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Hinkley C could be nuclear turning point

Prime Minister David Cameron said this shows the UK is "open for business".

The agreement on a strike price for Hinkley Point C could be a significant landmark, not just for the UK but for Europe and China, says **Junior Isles**

The deal struck between the UK government and EDF Energy for the construction of a new nuclear power station at Hinkley Point C could be a turning point for the nuclear industry.

If the project goes ahead as planned, it will be the first nuclear plant to start construction in Europe since the disaster at the Fukushima Daiichi nuclear power plant raised safety concerns around nuclear power.

The agreement, reached after nearly two years of negotiations, marks the start of the UK's new nuclear programme aimed at adding 16 GW of new nuclear capacity by 2030. The UK government and EDF had been wrangling over the strike price for power from the plant. Eventually a price of £92.5/MWh linked to inflation for a period of 35 years was agreed, nearly twice the current wholesale price. This will reduce to £89.50/MWh if another proposed reactor is built at Sizewell C.

EDF says it expects an internal rate of return of about 10 per cent from the project.

Announcing the agreement UK Energy and Climate Secretary Ed Davey said it was "an excellent deal for Britain and British consumers".

When complete in 2023, the new power station comprising two 1.6 GW reactors designed by Areva, will supply around 5-7 per cent of the UK's electricity.

The deal is hugely important for EDF and Areva, as well as their Chinese consortium partners China General Nuclear Corporation (CGNC), and China National Nuclear Corporation (CNNC).

It will give the French nuclear giants the opportunity to prove that next generation European Pressurised Reactors (EPRs) can be built in Europe without the problems seen at Flamanville and Olikiluoto. At the same time, Chinese involvement in the project could accelerate China's entry to the international nuclear reactor supply market.

The partnership will give CGN and CNNC the opportunity to gain experience in the UK and will support their long term objective of becoming established nuclear developers in the UK in partnership with EDF Group and in full compliance with UK regulatory requirements.

Britain's Prime Minister David Cameron said the pact with EDF to build the £16 billion plant with backing from two state-owned Chinese companies showed the UK was "open for business".

The share of equity in the project is expected to be: EDF Group 45-50 per cent, Areva 10 per cent; and CGN and CNNC 30-40 per cent. Discussions are

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Energy subsidies threaten German competitiveness

Businesses are voicing concern that Germany's so-called 'energy transformation' plan is driving up energy prices and costing German companies their competitive edge.

Following the Fukushima disaster, German Chancellor Angela Merkel took the decision to phase out nuclear power in the coming decades in favour of wind, solar and other renewable sources.

However, the renewables push is proving costly, requiring state guarantees expected to amount to €20 billion ($27 billion) this year alone, according to Environment Minister Peter Altmaier.

Further, the cost of subsidising renewable energy is set to rise nearly 20 per cent next year – highlighting a problem for the government as it manages the country's exit from nuclear power.

Merkel says reforming legislation under which generators of solar, wind and other renewable energy are guaranteed a fixed income is an urgent priority. Consumers currently pay a subsidy to make up the difference between that and market prices – which have fallen due to lower demand.

Electricity network operators said last month the subsidy will rise next year to 6.24 euro cents (8.5 US cents) /kWh from the current 5.23 cents.

Germany's energy and water industry association, BDEW, called for a two-step reform of the market with the aim of forcing operators of "green" power generation units to sell the electricity they produce on the market.

"Those who receive subsidies must become business people," said Hildegard Mueller, BDEW's Managing Director.

A major new study by global analytics firm IHS said rising electricity costs pose a growing challenge to Germany's export-based economy.

The IHS study, called *'The Challenge to Germany's Global Competitiveness in a New Energy World'*, examines the links among Germany's energy costs, competitiveness and economic performance.

The study concludes that transitioning to a lower carbon energy policy can be compatible with maintaining Germany's global competitiveness, and lays out a competitive energy scenario that includes a more moderate pace of renewables development and an increased role for thermal power generation, especially natural gas.

Escalating electricity prices in Germany and lower energy prices in North America are making German products less competitive and forcing firms to relocate to other countries, the study says.

"Rising electricity costs present a challenge similar to one Germany faced a decade ago from a rigid labour market," said Ralf Wiegert, Director, IHS Economics. "Solving that problem was key to enabling Germany's formidable export performance in the years since. Today, a rigid and inefficiently organised energy market with rising costs – which have strikingly jumped nearly 10 per cent in the past 12 months – puts Germany's international competitiveness, and thus its economy, at risk."

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taking place with a shortlist of other interested parties who could take up to 15 per cent.

The project, however, is not a done deal: a contract will not be signed until EDF and its partners take a final investment decision, expected next summer. The government also still needs EU approval.

Key terms of the contracts for the four most important suppliers to the project have now been finalised subject to a final investment decision. These are with: Bouygues TP/ Laing O'Rourke (civil work contract); Costain (marine work); Alstom (turbines) and Areva (instrumentation and control, nuclear steam supply system and fuel).

The risk of constructing the power station to budget and schedule will be shared by EDF Group and its partners. The UK Treasury has guaranteed it will underwrite the project against some financial risk.

Molho: Hinkley must not impact renewable funding

Commenting on the news of the deal, Nick Molho, head of climate and energy policy at WWF-UK said: "Now that the government has agreed a deal to support EDF's proposed new plant at Hinkley, it is essential that clear mechanisms are in place to prevent any future cost overruns from having an impact on the funding available to other low-carbon technologies such as renewables.

"This will be key to protect investment certainty for such technologies where there is significant potential to reduce costs, and to support economic growth in the UK without the environmental concerns associated with nuclear power, most notably the absence of a long-term geological storage solution for high level radioactive waste."

WWF said that the *'Low-Carbon Innovation'* report published in 2010 by the Committee on Climate Change showed that technologies like offshore wind could stimulate economic growth in the UK more than nuclear. This, it said, was supported by research by Cambridge Econometrics in November last year, which highlighted the economic benefits of offshore wind.

Greenpeace UK Executive Director John Sauven said: "With companies like Dong Energy now saying the price of offshore wind will drop so much it will be on par with nuclear by the 2020s, there is no rationale for allowing Hinkley C to proceed.

"Giving it the green light when there is no credible plan for dealing with the waste is also unacceptable. David Cameron has said himself that until the waste issue is sorted, no new investment is possible. This is yet another government U-turn which is creating uncertainty for investment in both energy efficiency and renewable energy, which, despite recent headlines, remain the best long term solution for the consumer, energy security and tackling climate change."

California takes energy storage to next level

■ Utilities must buy 1325 MW of storage capacity ■ Solana passes commercial operation tests

Junior Isles

In a pioneering move that will be carefully observed by utilities, environmentalists and the clean technology industry, California has adopted the first energy storage mandate for utilities in the US.

In October, state regulators with the California Public Utilities Commission unanimously approved a bold proposal by Commissioner Carla Peterman's that requires PG&E, Southern California Edison and San Diego Gas & Electric to expand their capacity to store electricity, including renewable energy generated from solar and wind.

The state's three investor-owned utilities must collectively buy 1325 MW of energy storage capacity by the end of 2020 – or roughly enough energy to supply nearly 1 million homes. The ambitious storage capacity target has been set because different storage technologies have different rates at which they can accept and discharge energy, and the mandate aims to be technology neutral.

"The decision lays out an energy storage procurement policy guided by three principals: optimisation of the grid, integration of renewable energy and reduction of greenhouse gas emissions," said Peterman.

The decision to mandate energy storage is expected to spur innovation in emerging storage technologies, from batteries to flywheels. The full impact on household utility bills will not be known until after the procurement process begins. Utilities must begin buying a combined 200 MW of energy storage technology by 2014.

California has long been a leader in the US in promoting the use of renewables. In 2011 it introduced a Renewable Portfolio Standard law, which requires utilities to obtain 33 per cent of their electricity from renewable sources like solar and wind.

Last month Abengoa announced that its Solana project – the world's largest parabolic trough plant with a total installed capacity of 280 MW and also the first solar plant in the US with thermal energy storage – had successfully passed commercial operation tests.

Solana is the first solar plant in the US with a thermal energy storage system that is able to generate electricity for six hours without the concurrent use of the solar field.

Energy storage has been steadily gaining traction in the US. At the start of October AES Corporation said it is now operating more than 100 MW of grid-scale storage resources with the commercial operation of its 40 MW resource in Ohio.

This is AES' fifth facility to run on its patented 'sOS' Storage Operating System.

"Advanced energy storage resources can uniquely maximise the performance and efficiency of the grid through their ability to act as both generation and load," said Phil Herrington, President of Competitive Generation for the AES US Strategic Business Unit. "With over 100 MW now serving the PJM market, we are seeing a growing interest from AES customers in other key markets."

Energy leaders call for collaboration

Energy leaders at the recent World Energy Congress held in Daegu, South Korea, said there is a need for greater collaboration in tackling the energy trilemma. **Mary Harries Magnusson**, reports.

Greater collaboration is needed between nations and between private and public sectors, said senior government and industry figures at the recent World Energy Congress in Daegu, South Korea.

Citing the trade-offs between the trilemma aims of energy security, social equity and environmental impact mitigation as "the most significant challenge," South Korea's President, Park Geun Hye, called for increased global energy co-operation, particularly between energy-producing and energy-consuming countries, as a contribution to global market stability.

In a joint "Daegu Declaration" from the government of Korea and the World Energy Council (WEC), the two parties concluded that "if governments and industries cooperate with each other to set a course for the future, improve the business environment, coordinate government policies, and enhance stability, it will be possible to achieve the goal of strengthening the role that the energy sector plays in economic development and climate change response."

Officials from Russia also spoke about international co-operation and expanding Russian energy links to Asia, particularly South Korea and China. Noting that half of the world's 1.2 billion people with no access to electricity live in Asia, Alexander Novak, Russia's Energy Minister pointed to Russia's "very good capacity in exporting energy".

Russia is the world's leading gas exporter and its oil exports equal those from Saudi Arabia. The country is also the world's third largest exporter of coal after Australia and Indonesia.

Notably, Novak said: "We have lots of natural gas, so we don't see producing shale gas as essential. We'll look for a few years at what happens in the United States… it's good to have the technology in case we need it."

Evgeny Dod, chairman of RusHydro, said his company is cooperating with Korea on tidal and wave-power projects, which is "emblematic of international energy cooperation."

Meanwhile, Oleg Budargin, director general of Russian Grids, told delegates: "If a connection is established with Chinese companies and Korean companies we could become a state-of-the-art bridge of huge volumes of power across our territory".

He added: "We have been talking with Korea about a transmission line from Vladivostok to Seoul. There is a possibility of laying a cable down the seabed. Political will is necessary, first and foremost."

Under the banner *'Securing Tomorrow's Energy Today'*, the 22nd Congress of the World Energy Council was attended by more than 6000 corporate and government delegates from 113 countries.

Vietnam maintains nuclear ambition

Vietnam is pressing ahead with Southeast Asia's most ambitious civilian nuclear energy programme despite a warning that the Japan-Vietnam nuclear cooperation may not proceed as scheduled.

The country's nuclear plans received a boost last month with the announcement that it had signed a so-called "123 agreement" allowing US firms to develop civilian nuclear power plants.

"Vietnam has the second-largest market, after China, for nuclear power in East Asia, and our companies can now compete," US Secretary of State John Kerry said after inking the agreement.

Vietnam is planning to build seven nuclear plants in the coming years and foreign companies and governments are competing to get a toehold in an industry that could be worth $50 billion by 2030, according to estimates by US officials.

But in a sign of potential difficulties to come, the planned construction start date for the first two plants has been delayed by three years, from 2014 to 2017, said Vuong Huu Tan, head of Vietnam's Radiation and Nuclear Safety Agency.

Japan's nuclear disaster also overshadows plans. Japanese government officials recently said Japan lacks the administrative system it requires to export nuclear technology to Vietnam, after it scrapped the agency in charge last year following the 2011 Fukushima disaster.

Vietnam agreed with Japan in October 2010 to import two Japanese nuclear reactors, and Tokyo has since agreed to finance the projects. Under domestic rules, however, the Japanese government has to confirm that the importing country has nuclear safety regulations in place and complies with international rules before the state-backed Japan Bank for International Cooperation lends money for the export, the officials said.

The now defunct Nuclear and Industrial Safety Agency had been in charge of confirming the safety of parts and machinery for export, even though Japan has yet to ship a reactor anywhere in the world, they said.

But the Nuclear Regulation Authority, launched in September last year as the new nuclear regulation authority, will not engage in procedures on the safety of nuclear export, the officials said citing what its secretariat told the energy agency in January.

The Agency for Natural Resources and Energy is considering having experts confirm the safety, but exactly when a new system will be established is unknown, the agency officials said.

Google adds to solar investment portfolio

- Ivanpah unit 1 on-line
- CA law supports fuel cell technology

Siân Crampsie

Google is continuing to build its investments in renewable energy with $103 million of funding for a solar power project in California.

The deal is the internet firm's thirteenth renewable energy investment and will be part of its over-$1 billion in commitments to renewable energy projects.

