by value, will almost double purchases of coal from outside India this fiscal year to curb fuel shortages at its power plants, according to a local report

The state-run Indian company will import 17 million metric tons of thermal coal in the fiscal year, which started April 1, compared with 9 million tons the previous year said two company officials familiar with the plans.

"Increasing imports has become a must for NTPC since many of its [power] plants are running with alarmingly low coal stocks," said Lakshminarayana Ganti, an analyst at Standard Chartered Securities India Ltd.

- India's Central Bureau of Investigation last month filed a case against former coal minister Dasari Narayana Rao and billionaire industrialist Naveen Jindal, an MP and the head of Jindal Steel and Power, over the misallocation of mining rights to big businesses.

Robust economy stimulates activity in Philippines

- San Miguel considers selling Meralco stake
- FPHC to make $3.14 billion in investments

Companies are moving to take advantage of the Philippines' robust economy and buoyant stock market to fund expansions and pay off debt, especially after ratings agency Fitch Ratings granted the country an investment-grade credit rating in late March.

Philippines conglomerate San Miguel Corp. is considering selling its nearly 33 per cent stake in electricity producer Manila Electric Co. (Meralco) in a deal that could be the biggest in the country's history.

Meralco serves an area that produces half of the nation's gross domestic product. The purchase of a stake of that size – worth about Peso142 billion ($3.4 billion) at the current share price – could trigger a tender offer for the rest of the shares depending on the structure of the sale.

Several groups have expressed interest in buying the 32.8 per cent combined stake in Meralco that is held by San Miguel and its subsidiaries, CFO Ferdinand Constantino wrote in a disclosure to the country's stock exchange.

In late May, Ramon Ang, San Miguel President and CEO said that the company is also preparing for the initial public offering of a 49 per cent stake in its power unit SMC Global Power Holdings this year.

SMC Global is currently pushing for the construction of a 300 MW coal plant in Davao and a 600 MW coal plant in Bataan. SMC Global has earmarked $1.5 billion for the projects.

In another indicator of the country's increasing activity in the sector, First Philippine Holdings Corp. (FPHC) last month said that it is expanding its power generation portfolio with $3.14 billion in investments.

FPHC's operating units First Gen Corp. and Energy Development Corp. are pursuing new energy projects that will increase the Lopez-owned group's generating capacity by 50 per cent to more than 4000 MW in the medium term.

UK debates market reforms


Davey: Bill will attract investment

Business groups, the government and the green lobby in the UK agree on one thing – the need for policy certainty to attract investment.

Siân Crampsie

The UK government's plans to reform the electricity market sector remain on track in spite of a fierce debate over decarbonisation targets.

Lawmakers voted in favour of the Energy Bill at its third reading in the House of Commons just a day after an amendment to include a 2030 decarbonisation target for the electricity sector was narrowly defeated.

The Bill has now moved on to the House of Lords – the UK's upper house – for debate.

The environmental lobby wanted the UK government to include a 2030 decarbonisation target in the Bill in order to improve the UK's clean energy investment environment and discourage a 'dash for gas'.

However the UK Energy Secretary Ed Davey maintains that the Bill as it stands will cut emissions and attract the investment needed in the UK's energy infrastructure. He emphasised last month that a decarbonisation target for 2030 could be set in 2016.

"Everything in our energy bill is based on the premise that we need to significantly decarbonise the power sector," wrote Davey in a letter to the *Financial Times*. "Indeed, it will ensure that we reduce the UK's emissions by 50 per cent by 2025, putting us ahead of many economic rivals."

The UK government – most notably the Chancellor, George Osborne – is concerned that setting a decarbonisation target now would restrict business at a difficult economic time. The government and business groups alike are keen to get the bill passed into law.

"The Energy Bill remains the best instrument for government to give investors the certainty they need to plough billions of pounds into keeping UK lights on, through an affordable low-carbon economy," said Katja Hall, Chief Policy Director at business group CBI. "We can't afford further delays, so it is essential there's political agreement and the Bill is on the statute book this year."

The government believes that the bill will unlock £110 billion of investment by 2020 while keeping consumers' bills as low as possible and enhancing energy security. Its measures include the introduction of a capacity mechanism, long-term contracts for difference and an emissions performance standard.

"It is clear that investment decisions will stand or fall on the details of the contracts for difference, the capacity mechanism, and the levy control framework – not on a carbon intensity target," said Hall.

"Debates about the effect of including a [decarbonisation] target in the Bill should not be allowed to prevent critical policy details being tied down. Vital investment decisions are hanging in the balance."

The debate in the UK echoes the ongoing debate in Europe about the need for policy certainty and the potential impact of emissions targets for 2030.

Last month Johannes Teyssen, CEO of E.On and the new president of electricity association Eurelectric called on policymakers in Europe to create a consistent and stable regulatory framework that would allow sustainable business growth.

Both Teyssen and Fulvio Conti, CEO of Enel and the outgoing Eurelectric president, said that political and regulatory intervention was damaging the competitiveness of Europe's economy. "There are too many national targets and there is too little European cooperation," said Conti.

EDF EN and wpd commit to French tender

- 6 MW Haliade confirmed
- UK seeks to boost offshore status

Two key players in the European offshore wind energy sector are joining forces to win contracts in the French government's plans to increase offshore wind capacity.

EDF Energies Nouvelles and wpd offshore have signed a partnership agreement to combine their expertise in the French government's second call for tenders.

They have selected Alstom as their turbine supplier.

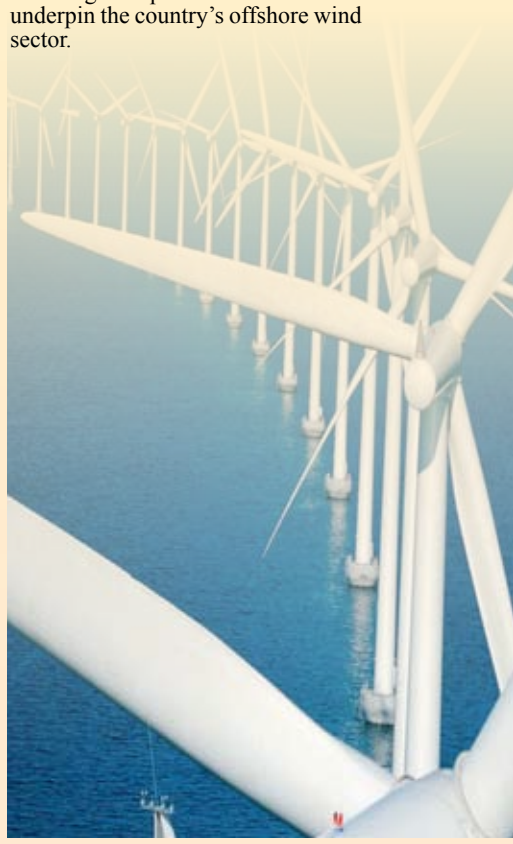
The French government launched its second call for tenders in January 2013 calling for investments of around €3.5 billion and the construction of 1000 MW of offshore wind capacity. The tender makes France one of the most important emerging markets for offshore wind alongside more established markets such as the UK, Germany and Belgium.

EDF Energies Nouvelles and wpd teamed up in the French government's first call for tenders and say that their continuing partnership indicates their commitment to supporting the French offshore wind energy industry. As in the first round of French tenders, they will propose the use of Alstom's 6 MW Haliade 150 offshore wind turbine for the second call for tenders.

Last month the UK reiterated its commitment to the continued development of the offshore wind sector with the announcement of plans to create an Offshore Wind Investment Organisation tasked with increasing levels of inward investment.

"This news is a welcome boost for British industry and restates the government's acknowledgement that offshore wind represents massive economic potential for the UK," said RenewableUK Chief Executive Maria McCaffery. "The fact that this new organisation will coordinate government's work with business via a leading industry figure is important as it further cements the positive relationship between government and industry."

RenewableUK has also highlighted the importance of attracting manufacturing companies to the UK to underpin the country's offshore wind sector.



Polish regime could woo investment

Poland is hoping that new regulatory proposals will encourage investment in its shale gas sector.

Prime Minister Donald Tusk says that he wants investors to feel secure about their business and appears determined to make progress on proposals for a new tax and regulatory package for the oil and gas sector.

Reports indicate that the new package would be in place by 2015 but that taxes would not be collected until 2020 in order to coax investors to the shale gas sector.

Poland is thought to have significant reserves of shale gas and a successful shale gas extraction industry would enhance energy security in the country.

However the initial excitement about the country's shale gas potential wore off after a number of test wells showed disappointing results, and a number of key players – including ExxonMobil and Marathon Oil – withdrew from the country.

The government's latest proposals include a 40 per cent cap on taxes and the creation of a new national energy mines operator, dubbed NOKE, which would be required to be a partner in all energy projects.

The US Energy Information Administration (EIA) said in 2011 that Poland had estimated reserves of 5.3 trillion m^3. These estimates were downsized by the Polish Geological Institute to around 760 billion m^3.

The Polish government has so far issued 109 exploration licences for shale gas. Some 43 test wells have been drilled and the extent and viability of Poland's shale gas reserves remain unclear.

- Germany's brewing industry has warned the government that permitting unconventional gas exploration would put the country's beer sector at risk. The German Brewers' Federation is concerned about water contamination and has asked the government to cease work on a new framework being drawn up for shale gas extraction.

Spain plans further cuts to tackle power sector debt

Spain's government has warned that a further planned overhaul of the country's energy sector will spell financial pain for utilities.

The country is expected to reveal at the end of June measures designed to reduce the tariff deficit – a multi-billion euro debt that sits on the balance sheets of power utilities.

The measures could include cuts to subsidies and would reduce revenues for utilities by 10-20 per cent. Spain's banks have been told that they should be prepared to refinance or take over assets, according to sources cited by the *Financial Times*.

The tariff deficit built up over many years in Spain because the portion of consumers' electricity bills that is regulated by the government did not adequately cover costs. The €28 billion deficit is guaranteed by the government, which has been told by Brussels to eliminate the debt.

Spain has already cut back renewable energy subsidies in an attempt to reduce the deficit and further cuts of up to ten per cent are possible. Renewable energy companies such as Acciona and Abengoa will be hit the hardest.

The reforms could trigger lawsuits from the green energy sector, which has lobbied hard to oppose further rule changes to the subsidy system.

Endesa could also be hit by the upcoming changes because of the subsidies it receives for supplying energy to the Spanish islands.

In a note to clients, Berenberg bank estimated such cuts to knock 14 per cent off Endesa's earnings per share, followed by a 9 per cent hit for Enel and 8 per cent for Gas Natural and Iberdrola.

Global dynamics drive energy changes

Large changes to patterns of energy production and consumption illustrate the flexibility and dynamic nature of the global energy system.

Siân Crampsie

Global energy consumption slowed significantly in 2012 on the back of an economic recession and an increase in efficiency, according to BP.

The oil giant says that emerging economies accounted for all of the net growth in energy consumption last year, while consumption declined in OECD countries for the fourth time in five years.

The decline in energy consumption was most notable in the USA with a 2.8 per cent fall.

The trends are published in the latest edition of the *BP Statistical Review of World Energy* and show how the world's energy system adapts to global events and patterns.

Oil and natural gas production growth in the USA was the largest in the world in 2012 as a result of the shale gas revolution there. Natural gas prices therefore fell in the USA leading natural gas to displace coal in power generation.

But while coal consumption declined in the USA, it rose in Europe, where natural gas prices remained high. Consumption of fossil fuels in Japan also rose due to a decline in output from nuclear power plants.

"The data show there is ample energy available. Our challenge as an industry is to make the best choices about where to invest," said Bob Dudley, BP Group Chief Executive. "We want to provide energy in ways that enable us to be both safe and competitive – deploying our strengths while reducing our risks, and managing our costs."

Globally, growth in energy demand slowed to 1.8 per cent from 2.4 per cent in 2011. China and India accounted for almost 90 per cent of the global increase, says BP.

