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FutureGen project resurrected as US pushes CCS

Steven Chu: supporting FutureGen

The Mattoon coal fired power project in Illinois has been revived as the US moves forward with plans to develop carbon capture and storage.

By Junior Isles

The Obama administration's decision to all but guarantee almost $1.1 billion in funding for the Mattoon FutureGen clean coal power plant in Illinois should ensure the project's revival. However, the project will need to find one or more new partners to replace American Electric Power Co. (AEP) and Southern Co., which are leaving the project, US Energy Secretary Steven Chu said.

The US Department of Energy said it would release by mid-July a document that is part of an overall environmental review and that is key to going forward. Though the DOE plans to decide by early 2010 whether to go ahead with or discontinue the project, it said moving forward is "the preferred outcome," and that it expects to contribute a total of $1.073 billion.

The project suffered a major setback in 2008 when the Bush administration pulled the plug on the project's funding after costs nearly doubled.

Executives at Southern Co. and AEP, two of the biggest coal-burning utilities in the US, said they support FutureGen, but had decided to focus their investments on their own carbon capture and storage projects.

The remaining participants in the Mattoon project aim to build a 275 MW coal fired a power plant that will capture and permanently store underground 60 per cent of the carbon dioxide emissions. This is down from the original aim to capture 90 per cent of the plant's CO_2. The plant would test the technology on a commercial level, a critical step in the face of likely federal climate change legislation that would limit US greenhouse gas emissions.

For its part, Southern Co. will begin in 2011 capturing a fraction of the CO_2

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EU to help China test carbon capture

The European Union is hoping its decision to give China up to ¤50 million ($70 million) to build a carbon capture and storage plant to test the technology will stimulate other countries to help fund a technology that will reduce CO_2 from China's fleet of large coal fired power plant in the future.

The EU's executive commission says the money will help China develop coal-burning power stations that could capture carbon dioxide and bury it underground.

During May's EU-China summit, Chinese Prime Minister Wen Jiabao asked Europe to help provide it with "clean coal" technology so China could curb emissions from coal-fired power stations.

Europe and the US are already working on pilot plants to test if the costly technology could work commercially and whether the CO_2 can be safely stored. EU governments agreed in March to devote some ¤1 billion ($1.4 billion) to building 12 demonstration plants in Europe by 2015.

With Asia accounting for a third of global greenhouse gas emissions, according to the Asian Development Bank, the EU wants to encourage the transfer of CCS technology to the continent.

The EU is asking other European governments to contribute more public money to the China carbon capture and storage plant project, saying the technology "would be significantly delayed without immediate assistance from developed countries." This could help trigger more private funding, it said.

The European Commission is pledging ¤7 million immediately to assess the feasibility of a plant and is prepared to give up to ¤50 million "provided there is continued political support from China and satisfactory progress" with the project. It says it also expects funding from China.

It said adding CCS to a new power plant burning coal could cost an extra ¤980 million ($1.4 billion).

Growing energy demand in China, India, Brazil, South Africa and Mexico is likely to be met largely from fossil fuels the EU said, and "the capacity to deal with these very substantial potential emissions must be developed urgently."

n GreenGen Co., has obtained approval from the National Development and Reform Commission to build a commercial-scale IGCC power plant. Located in the northern city of Tianjin, the 250 MW plant will be the only one of its kind in the country, at least for the next two to three years, according to Xu Shisen, GreenGen's chief technology officer.

The project, to be built at a cost of $1200/kW, will be based on a domestically developed technology to drive turbines that will run on synthetic gas produced from coal gasification. The gasifier will be supplied by US company, Future Fuels LLC.

GreenGen is 52 per cent owned by the state-owned Huaneng Group. China's other four large power producers – Datang Group, Huadian Corp, Guodian Corp and China Power Investment Corp – and top coal miners Shenhua Group and China Coal Group hold a six per cent stake each. The State Development and Investment Corp. and Peabody Energy Corp., the largest coal miner in the US, also hold six per cent each.

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(Continued from page 1)

from its 2525 MW Barry plant near Mobile, Alabama, in a partnership with the DOE and Mitsubishi Heavy Industries Ltd. Southern will also manage and operate the DOE's new National Carbon Capture Center near Wilsonville, Alabama, where carbon capture technologies will be developed. In addition, Southern unit Mississippi Power in January filed plans to build a 582 MW plant that would be fuelled with gas derived from coal, with carbon capture capability.

Chief executive Mike Morris said AEP would devote its resources to other sequestration projects, including a plant in West Virginia. The company will start in September to test CCS technology at the coal-fired Mountaineer plant in New Haven, WestVirginia, injecting up to 165 000 tonnes of CO_2 a year into the ground.

In June the DOE also announced the selection of nine projects that will develop pre-combustion carbon capture technologies that can reduce CO_2 emissions in future coal-based integrated gasification combined cycle (IGCC) power plants. The projects, totalling nearly $14.4 million, will be managed by the Office of Fossil Energy's National Energy Technology Laboratory.

Pre-combustion processes convert fossil fuels into a gaseous mixture of hydrogen and CO_2 prior to combustion. The CO_2 is then separated and the hydrogen-rich gas can be used in power plants. Compared with post-combustion processes, the pressure and concentration of CO_2 in pre-combustion processes are relatively high – offering the potential to apply novel CO_2 capture technologies.

The nine projects will look at developing technologies such as high temperature membranes, high efficiency solvents, solid sorbents and other novel technologies for capturing CO_2.

CCS is an important part of the Obama administration's plans to tackle climate change. In June the DOE issued a Funding Opportunity Announcement (FOA) soliciting projects to capture and sequester CO_2 from industrial sources and to put CO_2 to beneficial use.

The DOE anticipates making multiple awards under this FOA. The projects will be cost-shared, with the award recipients providing at least 20 per cent of the total funding required for each project. The DOE expects to provide more than $1.4 billion to the selected projects; the total investment (DOE plus cost-share) is expected to create more than 3000 jobs that will extend over six years.

Projects will be selected in two technology areas: large-scale industrial CCS projects from industrial sources ($1.322 billion) and innovative concepts for beneficial CO_2 use ($100 million).

Projects under this FOA will be funded with funds appropriated by the American Recovery and Reinvestment Act of 2009.

The closing date for applications is August 7, 2009. Selection announcements are anticipated in September 2009.

Policy shift towards developing countries

Dr Jonathan Pershing: calling for action

The US seems to have softened its stance towards developing countries in a move that could be important in the run-up to Copenhagen, **writes Junior Isles**

In a major policy shift, the US will ask developing countries to commit to taking actions to reduce their greenhouse gas emissions, but will not be penalised for failing to do so, Dr Jonathan Pershing, the Deputy Special Envoy on Climate Change announced at the end of the UN Bonn conference.

However, this would be part of an "implementing agreement", since the US has not signed the Kyoto Protocol, the first phase of which ends in 2012 and its terms will be renegotiated in Copenhagen this December.

"We need some mechanism to frame world commitments," he said. "All countries have to take action but these actions will be differentiated. There is no excuse for countries like China and South Korea. We expect developing countries to take on quantitative restrictions, which will be binding," he said.

The least developed countries, in particular, would be entitled to funding to meet these obligations but their actions would be monitored and reviewed.

"We are seeking a comprehensive agreement so that countries report their actions and provide information on how they are embarking on a low-carbon pathway," he said.

Chinese State Councillor Liu Yandong, meanwhile, said China was ready to increase cooperation with the US on climate change.

Liu made the remarks when meeting with the assistant to the president for science and technology and director of the White House Office of Science and Technology Policy John Holdren, and US special envoy for climate change Todd Stern.

"To cope with climate change is a common challenge for all humankind," Liu said, hoping that the international community would take concrete actions and work together under the principle of "common but differentiated responsibilities" among developed and developing countries.

Asked what progress there had been on funding developing countries at the Bonn conference, which ended on June 12, Dr Pershing said that the key issue was not the numbers, but to alter "long-term trends in development".

He emphasised the role of the private sector to leverage funds, in sharp contrast to the Kyoto Protocol and a Norwegian proposal that places the onus on the public sector.

Meena Raman from the Third World Network in Malaysia said the US and EU were trying to shift the responsibility from the public to private sector, thereby weakening the commitments of governments.

n At the end of May, the Group of Eight nations and four emerging countries (Brazil, China, Mexico and South Korea) signed an agreement on establishing a new international organization for energy efficiency as part of efforts to fight global warming. The signing for the International Partnership for Energy Efficiency Cooperation took place on the first day of a two-day energy minister meeting in Rome of the G-8.

Each country will contribute ¤1.3 million ($1.8 million) as establishment costs for the new organization whose secretariat will be set up at the International Energy Agency in Paris.

US still sees nuclear future

- Alliance will evaluate potential site for a new nuclear power plant
- DOE narrows list of recipients for government loan guarantees


Ohio Governor Ted Strickland: announced alliance formation

The US is still taking steps to ensure that nuclear is part of the future energy mix despite a report that says the building of new reactors would result in increased costs for taxpayers and ratepayers.

In June, Ohio Governor Ted Strickland joined executives from Duke Energy, Areva, USEC Inc., UniStar Nuclear Energy and the Southern Ohio Diversification Initiative (SODI) to announce the formation of an alliance to pursue the development of America's first clean energy park project at a US Department of Energy (DOE) site in Piketon, Ohio.

Known as the Southern Ohio Clean Energy Park Alliance, the partnership will evaluate the site as a potential location for a new nuclear power plant, including preparing a plant siting study and licensing documents for the US Nuclear Regulatory Commission (NRC).

The announcement came at the same time as a report titled: *'The Economics of Nuclear Reactors'* by economist Dr. Mark Cooper, a senior fellow for economic analysis at the Institute for Energy and the Environment at Vermont Law School. The report said that it would cost $1.9 trillion to $4.1 trillion more over the life of 100 new nuclear reactors than it would to generate the same electricity from a combination of more energy efficiency and renewables.

Solar, wind, geothermal, hydro and CO_2 capture rank high on President Obama's priority list but so does nuclear power.

Speaking to the Western Governors' Association in Deer Valley last month, Energy Secretary Steven Chu said: "Nuclear has to be part of the mix. It's clean, baseload energy." He said loan guarantees included in the federal stimulus package could cover three or four new nuclear power plants.

In May, the DOE narrowed its list of the most likely recipients of $18.5 billion in government loan guarantees for building the first new nuclear power plants. It informed four companies planning new reactors that their applications have been elevated for closer scrutiny.

DOE spokeswoman Stephanie Mueller said the proposed projects singled out for "due diligence" review, often the final phase of the review process, are: Constellation Energy for a reactor at its Calvert Cliffs nuclear plant near Lusby, Maryland; NRG Energy for two new reactors at its South Texas Project near Bay City, Texas; Southern Company for two new reactors at its Vogtle power plant near Waynesboro, Georgia.; and South Carolina Electric & Gas, for two new reactors at its V.C. Summer power plant near Columbia, South Carolina.

European utilities selling non-core assets

Several of Europe's major utilities are selling off non-core assets in an attempt to reduce debt.

Enel, Europe's second largest electricity utility, has sold a majority stake in its gas distribution network after finalising terms of an ¤8 billion rights issue – one of the biggest cash calls by any company since the credit crisis began.

The two transactions are part of the Italian utility's attempt to manage its ¤50.8 billion net debt and to maintain its credit profile and its credit rating. In April, Enel sold its high voltage electricity lines unit to Terna, another Italian utility, for ¤1.1 billion.

Enel said Friday it had sold an 80 per cent stake in its gas distribution network, Enel Rete Gas, to F2i, an Italian infrastructure investment fund, and Axa Private Equity, for ¤480 million.

F2i will have 75 per cent of ERG and Axa will have 25 per cent. Enel said the structure of the transaction would reduce its own debt by ¤1.2 billion.

Spanish electricity company Iberdrola is also looking to counter the effects of its sizable debt and protect its balance sheet, saying it will launch a ¤1.25 billion private share sale to raise capital.

In a filing to the Spanish market regulator, Iberdrola said the sale would help improve its cash flow to debt ratios and maintain its current credit ratings.

The company, based in the northern Spanish city of Bilbao, has a debt in excess of ¤31 billion.

Iberdrola added the amount of capital to be raised could be increased if needed and would help it maintain investment commitments. The company said in February it planned to invest ¤4.2 billion this year.

Meanwhile, Swedish utility Vattenfall is in intense, binding talks with more than one buyer for its German power transmission grid, as the group aims to improve its cash flow by selling non-core assets.

Vattenfall Europe's power grid sale has faced delays due to the financial crisis and regulatory concerns over its revenue parameters since announcing the divestment in July 2008. But talks are now moving and Chief Executive Lars G. Josefsson said that Vattenfall should find a successful bid in the third quarter and close the deal in the fourth.

USA debates energy package

The USA is under pressure to enact its climate bill before the end of the year, but even if it achieves this, the legislation is likely to be much weaker than that which was originally proposed.

Siân Crampsie

US President Obama's vision of a clean energy economy appears to be a long way off in spite of the progress of new proposed legislation in Congress.

In June the US House of Representatives passed the American Clean Energy and Security Act (ACES), a move that Obama said would "spark a clean energy transformation" in the economy and "spur the development of low carbon sources of energy".

The approval of the bill in the lower house – by a narrow margin of 219 votes to 212 – came soon after the Senate Energy and Natural Resources Committee approved a comprehensive energy package known as the American Clean Energy Leadership Act (ACEL) that would require utilities to generate 15 per cent of electricity from renewable sources.

The main thrust of the proposed ACEL Act is to expand the use of renewable energy as well as deal with concerns over the development of the transmission grid. However, lawmakers and environmental groups have already expressed concerns that the bill, which could reach the Senate floor in the autumn, is already weak.