Google announced its investment in the 265 MW Mount Signal project in October, just weeks after another of its key projects – the Ivanpah solar power tower project in California – produced its first energy.

The Mount Signal project is a solar photovoltaic plant under construction in Imperial County, CA. It is expected to be fully operational in 2014 and will sell its output to San Diego Gas & Electric under a long-term power agreement.

The Ivanpah unit 1 plant achieved first synchronisation in late September and will sell its energy to Pacific Gas & Electric (PG&E).

Proof-of-concept testing will also be conducted at units 2 and 3 at the site in the coming months, said a statement from NRG Solar, which owns the plant alongside Google and BrightSource Energy

"At Google we invest in renewable energy projects that have the potential to transform the energy landscape. Ivanpah is one of those projects," said Rick Needham, Director of Energy and Sustainability at Google. "We're excited about the project achieving this first sync – a landmark event along the path to completion."

Located in California's Mojave Desert, Ivanpah is the largest solar thermal plant in the world, spanning 3500 acres of public land. The 392 MW plant will consist of three power tower units and will nearly double the amount of commercial solar thermal energy capacity now operating in the US.

The solar power plants will make an important contribution to California's ambitious renewable energy targets.

The state has a long history of supporting clean energy initiatives and is seen as one of the most forward-thinking states in the US. In October the state's Governor signed new legislation designed to support natural gas-based distributed generation technologies such as fuel cells.

Last month First Solar Inc said that it had signed an agreement with NextEra Energy Resources to build a 250 MW solar power plant near Blythe, California.

First Solar will provide engineering, procurement and construction services, using its cadmium telluride (CdTe) photovoltaic thin-film modules.

NRG targets Caribbean for renewable investments

NRG and Digicel say that planned renewable energy investments in the Caribbean will bring financial and environmental benefits to the region.

The two companies have asked governments, utilities and other developers across the Caribbean for information about planned renewable energy projects in which they could invest and support through development, construction and operation.

"NRG's work in Haiti has demonstrated the transformative impact that renewable energy can have on communities that otherwise lack access to affordable, reliable electricity," said David Crane, Chief Executive Officer of NRG. "We stand ready with Digicel to support the widespread adoption of renewables across the Caribbean, thereby helping to drive down electricity costs for the region and reducing the deleterious impacts of fossil fuel generation on the Caribbean ecosystem."

Countries in the Caribbean generally rely on fossil fuel imports for electricity generation, but distributed and utility-scale renewable energy technologies can deliver a much lower cost of energy, even without subsidies.

"NRG's vision is for solar-led renewable medium- to large-scale off-grid systems across the region," added Crane. "We understand a mix of technologies, from batteries to wind energy systems, will be necessary to offer the greatest financial and environmental benefits to Caribbean stakeholders, and we are open to supporting all systems with demonstrated performance history."

Switch to gas helps US emissions

Energy-related carbon dioxide emissions in the USA declined for a second year in a row in 2012, bringing emissions to their lowest level since 1994.

The latest data from the US Energy Information Administration (EIA) shows that in spite of economic growth in 2012, energy-related CO_2 emissions declined by 3.8 per cent to 5290 million metric tonnes.

Energy-related CO_2 emissions have declined for five of the last seven years, says the EIA, and emissions are now 12 per cent below their peak in 2007.

The EIA puts the decline down to a mild heating season, a decline in carbon intensity in the US economy, a decline in electricity demand in the residential sector, and a decrease in coal-fired electricity generation.

Natural gas prices averaged $2.66/million cubic feet (MCF) in 2012, the lowest in a decade, leading to a rise in natural gas fired generation at the expense of coal. The carbon intensity of electricity generation fell by 13 per cent between 2007 and 2012, says the EIA, equivalent to around 314 million metric tonnes of CO_2.

Over half of this – 198 million metric tonnes of CO_2 – is accounted for by the switch from coal to natural gas.

Over the same period the overall carbon intensity of the US economy has fallen by six per cent.

In 2012 the country's GDP grew by 2.8 per cent.

Merchant solar plant proves parity in Chile

- 70 MWp plant to sell energy on spot market
- Chilean environment right for solar investment

The developers of a merchant solar power project in Chile say that their plans show that solar energy is reaching parity with conventional power generation technologies.

Total, Etrion and Solventus Energías Renovables have announced plans to build Project Salvador, a 70 MWp photovoltaic (PV) power plant in the Atacama region of Chile. The $200 million plant will be the largest solar merchant plant in the world and will help Chile to diversify its energy mix.

According to Total, solar power is a compelling proposition in Chile due to the high levels of solar irradiation in the region. "Combined with Chile's high electricity prices, large energy demand and low construction costs, solar can compete with traditional sources of electricity in Chile without government subsidies," said Philippe Boisseau, President, Marketing & Services and New Energies and a member of the Executive Committee of Total.

Some 70 per cent of the finance for Project Salvador will be financed through non-recourse project debt from the Overseas Private Investment Corporation (OPIC), the US government's development finance institution. The remaining 30 per cent equity portion will be funded by Etrion, Total and Solventus, based on their respective ownership interests of 70 per cent, 20 per cent and ten per cent.

Project Salvador will be built, operated and maintained by Total's affiliate, SunPower Corporation. Its electricity will be sold on the spot market and delivered to the Sistema Interconectado Central (SIC) network.

Construction is expected to start during the fourth quarter of 2013, and Project Salvador is expected to be operational by the first quarter of 2015 at the latest.

The Atacama region in Chile will be the location for the Project Salvador plant

Statoil scraps Maine Hywind

Statoil has withdrawn plans for an innovative offshore wind farm in the USA because of commercial and regulatory uncertainties.

The Norwegian firm was planning to build a 12 MW wind farm off the Maine coast using its Hywind floating turbine concept but announced last month that it would not be proceeding with the $120 million project.

A company statement said that "changes in the framework conditions in the state, uncertainty around the commercial framework, and the schedule implications of project delays made the project outlook too uncertain to proceed".

It added that it would now focus on a planned Hywind project in Scotland.

Trine Ulla, head of business development for Floating Wind in Statoil said: "Regardless of our exit in Maine, we will continue to explore the US offshore wind market. The US holds several locations with good wind conditions, deep waters and proximity to load centres."

Ulla commented that the decision was a difficult one, and that Statoil appreciated the support for the project both at the state and federal levels. "We have been met with enthusiasm and strong support from a broad range of local and federal stakeholders," said Ulla.

Statoil put the project on hold in July after Maine's Republican Gov. Paul LePages pushed to reopen the competitive bidding process to allow the University of Maine to bid for the offshore concession. LePage said Statoil's project would put too much of a burden on ratepayers and that Maine's flagship university should be allowed to compete.

In Scotland Statoil is planning to install five 6 MW floating turbines at a test site 20 km off the coast of Peterhead.

South Korea could cut emissions by diversifying energy mix

Dangjin 3: lowering emissions through advanced gas turbine technology

■ Switching from coal to gas could deepen emission cuts ■ H-class gas turbine starts up at Dangjin 3

Junior Isles

A study carried out by Siemens shows that South Korea could significantly reduce its carbon dioxide emissions by adjusting its energy mix.

The nation, which ranks number three on the list of countries with the highest coal imports, has already taken action to reduce its consumption of primary energy. The share of coal for electric power generation is expected to drop from roughly 40 per cent today to around 16 per cent by 2030.

In line with this decline, CO_2 emissions from the power sector are set to decrease by a third, although power consumption is likely to increase by about a quarter over the same period, says the study. It notes, however, that further changes in the generating mix could make it possible to reduce the sector's CO_2 emissions by up to two thirds.

For instance, building more high-efficiency gas-fired power plants than already planned could lower CO_2 emissions still further, and greater use of renewable energy resources would also help reduce both emissions and the country's dependence on imported fuels. Placing greater emphasis on nuclear energy would also enhance security of supply while lowering the CO_2 footprint.

According to Siemens, if Korea were to eliminate coal-fired power plants in favour of modern gas-fired units by 2030, the sector's CO_2 emissions would drop by a further third, and the country could save 9 million tons of imported oil equivalent per year.

"Korea is already a pioneer in the efficient use of energy. A high number of gas-fired power plants featuring the highest possible efficiencies are being built here," said Michael Süß, member of the Corporate Executive Committee of Siemens AG and CEO of Siemens' Energy Sector.

Last month Korean Independent power producer GS EPS inaugurated its 415 MW Dangjin 3 (formerly Bugok 3) project, the first deployment of a Siemens SGT6-8000H gas turbine in a single shaft combined cycle arrangement. The plant is the first to break the 60 per cent barrier for combined cycle efficiency in Asia.

Annually, Dangjin 3 will save more than three per cent of its natural gas fuel per kWh compared with Dangjin 2, which uses F-class technology. Assuming baseload operation, this will result in savings of up to 20 000 m^3 of natural gas per year.

According to GS EPS this will save in the region of $43 million over the lifetime of the plant at current gas prices.

GE targets Asia

GE Power & Water is placing a greater focus on Asia, aiming to cash in on expected massive investments in energy infrastructure to serve strong demand.

As much as $10 trillion is required for energy infrastructure investment in Asia over the next decade to serve continuous growth in demand, said Fintan Tuffy, general manager for fleet analytics and performance management.

In Southeast Asia, energy demand is expected to increase by 90 per cent by 2020, outpacing growth of 40 per cent in other parts of Asia.

With gas prices increasing each year in the global market, GE is confident its gas turbine technology will give it an advantage in the region.

Peeratarat Ittarattanachoke, leader for GE power generation services in Thailand, said the company is keen to bid for contracts with independent power producers and the Electricity Generating Authority of Thailand.

About 70 per cent of power generation capacity in Thailand is fuelled by gas, which has increased in price by more than 70 per cent over the last decade.

As gas prices are expected to keep rising, the electricity tariff is likely to approach Baht6/kWh ($0.19) in the next five years, nearly double the current average price of Baht3.70.

Energy demand in Thailand and the other Greater Mekong Subregion (GMS) countries – Cambodia, PRC China (Yunnan Province and Guangxi Zhuang Autonomous Region), Laos, Myanmar and Vietnam – has risen sharply thanks to growing tourism and investment and there have been moves to increase energy security in the region.

Under a memorandum of understanding (MoU) signed last month, Thailand's Energy Ministry and China's National Energy Administration will jointly study and develop fossil and renewable energy projects across the GMS. The two countries have agreed to cooperate on technology development in the areas of oil and gas, power grids, energy conservation and energy efficiency.

■ Vietnam's Deputy Prime Minister Hoang Trung Hai last month approved a 500 kV power transmission line project to bring hydropower from the southern part of Laos and the northeast region of Cambodia to Vietnam. In a separate development Vietnam's Vinh Tan 3 Energy Joint Stock Company (VTEC) teamed up with the Chinese Harbin Electric Company to build the $2.7 billion US Vinh Tan 3 coal-fired thermal power plant in the southern province of Binh Thuan.

About 70 per cent of Thailand's generating capacity is fuelled by gas

Bangladesh starts work on nuclear plant but coal plant faces delays

Bangladesh has begun work on its first nuclear power plant. Prime Minister Sheikh Hasina laid the foundation stone at the start of October for the plant in Rooppur in the northwest.

The project will use two 1000 MW Russian designed reactors, the first of which is expected to start generating power in 2018. Bangladesh signed a deal with Russian state-owned nuclear giant Rosatom in 2011 to build the plant. Russia agreed to provide low-cost loans to finance 90 per cent of the project $4 billion project. Russia will also train workers to run the plant.

The plant will help plug a generation gap that has seen the country's 150 million people experience a daily shortfall of about 2000 MW.

Hopes to get another major project off the ground, however, recently suffered a setback. Last month the proposed signing of a Memorandum of Understanding (MoU) between Dhaka and Kuala Lumpur for setting up a 1320 MW coal-fired power plant was deferred indefinitely.

Bangladesh and Malaysia earlier agreed to implement the project at Maheshkhali in Chittagong and had scheduled to sign the contract on October 2nd.

A top official at the Bangladesh Power Ministry said: "The signing was postponed when Dhaka found that Kuala Lumpur incorporated some issues in the deal which were not agreed by both the parties.

"At the final stage of the scrutiny, we saw the Malaysian authority had changed some of the provisions in the deal and incorporated some new issues. We accepted some of them and disagreed with many others."

As part of the government's long term strategy to increase power generation to 30 000 MW by 2020, the Power Ministry has planned a number of coal-fired power plants across the country.

Under the plan, a number of sites were selected which include Rampal in Khulna region, Maheshkhali, Anwara and Materbari in Chittagong region.

Indian energy sector needs $2.3 trillion by 2035

India's energy sector will need as much as $2.3 trillion in investments by 2035, accounting for the bulk of the energy share in South Asia, according to the Asian Development Bank (ADB).

Its *'Energy Outlook for Asia and the Pacific'* report said South Asia's investment needs are the second largest at $2.4 trillion (or 20.6 per cent of total investment requirements in Asia and the Pacific).