Just 20 years ago, the emerging economies accounted for only 42 per cent of global consumption; now that figure is 56 per cent. For a second consecutive year, oil supply disruptions in Africa and the Middle East were offset by growth among other Middle East producers, with record oil production in Saudi Arabia, the UAE, and Qatar. Despite these supply increases, average nominal oil prices reached another record high.

The International Energy Agency (IEA) has said the USA will be a net exporter of oil by the next decade and could overtake Saudi Arabia as the world's top crude producer by 2020.

Opec has already expressed concerns about the potential impact of rising US oil exports on its powers. The cartel accounts for around 40 per cent of global oil production and some of its members would be adversely affected by falling oil prices.

Dudley said that the shale gas revolution in the USA shows how increasing the diversity of energy sources was helping the global market to adapt to change.

"For those of us in the energy industry, the challenges are about how we respond to the big shifts we are seeing – a shift in demand towards emerging economies and a shift in supply towards a greater diversity of energy sources, including unconventionals," he said.

Africa realising renewables potential

International banks are showing increased interest in renewable energy projects in Africa thanks to significant potential for solar and wind energy and evolving regulatory regimes.

Countries such as South Africa and Morocco have the most advanced regimes for attracting renewable energy developers and financers but other countries – including Kenya and Uganda – are emerging as target markets, according to law firm Baker & McKenzie.

So far financing of renewable energy projects in Africa has been dominated by local banks and international development finance institutions. However international banks are showing "tremendous interest" in African projects, says Baker & McKenzie, which recently surveyed 140 senior executives in the energy industry.

"I am seeing lots of interest from countries such as Korea, Japan and even Thailand and Malaysia now, in investing in renewables outside their own country," says Baker & McKenzie Sydney partner Paul Curnow. "Asian investors will really focus on countries that have the most attractive renewable policy."

Baker & McKenzie's survey results reflect two other recently released reports that show a geographical shift in the deployment of renewable energy towards developing countries.

According to Bloomberg New Energy Finance (BNEF) and the Renewable Energy Policy Network for the 21st Century (REN21), more countries are taking up renewable energy than ever before.

Of the 138 countries worldwide that have renewable energy policies in place, two-thirds are in the developing world. China leads the way with $67 billion invested in 2012, but sharp increases were also seen last year in South Africa, Morocco, Mexico, Chile and Kenya.

The Middle East and Africa saw $12 billion invested in renewables in 2012, a rise of 228 per cent over 2011.

The 2012 global investment total for renewable energy (including small hydropower projects) was $244 billion. In previous years, global investments totalled $279 billion (2011), $227 billion (2010), $168 billion (2009), $172 billion (2008), $146 billion (2007) and $100 billion (2006).

Total renewable power capacity worldwide exceeded 1470 GW in 2012, up 8.5 per cent from 2011.

According to Baker & McKenzie, debt financing for African renewables is key. Investors need strong relationships with local banks and international development finance institutions to access affordable capital on a meaningful scale. South African banks have so far financed most of the country's programme to bring 6.9 GW of renewables capacity online by 2020.

"South Africa and Morocco are not the end of African renewable energy by any means," said Baker & McKenzie London partner Marc Fèvre. "In East Africa, Kenya and Uganda both have feed-in tariff regimes. There is a lot of interest in geothermal power in the Rift Valley region, while Kenya's Lake Turkana and Kinangop wind farms are both significant projects.

"In West Africa, Senegal has implemented legislation and a programme to develop renewable energy. Further south, we are working on the first wind farm in Namibia, but it won't be the last."

Ethiopia project angers Egypt

- Expert panel submits report
- Egypt proposes national commission

Ethiopia has maintained that the construction of a dam on the River Nile will not affect Sudan and Egypt following the completion of a year-long study of the project by a panel of experts.

Ethiopia last month announced that it was diverting the flow of the Blue Nile to begin building the Grand Renaissance Dam, angering Sudan and Egypt, which both depend heavily on the river's water.

Egyptian president Mohammed Morsi said that "all options are open" to deal with any threat to his country's water supplies posed by the $4.7 billion dam, suggesting that conflict could arise if Ethiopia pressed ahead with the project.

Ethiopia has submitted a report written by a panel of experts to Sudan and Egypt that concludes that their water supplies will not be significantly affected. The panel included representatives from Sudan and Egypt and also found that the dam project meets international standards.

The Ethiopian Ministry of Water and Energy said it would carefully consider recommendations of additional assessments and proposals in the report "that would help the basin countries benefit better from the dam".

The dam has been under construction for over two years on the Blue Nile River in Ethiopia's Benishangul-Gumuz region near a Sudanese border. It will have a generating capacity of 6000 MW on completion.

Ethiopian Minister of Water and Energy Alemayehu Tegenu told the *Associated Press* that Egypt should not worry about a diminished water share from the Nile.

"The dam is solely intended for electricity production... So there should not be any concerns about a diminished water flow," Alemayehu said.

"Even during the period when we would be filling the reservoir, we are going to employ a careful and scientific water impounding technique to make sure the normal flow is not significantly affected."

Ethiopia's decision to construct the dam challenges a colonial-era agreement that had given downstream Egypt and Sudan rights to the Nile water.

Morsi says that Egypt would create a national commission to address the dam and its impacts on transboundary water sharing on the Nile.

Special Project: London Array

Offshore wind comes of age

The inauguration of London Array, the world's largest offshore wind farm, is a significant milestone in the evolution of wind power. It marks the industry's ability to deliver truly large-scale wind projects.

Junior Isles

Offshore installation: Siemens installed 175 of its 3.6 MW turbines at London Array

There is no mistaking the importance of the UK to the global offshore wind industry. Currently it has the lion's share of the market, accounting for nearly 60 per cent of the total approximate 6 GW. Notably, in the EU more than 73 per cent of all new offshore wind capacity installed in 2012 was placed in UK waters.

Over the last decade or so, the UK has become home to some of the industry's most ambitious projects and will be the place where the offshore wind sector demonstrates that it can play an important role in a country's energy mix where there are ample wind resources.

The recent inauguration of the first phase of the London Array wind farm, the world's largest offshore wind project, is an important milestone in the history of offshore wind schemes and demonstrates the possibilities in this fast growing business.

The project has 175 wind turbines supplied by Siemens to deliver a maximum power output of 630 MW – enough to power half a million homes in the UK, while saving about 925 000 t of CO_2 a year.

Commenting on the significance of the project, Michael Hannibal, CEO of Offshore EMEA at Siemens Wind Power said: "We built the first offshore wind farm – called Vindeby in Denmark – in 1991. It followed a strategic decision in 1989 by Siemens (Bonus Energy at the time), to go into offshore. At the time, everyone believed it would be a significant amount of time – maybe 10 years – before the next project took place. This is basically what happened. It was 2001 before the next real project with large 2 MW machines happened."

The market grew slowly at first, with a few projects appearing around 2002 and 2003. However, it was not until 2007 that offshore wind really began to take off when the UK entered the market in a big way.

"The UK really made a market, with a pipeline of projects that brought volume to the industry. You can say this is when offshore wind started to industrialise. With regards to London Array, it is the first large scale wind project that you can say is a production plant; a power plant like you might see in the coal fired sector," said Hannibal.

London Array was born in 2001, when a series of environmental studies in the outer Thames Estuary confirmed the area as a suitable wind farm site. Two years later, the Crown Estate gave London Array Ltd a 50-year lease for the site and cable route to shore. London Array Ltd is a consortium comprising: Danish utility DONG Energy (50 per cent); German energy giant, E.On (30 per cent); and Masdar, Abu Dhabi's multi-faceted initiative set up to advance the development, commercialisation and deployment of renewable energy technologies.

Planning consent for a 1 GW offshore wind farm was granted in 2006, and permission was granted for the onshore works in 2007. Work on Phase 1 started in July 2009 when the consortium began building the onshore substation at Cleve Hill in Kent.

The contract for the supply of the turbines was also signed in 2009, at which time London Array Ltd and Siemens agreed a contractual schedule and programme for installing the turbines.

Chris Randle, Siemens Project Manager for London Array, had the job of ensuring the monumental task of building such a huge project ran as smoothly as possible.

"The first step was to align ourselves internally with our internal supply chain and procurement departments," he noted. "Managing a wind farm project of this size with such a large number of components is a vast and complex challenge. There are many key interfaces, both internally and externally that have to be carefully managed to ensure aspects such as component quality, while meeting delivery schedules."

The task was not made any easier by the financial crisis. Delivering so many components, especially during difficult economic times placed additional strain on sub-suppliers. It was therefore vital that Siemens kept a close dialogue with all of the parties involved in component production.

"I can recall one occasion where we had to step in to support one of our key suppliers. We had to provide some additional resources, infrastructure, equipment tools and management to support them during this difficult time. It secured our delivery of components to meet our milestones and meet the installation vessel load-out dates," said Randle.

Components were manufactured in several locations around Denmark. Marsh Towers and DS SM manufactured the turbine tower sections in Herning and Roedekro, respectively; blades were manufactured in Siemens' blade manufacturing plant in Aalborg, and the nacelles were assembled in the Siemens facility in Brande.

Delivery of the components from the various sites for loading onto the installation vessels was managed by a large team of project managers responsible for various packages of work. "With a project the size of London Array, these packages are quite big sub-projects in their own right," noted Randle.

A transport coordinator worked closely with two of the team managers responsible for managing the installation and pre-assembly activities. "They coordinated what components would be arriving, and when they would be picked up from production. They were responsible for coordinating the transport contracts with the heavy goods vehicles collecting the components from Aalborg, Brande and Herning. They were also responsible for coordinating with the site managers in the port of Esbjerg, where they were delivered for pre-assembly work."

Special Project: London Array

Towers were pre-assembled at Esbjerg

The production of the wind turbines and the their delivery was scheduled according to project management requirements. As with some other projects, a buffer of turbines were held on the quayside, ready to go in case the programme was accelerated and an installation vessel became available earlier than planned.

The schedules varied according to production and project demands but were ramped up as the project progressed. Manufacturing of the main components – transformers, nacelles, hubs, towers and blades – began in March 2011. Offshore construction also started in March when the first foundation was installed.

Following pre-assembly, the first components were ready to be shipped out from Esbjerg port in November 2011. Typically, six turbines at a time were loaded onto two barges for transport to the port of Harwich, UK, near the site.

Despite shipping in November, however, the first turbine was not installed until January 2012. The delay highlighted the main areas of unpredictability in building offshore wind projects – the weather. "We had to wait for an available weather window to transport over at the right times," noted Randle.

Sticking to a schedule that can be affected by the vagaries of the weather at sea can be tricky. Randle explained: "We try to plan as far in advance as possible and then it turns into a very dynamic plan with risk assessment up to the day it happens. So if the weather completely changes on the planned date – which often happens and we can't do that work – then the plan changes."

Weather uncertainty or not, like all major power projects, constructors of offshore wind projects are still subject to liquidated damages for late delivery or missing contractual milestones.

This means there has to be a certain amount of flexibility and contingency planning within the big plan for the overall project. "It's of crucial importance for us to plan effectively and utilise the time we have," stressed Randle.

Siemens also encountered several other challenges on this project, some it had not seen before. The main difference between London Array and previous projects, apart from its size, is the site. It is 20 km into the Thames Estuary, which is in the middle of a very busy shipping lane. This presents a number of transport complexities to managing offshore work.

The site is also located in two very distinct areas – one in deep water (up to 25 m), while the other dries out.

"This makes it a very difficult site to manage," said Randle. "It means you can't access a number of turbines during the day because the water level drops with the tide and you can only see sandbanks. So we had to plan our work around the tides, water depths and the times of the day, as well as plan our daily work activities."

Siemens had to therefore take various approaches to tackle the problem, such as the use of different crew vessels, and implementing different innovations.

"We commissioned a tract vehicle as a rescue vehicle in the event of an emergency. Although helicopter rescue is possible, we also wanted a Plan B. During the design phase, we commissioned the design of an Argo Cat, which sits on the back of one of our crew transfer vessels. It can tract across the sand to rescue one of the crew if necessary. It was trialled at our Gunfleet project and we took them on board for London Array as a safety vehicle should we ever need it."