The ACES Act has also been significantly weakened in its passage through Congress after pressure from the coal and industrial lobbies. The bill would cut US emissions of greenhouse gases to 83 per cent of their 2005 levels by 2020 through a range of energy efficiency measures, a cap-and-trade system and a mandate on renewable energy.

The ACES Act will now be sent to the Senate for consideration. If the Senate passes the ACEL bill, the differences in the two pieces of legislation would have to be reconciled and the final bill passed by both houses. ACEL is unlikely to reach the Senate floor before the autumn.

During his presidential campaign, Barack Obama set a goal of generating 25 per cent of power from renewable energy by 2025. The Senate's legislation is much less aggressive than this, mandating that power plants meet targets to gradually produce more renewable power, beginning with three per cent of their output between 2011 and 2013 and rising to 15 per cent between 2021 and 2039.

Utilities would be allowed to avoid up to one-quarter of the mandate by showing improvements in energy efficiency or increasing the use of nuclear energy.

President Barack Obama: sparking a clean energy transformation

Before being passed to the Senate floor, ACEL is likely to be combined with other Senate initiatives including a cap-and-trade proposal, according to the Pew Center on Global Climate Change. President Obama wants legislation in place before December in order for him to take a lead role in the global climate discussions scheduled to take place in Copenhagen at the end of the year.

The main changes that have been made to ACES over the last month include some key concessions to operators of coal-fired power plants in order to give them more time to develop and deploy clean coal technologies such as carbon capture and storage (CCS). Further changes may be made to the bill in order to win the House of Representative's approval.

Negotiations between lawmakers have resulted in a bill that calls for the government to give away 85 per cent of all emissions allowances under the proposed cap-and-trade system. Obama and the green lobby want all permits to be auctioned.

Other changes sought include reducing the near-term emissions target from 20 per cent below 2005 levels by 2020 to 17 per cent.

The ACEL Act's other main provisions include the expansion of the USA's electricity transmission infrastructure and for further exploitation of offshore oil and gas reserves. It would give much more authority to federal regulators over the siting of new high voltage power lines that are needed to support the expansion of renewable resources.

It would also remove the last congressional barrier to offshore drilling in the eastern Gulf of Mexico.

Away from Washington, D.C., a number of utilities are preparing to make greater use of renewable energy and have announced several key developments.

The Arizona Public Service Company has signed an agreement to purchase the output of a new concentrating solar power (CSP) plant being developed by Starwood Solar and Lockheed Martin. The 290 MW plant will be operational in 2013 and will be the world's largest dispatchable solar energy plant ever built.

Californian utility Pacific Gas and Electric is to purchase the output of a 230 MW solar photovoltaic (PV) power plant being developed by NextLight Renewable Power, while American Electric Power has issued a request for Proposals (RFP) for the development of up to 1100 MW of renewable energy.

Canada moves forward with climate initiatives, green funding

- Two C$1 billion initiatives launched
- Government prepares for carbon regulation

The Canadian government has marked a major milestone in the development of a carbon market in the country by announcing that it is moving forward with its offset system for greenhouse gases.

It is also hoping to spur the development of clean energy technologies with the launch of a C$1 billion Clean Energy Fund and a C$1 billion Green Infrastructure Fund that form part of a wider economic stimulus package.

Canada's offset system will establish tradable credits to encourage cost-effective greenhouse gas reductions in areas that will not be covered by planned federal greenhouse gas regulations. Potential projects that could qualify for offset credits include methane capture and destruction from landfill gas.

Companies subject to the greenhouse gas emissions regulations will be able to purchase offset credits on the carbon market and use these credits for compliance with their regulated targets. Other parties such as small businesses, individuals and travellers will be able to acquire and use these credits to voluntarily offset the greenhouse gas emissions from their activities.

The government has also said that the first projects to receive funding under its Green Infrastructure Fund is an initiative to enhance infrastructure at the Mayo hydropower facility and phase 2 of the Carmacks-Stewart transmission line in the Yukon Territory. The two projects will receive up to C$71 million of federal funds and will reduce the Yukon's dependence on diesel generation by over 40 per cent by 2012.

The Green Infrastructure Fund will target investments in sustainable energy and environmental projects that will improve the quality of the environment and lead to a more sustainable economy over the long term, according to the Canadian government. It will disburse up to C$1 billion over five years.

The Clean Energy Fund will invest C$850 million in technology development and demonstration and will also include a C$150 million research component. The government has reserved C$650 million for large scale carbon capture and storage (CCS) demonstration projects and C$250 million for smaller scale demonstration projects of renewable and alternative energy technologies.

Argentina calls for renewable investments

The Argentine government hopes to attract investments of up to $2.5 billion in its energy sector through a new renewable energy initiative.

The country's state-run energy company Enarsa has opened the bidding for multiple renewable energy projects with a combined capacity of around 1 GW. The government hopes that the move will finally boost development of its renewable energy sector and improve energy security.

Companies reported to be interested in submitting projects include AES, Vestas, Endesa of Spain, Pampa Energia, Petrobras and SoWiTec.

The government has set a target of generating around eight per cent of electricity from renewable sources by 2016. It hopes that offering developers 15-year contracts on the projects will be enough to overcome doubts about investing in the country.

Argentina currently generates about one per cent of its electricity from renewable sources. In 2005 the government outlined plans to develop more than 300 MW of wind power in areas such as Patagonia but current wind capacity stands at only 29 MW.

Brazil focuses on nuclear

The Brazilian government plans to build four new 1000 MW nuclear power plants through 2030, a top Mines and Energy Ministry official said.

Construction of a planned 1350 MW plant in the town of Angra dos Reis, in Rio de Janeiro state, is to begin once an environmental permit has been granted.

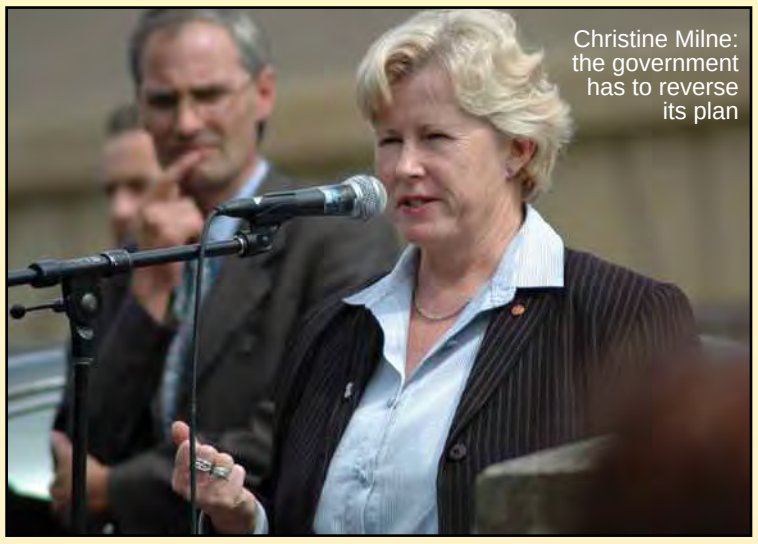
The first of the four new facilities are to be built before 2019 five years after the projected completion date for Angra III – in an area between the northeastern cities of Salvador and Recife, the Mines and Energy Ministry's energy planning and development secretary, Altino Ventura Filho, said.

"The continuation of the nuclear programme will be carried out at two locations... one in the northeast and the other in the southeast and each could have several plants. What is being planned through 2030 are two facilities in each of them," Ventura told a parliamentary committee on climate change.

n The European Atomic Energy Community (Euratom) and the Brazilian government recently set the terms of an agreement in the field of nuclear fusion research that should be signed in the next Brazil-European Union Summit, due to be held in October in Stockholm, Sweden.


Angra dos Reis, in Rio de Janeiro

Australia may change course after ETS opposition


Christine Milne: the government has to reverse its plan

Stiff opposition to Australia's carbon emission trading scheme may see the government alter its plans for renewable legislation.

Australian Greens climate change spokeswoman Christine Milne has said the government would have no alternative but to reverse its plan to link the passage of the emissions bill to renewable energy measures after the government failed to get the scheme through the Senate.

A vote on Australia's carbon emission trading scheme (ETS) will now have to wait until parliament returns in mid-August after the upper house delayed the vote.

Earlier, the Greens said the federal government's controversial emissions trading bill was certain to be defeated claiming the plan's economic and environmental analysis was inadequate.

Senator Milne said the government had added a complication by tying renewable energy target legislation to passage of the emissions reduction scheme. "The government is going to have to back down on that because so many businesses around the country are desperate to get going with expanding renewable energy."

Green groups want emissions trading ditched in favour of direct and immediate action to tackle climate change. Groups representing 400 000 people have put forward an alternative – dubbed "Plan B" – which includes phasing out coal-fired power stations.

Coal, however, is expected to play a continuing role in power generation. Mitsubishi Heavy Industries, Ltd. (MHI) and Mitsubishi Corporation (MC) recently agreed with ZeroGen Pty. Ltd., a company that is wholly owned by the Queensland State Government, to participate in a project to build an integrated gasification combined cycle (IGCC) power plant with carbon capture and storage (CCS). The plant with a capacity of 530 MW is slated to start operating in 2015.

Recently released national greenhouse accounts show Australia's emissions rose by an estimated 553 million tonnes of carbon dioxide equivalent, or 1.1 per cent, last year.

The government's response to climate change has met with significant public resistance with around 6000 people protesting in state capitals across Australia last month. The protest movement also wants Australia to have 100 per cent renewable energy by 2020.

The government has set a target for 20 per cent of Australia's electricity generation to come from renewable sources by 2020; a policy which will likely require an additional 45 000 GWh of electricity generation from renewable sources.

To reach this target, the government is implementing its $4.5 billion Clean Energy Initiative. As part of the initiative, last month the Minister for Resources and Energy, Martin Ferguson, invited geothermal companies to submit applications for funding under Round 2 of the $50 million geothermal drilling programme.

The State government of New South Wales also last month approved Australia's biggest wind farm. The project at Silverton, near Broken Hill, with almost 600 turbines, is to be built in far western NSW.

ADB to double annual clean energy investment

- ADB contribution will catalyze additional resources from private sector
- Taiwan Renewable Energy Development Act will spark investment

The Asian Development Bank (ADB) plans to double its clean energy investments to $2 billion a year in a bid to reduce greenhouse gas emissions in the region. The new target will take effect from 2013 and adds to the ADB's already significant clean energy investments.

"We expect that this contribution will catalyze significant additional resources from the private sector, carbon markets and other sources," said ADB President Haruhiko Kuroda during a high-level dialogue on climate change held in the ADB headquarters in Manila.

But Kuroda said the $2 billion annually represents only a fraction of the region's financing needs in the area of clean energy.

The ADB also said that Asia's share of global greenhouse gas emissions could rise to more than 40 per cent by 2030. Asia already accounts for a third of world emissions of greenhouse gases and its share of discharges from energy use has tripled over the past 30 years, said Kuroda.

Among ADB's clean energy investments are wind power projects in China and India; hydropower development in Bhutan, China and Vietnam; plans for energy-efficient lighting for low-income households in the Philippines; and a biomass power plant in Thailand.

In June the World Bank (WB) said it would provide $202 million to Vietnam to help increase the country's supply of electricity from renewable energy sources.

The credit will contribute to Vietnam's Renewable Energy Development Project (REDP). The aim of the project is to increase the supply of electricity to the national grid from renewable energy.

Meanwhile, Taiwan's green energy industry is poised to boom after a statute aimed at promoting renewable energy development cleared the legislative floor in early June. Yeh Hui-ching, director of the Ministry of Economic Affairs (MOEA) Bureau of Energy, said the passage of the Renewable Energy Development Act had formally ushered into Taiwan the era of alternative energy development and related applications.

Tsai Chin-yao, chairman of the Solar Photovoltaic Energy Development Committee under the non-profit Semiconductor Equipment and Materials International (SEMI) Taiwan, forecast that the enactment of the statute would spark investment of NT$30 billion in Taiwan's renewable energy sector within one year.

Under the law, the government will provide incentives such as equipment purchase subsidies and low interest loans to increase renewable energy generating capacity in Taiwan to between 6.5 GW and 10 GW.

Bangladesh budget outlines energy goal

In his budget speech Bangladesh's finance minister, Mr AMA Muhith, outlined a vision to solve the gas and power crisis, and proposed an allocation of Tk 4310 crore ($625.5 million) for the sector in the next fiscal year (FY).

The government is seriously considering using coal along with gas for power generation, Mr Muhith said. "We shall set up coal fired power plant using environment friendly technology for extraction of coal. If required, coal may be imported to run these power plants."

In view of the gloomy gas supply scenario, the Power Development Board (PDB) has now shifted its focus from gas-fired plants and proposed six coal-fired power projects – five of which would be 500 MW – totalling 2625 MW.

PDB officials said the five large power plants would cost around US $3.5 billion and would take at least four years to complete if the government commences tender processing work this year.

In addition, PDB in its proposal to the power ministry recommended the setting up of three more 100 MW duel-fuel power plants by 2013.

"If we go ahead as planned, we hope that by 2013, 2810 MW of power will be produced through 13 projects under the public sector and another 1350 MW through three private sector projects," the minister said.

The premier bourse said the stock market is ready to provide Tk20 000 crore ($2.9 billion) in the next five years, the amount government can utilise in setting up power plants under public-private partnership.

Bangladesh's central bank has also set up a revolving fund for banks and financial institutions to provide loans at low interest rates in the solar energy, biogas and effluent treatment sectors, local newspaper *The Daily Star* reported. The Bangladesh Bank board of directors approved the fund of Tk2 billion ($28.6 million), the newspaper said.

Renewables may receive $1 billion annually

With the signing of the implementing rules and regulations (IRR) of the Renewable Energy Act, the Philippines would be able to generate up to $10 billion in fresh capital from renewable energy development projects over the next 10 years.