"India will account for an estimated $2.3 trillion or 95.6 per cent of energy investment requirements in South Asia," said the report. Apart from India, other nations in the South Asia region are Bangladesh, Bhutan, the Maldives, Nepal, and Sri Lanka.

The projections are for the period from 2010 to 2035. In the business-as-usual scenario, the final energy demand of India is projected to increase at an annual rate of 2.7 per cent during the period, a slower rate compared with the projected GDP growth rate of 5.7 per cent.

With energy demand expected to grow faster than production, the economic impacts of importing fossil fuel, oil, gas and coal are rising, and energy security has become a priority for India, the ADB said.

It added: "A core problem in India is energy pricing. In addition, electricity tariffs are also at low levels. Electricity for agricultural use, which is supported through a complex subsidy mechanism, is almost free in certain areas."

The report notes that electricity price controls have also curtailed investment in new power plants, further hurting electricity supply.

India has been accelerating the use of renewables to help secure supply and improve energy access for its population.

For example, solar energy is a key part of the national government's goal under the Jawaharlal Nehru Solar Mission (JNNSM) to find renewable energy alternatives to fossil fuels.

In late September, the government finalised the setting up of an 'Ultra-Mega Green Solar Power Project' in Rajasthan. When the 4000 MW project is fully commissioned it will generate aproximately 6000 GWh of electricity per annum.

Six state-owned companies, including Bharat Heavy Electricals Ltd. (BHEL) and Power Grid Corp. (PWGR) of India Ltd., will form a joint venture to build the first 1 GW by the end of 2016 and sell their output at a maximum Rupees5500 ($89) per MWh, Tarun Kapoor, joint secretary at the Ministry of New and Renewable Energy, said.

Shortly after the announcement, the ADB said it will provide $500 million to build a power transmission system to deliver clean electricity from wind and solar power projects in Rajasthan in Northwest India to the state and national grids.

■ Avantha Group Company CG, inaugurated its 1600 kV ultra high voltage (UHV) research centre at its switchgear complex in Nashik, in the state of Maharashtra. Commenting on the inauguration, Avantha Group Company CG's CEO & Managing Director, Mr. Laurent Demortier said: "This Research Centre will provide us with the necessary tools to effectively compete in the fast growing UHV/ EHV market segments."

UK pledges green policy roll-back

Rising energy prices have put the UK government under pressure to re-examine the costs of green energy.

Siân Crampsie

The UK government has launched a review of competition in the electricity sector and of the country's support for green energy.

Prime Minister David Cameron made the surprise announcement last month after utilities SSE and British Gas said they would increase average energy bills by 8.2 and 9.2 per cent on average, respectively.

Cameron said that he would "roll back" green initiatives as well as introduce an annual competition test to ensure utilities aren't abusing market power. He has been accused of performing a U-turn after promising in 2008 that his government was committed to the green agenda.

Utilities, however, insist that the government's green policies are helping to push up energy bills.

Alistair Phillips-Davies, SSE's new CEO, told the *Financial Times* that costs for low carbon schemes have more than doubled in the past four years and that new policies included in the electricity market reform bill – such as the carbon price floor – would result in further increases.

While green policies currently account for around ten per cent of the average household energy bill, that proportion is set to rise steeply. Measures to support green power and increase energy efficiency will add 33 per cent to the price of electricity by 2020 and 41 per cent by 2030, according to the Department of Energy and Climate Change (DECC).

The price increases followed the government's announcement of a deal with EDF for the construction of a new nuclear power plant at Hinkley Point. The guaranteed "strike price" for energy from Hinkley is double the current price of electricity.

Details of the proposed competition review were due to be announced at the end of October. It is understood that the government had been examining the impact of green policies on energy bills for several weeks.

Utilities including EDF, SSE and Npower welcomed the reviews and said that the competition review would help to restore consumer confidence in the market.

The competition review is expected to be an annual event led by regulator Ofgem with input from the Office of Fair Trading and the new Competition and Markets Authority. It is likely to examine prices, profits, barriers to new entrants and how easy it is for consumers to get the best deal.

The government is thought to have been examining green schemes such as the Eco energy efficiency scheme, which has a budget of £1.3 billion. However it insists that energy bills will fall by 2030 when the benefits of energy efficiency schemes start to outweigh the costs of green subsidies.

Other factors causing energy bills to rise include a rise in wholesale power prices and a rise in network charges. The cost of buying energy in global markets has risen four per cent in the past year, according to SSE.

Large-scale offshore wind turbines take the stage

- Siemens 6 MW gearless turbine at UK test site
- Installation of Areva machines begins in German North Sea

Projects to install 5-6 MW wind turbines in European waters are taking shape as the offshore sector moves to gain efficiencies from large-scale machines.

Siemens has installed a market-ready version of its new 6 MW gearless wind turbine at a UK test site prior to going ahead with series production of the machine.

Meanwhile Areva has announced that installation of 120 of its M5000 turbines at the Global Tech I and Trianel Windpark Borkum in the German North Sea has started. The M5000 has a unit capacity of 5 MW.

Most offshore wind power projects under construction in Europe at present use wind turbines in the 3 MW size range, but developers are moving towards larger machines in order to gain economies of scale and reduce installation times.

Earlier this year, Siemens installed two 6 MW turbines at the Gunfleet Sands offshore wind farm operated by Dong Energy to carry out the first offshore testing of this ultra-modern direct-drive turbine.

The latest installation at SSE's site in Hunterston will enable it to carry out final tests in preparation for the UK's Round 3 offshore wind energy projects.

Extremadura complex marks Abengoa progress

The Extremadura solar complex has become Europe's largest solar energy facility after Abengoa started operations at two concentrating solar power (CSP) plants at the site.

Solaben 1 and Solaben 6 both have a 50 MW capacity and are based on parabolic trough solar technology. Abengoa has also closed the non-recourse financing for both plants, freeing up €200 million of equity in the two projects.

Spain's Extremadura complex has a total capacity of 200 MW. Two further CSP units entered operation in 2012. Abengoa is building additional CSP plants in the USA and South Africa.

Last month the 280 MW Solana CSP plant in Arizona, USA, started commercial operation. Abengoa said in a statement that the start-up of the plant – the first solar plant in the USA equipped with a thermal energy storage system – marked "a major accomplishment for Abengoa and the CSP industry".

V4 highlights energy issues

A group of central and eastern European countries has urged the European Union to enable rather than hinder the region in developing its nuclear energy capacity.

The Visegrad, or V4, group – consisting of the Czech Republic, Hungary, Poland and Slovakia – held its latest meeting last month, with energy topics being at the top of the agenda.

Czech Republic Prime Minister Jiri Rusnok highlighted at the meeting the importance of sovereignty regarding decisions over nuclear energy, and in general, on allowing all countries to choose the types and amounts of energy sources used within their countries.

The V4 are in favour of the extraction of shale gas as a means to improve energy security, while the development of a regional gas market was also discussed at the meeting.

■ The EPR reactor vessel has arrived at the site of the Flamanville nuclear power plant, Areva has said. The delivery of the component marks a new stage in the construction of the plant's nuclear island.

France upholds fracking ban

France has given a definitive 'non' to fracking after the country's highest court upheld a government ban on the practice.

The Constitutional Council ruled against a challenge to a government ban on fracking – the controversial technique used to extract shale gas – by US firm Schuepbach Energy.

France banned fracking in 2011 over environmental concerns. Energy Minister Philippe Martin said that the ruling meant that the fracking ban was secure.

Schuepbach had two exploration permits cancelled when the ban was enforced and argued that the ban discriminated against oil and gas firms because fracking is allowed for geothermal energy exploration.

Total is also awaiting a ruling on an appeal after its permits were revoked.

Hydraulic fracturing – or fracking – involves pumping water, sand and chemicals at high pressure deep underground in order to fracture rocks and release natural gas held in the rocks' pores. Its widespread use in the USA has resulted in demonstrations by environmentalists and those demonstrations have been replicated in Europe as oil firms begin to explore for shale gas reserves there.

In the UK last month Greenpeace launched a legal challenge to fracking in a bid to halt plans for shale gas extraction in England. The legal case is based on fracking companies' plans to drill horizontally under people's homes, something Greenpeace says would be unlawful if they do not have permission.

"Under English law, if you own land, your rights extend to all the ground beneath it. That means if someone drills under your home without permission it is trespass," said Greenpeace Senior Campaigner Anna Jones.

Greenpeace hopes that if thousands of people across the country join the legal block, it will create a patchwork of "no-go" areas for the fracking industry.

Companies undertaking fracking in the EU could be subject to strict regulations, however, as the European Commission is thought to be preparing an unconventional fuels directive.

European news website *Euractiv* revealed last month that the directive could be published at the end of this year and is likely to be a robust legislative package clarifying the rules for businesses and investors while minimising the risks of any impact on public health.

OECD plans climate scorecards

The OECD, World Energy Council and other international organisations say that not enough is being done to tackle climate change.

Siân Crampsie

The OECD is planning to score countries on their climate change policies in an effort to encourage action on global warming.

The agency said last month that countries should make carbon pricing the cornerstone of climate policy and that transformation of the global energy system is needed to limit climate change to a 2°C rise in temperature.

It is planning to add a climate scorecard to its regular economic surveys of countries in a bid to encourage a more coherent approach to policy than is present globally.

"Whatever policy mix we put in place, it has to lead to the complete elimination of emissions to the atmosphere from fossil fuels in the second half of the century," said OECD Secretary-General Angel Gurría. "We don't need to see zero net emissions tomorrow, but we will need to be on the pathway."

Gurría's comments followed the release in late September of the latest assessment of global warming by the Intergovernmental Panel on Climate Change (IPCC), which said that the influence of human activity on the world's climate is clear.

"Our assessment of the science finds that the atmosphere and ocean have warmed, the amount of snow and ice has diminished, the global mean sea level has risen and the concentrations of greenhouse gases have increased," said Qin Dahe, Co-Chair of IPCC Working Group I.

His fellow Co-Chair, Thomas Stocker, said: "Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions."

The IPCC report led to calls for action from environmental groups such as Greenpeace, ActionAid and WWF, while the World Energy Council (WEC) said there was a lack of global consensus on climate change and that the global energy industry should take greater responsibility in making energy systems more sustainable.

"We know that pollution from burning fossil fuels is the main cause of climate change," said Samantha Smith, leader of the WWF's Global Climate & Energy Initiative. "We are calling on governments and the financial community to act immediately to stop risky investments in coal, oil and gas, and start investing in our long term future based on sustainable, renewable energy."

According to the OECD, sending price signals to consumers through a carbon price would help to eliminate fossil fuel subsidies, which add up to $523 billion in developing and emerging economies, and wean countries off fossil fuels. Gurría also said that the use of carbon capture and storage (CCS) was not a "get out of jail free" card.

But appetite for investment in clean energy technologies remains hampered by the global economic downturn and a rise in the availability of cheap natural gas. The WEC said in its latest *World Energy Trilemma* report that rapidly shifting patterns of energy use and supply – such as the emergence of shale gas in the USA – made it difficult to develop long-term energy policies.

"This results in increased risk for industry and investors, which must be addressed if the much-needed energy transition is to be delivered in the future," said the WEC in a statement.

"If countries are to improve the sustainability of their energy systems, they must continue to work hard at identifying and successfully implementing balanced and forward looking policies," said Joan MacNaughton WEC Executive Chair of Energy and Climate Policy Assessment. "A more sophisticated and proactive partnership with the private sector is also necessary to drive the higher level of energy investment now required.

"For its part, the private sector needs to better understand how policy is made and how to contribute to it more effectively. It should also be more proactive in helping to build an informed consensus that moves us away from ad hoc approaches dominated by debate about short-term costs."

Ethiopia closer to geothermal vision

Geothermal energy capacity in Ethiopia could reach 100 MW by 2016 after the government signed a key agreement with Reykjavik Geothermal.

Under the agreement up to 1000 MW of geothermal energy capacity could be developed in two 500 MW phases. The government hopes that the deal will also kick-start other major investments in Africa's energy resources.

"Africa needs to transform, and energy is at the centre of that transformation," said His Excellency Hailemariam Desalegn, the Prime Minister of Ethiopia. "My vision is that over the next 30 years we will need to harness as much as 80 000 MW of hydro, geothermal, wind and solar power, not just for Ethiopia, but for our neighbouring countries as well."

The deal will make Reykjavik Geothermal the first independent power producer in Ethiopia, which has some of the best high temperature geothermal resources anywhere in the world. The first 500 MW phase of the project will be built inside the Corbetti Caldera, with the first 10 MW of power on-line in 2015.

Ethiopian utility EEPCo estimates that the country has over 10 000 MW of geothermal potential and over 50 000 MW of hydro potential. Exploitation of these resources could make the country a regional powerhouse.

But the country is locked in a dispute with Egypt and Sudan over its plans to build the Grand Renaissance Dam on the Nile River and last month urged its neighbours to drop their opposition to construction.

Ethiopia believes that the dam project would benefit the region as a whole but Egypt is concerned over the impact of the project on water security as it relies on the Nile for 95 per cent of its water.