Two different vessels – ACT Seaworker and MPI Discovery – also had to be used for the installation process due to the shallow water location.

MPI Discovery is a large, self-propelled jack-up barge that would pick up components directly from the port of Esbjerg and take them to the offshore wind farm. Seaworker is a smaller vessel that could only carry one turbine at a time. It would therefore take components from the barges coming in from Esbjerg and take them from the port of Harwich to the site. These vessels would also carry up to 20-25 of the Siemens installation team on each journey.

Randle explained: "The big vessel, Discovery, could not operate in the shallow water, so Seaworker was used for a lot of the shallow water locations. Discovery would bring six turbines into the field for installation in some of the deeper locations."

Installation of each turbine followed a similar process. Once the jack-up vessel was in place, the pre-bolted bottom and middle section of the tower was installed, followed by the top tower section. The nacelle and blades were then installed.

In line with safety requirements, turbines can only be installed when wind speeds out at sea are within the limits specified for the various components. This meant it took an average of 14-22 hours to install each turbine.

At this rate 175 turbines were installed in less than a year but it was by no means a walk in the park.

Randle pointed out: "I was on the installation vessel several times and I can tell you, it's a hard working day offshore. You're on a vessel that's moving around, the conditions are wet and windy but you have to carry out lifting operations in the best way you can in those conditions. Plans change on a minute-by-minute basis sometimes."

London Array represents only the second installation of Siemens' SWT-3.6-120 turbines.

When it was first introduced, the 3.6 MW turbine was Siemens' offering for the coming offshore market.

Henrik Stiesdal, Siemens' Chief Technology Officer recalls: "The turbine was our shot at the big turbine that we could see the offshore market needed."

The wind turbine operates automatically. It is self-starting when the wind speed reaches an average of about 3 to 5 m/s (about 10 mph). The output increases approximately linearly with the wind speed until the wind speed reaches 12 to 13 m/s. At this point, the power is regulated at rated power.

If the average wind speed exceeds the maximum operational limit of 25 m/s, the wind turbine is shut down by feathering the blades. When the average wind speed drops back below the restart average wind speed, the systems reset automatically.

According to Stiesdal, one of the things that set it apart from other offshore turbines is that it was designed as an offshore machine from the beginning in terms of size and construction.

The turbine is a geared machine with 58.5 m blades made of fiberglass-reinforced epoxy and cast in one piece to eliminate weaker areas at glue joints.

Stiesdal noted: "We put out a prototype with a 107 m rotor [diameter] but the idea was always that the fundamental design would target a large rotor. We just did not feel that we could start with a larger rotor from the beginning because we always had a healthy respect for taking too large a jump."

Siemens therefore decided to first build a 52 m blade machine, since on the same 3.6 MW rating it gave the same rotor loading in watts per square

SWT3.6-120 main specifications

Operating data	
Cut-in wind speed	3-5 m/s
Nominal power at	12-13 m/s
Cut-out wind speed	25 m/s
Maximum 3 s gust	70 m/s (IEC version)
Rotor	
Type	3-bladed, horizontal axis
Diameter	120 m
Swept area	11300 m²
Nominal rotor speed	5-13 rpm
Power regulation	Pitch regulation with variable speed
Blade type	B58
Blade length	58.5 m
Generator	
Type	Asynchronous
Nominal power	3600 kW
Protection	IP 54
Cooling	Integrated heat exchanger
Insulation class	F
Tower	
Type	Cylindrical and/or tapered tubular
Hub height	90 m or site-specific
Weights (approximate)	
Rotor	100 000 kg
Nacelle	125 000 kg

Special Project: London Array

Rotor blades at Esbjerg port: a buffer of components was held on the quayside

metre as on its earlier machines.

Stiesdal explained: "We would always stay within a 60 per cent leap in size. So moving from a 2.3 MW to this size felt like a safe bet.

"The 120 m rotor was in the calculation right from the start but we did not have the ambition in the beginning to make such a big blade. However, the market was showing signs of moving to lower rotor loadings and the 120 m rotor was seen as the maximum that the structure was supposed to be capable of carrying."

Stiesdal says there are several other features that demonstrate that the design is specifically aimed at offshore operation.

For example, it has climate control to help prevent corrosion of internal components.

It also has operation and control features that are important for a machine operating out at sea.

The SWT-3.6-120 wind turbine is equipped with the Siemens WebWPS SCADA system to allow remote control and a variety of status views and useful reports from a standard internet web browser. The status views display information such as electrical and mechanical data, operation and fault status, meteorological data and grid station data.

The turbine is also equipped with Siemens' TCM condition monitoring system. This system monitors the vibration level of the main components and compares the actual vibration spectra with a set of established reference spectra. Result reviews, detailed analysis and reprogramming can all be carried out using a standard web browser. All the turbines for London Array are controlled and monitored from an operation and maintenance centre in the port of Ramsgate.

"These features are important for a machine that is out at sea. It means you have control of your machine if something starts going wrong," said Stiesdal.

Stiesdal also notes that the SWT-3.6-120 has a full power converter. "There are different schools of thought on how to connect turbines to the grid. Siemens' approach is to have a converter that converts all the power. Others use a double-fed induction generator where you only convert the power that comes out of the rotor. We are of the opinion that the full converter offers the highest degree of flexibility for grid requirements."

Connection to the grid and commissioning marks the final step in a project going live, and Siemens put a lot of effort into optimising the commissioning process to help deliver power as fast as possible.

It had a construction office in the port of Ramsgate housing the site management and a number of technicians. Once installation of the turbines was complete, personnel from the construction office would transfer out to a hotel vessel and onto a crew transfer vessel to the turbines to begin commissioning.

Personnel were specialised in areas such as mechanical completion, high voltage work, cabling work and final commissioning activities. The internal components of each turbine were commissioned before it could be cleared for connection to the grid. The entire process began at the end of October 2012 and was completed in April this year.

Randle noted: "The industry has never seen 175 turbines commissioned in that amount of time."

Once commissioned, each turbine started to generate electricity and following a 240-hour reliability test, was then handed over to the customer – a process that was repeated 175 times. The last turbine completed its reliability test in May and the full asset was handed over in June.

The entire project from start to finish has been a learning exercise for Siemens and the experience and information gathered will be shared throughout the organisation. One key piece of advice that Randle has for other project managers is to "always have a Plan B and a Plan C ready".

"The best plans in the world can change, and they do change, so be flexible and ready to adapt that plan to the situation at the time."

He also stresses that projects of this size are about collaboration and working in partnership with everybody involved. While this is very important during project execution, a good relationship between a utility and supplier can bring other benefits.

Prior to winning the London Array contract, Siemens had entered into a framework agreement with DONG Energy for 500 turbines. This was a significant milestone for the industry since it marked the move from project-by-project thinking, to serial production thinking.

Stiesdal said: "[For the customer] It's about selecting a supplier with whom you want to get the benefits of serial production. This master agreement took us out of the stop-and-go purely project-oriented business into something that was more of a standardised product. It essentially 'onshorised' offshore."

Such developments could be hugely important for both Siemens and the industry. According to Siemens, its agreement with DONG will help promote the industrialisation the industry needs.

According to Hannibal, London Array, together with other projects, is helping the industry to reduce the cost of energy.

He said: "Each decade, we have managed to reduce the levelised cost of energy by about 40 per cent. So far it has been largely achieved through turbine development but looking ahead, we still need other innovations."

The UK has set itself a goal to reduce the cost of energy to £100/MWh by 2020. Siemens believes the industry should be aiming for €100/MWh as opposed to £100/MWh. To do this, Hannibal says the industry will have to be smarter.

"We can't just depend on developing larger and larger turbines. We will have to look at foundations, cables and electrical system solutions. Adopt new ways of thinking.

"We have to do things differently – get smarter at installation. London Array has contributed significantly to the industry. For example it has enabled the next wave of special-purpose vessels for installing both foundations and turbines to be built. It is a project where we have noticeably taken things one step further and we can take what we have learned here forward to other projects."

There will no doubt be a number of other projects to look forward to in the UK. As much as 30 GW of new capacity could be installed under the country's Round 3 offshore programme.

Hannibal warns, however, that the UK is in danger of losing momentum with the current uncertainty surrounding electricity market reform. The current incentives provided through Renewable Obligation Certificates (ROCs) is being phased out and will be replaced by a feed-in tariff with contract for differences (CFDs).

While the industry generally supports the electricity market reforms aimed at delivering low carbon generation, the government has been slow in providing details of the reform and announcing the price that generators will be paid for producing clean electricity. This is causing the market to slow down.

"The new CFD will provide the right regime to attract investment from pension funds and other investors. But what is not positive for the market is the current uncertainty on what the strike price will be, what the actually CFD means, how long it will run for etc. Uncertainty like this has the tendency to delay projects, so we will see the UK market lose momentum before it picks up," said Hannibal.

Fortunately, Siemens says it has a good pipeline of projects to balance out any temporary lull in the UK.

"We have a backlog of projects in UK waters and are installing projects in Denmark and Germany. So it is good that we are well positioned and have a backlog of projects in different places," said Hannibal.

While policy challenges remain, the UK still looks set to take offshore wind to the next level and, as Hannibal says, London Array signifies that offshore wind farms are now "in the grown-ups class when it comes to power plants".

Blades were transported by heavy goods vehicle from Aalborg

SIEMENS

A vision becomes reality.

Just outside of Greater London, we've built the world's largest offshore wind power plant.

siemens.com/wind

A total of 175 Siemens offshore wind turbines were erected in the outer Thames Estuary to realize the world's largest offshore wind power project – London Array. With a capacity of 630 MW, it generates enough energy to power more than 500.000 homes.

By supplying wind turbines, substations, and service to this landmark project, Siemens has contributed to the UK maintaining its position as an offshore leader, demonstrating the potential of modern offshore wind power.

Drawing on over 30 years of experience in wind power and a global network of highly skilled employees, Siemens has again proven itself to be a trustworthy and reliable business partner. As the world looks for energy solutions, if anyone has the answers, then Siemens does.

Answers for energy.

Centrica makes foray into UK shale gas

The potential for shale gas development in the UK is starting to lure the big players.

Siân Crampsie

Centrica is betting around £100 million ($155 million) on successful growth in the UK's shale gas sector.

The UK energy firm has paid £40 million in cash for a 25 per cent stake in the Lancashire Bowland shale gas exploration licence area operated by Cuadrilla Resources, the only company to have so far undertaken 'fracking' operations in the UK in search for shale gas.

The deal is a sign that the energy majors are getting serious about the potential of shale gas in the UK. Cuadrilla believes that its Bowland licence area contains 200 trillion cubic feet (TCF) of shale gas – enough in theory to meet the UK's needs for 67 years.

Last month IGas estimated that there is up to 170 trillion cubic feet (TCF) of shale gas in its licence area in northwest England.

Centrica's move is a bet, however, as it is unclear how much of the gas in place can be extracted, and how much it will cost to extract. Centrica has committed to fund £60 million of expenditure on exploration and appraisal costs and will also make a further £60 million contingent payment on completion of certain milestones.

Cuadrilla has welcomed Centrica's investment as a "ringing endorsement" of the UK's shale gas potential.

"This transaction presents an attractive opportunity for Centrica to explore the potential and commercial viability of natural gas from shale in the UK," said Mark Hanafin, Managing Director of Centrica's international upstream business. "With North Sea gas reserves declining and the UK becoming more dependent on imported gas supplies, it is important that we look for opportunities to develop domestic gas resources, to provide affordable sources of gas to our customers, and to deliver broader economic benefits to the UK."

Energy firms are hoping that successful exploration of shale gas reserves in the UK will help to boost energy security and economic growth as well as reduce energy bills. Analysts have already warned, however, that the energy revolution caused by shale gas in the USA is unlikely to be repeated in the UK due to differences in geology, population density and regulations.

Environmentalists are also concerned about the impact of hydraulic fracturing – or "fracking" – on the environment. WWF said that shale gas exploration was "completely incompatible" with efforts to tackle climate change.