Energy Secretary Angelo Reyes said there are already a number of interested investors that have lined up for pre-qualification at the Department of Energy (DOE).

"Our objective is to double the power being generated from renewable energy sources from 4500 MW to 9000 MW in 10 years," he said.

Reyes said the Philippines has a capacity potential of 200 000 MW from renewable energy. "Investors are aggressively coming in as they see the potential of RE development in the country," he said.

DOE director Mario Marasigan, meanwhile, said they are currently pre-qualifying 15 projects, most of which will be undertaken by local groups with foreign partners.

Marasigan said the local power firms have also been actively looking at potential investments in RE development.

Among these companies are First Gen Corp., Aboitiz Power Corp., Trans-Asia Power, Energy Development Corp., Suweco, Constellation Corp., Oriental Energy, Green Power Philippines, Deep Ocean Philippines, Norasian Corp. and Philcarbon.

Angelo Reyes: Philippines Energy Secretary

PLN to implement power projects in 78 locations

Indonesian state-owned power utility firm PLN said the second phase of its 10 000 MW 'Crash Programme' will be implemented in 78 locations with a combined capacity of 9706 MW. PLN Director Fahmi Mochtar said the company had completed the details of the 10 000 MW programme and would hand them over to the government.

Like the development of the first 10 000 MW programme, most of the projects in the second programme are located in Java with a combined capacity of 5685 MW. Projects to be built outside Java would have a combined capacity of 4021 MW.

- PLN said it is set to secure another $761 million in loans from Chinese banks to help finance construction of two large power generation plants in Java.

The China Development Bank will provide $468 million for the Adipala power plant in Cilacap, Central Java, while Export Import Bank of China will provide $293 million to finance the Pacitan plant in East Java.

India increases renewables and nuclear

India's hopes of reducing greenhouse gas emissions were boosted with a rise in output from renewables and nuclear.

The country saw a 12 per cent rise in investment in renewable energy with $4.1 billion being pumped into this sector last year.

It was also revealed through a document obtained by Greenpeace that India might be gearing up to turn itself into the global leader in solar power generation.

Called the National Solar Mission, the Indian plan outlines a target for 20 000 MW of solar capacity by 2020, according to a draft copy obtained by Greenpeace.

"This would be the most ambitious solar plan that any country has laid out so far," said Siddharth Pathak, a climate and energy campaigner for Greenpeace India.

India would generate 100 000 MW of solar power by 2030 and 200 000 MW by mid-century under the plan.

The plan acknowledges the high cost of solar but says costs could be driven down to between 4 and 5 rupees/kWh by the period 2017-2020, making it cost-competitive with fossil fuels.

There was also positive news on the nuclear front. The country's nuclear reactors, which were running at only 40 per cent capacity, have now improved their generation with increased availability of uranium.

The 12 reactors of Nuclear Power Corporation are now operating at 70 per cent of their capacity with improved production of uranium at Jaduguda and Turamdih in Jharkhand.

India is also said to be close to signing a deal with Canada to buy uranium and nuclear technology for civilian use.

The international community has been clamouring to gain a foothold in India's lucrative nuclear power sector since the ban on nuclear trade with the country was lifted last year.

Westinghouse Electric Company recently said it will begin discussions with Nuclear Power Corporation of India Ltd., (NPCIL) with a goal of reaching agreement on the deployment of Westinghouse AP1000 nuclear power plants in India.

China and S. Korea eye smart grids

China is expected to hammer out a stimulus package for developing an intelligent power grid later this month, to help reduce costs for both utilities and consumers as well as protect the environment.

According to Liu Zhenya, general manager of State Grid Corporation of China, the leading grid operator is planning to build a major smart grid by 2020.

Lu Qiang, an academic at the Chinese Academy of Sciences and professor at Tsinghua University, predicted that China would need to spend at least one trillion yuan to build a smart grid meeting international standards.

Meanwhile, a report by the joint smart grid roadmap committee of South Korea said that the country will set up a smart grid by 2030 to help reduce its greenhouse gas emissions by 41 million tons annually and help cut fossil fuel imports by $10 billion.

Japan's emission target falls short of expectations


Taro Aso: setting new targets

Japan has called its recently announced target to cut greenhouse gas emissions by 15 per cent from 2005 levels by 2020 "ambitious" but critics have called the target inadequate.

Japan's Prime Minister, Taro Aso said the 2020 target, which translates into an 8 per cent cut from 1990 levels, is "extremely ambitious" because the figure does not take into account emission cuts that can be achieved through emissions trading or forest absorption of CO_2.

He said Japan's target "goes beyond the mid-term targets of Europe, which stand at a 13 per cent reduction from the 2005 level, and that of the Obama administration in the United States, which is a 14 per cent reduction from the same year."

However, China, one of Japan's biggest critics dismissed the target as inadequate. Yu Qingtai, Chinese climate envoy said: "I do not believe it is a number that is close to what Japan needs to do, should do."

This was echoed by the World Wide Fund for Nature (WWF) International. Kim Carstensen, director of the Global Climate Initiative at WWF described Aso's plan as "appalling" because an 8 per cent cut from 1990 levels means that Japan would have slashed only 2 per cent more by 2020 from the 6 per cent cut it pledged for 2008-2012 from 1990 levels in the Kyoto Protocol.

Some analysts, however, said that the target is a "politically appropriate level."

"I think the target has two meanings," said Shinichi Mizuta, a foreign policy analyst at Mitsubishi Research Institute Inc. "First, Japan secures a minimum level to negotiate a new climate deal. But the target also takes into account domestic industry's concerns that a sharp reduction would undermine Japan's competitiveness."

Mr Aso said in an interview with the *Financial Times* that it would be "very irresponsible" to aim for greater cuts without considering the impact on the public and industry, especially since Japan's economy already led the world in energy efficiency.

Leading Japanese business organizations were split over the new target for GHG reduction.

"We must say it is a very tough target," said Fujio Mitarai, chairman of the Japan Business Federation, also known as Nippon Keidanren. But Masamitsu Sakurai, chairman of the Japan Association of Corporate Executives, praised the government for setting a "responsible" goal as an industrialized country.

Increasing the use of nuclear power will be key in achieving the new emissions target.

Minister of economy, trade and industry, Toshihiro Nikai, said: "It's important for us to stably increase the number of nuclear power stations and boost the operating capacity rate of reactors." The operating capacity of the 53 reactors nationwide declined to around 60 per cent in fiscal 2008 compared with its peak of 84 per cent in fiscal 1998.

UK proposes clean coal "subsidy"

- Proposals to further boost technology development
- International collaboration with Norway

Longannet power station, Scotland

Siân Crampsie

The British government is proposing to support the deployment of clean coal technology by paying electricity generators a guaranteed price for the carbon dioxide (CO_2) that they store.

In a consultation document on the development of clean coal, the government says that it recognises the risks involved in the development of advanced technologies and the reluctance of companies to make investments when the price of carbon in the EU's emissions trading scheme has been volatile. It has proposed the addition of a levy on electricity users to fund the scheme.

It has also proposed a range of contingency measures in case carbon capture and storage (CCS) technology is not commercially available as early as expected.

The proposals are part of plans by the UK to "invigorate global action" on CCS and place the country at the forefront of technology development in this field. The government recently signed an agreement with Norway to assess the carbon storage potential of the North Sea.

A number of companies in the UK are already investing heavily in the development of CCS, including ScottishPower, which has started operating a test project to capture CO_2 emissions from its Longannet power station in Scotland. The project is the first time that CCS technology has operated at a working coal-fired power plant in the UK and uses technology developed by Aker Clean Carbon.

A recent study commissioned by the UK government indicates that clean coal technology could bring £2-4 billion per year into the UK economy by 2030 and support 30 000-60 000 jobs in engineering, manufacturing and procurement.

The consultation document confirms the government's intention to support up to four pilot CCS demonstration plants and implement a policy requiring all new coal fired power stations to demonstrate CCS at least 300 MW net of capacity as soon as they enter operation.

It is also proposing a policy requiring new coal fired power plants to retrofit CCS to their full capacity within five years of CCS being proven. "The conditions we're proposing for new coal are the most environmentally ambitious of any country in the world, requiring the demonstration of CCS on a substantial proportion of any new power station and the 100 per cent retrofit of CCS when it's proven," said climate change secretary Ed Miliband.

"At the same time, by providing funding for demonstrations, we can maintain coal as part of our energy mix, supporting diversity and therefore security of supply."

In late May the British and Norwegian governments announced that they have commissioned jointly a study investigating the role that the North Sea will play in the CCS market and that they will campaign for international recognition of the importance of CCS. The study will look at how quickly the base of the North Sea could be needed for CO_2 storage and what the UK, Norway and other countries have to do to get it ready in time.

It will also build a profile for the whole of the North Sea, assessing each country's storage potential and projections of likely volumes and locations of CO_2 flows, against a rising price of carbon.

Norwegian scientists have also invited researchers funded by the US Department of Energy (DOE) to help with a project tracking injected CO_2 in the world's first and longest running carbon storage operation located at the Sleipner gas field in the North Sea. The researchers will monitor the sandstone formation of the 1 km-deep reservoir, into which more than 10 million tonnes of CO_2 have been stored to date.

EU on track for Kyoto targets

- Study launched into energy security
- Renewables will boost economies, says Commission

The European Commission says that it is confident that the EU will meet its Kyoto obligations after news that greenhouse gas emissions in the EU15 fell in 2007 for the third consecutive year.

The European Environment Agency (EEA) has released its latest greenhouse gas (GHG) inventory report, which shows that emissions fell in the EU15 by 1.6 per cent in 2007 and by 1.2 per cent in the EU27. Emissions in the EU15 now stand five per cent below Kyoto Protocol base year levels.

EEA Executive Director Professor Jacqueline McGlade has warned, however, that EU countries need to sustain the progress made on emissions in the coming years. "The economic stimulus packages that governments are currently adopting represent a crucial opportunity to address the climate crisis and the financial crisis simultaneously," said McGlade. "A strong Copenhagen agreement later this year would drive forward investments vital to our future prosperity."

EEA data show that among the EU-15, all but Greece and Spain reduced their emissions in 2007. The largest percentage drop was seen in Germany, where GHG emissions fell by over 23 per cent in 2007.

The EU15 agreed to reduce emissions by eight per cent over base year levels under the Kyoto Protocol, with each nation signing up to an individual target.

The EEA says that falling emissions from 2005 are largely due to the reduced use of fossil fuels in the household and services sectors, warmer weather and higher fuel prices.

The European Commission has also launched a study into the impacts of climate change policies on energy security, and has appointed a consortium led by Ecofys to carry out the work.

The project aims to develop and test a methodology to assess the potential impacts of policies such as greenhouse gas reduction targets, renewable energy targets, the deployment of carbon capture and storage technology and emission performance standards.

The Commission recently said that reaching the bloc's 2020 renewable energy target would create around 2.8 million jobs and generate a total added value of around 1.1 per cent of GDP. The EU has pledged to have at least 20 per cent of renewables in its energy mix by 2020 and this policy is expected to boost the growth of the sector in coming years.

Jacqueline McGlade: EU countries need to sustain progress

The Commission also believes that stronger policies and the use of more innovative technologies such as second-generation biofuels will be key to achieving the renewable energy target.

Sweden selects nuclear repository site

Sweden has marked a milestone in its nuclear waste programme with the selection of the site for what will be one of the world's first permanent nuclear waste storage sites that can house high level waste for more than 100 00 years.

The Swedish Nuclear Fuel and Waste Management Company, SKB, has selected Forsmark as the site for the final repository for the country's spent nuclear fuel. The move follows an announcement earlier this year that the government plans to reverse a decades-old ban on the construction of new nuclear plants as part of a proposed climate and energy policy.

The Forsmark site – located near the Forsmark nuclear power plant around 100 km from Stockholm – was selected after two decades of research. "The Forsmark site offers rock at the repository level which is dry and has few fractures. These properties are of a major significance for long-term safety," said SKB in a statement.

Nuclear power accounts for nearly half of electricity production in Sweden. Public acceptance of the Forsmark site by local communities is high, says SKB.

Large PV planned for Germany

- BP: PV crystalline remains a "leader"
- Coal plant project cancelled

Germany is to host one of the world's largest solar photovoltaic (PV) installations after RGE Energy AG and BP Solar announced plans for a 46 MWp plant in Koethen, Saxony-Anhalt.

The new plant is part of a wider agreement between the two companies to install a total of 66 MW of solar capacity in Germany. BP Solar says that it will offer RGE a guarantee on the yield of the solar modules, a policy normally reserved for BP Solar's own turnkey projects.

BP Solar will supply RGE with around 210 000 crystalline PV modules, which are set for installation by the end of 2009. The company says that the project emphasises the importance of the German solar market as well as its view that "PV crystalline technology will continue to be a leader in the solar sector".

Elsewhere in Germany, the prospects for the development of a 1000 MW advanced coal fired cogeneration plant have ended after utility EnBW and chemical company Dow terminated plans for the project.

The two companies agreed in early 2008 to develop plans for the construction of a major new plant at Dow's Stade chemical plant in northern Germany. The project is thought to have been in a technically mature stage and EnBW says that it had the necessary financing in place for the project.

However, the general economic downturn and the recent sharp deterioration of Dow's credit rating are thought to have prompted the chemical firm to reassess its options.

Eskom wins tariff hike

South African utility Eskom has won its latest battle for a rate hike to set it on the path to financial stability, **writes Siân Crampsie.**

South African utility Eskom will be able to continue its capital expenditure programme as planned following a controversial decision by the country's regulator to allow an interim increase in electricity tariffs.

Regulator Nersa has awarded Eskom an average 31.3 per cent tariff increase for the period 1 July 2009 to 31 March 2010, a move that will boost Eskom's revenues and enable it to implement projects aimed at increasing the country's electricity generating capacity. The utility has requested a 34 per cent increase.