Ethiopian Deputy Prime Minister and EEPCO Chairman, H.E. Dr. Michael Debretsion said the deal with Reykjavik Geothermal was a "significant step" in EEPCo's vision to be "the regional leader for power generation and export in East Africa".

The project will require $4 billion of investment over an 8-10 year period. Investment is being led by US private investors and is also supported by the USA's Power Africa initiative.

"The Corbetti project is a new model for developing large scale power projects in Africa," said EEPCO CEO, Miheret Debebe. "The project combines the expertise for electrical power generation of Ethiopia, with the geothermal technical knowledge of Iceland and the financial and structuring expertise of the United States.

"This project will set a new benchmark for large scale projects financed by the private sector and will help Ethiopia unleash its full energy potential."

US praises Nigerian privatisation

The Nigerian government says that the privatisation of the country's electricity sector will help boost electricity generating capacity to 20 000 MW by 2018.

The government last month handed over licenses and share certificates in the newly-privatised industry to its private sector owners and noted that both the economy and energy consumers in Nigeria would benefit from the deals.

The handover of legal control of 15 electricity companies to new owners completed the first phase of the $2.5 billion privatisation programme designed to end the electricity shortages that have crippled the country for several years.

"To the Nigerian people, who have demonstrated such great patience and confidence, putting up often with darkness, noisy power generating sets, the related pollution and the daily disruption in their lives, I say better days are coming," said Nigerian President Goodluck Jonathan during the handover ceremony last month.

The government estimates that investments of $3.5 billion per year are needed in the energy sector to restore existing plants and complete the construction of new ones, as well as bring the transmission and distribution infrastructure up to scratch. Nigeria's installed capacity stands at around 3200 MW and it is estimated that privately owned generators produce a further 7000 MW.

Nigeria's privatisation programme won praise from the US government's Power Africa initiative, which is designed to support power sector development in sub-Saharan Africa. "The United States government… congratulates the government of Nigeria on achieving a very important milestone in the liberalisation of the power sector," said US Chargé d'Affaires Maria Brewer.

"The US will continue to partner with Nigeria to advance a seamless transition from public to private sector management of the power sector to ensure that the Nigerian people have access to electricity."

Utilities to benefit from smart grid alliance

Siemens and Accenture are furthering their cooperation with the creation of a joint venture that will provide end-to-end smart grid solutions.

Junior isles

Utilities look set to benefit from the formation of a joint venture in the smart grid field. Siemens and Accenture have agreed to form Omnetric Group to develop solutions and services that allow utilities to improve efficiency and achieve greater supply security.

Thomas Zimmermann, CEO of the Business Unit Smart Grid Services in Siemens Smart Grid Division said: "One year ago we announced a strategic partnership between Accenture and Siemens to push smart metering, which has worked well… now we are taking the next step to show our clear commitment. Our customers are demanding more end-to-end solutions, which we can do jointly with our partner, Accenture."

Omnetric Group will focus on solutions and services for system integration and management of the growing volume of data created as part of power grid operation. These offerings will enable utilities to integrate operational technologies (OT), such as real-time grid management, with information technologies (IT) like smart metering.

The solutions and services that the new company will provide will address a host of the challenges that energy utilities are facing today.

"Utilities can improve overall grid reliability and bridge the gap to real-time grid control through integration and implementation of new and previously isolated grid applications," said Jan Mrosik, CEO of Siemens' Smart Grid Division. Demand response solutions can be used to actively manage consumption, for example. Virtual power plants enable new profitable business models, and meter data management makes usage transparent for consumers and permits energy-efficient consumption. "We believe this integration could not be done better than by a company that combines Siemens' industry know-how and Accenture's complementary IT experience."

Jack Azagury, Global Managing Director for Accenture's Smart Grid Services, said: "Omnetric Group will be excellently positioned to help utilities realise the benefits of this IT and OT 'convergence,' which is a critical step toward managing an increasingly complex and data-driven utility."

Siemens and Accenture will own 51 per cent and 49 per cent, respectively, of Omnetric Group but no further financial details of the agreement were disclosed.

The company will be headquartered in Munich and will employ approximately 100 people in its first year, and is expected to reach 200 people in less than two years. Its business operations will focus initially on Europe and the US, with further global expansion planned in the future.

"We will be active in South Africa and there are opportunities in the Middle East," noted Maikel van Verseveld, Managing Director, Accenture Smart Grid Services, who will have responsibility for running the company.

Omnetric Group is expected to begin operations by around February next year, pending regulatory approval and other closing conditions.

The news came as Siemens also announced the signing of a smart grid cooperation agreement with Dutch grid operator and energy utility Alliander N.V. The objective of the cooperation is to develop and promote innovations for intelligent power supply networks.

Possible solutions include technologies that can be used to increase the transparency of medium- and low-voltage networks, innovations for virtual power plants, innovations for data security in power grids and for patch management.

Technip joins Cansolv in CCS arena

Shell Cansolv is hoping to broaden the reach of its carbon capture technology through a new commercial agreement with Technip.

The two firms are joining forces to market and build Cansolv's carbon capture and sequestration (CCS) technologies to the power generation industry worldwide.

The collaboration will benefit from Technip's experience in the design, construction and management of large infrastructure projects and enable Cansolv to offer a full chain of services in the post-combustion CCS sector.

Cansolv's technology uses a proprietary amine solvent to capture carbon dioxide (CO_2) from flue gas streams and can be retrofitted to existing plants or built as greenfield projects. Three Cansolv CO_2 capture plants are in the start-up or construction phase.

In January 2013 Cansolv announced that the first tonne of CO_2 had been captured at a demonstration plant at Aberthaw coal-fired power plant in Wales.

Cansolv was bought by Shell in 2008 in a period when several major energy technology companies were making investments in the CCS field in anticipation of growing demand for the technology in developed markets such as Europe and the USA.

However the global economic downturn and uncertainty over climate change policy in the EU and the USA have dampened the appetite for investment in CCS technology.

Jacobs, SKM merger will extend global reach

Jacobs Engineering says that a merger with Sinclair Knight Merz (SKM) will enable it to expand its global reach and broaden its client base.

The two firms have signed a merger implementation agreement that will see Jacobs buy SKM for around $1.2 billion in cash. The motivation for the deal was strong as the two companies are an "excellent fit", according to Jacobs President and Chief Exective Officer Craig Martin.

"Our capabilities and geographies have little overlap, enabling the combined companies to continue to expand client relationships and provide significant opportunities for employees," said Martin.

California-based Jacobs is one of the world's largest and most diverse providers of technical, professional and construction services. Its purchase of SKM will give it access to the Australian firm's operations and clients in Australia, Asia, South America and the UK.

The transaction is expected to close by the end of Jacobs' first quarter of Fiscal Year 2014, and to be accretive to earnings, the firm said in a statement.

SKM operates in a number of industries, including mining, water and environment and energy. It employs 6500 people in 40 offices.

Jacobs employs around 65 000 people in 25 countries around the world, offering a broad range of services including scientific consulting as well as many aspects of engineering, construction, and operations and maintenance.

Lockheed deal boosts tidal technology

- Lead design in 1.5 MW turbine project
- Deal supports MeyGen project

Siân Crampsie

Lockheed Martin is to invest in tidal energy technology through a new agreement with marine renewables firm Atlantis Resources Corporation.

The companies have formed a global partnership aimed at supporting the development of Atlantis' new AR1500 turbine system.

The new alliance builds on the two companies' previous project alliances and will extend Lockheed's reach in the marine renewables sector.

Lockheed Martin will provide lead design and engineering services for the new Atlantis 1.5 MW tidal turbine, which the companies are aiming to demonstrate at Atlantis' Fundy Ocean Research Centre for Energy (FORCE) berth in Canada.

The agreement also provides for Lockheed Martin investment in tidal energy technology and joint projects through design, component development and systems integration services.

Atlantis CEO Tim Cornelius said that the alliance with Lockheed would allow Atlantis "to further enhance" its technology, project pipeline and capabilities. He added: "Leveraging the experience and knowledge gained from the development and testing of our previous turbine systems over the past five years, Lockheed Martin will now work to complete the detailed design of our AR1500 system, which we will seek to deploy and test at the FORCE facility in early 2015."

The agreement also supports the future delivery of Atlantis turbines to the MeyGen project in Pentland Firth, Scotland.

The MeyGen joint venture with Morgan Stanley and GDF Suez is the world's largest tidal stream project under development and received final planning consent from regulator Marine Scotland in September.

"Tidal energy is a very large, almost untapped, resource available on a global scale," said Tim Fuhr, director of ocean energy programmes at Lockheed Martin. "Through this partnership, Lockheed Martin and Atlantis will bring the technology and skills to leverage the power of the ocean and provide access to affordable and secure renewable energy."

Dong secures new investment

An injection of capital funds by three private investors will help Dong Energy achieve the targets set in its financial action plan, the utility has said.

Funds managed by Goldman Sachs along with Danish pension funds Arbejdsmarkedets Tillægspension (ATP) and PFA Pension Forsikringsaktieselskab (PFA) have agreed to invest a total of DKK11 billion ($2 billion) in Dong.

The deal will help Dong to reduce debt and implement its plans for expanding its business, including becoming a leading player in offshore wind energy.

The three funds will purchase new shares in Dong, reducing the Danish government's holding in the firm from 81 to approximately 60 per cent. The parties have also agreed to seek an IPO of Dong "when conditions are right", according to a statement from Dong.

The deal will strengthen Dong's balance sheet, which like those of other European utilities has been put under pressure by weak energy demand and falling power prices.

Dong wants to triple its offshore wind energy portfolio from 2 GW to 6.5 GW by 2020 and also invest in the exploration and production of oil and gas.

"DONG Energy has an exciting and profitable growth potential. With the injection of new equity, we have almost fully delivered on our financial action plan and have thus secured the necessary platform for pursuing our ambitions for the coming years," said Dong CEO Henrik Poulsen.

Goldman Sachs Infrastructure Partners – one of the world's biggest infrastructure investors – will subscribe to new shares worth DKK8 billion crowns, along with energy-focused private equity fund Broad Street Energy Partners, also managed by Goldman Sachs. Together they will have a stake of about 19 per cent.

ATP will subscribe DKK2.2 billion for a 5 per cent stake and PFA DKK0.8 billion for a 2 per cent stake.

Americas

US utility orders dry storage canisters

Areva TN has been awarded a multi-million dollar contract to supply 46 NUHOMS dry cask storage systems to a US nuclear utility for the management of its used nuclear fuel.

This proven system is used at more than half of the 104 US nuclear plants and meets a dual need: the transportation and storage of used nuclear fuel. Extremely robust, it features a stainless steel canister placed in a concrete module.

This is the only storage system that has been licensed for all fuel produced by pressurised water reactors, boiling water reactors, as well as Russian designs.

Alstom wins LTSAs

Alstom has won three long term service agreements (LTSAs) for natural gas fired power plants in the USA and Canada.

The LTSAs cover the Milford combined cycle power plant in Connecticut, USA, the Sarnia cogeneration plant in Ontario and the Poplar Creek cogeneration plant in Alberta.

The scope of the contracts includes parts replacement, reconditioning services, outage management, labour and on-site support staff, and optional gas turbine upgrades to increase performance and reduce maintenance costs by extending time between inspections.

McLean project places turbine order

The McLean Mountain Wind Limited Partnership has placed an order with GE for the supply of 24 wind turbines for its wind farm project on Manitoulin Island, Ontario, Canada.

GE will provide its 2.85-103 turbines for the project, which is a 50-50 partnership between Northland Power and Mnidoo Mnising Power.

It will also be responsible for operation and maintenance through a 10-year full service agreement. The facility will benefit from around-the-clock remote monitoring and diagnostics through GE's global wind monitoring centre in Schenectady, NY, which also will help maximise wind turbine operating performance and life.

Siemens kits out Grand Renewable project

Samsung Renewable Energy Inc. and Pattern Energy Group have placed an order with Siemens for wind turbines for the Grand Renewable Energy Park in Ontario, Canada.

The Grand Renewable project will consist of 100 MW of solar power and 150 MW of wind capacity. Siemens will supply, deliver and commission 67 of its SWT-2.3-101 wind turbines.

The deal also includes a three-year service and maintenance agreement.

Gamesa seals Iberdrola deal

Gamesa has signed a contract with Iberdrola to supply 202 MW of wind turbines for a project in southern Texas, USA.

Gamesa will supply 101 of its G97-2.0 MW wind turbines for the Baffin wind farm, which forms part of Iberdrola's 606 MW Peñascal complex. The wind turbines are scheduled for delivery mid-2014, while the Baffin facility is slated for commissioning towards the end of next year.

This agreement marks the largest single order for the G97-2.0 MW wind turbine unit, says Gamesa.

Asia-Pacific

Wärtsilä wins Indonesia order

Finnish firm Wärtsilä says it has strengthened its position in the global market for large gas engine power plants after winning an order for a major new project in Indonesia.