"Just a few months ago, [Centrica CEO] Mr Laidlaw was highlighting environmental concerns and population density as problems facing shale development in the UK," said Jenny Banks, climate and energy specialist at WWF-UK. "These haven't gone away so it'd be interesting to know what has changed for Centrica now."

In May the UK's Institute of Directors (IOD) published a report analysing the economic benefits of onshore shale gas development in the UK. In it the IOD said shale gas development could create tens of thousands of jobs, reduce energy imports, generate tax revenue and support economic growth.

Tognum makes Russian deal

Engine firm Tognum is hoping to cement its position in the Russian and CIS engine market with the creation of a new production facility in the city of Kolomna, near Moscow.

Tognum has signed an agreement with Transmashholding, one of Russia's largest rolling stock manufacturers, to set up a joint venture company to assemble, test and finish diesel engines and gensets in the new factory.

The new site will also handle sales and aftersales service and will be operated by the joint venture company, MTU Transmashholding Diesel Technologies. Tognum will invest €80 million in the project.

"This joint venture is an important and logical milestone in the development of our long-term relationship with Transmashholding and the consequent joint decision to further develop the CIS-market with modern diesel technologies," Tognum's CEO Joachim Coers said.

The new plant is expected to produce up to 1000 engines per year for the rail, mining and on-site power generation sectors. Production is set to start by December 2015.

Tognum rival Wärtsilä has also established a joint venture with Transmashholding and announced in June 2012 that it was ready to start construction of a new factory in Penza, Russia for the manufacture of diesel engines.

Wärtsilä said that the deal would strengthen its position in the Russian market, in particular the rail locomotive market.

Kolomna: home of Tognum's planned Russian production centre

Strategic shift planned for EnBW

Embattled German energy utility EnBW is planning to boost investment in renewables and power networks in a bid to overcome tough trading conditions.

The company is expecting a sharp fall in profits from its conventional power generation business and is also trying to compensate for the forced early closure of two nuclear power units.

By 2020, EnBW intends to generate 40 per cent of its profits from its renewable energy business and its regulated power networks sector, compared with 12 per cent at present. It says that an asset disposal programme will raise €2.7 billion of funds for its strategy.

According to CEO Frank Mastiaux, EnBW will expand its onshore wind generating capacity to 1750 MW over the next seven years, up from 200 MW at present. Its investments will be spread across Germany, Austria, Switzerland and Turkey.

Like other power generators around Europe, earnings from EnBW's gas-fired power plant fleet have fallen due to low power prices and competition from renewables. RWE and E.On have also taken steps to adjust to the trading environment, including the closure of generating capacity and streamlining company structure.

Dow Jones newswires reported in June that RWE was considering the mothballing of gas and coal-fired power plants in Europe amid low wholesale power prices, which currently stand at around €38/MWh.

Wholesale prices of €55-60/MWh are needed to run a fleet of power plants over the long term, *Dow Jones* reported RWE board member Rolf Martin Schmitz as saying.

Market woes force Siemens solar closure

Siemens is to close its solar thermal business after failing to find a buyer.

The German engineering firm announced in October last year that it would exit the solar energy business but weak market conditions in the solar sector have made it hard to find an investor.

The closure will result in the loss of 280 jobs and is expected to cost Siemens millions of euros. Siemens announced in May that it would phase out its solar photovoltaics (PV) business.

Siemens says it will complete current projects and continue to fulfil warranty obligations in the solar sector. It said that there had been a number of interested parties for the solar thermal business but that negotiations had proved difficult because the current and future market for solar receivers remains low.

"We had negotiations with a number of interested parties but no agreement could be achieved," read a statement from Siemens. "Current and prospected market volumes for solar thermal receivers remain on a low level, making it difficult to agree on a business plan for an acquisition scenario that meets the requirements of both investor and seller.

In 2012 Siemens said that global market expectations for concentrated solar power had shrunk from 4 GW to slightly more than 1 GW. The reduced market size is largely due to intense competition from the PV segment of the solar market.

The PV market has witnessed a rapid fall in product prices as a result of surplus production capacity globally. While this has helped to drive rapid growth in the market, it has also wiped out profit margins for many PV product manufacturers.

These market conditions coincided with the economic recession and currency crisis, forcing Siemens to reassess its activities in the PV and solar thermal businesses.

In 2009, Siemens paid $418 million for Israel-based Solel Solar Systems, a manufacturer of solar thermal plant products. A year later it acquired a stake in Archimede Solar Energy, a solar thermal company based in Italy.

The firm hoped to emulate its rapid growth in the wind energy sector and had forecast double-digit annual growth rates in the solar thermal sector to 2015. However the solar thermal units is reported to have suffered nearly $1 billion in losses over the last two years.

Americas

Abengoa orders Carty CCGT

Abengoa has placed an order with Mitsubishi Power Systems Americas Inc (MPSA) for the supply of a natural gas powered combined cycle power unit at the Carty generating station in Oregon, USA.

The 440 MW Carty plant is being built on behalf of Portland General Electric (PGE) and is scheduled for completion in mid-2016. MPSA will equip the plant with an M501GAC gas turbine, an SRT-50 reheat steam turbine and a heat recovery steam generator.

Under a separate long term service agreement, MPSA will provide the Carty generating station with comprehensive turbine maintenance, repair and outage services, replacement parts supply, and dedicated remote monitoring for its gas turbine.

Nexans to supply EHV link

Nexans has been awarded a contract by China's Sinohydro Corporation to supply the extra high voltage (EHV) power cable link for Ecuador's 1500 MW Coca Codo Sinclair hydroelectric project currently under construction in the Amazon Basin.

Nexans will supply 7 km of single-core 500 kV state-of-the-art XLPE (cross-linked) insulated power cable, with a 1600 mm² copper cross-section, together with associated accessories, to transmit power generated from the new dam on the Coca river to the local substation for distribution into Ecuador's power grid.

The cable will be manufactured during 2013 and delivered in 2014.

Asia-Pacific

Siemens delivers Ashuganj GT package

Daewoo International and UTE TSK-Inelectra have placed orders with Siemens for the delivery of gas turbine-based power generation systems for two new combined cycle power plants being built in Bangladesh.

Daewoo is building a 225 MW power plant at Ashuganj while UTE TSK-Inelectra is building a 385 MW plant at the same site. Both projects are owned by the Ashuganj Power Station Company Ltd.

For the 225 MW plant, Siemens will supply an SGT5-PAC 2000E package comprising an SGT5-2000E gas turbine, an SST5-600 steam turbine, and two SGen5-100A generators. For the Ashuganj 385 MW combined cycle power unit, Siemens will be delivering an SCC5-PAC 4000F/3000 package consisting of an SGT5-4000F gas turbine, an SST-3000 steam turbine and an SGen 5-2000H generator.

The new plants will help Bangladesh cope with rising energy demand, which is being driven by strong economic growth.

Toshiba wins Laos order

Sinohydro Resources has awarded Toshiba Hydro Power (Hangzhou) Co (THPC) a contract to supply three 80 MW hydroelectric turbines and generators for the Nam Ou 5 hydropower plant on the Nam Ou, a major river in Laos.

THPC will design and manufacture the turbines and generators and start delivery next January. The first unit is expected to enter operation in December 2015.

Following on from Nam Ngum 2 and Nam Ngiep 2, this is Toshiba's third major order for a hydropower plant in Laos.

Gamesa agrees India deal

Gamesa has reinforced its position in India with the signing of two agreements for the supply of wind turbines to two major developers.

The Spanish firm has signed a deal to provide 130 MW of wind turbines to China Light & Power India (CLP India) and has also signed another agreement with Greenko Win Project for 100 MW.

For CLP India, Gamesa will supply, install and commission 65 of its G97-2.0 MW wind turbines at the Jath wind farm in the state of Maharashtra. It will also undertake operations and maintenance at the site for ten years.

For Greenko, Gamesa will install 50 G97-2.0 MW wind turbines at two 50 MW wind farms in the state of Karnataka and Andhra Pradesh.

Europe

Centrax expands in France

Centrax has expanded its presence in the French power generation market with the sale of three gas turbine packages.

Dalkia has ordered two CX501-KB7 units while Cofely has ordered one CX501-KB7 unit. Dalkia will install one unit at the Omnitherm district heating plant in Valence and the second at the Gie Evry district heating plant in southwest Paris.

Cofely's KB7 unit is destined for the Chambery plant of gypsum producer Placoplatre.

Centrax will deliver all three units this summer.

RWE npower selects Trilliant

Trilliant has announced that it has been selected by RWE npower to supply smart meter services for the roll-out of a smart energy meter programme in the UK.

Trilliant's services include communications hubs and its UnitySuitehead end software. The deal will make the firm the largest provider of in-home smart energy communications equipment in the UK.

With over 500 000 homes in the UK already connected to Trilliant's UnitySuite head end platform, RWE npower will be able to use Trilliant's knowledge of smart meter deployments to leverage the current solution for deployment this year.

Gamesa sells Scottish wind farm

Gamesa has closed the sale of a 15.3 MW wind farm development in Scotland to John Laing, a specialist investor and asset manager.

The Carscreugh wind farm, located in Dumfries and Galloway in south-west Scotland, will be equipped with 18 Gamesa G52 turbines, each with a unit capacity of 850 kW.

Gamesa expects to install the wind turbines towards the end of this year and to commission the facility in the first quarter of 2014. Under the agreement, the company will also carry out operations and maintenance services at the facility for 10 years.

FoundOcean awarded Fife contract

Graham Construction has awarded FoundOcean a contract to pile grout the foundation for the world's largest offshore wind turbine. The 7 MW wind turbine will be installed at the Fife Energy Park in Scotland, and features turbine blades that are over 80 m long – lnger than the wingspan of an Airbus A380 aircraft.

Grouting will take place in July 2013 and will be done in two phases.

Alstom improves West Burton and Cottam

Alstom has been awarded a contract to retrofit intermediate pressure (IP) turbines at West Burton and Cottam coal-fired power stations in the UK. The retrofit will improve the efficiency and extend the life of turbines at the two EDF Energy power stations.

West Burton and Cottam power stations are both rated at 2000 MW and are located in Nottinghamshire in the East Midlands.

The contract entails replacing the inner cylinder and fitting a new rotor and blades on Cottam 2 and West Burton 1. The work will improve the heat rate, reset the life of the major IP turbine components, and ensure lower maintenance costs for the remainder of their life.

Areva contracted for research reactor

Areva has signed a multi-million euro contract with the Technical University of Munich (TUM) in Germany for the supply of fuel elements for the FRM2 research reactor.

The 20 MW reactor was commissioned in 2004 and is used for the production of neutrons for scientific research in the nuclear, industrial and medical domains.

Metso wins WTE orders

Metso has been awarded its sixth and seventh repeat orders from the CNIM group for the automation of two greenfield waste to energy (WTE) plants in the UK.

Metso will supply an extensive Metso DNA distributed control system and safety system to both new plants, one of which is located in North Oxfordshire and the other in Cardiff.

The control systems aim to help WTE plant operators maximise incinerator capacity by keeping combustion and steam production stable while allowing high availability of the production processes.

Both plants will be operated by Viridor, one of the UK's leading recycling, renewable energy and waste management companies.

International

Kenya orders biogas power plant

UK-based Clarke Energy has placed an order with GE for two Jenbacher J420 biogas engines for a new 2.8 MW agricultural biogas power project at a large vegetable farm near Lake Naivasha in Kenya.

The project is owned by Tropical Power and will be the first biogas engine project in sub-Saharan Africa for Clarke Energy. It will use biogas generated from farm waste as a fuel.

The farm grows vegetables for sale in supermarkets. Its biomass waste, including trimmings and unsold vegetables, will be processed in a digester to create biogas. The containerised gas engines will be configured for cogeneration, with surplus heat recovered as hot water and used to support the biogas plant's process heating.

The project is important for Kenya's local economy because current economic development efforts are putting a strain on the local power distribution network, says GE.

Vestas equips Croatian project

Vestas is to supply the wind turbines for a 42 MW project in Croatia.

