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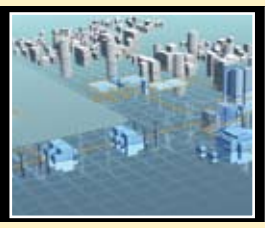

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Germany to overhaul and speed up transition plan

Angela Merkel: "far from being where we should stand"

German Chancellor Angela Merkel has acknowledged "an urgent need for reform", as public concern grows over the cost of phasing out nuclear and rapidly increasing generation from renewables. **Junior Isles**

Germany's accelerated transition to renewable energy following the decision to close down its nuclear power plants is meeting increasing public opposition.

It is predicted that subsidies for renewable generators will increase the overall cost of electricity for consumers by about 7 per cent. Subsidies are financed through a tax on electricity prices paid by all households and analysts say the recent expansion of renewable energies will require a tax hike of up to 50 per cent starting next year.

The forecasts came as Germany's transmission companies revealed that the mandatory surcharge on every unit of electricity will rise to 5.3 cents next year from 3.6 cents/kWh.

With retail prices already among the highest in Europe, there is an increasing worry that renewable energy subsidies could kill public acceptance. Germans already pay some of Europe's highest electricity prices, averaging about 24 euro cents (31 cents) per kWh compared with about 13 euro cents in France or 14 euro cents in Britain, according to EU figures.

The sharp increases in prices are in contradiction to German Chancellor Angela Merkel's pledge that the fast transition from nuclear would not impact energy costs for households.

Merkel recently defended her government's decision to phase out nuclear power and switch to renewable energies within a decade, but acknowledged the need to overhaul and speed up the transition plan.

"We have achieved a lot but we are far from being where we should stand," Merkel told a gathering of the German Employers Association.

The country's grid operators said a surcharge on households' electricity prices to finance the expansion of electricity from renewable sources will increase by 47 per cent on the year in January. A typical family of four will have to pay about €250 ($324) per year on top of their bill, but many large companies are exempt from the surcharge to safeguard their competitiveness.

The surcharge is used to guarantee producers of wind, solar or biomass power a long-term above-market rate for their electricity output, making sure their investments are profitable.

Merkel acknowledged there is "urgent need to reform" the system because rapid renewable generation expansion has led to sharply rising costs. She warned, however, that the changes would not be easy as they are being opposed by an increasing number of producers of electricity from other sources.

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UK nuclear ambitions see new horizon

The UK's plans for a new generation of nuclear reactors regained some momentum after a consortium led by Hitachi won the bid to purchase the Horizon nuclear joint venture (JV).

The deal will see Hitachi build two to three (approx.) 1300 MW plants at sites in Wylfa and Oldbury with the first unit starting operation in the first half of 2020s. Babcock International and Rolls-Royce have signed MOUs with Hitachi to help deliver the programme.

Hitachi will employ its Advanced Boiling Water Reactor (ABWR) technology, which has already been licensed in other countries but has not yet been licensed in the UK.

Chris White, a Partner at Pinsent Masons said: "A question mark remains over how this sale will affect the UK's statutory nuclear timetable to hit the target mandating 16 GW of new nuclear generation on the grid by 2025.

"At present, the new owner's proposed reactor design isn't certified in the UK and so it will be interesting to see whether, in the circumstances, they will be able to accelerate this regulatory process, which can take up to five or so years, in the UK."

Doubts had been cast over the sale of Horizon after a consortium of Areva and Guangdong Nuclear Power surprisingly failed to submit a bid at the beginning of October. A consortium led by Westinghouse was the other bidder for the JV, which was put up for sale by its owners RWE and E.On in March this year.

Although the sale of Horizon is a boost for the government's nuclear ambitions, other obstacles still remain.

Late last month EDF said it might not pursue plans to build its proposed plant at Hinkley Point unless it is offered sufficient incentives. EDF's chief executive Vincent de Rivaz told a UK Commons energy committee his company needed "a compelling business case" to proceed with the project.

"In this respect, our final investment decision requires more progress to be made," he said.

EDF's decision on whether it will proceed with the project depends almost entirely on the 'strike price' of a new government support mechanism known as contracts for difference (CfD) that will give a guaranteed price to low carbon electricity.

Mr de Rivaz said that his company would not invest if there was not sufficient clarity but added: "We are not trying to twist the arm of the government."

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Germany's center-left opposition leader Sigmar Gabriel warned: "The electricity price goes up, and the population's support for phasing out nuclear power is declining."

His Social Democrats argue that the government is unfairly burdening households for the transition, especially hurting the nation's poorest.

Business leaders have also criticised the way the switchover has been managed, saying that the costs are spiraling and hurting some companies.

The Employers Association's chairman, Dieter Hundt, strongly criticised Merkel's government for failing to live up to the ambitious challenge of reforming the energy sector within a decade, saying it must act faster and end "the madness of subsidies" for renewable generation because they threaten the competitiveness of German companies.

Hundt questioned: "In light of the hesitant implementation of the energy switchover and the exploding energy prices, must we not reconsider the decisions and time frames?"

Germany's environment minister Peter Altmaier said the country must overhaul the tax financing expansion of renewable energies to keep costs in check and ensure a smooth phasing out of nuclear power by 2022.

Altmaier: the tax financing expansion of renewable energies must be overhauled

Altmaier presented a roadmap last month to reform the system of subsidies and investment incentives for expansion of wind, solar and biomass power that already produce a quarter of Germany's electricity.

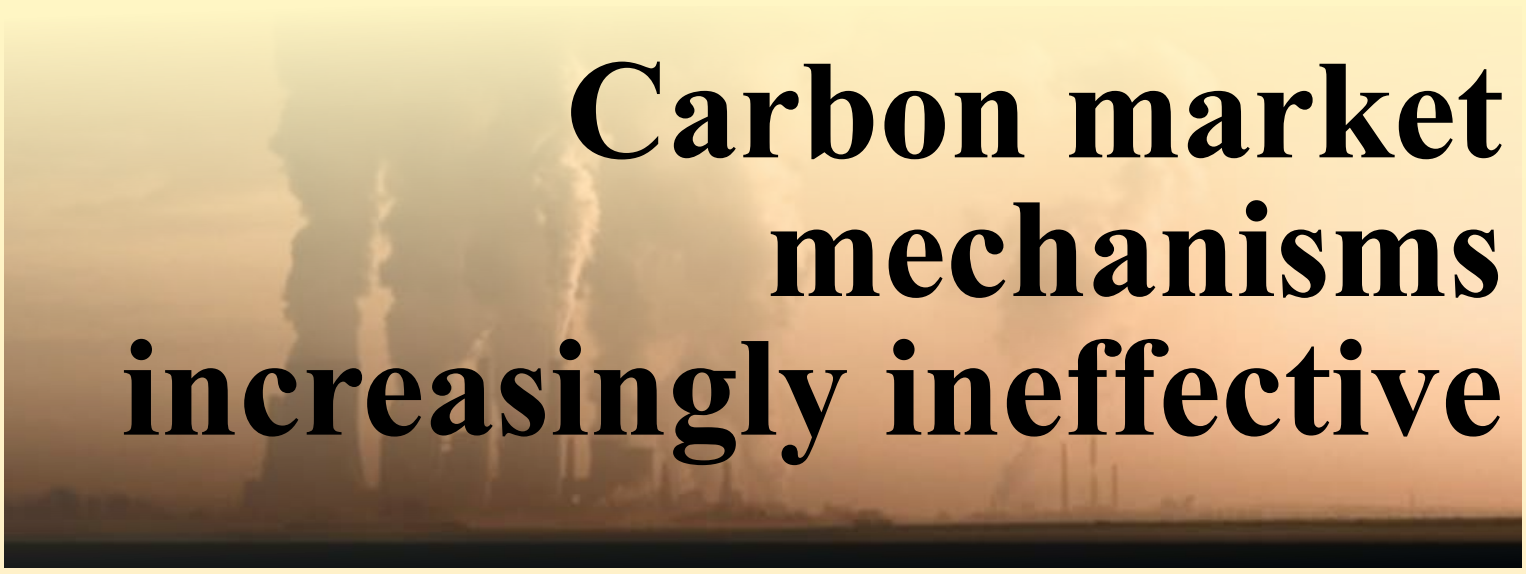
He outlined plans to limit support for wind energy and biomass generation following a similar cap imposed on the photovoltaic sector, as part of a proposed reform of renewable energy policy.

Altmaier also proposed raising Germany's green targets, saying he wanted renewables to account for 40 per cent of total power production in Germany by 2020, up from 25 per cent now and an original target of 35 per cent. But he said the system must be overhauled to achieve these targets as well as the long term ambition to generate 80 per cent of its electricity from renewables by 2050.

The rapid increase in renewables is supported by those who claim the short term price rises will be negated by the long term benefits.

Matthes of the Institute for Applied Ecology said that people are more likely to accept the increases when they realise that the energy sector's transformation is also a hedge against rising fossil fuel prices and a step toward energy independence.

"I think it's better to invest 1 per cent of our GDP per year in expanding renewable energies at home than transferring increasingly high sums to people in Russia or the Middle East who are making a lot of money on fossil fuel reserves," he said.



Carbon market mechanisms increasingly ineffective

- CDM has "essentially collapsed"
- Emission allowances to be back-loaded

Junior Isles

The use of existing carbon market mechanisms to cut global carbon dioxide emissions is looking increasingly ineffective.

In October carbon credits issued under the UN's Clean Development Mechanism (CDM) plunged to record lows, with a panel set up by the UN itself to assess the CDM saying it has "essentially collapsed".

The CDM was set up under the Kyoto Protocol to allow industrialised countries to offset the impact of their greenhouse gas emissions by funding low carbon projects in developing countries.

These projects produce a carbon credit called a certified emission reduction (CER) for every tonne of carbon avoided. In October CERs were trading at just over €2.

Per Lekander, a carbon analyst at UBS told the *Financial Times*: "Unfortunately, the UN carbon market has become a complete joke. I think the scheme would never have survived until now if it hadn't been for such a noble cause."

CERs can be used in the European Emissions Trading scheme (EU ETS) and the slump in CER prices has not been helped by the fall in the price of EU Emission Allowances (EUAs).

In an attempt to boost prices, the European Commission is about to present crucial plans for limiting oversupply of allowances, including proposals for the exact number of emission permits it plans to temporarily withhold from auction.

On November 14 the Commission will publish the amount of EU allowances (EUAs) to be back-loaded, alongside an impact assessment, and a "menu of options" for longer term action to tackle low carbon prices, said a Commission spokesman.

The EU has been looking to take action to reform its EU ETS after carbon prices dropped to below €6/tonne of CO_2 – well below the €40 to €50 per tonne analysts say is necessary to drive low carbon investment at a large scale.

In July, Climate Action Commissioner Connie Hedegaard outlined plans to delay the sale of permits, which had been scheduled for auction in 2013 and 2014 in a bid to boost the value of the remaining credits.

The Commission is reportedly considering three scenarios where the auctioning timetable would see 400 million, 900 million or 1.2 billion allowances held back. Companies such as Statoil, Shell and Dong Energy have called for 1.4 billion EUAs to be withheld, a figure that was supported by a European Parliament Committee in December.

However, other industry groups have lobbied against any changes to the current auction timetable, warning that any increase in the price of carbon will have a knock-on impact on energy prices.

Carbon and sustainability analytics firm RepuTex anticipates that 900 million permits will be back-loaded in the EU ETS. It also says that the withdrawal of 900-1200 million permits will be enough to push EUA prices above €15/EUA, before falling back at the end of Phase 3.

Chinese solar manufacturers hit hard times

Chinese solar panel manufacturers are beginning to struggle in the face of falling solar panel prices and the US' imposition of higher anti-subsidy tariffs on imports.

After years of rapid expansion, which saw the world flooded with cheap panels, China's solar panel producers are facing tough times.

Timothy Lam, solar analyst at Citi in Hong Kong recently told the *Financial Times*: "This is a fight for survival." He estimates that Chinese and Taiwanese solar manufacturing is running at 50-80 per cent of capacities as companies try to minimise losses in the face of falling solar panel prices.

Suntech, the world's largest solar panel manufacturer has cut 40 per cent of its solar panel production and seen its share price fall 60 per cent this year. Many of the country's solar panel producers are now facing production cuts, job losses and possible bankruptcy in some instances.

The outlook became even bleaker with the decision last month by the US Department of Commerce (DOC) to increase tariffs on imports of solar panels from China.

The Commerce Department upheld charges of 18 per cent to nearly 250 per cent on Chinese solar panel producers to counter what it said were improper subsidies by Beijing to the industry. For some companies, charges are lower than preliminary tariffs announced in May.

A spokesman for one of China's biggest panel producers, Yingli Green Energy Holding Co., said tariffs of about 30 per cent imposed on that company would make sales to the US unprofitable. He said gross profit margins in the solar industry are about 10 per cent.

"A tax rate of 30 per cent is the same as 200 per cent. Both of them mean the door is closed for exporting to the United States," said the spokesman, Wang Shuai. "No one does business to lose money."

China's government has demanded Washington repeals the steep tariffs.

"The United States is inciting trade friction in new energy and sending a negative signal to the whole world about protectionism and obstructing the development of new energy development," Ministry of Commerce spokesman Shen Danyang said in a statement.

"We hope the US side will correct its erroneous action with early termination of the trade remedy measures," Shen said.

UK backs gas fired generation

The UK has confirmed its support for gas fired generation with the announcement that it is planning a fleet of new gas fired generation. It also said it would provide a targeted tax regime for the nascent shale gas industry.

UK Energy and Climate Change Secretary, Ed Davey said that 20 new gas fired power stations with a combined capacity of 20 GW would be built by 2030.

"I strongly support more gas, just as I strongly support more renewable energy," Mr Davey told *the Guardian* newspaper. "We need a big expansion of renewable energy and of gas if we are to tackle our climate change challenges."

The government is hoping to secure domestic gas supplies by exploiting the UK's shale gas deposits. It believes the tax proposals will assist the industry through the early (and expensive) stages of its development and ensure that the UK's shale gas reserves are properly exploited.