Despite concern in South Africa that a major tariff hike will impact the poor as well as add to inflation, Eskom and the government argued that the price of electricity in South Africa was not reflective of true costs, a factor that has placed strain on Eskom's financial reserves as well as made it hard for the company to obtain financing.

Eskom is aiming to spend around R385 billion over five years in order to boost the capacity and operational efficiency of the country's power system. It is planning a spend of R87 billion on capital projects in 2009/10, R104 billion in 2010/11 and R84 billion in 2011/12 but is also expecting funding shortfalls in most of these years.

In May, Eskom secured an export credit agency covered financing arrangement for ¤530 million with seven European banks to fund part of the foreign content of the Medupi boiler contract with Hitachi Power Europe as well as other activities. In 2008 its credit rating was downgraded but it succeeded in securing a $500 million (R5100 million) loan from the African Development Bank as well as ¤300 million (R3900 million) from the European Investment Bank.

Eskom's difficult financial situation had led the company to start prioritising some of the projects planned under its capital expenditure programme while delaying others. Priority projects for the utility are the construction of two new 4000 MW coal fired power stations – Medupi and Kusile.

The company was thought to be reconsidering its plans for a 1500 MW pumped storage facility in Limpopo and a 100 MW wind farm in Western Cape.

In its decision on electricity tariffs, Nersa said that Eskom in future should submit tariff applications six months ahead of the implementation date. The regulator also said it would study Eskom's primary energy costs as poor management of coal reserves and supplies was a key factor in the power cuts experienced in the country in 2008.

Energy demand will get back on track

Renewable energy could become the fastest-growing source of world electricity generation as economies recover from the recession over the next 12 to 24 months, according to the latest International Energy Outlook by the US Energy Information Administration (EIA).

Supported by high fossil fuel prices and continued government incentives, the EIA predicts that world renewable energy use for electricity generation will grow by 2.9 per cent per year to 2030. Overall in its reference case scenario, the EIA forecasts that world energy consumption will grow by 44 per cent between 2006 and 2030.

The International Energy Outlook 2009 indicates that the downturn in energy demand caused by the economic crisis will reverse over the next 12 to 24 months as economies recover. Most nations will see energy consumption growth rates return to pre-recession levels, says the EIA.

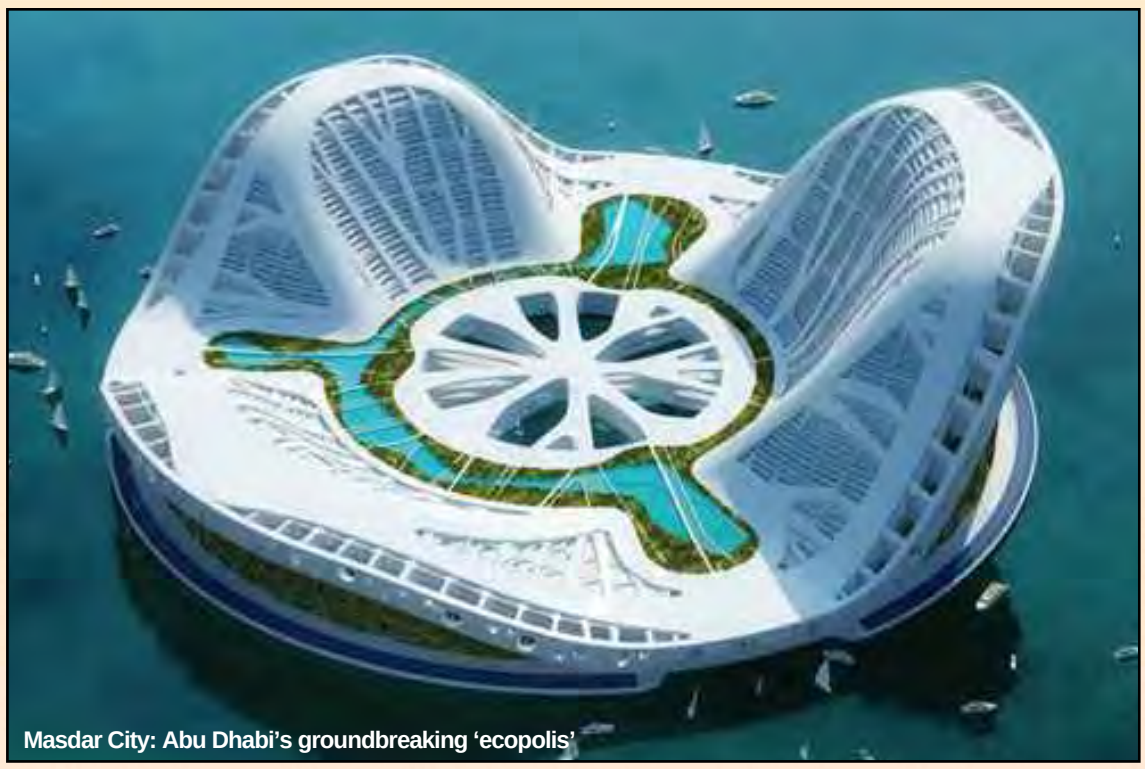
The EIA's predictions for renewable energy are echoed in other recent reports that forecast strong growth in both the wind and solar energy sectors.

USA-based NextGen Research says that government support in the form of feed-in tariffs and renewable portfolio standards, international goals for renewable energy and a boom in China's renewables sector will drive a massive expansion of wind power over the next four years. It predicts that the global installed capacity of wind power will rise from 121 GW in 2008 to 318.5 GW by 2013.

The global recession has dealt the global wind power sector a "glancing blow", according to NextGen. "The world has embarked on a green revolution, with a growing number of aggressive government policies mandating increased reliance on renewable energy," said NextGen's Keith Reinhardt. "In addition, the cost of generating electricity from wind is approaching parity with traditional energy sources, and could become cheaper than fossil fuel-based electrical generation regardless of government subsidies as fuel prices rise and a standardized global value is placed on carbon emissions."

Jordan plans 500 MW solar plant

- Masdar completes 10 MW solar plant
- Jordan signs UK nuclear pact



Masdar City: Abu Dhabi's groundbreaking 'ecopolis'

Jordan is to establish itself firmly on the world renewable energy map with the construction of a solar photovoltaic (PV) power plant that will have a capacity of 500 MW by 2015.

A consortium of Jordanian and global organizations have announced the planned launch of the Shams Ma'an project, which is expected to be one of the world's largest PV power plants. Its first phase of 100 MW will start operating in 2012.

The developers of Shams Ma'an, Kawar Energy and Ma'an Development Company (MDC), are portraying the project as a giant step forward in Jordan's plans to increase renewable energy capacity and energy independence. Jordan has set a target of renewable energy accounting for seven per cent of installed power capacity by 2015, and is also planning the construction of nuclear power capacity.

Jordan's plans mirror those in other parts of the Middle East, where governments have recognised the potential role that renewable energy can play in the diversification of their economies, environmental sustainability and the preservation of oil reserves.

Abu Dhabi recently celebrated the completion of a 10 MW solar plant that will power the initial construction activities of Masdar City, the emirate's groundbreaking 'ecopolis'. The plant is the largest grid-connected solar plant in the Middle East and North Africa, consisting of 87 777 PV modules producing 17 500 MWh of energy per year.

In Dubai, plans have been announced for the development of a major solar panel manufacturing plant, while Fujairah has completed a feasibility study into a 66 MW wind farm.

The Shams Ma'an plant is expected to account for one-quarter of Jordan's renewable energy goal. It will consist of up to 1 million PV panels located in southern Jordan occupying an area of up to 2 million m^2.

The developers will also establish a "solar hub" for research, development and training in solar technologies.

"Shams Ma'an's 160 GWh/year energy output will not only contribute to Jordan's renewable energy planned target, but equally important, it will prevent the equivalence of 160 000 tons of CO_2 emissions," said Hanna Zaghloul, CEO of Kawar Energy. "Jordan imports 96 per cent of its energy… Yet Jordan is blessed with its sun especially in the southern parts that have excellent irradiation indexes making it one of the world's ideal places for Solar Energy production."

The project will be carried out over four phases, starting with research and technology evaluation by October 2009, to be followed by technology selection by September 2010. Construction will start by January 2011.

Jordan's plans to have its first nuclear power plant operational by 2015 have also gathered pace with the signing of an accord on nuclear cooperation with the UK. Jordan has signed similar deals with France, Canada, China and the Republic of Korea.

Desertec initiative gathers pace

The backers of an ambitious project to build a 'supergrid' covering North Africa, the Middle East and the EU have said that they want to have a roadmap for the project in place in the next two to three years and have rejected critics who say that the project represents values of neo-colonialism.

The Desertec Foundation is bringing together industrial leaders from Europe and the Mediterranean area to form the Desertec Industrial Initiative (DII) at a meeting in Germany in mid-July. Backers of the project, which envisages the export of electricity from solar thermal and wind power projects in the Middle East and North Africa (MENA) to Europe via a network of high voltage direct current (HVDC) lines, include RWE, Siemens, Deutsche Bank and Munich Re.

The Desertec Foundation is a charitable initiative of the Club of Rome but its plans have been met with criticism, particularly from German MP Hermann Scheer, who is president of Eurosolar and General Chairman of the World Council for Renewable Energy.

Scheer recently commented to reporters that Desertec's forecasts for the price of electricity from the project were not realistic and that the initiative would take years to implement. In the meantime, argues Scheer, electricity demand in MENA will rise to a point where there will be no excess capacity available for export to the EU.

"The project would also be bad for energy dependence in the EU," Scheer's spokesman told *TEIT*. "Solar thermal is a good concept for North Africa but only to meet their own needs … the transmission lines would also be a target for terrorist attacks."

Hermann Scheer: electricity prices would be unrealistic

AECL faces restructure

- Reactor division to standalone
- Strategic partner could boost profile

Siân Crampsie

An exhaustive review of Canadian nuclear firm AECL has prompted the country's government to announce a restructuring of the firm.

An 18-month review of the company, which manufactures Candu reactors as well as conducts research and development activities, has concluded that it should be split up in order to help it to compete in the rapidly growing global nuclear market. The privatization of the government-owned company has not been ruled out, according to media reports.

The review into AECL's corporate structure found that the company is too small and too limited to compete with other major global players. It proposes that AECL be split along the lines of its two main divisions, Candu Reactor and Research and Technology.

The Research and Technology division would remain in government hands, while its Reactor division could be opened up to strategic partners.

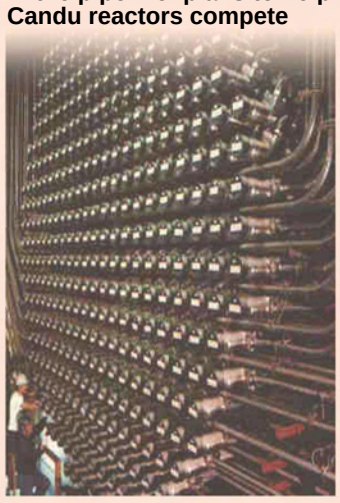
The review said there was "significant private sector interest" in AECL's commercial operations, "a testament to the Candu brand and the skills and expertise of the AECL workforce".

"Our government is acting now to inject strength into Canada's nuclear industry by enhancing the culture of growth; the culture of efficiency; and the culture of leadership," said the Honourable Lisa Raitt, Minister of Natural Resources. "The ultimate objective of this restructuring is to leverage Canada's long-term investment in nuclear energy and strengthen Canada's nuclear industry at a time of global expansion."

The government has engaged N.M. Rothschild & Sons to develop a restructuring plan and to provide external financial advice as required.

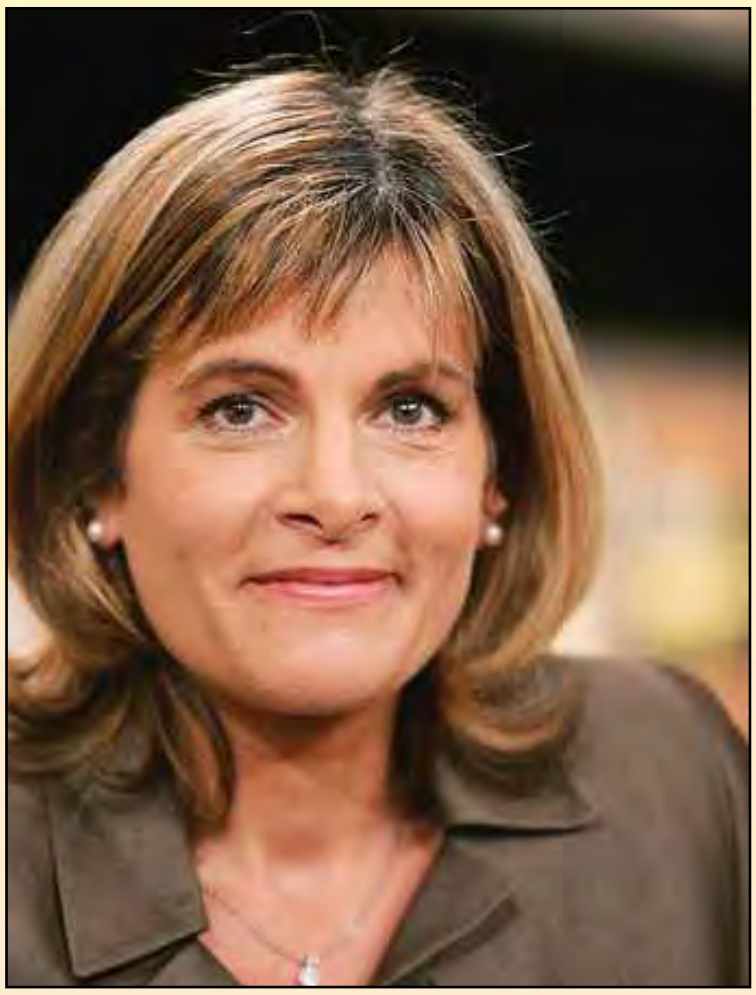
The news was welcomed by the Organization of Candu Industries (OCI), which represents more than 140 Canadian companies supplying goods and services for Candu reactors in domestic and export markets.