The order was placed by Eko Energija d.o.o., a company wholly owned by the EnerCap Power Funds, managed by EnerCap Capital Partners. Vestas will supply, install and commission 14 of its V90-3.0 MW turbines at a site in Obrovac, Croatia.

"We're delighted to commence the construction of the Obrovac wind power plant which marks our first investment in Croatia," said Alastair Hammond, partner at EnerCap Capital Partners. "We are pleased to work with Vestas again, following our successful project in Scieki, Poland, last year."

The first turbine delivery is planned for the first quarter of 2014 and the wind power plant is expected to be commissioned during the second quarter of 2014.

Nordex expands in South Africa

Independent power producer Cennergi has placed an order with Nordex for the delivery and turnkey installation of a wind farm in South Africa.

The 134.4 MW Amakhala Emoyeni plant will be built near Bedford in Eastern Cape Province, with work starting in the third quarter of 2014. Installation of the turbines will start in mid-2015.

Nordex will supply and install 56 of its N117/2400 turbines and has also signed a ten-year service agreement covering the plant.

Amakhala Emoyeni is one of the projects from the second round of the South African REIPP auctions approved by the South African Ministry of Energy in May 2012 and comes with a 20-year electricity power purchase agreement. The next round of tenders is to be held in August this year, when Nordex hopes to win further business, it said in a statement.

Algeria projects select Siemens

Siemens has won orders from Daewoo E&C Co. and Hyundai Engineering Co. for the supply of power plant components for the Ras Djinet and Ain Arnat combined cycle power plants in Algeria.

The two plants are being built for Sociéte Algérienne de Production de l'Electricité (SPE), the state-run energy provider in Algeria, and will have a combined generating capacity of more than 2000 MW. Siemens will supply six F-class gas turbines, six steam turbines and six generators.

The two plants will supply power to over five million households on Algeria's Mediterranean coast. They are part of plans to expand the country's power generating capacity from 11 GW to 26 GW by 2022 in response to economic development.

Voith modernises Inga I

Voith has been awarded a contract to modernise the Inga I hydropower plant in the Democratic Republic of Congo.

The €58 million project will be carried out by Voith and its partner Elecnor SA, and will be financed by the World Bank. It will involve a comprehensive rehabilitation of two turbine-generator units inside the power station, which entered service in the early 1970s and which has completed nearly 260 000 operating hours.

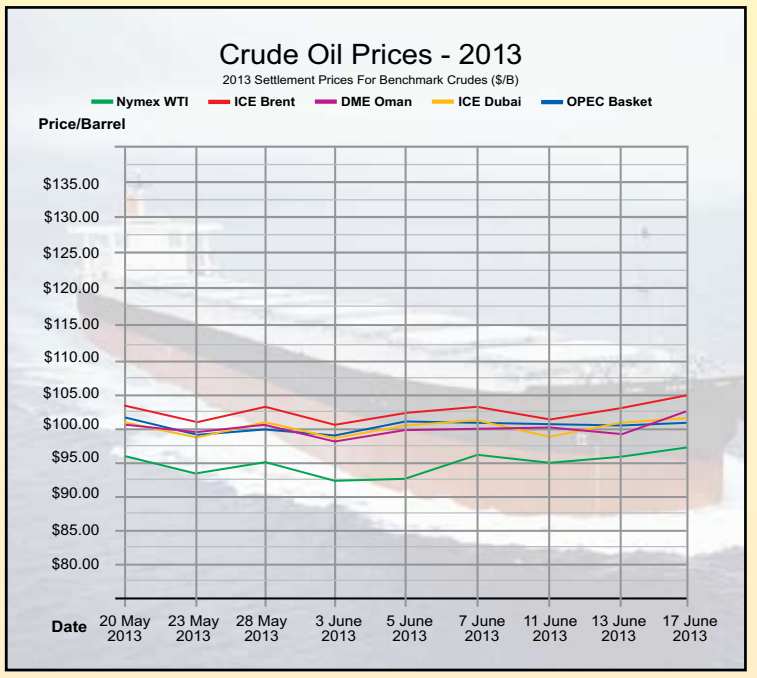
Voith and Elecnor will replace two existing generator sets with new sets rated at 55 MW.

Oil

Crude price rises may be short-lived

- International oil prices to gradually decrease
- US shale oil production cutting Opec demand

David Gregory



Crude prices eased their way upward during the first weeks of June, but with no genuine indication that they would continue that trend. West Texas Intermediate (WTI) moved from $93.45/b on the first trading day of the month to a high of $98.24/b by June 19, only to fall to $95.40/b the following day. Brent followed the same tack, going from $102.06/b to $106.12/b and then back to $102.26 on the same days.

June was a month of reports that looked into the future of the oil market. The World Bank forecast that international oil prices would gradually decrease to an average of $80/b by 2025, in its latest *Global Economic Prospects*. Using the average of WTI, Brent and Dubai crudes, the World Bank forecast an average oil price $102.40/b for this year, compared to $105/b in 2012. The price would average $101/b in 2014 and 2015, but it cautioned that the price of crude could jump by $50/b or more if there was a major disruption of oil supply from the Middle East.

It used as a yardstick what it considers to be the cost for producing Canadian tar sands, $80/b.

The economies of oil-exporting countries could be particularly vulnerable to a shift in crude prices, according to the bank report, which said that if real prices were to fall to $80/b in mid-2014 due to rising production and reserves in the US and other non-Opec countries, oil exporting countries in the Middle East and North Africa could see their GDPs fall by 1.4 per cent and their current account balances shrink by 3.5 per cent in 2014.

"In the current environment, regional oil exporters will no longer be able to rely on high and rising prices, but will increasingly need to rely on increased output," the bank report said, adding: "This in turn necessitates reforms that would allow them to invest heavily in infrastructure, and exploration to raise current production levels which have stagnated or been steadily declining in recent years."

The bank noted that Opec's response, and particularly that of Saudi Arabia, to such a situation would be key regarding prices. "A key uncertainty in the outlook is how Opec reacts to changing global demand and non-Opec supply conditions," the report said.

"Since 2004 when crude oil prices started rising, Opec has responded to subsequent price weakness by cutting supply, but has not been as willing to intervene when prices increase," it said. "However, as non-Opec supplies continue to come on-stream and demand moderates in response to higher prices, the sustainability of this approach may come under pressure."

Analysts see rising shale oil production in the US as cutting into demand for Opec crude. This situation is allowing crude stocks to build and putting downward pressure on oil prices. The reason prices are not lower is because of supply disruptions from Libya and the sanctions against Iran.

The International Energy Agency (IEA) said in early June that a "shockwave" in non-conventional oil production would see North American oil supply increasing by 3.9 million b/d during the next five years. It said shale oil production would raise US output to 8.4 million b/d over that time. And it said that it sees demand for Opec crude remaining below 30 million b/d (the organisation's current production target) for the next several years.

BP released in June its annual statistical report in which it said global oil consumption grew by 890 000 b/d in 2012, which is 0.9 per cent below the historical average. Oil had the weakest global growth rate among fossil fuels for the third consecutive year, BP said. OECD consumption declined by 1.3 per cent (530 000 b/d), the sixth decrease in the last seven years. The OECD now accounts for only 50.2 per cent of global consumption, its smallest share on record.

Global crude output increased by 1.9 million b/d, 2.2 per cent, with Opec accounting for about three-quarters of the rise, although Iranian production was down by 680 000 b/d, BP said.

Non-Opec output grew by 490 000 b/d with increases in the US averaging more than 1 million b/d and Canada, Russia and China offsetting unexpected outages in Sudan/South Sudan (-340 000 b/d) and Syria (-160 000 b/d) as well as declines in mature areas such as the UK and Norway.

Meanwhile, Norway's state-owned Statoil said in its long-term outlook to 2040 that "strong crude oil prices, less fuel subsidisation in the non-OECD countries, technological advances and more stringent environmental regulations will dampen future oil consumption."

Gas

Turkmenistan gas elusive option for Southern Gas Corridor

A deal that would see Turkmen gas moving westward would give a solid boost to the Southern Gas Corridor but a deal that would bridge the political differences between Ashgabat and Baku remains elusive.

Mark Goetz

In mid-June, the partners in Azerbaijan's Shah Deniz consortium were still deciding between rival pipeline projects – Nabucco West or the Trans Adriatic Pipeline (TAP) – for the transport contracts of Shah Deniz Stage 2 (SD2) gas to Europe.

SD2 will produce an additional 16 billion cubic metres per year (bcm/year), 6 bcm/year of which will go to Turkey and the remaining 10 bcm/year to Europe, either through TAP's southern route to Greece, Albania and Italy, or through Nabucco West's system through Eastern Europe to the Central Europe Gas Hub at Baumgarten, Austria.

The pipeline through which SD2 gas to Europe will travel – the Trans Anatolian Pipeline (TANAP) across Turkey – is due to start delivering gas at the EU border in 2019. None of the pipelines that have been proposed as components of the Southern Gas Corridor have been built, but once the BP-led Shah Deniz partners make a decision, construction will need to get under way.

For all the angst that has so far been put into the Southern Gas Corridor, 10 bcm/year is not a great deal of gas, but it is seen as a start by the EU towards diversifying its energy supplies and thus boosting its energy security.

Europe's energy diversity and security of supply could be enhanced further if agreements could be reached that would see shipments of Turkmenistan gas arriving in Europe. The Central Asia state has huge natural gas resources that have only in the last few years come into their own.

During the Soviet era and well into the 2000s, land-locked Turkmenistan was dependent upon Russia's pipeline system to export its gas. That changed in 2009 when a trans-Asian gas pipeline to China began to transport gas across Uzbekistan and Kazakhstan to the Chinese border.

Turkmenistan continues to support a project to build a pipeline to Afghanistan, Pakistan and India – the TAPI project. There is a strong market for Turkmen gas in those countries, but concerns over security keep that project from moving ahead.

There has long been talk of shipping Turkmen gas to Europe through a Trans-Caspian Gas Pipeline. The project almost materialised in 2000, and for the last two years the EU has been attempting to negotiate a treaty for the construction of a subsea gas pipeline connecting Turkmenistan with Azerbaijan, where Turkmen gas would enter the system transporting Shah Deniz gas through the Caucasus to Turkey.

A deal to move Turkmen gas westward would boost the Southern Gas Corridor, but so far a deal that would bridge the political differences between Ashgabat and Baku, and ease Turkmen concerns over Caspian regional affairs remain elusive. Furthermore, there are questions about Azerbaijan's own interest in transporting Turkmen gas through TANAP, in which it will hold a majority share.

Over the years, numerous statements agreeing on the shipment of Turkmen gas to markets west of the Caspian have been signed. The latest joint statement between Turkmenistan and Turkey signed in late May said the two countries discussed "projects in the sphere of supplying Turkmen natural gas to Europe."

With gas demand growing and expected to reach 70 bcm/year by 2025 or shortly thereafter, Turkey would welcome the arrival of Turkmen gas as much as Europe.

Turkmenistan's potential is there. In May, during an energy conference in Ashgabat, Turkmen officials announced that gas production from the giant Galkynysh field would begin in late June and in September at the latest.