Mr Davey is expected to give the green light to fracking as part of the government's broader gas strategy later in the year.

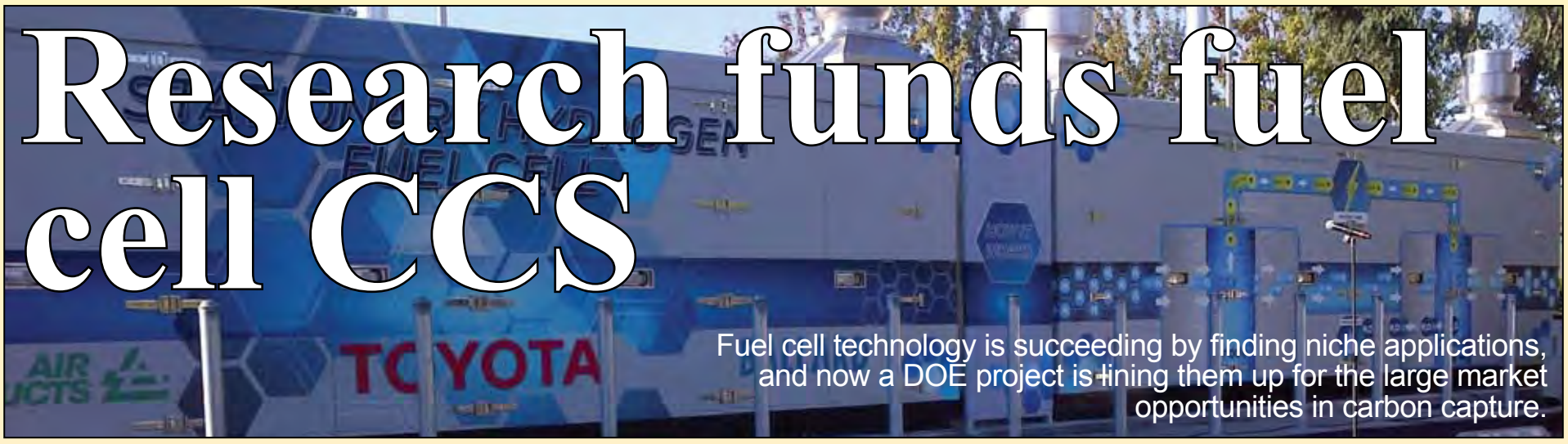
Commenting on the gas energy debate and the UK's future energy needs, John Cridland, CBI Director-General, said: "A diverse energy mix, combined with market certainty, will be crucial if the UK is to have a secure and affordable energy supply in the future.

"Gas has a big part to play in the UK's energy mix in the years to come, but we cannot become dependent on any one source of energy.

"An over reliance on new gas would leave us exposed to global price and supply fluctuations and jeopardise our carbon targets, so we need to build more of everything, including renewables, nuclear and CCS."

- The Irish power company ESB announced that it was investing in a new 880 MW combined cycle gas fired power station just outside Manchester.

Research funds fuel cell CCS



Fuel cell technology is succeeding by finding niche applications, and now a DOE project is lining them up for the large market opportunities in carbon capture.

Siân Crampsie

Fuel cell technology could be used to help reduce the carbon footprint of coal fired power plants if a research project funded by the US Department of Energy (DOE) proves successful.

FuelCell Energy, a manufacturer of carbonate fuel cells, says that it will enter the second phase of the carbon capture development project, enabling it to continue research into the use of its Direct Fuel Cell (DFC) technology to separate carbon dioxide (CO_2) from the emission streams of coal fired power plants.

Phase II of the three-and-a-half year research project – implemented by the National Energy Technology Laboratory (NETL) – will provide FuelCell Energy with $0.8 million of funding.

The award follows a successful first phase of the project, says FuelCell Energy, which last month also celebrated the operation of a 2.8 MW fuel cell power plant in California.

"The potential for efficient and cost effective carbon capture from our Direct FuelCell power plants illustrates the versatility of our technology," said Chip Bottone, President and Chief Executive Officer of FuelCell Energy. "This award enables us to further advance and refine our research as we pursue this opportunity that has the potential to favourably impact public health while providing FuelCell Energy with the possibility of a new and potentially large market opportunity."

The research project started in 2011 and involves a total DOE award of $3 million.

In a carbon capture application, the exhaust of a coal fired power plant would be directed into the air intake of a DFC power plant, which would separate and concentrate the CO_2 for capture and sequestration or industrial use.

FuelCell Energy's carbonate fuel cells require a source of CO_2 as a reactant for the electrochemical reaction that produces power. A separate source of fuel for the fuel cell, such as natural gas or syngas, would also be required.

FuelCell Energy points out that an additional benefit of using carbonate fuel cells in this way is the destruction of some of the nitrogen oxide (NO_x) emissions in coal plant streams as the exhaust passes through the fuel cell. This reduces the cost of NO_x removal equipment for coal fired power plant operators.

It also says that other carbon capture technologies under development are energy-intensive, whereas the use of fuel cell technology would increase the power output of coal fired plants with no net increase in emissions.

Partners in the project include Pacific Northwest National Laboratory (PNNL), Richland, Washington and URS Corporation, Austin, Texas.

In California, FuelCell Energy has opened a 2.8 MW DFC power plant operating on biogas at a municipal water treatment facility. Electricity and heat from the project is being sold to Inland Empire Utilities Agency (IEUA) under a 20-year power purchase agreement.

"This 2.8 MW fuel cell power plant is the world's largest power plant operating on renewable on-site biogas," said Bottone.

Elsewhere in California, Toyota Motor Sales (TMS) announced the start-up of a 1.1 MW fuel cell generator on its Torrance headquarters campus.

Designed and built by Ballard Power Systems, the proton exchange membrane (PEM) stationary fuel cell is the largest PEM fuel cell of its kind. The fuel cell is powered by hydrogen gas fed directly from a pre-existing industrial hydrogen pipeline, also a first for this technology.

This plant will allow Toyota to reduce utility grid electricity usage during peak power demand. The same hydrogen pipeline also supplies a hydrogen filling station adjacent to the TMS campus used to fuel Toyota's and other manufacturers' fuel cell hybrid vehicle fleets.

Chilean projects progress

- Termonor approved
- SoWiTec, Alterra plan new projects

Rurelec has sealed its entry to the northern Chilean power generating market by initiating the construction of a 40 MW power plant in Arica.

The Termonor gas turbine plant has been granted full environmental approvals and will serve the growing electricity demand in the Arica port region.

London-based Rurelec says that the capacity of the plant is likely to be expanded to 136 MW as demand from a booming mining industry grows.

The firm has also been shortlisted in a tender to construct a 450 MW combined cycle power plant in the region. It says that around 3000 MW of new generating capacity will be required in Chile's Sistema interconectado del Norte Grande (SING) transmission system over the next seven years.

"We are delighted to have been granted full environmental approval for our power plant in Arica and to have been shortlisted for a 450 MW power purchase agreement in the SING [Sistema interconectado del Norte Grande transmission system]," said Peter Earl, CEO of Rurelec. "Working with our partners in Chile, we are looking to meet Chile's demand for electricity in the northern SING region which serves some of the largest global mining companies in the world."

Other firms moving in on the Chilean market include Alterra Power Corp., which has signed an agreement with Energy Development Corporation (EDC) to develop Alterra's Mariposa geothermal power project in Chile.

The agreement also includes five of Alterra's Peruvian geothermal concessions.

In October SoWiTec Development signed an agreement with DNV Kema to provide support and technical services for the development of 20-50 proposed wind projects in Chile, Peru, Brazil, Argentina, Uruguay and Russia.

DNV Kema will support the verification and reporting of wind measurements and technical due diligence.


Santiago, Chile: presenting opportunities

Hawaii explores fuel cell vehicles

Hawaii is investigating the possibility of using hydrogen in its energy mix.

The Hawaii Natural Energy Institute (HNEI) has undertaken an environmental assessment for a facility that would produce hydrogen for use in fuel cell vehicles.

The facility, located in the grounds of a power plant owned by Puna Geothermal Ventures on Hawaii island, would use an electrolyser to separate water into hydrogen and oxygen.

The project could also be expanded to use hydrogen as a fuel for electricity generation.

The hydrogen produced would then be stored in pressurised containers and transported to Hilo and Hawaii Volcanoes National Park where it will be used to power fuel cell shuttle buses.

Brazil wind set for expansion

Wind energy's share in total electricity generation is expected to increase by just over 500 per cent in the next four years, according to the Brazilian Power System Operator (ONS).

ONS data indicates that wind energy currently accounts for just 1.1 per cent of electricity generation in Brazil, but predicts that this will increase to 5.6 per cent in 2016.

Other sources of electricity generation, including nuclear, natural gas, coal, biomass and fuel oil will also expand over the period.

The projections are positive news for wind farm developers who are already ramping up operations in the country.

Alstom said last month that it had signed a letter of intent with the government of the state of Rio Grande do Sul to set up a wind tower factory.

Meanwhile Iberdrola and local partner Neoenergia last month started the construction of a 150 MW wind farm in the northeast of Brazil – the latest in a portfolio of ten wind farms that the two companies are jointly developing in the country.

Electricity demand in Brazil is climbing in line with economic growth. While electricity use in the residential and commercial sectors is growing, it is declining in the industrial sector.

Brazilian president Dilma Rousseff has implemented a programme to cut Brazil's high electricity prices and stimulate industrial activity. The programme involves reducing taxes on energy production and renewing electricity generators' licenses in exchange for reduced electricity rates.

In October Brazilian power companies requested the renewal of 106 concessions to operate generating plants around the country.

About one-quarter of Brazil's electricity generation capacity, together with about four-fifths of transmission and one-third of distribution networks, is tied to contracts that expire between 2015 and 2017.

According to ONS, electricity generation in Brazil is set to climb 29 per cent from 2012 to 2016. The proportion of hydropower in the generation mix will decline over that period from 78.7 per cent to 71.2 per cent.

Installed capacity is expected to grow from 111 618 MW to 145 377 MW in 2016.


Wind expansion in Brazil is climbing in line with economic growth

Malaysia moves to ramp up generating capacity

The Bakun hydropower project will reach full capacity next year

Malaysia recently announced plans for a number of power plants that will significantly boost its generating capacity within the next four to five years.

Last month Sarawak Energy Bhd (SEB) said it would build another five coal fired power plants with a combined generation capacity of 2400 MW to support energy-intensive industries in the Sarawak Corridor of Renewable Energy (SCORE).

The five plants include the 600 MW (2x300 MW) Balingian I project, for which the tender for construction has already been issued.

SEB senior vice-president (thermal) James Ung Sing Kwong said the new coal fired power plants would fill the gap of additional hydro generating capacity coming on stream as more dams would be built.

Sarawak Hidro Sdn Bhd is expected to commission the remaining four of the eight 300 MW turbines at Bakun hydroelectric dam in the second half of 2013 to bring the project up to its full generating capacity.

Managing director Zulkifle Othman said installation of the fifth to eighth turbines from Argentina was in progress and that they would be commissioned in stages.

"Testing of the fifth turbine is expected to be carried out in March next year," he said.

Zulkifle said 1200 MW of electricity was available for use by state-owned Sarawak Energy Bhd (SEB) following the recent commissioning of the fourth turbine from Alstom.

Meanwhile, Peninsular Malaysia is also set to boost its capacity as it announced the extension of first-generation independent power producers (IPPs) power purchase agreements (PPAs). The Energy Commission (EC) also awarded Tenaga Nasional Bhd (TNB) a contract to build and operate the RM3 billion ($983 million) combined cycle gas turbine (CCGT) Prai power plant.

The new 1071 MW Prai power plant is expected to commence operation by March 1, 2016. Energy Commission chairman Tan Sri Dr Ahmad Tajuddin Ali said the extension for PPAs and Prai power plant bidding was done concurrently to meet the requirement of generation capacity in Peninsular Malaysia for 2016/2017.

He said the CCGT power plant would use two units of Siemens advanced H-class gas turbines, which can achieve plant efficiency of around 60 per cent, compared with around 55 per cent for the existing F-class combined cycle plants in the system. This higher efficiency would make the plant cleaner and more economical than existing units. Power from the plant will be sold at 34.7 sen/kWh.

India keen to sell NTPC stake this fiscal

India's Department of Disinvestment (DoD) is said to be in urgent consultations with senior officials of state-run power generator National Thermal Power Company (NTPC) in an attempt to push through the sale of a stake in the company during the current financial year.

The DoD has already circulated a Cabinet note for the sale of a 9.50 per cent stake in NTPC, which could help the Centre raise about Rs13 100 crore ($3 billion).

The power ministry's secretary, P. Uma Shankar, said the ministry of finance, which handles divestment of state-run companies, has sought the ministry's views on the planned divestment. The government currently holds 84.50 per cent stake in NTPC, which would come down to 75 per cent post-divestment.

NTPC reported a net profit of Rs 9224 crore in the last fiscal compared with Rs 9103 crore in 2010-11. Company executives say now is not a good time to sell NTPC's shares, due to unsettled markets and supply problems affecting the power sector.

India's power sector is plagued by short supplies of coal and natural gas and the unwillingness of banks to extend loans to finance projects.

In early October Tata Power Co. said it is looking to acquire coal mines and sign long-term coal import deals in the US, Colombia and Africa as it seeks to multiply its generating capacity fourfold over the next eight years.

India's inability to produce enough coal and other fossil fuels to power its economy has slowed its growth and forced power generators, including NTPC, to curtail operations, trim expansion plans and seek coal from overseas.

The government maintains, however, that it will ensure affordable electricity to all households in five years' time.

Indian Prime Minister Manmohan Singh recently said: "Our goal is to provide electricity to all 600 000 villages of India. More than 100 000 villages were provided connections in recent years. Now, only a few thousand households remain un-electrified."

He added: "Our aim is to provide 24/7 electricity to all households in the next five years."