In the pipeline: plans to help Candu reactors compete



France to sell Areva stake

- Strategic investors sought
- T&D sell-off likely



Areva's Anne Lauvergeon: opposed to sell-off

The French government is preparing to sell minority stakes in national nuclear champion Areva and will ask the company to divest non-core subsidiaries in order to raise funds for the Paris-based firm's investment needs.

The *Financial Times* newspaper has reported that the government could sell up to 15 per cent in Areva to strategic partners in Asia and the Middle East, a move that would raise around ¤2 billion.

The company is also set to launch the sale of its transmission and distribution business.

The sale of shares in Areva would form the basis of a capital increase, with strategic partners such as Japan's Mitsubishi Heavy Industries (MHI) and Abu Dhabi's Mubadala thought to be in the running. Areva's investment needs have been put at ¤8-10 billion up to 2012, excluding the cost of buying Siemens' share in Areva NP.

Areva is under pressure to make investments to meet rising demand worldwide for its nuclear reactors. Chief Executive Anne Lauvergeon is thought to be opposed to the sale of the transmission business, which has generated good cash flows, and is reported to have asked the government to inject money into the firm.

In February Areva said that losses at its high-profile EPR reactor project in Finland had affected earnings and that it had made a ¤749 million provision in its 2008 annual results to account for delays and cost overruns at the power plant. The ¤3 billion Olkiluouto 3 project has now accumulated an estimated ¤1.7 billion in losses, and this could rise due to the on-going lawsuit between Areva and partner Siemens, and their Finnish client, TVO.

The engineering firm recently announced plans to expand production at its Chalon/Saint-Marcel production plant in eastern France to bring annual production to an average equivalent of 2.7 EPRs, up from 1.7.

Areva bought its transmission business for ¤920 million from Alstom in 2004 and its French counterpart could now be interested in buying back the unit, now valued at ¤3.5-5 billion.

Areva's transmission and distribution business generated sales of about ¤5 billion last year. It is set to benefit in coming years from plans in major markets such as China and India to expand transmission grids, while electricity networks in Europe and North America require upgrading in order to meet the demands of increased renewable energy generation.

Areva T&D in June said that it had formed a strategic alliance with US transmission organization PJM Interconnection to enable the deployment of "smart" grid technologies in parts of the US network.

Vattenfall, RWE drive the future

Utilities in Europe are plugging into the market potential of electric vehicles by starting strategic partnerships to enable the roll-out of the technology.

Sweden's Vattenfall has signed an industrial joint venture partnership with Ford-owned Volvo Cars to introduce plug-in hybrid cars to the market, while Germany's RWE says it is entering a partnership with Apcoa Autoparking GmbH to roll-out charging points for electric cars in publicly accessible parking areas.

Vattenfall said that its initiative with Volvo will mean that cars that can be fuelled with electricity from a standard wall socket will be a reality in 2012. The cars, which will be powered by both diesel and electricity, will be made by Volvo while Vattenfall will develop the charging systems.

The RWE-Apcoa venture will see the creation of charging points for electric vehicles at 20 Apcoa-owned parking facilities in central locations in the German city of Berlin. The initiative will then be rolled out in other cities such as Hamburg, Dusseldorf, Frankfurt, Stuttgart and Munich.

Both RWE and Vattenfall say that they want to demonstrate the convenience of electric vehicles as well as speed up their introduction to the market. "We want to reinforce electricity's importance in society and its key role in solving climate issues. Together we are developing the next-generation technology based on plug-in cars and various charging alternatives," said Lars G. Josefsson, President and CEO of Vattenfall.

"Together, we want to demonstrate to consumers that it will soon be a very simple thing for the general public to recharge their vehicles," said Carolin Reichert, responsible for electric mobility at RWE.

Suzlon makes final REpower payment

Indian wind turbine manufacturer Suzlon has reached a major milestone in its business development strategy by completing its purchase of a majority stake in Germany's REpower.

Following a final payment of ¤87.6 million to the Martifer Group, Suzlon now owns just over 90 per cent of REpower, one of Germany's leading wind turbine manufacturers.

However, the Pune, India-based company is reported to be cutting back its blade production activities in the USA. Local media in the state of Minnesota has indicated that Suzlon was planning to lay-off up to 160 workers from a facility in the city of Pipestone by the end of September.

Suzlon says that its business strategy is to improve cost efficiency and focus on high growth markets. It already has a 10 per cent share of the global wind market.

Meanwhile Japanese engineering firm Mitsubishi Heavy Industries announced in June that it planned to build a nacelle and blade manufacturing facility in the USA to meet projected demand for equipment in the North America wind industry.

MHI is reported to be considering several possible locations for the plant. It expects the global wind turbine market to double in size over the next five years.

European Commission gives go-ahead to Essent deal

RWE's plans to strengthen its position in northwest Europe's energy markets are to go ahead after the European Commission gave the German firm the green light to acquire Dutch utility Essent.

Approval of the ¤9.3 billion deal was given on the condition that Essent sells its 51 per cent stake in German utility Stadtwerke Bremen AG. RWE said that it was pleased that the European Commission has "paved the way for this truly trans-national combination".

The European Commission said that the transaction would not raise competition concerns on the wholesale, retail or trading electricity markets in the Netherlands, nor on most of the electricity and gas markets in Germany, as "RWE's and Essent's joint market shares are moderate and a sufficient number of competitors will remain in the market after the merger".

"After an extensive review of the proposed transaction and an in-depth market investigation, the Commission is confident that the takeover of Essent by RWE poses no competition problems in the Dutch electricity or gas markets," said Competition Commissioner Neelie Kroes. "RWE will in particular not be able to use its position as owner of certain interconnectors on the Dutch-German border to withhold electricity and thereby increase prices in the Dutch electricity markets.

"The Commission is also confident that the commitments offered by RWE to remedy concerns in the German generation and wholesale electricity and gas markets will guarantee that competition will continue to be effective in these markets."

Americas

PacifiCorp issues renewables RFP

US utility PacifiCorp is planning to boost its renewable energy portfolio through a solicitation for up to 500 MW of generating capacity to enter operation between 2010 and 2012.

PacifiCorp has filed a draft request for proposals (RFP) with the Oregon Public Utility Commission, stating that it wants up to 200 MW of new renewable energy capacity on-line in 2010 and a further 100 MW and 200 MW on-line in 2011 and 2012, respectively.

Each renewable resource must not exceed 300 MW, and must have an expected annual output of at least 25 000 MWh after accounting for planned and unplanned outages, according to PacifiCorp. The bids must come in the form of a power purchase agreement, an asset acquisition/sale agreement, or a build-own-transfer agreement.

The RFP will also accept renewable generation coupled with energy storage.

SoCalEd signs renewable contracts

US utility Southern California Edison has signed agreements with developers of wind and solar power projects for the delivery of up to 960 MW of power.

The agreements include contracts with Solar Millennium for up to 726 MW of power from solar thermal projects, an agreement with Columbia Energy Partners for up to 104 MW of wind power, and one with BP Wind Energy & Ridgeline Energy LLC for up to 130 MW of wind power.

The projects are located in California, Oregon and Idaho and are scheduled to come on-line between 2010 and 2014.

Flour selected for Trailblazer CCS plant

Fluor Corporation has been selected by Tenaska to begin limited engineering for the Trailblazer Energy Centre, the USA's first conventional coal fired power plant designed to capture up to 90 per cent of carbon dioxide (CO_2) emissions.

Under a memorandum of understanding signed by Fluor and Tenaska, Fluor will undertake a 12-month limited engineering and design phase. If Tenaska decides to go ahead with construction of the plant, Fluor will undertake the engineering, procurement, construction and commissioning.

The proposed Trailblazer plant is scheduled to open in 2015. The 600 MW plant will deliver electricity to the USA's ERCOT transmission system and will deliver captured CO_2 by pipeline to the Permian basin oilfields in west Texas for enhanced oil recovery.

El Paso signs up for CSP output

El Paso Electric has signed a power purchase agreement to offtake the energy from a new concentrating solar power (CSP) plant being developed in southern New Mexico state, USA, by NRG Energy and eSolar.

The 92 MW plant is scheduled to be fully operational in mid-2011, when it will become the first commercial-scale solar thermal plant in New Mexico.

The project forms part of NRG and eSolar's recently announced plans to develop up to 500 MW of solar thermal power in California and southwestern USA. The power purchase agreement will also help El Paso meet its obligations under New Mexico's renewable portfolio standard.

CFE plans wind projects

Mexico's Federal Electricity Commission (CFE) is planning to boost the country's wind power output with two separate contracts for the development of wind power plants in the southern state of Oaxaca.

The utility has inked a $217 million deal with Spanish company Iberdrola Renovables to build the 101 MW La Venta III wind power plant, and has also signed a $176 million deal with the EAO consortium to build the 101 MW Oaxaca 1 wind power plant.

Capstone wins order for microturbines

Capstone Turbine Corporation has received an order for three C200 microturbine systems from China Southern Power Grid Co., Ltd. (CSG).

The natural gas powered turbines will be installed in a CSG dispatch building and serve as a pilot project to show the benefits of microturbines in a trigeneration application. The project is also designed to illustrate how trigeneration projects can easily and safely connect to the CSG grid.

Asia Pacific

Areva to replace steam generators

France's Areva has secured a contract from Korea Hydro & Nuclear Power (KHNP) to replace the six steam generators on the Ulchin 1 and 2 nuclear power plants during outages planned for 2011 and 2012.

In a consortium with Korean engineering contractor Daelim Industrial, Areva will perform the primary system and licensing operations in co-operation with KHNP and Korea Power Engineering (KOPEC).

PNOC plans for wind development

The Philippine National Oil Company (PNOC) has signed an agreement with a consortium of Japanese firms for the development of wind power project in the Philippines.

The consortium, consisting of Mecaro Rio Vista Energy Corp. (MOREnergy), Mecaro Co. Ltd., Philippine Nippon Steel Construction (PNS Construction) and ESCA Engineering, will provide PNOC with technical assistance and expertise for the development of wind power projects in areas identified by PNOC. It will also help PNOC to develop practical applications of wind power in rural areas and areas that are not currently served by electric utilities.

Alstom selected for Japanese wind farm

The Tokyo Electric Power Company (Tepco) has appointed Alstom to be the exclusive supplier of wind turbines for the new Higashi Izu wind farm in Shizuoka Prefecture, Japan.

Under its contract with Tepco, Alstom will supply, install and commission the wind farm's 11 Eco 74 wind turbines. The wind farm is Tepco's first wind farm project and will have a total electrical output of around 18 MW when it is commissioned in October 2011.

Europe

MHI and Foster Wheeler selected for CCS project

E.On UK, a subsidiary of German utility E.On, has awarded engineering firms Mitsubishi Heavy Industries (MHI) and Foster Wheeler a contract to conduct engineering and design work on a carbon capture and storage (CCS) demonstration project in southeast England.

MHI and Foster Wheeler will carry out the pre-front end engineering design (pre-FEED) work for the proposed CCS facility, which is being considered for funding under the UK government's CCS demonstration competition. If construction goes ahead, the CCS plant will be built at E.On UK's proposed Kingsnorth advanced coal-fired power plant in Kent.

Foster Wheeler's scope of work includes the development of the project schedule and the cost estimate, which will form the basis for the project sanction and the subsequent engineering, procurement and construction phase. MHI will supply its CO_2 capture technology for the project.

Frame 6B heads for Spain

GE will supply a Frame 6B gas turbine-generator for the Lubrisur cogeneration plant, which will help to meet the increasing energy requirements of the Gibraltar-San Roque refinery, with excess electricity to be sold to the Spanish grid. The plant has a capacity of 42 MW of power and will also produce steam to be used for refinery processes.

Hospital orders fuel cells

Giessen-Marburg University Hospital in Germany has ordered an MTU Onsite Energy fuel cell to supply the hospital with energy from 2010. The contract is worth nearly ¤2 million.

The Type HM400 (HotModule) natural gas fuelled fuel cell is capable of an electrical output of 345 kW and a thermal output of 230 kW. It is the most powerful such plant so far supplied by MTU Onsite Energy.

Steam turbine for Maasvlakte plant

Alstom and E.On Benelux have agreed on a contract to supply the steam turbine unit for the new fossil-fuel power plant at the Maasvlakte power station in Rotterdam.

Like the existing Maasvlakte power plant, the new unit will be able to co-fire biomass and is being designed for subsequent retrofitting with carbon capture technology.

Alstom will provide a 1110 MW steam turbine generator package and will carry out full erection, commissioning and trial runs.

Airtricity buys Irish wind farm and orders offshore turbines for Germany

Wind farm developer Airtricity is to construct the 20 MW Slieve Divena phase II wind farm in Northern Ireland after reaching an agreement with RES UK & Ireland Ltd to buy the project.

Airtricity has yet to decide on a start date for construction, but says that the eight-turbine project was granted planning consent in 2007. It is a 20 MW extension to the existing Slieve Divena wind farm, which Airtricity also bought from RES in 2007.

Airtricity has also signed an agreement with Siemens Energy for the delivery of 80 SWT-3.6-107 wind turbines for the Butendiek offshore wind farm in the German North Sea. The offshore project, with a capacity of 288 MW, will be commissioned in 2012.

Vestas turbines for Hungary

Hungarian company Euro Green Energy has placed an order with Vestas for the delivery of 12 wind turbines for a project in the country's Bony region.