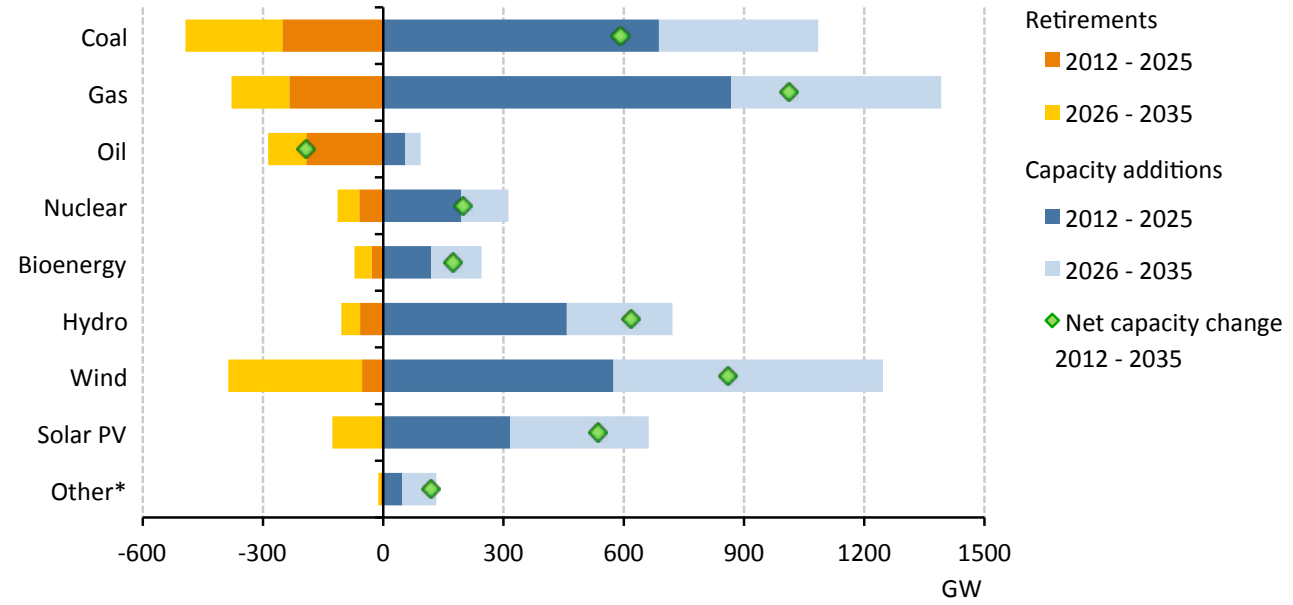
Galkynysh, previously known as South Yolotan, is considered the second largest gas field in the world, and the largest offshore (the largest being the North Field/South Pars in the Persian Gulf). According to UK auditor Gaffney, Cline and Associates estimates reserves in Galkynysh at between 13.1 and 21.2 trillion m^3, enough to keep China, the TAPI project, Turkey and Europe well supplied for decades.

The project requires an investment of $9.7 billion and would produce 30 bcm/year. Following a second stage of development at Galkynysh, Turkmen gas exports to China could rise to 65 bcm/year.

International energy companies, including ExxonMobil, Chevron, Shell, BP and BG Group have expressed their interest in investing in the country's gas resources, but the country does not welcome foreign companies to operate onshore.

Turkmen sources estimate that the country produced about 70 bcm during 2012 but the new *BP Statistical Review of World Energy*, using a new system for calculating reserves and production for former Soviet republics, said in the 2013 edition that gas output in Turkmenistan amounted to 64.4 bcm last year.

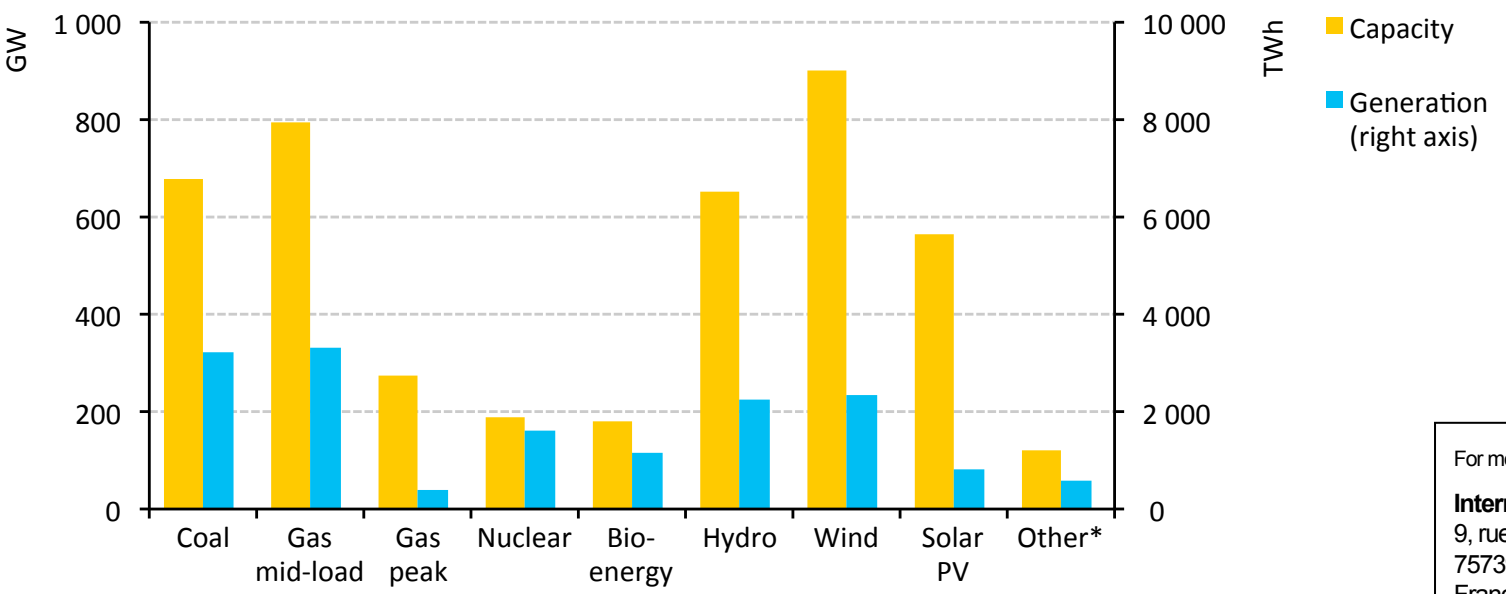
Power generation capacity additions and retirements in the New Policies Scenario 2012-2035



***Other includes geothermal, concentrating solar power and marine**

World Energy Outlook 2012 © OECD/IEA, Figure 6.3, page 184

Global incremental generation and capacity by type, 2010-2035



***Other includes geothermal, concentrating solar power and marine**

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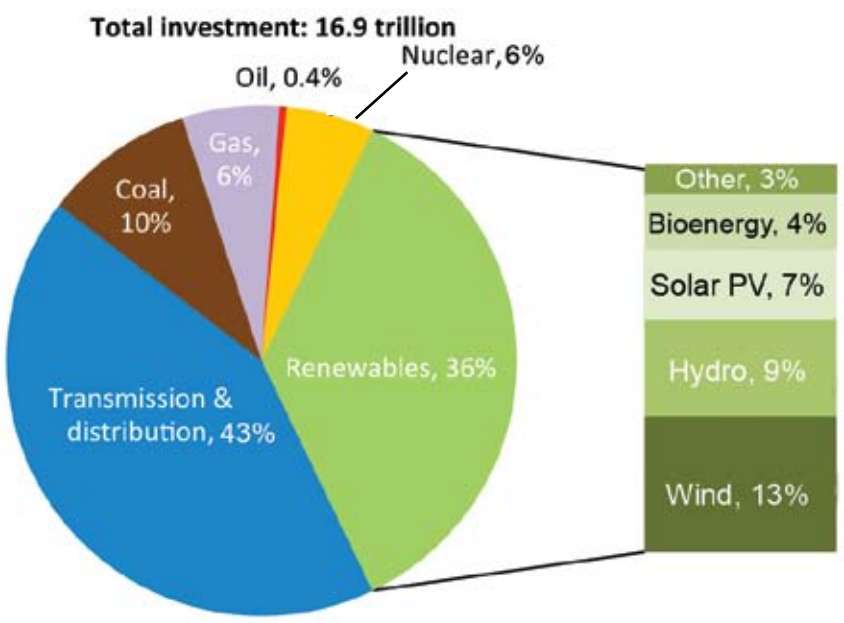
For more information, please contact:

International Energy Agency
9, rue de la Fédération
75739 Paris Cedex 15
France.

Email: bookshop@iea.org
website: www.iea.org

Power sector cumulative investment by type in the New Policies Scenario, 2012-2035



***Other includes geothermal, concentrating solar power and marine**

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Source: World Energy Outlook 2012

Industry Perspective

Lessons from the Island

Britain's smart metering programme could provide a blueprint for nations elsewhere in Europe and beyond. Elster's Managing Director, **Richard St Clair,** looks at the progress made and lessons learned so far.

The smart meter programme in Great Britain being led by the Department of Energy & Climate Change (DECC) has made good progress. Following the successful notification of Smart Metering Equipment Technical Specifications (SMETS) 1 by the EU, the Foundation stage started proper in autumn last year.

By 2020, smart meters together with in-home displays will have been rolled out across the country under the mass rollout (now due to commence 2015), giving people real-time and comparative information to better manage their energy consumption, save money, and reduce carbon emissions.

For energy suppliers, the challenge now is to replace over 53 million gas and electricity meters, and install 30 million communications hubs in homes and small businesses. For government and industry, there are several major tasks ahead, including publication of the second version of the Smart Metering Equipment Technical Specification (SMETS 2), and the award of the communication service provision (CSP) and data service provision (DSP) contracts.

SMETS covers gas and electricity meters, the in-home display, and communications hub with standards to ensure that equipment will communicate in a consistent and secure format. The communications hub will act as the 'bridge' between devices in the premises and the utility, allow devices to be added or replaced over time, and ensures consumers can switch suppliers easily.

To give suppliers the confidence to get going, the UK government split the SMETS into two stages. SMETS 1 published in April last year and delivered functional interoperability in smart metering equipment for Foundation. Meanwhile, SMETS 2 and its companion spec will set out further detail and is due to be published soon.

SMETS 2 will also be governed much more rigorously by the security requirements mandated by the government as part of the CSP/DSP contracts due to be awarded this summer. These contracts will be with the central Data and Communications Company (DCC), the function established by DECC to manage the data that travels to and from gas and electricity smart meters in households and energy suppliers.

During this process CSP/DSP bidders have been asked to include provision of the communications hub as part of their infrastructure, instead of energy suppliers. The thinking behind this is that CSPs/DSPs will then own the end-to-end communications responsibility, assuring the level of security and privacy vital to gaining consumer acceptance.

Britain has made security of the smart metering system a top priority, adopting a 'secure by design' approach. This means security concerns are considered and addressed at every stage of the development lifecycle, to give consumers confidence in the upcoming rollout and avoid any potential backlash, such as the one witnessed in the Netherlands.

Consumers will have a choice over who has access to their smart meter data, except where the data is needed to fulfil regulated duties. It is proposed that suppliers have access to monthly data without specific customer consent. For access to daily data, however, they will have to provide a clear opportunity for the customer to opt out. Furthermore, without the customer's explicit consent they cannot use that data for marketing or other purposes.

By putting consumers in control, it is hoped that smart meters will encourage them to adopt behaviour changes to improve energy efficiency and save money on their energy bills. The government has mandated a Central Delivery Body, established and funded by suppliers, to deliver a programme of consumer engagement activities that build consumer willingness, awareness, and understanding of how to use smart meters to manage energy consumption.

Britain's much stronger emphasis on communicating the consumer benefits of smart metering and its potential for energy efficiency savings makes it stand out from the approaches being taken in many other European nations where the primary benefits are viewed as being improving the management of supply, and reducing losses and administrative costs.

Given the political and regulatory uncertainty pervading in the EU, smart metering rollouts are driven largely by internal energy markets and political objectives. Few, if any, have dual fuel requirements, or place the consumer and carbon reduction at their core:

- France is targeting 35 million smart electricity meters by 2018 (90 per cent of customers). Gas smart metering is less advanced, although a smaller scale pilot completed in mid-2011 may lead to a rollout of 11 million smart gas meters between 2014 and 2020. The drivers are different in France, given its large, stable, low-carbon nuclear base, which makes it comparatively immune to market volatility and high carbon outputs impacting on other nations.
- The Netherlands rollout of smart gas and electricity meters started last year and aims to reach 7 million domestic and small business users by 2015. It follows some initial delays caused by a failure to properly consider consumer concerns related to data access and privacy. Objectives of the programme now include enabling greater energy market competition through easier switching for customers, improving operational efficiency, and supporting energy savings.
- Spain – 26 million smart electricity meters are to be rolled out to domestic customers by the end of 2018 to allow energy suppliers to remotely change the limits on the amount of energy the household can draw upon. It is worth noting that security has not been a primary focus.