Malaysia to help Indonesia boost power supply

- TNB signs joint development agreement with PT PLN
- Korea Midland Power Co. completes 600 MW coal fired plant

Syed Ali

Malaysia's Tenaga Nasional Bhd (TNB) and its Indonesian counterparts have moved closer to their plan to build a coal fired power plant and undertake a coalmine project in Sumatra. The plant is part of a project that also involves the construction of a transmission line that will connect the Indonesian and Malaysian power grids.

TNB said it had signed a joint development agreement with Indonesia's power company PT PLN and coal miner PT Bukit Asam, which has a production operation mining permit in Indonesia.

TNB said the mine mouth coal fired power plant would be built in Peranap, about 250 km southeast of Pekanbaru, Sumatra. Its capacity will depend on the outcome of the studies under the agreement but is expected to be around 1000 MW.

The venture would also see TNB taking a role in the procurement relating to the construction of the interconnector from Telok Gong in Melaka to Garuda Sakti in Sumatra, Indonesia.

This will be the second of two interconnectors planned between the countries. PLN president director Nur Pamudji said the company started the construction of a line from West Kalimantan, Indonesia to Sarawak, Malaysia, earlier this year by initiating land acquisitions. PLN expects construction of the 275 kV line to be completed by the end of 2014.

Indonesia has been focusing on building coal fired and geothermal generation in power programmes designed to meet burgeoning demand and alleviate power shortages.

Last month, Korea Midland Power Co., a unit of state-run power provider Korea Electric Power Corp., completed a 600 MW coal fired power station on Java Island.

Construction work is also soon to start on an $880 million geothermal power plant in a conservation area on the slopes of Mount Slamet in Purbalingga, Central Java.

The Banyumas regency administration said that PT Sejahtera Alam Energy (SAE), the winner of the project tender, would start initial exploration as early as this year. It would then proceed with the execution part of the project with a view to beginning operation in 2017.

The head of the regency's Energy and Mineral Resources Agency, Anton Adi Wahyono, said: "The plant will gradually increase its capacity in three stages. It is expected to reach its maximum production capacity of 220 MW by 2021."

In a separate move, Japanese trading house Mitsubishi Corp said it would pay about Yen 16 billion ($200 million) for a 20 per cent stake in Star Energy Geothermal Pte Ltd., which has been operating the Wayang Windu geothermal power plant.

Star Energy plans to boost the plant's capacity to 420 MW by 2017 through additional investments worth $500 million. This would make it one of the world's largest geothermal plants, it said.

Meralco moves to secure electricity requirements

Meralco PowerGen Corp., the power generation arm of Manila Electric Co., plans to put up a liquefied natural gas fired power plant in Batangas that can generate at least 1200 MW, as part of its plans to help secure the growing electricity requirements within its franchise area.

Meralco PowerGen hopes that Shell would become its supplier of the LNG should it decide to push through with the project. This was formalised under a memorandum of understanding recently signed by both parties.

"The setting up of an LNG-based combined cycle power plant is meant to address fuel diversification as well as address the mid-merit capacity needs of the Luzon grid. This collaboration with Shell companies in the Philippines helps pave the way for facilities that ensure a reliable and competitively priced power supply," said Aaron A. Domingo, Meralco PowerGen executive vice president and general manager.

Meanwhile, Electricity Generating Public Co. Ltd. (EGCO) of Thailand said it is keen on partnering with Manila Electric Co. (Meralco) for its power plant expansion in Quezon. EGCO wants Meralco as an off-taker and partner for the 500 MW second phase of its coal fired power plant in Mauban, Quezon, Quezon Power (Philippines) Ltd. Co. managing director Frank Thiel said.

The Philippines has been focusing on fossil fuels to meet burgeoning demand but also hopes to increase the role of renewables, particularly geothermal. It is hoping to attract foreign investors in an effort to become the world's largest geothermal power producer.

Last month Orka Energy of Iceland, an expert in district heating systems, bought into a geothermal project in Eastern Visayas, a Department of Energy (DOE) official said.

In a briefing, DOE Undersecretary Jose Layug Jr. said Orka Energy has entered the Philippines through a farm-in deal for the 49 MW Biliran geothermal project.

Orka Energy is scheduled to drill two or three production wells next year, Layug said.

"If it is [commercially] viable, they can start next year. They are still awaiting the environmental compliance certificate," Layug said.

The DOE is encouraging the private sector, both local and foreign firms, to invest in geothermal electricity production.

To date, installed geothermal production capacity in the Philippines is 1972 MW, the second highest in the world after the US.

The Philippines has granted 35 service contracts for geothermal projects under the Renewable Energy Act of 2008, which aims to accelerate the exploration and development of renewable energy resources in the Philippines.

"We hope that by 2030, there will be an additional 1500 MW in geothermal resource. It should make us number one [in the world]," Layug said.

ADB-led lenders readying Bangladesh fund

- Generation capacity to reach 20 000 MW by 2021
- GE to build two new power plants

Four lenders including the Asian Development Bank (ADB) are readying a fund worth about $1.4 billion for the development of Bangladesh's power sector in phases, officials said.

Negotiations for the loan package were completed successfully last month with the ADB, the provider of the major part of the fund, according to a senior official at the Economic Relations Division (ERD).

Under the package, the Manila-based lender will provide $700 million while the Jeddah-based Islamic Development Bank will extend $380 million, the European Investment Bank (EIB) $198 million and the French donor agency AFD $100 million.

A framework financing agreement would be signed with the four lenders in the current year, the ERD official said.

Under a five-year development programme involving nearly $1.6 billion for the power sector, the government will also contribute the remaining $220 million.

The ADB will administer the fund to be disbursed in three tranches over the next three years.

Under the $1.6 billion Power System Expansion and Efficiency Improvement Programme, the government would boost generating capacity, expand transmission and distribution lines and upgrade some plants to enhance their capacity over a period of five years from the current 2012-13 fiscal year, a power division official said.

The Bangladeshi government plans to increase the country's electricity generation capacity to 20 000 MW by 2021.

It moved closer to its target last month with the news that General Electric will supply gas turbines worth $89 million to two new power plants with a combined generating capacity of 675 MW.

Isolux Ingenieria SA of Spain, which is installing the Siddhirganj power plant, and local Summit Group, engaged in Bibiyana-2 power plant, signed deals with GE in Dhaka on October 2, 2012.

The Siddhirganj plant is likely to go into commercial operation by end-2014, while the Bibiyana plant in mid-2015.

The Siddhirganj power plant will begin operation in 2014

Thailand revised PDP to cost $26 billion

Thailand's revised Power Development Plan (PDP) spanning 2013-30 will require a total budget of Baht 800 billion ($26 billion) for power plants and transmission lines, said the Electricity Generating Authority of Thailand (Egat).

The PDP, which was revised in September, aims to add 55 000 MW of new capacity by 2030, said Pongdith Potchana, Egat's deputy governor for corporate social responsibility.

Based on the country's average annual gross domestic product growth of 4 per cent to 4.5 per cent over the next two decades, Thailand should have a total power capacity of 70 686 MW in 2030, up from 32 000 MW at present.


Osborne must not water down green commitments

UK government to underwrite subsidies for low-carbon generation

■ Talks with EDF on early subsidy ■ Onshore wind to benefit from new infrastructure bill

Tim Probert

Electricity market reform (EMR) in the UK appears to be on track as its government said it would underwrite a new system of subsidies for low-carbon power generation ahead of the publication of an energy bill this month.

The UK proposes to replace its existing renewables subsidy scheme with a feed-in tariff with contracts for difference (CfD) – long-term contracts set at a fixed level whereby low-carbon generators, including renewables, nuclear and CCS, will be paid, or pay, the difference between a wholesale market reference price and a government-agreed 'strike price'.

The UK's draft bill published in May stated CfDs would be underwritten by its 'Big Six' energy suppliers, but the companies and other industry players warned this would place the explicit rationale of EMR – to reduce the cost of decarbonising the electricity sector – in considerable jeopardy.

Speaking at an event organised by the Confederation of British Industry on October 18, Edward Davey MP said: "Developers and investors, in the renewables sector in particular, have told us they want a single strong counterparty to these contracts and we are listening.

"The Department of Energy and Climate Change (DECC) has finalised a plan involving creating a single counterparty, probably a company owned by government." Davey added exact details would be unveiled in the energy bill due to be published before the lower house of UK parliament shortly.

Admitting DECC's plans were "statist", energy secretary Davey said DECC intended to move to a market-based, price-discovery model over the next decade. "When most current technologies have matured, we'll move to technology-neutral auctions," he said. "So in the 2020s, low-carbon technologies should start to compete with each other in a true low-carbon electricity market."

The energy secretary said six offshore wind and biomass firms were negotiating with DECC about agreeing subsidies before the CfD system comes into force in 2014. DECC is already talking to EDF about agreeing an early subsidy so it can bring forward investment in a 3.3 GW nuclear plant at Hinkley Point.

Davey also revealed that a new infrastructure bill would make it easier for energy developers to change planning consents. Instead of applying for a new 'Section 36' consent, developers would only have to undertake a three-month consultation on changes. This change would make it easier for onshore wind developers to build additional turbines or for biomass developers to alter the type of fuel they wish to burn.

His comments on renewable energy and EMR came as business leaders and environmental groups stepped up the pressure on the government to clarify its position on support for the green economy amid concern that key targets will be relaxed.

In a letter to UK newspaper *The Times*, seven global energy technology companies said that they would pull investments in the UK if Treasury chief George Osborne watered down the government's green commitments. Siemens, Alstom, Mitsubishi Power Systems and others said that they were reassessing the level of political risk in the UK because of a lack of decision making.

"Right now, the policy future looks too much like a blank canvas," said Dr. Neil Bentley, head of business group, CBI.

The Renewable Energy Association (REA) has also called on the government to use EMR to boost renewable energy investment by implementing a clear carbon target to 2030, a fair and transparent process for awarding contracts, and extending the renewables obligation to 2020.

Additional reporting by Siân Crampsie.

Nuclear firms seal Polish cooperation

The European Commission is formulating a plan for short and long term intervention in the region's carbon market.

Companies vying for contracts to build Poland's first nuclear power plants are continuing to put in place agreements and plans to support the proposed new build projects.

Both GE Hitachi (GEH) and an Areva-EDF partnership have reported progress with their localisation strategies in Poland; GEH through a memorandum of understanding (MOU) with the Warsaw University of Technology (Warsaw UT) and Areva-EDF through a MOU with Polish engineering company Energoprojekt.


Vying for nuclear: companies are planning for Poland's first plant

The two organisations are bolstering their local expertise and supply chains in anticipation of participating in Poland's plans to build 6 GWe of nuclear energy capacity by 2035.

The new build programme is being led by Polska Grupa Energetyczna (PGE), a state-owned generator, and is an important element of Poland's plans to cut emissions and improve energy security.

GEH's agreement with Warsaw UT focuses on workforce development and builds on a long-term collaboration between the two organisations. GEH has signed similar agreements with other Polish universities in order to help ensure that the country has an adequate pool of nuclear engineers and skilled workers.

Areva and EDF's agreement with Energoprojekt focuses on delivering expertise in engineering and construction to the Polish nuclear build programme. "Associating the skills and knowledge of companies who know the local context to the expertise and know-how of experienced nuclear companies is a condition for the success of the Polish nuclear programme, in particular to ensure the quality and industrial safety for future operations," said Dominique Lagarde, director of EDF's nuclear engineering division.

Italy unveils energy plan

Italy is hoping to drastically reduce the amount of energy it imports by nearly one-quarter by 2020.

The country's government has released a new plan for energy policy that is focused on boosting energy efficiency, renewable energy capacity and hydropower output, and on reducing consumers' bills.

The plan, which has been released for public consultation, targets a 23 per cent reduction in energy imports by 2020. If implemented, investments of up to €180 billion would be required.

Italy is dependent on imports for around 90 per cent of its total energy needs and it spends €62 billion per year on imports. Its energy prices are among the highest in Europe.

The proposed plan also calls for a 19 per cent cut in carbon dioxide emissions over 2005 levels.

Italy already boasts a successful – and generous – renewable energy incentive programme.

In September Paolo Andrea Colombo, chairman of Italian utility Enel, said that the renewable incentive programme would cost an estimated €240 billion over the next 15-20 years.

€25 billion needed for nuclear safety upgrades


Oettinger: "There is room for safety improvement"

■ Stress tests reveal safety gaps
■ Member states to prepare action plans

Siân Crampsie

Nuclear power plants in the European Union (EU) should be upgraded to ensure they can withstand extreme natural events, says the European Commission.

The EU's executive body has published a landmark report into safety standards in its nuclear industry.

Although none of the EU's nuclear power plants needs to be closed, "there is room for safety improvement" in most, said EU Energy Commissioner Günther Oettinger.

Up to €25 billion might need to be invested to increase safety levels.

The report is based on a series of stress tests carried out on all 143 of the EU's nuclear reactors in the wake of the nuclear disaster at the Fukushima plant in Japan in 2011. Many of the nuclear power plants were found to have insufficient backup power sources for use in the event of a disaster.

France, which relies on nuclear power for over 70 per cent of its electricity needs, received the greatest number of safety improvement recommendations. Its reactors were also shown to be defective in detecting earthquakes.

The UK's reactors lack back-up control centres, said the report. The stress tests also found that nuclear power plants in Finland and Sweden would not be able to launch emergency back-up systems within one hour of a loss of power to cool reactors.

"The stress tests have revealed where we are good and where we need to improve," said Oettinger. "All authorities involved must work to ensure that the highest safety standards are in force in every single nuclear power plant in Europe."

The stress tests examined the preparedness of nuclear power plants against extreme events such as earthquakes, tsunami, flooding and nearby explosions.

EU member states will now have to follow up the report by preparing national action plans and timetables for implementing the recommendations. The Commission says it will report on member states' progress in mid-2014.

It wants to ensure that the recommendations are consistently and transparently implemented throughout the EU.

Ukraine plans diversification

- Coal reserves help energy security
- IEA identifies reforms, efficiency as key to success

Siân Crampsie

Ukraine is looking towards coal and coal gasification technologies as a way of improving its energy security.