The order includes the delivery, installation and commissioning of Vestas V90-2MW wind turbines, a Scada system and a three-year service agreement. Installation of the turbines in Bony, about 80 km west of Budapest, will start in the fourth quarter of 2009.

The project is scheduled to be completed by the end of 2009.

Accenture wins smart grid contract

The city of Amsterdam has awarded IT services vendor Accenture a contract to implement a smart grid and support a programme to reduce carbon emissions in the city.

In a contract estimated by analysts Datamonitor to be worth around $15 million over three years, Accenture will work with the Amsterdam Innovation Motor to develop, implement, manage and assess each of the phases and projects of the Amsterdam Smart City programme. It will also manage the integration of the smart-grid technology and the analysis and use of data.

International

Marubeni buys Shuweiha-2 stake

Marubeni is to buy a 20 per cent stake in the Shuweihat 2 power and water desalination project in the emirate of Abu Dhabi.

The Japanese conglomerate has reached an agreement with French energy major GDF Suez to buy the stake in the project, which will deliver 1500 MW of electricity and 454 610 m^3/day of water to the Abu Dhabi grid when it is completed.

GDF Suez is developing the independent power and water plant, in which it now holds a 20 per cent stake. The Abu Dhabi Water and Electricity Authority (ADWEA) holds the remaining 60 per cent of the project.

Operation of the plant will be managed jointly by GDF Suez and Marubeni.

GE bags Al Dur contract

GE Energy has announced that it has won contracts totalling more than $500 million to supply power generation equipment and services to the Al Dur independent water and power project, the largest power plant in the Kingdom of Bahrain.

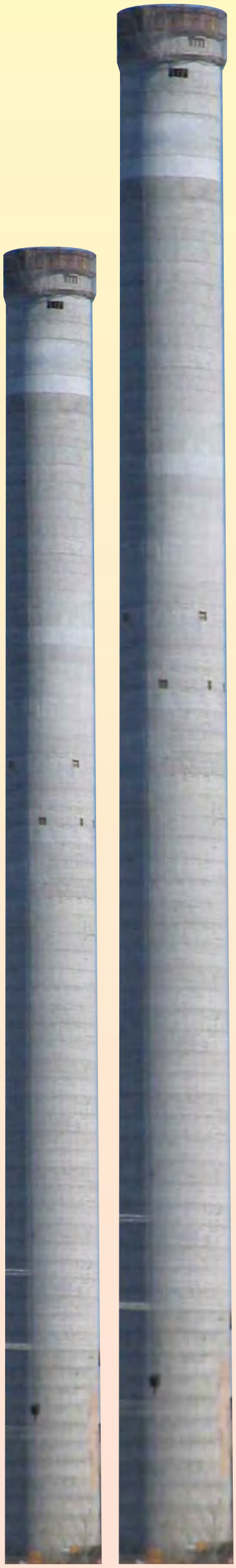
GE will supply two steam turbines and four heavy-duty Frame 9FA gas turbines to the project, which is being developed on Bahrain's southeastern coast to help meet the Kingdom's growing power and water requirements. GE also has signed a 20-year contractual service agreement (CSA) contract for the project to support the long-term operability and performance of the turbines.

The project will represent the first installation of GE's F-class gas turbines in Bahrain. When complete, Al Dur will provide 1250 MW of power – equivalent to 30 per cent of the Kingdom's existing capacity – and 48 MIGD of desalinated water.

ABB to strengthen Saudi transmission grid

ABB has won orders worth $100m for substations to strengthen Saudi Arabia's transmission and distribution network. The company will design, supply, install and commission three 110 kV substations that will serve the growing power needs of the Mecca region.

The substations are scheduled to be commissioned in 2011 and will be operated by Saudi Electric Company.



Conquering the peaks

As the UK embarks on a nationwide smart metering programme, Redpoint Energy's **Duncan Sinclair** looks at the way advanced meters can be used to overcome the problems of highly variable output from intermittent renewable sources.

The UK's renewable energy strategy is a key part of its decarbonisation agenda, which seeks to reduce CO_2 emissions by 80 per cent from 1990 levels by 2050. Ambitious short-term targets have been set for incorporating renewable sources into the energy mix: from two per cent today to 15 per cent in 2020. In order to meet these targets a sea-change is required in the way the country thinks about energy consumption: the way it is used, the way it is sourced, the way it is controlled and regulated, and the way it is funded.

However, the defining characteristic of many renewable energy sources is the intermittent nature of their output. Subject to fluctuations in weather conditions, wind turbines only turn when the wind blows, solar panels produce power only when the sun shines.

In fact, wind power, the most widely adopted renewable energy source in Great Britain to date, perfectly illustrates the problem. There are many views on how far output can be relied upon at times of peak demand: numbers range from zero to 30 per cent of its installed capacity. Aside from the uncertainty – a problem in itself – even 30 per cent compares rather unfavourably to the 90 per cent that can be expected on average across the conventional generation fleet.

This unpredictable and highly variable output creates a whole new paradigm for energy management, and a whole new series of challenges for the energy industry and the government to overcome.

And the problem gets more challenging the more wind we use. In a small system like that of Great Britain, output from renewable plant is highly correlated. In other words, the same weather conditions are likely to have a similar impact at each wind generation plant in a particular region, and possibly across the whole country.

Simply put, if one wind turbine isn't running, the chances are that many others aren't either. There is a far greater possibility that there will be little or no output at all from the entire wind fleet than there is with conventional generation – where outages at individual plants tend to be independent of each other.

And so we are left with a paradox: renewables can displace thermal generation, saving fossil fuels and reducing carbon emissions, but we will still need almost as much conventional capacity as we have today to meet demand when renewables output is low. We would also need more thermal generation to provide balancing services, since the variations in wind output are difficult to forecast.

With forthcoming closures of oil and some coal plant, gas becomes the prime candidate to provide that reserve supply. And here we find the first of many technical challenges, since a number of gas-fired generation plants may struggle to provide the flexibility necessary for this new role. Then there is the security-of-supply issue to contend with: as this winter's Russia-Ukraine dispute demonstrated, greater dependence on gas is not without risk to net importers like the UK.

The problems are not confined to situations where there is a shortage of generated output. There is a very real risk that if low demand coincides with high wind, the excess output that results will simply be spilled if it can't be exported or stored in some way. And spilled generation represents spilled investment. Only the generation output that is consumed counts towards renewables targets. If those targets are to be met, any spilled volumes must be replaced with additional investment in other renewables – thus increasing the costs involved.

This is not the only investment challenge created by the intermittency of most renewable output. At current levels of use, wind plant in Great Britain should be able to capture a price slightly better than that of the baseload. However, any significant displacement of conventional generation will reduce the cost of marginal plant and lower market prices. This has already been observed in countries such as Spain, Germany and Denmark, where levels of wind capacity are relatively high.

As a result, we get a negative correlation between wind output and the price that generators receive: the higher the wind capacity the lower the prices for its power when it generates. Conversely, prices will be higher when wind generation levels are low. This means that initial investment in wind power delivers returns that may diminish over time as more and more plant is incorporated into the mix. Ultimately subsidies for renewables may need to rise to counter this effect.

All of these problems can be addressed in a number of ways: greater interconnection to other markets and diversifying renewable sources to include more marine technologies for example, whose output is less correlated with wind. Greater electrification in the heat and transport sectors could also add valuable storage capabilities to the grid to help flatten load patterns. All of these alternatives will need to be explored if renewable generation is to be successfully incorporated into the energy mix.

But an immediate and cost effective solution may be found in demand-side modulation, so that the revolution in the way energy is generated and supplied is accompanied by an equally dramatic shift in the way it is consumed.

Duncan Sinclair: demand-side modulation may offer an immediate and cost effective solution

The current shape of demand causes huge cost to the system, but if it can be made flatter – less 'peaky' and more consistent – it will reduce the amount of back-up flexible capacity the country needs. And if consumers can respond to fluctuations in supply on the grid, then the cost of managing wind intermittency could be reduced yet further. In fact it would take comparatively little demand-side response to significantly reduce the risks associated with variable renewable output. Modulating demand with various degrees rather than cutting it completely is all that is necessary.

There are a number of ways in which this can be achieved, offering utilities and/or their consumers the ability to adjust consumption with various degrees of automation and control. There is significant technological development to support it, which themselves need large-scale investment and support.

However, investment aside, if demand modulation is to succeed down to the domestic level, some form of time-of-use tariff that is more finely granulated than the current standard unrestricted and peak and off-peak pricing schemes, will be required. Households will need to be able to see the impact of their behaviour, and to adjust their consumption according to changing price signals. I&C customers' half hourly meters will need to be more sophisticated.

> Smart meters can be seen as the first step towards the smart appliances and smart grid technologies that are a key element in transforming electricity transmission and distribution

This is why the widespread adoption of smart metering – which provides this shared intelligence between supplier and consumer – are essential to the greater adoption of renewable energy sources. What's more, they have the potential to incorporate greater flexibility into the grid through small-scale renewable generation. As a result local supply and demand can be matched more closely, and hence more efficiently, and regional pressures on the grid can be eased.

But it is important to note that this kind of change cannot be expected overnight. Even the widespread deployment of smart meters cannot guarantee that customers will respond and change their consumption based on short-term signals, since the marginal cost of consumption is small in the immediate term.

Furthermore, the very things that have the greatest immediate impact on demand in a domestic setting – the television, the heating, the washing machine – are precisely the appliances that are considered essential. Consumers are unlikely to cut down significantly on these big energy hitters. However, the time of use of the latter two can be shifted with little impact on the consumer, and it is to be hoped that consumption patterns will change over the longer term, once the cumulative effect of smaller actions upon the overall bill can be seen.

Nonetheless, as enablers of dynamic response and dynamic demand, smart meters are critical and a successful national roll-out will be key to the low carbon strategy. There is little possibility that any form of demand-side modulation can successfully be achieved at the domestic customer level without the bi-directional information they provide and the dynamic pricing signals they support.

Other changes will certainly be necessary – the settlement system being perhaps the most obvious of many candidates. But smart meters can be seen as the first step towards the smart appliances and smart grid technologies that are a key element in transforming electricity transmission and distribution in the face of greater penetration of intermittent renewable generation.

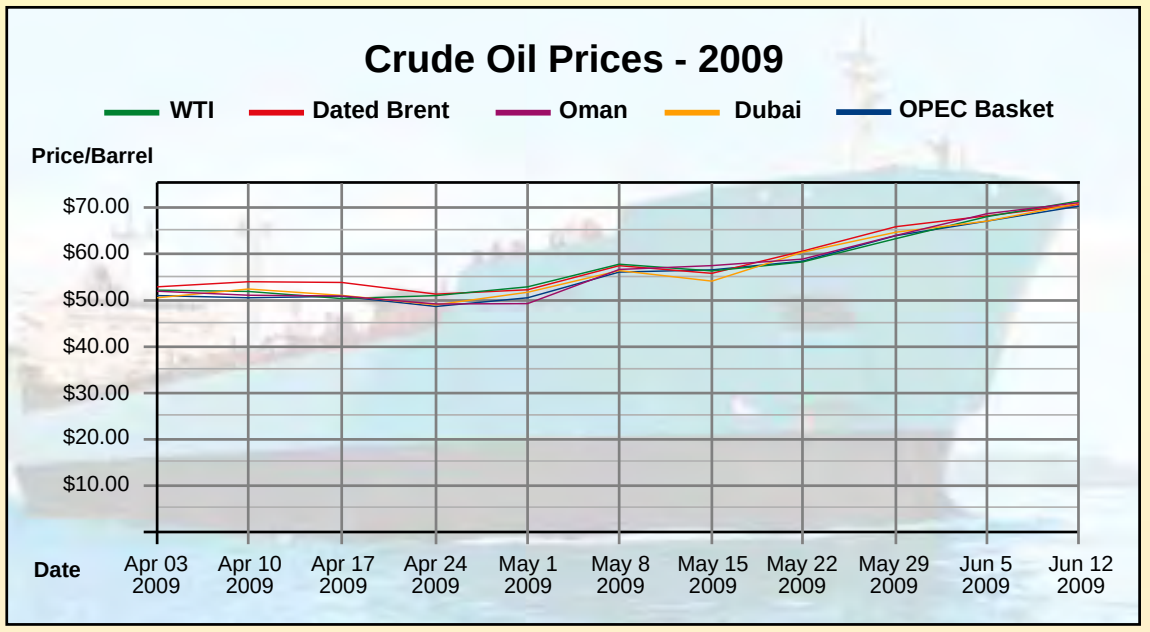
And although the immediate goal of smart meters may simply be to encourage greater energy efficiency, it is in achieving this longer-term goal that smart meters will fulfil their true potential.

Duncan Sinclair is Director of Redpoint Energy, a specialist energy consultancy, advising on investments, strategy and regulation across Europe's liberalised power, gas and carbon markets.

Oil

Crude prices gain despite high oil stocks

- Global oil demand up slightly
- Increasing price of crude could forestall economic recovery



By David Gregory

Rising oil price is good news for oil producers and oil companies but analysts believe that the fundamentals are still not there to support the increases that have appeared on the market in recent weeks and warn that a price correction could push prices back down.

Crude oil prices hit their lowest point so far during the current economic turmoil in February when WTI closed at $33.98/b on 12 February. Since then they have more than doubled, seeing steady gains throughout the first half of June, settling at $70/b or better on some days.

Like a year ago, the heady price of crude oil is again being attributed to market speculators who believe the 'green shoots' of economic recovery will see demand pick up. But there are concerns that the increasing price of crude oil – resulting in higher retail gasoline prices in the US – could forestall economic recovery.