As markets across Europe begin to liberalise, it is logical that the smart metering programme in Britain will provide a blueprint in respect of creating an 'information market for consumers'. Certainly, there have been a number of key lessons learned thus far.

One of the most important lessons involved the wireless technology specification. With so many different parties involved, the process was delayed by a vacuum of governance. However, it was resolved with the establishment of the Smart Specification Working Group (SSWG), which has created a level playing field and quickly consolidated industry thinking.

It is also recognised that a wired solution will be required for certain types of property (e.g. high-rise flats), and a trial of wired networking solutions is planned. Indeed, Britain's greatest achievement with smart metering centres on the interoperability and potential for scalability moving forward – especially when one considers the maturity the industry has shown in setting up the SSWG voluntarily.

SSWG has had its detractors and criticisms in light of how inclusive it is, but it has continued to build a more formal, yet open structure to gain industry-wide consensus and avoid the delays from 'design by committee'. Likewise, DECC has been proactive in driving the smart meter programme amidst criticism. For DECC, a key success factor has been the de-coupling of SMETS 1 and SMETS 2 to expedite (and indeed enable) a Foundation.

In many other countries, smart metering projects have ended up taking too long to get going because they have attempted to get everything exactly right before they start. The reality is there will always be continuous technology development. Just the simple act of starting delivers value and crucially, with SSWG and a number of other industry groups being formed, Britain's work on interoperability has been outstanding.

One of the biggest challenges in Britain has been around finding a security design that is proportional to the risk involved. The electricity and gas networks are part of Britain's critical national infrastructure, and for that reason, programmes such as smart metering fall under the gaze of the authorities.

Thus a pragmatic balance must be struck between satisfying the high-level security requirements of a critical national infrastructure, but in respect of the fact only small amounts of meter reading data are being transmitted. The volume of data being transported via the smart metering infrastructure has multiplied several times to satisfy the security requirement, but the fact remains that even if someone did hack an individual's meter, they would not gain access to the national grid.

Consumer engagement is perhaps Britain's other greatest challenge. Up until very recently, this had not been budgeted for, but should now be addressed with the establishment of the Central Delivery Body. A wide-reaching advertising campaign should be planned; similar to the one managed by Digital UK for the switchover to digital television, informing consumers of what they will need to do and how they can benefit.

Early engagement with all stakeholders is also essential. The smart metering value chain is wide and the danger is that without early engagement, rollouts can run into scenarios where equipment needs to be bolted on at a later date to meet evolving requirements.

As the smart metering experience in Britain clearly demonstrates, the sooner all relevant parties are engaged, the better the overall system design will be – ensuring a cost effective, efficient and future-proof delivery to the benefit of the market, the environment, and consumers.

One of the biggest challenges in Britain has been around finding a security design that is proportional to the risk involved.

St Clair: early engagement with all stakeholders is essential

Marine **potential**

Marine energy has tremendous potential. But while the big numbers are generating investor interest, the focus now is to deploy full-scale devices at sea to prove the technology works and begin the process of driving down costs.

Johnny Gowdy

Putting values against the potential energy generation capacity of the world's oceans will never be an exact science, but one thing that unites the various forecasts available is the considerable size of the numbers involved.

Estimates from the International Energy Agency say a combination of wave, tidal, ocean thermal and salinity gradient technologies could provide more than 100 000 TWh of energy a year.

Further, it believes there could be a 200 GW market for marine energy by 2050.

Global estimates for economically exploitable wave power vary, but analysis suggests there is potential for around 800 GW, corresponding to more than 2000 TWh, which according to the World Energy Council's survey of energy resources is approximately 10 per cent of global electricity production.

Just a few years ago the UK's Carbon Trust put the value of the global marine energy sector at $760 billion by 2050.

With numbers like those it is easy to understand why marine energy has become such an exciting sector for technology developers, but extracting it commercially and sustainably remains a huge – and capital-intensive – challenge.

One of the global hotspots for marine energy development is the UK. With more wave and tidal stream devices installed than the rest of the world combined, it is widely regarded as the world leader.

That optimism stems in part from the UK having approximately 50 per cent of the total European wave energy resource and 25 per cent of the European tidal energy resource. Enough resource The Crown Estate has estimated, to theoretically provide 285 TWh/year from a combination of tidal stream, tidal range and wave energy projects. This is over 75 per cent of the current (2012) UK electricity consumption.

The key word here is "theoretically". The reality is that the marine energy sector is still at an early stage of technology development and must overcome both technical and commercial hurdles before this resource can be harnessed. Even then, the practical and planning constraints of deploying technology at sea will mean that the actual energy potential is somewhat less than the theoretical.

So, while the big numbers are helping to generate investor interest in the sector, the real focus now is to deploy full-scale devices at sea to prove the technology works and to begin the process of driving down costs.

To enable this to happen, the role of offshore test centres is absolutely crucial. With the typical cost of deploying a single full-scale device exceeding £6 million, it is really only at pre-consented facilities where a grid is provided that technology developers can demonstrate their technology in real sea conditions. The provision of such facilities has therefore been a key part of the UK's marine energy strategy.

The European Marine Energy Centre in Orkney off the west coast of Scotland was established in 2003 and is a grid-connected, full scale wave and tidal energy converter testing and accreditation facility. It is widely credited with accelerating the development of marine energy over the last decade.

> While the big numbers are helping to generate investor interest , the real focus now is to deploy full-scale devices at sea…

In the North East of England, the National Renewable Energy Centre (Narec) offers a range of facilities including a 3 MW tidal turbine test rig, and a wind turbine blade facility designed to simulate extreme conditions offshore.

In recent years the southwest of England has seen significant investment in marine energy infrastructure and expertise, prompting the UK government to designate the region as the UK's first Marine Energy Park.

The South West Marine Energy Park (SWMEP) has successfully brought together a broad range of private sector companies, local authorities, universities and research organisations with the collective aim of accelerating the development of marine renewables in the southwest and UK.

It also aims to capitalise on the southwest's 8.7 GW of wave generating capacity and the single largest tidal resource in the UK; in the Bristol Channel and Severn Estuary.

The SWMEP includes significant assets and expertise such as a tank-testing facility at Plymouth University which has attracted global interest since its opening last year. It includes a 35 m ocean wave basin capable of producing waves almost 1 m in height and offering multi-directional, recirculating current generation.

The tank is part of MARIC, Plymouth University's Marine Innovation Centre, connecting industry expertise, academic research and facilities to support the growth of the marine and renewable energy sectors.

In Cornwall, the £30 million Wave Hub has been built for the testing of arrays of wave energy converters. Wave Hub is a grid-connected facility 10 miles offshore in oceanic sea conditions into which wave energy converters can be plugged and tested on a large scale. Its sister site, FaBTest in Falmouth Bay, offers a nursery facility for sea trials and prototype development in a less energetic environment.

Although it was built primarily to test wave energy technology, Wave Hub is also the preferred location for a UK government-backed project to create a £25 million offshore floating wind turbine demonstrator. This could be deployed by 2015.

Taken together, the UK test centres, combined with other university and private sector resources, are able to offer marine energy developers continuous support along the technology development pathway from concept design through to full commercialisation.

Coupled with the strong political support that has been given to the sector, the UK has been able to establish itself as a focal point for technology developers and their investment partners. The clustering of research, alongside financial support, has also enabled the UK to invest in its supply chain capability, skills, vessels and ports, in regions like the southwest of England, in order to provide the sector with the wider infrastructure needed to promote industry growth.

It is still early days, but the immediate impact has been to create a buzz of activity with projects such as Fred Olsen's Bolt 2 deployment at FaBTest, which engages with local communities and also brings in economic opportunities for local businesses.

The feeling at the moment is that the sector is on the cusp of commercial reality. This optimism has been fuelled by the increasing investment coming into the industry from major industrial firms including Siemens, Alstom, Fred Olsen, DCNS and ABB.

These international companies bring much needed capital to finance large scale deployments. They also provide the scale and muscle needed to help reduce costs and underwrite the performance guarantees and warranties that the ultimate customers, utility companies, will need before investing in full commercial projects

So while not quite there yet in terms of technology readiness, the industry is confident that commercialisation can be achieved in the near term and the focus is naturally turning to the creation of future markets. To do this, the industry needs the right financial incentives to be in place, and for governments to create a stable and long-term policy framework within which these markets can operate.

The imperative for industry experts to talk earnestly with government has in part been driven by impending changes to the way in which the UK provides a subsidy for low carbon energy.

Called Electricity Market Reform (EMR), the proposal is to replace the existing Renewables Obligation in the UK (which will close to new projects from 31 March 2017) with a system of Contracts for Difference (CfD). The CfD model will be based on a pre-determined 'strike price' payable to eligible generators, measured against a reference wholesale market price.

While the new scheme looks good on paper, and potentially offers a greater level of price certainty, it does put the fledgling marine energy sector in with the big boys of nuclear and offshore wind. The danger is that, unless a bespoke package can be agreed for new technologies, marine energy will be swamped by lower cost competitors before it has had a chance to compete.

For this reason the industry is currently asking the government for a market entry strike price of £300-320 per MWh for wave energy and £280-300 per MWh for tidal as the minimum requirement to provide adequate returns for investors over a 20-year period. This price would of course be expected to fall rapidly as technology costs are reduced. The industry also wants to make sure it is not squeezed out of the market and so is asking for a small allocation of the total subsidy available to be ring-fenced for marine energy.

The finer details of the EMR – including strike prices – will emerge in the coming months when the UK government issues prices for different technologies for the period 2014-19. Following consultation they are expected to be finalised before the end of the year.

The high strike price required by marine energy is not unreasonable given that the technology is new, and that the scale of the projects within the review period will be insignificant when compared to other low carbon sectors – so the impact on consumers will be barely discernible. Nevertheless in the febrile politics surrounding the UK renewable energy sector this level of subsidy will come in for very stringent scrutiny from both Treasury and the media.

The pressure is therefore on the industry to demonstrate that it can make use of the additional subsidy to deliver a commercial technology, and also to make good the promise that marine energy can open a global marketplace bringing jobs and economic benefits to the UK economy.

We will know more at the end of the summer, but given the level of commitment shown to the sector thus far, and the strong level of regional support, it is expected that a deal will be struck that allows momentum to be maintained. If this happens, the UK will continue to be the prime destination for wave and tidal developers and limited consented and grid connected test sites such as Wave Hub will be extremely busy.

Johnny Gowdy is a director at Regen SW, an independent centre of expertise supporting the renewable energy sector, and programme manager of the South West Marine Energy Park.

Artist's impression of the Swansea Bay Tidal Lagoon project. The proposed £650 million project moved forward with the recent announcement that formal consultation would begin on July 4, 2013. The project could deliver up to 400 GWh of electricity each year

Marrying the internet with industry

Some are hailing the 'industrial internet' as the third great wave of innovation after the industrial revolution and the internet revolution. Combined with 'big data' analytics, its use could have a tremendous impact on the power industry, says **Junior Isles**

South London's old Battersea power station, an iconic monolith from a bygone era was chosen as the European launch pad for GE's plans to marry the internet with its industrial expertise.

"Out of the ashes of the industrial revolution, which is this building, we are going to create the birth of the wave of the industrial internet," said Ferdinando Beccalli-Falco, President and CEO of GE Europe and CEO, GE Germany.

The industrial internet brings together the advances of two transformative revolutions: the countless machines, facilities, fleets and networks that arose from the industrial revolution and the more recent advances in computing, information and communications brought by the internet revolution.

It is about using the internet to monitor equipment remotely, taking the vast amounts of data, or 'big data', coming from the equipment and using analytics software to analyse that data in order to optimise performance and improve industry productivity.

GE estimates that the technical innovations of the industrial internet could find direct application in sectors accounting for over $32.3 trillion in economic activity. As the global economy grows, the company says that by 2025 it could be applicable to $82 trillion of output – or approximately half of the global economy.