Wärtsilä will supply a 184 MW power plant to PT Wijaya Karya (Persero) Tbk., a construction firm building the Arun peaking power plant in northern Sumatra for PLN. The plant is being built on a fast-track basis and will come on-line in March 2015.

Wärtsilä will supply 19 of its 34SG gas engines to the site in Lhokseumawe, Aceh Special District, as well as other equipment. Electricity from the new plant will help to stabilise the region's grid and improve the reliability of electricity supplies.

Gamesa bags 54 MW Andhra Pradesh order

Wind turbine firm Gamesa has won an order to supply 27 wind turbines for a project being built in Andhra Pradesh state, India.

The company will supply its 2 MW units for the project, located at Tagguparthi. It will install the turbines and also be responsible for operation and maintenance for ten years.

The project is due to be commissioned by mid-2014.

Philippine IPP orders biomass plant

Areva and its partner Engcon Energy Philippines have been awarded a contract by the Green Innovations For Tomorrow Corporation, an independent power producer, for the construction of a biomass power plant in the Philippines.

The 12 MW power plant will use rice husk as fuel. Areva and Engcon Energy will be responsible for the engineering, design and installation, and will also provide the main equipment and will perform testing before the commissioning.

This power plant, scheduled for completion by mid-2015, is the first Areva biomass project in the Philippines.

India holds solar auction

India has called for bids for the construction of 750 MW of solar energy capacity in its first national auction since 2011.

State-run Solar Energy Corp said on its website that bids are due by November 29, 2013, and that around $303 million in grants is available for developers. It has asked developers to submit bids specifying the funds that they are seeking and says that the lowest bidders will win.

The auction is designed to help reduce the costs of solar energy in India. Around half of the capacity installed will have to use domestically manufactured goods and panels.

GVK orders Ratle turbines

GVK Power has placed an order worth over €100 million with Alstom for the supply of Francis turbines for the 850 MW Ratle hydropower plant in Indian-administered Jammu & Kashmir.

The contract covers the supply of four Francis units of 205 MW each and one Francis turbine of 30 MW. The project is located on the Chenab River and is Alstom's first major contract in the Kishtwar district.

Europe

B&W orders Lisahally equipment

Burmeister & Wain Scandinavian Contractor (BWSC) has ordered an 18 MW geared reaction steam turbine (GRT) from Alstom for a biomass project in Northern Ireland.

The wood-fuelled biomass power station, to be built on a 10-acre site in Lisahally, is the first of its kind to be built in Ireland. The 15.8 MW plant was part-funded by the UK's Green Investment Bank and Danish EKF.

It is expected to start operating in 2015.

ABB wins offshore connection

TenneT has awarded ABB a major contract for the supply of an AC transmission link connecting Sandbank, an offshore wind farm in the German North Sea, to the high voltage direct current (HVDC) converter station SylWin Alpha.

The 288 MW link is an important part of Germany's renewable energy ambitions. The Sandbank wind farm is located 90 km off the coast.

The connection will deploy two 3-core 155 kV AC submarine cables, each 36 km long. ABB will have turnkey responsibility for the design, engineering, supply and installation of the subsea cable system including two shunt reactors on the AC platform. The project is scheduled for completion in 2015.

Sandbank is the fifth offshore wind connection project in Germany awarded to ABB by TenneT. ABB is presently executing the Nordergründe AC cable link connecting an offshore wind farm directly to an onshore substation.

The other three projects are offshore wind connections based on HVDC Light technology of which BorWin1 has already been commissioned and DolWin1 and DolWin2 are under construction.

Vestas bags major Romanian order

Vestas has won an order for the construction of one of the largest wind farms in Romania.

The company will supply, install and commission the turbines and control system for the 108 MW Crucea North wind farm, which is being developed by Germany's Steag. Delivery of the turbines is planned for April 2014, with commissioning due to be completed by December 2014.

The Crucea North project is located in the province of Dobrogea, around 50 km north of the Black Sea harbour town of Constanta. It will use Vestas' V112-3.0 MW turbines and will be a key contributor to Romania's renewable energy action plan.

Maxsys confirms order with Nuon

Clean tech firm Maxsys Fuel Systems has signed a major contract with Vattenfall subsidiary Nuon that will help the Dutch utility's customers save energy.

Maxsys will supply Nuon's Dutch customer base with its Fuel System, which can be applied to all types of boilers, drying plants, furnaces, kilns, ovens and heaters. The patented technology will first be applied to Nuon's industrial customer base, which could expect energy savings of at least five per cent and a return on investment within two years.

The deal includes the option to roll out the technology to Nuon customers in Germany and Sweden.

Areva to study research reactor

Areva TA, Ansaldo Nucleare and Empresarios Agrupados have been awarded a contract to perform preliminary studies for the new Myrrha research reactor by SCK•CEN, the Belgian nuclear energy research centre.

The €24 million contract scope includes estimating the investment and operation cost for the reactor, validation of performance objectives, preparation for an operating license, and the definition of a detailed project schedule.

Areva TA will provide technical coordination and manage the overall nuclear design, as well as perform the studies for the general installation, safety, and instrumentation and control.

The Myrrha research reactor will contribute to the development of transmutation as a technique for recycling and processing highly radioactive waste. Myrrha is scheduled to enter full operation in 2024-2025.

International

BGR secures first overseas order

India-based BGR Energy has signed a $246 million contract with Iraq's Ministry of Electricity for the construction of a 500 MW power plant.

The engineering, procurement and construction contract is the first overseas order secured by the Chennai-based firm, which will build the 4 x 125 MW Al Nasiriya gas turbine power plant.

Wastewater plant orders biogas units

GE is to supply eight of its 1.4 MW Jenbacher J420 biogas engines for a new cogeneration plant based at the Dan Region (Shafdan) wastewater treatment plant in Israel.

The Shafdan wastewater treatment plant is the largest wastewater treatment plant in Israel and treats municipal wastewater for 2 million people in central Israel. Its owner, "Mey Ezor Dan" Cooperative Agricultural Water Society LTD (MED), is installing an anaerobic digestion system and biogas cogeneration plant to improve the plant's efficiency.

The new cogeneration plant will provide 11.2 MW of on-site power as well as heat to run the digesters as well as the whole Shafdan site.

GS E&C wins $920 million transmission project

GS Engineering & Construction said that it has won the Saudi 380 kV Power Transmission Line Project commissioned by Saudi Electricity Company.

The $922.5 million order calls for building 225 km power lines connecting the PP-12 combined cycle power plant located 140 km west of the Saudi Arabian capital Riyadh with the Irrqaa power substation on the outskirts of the capital city.

The project will be completed by November 2015 after 25 months of construction.

Smart pilots in Turkey

VIKO and Kamstrup have signed contracts with Turk Telecom Group and Turkish electricity distribution firm EnerjiSA to develop two smart metering pilot projects in Turkey.

Turk Telecom and Kamstrup have signed a deal to test Kamstrup's Omnia smart grid platform in Turkey's Bursa region. A second pilot will take place in the Ankara region, where EnerjiSA has selected four residential areas for smart meter installation.

The two pilot projects will indicate the possibilities of grid optimisation through smart metering technology in Turkey, where strong economic growth is driving energy demand growth.

Oil

East African oil sector rife with challenges…

- Kenya exports to start in 2016
- Crude production in Uganda delayed

David Gregory

A spate of new oil discoveries in East Africa is attracting the attention of international operators and promise economic development to a remote and impoverished part of the world. While crude resources in Kenya, Uganda and South Sudan are estimated in the billions of barrels, a lack of infrastructure, bureaucracy, politics, ethnic rivalries and corruption will make it difficult to get the crude out of the ground and into international markets.

Numerous successful wells have been drilled in recent years in the East African Rift Valley basin. The UK's Tullow Oil has been one of the most successful. In late September, operator Tullow and its partner Africa Oil reported their fourth straight oil discovery in northern Kenya, bringing its reservoir potential to some 350 million barrels. Tullow has had even more success in Uganda, where it is partnered with France's Total and China National Offshore Oil Corporation (CNOOC). Crude reserves are estimated at some 3.5 billion barrels in Uganda, which plans to build a refinery for the regional market and export crude with a pipeline through Kenya.

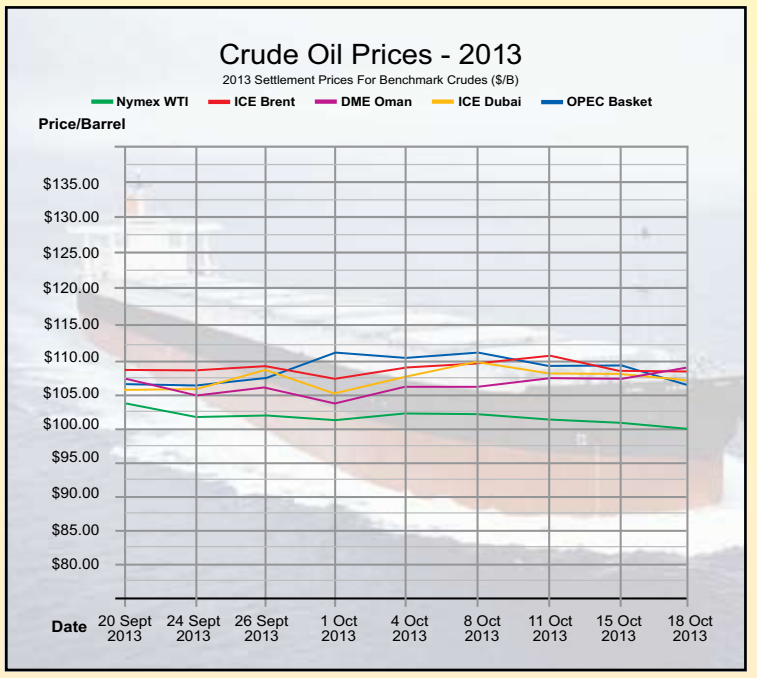
Output in Kenya is expected to reach 12 000 b/d in 2020 and average more than 100 000 b/d by 2025. The country's first commercial crude will be produced in 2014 and exports are to start in 2016 when Tullow begins to export 10 000 b/d by road or rail.

Over the next 12 months Tullow plans to drill another 12 wells in a basin that it says has exceptional potential.

Kenya plans to hold its first licensing round in 2016 after reviewing its hydrocarbon law and model production sharing contracts. Seven blocks will be up for auction, created by combining areas that will be relinquished from already licensed fields. In the past Kenya has negotiated the licensing of blocks on a country-to-company basis. Kenya has 44 licensed blocks, but several are due to hand back 25 per cent of their acreage soon.

In September Uganda awarded its first production license to CNOOC for the development of the Kingfisher field in the Albertine region. China's state-owned firm will invest $2 billion over four years in order to bring 40 000 b/d on-stream by 2017. It will drill 40 wells into a crude reservoir estimated to hold 635 million barrels, of which 196 million are recoverable. CNOOC will also construct a 50 km pipeline to the planned refinery. Associated gas produced at Kingfisher will be used for power generation.

Kampala has awarded Blocks 1, 2 and 3A to a consortium including Tullow, Total and CNOOC. Each holds a third share in each of the blocks and CNOOC is operator of Block 3A, where the Kingfisher field is located. Total is operator in Block 1 and Tullow operator of Block 2. The Ugandan government will take a 15 per cent stake in the Kingfisher field once it comes on-stream.



Uganda's crude output is expected to eventually reach 250 000 b/d.

Crude production in Uganda has been delayed because of a disagreement between the government and the companies over the construction of a refinery. Uganda is looking to supply the regional market with a large refinery, but Tullow, Total and CNOOC have argued for exports.

It was agreed earlier this year that a 30 000 b/d refinery, designed with a second phase that could expand to a capacity of 60 000 b/d, would be built in the west Hoima district, but it will be part of a larger plan that includes construction of a crude export pipeline to the Kenyan port of Lamu that will also provide access for crude from Southern Sudan, which has been looking for an alternative route to the pipeline through Khartoum and Port Sudan.

Phase one of the refinery is scheduled to come into operation in 2018 and expand to 60 000 b/d by 2020. Uganda's petroleum products demand averages 27 000 b/d and the countries in the region rely on product imports.

During a recent meeting of regional leaders, Uganda offered 40 per cent of the refineries shares to its partners in the East African Community (EAC): Kenya, Tanzania, Rwanda and Burundi. The remaining 60 per cent will be held by private investors. Total and China are expected to take shares in the project which is estimated to cost $2.5 billion.

Meanwhile, the real money-maker for the region will be the export pipeline, which is expected to begin operation in 2018-20 even though some consider that optimistic.

Gas

… but gas development will attract billions

The next 12 to 18 months in East Africa will be fascinating as exploration continues, development plans unfold and several high profile deals are completed.

Mark Goetz

East Africa is slated to become a major gas exporting region. Natural gas discoveries offshore Mozambique and Tanzania have so far confirmed gas resources exceeding 130 trillion cubic feet (tcf) and big international companies are planning to build LNG export facilities in remote areas on the coast that will supply growing markets in Asia and the Far East.

Practically no infrastructure exists in the areas where the LNG facilities are planned and billions of dollars of investment will be needed to launch the new industry. Revenues from gas sales will transform this region of Africa as its natural resources are developed.