President Viktor Yanukovych says that the construction of five plants producing syngas from coal will start in 2013.

The country is tapping Chinese technology for the projects, which could cost as much as $3.5 billion.

It has also been increasing its coal production over the last few years not just to meet increasing energy demand but also as a means of reducing its dependence on Russia for natural gas.

The International Energy Agency (IEA) has urged Ukraine to reduce its import dependency by tapping its own natural gas supplies and reinforcing energy efficiency policies.

The Paris-based agency last month released an in-depth review of Ukraine's energy policies. It says investment in energy infrastructure and deep regulatory reforms would also be key to improving supply security.

Natural gas accounts for around 40 per cent of primary energy supply in Ukraine and all of Ukraine's supplies are sourced from Russia. The government is keen to exploit the country's conventional and non-conventional gas reserves to improve its position.

According to the IEA, Ukraine has considerable untapped biomass and waste-to-energy resources. China has also offered its assistance with the former by expressing an interest in ethanol biofuel production.

Improved energy security could also be achieved through greater energy efficiency and the removal of cross-subsidies from energy pricing systems, says the IEA.

"Ukraine has already taken important steps towards energy sector reforms, but achieving the full potential for an energy revolution will require a greater policy focus on developing energy efficiency in the building and industry sectors and modernising district heating systems," IEA Executive Director Maria van der Hoeven said. "The country must make deep regulatory reforms to foster effective competition, alongside a progressive move towards market prices to attract investment to develop the sector."

The IEA has called on Ukraine's government to implement an energy strategy that monitors its progress against targets set and benchmarks the country internationally, increases oil and natural gas production, and upgrades its natural gas transmission system.

In September Ukraine launched the construction of a 750 kV, 353 km-long transmission line connecting south and central Ukraine.

The new power line will enable the country to fully exploit the underutilised capacity of Rivnenska and Khmelnytska power plants and stabilise electricity supply to central Ukraine, Kyiv and Odesa.

International partners close to Mongolia deal

A group of international companies are in the final stages of negotiations to build a $1.3 billion coal-fired power plant in Mongolia.

According to a report in the *Financial Times* newspaper, GDF Suez of France, Posco Energy of South Korea, Sojitz of Japan and Newcom of Mongolia are working out the final details of an agreement with the new Mongolian government to construct the combined heat and power plant CHP5 in Ulaanbaatar.

The consortium was named as the preferred bidder for the project in July and would build and operate the 415 MWe, 587 MWth facility for 25 years. The plant would be equipped with circulating fluidised bed (CFB) boilers.

The new plant will support the rising energy demand in Mongolia, which is largely driven by the mining sector and the abundant supply of natural resources, together with a growing population.

The current size of the Mongolian electricity market is 856 MW and GDP growth is expected to be on average 15 per cent in 2012-2013, making it one of the fastest-growing economies in the world. The power plant is scheduled to begin operations by 2016 and will supply roughly half of Ulaanbaatar's energy needs.

GDF, Posco and Sojitz will each hold a 30 per cent stake in the consortium, and Newcom will hold ten per cent. GDF Suez will invest in the project through its subsidiary, International Power. The total project cost will be funded by a mix of debt and equity in a 75:25 ratio, according to International Power.

Closing in on Mongolia: an international consortium is finalising details for a $1.3 billion power plant

Nigeria names privatisation winners

The Nigerian government is hoping that the selection of winning bidders in the country's power privatisation programme will mark the start of badly-needed investment in the sector.

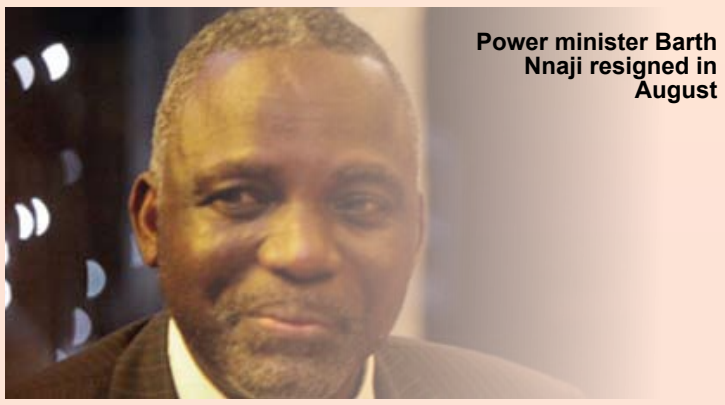
The Nigerian Bureau of Public Enterprises has revealed the companies that will run five of the six thermal generating firms created by the break-up of the country's power generation sector.

The sixth generating company – Afam – is to be retendered after the power minister Barth Nnaji resigned in August when it was revealed he had a stake in one of the consortia bidding.

They include a consortium comprising Nigeria's Transcorp and US company Symbion Power, and another consisting of Forte Oil, Shanghai Municipal Electric Power Company and BSG Power.

The government is also planning to sell eleven power distribution companies in the near future. The Bureau of Public Enterprises said in a statement that various consortia bid between $23 million and $300 million for each of the power generation plants.

The bidding process attracted 271 interested parties and generated 25 proposals from pre-qualified bidders before the final bids.



Power minister Barth Nnaji resigned in August

Renewables post gloomy 2012

Reduced investment appetite in the EU and policy uncertainty around the world are being blamed for a predicted drop in renewable energy investment in 2012.

The latest market analyses from firms such as Rabo and Bloomberg New Energy Finance (BNEF) point to a drop in clean energy financing for the third quarter of 2012 compared to both the second quarter of 2012 and the third quarter of 2011.

Both research firms predict that the full-year 2012 figure for investment in clean energy is likely to fall short of last year's record levels.

According to Rabo, $3.3 billion was invested in new renewable energy capacity between July and September 2012. It says that although Europe was on the same level as North America last year – with about $8.5 billion invested in each region in 2011 – Europe's investments to date in 2012 add up to just $1.2 billion.

Asset deals in the US and Canada amount to $6 billion so far this year, and with a few months left, might come close to reaching 2011 levels. Asian investments are likely to go beyond 2011 levels as $3.3 billion has already been spent this year, close to the $3.5 billion of last year, says Rabo.

BNEF notes that the renewable energy sector remains challenged by policy uncertainty in the USA, UK and Italy. Falling wind and solar photovoltaic (PV) panel prices have also dampened the overall dollar value of new projects, says the firm.

Michael Liebreich, chief executive of BNEF, said that the figures were "disappointing, but not surprising".

The World Bank announced last month that it approved a total of $3.6 billion in financing for renewable energy projects in fiscal 2012, a record 44 per cent share of its annual energy lending of $8.2 billion.

"The renewable energy lending figure for 2012 is a remarkable spike, but it is also part of a consistent trend of increases over several years," said Rachel Kyte, Vice President of Sustainable Development at the World Bank. "It shows the determination of many countries to seek lower-carbon energy solutions.

About $5.4 billion (43 per cent) of the Bank Group's renewable energy lending since 2007 has been for hydropower, with $1.1 billion (8.5 per cent) each for geothermal and solar PV, and $875 million (7 per cent) for wind, and smaller amounts for biomass and solar thermal. Another $3 billion went to projects in which the clean energy technology supported was not identified beforehand; these include renewable energy funds, credit lines and community-driven development projects which typically support a mix of micro-hydro, solar and wind power.

Within the World Bank Group, the International Finance Corporation (IFC) was the largest sponsor of renewables at $4.5 billion (35 per cent) over the last six years, followed by IBRD ($3.7 billion), IDA ($2.4 billion) and MIGA ($533 million).

Siemens sells solar business

A tough trading environment is forcing Siemens to reassess its business and its solar power unit is the first asset to be put up for sale.

Siân Crampsie

Poor growth and strong price pressure in the solar energy markets has forced Siemens to sell its solar power business and refocus its renewable energy activities on hydropower and wind power.

The German engineering conglomerate is in talks with potential buyers for its solar energy business, a unit that it once held high hopes for.

The sale is part of a wider, two-year restructuring programme announced in October that is designed to improve the financial performance of the company and put it back on track to meet its 'Siemens One' goals.

Further concrete measures aimed at cost reduction, improving competitiveness and making the company more agile will be announced in November.

Siemens has not ruled out further asset sales. "We will take a close look at businesses in our sector structure whose profits haven't met our expectations for a longer time," said CEO Peter Löscher.

Siemens had focused its solar energy activities on the concentrating solar power (CSP) sector, which uses curved mirrors to harness the sun's energy as well as steam turbines and generators – core elements of Siemens Energy's product offerings.

"The global market for concentrated solar power has shrunk from 4 GW to slightly more than 1 GW today. In this environment, specialised companies will be able to maximise their strengths," said Michael Süß, member of the Managing Board of Siemens AG and CEO of the Energy Sector. Siemens also intends to part with its solar photovoltaic (PV) activities.

It says it will continue to offer suitable products for solar thermal and PV power plants, such as steam turbines, generators, grid technology and control systems.

Siemens was forced to reassess its business operations after posting a fall in orders in the third quarter this year and in response to a decline in margins since the start of 2011. As a whole the company achieved €73.5 billion in sales last year and has set a mid-term goal of increasing this to €100 billion.

Weakening demand in China and a poor outlook in Europe have buffeted its targets and Löscher said last month that the company did not react quickly enough to the downturn in comparison with competitors such as GE.

The recently announced two-year programme could jeopardise Siemens' proposed purchase of Andsalso Energia, an Italian engineering company that is majority owned by Finmeccanica.

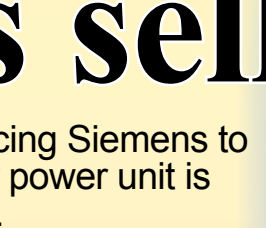
The financial press reported in late September that Siemens was in talks with Finmeccanica as the preferred bidder for the Italian's 55 per cent stake in Ansaldo. US private equity group First Reserve owns the remaining 45 per cent of Ansaldo.

Siemens' bid for Ansaldo has sparked a rival bid from Fondo Strategico Italiano, a state-backed €4 billion fund, according to the *Financial Times*. The German firm could also face opposition from Italian unions.

Analysts have questioned Siemens' motivations for buying Ansaldo, whose gas turbines are based on Siemens designs.

However it is thought that buying Ansaldo could help Siemens to fend off Asian rivals seeking to gain a foothold in Europe's gas turbine and power plant equipment market, and could also give the German firm access to new customers in Italy, North Africa and the Middle East.

Abramovich tackles the fuel cell sector



Abramovich's investment is a big opportunity for AFC Energy

A niche fuel cell manufacturing firm with big ambitions is to benefit from a cash injection from Russian billionaire Roman Abramovich.

AFC Energy says that Ervington Investments Ltd, which is ultimately owned by Abramovich, the owner of Chelsea Football Club, has agreed to an equity investment of £6.67 million in return for a 15 per cent stake in the UK-based, AIM-traded firm.

The investment comes a month after AFC opened a pilot production plant in the UK capable of producing up to 20 000 fuel cell electrodes per year. The funds from Ervington will strengthen AFC Energy's balance sheet and provide the company with additional cash resources to execute its long term growth strategy, it said in a statement.

"This investment by Ervington is a ringing endorsement of AFC Energy's innovative technology and its strategy to become a leading hydrogen fuel cell energy supply company for industrial and utility-scale applications," said Ian Williamson, CEO of AFC Energy. "Ervington's support not only enables us to take full advantage of our commercialisation plans expeditiously but will also provide us with high level access to energy users and potential partners globally."

AFC's technology is based on alkaline fuel cells that convert oxygen and hydrogen into energy. Their advantage over other fuel cell technologies is their low operating temperature and a simple, low component count.

The company is pursuing opportunities in several sectors where hydrogen is readily available including the chlorine, clean coal and waste-to-energy industries as well as applications for distributed/back-up power.

TVO seeks €1.8 billion for OL3 delays

Teollisuuden Voima Oyj (TVO) has revised the costs and losses it has incurred as a result of the delayed Olkiluoto 3 nuclear power plant project in Finland to €1.8 billion.

The Finnish utility has submitted a new claim to the International Chamber of Commerce (ICC) arbitration proceedings against Areva and its partner Siemens, who are building the nuclear plant.

The claim is the latest development in the long-running dispute between TVO and its contractors.

The 1600 MW European Pressurised Water Reactor (EPR) project was supposed to have been completed in 2009 at a cost of €3.2 billion.

TVO announced earlier this year that it was expecting the project to be completed in 2014. It blames Areva-Siemens for the delays, an accusation that the French-German consortium refutes.

Areva and Siemens initiated arbitration proceedings against TVO in December 2008, seeking €1.9 billion for costs and losses incurred during the project. TVO maintains that the Areva-Siemens claim is "without merit" and that the companies are contracted to build the plant on a fixed-price turnkey basis.

In July the ICC arbitration panel ordered TVO to pay €125 million to the Areva-Siemens consortium on the grounds that TVO had withheld funds and contravened the contract terms.

Siemens and Accenture plan smart future

- JV aimed at utility smart grids
- EcoIslands signs up new partner

Siemens and Accenture say that they will be able to help utilities improve the automation, planning, monitoring and diagnosis of their power supply grid infrastructures with the creation of a new joint venture that will offer advanced metering infrastructure and meter data management solutions.

Accenture will provide consulting and systems integration services for smart meter solutions, asset management and analytics capabilities while Siemens will leverage its Smart Grid Suite, a portfolio of integrated smart grid products, and corresponding professional services.

The joint venture will help utilities manage the vast amounts of data gathered through smart meters, which provide detailed information on the status of their distribution systems as well as customer consumption.

Thomas Zimmermann, CEO Business Unit Services, Siemens Smart Grid Division said: "This collaboration will lead to customised solutions that can be quickly integrated into a utility's existing infrastructure.

"Smart grids are now at the point of real business, not just buzzwords and concepts. We are now seeing pilot projects in North America and Europe," he added.