In its latest *Oil Market Report*, released on 11 June, the International Energy Agency (IEA) adjusted global oil demand up slightly "following stronger-than-expected early-year OECD demand." Compared with its report of a month earlier, the IEA increased its forecast for 2009 by 120 000 b/d to 83.3 million b/d. "These revisions do not necessarily imply the beginnings of a global economic recovery, and may only signal the bottoming out of the recession," the IEA warned.

The report forecast OECD demand for 2009 would increase by 120 000 b/d to 45.2 million b/d, which is 4.9 per cent below demand in 2008, or down by 2.3 million b/d. For the non-OECD countries, the IEA report left demand unchanged at 38.1 million b/d, down by 130 000 b/d from 2008.

Meanwhile, Opec producers are taking advantage of the high oil prices by producing above their agreed output target. As of January the Opec-11 (excluding Iraq) have had a target of 24.845 million b/d. Most Opec members have been adhering closely to their country targets, but in May production exceeded 26 million b/d, meaning that compliance with the target had slipped from April's output of 25.94 million b/d. More than half of the over-production is from Iran and Angola.

Opec struck an optimistic note in its *Monthly Oil Market Report*, released on 12 June, saying: "The oil market appears to have entered a new environment… Despite continuous downward revisions to economic growth and demand expectations along with a growing supply overhang, such pressures never materialized. Instead, prices have not only remained steady but have even moved higher."

The report reflected on the role that the market is having on crude oil prices. "Financial market developments have been an important factor behind this recent divergence between oil market fundamentals and prices," Opec said. "Crude prices have shown a strong correlation with developments in the equity markets as well as fluctuations in the US dollar. The rise in equities generally reflects an improving sentiment about the outlook for the world economy and hence oil demand growth. As a result, crude futures and equities have risen in tandem, on the general perception in the market that the worst is over for the world economy."

The report said that during 2009, world crude oil demand is expected to see continued negative growth of 1.6 million b/d, essentially unchanged from its forecast last month. It said the first half of the year has seen a downward revision, while a gradual recovery in demand is expected by the end of the year. The OECD demand is expected to fall by some 1.8 million b/d, while non-OECD demand should see slight growth of around 0.2 million b/d, the report said.

The report also revised demand of Opec crude for 2009 down by 0.2 million b/d to reflect lower-than-expected growth in world oil demand. "Required Opec crude is now forecast at 28.6 million b/d, a decline of 2.2 million b/d" from the 2008 estimate of 30.8 million b/d.

Opec is not alone in hoping that the worst is over for the world economy but a number of factors are still in play. Demand for crude is returning to some parts of the world like China and the US but it is difficult to expect that crude prices can continue to rise at the rate that they have over the last three months. If they do, we will be back at $147/b or more very soon.

Gas

Qatar LNG eases Kuwait seasonal gas shortage

The arrival of Qatari LNG in Kuwait will be the first time that a major hydrocarbon producer in the Gulf will import LNG and is an indication of how demand for energy is growing in the region.

Mark Goetz

Opec member Kuwait is importing liquefied natural gas (LNG) to cope with the seasonal rise in energy demand. Shipments the equivalent of 500 million ft^3 per day million (cfd) will arrive from Qatar, another Opec member and the world's largest producer of LNG. The LNG will be delivered to an offshore regasification terminal and piped onshore to power generation and water desalination facilities. This arrangement is expected to last until October but Kuwait's quest for more gas supply is one that will go on.

The arrival of Qatari LNG in Kuwait will be the first time that a major hydrocarbon producer in the Gulf will import LNG and is an indication of how demand for energy is growing in the region. Another Gulf Opec member, the United Arab Emirates (UAE), is facing a serious future gas shortage and is also importing gas from Qatar by pipeline through the Dolphin Project. Abu Dhabi is investing $10 billion in the development of its Shah sour gas resources, due to come on-stream in 2013, in order to address burgeoning energy demand there.

Kuwait began discussions with Qatar several years ago about the purchase of natural gas from its huge North Field and the construction of an underwater gas pipeline running up the Gulf to connect the two Gulf Cooperation Council (GCC) members (Kuwait, Qatar, the UAE, Saudi Arabia, Bahrain and Oman). But the plan stalled when Saudi Arabia objected to the pipeline crossing its offshore territory.

With its own gas production insufficient, and unable to arrange gas supplies from any of its immediate neighbours, Kuwait opted for the temporary solution of installing the offshore regasification unit near Mina al-Ahmadi in a $150 million short-term solution. Importing gas will allow it to make more of its petroleum products available for export, but in the long-term, Kuwait will face the challenge posed by growing domestic energy demand.

Last month the Chairman and Managing Director of the Kuwait Oil Company (KOC), Sami al-Rushaid, announced that Kuwait will by 2020 require 4.5-5 billion cfd of natural gas and that the country would be able to meet only 40-50 per cent of domestic demand.

"The greatest challenge facing KOC," Mr Rushaid said, "is the increasing demand on energy, especially for power generation." New cities being built in the country's interior will put tremendous demand on Kuwait's power generation sector and the construction of several new plants is already under way.

Despite crude oil reserves of more than 100 billion barrels, Kuwait's gas reserves amount to only 1.78 trillion m^3 (62.9 trillion ft^3), according to the BP *2009 Statistical Review*. During 2008, Kuwait produced and consumed 12.8 billion m^3 (bcm) or 1.24 billion cfd. Most of that was associated gas, which depends on crude oil production. With crude oil production restricted by Opec in order to remove excess supply from the market, Kuwait is not in a position to pump more oil to remove more gas.

In March 2006, Kuwait announced the discovery of 35 trillion ft^3 of non-associated gas in the northern Umm Niga and Sabriya fields. Gas production from the fields began in 2008 and development calls for output to reach 1 billion cfd by 2015.

Included in KOC's plans of meeting the future domestic energy demand target is the proposed 615 000 b/d al-Zour refinery, which would produce the equivalent of 1.3 billion cfd of liquids for the purpose of power generation. But the refinery has faced a number of setbacks due to Kuwait's domestic political turmoil. Even when – and if – the $15 billion al-Zour refinery comes on-stream, Kuwait will still be looking for 1.5-2 billion cfd of gas from foreign suppliers.

One option that Kuwait hopes will materialize is access to the Dorra gas field, located in the northern Gulf in a region where the Kuwaiti, Saudi and Iranian offshore territories converge. The field holds reserves estimated at 20 trillion ft^3 and Kuwait has been keen to develop the southern part of the field, well away from Iranian waters. However, Tehran has repeatedly stated its opposition to any part of the field being developed before the offshore borders between the three countries is demarcated.

Kuwait has also discussed gas imports by pipeline with Iran and Iraq, but those talks have yet to lead to anything tangible.

Capturing coal's promise

With growing global demand for coal, it is imperative to develop and deploy technologies that use coal as cleanly as possible. The US Department of Energy is playing a leading role in commercializing carbon capture and storage technologies worldwide.

Dr. Victor K. Der

Respected national and international forecasts on energy supply and use say that coal is here to stay, and recent statistics confirm that coal is the fastest growing component of global energy supply. Economic growth has been shown to be tied to energy availability and consumption, particularly lower-cost fossil fuels like coal. While alternative sources of energy exist, geographic concentration, expense or long lead times for development mean they will not likely displace coal to a large degree in the near future.

To retain coal and other fossil fuels as viable energy sources in a carbon-constrained world, carbon capture and storage (CCS) technologies are expected to play a pivotal role. On a global scale, CCS technologies have the potential to reduce overall climate change mitigation costs and increase flexibility in reducing greenhouse gas (GHG) emissions.

According to the United Nations Intergovernmental Panel on Climate Change (IPCC), CCS technologies could account for at least 15 per cent to as much as 55 per cent of the global reductions in GHG emissions.

The IPCC also states that technology development, improvements from industry, and research programmes – such as the US Department of Energy's (DOE) Carbon Sequestration programme – could help reduce the current costs of capturing and storing carbon dioxide (CO_2) from power plants by 30 per cent or more. Moreover, a particularly beneficial aspect of certain CCS technologies is that their component parts – carbon capture, transportation, and storage – rely on technologies used and adapted from other commercial industries, thereby enhancing the availability and cost-competitiveness of CCS technologies as viable mitigation options.

The US DOE is taking a leadership role in accelerating the development and use of CCS technologies at home and abroad. Through its advanced coal programme, managed within the Office of Fossil Energy and implemented by the National Energy Technology Laboratory, DOE is developing both the core and supporting technologies through which CCS could become an effective and economically viable option for reducing CO_2 emissions. In partnership with the private sector, efforts are focused on maximizing efficiency and performance, while minimizing the costs of these new technologies. DOE is developing the knowledge-base, technologies, best practices, and protocols to overcome barriers to the widespread deployment of CCS technologies so that sequestration can become a viable option in the near future.

Central to DOE's CCS research is its field test programme, which is being implemented through the Regional Carbon Sequestration Partnerships programme. The Regional Partnerships programme reflects the geographic differences in fossil fuel use and potential storage sites across North America, and targets the use of regional approaches in adopting CCS technology. The seven Regional Partnerships represent more than 350 unique organizations in 42 states and four Canadian provinces. Collectively, the Regional Partnerships represent regions encompassing 97 per cent of coal-fired and industrial CO_2 emissions, 96 per cent of the total land mass, and essentially all the geologic storage sites in North America that can potentially be available for carbon sequestration.

Research is also focused on developing technology options that dramatically lower the cost of capturing CO_2 from fossil fuel power plants. This research can be categorized into three pathways: post-combustion, pre-combustion, and oxy-combustion.

Post-combustion processes capture CO_2 from the stack gas after a fuel has been combusted in air.

Pre-combustion processes convert fuel into a gaseous mixture of hydrogen and carbon dioxide. The CO_2 is then separated and the hydrogen is combusted. Compared with post-combustion processes, the pressure and concentration of CO_2 resulting from pre-combustion processes is relatively high, making CO_2 separation easier to achieve and offering the potential to apply novel CO_2 capture technologies, such as membranes, solvents and sorbents.

Oxy-combustion is an approach where a hydrocarbon fuel is combusted in nearly pure oxygen rather than air, which produces a mixture of CO_2 and water that can easily be separated to produce pure CO_2.

These carbon capture efforts encompass not only improvements to state-of-the-art technologies but also development of several revolutionary concepts, such as metal organic frameworks, ionic liquids, and enzyme-based systems.

To help accelerate commercialization of CO_2 capture technologies, DOE announced the creation of the National Carbon Capture Center (NCCC) at Southern Company Services' Power Systems Development Facility (PSDF) in Wilsonville, Alabama, in May 2009. Testing and developing new CO_2 capture technologies in commercially representative conditions is critical before the technologies can be deployed at full scale. The PSDF can provide such a setting by delivering coal-derived syngas and flue gas over a wide range of process conditions. Long-term testing will be conducted at the NCCC to establish the durability and reliability of new technologies. The testing at the NCCC will provide an important step in the scale up of CCS technology to commercial size.

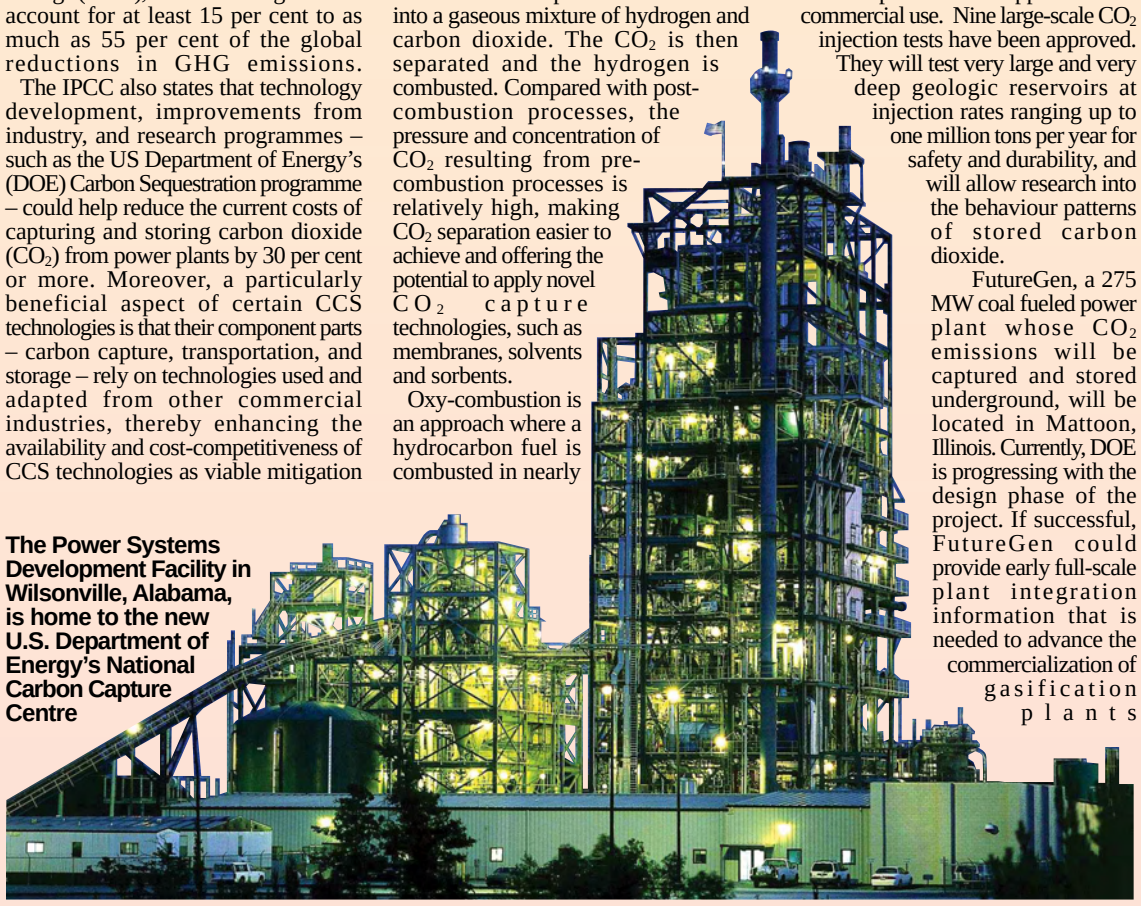
The success of DOE's research in CCS technologies will ultimately be judged by the extent to which emerging technologies are deployed in domestic and international marketplaces. However, both technical and financial challenges abound. Commercial-scale demonstrations help industry understand and overcome start-up and component integration issues, and gain the experience necessary to reduce risk and secure private financing and investment for future CCS projects.