Speaking at the East Africa Oil and Gas Conference in London in early October, Wood Mackenzie's Martin Kelly said investment in the region – particularly Mozambique, Tanzania and Uganda, where oil has been discovered – would reach about $7 billion annually by 2018.

Kelly, head of sub-Sahara Africa upstream research, said the next 12 to 18 months in East Africa would be a fascinating time as exploration continues, development plans unfold and several high profile deals are completed.

"Overall, the outlook for East Africa is a positive one, with a great deal of upstream activity over the next year or so," he said. "Upstream capital investment in East Africa has averaged about $1 billion a year since 2010, excluding exploration investment. As these discoveries are developed, we expect to see levels of investment grow at an average of around 60 per cent per year until 2018."

He added: "The surge in investment will also cause East Africa's oil and gas production to triple from around 500 000 barrels of oil equivalent per day (boe/d) to 1.5 million boe/d."

Italy is considering commissioning a floating LNG (FLNG) vessel that would process offshore natural gas offshore in Mozambique's Area 4 Block where gas discoveries amount to 87 tcf. This would require billions in investment but should allow Eni to bring the block into production before the LNG facility onshore starts-up, which is now optimistically scheduled for 2018.

With US explorer Anadarko, which operates Area 1 Block, where recoverable gas resources are estimated at 35-65 tcf, the two companies are planning to combine their discoveries for processing at a planned LNG complex designed to produce 20 million tons/year, but which might eventually see 10 LNG trains, each with a 5 million t/y capacity, in operation. Phase 1 of the project could cost some $14 billion.

Total investment in Mozambique for exploration, development and the LNG facility could, by the end of the decade, amount to $50 billion. The site chosen for the facility is in a remote area called Afungi in Cabo Delgado Province in northern Mozambique. But it remains to the seen if the task of putting a LNG plant into operation can be achieved by 2018 and reports say the project could be pushed back by one or two years.

Eni East Africa holds 70 per cent of the Area 4 license and is partnered with China National Petroleum Corporation (CNPC), which holds 20 per cent of Eni East Africa. Other Area 4 partners include Galp Energia with 10 per cent, Kogas with 10 per cent and Mozambique's state-owned ENH with 10 per cent.

Anadarko has a 36.5 per cent stake in Area 1, while Japan's Mitsui holds 20 per cent, India's BPRL Ventures holds 10 per cent, Videocon holds 10 per cent, and Thailand's PTTEP holds 8.5 per cent.

Meanwhile, Statoil and Tullow Oil are drilling for oil in Area 2. All of Mozambique's main gas discoveries have occurred in the Rovuma Basin.

In the waters to the north, offshore Tanzania, BG and its partner Ophir Energy have drilled successful wells and also plan to join forces with other companies drilling for gas to create another LNG plant. Companies working in Tanzania include Statoil, Petrobras and ExxonMobil. Based on the discoveries made so far, the country estimates its gas resource at 44 tcf.

Tanzania announced earlier this year that it would open its fourth licensing round at the end of October. Seven deep water offshore licenses will be tendered plus one block in Lake Tanganyika. The country is in the process of drawing up a new natural gas implementation strategy that will include upstream oil policy and laws governing natural gas.

Mozambique is expected to launch its fifth licensing round by the end of 2013, but that will depend on the passage of a new hydrocarbon law. As many as 12 blocks could be tendered, several of which will be in the Rovuma Basin.

World: New Policies Scenario *(The NPS is the IEA's central scenario)*

	Electricity generation (TWh)							Shares (%)		CAAGR (%)
	1990	2010	2015	2020	2025	2030	2035	2010	2035	2010-2035
	New Policies Scenario							NPS	NPS	NPS
Total generation	**11 819**	**21 408**	**24 996**	**28 235**	**31 007**	**33 789**	**36 637**	**100**	**100**	**2.2**
Coal	4 426	8 687	10 242	10 897	11 212	11 565	11 908	41	33	1.3
Oil	1 336	1 000	967	787	679	601	555	5	2	-2.3
Gas	1 727	4 760	5 374	6 108	6 920	7 723	8 466	22	23	2.3
Nuclear	2 013	2 756	2 881	3 443	3 847	4 114	4 366	13	12	1.9
Hydro	2 144	3 431	3 950	4 513	4 924	5 323	5 677	16	15	2.0
Bioenergy	131	331	474	696	926	1 179	1 487	2	4	6.2
Wind	4	342	808	1 272	1 719	2 187	2 681	2	7	8.6
Geothermal	36	68	93	131	190	253	315	0	1	6.3
Solar PV	0	32	183	332	490	664	846	0	2	14.0
CSP	1	2	21	50	86	152	278	0	1	23.0
Marine	1	1	3	5	12	27	57	0	0	20.4

	Electrical capacity (GW)						Shares (%)		CAAGR (%)
	2010	2015	2020	2025	2030	2035	2010	2035	2010-2035
	New Policies Scenario						NPS	NPS	NPS
Total capacity	**5 183**	**6 347**	**7 162**	**7 861**	**8 588**	**9 345**	**100**	**100**	**2.4**
Coal	1 649	2 012	2 119	2 171	2 250	2 327	32	25	1.4
Oil	435	428	354	301	261	245	8	3	-2.3
Gas	1 351	1 639	1 845	2 039	2 234	2 419	26	26	2.4
Nuclear	394	422	474	519	551	583	8	6	1.6
Hydro	1 033	1 184	1 348	1 467	1 583	1 684	20	18	2.0
Bioenergy	72	98	135	170	208	252	1	3	5.1
Wind	198	390	586	760	924	1 098	4	12	7.1
Geothermal	11	14	20	29	38	46	0	0	5.8
Solar PV	38	153	266	378	491	602	1	6	11.7
CSP	1	6	14	24	40	72	0	1	17.6
Marine	0	1	1	3	7	15	0	0	17.3

	CO_2 emissions (Mt)							Shares (%)		CAAGR (%)
	1990	2010	2015	2020	2025	2030	2035	2010	2035	2010-2035
	New Policies Scenario							NPS	NPS	NPS
Total CO_2	**20 980**	**30 190**	**33 185**	**34 560**	**35 403**	**36 197**	**37 037**	**100**	**100**	**0.8**
Coal	8 335	13 105	14 901	15 350	15 391	15 360	15 287	43	41	0.6
Oil	8 836	10 893	11 546	11 863	12 080	12 292	12 573	36	34	0.6
Gas	3 808	6 192	6 738	7 347	7 932	8 545	9 176	21	25	1.6
Power generation	**7 481**	**12 495**	**13 849**	**14 338**	**14 545**	**14 738**	**14 951**	**100**	**100**	**0.7**
Coal	4 918	9 040	10 253	10 643	10 684	10 664	10 623	72	71	0.6
Oil	1 204	870	831	692	589	506	461	7	3	-2.5
Gas	1 359	2 585	2 765	3 003	3 272	3 569	3 868	21	26	1.6
TFC	**12 486**	**16 127**	**17 642**	**18 501**	**19 116**	**19 687**	**20 272**	**100**	**100**	**0.9**
Coal	3 278	3 769	4 308	4 362	4 361	4 351	4 321	23	21	0.5
Oil	7 075	9 367	10 044	10 507	10 835	11 135	11 462	58	57	0.8
Transport	*4 388*	*6 565*	*7 095*	*7 512*	*7 841*	*8 162*	*8 519*	*41*	*42*	*1.0*
- Bunkers	*614*	*1 092*	*1 131*	*1 209*	*1 277*	*1 356*	*1 446*	*7*	*7*	*1.1*
Gas	2 133	2 992	3 290	3 632	3 920	4 201	4 490	19	22	1.6

World Energy Outlook 2012 © OECD/IEA 2012, Annex A, page 554

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Source: World Energy Outlook 2012

How to be a good host

One of the issues with energy infrastructure is that its wider benefits are not always felt at a local level. However, it is possible to create local benefits through a variety of different mechanisms. **Angus Evers**

Evers: The renewable energy debate in the UK now seems polarised between developers and local residents

Few issues have the potential to stir up opinions in communities as strongly as the development of energy infrastructure. This is particularly the case where onshore wind, unconventional oil and gas exploration and production or nuclear power are involved. There is also growing opposition to the development of solar photovoltaic farms.

In the UK, opinions on onshore wind farms have been further stirred by the publication of figures from the Department of Energy and Climate Change showing that in the first eight months of this year there was a 49 per cent increase in the number of onshore wind farms granted planning permission, compared with the same period in 2012. On October 11, 2013 the Secretary of State for Communities and Local Government, Eric Pickles, pledged to call in more applications for renewable energy developments to determine them himself, on the basis of his concerns that guidelines on landscape protection were not being followed.

The renewable energy debate in the UK now seems polarised between developers, who often see local residents as "NIMBYs" (Not In My Back Yard), and local residents, who view developers as big corporates forcing on them unwanted development that contributes nothing to the local community or local economy. Experiences in other countries, however, are very different, with much greater public acceptance of renewable energy developments such as onshore wind farms.

This is particularly the case in Northern Europe, especially in Scandinavia, Germany and the Netherlands. What are these countries doing that the UK is not, to gain this public acceptance and is there anything that the UK can learn from them?

One of the issues with energy infrastructure is that its wider benefits are not always felt at a local level. However, it is possible to create local benefits through various mechanisms, the most common ones being generally categorised as community benefits and community ownership (although confusingly the term "community benefits" is also used to encompass community ownership as well).

In 2005 the then Department of Trade and Industry published a report titled *"Community Benefits from Wind Power – a study of UK practice & comparison with leading European countries"*, which compared the UK's approach to community involvement in onshore wind projects with the approaches adopted in Denmark, Germany, Ireland and Spain. The report identified a range of benefits that could be provided, namely community fund contributions, community compensation, pre-approval contributions, local taxes, jobs, individual investments and co-operative investments, and analysed their use in each of the countries studied.

Although the report was published in 2005, not much has changed since then. The UK is still the only country to use community fund contributions. These contributions are sometimes made by way of benefits in kind, such as community facilities and local environmental improvements. Many developers and operators now offer these benefit packages to host communities as a matter of course.

Under RenewableUK's Community Benefits Protocol, operators of onshore wind farms make a voluntary contribution of £1000/MW of installed capacity annually for wind farms of 5 MW and above for the life of the wind farm. The government is hoping that RenewableUK may increase its recommended sum to £5000/MW following an evidence-gathering exercise it conducted last year, focusing on how to give communities more of a say over, and greater economic and wider social benefits from, hosting onshore wind farms.

> Critics of the UK's approach to community benefits claim that community funds and benefits in kind are nothing more than legalised bribery to get planning permission. This is not the case.

The government is also expecting operators drilling for shale gas involving hydraulic fracturing to provide £100 000 in community benefits per well site at the exploration stage and to pay a further 1 per cent of revenues to host communities once production starts. In July this year it was also announced that local authorities in areas hosting new nuclear power stations will be able to retain 50 per cent of the business rates they collect, together with the growth on that share, for up to 10 years, with extra government funding being made available for a further 30 years. The government estimates that this could be worth around £128 million to communities around the recently consented Hinkley Point nuclear power plant in Somerset.

Critics of the UK's approach to community benefits claim that community funds and benefits in kind are nothing more than legalised bribery to get planning permission. This is not the case. Community benefits are voluntary and fall outside the planning system (although communities receiving these benefits may be less inclined to object to planning applications).

In all parts of the UK, decisions about planning proposals must be based on planning issues alone and must not be influenced by unrelated benefits offered by developers. It is therefore not possible for a developer to "buy" a planning permission for a development that is unacceptable in planning terms.

In Denmark and Germany community energy projects, in which communities develop projects themselves, or at least take an ownership stake in projects developed by commercial developers, are far more common than in the UK, but community funds and benefits in kind are almost unheard of.

Financial participation and co-ownership by landowners and locals are encouraged by policy in Denmark. Under Denmark's Renewable Energy Act 2008 developers are required to offer up to 20 per cent of shares in a project to individual householders living within a 4.5 km radius of the site; shares not taken up are then offered to other householders in the wider municipality.

In Germany over 65 per cent of onshore wind turbines and solar panels are reported to be owned by individuals, farmers and communities. Other mechanisms used to win community acceptance for energy developments in Europe include the retention of taxes in the local area and requirements that manufacturing jobs are created locally.

Community-owned projects are on the increase in the UK, but the UK still lags behind other European countries in terms of community ownership of renewable energy projects. A report published in November 2012 for the Scottish Government estimated that less than 10 per cent of renewable energy is owned locally in the UK and that even if Scotland achieves all its renewable energy targets, only 3 per cent will be community or locally owned.

In spite of the low take-up of community ownership of renewable energy schemes in the UK, a recently-published report by the think-tank ResPublica, titled *"The Community Renewables Economy"*, stated that the total capacity of community-owned renewable energy projects has grown from just over 4 MW in 2003 to nearly 60 MW in 2013 and estimated that it could expand further to at least 550 MW by 2020.