The application of the internet to the industrial setting is therefore one of the key areas that GE is putting its investment dollars. Jeff Immelt, GE's Chairman and CEO summed up the new development as "the combination of materials science and analytics for the purpose of driving better customer outcomes".

According to GE, even small performance changes can drive massive economic improvements. A key message stressed by Immelt is what he describes as "the power of one".

He explained: "If you improve the installed base of GE installed aircraft engines by one percentage point in fuel performance a year, that saves our customers $2 billion on the bottom line. I can give similar examples as it pertains to fuel-energy performance of gas turbines."

According to the company's calculations, a 1 per cent efficiency improvement in the global gas fired power plant fleet could yield a $66 billion saving in fuel consumption over 15 years.

GE has already started harnessing the industrial internet to improve the operation of major industry components. In January this year it introduced a prototype of its "brilliant" 2.5-120 wind turbine, which it claims is the most efficient high-output wind turbine.

The new machine, which is now operational at a test site in Wieringermeer, Netherlands, uses the industrial internet to analyse tens of thousands of data points every second, allowing for management of variable wind sources to provide smooth, predictable power.

While the turbine's multiple onboard computer systems can respond to the enormous amounts of data the machine's network of sensors can deliver, the new advances allow GE's central operations centres to remotely respond to variables that the turbine's automated response fails to manage. These variables range from a change in wind or local grid conditions to a lightning strike.

The machine's networking infrastructure and wireless communications allow it to interact with input from its own sensor system and the internet. It can assimilate detailed weather forecasts, grid energy supply-demand needs, and transmission system frequencies and voltages to adjust its operations and increase efficiencies in everything from power electronics to blade positioning.

Designed for low wind speed sites, according to GE the turbine captures a 25 per cent increase in efficiency and a 15 per cent increase in power output compared to its current model.

> Power generation is a capital-intensive industry and utilities struggle to differentiate themselves from their competitors

This is the type of advance that will be crucial for utilities struggling to improve profit margins. Power generation is a capital-intensive industry and utilities struggle to differentiate themselves from their competitors.

Guy Richelle , Chief Executive Officer of GDF Suez Branch Energy International, explained: "Our competitors have access to the same equipment, the same capital etc. So what you do at the margin is very important in helping the business be successful."

Richelle admits that GDF Suez is not using the industrial internet today but is keen to explore areas in which he believes it could be applied.

The company has approximately 115 000 MW of generating capacity installed in more than 30 countries at around 150 sites. Its portfolio is a mix of old and new plants. Some 50 per cent of its generating capacity comes from gas turbines but it also runs nuclear and coal plants, and has renewable generation in the form of wind and hydro.

"When I think of how we can optimise and create the most value out that portfolio, there are two ways. Firstly, there is the generation of revenue and then there's the cost side.

"Looking at the revenue side, if, for example, you are operating in a merchant market like the US, one of the things you have to do is capture value during those few hours in the year when power is extremely expensive and the margin is therefore very high."

Richelle looked back to Texas in 2011 when average power prices were $40/MWh but in summer hit highs of $3500/MWh for a few hours. During these peak price times, huge margins could be generated compared to the average.

He noted: 'Equipment such as gas and steam turbines are set for the average operation. The settings are not designed to allow you to exceed your safety margins for the few hours when you might need it. If we were able to increase the power output – based on the historical operating information of the asset – for those few hours when power is expensive, the asset could generate a lot more value."

Richelle gave another example of where value could be created on the revenue side. "Despite having 50 years of experience, excellent operators and operating procedures, modern DCS systems, and well maintained machines, we still see catastrophic events at sites. When a gas turbine fails, it is extremely costly. But it's not just the cost of repair; there's the knock-on effect and cost of replacing the power you have promised to supply to the customer. So limiting downtime is extremely important."

Utilities currently buy expensive insurance to protect against unforced outage risk – insurance that Richelle says does not cover the first 45 days of downtime. He believes a lot more could be done by using the instrumentation on the machines to detect the onset of a failure.

In terms of cost, a utility's biggest outlay is on fuel, so improving fuel efficiency is key. "It is very dependent on technology," said Richelle, "but a lot can be done in terms of looking at the whole power plant and having systems that can optimise how we dispatch every single piece of equipment on what is actually a complex site."

Another area for potential significant cost reductions is in maintenance. Richelle says if maintenance can be performed based on data related to the history of the actual machine instead of according to standard maintenance programmes, the number of spare parts could be reduced and time between outages extended.

"For example the ability to measure the actual degradation of the coating on [gas turbine] blades would be very interesting to us," Richelle noted.

Certainly there could be significant benefits if all the data coming out from equipment operating in plants around the world could be mined.

GE says a 30 MW class aeroderivative gas turbine has about 180 sensors that look at 1200 parameters related to both its operation and health. Such a machine produces about 100 GB of data per day. Making sense of all this data is impossible for even the most experienced operator. Data analytics software is therefore essential.

Just ahead of the London launch, GE announced strategic alliances with Accenture, Pivotal and Amazon Web Services aimed at advancing the industrial internet by integrating services and developing software, analytics and cloud-based capabilities that serve diverse functions for industry.

GE also announced a big data and analytics platform to manage data produced by large-scale industrial machines in the cloud. Built to support the industrial internet and turn big data into real-time insight, the platform will benefit major industries.

Combined with GE's Predictivity services and technologies, it will allow utilities to manage and operate critical machines such as gas turbines in the cloud. According to GE, it marks the first time industrial companies will have a common architecture, combining intelligent machines, sensors and advanced analytics.

Bill Ruh, Vice President of GE's Global Software Centre in Silicon Valley said: "GE's industrial strength platform is the first viable step to not only the next era of industrial productivity but the next era of computing. The ability to bring machines to life with powerful software and sensors is a big advancement – but it is only the ability to quickly analyse, understand and put machine-based data to work in real-time that point us to a society that benefits from the promise of big data."

Junior Isles

We don't need another 'lemma

As if it did not already have enough conflicting goals, the EU is now introducing yet another target to an energy policy that is already struggling to fulfil its current ambitions.

Since the introduction of carbon targets, there has been much debate on how energy policy can address the 'trilemma' of delivering affordable, secure and low carbon electricity. With difficult economic times and contracting economies, politicians are now stipulating that energy policy must also foster economic growth.

To avoid de-industrialisation the EU recently set another target – 20 per cent of GDP must come from the manufacturing sector by 2020. In late May the European Council said it would begin an impact assessment on energy and industry.

Antonio Tajani, European Commissioner for Industry and Entrepreneurship has the job of presenting the results of this impact assessment, which should be published ahead of the next important European Council on industrial policy in February 2014.

Speaking at the annual Eurelectric conference in Bologna, Italy, in June, Tajani said: "We need more industry but we will not be able to do it without a good energy policy. Europe wants to lead the green revolution but not at the expense of jobs and industry".

This latest move by European politicians is further evidence that climate change is in reality taking a back seat to the economy. There is no doubt that politicians face an extremely difficult task in designing a policy that can meet all of its goals. Having started out with a focus on just affordability and security of supply, they are now trying to adjust and make amendments to meet new objectives as they arise.

Unfortunately, the end result is a set of incoherent policies that cause confusion, followed by stagnation and ultimately will achieve none of the goals effectively.

At the Eurelectric press conference, Dr Johannes Teyssen, CEO of German energy giant E.On, told journalists: "If you look at security of supply, across Europe you hear that investors are considering retiring over 100 GW of sometimes older plants [but] sometimes very efficient, modern plant. These plants are needed but system prices tell us they are not needed. We have growing instabilities in parts of the system because it can't cope with the influx of renewables and the need for flexible power [to compensate].

"With regards to affordability, it doesn't look good because prices are going up for retail customers. On sustainability, CO_2 emissions are going up again. Instead of staying on the sustainable pathway, we are silently turning around. Compared to all other global regions we are doing worst of all and still pretending we are leaders in climate abatement strategy. So European policy is violating all fundamental targets."

He added: "Instead of questioning the three '20' targets that we already have, they have added a fourth one, and none of these are aligned with any of the others."

Continually altering policy to meet an increasing number of goals is much like trying to fix a balloon with a bulge. Squeeze it in one place, and it bulges somewhere else.

Teyssen offered a somewhat more colourful visual. "Politics is like an elephant in a glass shop: four targets and every time it turns around to run in one direction it knocks over the rest of the shop with its butt. In the end, if you look around we are sitting in a lot of broken glass right now and the elephant is still in the middle of the room."

Certainly the industrialisation target is a good one but Europe has to find a better way of delivering all of its goals. Much of the debate at the Eurelectric conference therefore focused on the re-design of market structures.

Both E.On and Enel said the industry must work out how to: promote renewable growth without destroying the system; re-invent the European Emissions Trading Scheme (ETS) to give a fair and sustainable price signal; and integrate Europe to avoid national approaches to energy policy.

Continually altering policy to meet an increasing number of goals is much like trying to fix a balloon with a bulge.

Part of the problem is the way some parts of the industry, media and the political arena set renewables and fossil fuel generation against each other. The fact is, both have their strengths and weaknesses and should be rewarded accordingly.

Teyssen said: "Renewables cannot deliver system stability. Fossil products cannot deliver clean energy. So you need to marry them. Cleaner conventional fossil fuel generation, such as gas and cleaner coal, is a natural partner for renewables and not a foe, and vice versa. Both will fail by themselves.

"Today, however, politics throws them against each other as enemies… through unfair competition. Both deliver valuable products and should be rewarded for what they deliver... we want, and support, renewables but they have to be integrated into the system in an intelligent manner with sustainable conventional backup."

Meanwhile, Eurelectric continues to support the concept of the ETS. Both Teyssen and Enel's CEO, Fulvio Conti, stressed that something has to be done to fix the failing scheme. With carbon prices languishing around the €4/t CO_2 mark, urgent action is needed and perhaps it is time to consider other ways of putting a price on carbon.

Conti noted: "We have said let's fix the ETS for the short-term, in anticipation of a major reform that has to be made. We strongly advocate the restoration of a system that is credible enough for the ETS to be the only driving force for decarbonisation."

Teyssen added, however, that if this cannot happen politicians need to admit that the "system is bust" and find other instruments. "We believe a market-based system has its advantages… but if they don't get their act together and another year passes without fixing the ETS, then maybe at some point the only thing would be to give a price signal. This can be done in various ways but the politicians need to decide. The worst scenario is doing nothing and have a lost decade in carbon abatement.

"The message has to be clear: if we continue in this faulty blurred way, we will continue to miss our targets even worse. And I promise you, the outcome will not be re-industrialisation of Europe but de-industrialisation because of an uncompetitive power strategy."

Earlier, Tajani had pointed to the US' success in reducing the cost of energy and said Europe should also be pragmatic in its approach to cutting energy prices. "It is important for growth and new jobs," he stressed. "We need to diversify energy resources to prevent de-industrialisation of the EU," he added.

It was interesting to learn that many are now looking to the US for leadership on how the EU might achieve its goals. In an electronic vote at the conference, 50 per cent of delegates thought that the US was the most successful region in terms of energy market strategy.

Yet one has to be wary of using such snapshots as a bellwether. While holding up the US as an example, the majority of that same audience also believed that building renewable energy sources should be the most important greenhouse gas reduction option.

The US' success in reducing energy costs and cutting emissions has been more the result of good luck than design. Its achievements are largely attributable to the discovery and exploitation of significant shale gas resources rather than any focus on renewables or real desire to cut GHG emissions.

As RWE's CEO Peter Terium noted: "The US is having a large reduction of CO_2 because of shale gas, not because of any climate intent or any policy."

So while good fortune is helping the US to deliver cheap, secure energy, and cut emissions at the same time, an effective EU energy policy becomes even more impossible.

Instead of a 'trilemma' we now have a 'quadrilemma'. But I suggest we stop here. Apart from confusing the elephant even further, there could be even greater confusion as to which 'lemma would come next – would it be a 'pentalemma' or 'quintalemma'?