Siemens and Accenture are currently working with Canadian utility SaskPower, to help implement an advanced metering infrastructure that will help it to provide more reliable energy and better customer service.

The increased use of smart meters, which also provide visibility and control over the distribution grid, is critical as utilities seek ways to drive energy efficiency and integrate growing amounts of renewable power from sources such as solar and wind into the power supply network.

In the UK last month, a major renewable energy and smart grid initiative known as EcoIslands brought a new partner on board in the form of IPL, an IT services company.

IPL's smart grid software platform allows producers of renewable energy to co-ordinate effectively with the wider distribution network and with energy storage, therefore allowing local communities to efficiently use locally produced, cheaper energy and reduce reliance on fossil fuels.

At the EcoIslands' project on the Isle of Wight in the UK, IPL's software will help micro-generation sources and energy storage systems integrate with the grid.

The Ecoisland Partnership CIC is a community interest company whose aim is to make the Isle of Wight the first sustainable region in Britain.

In July it was announced that the Isle of Wight would become a test bed for hydrogen fuel with a project that will build a hydrogen energy production, storage and vehicle refuelling system that would be integrated into the power system on the island.

Zimmermann: collaboration will lead to customised solutions

Americas

Vestas secures Canada contracts

Vestas has secured orders for the renewal or installation of 533 MW of wind power capacity in Canada.

International Power Canada has awarded Vestas ten-year service agreements covering 276 wind turbines at eight locations in New Brunswick, Ontario and Prince Edward Island. The agreements include 335 MW for existing wind power plants and 198 MW for two projects in Ontario to be completed in 2013.

The agreement includes services to maximise energy production from the turbines, systems to manage output, remotely controlled turbines, as well as maintenance.

Siemens builds Brazilian CCGT

Siemens is to build a new combined cycle power plant in Manaus for Amazonas Distribuidora de Energia S.A., a subsidiary of Eletrobrás, the National Brazilian Electrical Company.

The 580 MW UTE Mauá 3 power plant will be built in two phases by Siemens and Construtora Andrade Gutierrez S.A. The plant will be the largest natural gas fired power plant in the Amazon region and will play an important role in ensuring reliable electricity supplies during the 2014 football World Cup.

The first phase will be the construction of the simple cycle plant scheduled to be online in 2014. The combined cycle conversion will follow as phase two of the plant construction.

Siemens will deliver the engineered power island, including two SGT6-5000F gas turbines, one SST6-5000 steam turbine, three SGen6-1000A generators, and the SPPA-T3000 instrumentation and control system.

TransCanada upgrades MacKay River

TransCanada Energy has selected GE to upgrade its MacKay River cogeneration plant to increase its output while maintaining low emissions.

Under the contract, GE will apply its advanced gas path (AGP) solution to the natural gas fired 7FA turbine at the 165 MW power plant, which provides electricity and steam for oil sands extraction operations in Alberta, Canada.

AGP technology enables power providers to operate more efficiently and reliably by upgrading hot gas path, bucket, nozzle and shroud components with design and material innovations. This installation will be complemented by the advanced controls capabilities of several GE OpFlex solutions including a Cold Day Performance app.

Together, these enhancements are expected to increase the plant's output by up to 4.5 per cent, with the potential to increase steam and electricity production further in the future.

Asia-Pacific

Areva equips Japanese PWRs

Areva is to equip the Japanese fleet of pressurised water reactors (PWRs) with more than one hundred of its passive autocatalytic recombiners (PARs).

PARs help to preserve the integrity of nuclear reactors by preventing the build up of hydrogen in reactor containment vessels. They do not require any operator intervention or power to work and therefore continue to work in the event of a station blackout.

The devices are easily installed, says Areva. They work by converting hydrogen into steam by catalytic oxidation.

Doosan Heavy bags wind farm deal

Doosan Heavy Industries & Construction Co., Korea's leading power equipment maker, said it has clinched a deal to build a wind farm on an island off the west coast of the country.

Under the deal with the Korea South-East Power Co. (KOSEP), a unit of the state-run Korea Electric Power Corp., Doosan Heavy will build the wind farm in a thermal power plant complex on Yeongheung Island.

The 24 MW wind farm will start commercial operations in July 2013, Doosan Heavy said.

Europe

Metso to deliver Jönköping biofuel boiler

Metso will supply Jönköping Energi's combined heat and power (CHP) plant in Torsvik, Sweden, with a new biofuel-fired boiler, the company has said.

Metso will provide a 100 MW bubbling fluidised bed (BFB) boiler that will be mainly fuelled with wood chips. The order is a key part of a project to expand and modernise the Jönköping CHP plant and will be completed in late 2014.

The project is a significant investment for the municipality of Jönköping as the existing boilers and related systems are in need of replacement and the new systems will enable the replacement of refined biofuels with primary biomass fuels.

Centrax sales success in France

Centrax Gas Turbines, the UK-based industrial power systems specialist, has won a significant order for a new CX501-KB7 generator set that will support the expansion of a major geothermal heating plant on the outskirts of Paris.

The new 5.3 MW indoor unit will supply electricity and heat to complement the output of a geothermal installation that powers a district heating system supplying more than 12 000 houses, apartments, schools, businesses and a university.

The new package is the tenth in France to be replaced by Centrax, which is playing a leading role in meeting demand for plant upgrades resulting from the French government's plan to reinvest in cogeneration equipment that is more than 12 years old.

Gamesa debuts in Finnish market

Gamesa has bolstered its presence in northern Europe by landing an order in Finland for 18 MW for TuuliWatti Ltd, a wind power joint venture between Finnish energy company St1 Ltd and national retail cooperative S-Group.

The agreement calls for the delivery, installation and start-up of four G128 turbines, each with a capacity of 4.5 MW and a 140 m tower, at the Simo wind farm in the commune of the same name in northern Finland. Gamesa and TuuliWatti have also signed a framework agreement that includes an option for delivering another 117 MW for another four wind farms in Finland.

Gamesa will perform operation and maintenance (O&M) services at the Simo facility for 10 years, with an option to extend the contract for another five years. The Simo wind farm's turbines will be the largest and highest-capacity turbines installed to date in Finland.

First Flight for NI offshore project

The UK's Crown Estate has announced that First Flight Wind has been selected to develop an offshore wind farm off the southeast coast of County Down, Northern Ireland.

Subject to obtaining all necessary consents from the Department of Environment and the Department of Enterprise, Trade and Investment, the project could deliver up to 600 MW of generating capacity for Northern Ireland.

First Flight Wind Ltd is a consortium comprising B9 Energy, DONG Energy and RES

International

DEWA selects First Solar for PV park

The Dubai Electricity & Water Authority (DEWA) has chosen First Solar to build the first, 13 MW phase of a major new solar park.

First Solar will provide engineering, procurement and construction services as well as its thin-film photovoltaic (PV) modules to the facility, located in Seih Al Dahal, 50 km south of Dubai.

The 13 MW solar power plant is the first phase of the landmark Mohammad Bin Rashid Al Maktoum Solar Park, named after the leader of the Emirate of Dubai, an AED12 billion ($3.23 billion) project that is expected to eventually cover 48 km² and produce 1000 MW using both PV and solar thermal technology.

Séchilienne-Sidec upgrades boiler controls

French firm Séchilienne-Sidec has selected Metso's DNA automation system for power plant upgrade projects in Reunion and Guadeloupe.

The DNA systems will be installed on a total of six boiler units between 2013 and 2015. Metso's retrofit delivery scope consists of the Metso DNA automation systems, a Metso Information Management System, a Metso DNA Control System Simulator, system installation and control system documentation.

In Reunion, located in the Indian Ocean, Metso's systems will be installed at the 60 MW Compagnie Thermique Bois Rouge power plant and the 64 MW Compagnie Thermique du Gol plant. Séchilienne-Sidec produces 57 per cent of the island's total electricity.

In Guadeloupe, Metso will retrofit the 64 MW Compagnie Thermique du Moule power plant with a new automation system. Séchilienne-Sidec produces 31 per cent of the electricity consumed on this island located in the Caribbean Sea.

HHI wins $3.2 billion deal in Saudi Arabia

Hyundai Heavy Industries (HHI) of South Korea has won a $3.2 billion contract to build a power station in Saudi Arabia, the company said in October.

The Jeddah South thermal power plant will be built 20 km south of the city of Jeddah by 2017 with a capacity of 2640 MW. It will account for nearly five per cent of Saudi Arabia's entire power generation, HHI said.

HHI will take full responsibility for design, construction management and pilot operation. The plant will be equipped with supercritical-pressure boilers. Saudi Services for Electro Mechanic Works Company Limited (SSES) has awarded ABB an order worth over $20 million for high voltage gas-insulated switchgear (GIS) for a new substation in western Saudi Arabia.

ABB wins GIS order

ABB will supply 420 kV GIS equipment that will form an integral part of the new Al Lith substation being built by SSEM for Saudi Electricity Company (SEC), the country's national power transmission and distribution operator. Al Lith, about 190 km from Jeddah, is a rapidly growing coastal province in the western area of Saudi Arabia.

The substation is scheduled to be energised in September 2014.

Siemens to build Turkey wind plant

Borusan EnBW Enerji has placed an order with Siemens for the supply of 22 wind turbines for the Balabanli wind power plant near the Turkish city of Tekirdağ.

The Siemens wind turbines have a capacity of 2.3 MW and a rotor diameter of 108 m. The order is the fourth for wind turbines from Turkey for Siemens, which will also provide service and maintenance for the new facility for ten years.

ABB strengthens Iraq network

ABB has won orders worth around $65 million from Mass Global Investment (MGI) Co., to provide a turnkey electrical and automation solution for a new gas turbine power plant and substation extension in northern Iraq.

Comprising four gas turbines with a capacity of 125 MW each, the new Dohuk 2 power plant will be an extension of the existing ABB-built 500 MW Dohuk 1 power station, which went into operation in 2011.

ABB will design, supply and install the electrical balance of plant solution and provide the grid connection for the 500 MW open cycle gas turbine (OCGT) power plant. Key product supplies include low- and medium-voltage switchgear, the auxiliary systems for fuel supply and the control and automation system.

The new plant will be fuelled by natural gas and light fuel oil. It is scheduled to be operational in just 10 months and is the latest in a series of OCGT projects implemented by ABB for MGI.

ABB will also extend a 132 kV substation delivered earlier, to connect the Dohuk 2 power plant to the grid.

Saudi prepares for smart grid

CESI Middle East, a market leader in power systems consulting and testing, announced today that it has been selected by the Electricity & Co-Generation Authority of The Kingdom of Saudi Arabia, ECRA, to develop policies, specification requirements and an implementation plan for a smart metering and advanced metering infrastructure.

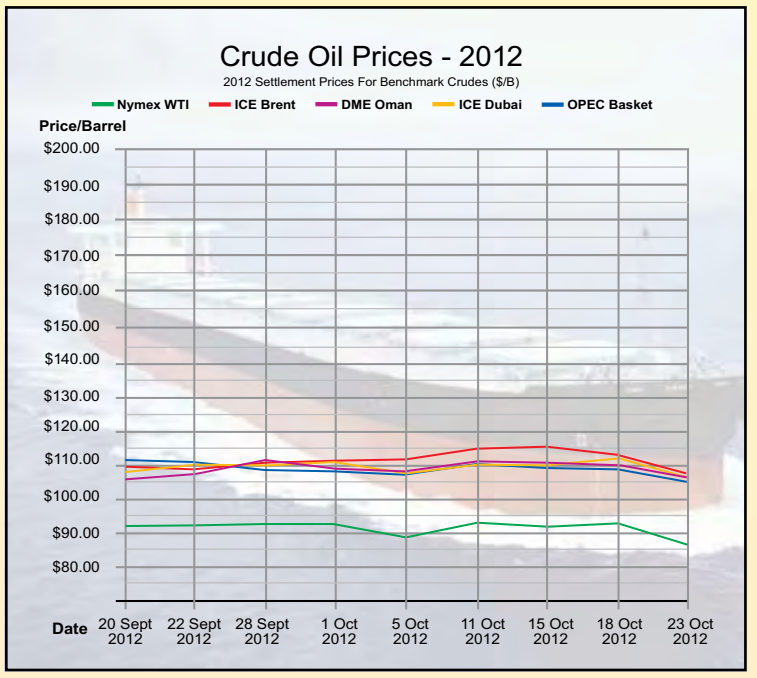
This new mandate, which is the first kingdom-wide project of its kind to be undertaken in Saudi Arabia, not only increases CESI Middle East's leadership position in the Middle East, but also gives further impetus to the development of future plans based on renewable energy across the Middle East.

CESI will carry out a study with A. T. Kearney to identify challenges and obstacles that smart grids could help to overcome, identify smart metering technologies that are best suited to the Saudi market and develop an overall smart grid deployment strategy for the country.

Oil

Crude prices decrease but not enough to boost economy

- Iran threatens to stop exports
- Shale oil transforms US oil production outlook



David Gregory

Crude prices have fallen over the course of the last month as the market reports sufficient supplies and reasons to expect improvements in the global economy remain elusive. West Texas Intermediate (WTI) was in the $85-90/b range in mid-October, compared with around $95/b in mid-September. The price of Brent crude declined but not by as much over the last month. It was trading at $108-110/b in mid-October compared to $110-116/b in mid-September.

Speaking in Singapore in mid-October Maria van der Hoeven, Executive Director of the Paris-based International Energy Agency (IEA) repeated what has in recent months become a mantra: "The market is sufficiently well supplied."

But that is not enough to bring the price of crude down, especially in the US where the price of gasoline is weighing on the economy and the presidential election there in early November.

Saudi Arabia and other Persian Gulf producers have boosted crude output as sanctions against Iran have begun to kick in. The US and the EU have joined forces to press international markets to reduce purchases of Iranian crude in response to Iran's nuclear research programme. But up to now it has been concerns that sanctions against Iran might impact the oil market with an unforeseen shortage that has helped to keep crude above or near $100/b.