The UK and European approaches to community involvement in energy projects each have their advantages and disadvantages. Under the UK's approach of using community benefit funds and benefits in kind, communities do not really gain a sense of ownership of the infrastructure, but at least it is the whole community that benefits and not just those who can afford to (and are willing to) invest. Whatever the preferred approach, however, it is vital that developers of energy infrastructure in the UK consider community benefits as an integral part of their projects and that host communities exploit the opportunities presented by those benefits.

Angus Evers is a partner in the Planning & Environment Group at international law firm SJ Berwin LLP.

Community benefits from wind power

Benefit/feature	UK	Denmark	Germany	Ireland	Spain
Community fund contribution	Yes	No	No	No	No
Community compensation	No	No	Yes	No	No
Pre-approval contribution	No	No	No	No	Yes
Local taxes	No	Yes	Yes	Yes	Yes
Jobs	No	Yes	Yes	No	Yes
Individual investments	No	Yes	Yes	No	Yes
Co-operative investments	No	Yes	No	No	No

Looking for clean money

As clean tech investment continues to slide there are still a few reasons to be cheerful, says **Junior Isles**

Investment in clean energy, although considerable, has been falling for the last two years. And with policy uncertainty, created by concerns over the cost of energy in a difficult economic climate, there are serious question marks over the financial sector's appetite to invest in the clean energy infrastructure that is desperately needed to combat climate change.

According to a recent report by Bloomberg New Energy Finance (BNEF), global investment in clean energy was $45.9 billion in the third quarter of 2013, down 14 per cent on the second quarter of this year and 20 per cent below Q3 2012.

This latest figure makes it almost certain that investment in renewable energy and technologies such as smart grid, energy efficiency, storage and electric vehicles will end this year below 2012's $281 billion – 11 per cent down from the record level of 2011.

Commenting on the figures, Michael Liebreich, chief executive of BNEF, said: "After the slightly more promising second quarter, we now have a very disappointing third quarter figure for investment."

He noted that while $45.9 billion is still a substantial amount of money – greater than that invested in the whole of 2004 – the "loss of momentum since 2011 is worrying".

In May this year, the world crossed a symbolic threshold when observed concentrations of CO_2 exceeded 400 parts per million for the first time. However, a recent report by the US-based Climate Policy Initiative states that spending by governments and companies on renewable energy and other mitigation measures fell from $364 billion in 2011 to $359 billion in 2012 – far below even the most conservative estimates of investment needs.

The total, which includes business-as-usual spending on low-carbon projects as well as supplementary financing, is less than 60 per cent of what the International Energy Agency says is needed above normal energy-investment levels to stem emissions fast enough to meet United Nations temperature targets.

"Investment to combat and adapt to climate change is happening around the world but it's short of where it needs to be and efforts to grow it have not been successful enough," said Climate Policy Initiative (CPI) Executive Director Thomas Heller.

Following the CPI report, Michelle Davies, partner and head of the Clean Energy and Sustainability Group at global law firm Eversheds, said the CPI figures are "not surprising" and are probably the result of three separate sets of circumstances that all impact each other.

First, in the developed world the cost of energy continues to rise. Governments, particularly in Europe, are concerned about energy costs becoming politicised and do not want to be seen to be adding to the problem. Many see renewable and clean energy solutions as a contributor to higher energy prices. Accordingly, government support, which underpins private investment, is being reduced or removed and the private funding which would otherwise follow this is also lacking compared to what it has contributed previously.

Secondly, new sources of energy are being developed. For example, fracking in the US is, according to Eversheds, having an impact as funding is diverted to shale gas rather than renewables.

> While $45.9 billion is still a substantial amount of money – greater than that invested in the whole of 2004 – the "loss of momentum since 2011 is worrying"

Thirdly, developing or emerging markets for renewable energy are not implementing renewable policies on the large scale or as quickly as was previously anticipated. "It is these large-scale policies that can really mobilise the sector in a particular region. The Middle East is a good example of this," noted Davies.

"As a result, funds which had historically been utilised in Europe and which are freeing up in North America and which had been hoping to find a large and secure home in the emerging markets have to a degree been left slightly stranded," she added.

BNEF also observes that several factors continue to affect global clean tech investment, citing "the lure of cheap gas in the US, a levelling-off in wind and solar investment in China and policy uncertainty in Europe". Indeed there has been a general weakening of political will in major economies. As Liebreich noted: "Governments accept that the world has a major problem with climate change but, for the moment, appear too engrossed in short-term domestic issues to take the decisive action needed."

Weakening political will surrounding clean tech has been evident in several countries. Just recently, UK prime minister David Cameron spoke of "rolling back" green initiatives. Last month Poland abandoned renewables support in favour of coal. There has been similar pressure to reduce or eliminate renewable subsidies elsewhere, making already cautious investors even more hesitant.

Karen Wordsworth, Director of Climate Change and Sustainability at KPMG, who heads up energy and resource efficiency within KPMG's sustainability team said: "There's been a lot of shift in some of the [investors'] thinking because of the changes in feed-in-tariffs and government incentives, which make it a very uncertain investment regime. Many organisations are now a little bit wary of investing in projects that only stack up because of government incentives."

She points out that investors are particularly reluctant to invest in newer technologies. In areas where there is significant innovation, such as energy saving and waste-to-energy initiatives, projects are being financed using a project finance approach.

"For example, in energy efficiency, an organisation would finance the technology investments through any savings made as a result of reduced energy consumption," she said.

This approach is also evident in the waste-to-energy market, where some of the cutting-edge technology is considered by the financial sector as unproven.

"If you are looking for anything other than an equity play, you wouldn't get the finance, and the issue around equity is the equity financiers often want a large slice of the pie. This is often difficult to overcome and is a challenge to getting the project done. One solution it is to embed it with a power purchase agreement. In a waste-to-energy project, if you have a PPA at one end and a secure waste feedstock coming in at the other end, the 'unproven' [technology element] can be overcome."

As technologies mature, however, investors should become more comfortable with lending. There is evidence of this in the solar sector, where the falling cost of PV panels is helping solar projects make more economic sense and therefore more financeable.

Wordsworh commented: "There have been some issues with the variability of the quality of solar panels but where the quality of panels has not degraded as costs have come down, then they are viable and becoming more attractive to finance."

BNEF figures show that installation of solar photovoltaic power capacity worldwide is set to hit a new record in 2013 – at some 36.7 GW – adding more megawatts than wind for the first time.

"The dramatic cost reductions in PV, combined with new incentive regimes in Japan and China, are making possible further strong growth in volumes," said Jenny Chase, head of solar analysis at BNEF. "Europe is a declining market, because many countries there are rapidly moving away from incentives, but it will continue to see new PV capacity added."

However, reduced costs per megawatt means that the dollars invested in new capacity will almost certainly be below the equivalent for last year.

Nevertheless, market activity is increasing. Mercom Capital Group, LLC, a global clean energy communications and consulting firm, released a report last month on third quarter funding and mergers and acquisitions (M&A) activity for the solar sector. Total corporate funding in the solar sector, including venture capital, debt financing and other equity financings raised by public companies, was significantly higher at $2.18 billion, compared to $915 million in Q2.

Raj Prabhu, CEO of Mercom Capital Group, commented: "Overall market conditions for the solar sector continue to improve. Project funding and M&A activity were at record levels, reflecting an improved demand outlook."

As the solar sector continues to boost clean tech financing, so too will emerging markets. The difficulty in securing financing can partly be attributed to the fact that banks are applying much stricter lending criteria in the wake of the financial crisis. Yet lending criteria varies from country to country.

According to BNEF, third quarter data showed weakness almost across the board, with investment in China, the US and Europe all down on the equivalent period of 2012. There was, however, a rise in activity on both the quarter and the year in Canada and notably Chile and Uruguay.

Davies said: "There is every reason to believe that the emerging markets for clean energy will deliver. There are strong economic and social drivers, which mean renewables on a large scale should happen. The key question, which we can't answer at the moment, is when?"

Quite often projects in developing countries tend to be broader projects that have additional goals, which can make projects more attractive.

Wordsworth explained: "These are perhaps capacity- or, capability-building, or infrastructure projects. Some of the lending criteria for these can be slightly different because they can bring in other benefits to investors apart from purely return on investment.

"We are working with some colleagues in South Africa who are interested in attracting businesses into the region, so there are incentives around attracting projects that bring in inward investment in clean tech."

This view was echoed at the recent *FT Renewable Energy Summit* in London. Mark Tanton, Managing Director of Red Cap Investments, a private company developing renewable projects in South Africa said: "In South Africa, it has been the complete opposite to the doom and gloom we have been hearing about. In the last two years, we have gone from zero to hero."

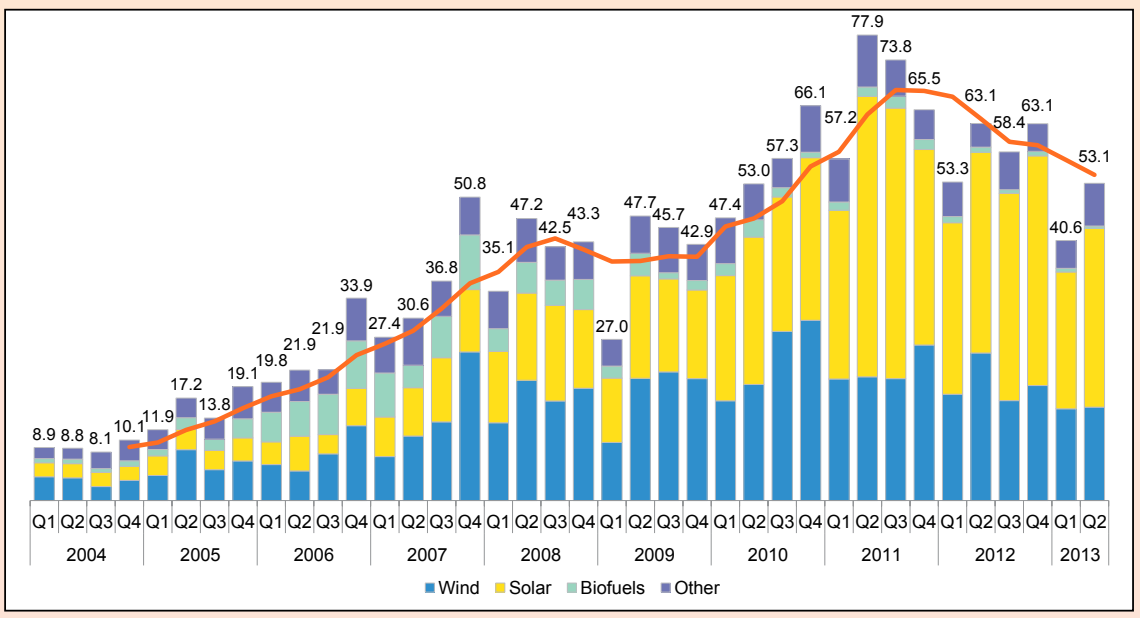
Speaking at the same conference, Sumant Sinha, Founder, Chairman and CEO of ReNew Power Ventures, a leading Indian renewable independent power producer said: "There is humungous potential in solar. The driver in India is not so much about climate change, it's more about energy access."

So while the near- to mid-term outlook for renewables looks challenging, as costs come down and investors become more comfortable with technology, fresh private capital should begin to flow once more. In the meantime, however, emerging markets will likely be the stomping ground for investors looking for clean investment opportunities.

New investment in clean energy by sector: Q1 2004-Q2 2013 ($ billion)

Note: Total values include estimates for undisclosed deals. Excludes corporate R&D, government R&D, digital energy asset investment and energy storage asset investment (only available annually)

Source: Bloomberg New Energy Finance 'Global Trends in Clean Energy Investment', July 11, 2013



The second Siemens Flex Plant in the US has begun operation in California. **Junior Isles** visited the facility in El Segundo, which demonstrates the shape of things to come for gas turbine combined cycle plants in the country.

El Segundo is quick off the mark

California has long been a trailblazer in the US when it comes to carbon reduction. In 2006 it passed a landmark climate change act and then in 2011 introduced a renewables portfolio standard that set a target to produce 33 per cent of its electricity from renewables by 2020.

The growing amount of renewables on the grid combined with cheap gas has seen gas fired power plants become the generators' choice for supporting intermittent renewables. At the same time, equipment manufacturers have responded to this need by developing combined cycle gas turbine (CCGT) power plants that can start faster and ramp up and down to follow variable renewable output.

Last year saw the inauguration of the Lodi combined cycle power plant in California – the first Siemens Flex Plant in the US. Now one year later, a second Flex Plant has started up in El Segundo. In addition to featuring Siemens Flex Plant technology, the 550 MW facility is notably the first to incorporate NEM's new DrumPlus heat recovery steam generator.

The modernisation of the El Segundo Energy Centre, owned by NRG Energy, represents the latest move in the company's ongoing drive to lower emissions from its thermal generating fleet while at the same time allowing greater use of renewables.

John Chillemi, President of NRG's West Region said: "Our modernisation efforts at El Segundo ideally complement California's growth of intermittent renewable energy sources, such as wind and solar, in support of the State's renewable portfolio standard… in addition we have worked with the community to improve the visual aesthetics of the site…"

Following its merger with Genon last year, NRG is now the US' largest independent power producer, with a portfolio of 47 000 MW serving about 37 million homes across the country.

Since about 2000, the company has reduced its greenhouse gas footprint by around 50 per cent through the addition of cleaner thermal generating capacity and renewables.

This latest project sees the replacement of two old units at the El Segundo facility. The old plant comprised four units – Units 1 and 2, which began operating in the 1950s and Units 3 and 4, which have been running since the 60s. Units 1 and 2 were retired in 2002 and demolished to make way for the two new units. Unit 3 has also since been retired, while the 335 MW Unit 4 is still operating.

In addition to helping the integration of renewables, the project brings several other benefits: it reduces the consumption of potable water by nearly 90 per cent; it meets or exceeds the State and South Coast's strict air quality standards; and will use 30 per cent less natural gas per megawatt produced than the original steam boilers. Also, the removal of two large oil tanks will lower the site's profile and reduce the overall visual impact.

The repowering project has long been in the making. George Piantka, Director of Environmental Business for NRG West Region has been part of the permitting effort since 2000, first as a consultant and then as an employee of NRG.

He recalls: "The original plan looked at a 2 + 1 combined cycle that would use ocean water for cooling. This project was originally licensed in 2005 with the California Energy Commission. But in 2007, we decided to move to a new configuration. The decision to switch to a configuration that used air cooling allowed the retirement of around 400 million gallons per day of ocean water cooling. This was in compliance with the objectives of the State Water Resources Control Board, which were approved in 2010.

"The old plant also did not have its own sanitary discharge system, so as part of the infrastructure improvements we connected to the city's sanitary discharge. We also designed the plant for zero liquid discharge. "

In terms of operation, the plant will help meet both California's baseload and peak load demand through its fast-start technology. It is permitted to start 200 times per year. As Piantka notes: "Although the capacity factor we committed to is about 60 per cent, which equates to a little over 5400 h/year, we need this plant to be available 24/7."

It is this ability to bring a large amount of power online quickly that proved particularly attractive to NRG. The plant is able to deliver 300 MW in less than 10 minutes and the remainder in one hour.

The new plant features two power islands delivered by Siemens. Each unit comprises an SGT6-5000F gas turbine, an SST-800 steam turbine, an SGen6-100A-2P generator, a heat recovery steam generator (HRSG) and an air-cooled heat exchanger. Siemens also supplied the complete electrical equipment and the SPPA-T3000 power plant instrumentation and control system.

Commenting on the new plant, Richard Loose, Siemens' Director of Marketing Energy Solutions, Americas, says: "When you look at the plant you might think it looks like other 1+1 combined cycle plants but the unique thing is, it's actually a peaker. When you hit start each block delivers 150 MW in 10 minutes. For a combined cycle, that's game-changing technology."

Although all the Siemens supplied equipment are all existing components that have been proven in the field, the units feature first-of-a-kind HRSG technology developed by NEM. Loose says, "It really is an important part of this game-changing technology."

Unlike Lodi, which is a Flex Plant 30 that uses a triple pressure boiler, the Flex Plant 10 at El Segundo has a single pressure boiler, producing 78.3 kg/s of steam at a temperature of 502°C and a pressure of 99.6 bar.

Steam from the HRSG is fed to the steam turbine for additional power output, resulting in an overall plant electrical efficiency of about 49 per cent. This is around 9-10 per cent higher than a traditional gas turbine-based simple cycle peaking plant.

The innovative HRSG design allows the Flex-Plant 10 to not only meet the challenging emission regulations in California but also, according to NEM, to be the most economically competitive solution for peak-to-intermediate duty cycles.

NEM worked with Siemens on the boiler design for the El Segundo units. "The key consideration in its design," says Loose, "was that it should not restrict the operation of the gas turbine." The design of the DrumPlus boilers ensures that no hold points are imposed on the gas turbine during start-up.

Instead of having a large high-pressure steam drum, the water/steam separators have been located outside of the drum. The drum also uses a thin-walled design to minimise stresses across the drums. Whereas conventional drum-type HRSGs run a high risk of severely reduced lifetime due to cycling stresses, the significantly lower peak stress means the boiler can handle 10-minute start-ups while maintaining the same design life span of conventional drum-type HRSGs.

Like any drum-type HRSG, the DrumPlus boiler needs no special feedwater equipment such as a condensate polishing plant and can use water that meets ASME requirements.

Loose also explained that the boiler design allowed the use of a conventional selective catalytic reduction (SCR) and CO catalyst. "This gives us a plant that can operate like a peaker, with unrestricted start-up, but with a conventional SCR at the back. It therefore has the operating profile of a peaker but the emission footprint of a combined cycle."

According to Siemens, start-up CO emissions are reduced by 90 per cent compared to conventional CCGT plants as a result of the shorter start-up time. "That's the equivalent of reducing about 200 diesel trucks from the highway for about an hour. That's significant if you have a plant that starts up as often as this is designed to," says Loose.

Another unique aspect of El Segundo is the use of what Siemens calls its Clean Ramp technology. The technology has been tested at several locations but this is the first time it is being fully implemented. The technology allows the plant to ramp up and down at 30-35 MW/minute while maintaining 2 ppm of NOx out of the stack.

Siemens began looking at the concept of clean ramping around 2006/07 in response to an increasing market focus on transient NOx emissions.

Explaining the technology, Loose says: "As a combined cycle ramps up, there's a transient NOx. Normally, sensors in the stack detect a NOx excursion and issue a signal to input more ammonia. It's a reactive scheme.

"What we have done is tie into the controls of the gas turbine so that as soon as the gas turbine gets a signal to ramp up, we can also ramp up the ammonia injection proactively."

With one of the strictest legislations for emissions in the country on NOx, the technology proved essential.

"In this district, for Best Available Technology, there is a NOx limit of 2 ppm over an hour. So when ramping up or down, we have to meet our limit over that hour period – something we have been able to demonstrate during commissioning and operation," Piantka explains.

Having inaugurated its second plant, Siemens is confident of starting up other Flex Plants elsewhere in the world. "We targeted the California market with its renewables but we are also in Brazil, where there's tremendous wind generation. They use hydro to backstop wind but they are going to run out of hydro to support wind. We are building a combined cycle plant in Manaus and although it's not a Flex Plant, they are asking how this type of technology can be used. It's the same in Mexico where they are also building quite a lot of wind."

Other projects are also in the pipeline. And with the rapid rise in renewables, fast-start technology looks like becoming the standard for new combined cycle plants in many parts of the world.

In addition to featuring Siemens Flex Plant technology, the new 550 MW El Segundo facility is notably the first to incorporate NEM's new DrumPlus heat recovery steam generator

Junior Isles

Deal or No Deal?

The manner in which the UK government and EDF Energy went back and forth on Hinkley Point C, they could have been contestants on the TV game show *Deal or No Deal*. Finally, after nearly two years of negotiations, they reached an agreement that was acceptable to both sides. But is it a good deal for consumers?

The government claims it is. Announcing the agreement, Energy and Climate Change Secretary Ed Davey said it was "an excellent deal for Britain and British consumers". Whether the government genuinely believes its own rhetoric or not is debatable.

Originally, it said household energy bills could be about £77 lower in 2030 with a generation of new reactors. However, Davey immediately backtracked on his claim that the new Hinkley Point C plant, together with the new fleet of reactors, would reduce bills. He said the projection of lower bills as a result of nuclear was highly uncertain. "I can't guarantee that, of course I can't," he stressed.

Vincent de Rivaz, EDF Energy UK's chief executive, called the deal "good, fair and balanced for consumers, the UK and EDF."

As expected, the renewable lobbyists lambasted the deal. Greenpeace Executive Director John Sauven said: "Hinkley C fails every test – economic, consumer, and environmental. It will lock a generation of consumers into higher energy bills, via a strike price that's nearly double the current price of electricity, and it will distort energy policy by displacing newer, cleaner, technologies that are dropping dramatically in price."

> "At twice the current electricity price, bill payers need to understand that these higher costs will, in time feed through and put additional pressure on the price customers pay for their energy"

Many predict that renewables will be cheaper than nuclear by 2020. Denmark's Dong Energy, a big offshore wind farm developer, has said it could reduce its market price for electricity from offshore wind power to £85/MWh for projects taking investment decisions by 2020.

UK trade group, the Solar Trade Association anticipates that solar is set to require around £86/MWh for 15 years in the year 2019/20 (based on 2012 prices). "If, like nuclear, solar's support was spread over 35 years instead of 15, then the strike price would be even lower," it said.

Based on these strike prices, renewables like wind, solar and biomass could deliver power competitively and, importantly, in time to divert a looming capacity crunch. Also, they would not require the massive capital costs associated with nuclear.

Indeed, the staggering cost of constructing nuclear plants, especially following the disaster at Fukushima, was a major barrier to the Hinkley Point C project. The UK government was forced to find investors and launching a charm offensive on the Chinese was seen as essential. Without Chinese money, the price tag – which quietly crept up from £14 billion to £16 billion – would have been too much for EDF to shoulder alone.

Taking a minority stake in Hinkley could prove to be good value for the Chinese.

It is likely the deal will give China greater visibility in the international nuclear arena. As it gains experience and credibility from its involvement at Hinkley Point, the UK could be instrumental in China exporting its CAP1000 and CAP1400 reactors – a localised version of the Westinghouse AP1000 – to the international market. The China National Nuclear Corporation (CNNC) and State Nuclear Power Technology Corp (SNPTC) have talked of export potential from late 2013.

EDF's agreement with the UK government came as politicians hammered out a broader memorandum of understanding with China on civil nuclear cooperation during a visit to Beijing. Under the MOU, the UK-based International Nuclear Service will begin sharing its expertise on radioactive waste management, and will start training Chinese technicians. This will be invaluable for China as it expands its own nuclear programme.

The chancellor believes the agreement will open the door for British companies to participate in China's nuclear programme, a sentiment echoed by the Nuclear Industry Association (NIA). "Closer cooperation with the world's fastest growing nuclear nation presents substantial opportunities for UK companies with expertise, skills and long experience in nuclear technology," said Lord Hutton, head of the NIA.

The NIA also said the MOU would "make sure" that British companies such as Rolls-Royce, International Nuclear Services and engineering companies such as Mott MacDonald can be part of China's multi-billion dollar new nuclear programme.

This could, however, prove to be just wishful thinking. It is more likely that China will favour its own suppliers and engineers wherever possible. In the long run, the Hinkley deal should prove to be value for money for China.

At the same time the UK government gets its first new nuclear plant since 1995, without having to spend a penny, yet. As Davey put it: "[For] the first time nuclear power stations in this country will be built without money from the British taxpayer."

In response to the initial agreement on Hinkley Point C, EnergyUK said: "It is good news for the UK and British customers that new nuclear is going ahead. There is a clear need to build new power stations and nuclear represents clean, reliable energy and jobs both during the build and while the plant is running. Building new power stations is never quick or cheap, but in the case of Hinkley development, nothing goes on the bill until 2020."

This is true but at nearly twice the current wholesale price, at some point in time consumers will feel the effects. Paul Massara, chief executive of Npower welcomed the guaranteed electricity price for nuclear but observed it would result in higher energy bills.

"At twice the current electricity price, bill payers need to understand that these higher costs will, in time feed through and put additional pressure on the price customers pay for their energy," he noted.

At a strike price of £92.50/MWh (linked to inflation) or £89/MWh if a further project at Sizewell C is built, some argue that the government has caved in to EDF and could have found a way of securing a better deal.

It is a fair point. The government did not put the project out to competitive tender, which is the usual practice for public sector contracting. EDF is not the only player in town and a proper tender process would have forced competing companies to focus on bringing costs down.

Further, with other opportunities thin on the ground post-Fukushima, and bad publicity following cost overruns and delays at Olkiluoto and Flamanville, it is more likely that EDF needed Hinkley Point C more than the other way around.

The NIA said the agreement "will help protect consumers from the uncertain and volatile costs of imported fossil fuels for decades to come". This is true. But it is also true of renewables. The government argues that new nuclear is crucial to energy security and cutting carbon emissions. The renewables lobbyist would claim that nuclear is not needed for this. It is a fair debate.

However, the government's view that nuclear should be part of the energy mix is sound. Low or zero carbon baseload capacity is needed and nuclear has proven it can do this reliably, at a stable price of electricity. And with regards to the "choice" between nuclear and renewables or any other low carbon generating sources, as Davey stressed "it is not an either/or choice – we need a diverse energy mix".

Where the government has let consumers down, however, is in how it has gone about building a new fleet of nuclear plants. Its dogged determination to get the nuclear programme off the ground, at what seems almost to be at any price, will cost consumers more than is necessary.

Consumers will have to get used to the fact that building a new low carbon energy infrastructure that is diverse and secures electricity at stable prices, will increase bills. And price freezes, as suggested by the opposition leader, are not the answer either. However, the current government has to also realise when a deal is really no deal.