Iran's crude exports are estimated to have declined by around 1 million b/d since mid-year, when the EU ban on imports went into effect. The IEA recently reported that Iran's output had declined to 2.63 million b/d and that exports were averaging around 860 000 b/d, compared to 2.2 million b/d at the end of 2011.

Speaking at the World Energy Forum on October 23, Iranian Oil Minister Rostam Qasemi said any attempt to put further sanctions against Tehran would result in Iran stopping its exports altogether, but his threat made little impact on the market, which saw WTI and Brent settle at $86.67/b and $108.25/b respectively that day.

In Singapore, Ms. van der Hoeven said the IEA is continuing to monitor Iran's crude output situation and said: "If there is a serious physical disruption of supply there is always an opportunity to act because the stocks are there," referring to a release of strategic stocks. But she also noted that more oil, particularly North American shale, is coming to the market.

Future US production figured in the recent *Monthly Oil Report* released by the London-based Centre for Global Energy Studies (CGES). "Until recently, one of the things about which we could be fairly certain was that output from the US was in decline," the consultancy said in the report.

US output peaked in the early 1970s and averaged 6.7 million b/d in 2007, it noted. But the production of shale oil has "transformed" the outlook for US oil production CGES said.

The Centre pointed to the Bakken Shale deposit in North Dakota where production is now averaging 700 000 b/d, making it the second-largest oil producing state in the US, surpassing the production of Opec member Ecuador and nearing the rate of Qatar's crude output. It pointed to an IEA forecast predicting that the fourth quarter of 2013, crude production in the lower 48 states could average more than 5 million b/d for the first time since 1989.

"Soaring US production could have a huge impact on global oil markets," CGES said in its report, "even if it cannot be exported. It is already backing out US imports of light, sweet crude from overseas, making growing volumes of West African and other crude available to importers elsewhere. This flood of US crude is likely to put oil prices and Opec output under downward pressure next year."

Meanwhile in Baghdad earlier this month, when the IEA released its *Iraq Energy Outlook* report, Iraqi Deputy Prime Minister for Energy Affairs, Hussein al-Shahristani, said Iraq crude output could reach 10 million b/d by 2020 and sustain that rate of production for 20 years.

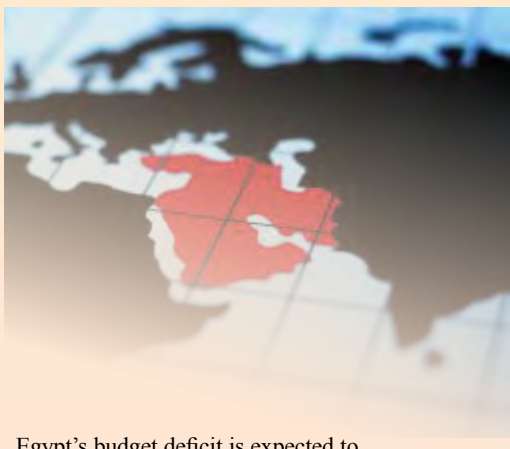
The IEA forecast was a little more modest. It forecast that Iraqi output would likely reach 6.1 million b/d by the end of the decade and 8.3 million b/d in 2035. The IEA said under the agency's 'high case' scenario, in which conditions are most favourable, Iraq might reach a production rate of 9.2 million b/d by 2020.

In recent months Iraq has replaced Iran as Opec's second largest producer with output averaging 3.4 million b/d and exports at 2.6 million b/d.

Gas

Egypt to become net gas importer

Egyptian officials have been negotiating with Algeria and Qatar about the delivery of gas to Egypt, which is now to become a gas importer – a situation that was not thought likely just a few years ago.



Mark Goetz

Despite possessing significant natural gas reserves, Egypt is facing a serious domestic energy crunch, the result of falling investment and production, and an energy subsidy system that is unsustainable.

Egypt has proven domestic gas reserves of 77 trillion cubic feet (tcf), the equivalent of 2.2 trillion cubic metres (tcm), and according to the *BP Statistical Review of World Energy June 2012*, it produced 61.3 billion cubic metres (bcm) and consumed 49.6 bcm in 2011. Of this, 8.6 bcm was exported to foreign markets in the form of LNG from the liquefaction facilities in Idku and Damietta, located at opposite sides of the Nile Delta, where a large portion of Egypt's gas is produced.

Exports from the LNG plants are reported to be falling, and shipments through the Arab Gas Pipeline (AGP) to Jordan have been halted altogether in an effort to meet domestic demand. Pipeline exports – to Jordan and Israel – suffered throughout 2011 and 2012 due to repeated attacks on infrastructure in the Sinai Peninsula. Exports to Israel stopped completely last year.

The new government of Mohammed Mursi is strapped to find a way to address the country's growing demand for energy, but how to do so without cutting the subsidies that are meant to make gas and petroleum products inexpensive for poor families is a dilemma. Subsidised gas has essentially been taken over by black market operators, and end up benefitting the privileged more than those it is meant to help. It has been reported that only 20 per cent of Egypt's energy subsidies go to people in the bottom 80 per cent of society.

In recent weeks, Egyptian officials have been negotiating with Algeria and Qatar about the delivery of gas to Egypt, which is now to become a gas importer, a situation that was not thought likely just a few years ago.

Late last month the Egyptian Natural Gas Holding Company (EGAS) issued a tender for the delivery of LNG to begin in May 2013. The invitation to supply LNG called also for the construction of a marine jetty or buoy mooring system at an Egyptian port. Also sought are the establishment of a LNG Floating Storage and Regasification Unit (FSRU) and the construction of all necessary facilities, equipment and pipeline connections with the country's national distribution grid.

The Ministry of Petroleum plans to import as much as 1-1.5 billion cubic feet per day (10-15 bcm/year), according to the Egyptian media. The gas will enable the export of Egypt's own LNG and be used to supplement power stations along with steel and cement plants.

But Egypt's subsidy system poses the real problem. Despite selling its own gas domestically far below production costs, the country also takes a hit with imported petroleum products. Energy subsidies cost Egypt $6.9 billion during the 2005-06 financial year, and jumped to $12.3 billion in 2009-10. The new government of President Mursi is looking at energy subsidies that will amount to $11.5 billion, provided some measures to cut subsidies are implemented. Subsidies account for as much as 20 per cent of the country's budget.

The subsidy system is now backing up into Egypt's productive sector. The fact that the Ministry of Petroleum is now chasing to cover the cost of subsidies is resulting in delays in payments to foreign companies operating in Egypt and pumping the gas, crude and condensate that the country needs. The delay in payments has forced most companies to reduce their drilling and production activities and to delay projects. Some smaller firms have begun to shy away from Egypt altogether, citing not only delays with payments, but also the slow bureaucracy and lengthy decision making.

Egypt's budget deficit is expected to reach $22 billion during the July 2012-June 2013 financial year, and foreign exchange reserves have fallen to $15 billion. The budget deficit for the current year is $9.8 billion and Cairo is looking to international assistance to cover it.

Egypt has been negotiating for some time with the International Monetary Fund (IMF) for a standby facility of $4.8 billion. But the IMF is insisting that Egypt take steps to reform its subsidy system and reduce the budget deficit.

Whether Egypt will be able to manage that remains to be seen. Most of its 80 million-plus population are economically disadvantaged and it will not be easy for the new government to solve the dire state of the country's financial condition without provoking more political unrest.

A glimpse of the future

PowerMatching City in the Netherlands is a 'living lab smart grid' consisting of 25 interconnected households. As the first total-concept smart grid deployment project in the world, it will demonstrate the true potential of a smart grid.

Frits Bliek and **Albert van den Noort**

Distributed energy sources are a promising solution to solve today's energy and climate challenges but large scale integration in our currently top-down oriented energy infrastructure provides new technical, economical and social challenges for grid operators and utilities.

Intermittent energy sources like wind and solar energy require flexible energy sources like combined heat and power (CHP) technology and energy storage to balance out the fluctuations. At the same time our energy consumption changes: (light) electric vehicles become our means of transportation, traditional heating system are replaced by micro-CHP systems and heat pumps and various appliances allow coordination in a smart way.

The energy supply chain will become completely bi-directional and market roles will change: consumers will become self-producing so-called 'prosumers' and new market parties, like commercial aggregators, will enter the supply chain.

In order to fully exploit the potential of this new emerging energy landscape advanced information and communication technology (ICT) solutions will enable smart grid solutions and provide the essential coordination communication infrastructure to seamlessly match supply and energy demand without user interaction or loss of comfort.

A demonstration of the possibilities is currently in operation in the Netherlands. Launched in 2007 as one of the INTEGRAL project demonstrations, PowerMatching City demonstrates what our energy system could look like in 2030. PowerMatching City is a living lab smart grid consisting of 25 interconnected households and is the first total-concept smart grid deployment project in the world.

PowerMatching City consists of real homes in Hoogkerk, a village near Groningen, outfitted with a variety of smart grid appliances. Gas-fuelled appliances ensure the integration of gas and electricity on the household level, creating flexibility for peak loads in electricity demand. This market-based smart grid implementation allows end-users to trade energy on a local market level.

Testing of Phase 1 was successfully completed in March 2011. In phase II, advanced smart grid technology is now being tested and developed. This technology optimises the energy use of consumers by automatically shifting local energy production of micro CHP systems as well as the energy demand of various devices such as electric vehicles, washing machines and heat pumps.

The project is being executed by a consortium, consisting of knowledge institute TNO, system integrator ICT Automatisering, energy company Essent, distribution system operator Enexis and gas infrastructure company Gasunie under the lead of energy consulting and testing and certification company DNV KEMA Energy & Sustainability.

In PowerMatching City, various technologies have been used to demonstrate the full concept of a smart grid. Off-the-shelf products have been altered to provide flexibility to the grid and allow coordination and control by the smart grid.

Distributed Energy Resources (DER) are applied in the form of combined heat and power (CHP) and renewable energy sources (RES).

Micro CHP provides high efficient local power generation in half of the households of PowerMatching City. The units have an output power of 1 kWe and 6 kWth. A 210 litre hot water buffer is used to decouple the production of heat and electricity.

RES provide sustainable energy from solar and wind power. Each household is connected to at least 14 m^2 of PV solar panels providing 1590 Wp and 880 kWh. Local weather forecast data is used to predict the output power and an adaptive algorithm is used to adjust to the actual efficiency of the solar panels used.

Smart hybrid heat pumps (SHHPs) and various smart appliances (SA) such as washing machines and dishwashers help manage demand response (DR).

SHHPs combine highly efficient air-to-water heat pumps with a condensing boiler. The heat pumps are used for base load heating throughout the season, but during peak loads, for example for tap-water, or during cold winters when the efficiency of the heat pump drops, a condensing boiler is used as an additional or under some circumstances as a more efficient source of heat. These systems are applied as a heating system in the other half of the households of PowerMatching City.

Off-the-shelf products have been altered to provide flexibility to the grid and allow coordination and control by the smart grid

The households of PowerMatching City have been equipped with a smart washing machine and a smart dishwasher that can be programmed by the participants. On the control panel the latest end-time can be programmed into the machine to enter the time that the laundry or the dishes need to be clean. An agent automatically determines the optimal period to complete the washing programme against the lowest expected costs without any further user interaction. As a proof of principle a smart freezer has been constructed that can store the coldness by allowing it to freeze between -180°C and -250°C. An agent optimises the power consumption of the freezer and minimises the electricity costs.

Electricity storage (ES) is provided by electric vehicles (EV) and in-home electricity storage (IHES). Two full EV and one plug-in hybrid car are connected to the PowerMatching City grid. The capacity of the batteries is 37 kWh and 6 kWh, respectively. Data communication is provided by a virtual private network (VPN) router over a Universal Mobile Telecommunications System (UMTS) and the charging process is controlled by an agent that runs on an on-board car PC.

Automatic Meter Reading (AMR) is applied at both the household level (HL-AMR) and device level. HL-AMR is used to measure the total electricity and gas consumption/production of each household. Meter data is collected by meters that match the Dutch smart meter standard.

A low power PC in the meter cupboard of each household functions as an Energy Service Gateway ESG. All agents that control the various devices in the home run on the ESG. However, in the future this code could be a part of the onboard logic of the appliances once they become commercially available. In the electric vehicles an identical solution has been chosen and in a more mature solution the agent logic could be integrated in the onboard logic of the car as well.

Detailed Data Access (DDA) is facilitated by the AMR and is opened up by three portals: a user portal, an operator portal and a data analysis portal.

The user portal provides detailed insight into the energy consumption and production profiles of the end-user via a smart phone, a PC or an in-home wall display. Aggregated data as well as individual near real-time signals of individual devices can be monitored and compared with the average of the whole group to entice the end user to reduce their own energy consumption.

The operator portal is used for remote monitoring and maintenance purposes. This portal provides configuration and monitoring functionality and allows operators to detect faults even before end-users experience them and take corrective measures in time.

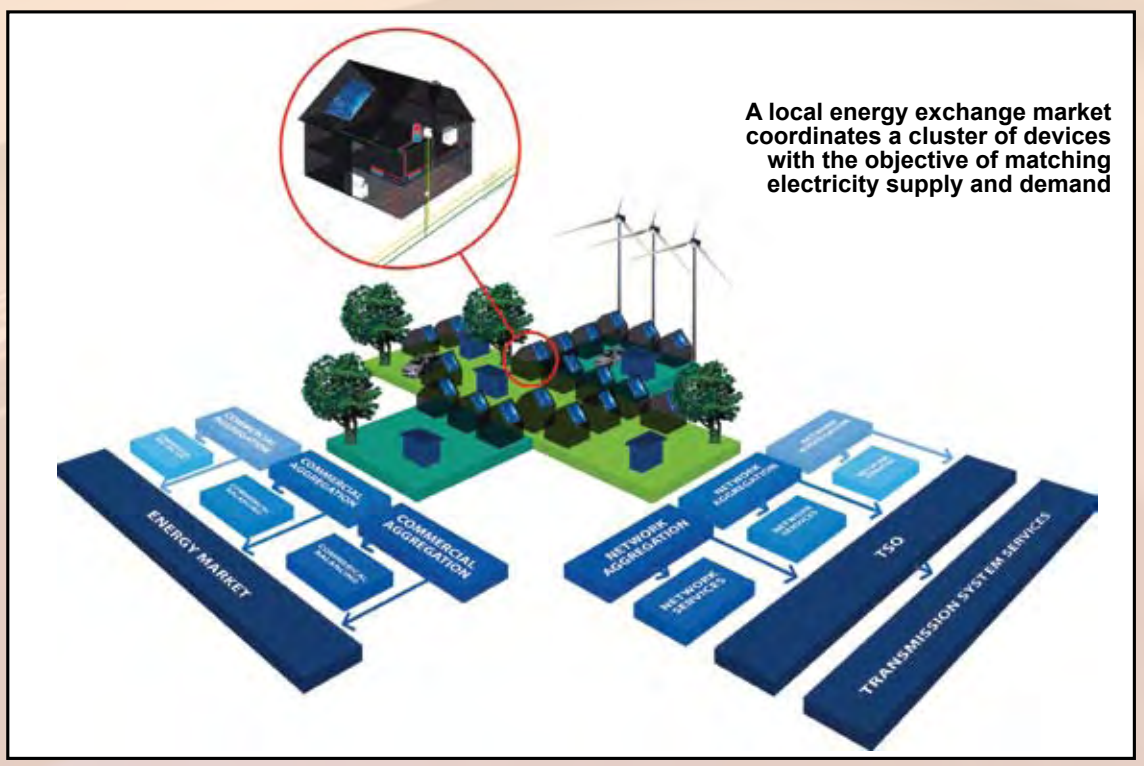
The data analysis portal can generate automated reports as well as individually configurable reports for data mining in all the data collected in the experiment. This allows detailed analysis by experts.

Since the phase-I households are distributed over a larger area and not physically connected to an individual distribution station, the load on the "virtual distribution station" has been reconstructed based on the sum of the loads of the individual households. This allows the technical coordination objectives to be tested. The drawback of this construction is that it is not possible to investigate power quality issues. In the next phase of the project the living lab environment will be extended with an intelligent distribution station and a relevant set of households behind one or more feeders.

The coordination of the cluster is provided by Power-Matcher technology – a distributed energy system architecture and communication protocol, which facilitates implementation of standardised, scalable smart grids that can include both conventional and renewable energy sources.

Through intelligent clustering, numerous small electricity producing or consuming devices operate as a single, highly flexible smart grid, creating a significant degree of added value in electricity markets. The concept is based on a distributed multi-agent based system that uses a local energy exchange market to coordinate a cluster of devices with the objective of matching electricity supply and demand.

PowerMatching City provides the essential scalability that is needed for large scale smart grid implementation and enables integration of numerous energy sources and devices. The results are very promising and the cluster of these smart homes demonstrates the true potential of a smart grid and will provide the essential data to validate the underlying business cases. Moreover it will reveal the potential of smart grids to seamlessly integrate distributed renewable energy into our energy infrastructure.



A local energy exchange market coordinates a cluster of devices with the objective of matching electricity supply and demand

Frits Bliek is a senior energy market expert at DNV KEMA; Albert van den Noort works at DNV KEMA as a project manager for the PowerMatching City project.

The real story behind European power demand

The growth rate in European power demand has fallen steadily over the last five years but the power demand curves of individual European countries reveal some unexpected patterns.

Twan Vollebregt

Economic events of the last five years have fundamentally reshaped the European energy industry. While it is no surprise that energy demand has reacted strongly, particularly in the industrial and commercial sectors, the response has by no means been uniform across countries like Germany, Spain and Greece. The different responses from different countries highlight some illuminating details about their relative demand elasticity and the power-to-GDP intensity.

Between 2003 and 2007, the rate of growth in power demand steadily declined across Europe despite apparently favourable economic conditions. In many ways, the onset of a recession was already being flagged.

As rumours of trouble in the US financial markets rumbled throughout 2008 and finally exploded with the collapse of Lehman Brothers in the fourth quarter, demand started to slide before tumbling to a notable downward spike in 2009. As expected, the following year saw a bounce, albeit less strong than the 2009 dip, but rather than a return to normal levels, 2011 saw a further modest drop. Initial reports from TSOs indicate that 2012 will almost certainly show a further fall, as is consistent with the general economic situation.

This dramatic picture is more or less replicated across individual country profiles. However, interesting differentiated patterns do occur. Before the downturn, European countries could be split into three broad groups: those with around two per cent growth (Austria, Greece, Netherlands and Spain); those averaging around one per cent growth (Germany, France); and those growing more slowly or even showing a decline (Denmark, Belgium, Italy and Sweden). These groupings represent the combined impact of GDP growth and the type of economy in each country – those that use power as part of a growth strategy naturally differ from those focused on energy efficiency.

If we look at both Greece and Spain, we can see rapid economic growth that, with the benefit of hindsight, showed certain bubble-type characteristics. However, neither country had much focus on energy efficiency, which resulted in simultaneous growth in power demand.

Similarly, Austria and the Netherlands, although mature economies, were still strongly growing and using power consumption as a key driver of that growth. Germany and France were struggling somewhat in terms of GDP, so despite their strong economies they experienced a slower growth in power demand.

Among the lower growth countries, both Belgium and Italy were on a flat economic trajectory with little if any growth in GDP. In contrast, the Nordic countries (Denmark and Sweden) had focused significantly on efficiency and reducing consumption, which led to lower growth in demand.

It is important to first understand that "power consumption" is a rather poorly defined term. Does it include network losses? What about de-centralised consumers with on-site generation? And do we count the consumption of pump storage plant? It is all too easy to end up comparing apples with oranges.

Add to that the real challenge of obtaining high quality accurate data for an individual country. If we look at the Netherlands as one example, it is relatively easy to use incorrect numbers: the ENTSO-E figure for power consumption in 2011 was 110.8 TWh, while the transmission system operator, TenneT showed 104.4 TWh. At the same time the CBS – the state statistics office – reported a total consumption of 118.1 TWh. These are material differences, derived from differences in scope and definition – and even using a single source for all years will produce inaccurate results due to definitional changes over time. Energy Fundamentals uses a very strict definition of power consumption – including network losses and decentralised consumption but excluding pump storage consumption.

Turning back to the power demand growth rates of European countries, let us zoom in on the cumulative growth of a selection of countries since the pre-crisis year 2007. This reveals some interesting and somewhat unexpected patterns.

By 2011, the EU average cumulative power demand growth rate was still approximately two per cent below the 2007 level, indicating a five-year period leading to negative power demand growth: an unprecedented phenomenon in recent decades. However, this played out in different, and often in somewhat counter-intuitive ways in different countries.

In line with the drop in its economic growth, German power demand fell sharply in 2009. However despite its strong economic performance subsequently, there has been a very weak recovery in power consumption. This is mainly due to a structural reduction in industrial demand, offsetting household and services demand that has returned to growth.

With its greater economic woes but much smaller industrial sector and strong household/services growth momentum in 2007, Spain was affected less than might be expected, resulting in a cumulative growth rate not far from zero. And despite its very poor economic performance during 2007-2011, Greek consumption growth is relatively inelastic and has carried forward much of its trend momentum – in 2011, a 6 per cent GDP reduction resulted in a power consumption reduction of less than 2 per cent.

At the opposite end of the spectrum, Poland is the least affected and its strong economic performance means that power consumption growth is now growing at almost pre-2007 levels once more.

Putting all of this into perspective is the 'trend' growth, which depending on the type of economy would be expected to range between 1 and 2 per cent per year. Had that growth trajectory been followed since 2007, at 1.5 per cent average annual growth the cumulative European growth would have been at 8 per cent in 2011, rather than minus 2 per cent.

This gap of 1000 basis points has had huge consequences for investment in the sector, leading to capacity margins that are much larger than anticipated and upsetting investment plans that had assumed ongoing growth. Add to this the large volumes of renewable energy generation that have entered the market – despite strong economic signals to the contrary – and the result is a market that is headed for oversupply.

The key lesson to be learned from unravelling these growth patterns is that long-term fundamental analysis remains a critical part of the risk management process. As rapidly changing economic fortunes have indicated, investment decisions cannot be made purely on the basis of short-term curves or historical movements.

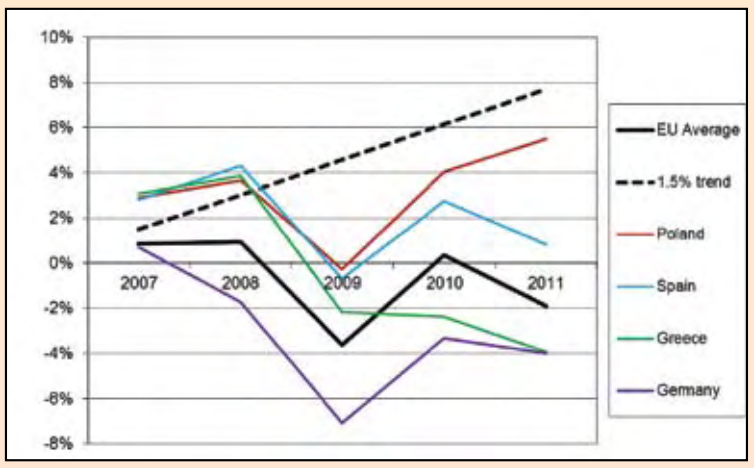
The broader context – including the financial environment – must be considered, as well as country-specific factors. Investment decisions cannot be made on over-simplified observation of the markets. In-depth analysis and quality data is key, as the comparison between Greece and Germany demonstrates.

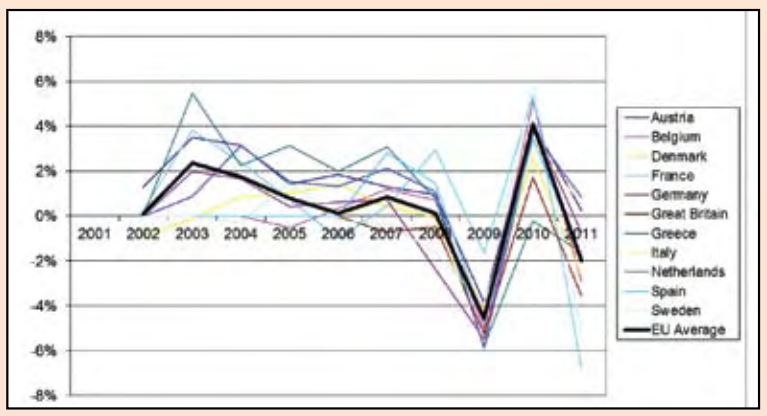
Twan Vollebregt is CEO of Energy Fundamentals, a Swiss company that provides an integrated fundamental data and modelling system for investment decision makers in European power market.

Vollebregt: Investment decisions cannot be made on over-simplified observation of the markets

... long-term fundamental analysis remains a critical part of the risk management process.

Cumulative growth demand since 2007

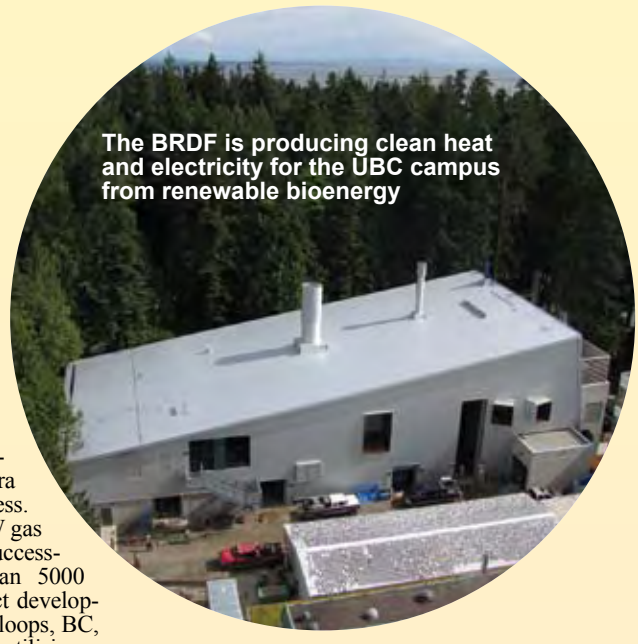




The rate of growth in power demand steadily declined across Europe between 2003 and 2007

Turning up the heat on biomass gasification

A new facility to demonstrate combined heat and power production from biomass gasification in a commercial setting, recently began operation in Vancouver, Canada. **Junior Isles** looks at this pioneering project.



The BRDF is producing clean heat and electricity for the UBC campus from renewable bioenergy

Much of British Columbia is characterised by its extensive forests. Forests cover about two-thirds (60 million hectares) of the province's total land mass and, since 95 per cent of BC's land base is publicly owned, the management of the forest resource rests largely with the provincial government. Subsequently, there is no shortage of sources of biomass. This combined with a desire to push clean technology has led the University of British Columbia (UBC) in Vancouver to open a new clean energy facility that also fits into its educational programme.

The $27-million Bioenergy Research & Demonstration Facility (BRDF), which opened in September, received financial support from UBC, the Province of British Columbia, and the Canadian Federal Government. It is claimed to be the first demonstration of its kind in the world of a community-scale heat and power system fuelled by biomass.

Certainly UBC is Canada's first university – and one of a few institutions worldwide – to produce both clean heat and electricity for its campus from renewable bioenergy. UBC researchers, students and partners will use the first-of-its-kind facility to research, develop and evaluate bioenergy and other clean energies, processes and technologies.

Commenting on the project, Brent Sauder, Director, of UBC's Strategic Partnerships Office said: "UBC is an independent municipality occupying a site of 400 hectares. It is a community of over 50 000 persons made up of students, staff, faculty and market housing residents. The UBC owned and managed electrical and heating grids serve over 400 buildings in the university's academic core

"All the heat and power generated by the cogen facility will be consumed on campus, offsetting the amount of energy normally supplied by the electricity and gas utilities."

Sauder noted that as a "small city", UBC is perfectly placed to try out new technologies. "Under the Living Laboratory Initiative, we have the ability to try out technologies such as cogen and hot-water district heating. We also have a project based on distributed batteries. We are doing a number of things with different partners to try to demonstrate the economic value of these new technologies."

The BRDF is a partnership between UBC, Vancouver-based Nexterra Systems Corporation and GE Energy. Notably, it is the first commercial demonstration of a new application that combines Nexterra's gasification and syngas cleaning technologies with GE Energy's Jenbacher engines.

The system creates synthesis (syn) gas that is then burned in raw form to produce steam, or conditioned to create ultra clean syngas that is injected into an internal combustion engine used to generate electricity and additional heat (recovered engine heat) for the UBC campus.

Although the use of biomass gasification to generate electricity can be seen as a somewhat exotic solution, Roger George, General Manager, North America, Gas Engines, GE Jenbacher points out that it has advantages over other conventional technologies.

"Compared to straightforward incineration, there's a significant efficiency gain. The BRDF will have an electrical efficiency of about 25-26 per cent compared to about 18-20 per cent for a conventional [boiler and steam turbine] solution. In addition, in CHP mode additional thermal energy capacity is available to increase overall system efficiency to up to 60 per cent. The gasifier also has advantages in terms of emissions at the back-end of the system. Gasification is a much more elegant solution. In terms of scale, it is also much more targeted [to this particular installation]. Gasification of biomass peaks at about 10 MWe in terms of scale. Steam turbine-based plants scale after above 10 MWe."

The start-up of the system at UBC represents the culmination of more than four years of product development work and collaboration between Nexterra and GE's Jenbacher business. Prior to installing the 2 MW gas engine at UBC, Nexterra successfully completed more than 5000 hours of trials at its product development centre (PDC) in Kamloops, BC, including over 3000 hours utilising a 250 kWe Jenbacher engine.

Explaining the partnership with Nexterra, George noted: "Jenbacher has more than 12 years of experience of burning syngas in its engines… We wanted to find a [gasifier] technology company that could execute on a commercial solution. We did a lot of testing with Nexterra on a pilot project and then standardised the gasifier for a Jenbacher 620 engine platform. This is our largest engine capable of running on syngas."

> "The operation of this unit will provide solid data for projects in other parts of the world. GE believes there are significant opportunities in the Europe, India and Southeast Asia"

The pilot served to examine two main areas: the consistency and stability of the syngas from the gasifier and the cleanliness of the fuel.

"In addition to the syngas stability, tars can be a big problem. They can cool and solidify in areas of ducting just before the engine, which causes a serious maintenance issue. So a critical issue was how to clean those tars before they get to the engine. We had to make sure these two issues were solved before we moved to a bigger engine," said George.

With the pilot demonstrated successfully, the next step was to scale it up. UBC is the first commercial customer to demonstrate the technology. George commented: "As a demonstration project they have given us the leeway to improve the system. For example, the engine is rated at 1.5 MW electrical but during commissioning we were able to tune the engine along with the gasifier to increase the capacity to 2 MWe."

The BRDF will gasify 12 500 dry tonnes/year of woody biomass, some of which was previously destined for local landfills. The feedstock is an area that requires careful consideration.

Sauder explained: "You have to be very clear about the characterisation of your fuel stock. We have a student working on characterising the fuel coming into the plant. UBC is building towards defining a 'blend of biomass' specially mixed by our fuel aggregator to suit our needs."

The quality of the fuel has a direct correlation to the ability to produce good syngas and also affects the performance and maintenance costs of the facility. As Sauder pointed out: "Some people think biomass is biomass but that is definitely not the case. I can see the day when biomass will be graded, just like other fuels.

There will be different classes of biomass so you know what you are buying."

The BRDF has two main operating modes. The first is 'thermal-only mode', where the syngas from the gasifier replaces natural gas used to produce steam and hot water to meet the campus' heating needs.

The second is called 'demonstration mode', as it is the first site to use the technology for combined heat and power in a commercial setting. Here the syngas is conditioned to remove impurities and fed into GE's Jenbacher gas engine to produce electricity. In addition, heat from the engine is recovered and directed to the district heating system. The combined heat and power system has a maximum output of 2 MW of power and 4365 kg/hr (9600 lb/hr) of steam.

According to UBC, the engine has been running well since start up. Performance tests will be carried out during the first three months of operation. Once in full commercial operation, the BRDF is expected to produce up to 15 million kWh/yr of electricity.

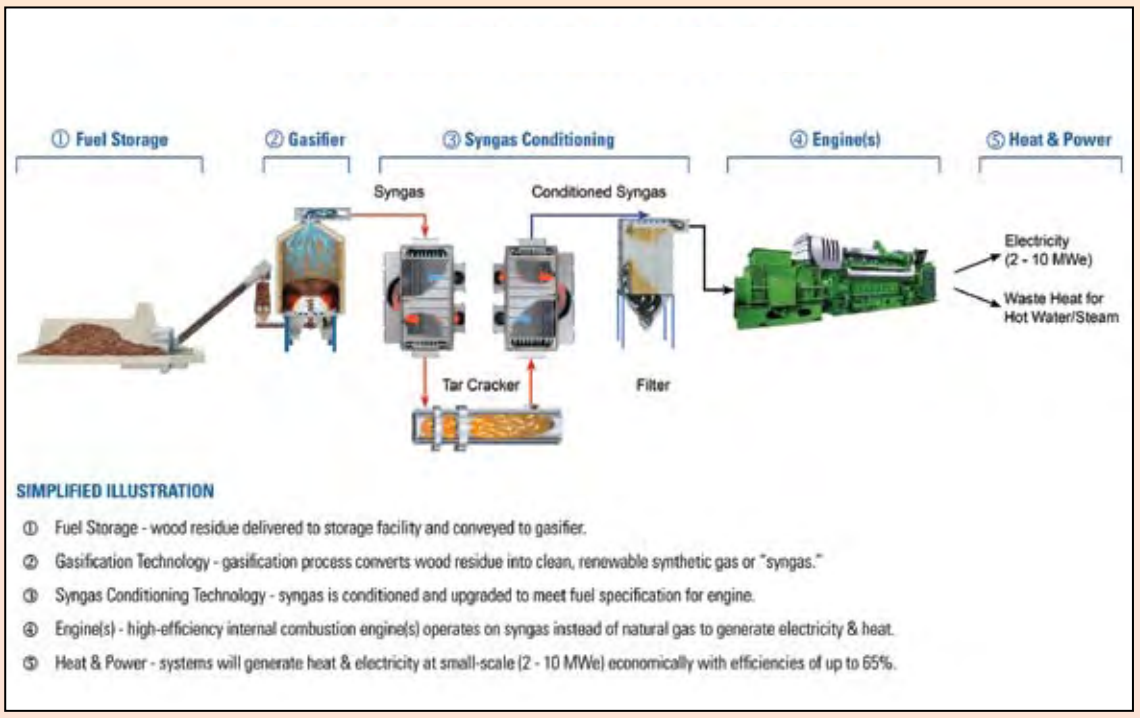
Sauder noted: "In thermal mode it has been working well, as we would expect. The cogen part of the project is the part where the technical risk is. At the moment we are running in cogen for increasing periods of time and taking measurements on things such as emissions and noise, which have been fine. We will start to get 'commercial hours' out of it after about a year's operation. Our aim is to run it 24/7 at its full capacity."

The operation of this unit will provide solid data for projects in other parts of the world. GE believes there are significant opportunities in Europe, India and Southeast Asia.

George explained: "Biomass availability is the first criteria. There also has to be a certain level of price for power. There are opportunities in areas where natural gas is not widely available and people have to depend on diesel. The industrial sector also has possibilities. In Southeast Asia for example, there is big potential for rice husk gasification."

UBC's BRDF will not only demonstrate the feasibility of such projects but also the commercial viability. In addition to supplying up to 12 per cent of UBC's heat requirements, it will reduce UBC's campus greenhouse gas emissions by 9 per cent (5000 tonnes). Although UBC is a jurisdiction of very low natural gas and electricity prices, at today's gas prices, UBC estimates the BRDF will pay for itself in about 15 years.

Simplified illustration of the advanced biomass heat and power system



A bridge too far?

Junior Isles

Few would dispute that the future power generation mix will have a high proportion of renewables – at least in Europe. What continues to be a point of fierce debate, however, is what that proportion should be and how we get there.

Speaking at the *European Turbine Network (ETN) 2012* conference in Brussels last month, Philip Lowe, Director-General for Energy at the European Commission (EC) said: "Meeting 2050 objectives for a low carbon economy cannot be achieved without a high level of electricity generation from renewables in the system, on average, across the EU."

If this is the case, the question then remains how will the remaining technologies – coal, gas and nuclear – shake out? In all its scenarios looking to 2050, the EC sees gas playing a very significant role up to 2030/2035. Lowe noted that every country has objections to one technology or another but said gas is "possibly better placed than virtually every other technology".

Lowe's views, at least of the near to medium term were largely echoed by Mark Johnston, senior adviser at the WWF. "Looking into the future, I personally believe the new build coal paradigm that remains in Poland will collapse. I also believe the new build nuclear paradigm that persists in the UK will collapse. When that happens, it will create more market space for gas fired generation as the default option," he commented.

The general view is that gas will play the role of a transitional or bridging fuel to a future where the European energy landscape will be dominated by renewables.

Steve Heinen, Energy Analyst, Energy Technology Policy Division, International Energy Agency said: "We need to recognise the role of natural gas as a transitional fuel. In our 2°C scenario, in the short term natural gas fired power generation will save 7-8 Gt of CO_2, mainly through switching from coal to gas."

The leap for gas in the short term will be very interesting. Even if not the most ideal approach, it is a fairly easy way to solve the variability problem with renewables. But in spite of being an easy fix, gas fired generation has its short-term challenges.

Speaking just two weeks earlier at *The International Herald Tribune's Global Clean Energy Forum* in Barcelona, Giles Dickson, VP Policy Advocacy, Alstom said: "Gas is crucial in helping to deliver renewables to provide the backup capacity and accommodate the intermittency. The challenge is that gas plants in the future will be running at lower loads than in the past. We have already seen that here in Spain."

He asked: "How do you deliver investments in gas capacity when the prospect is of load factors of 50 per cent or lower? Today in Germany we are seeing that industry and investors do not want to invest in new CCGT plants partly because of the relatively high gas prices in Europe compared to the US but also because of the low load factors."

> "The challenge is that gas plants in the future will be running at lower loads than in the past"

In the US, the case for CCGT is much more clear-cut. And with gas prices around $2-3 per million Btu there is a real possibility that gas may crowd out renewables.

Richard Tuthill, Chairman of the US Gas Turbine Association told *ETN* delegates that the share of gas in the power generation mix in the US rose from 16 per cent in 2000 to 24 per cent in 2010 primarily due to the difficulty in permitting new coal fired plants.

Robert Steele, Programme Manager, Electric Power Research Institute, said that for the first time in the US coal and gas generation were equal.

He added: "In the US, building a natural gas combined cycle plant is an easy choice… Duke Energy made a strategic decision some years ago to go to gas; they want to balance coal and gas by 2015. Many [US] utilities are doing this and we are seeing a pattern where they are thinking about a 30/30/30 split between nuclear coal and gas."

Even though the shale gas boom has secured the future of gas fired generation in the US for many years to come, there still has to be a question mark over the very long-term role of gas, especially in Europe.

Lowe noted: "If there is a leap to gas in Europe, which there could well be with the replacement of coal fired capacity, there is a question mark over what we do to achieve emission goals beyond 2030."

The IEA said that in the longer term, under its 2°C scenario, the move to gas could save 20 Gt of CO_2 until 2050 but will need the addition of CCS. Yet the uncertainty surrounding CCS calls into question the future of gas beyond 2035.

Tuthill said: "The demonstration projects need to happen and we need to mature the technology. But there will not be widespread deployment of CCS unless it is mandated, because it is simply not economical."

If there is any focus on CCS at the moment, it is on coal fired plant. CCS on a gas fired combined cycle running for limited hours may be a bridge too far.

One delegate from Vattenfall explained the reality of the situation: "Technology is not the problem, it is the cost. You will never build a CCS plant that will only run for 1000 hours [a year]. It would require a CO_2 price of €200/tonne just to break even. It will not happen."

A survey carried out by EPRI supported this view with some startling facts. Steele explained: "We had responses from 24 utilities worldwide – roughly half from the US and half international, mainly from Europe. Out of 31 questions on R&D, CCS on natural gas combined cycle plants was number 30 in terms of interest. I absolutely agree we need demonstrations… but right now, internationally, CCS on natural gas combined cycle plants is an absolute bottom priority for everybody. That needs to change."

Although there are no full-scale CCS plants in the electricity sector, it is worth remembering that there are other industries where there is no other technology for reducing CO_2. CCS therefore clearly has a very significant role and industries must find ways of incentivising it.

In Barcelona Dickson said: "The challenge that CCS is facing is that mobilising finance for projects is a challenge – not least when CCS doesn't benefit from any feed-in tariff or green certificate scheme unlike the renewable versions of low-carbon energy technology. This is something that some governments in Europe are now addressing.

"There is a growing demand for CO_2 in the US for enhanced oil recovery (EOR) to support its big push for oil and gas production. The challenge in the US will be to use the increased government revenues that come from expanded production to square the circle and ensure that CCS is commercially viable for the electricity generator, so that they in turn can generate the CO_2 that is needed for EOR – it would be a virtuous circle. This is potentially a very exciting development in the US."

Back in Brussels, his colleague Michael Ladwig, Director of Scientific Collaboration at Alstom maintained his faith in the future of gas in both the near and long term. "I do see gas as a transition or bridging fuel. It may be a very long bridge, perhaps the longest ever," he joked. "But we need gas and we need to adapt to the needs of a more renewable world."

Ladwig's belief in CCS is admirable. He said he was once asked what he would do if given €1 billion. He said he would build a gas fired plant with CCS.

For me, that is definitely a bridge too far. Using the money to retire to Barbados would be a much safer and more pleasurable option.