DOE is implementing several large-scale programmes such as the Regional Partnerships' geologic storage field tests, the FutureGen project, and the Clean Coal Power Initiative (CCPI) demonstration projects to establish the early generation technology base to shift CCS from concept to reality.

The geologic storage field tests are entering the development phase this year, the last step needed to support routine commercial use. Nine large-scale CO_2 injection tests have been approved. They will test very large and very deep geologic reservoirs at injection rates ranging up to one million tons per year for safety and durability, and will allow research into the behaviour patterns of stored carbon dioxide.

FutureGen, a 275 MW coal fueled power plant whose CO_2 emissions will be captured and stored underground, will be located in Mattoon, Illinois. Currently, DOE is progressing with the design phase of the project. If successful, FutureGen could provide early full-scale plant integration information that is needed to advance the commercialization of gasification plants coupled with CCS technology.

Dr. Victor K. Der: advanced CCS technologies will undoubtedly play a key role in mitigating CO_2 emissions



The Power Systems Development Facility in Wilsonville, Alabama, is home to the new U.S. Department of Energy's National Carbon Capture Centre

FutureGen is supported by DOE's ongoing advanced coal programme, which will be the principal source of technology for the plant. The project is led by the FutureGen Industrial Alliance, Inc., a non-profit industrial consortium representing the coal and power industries, with the project results being shared among all participants, and industry as a whole. DOE's total anticipated financial contribution for the FutureGen project is just over $1.0 billion.

The CCPI is primarily focused on component and subsystem testing at commercial scale to gain operational integration experience. The CCPI Round 3 competition specifically targets advanced coal-based systems and subsystems that capture or separate CO_2 for sequestration or for beneficial use. The competition is also open to any coal-based advanced carbon capture technologies that result in co-benefits with respect to efficiency, environmental, or economic improvements.

In February 2009, President Obama signed into law the American Recovery and Reinvestment Act (Recovery Act), which provides $3.4 billion for initiatives to expand and accelerate commercial deployment of CCS technology. DOE anticipates funding projects that will capture and sequester CO_2 from industrial sources, and put CO_2 to beneficial use. Recovery Act funds will also expand CCPI and advance the FutureGen project. Other projects will characterize high-potential geologic formations that could sequester CO_2, facilitate transfer of knowledge and technologies required for CCS projects, and provide training opportunities for graduate and undergraduate students.

DOE plays an active role in the burgeoning, worldwide effort to mitigate climate change.

Recognizing that climate change is a global issue requiring a global response, DOE plays a leading role in the Carbon Sequestration Leadership Forum (CSLF) – an international climate change initiative focused on commercializing CCS technologies worldwide. Formed in 2003, the CSLF is a Ministerial-level organization comprised of more than 20 countries and the European Union.

In addition to the CSLF, the DOE is currently cooperating with numerous countries through bilateral agreements and multilateral activities. Most recently, DOE signed a bilateral agreement with Italy's Ministry of Economic Development to cooperate on a wide variety of CCS projects and issue areas, including power generation processes, advanced coal gasification technologies, power system simulations, characterizing sub-surface carbon sequestration potential, and exchanging CCS researchers.

In April 2009, the US joined 15 governments and more than 40 major companies and industry groups in launching Australia's Global Carbon Capture and Storage Institute.

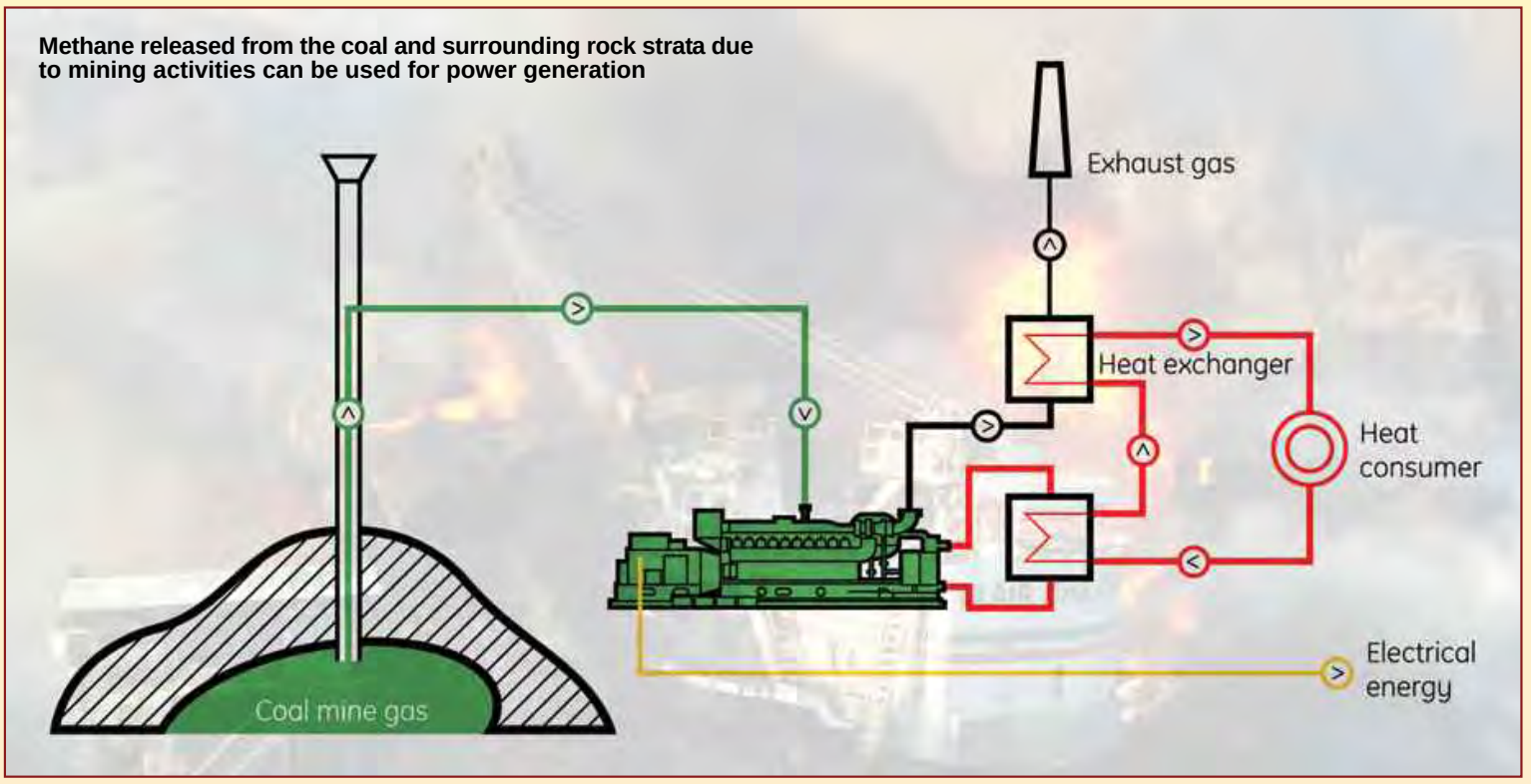
Additionally, US technological advances and expertise in CCS are being shared in such initiatives as the Australian Otway Basin project; the European Union funded CO2SINK project in Germany; the Algerian In Salah industrial-scale CO_2 storage project; the Ordos Basin Assessment in China; the North Sea Sleipner Project; and the IEA GHG Weyburn-Midale CO_2 Monitoring and Storage Project, Zama Acid Gas Project, and the Fort Nelson Project, all in Canada.

With growing global demand for coal, it is imperative to develop and deploy technologies that use coal as cleanly as possible. Advanced CCS technologies will undoubtedly play a key role in mitigating CO_2 emissions under potential future carbon stabilization scenarios. The US is accelerating its efforts to capture and store CO_2 in safe and cost-effective ways, propelling CCS technology from concept to reality.

Dr. Victor Der is Acting Assistant Secretary for Fossil Energy at the US Department of Energy.

Power from underground explosives

While generating power from coal mine gas has several benefits, there are technical problems associated with its use.
David Flin



Methane released from the coal and surrounding rock strata due to mining activities can be used for power generation

Coal mine gas (CMG) is increasingly important as a source of power generation. Several Clean Development Mechanism/Joint Implementation (CDM/JI) projects under the Kyoto Protocol are already in place, because CMG is considered a waste gas from mining operations that is usually vented into the atmosphere. Furthermore, methane has a strong environmental impact as a greenhouse gas, and can generate high levels of emission reductions if burned. Generating additional income through these Kyoto mechanisms has lifted CMG projects in many regions into profitability.

These projects are increasingly profitable; they reduce greenhouse gas emissions; and they increase safety at active coal mines. But there are technical problems associated with their use.

CMG is released from the coal and surrounding rock strata due to mining activities, past or present. In underground mines, it can create an explosive hazard, so it is removed through ventilation systems. Along with the ventilation, a degasification system consisting of a network of boreholes and gas pipelines is often needed to allow the coal to be mined. In abandoned mines and surface mines, methane may also escape to the atmosphere through natural fissures and other diffuse sources.

The degasification system can remove methane in advance (Coal Bed Methane; CBM), during (Coal Mine Methane; CMM) and after (Abandoned Mine Methane; AMM) mining has occurred. CMM comes from drainage from active mining, and has a fluctuating methane content ranging from 25-60 per cent. AMM is extracted from sealed mines, and contains 40-80 per cent methane at a constant level, and contains no oxygen.

There are a number of technical challenges that may potentially arise when using CMM. The most significant of these are: gas humidity and dust; low methane concentrations; air content; quick methane and pressure fluctuations; high ambient temperatures and high altitude; remote location and less experienced operation and maintenance (O&M) staff.

Fluctuations in gas level require a special fuel control system to ensure smooth operation of the gas engine. The fuel system requires a rapidly modulating gas regulator to maintain the proper energy input to the engine with varying gas calorific value and gas pressure. Engine manufacturers have developed solutions to tackle this condition. For example, GE Jenbacher has developed a special gas mixer and control system, and Caterpillar uses either Woodward TecJet or Raptor valve control system. The engines also require a bigger gas inlet system and admission valves due to the lower air/fuel ratio for CMM applications compared to natural gas applications.

Both CMM and AMM show decreasing methane content over the years, making it increasingly challenging to convert the gas into energy. Gerhard Pirker, Marketing Programme Manager for GE Energy Jenbacher gas engines, said: "For low methane CMM, GE's Jenbacher business has adjusted the pre-chamber system of its type 6 engines. Combined with a special layout of the gas train and turbo charger, the pre-chamber technology achieves maximum efficiency (complete burning) despite low heating value (2.5kWh/m)."

The gas stream also requires special gas conditioning to handle particulate and humidity issues in the gas. A dirt filter or wet scrubber is required to remove particulates and a gas chilling and reheating system to reduce gas humidity. The gas blower boosts the pressure to the desired gas engine pressure and removes any pressure fluctuations from the gas gathering system. As the quantity of gas generation from the field varies, a gas flare is also required to remove any excess gas to prevent over-pressurisation of gas mains.

> Sometimes, CMM gas composition may possess various contaminants such as silicon and sulphur that can cause engine corrosion issues

Pirker said: "Sometimes, when methane content in the CMM drops below the lower limits specified by the gas engine suppliers, the CMM is topped up with supplementary natural gas to maintain the safe minimum methane content. There is also technological development taking place into methane concentration systems, converting low methane concentrations streams of 15-20 per cent to concentrations of around 40 per cent."

Sometimes, CMM gas composition may possess various contaminants such as silicon and sulphur that can cause engine corrosion issues. Water vapour can result in the formation of acids and contaminate lube oil as well as causing gas valve sticking.

When the CMM gas has a high concentration of particulates, these are best removed by the installation of a gas scrubber. The wet scrubber installed at EDL's (Energy Development Ltd) German Creek power station in Australia is a good example of removing high concentrations of solid contaminants from the gas. The other corrosion promoting contaminants from gas are not economical to remove and therefore these corrosion issues need to be handled by suitable material selection for engine components.

Other corrosion promoting contaminants from gas are not economical to remove and therefore these corrosion issues need to be handled by suitable material selection for engine components.

Nitin Patil of PB Power said: "Engine suppliers suggest a few alternatives for low Btu applications, including the following: the scraping ring helps remove deposits on the cylinder wall; the cast iron piston gives better durability over the aluminium alloy piston for this application; the lube oil is generally designed to be more alkaline to extend the oil change intervals; the jacket water temperature is generally designed to be higher to raise the acid dew point; and the bearing needs to be without copper and brass metals when H_2S level above 10 ppm."

As far as the logistical issues are concerned, available space, ground conditions, climate and infrastructure at a mine are often a challenge for erecting a CMM power plant. In addition, the plant needs to be flexible to changing gas volumes or even location of mine shafts.

In many cases, the staff at a CMM power plant has limited experience with gas engine operation. Since many plants are located in remote areas, the O&M support from the gas engine supplier becomes difficult.

Finally, several coal basins are located at altitudes of >1000 m above sea level, and the ambient temperatures are sometimes high. If the heating value of the fuel gas is also low, full load operation becomes challenging.

Pirker said: "Therefore an optimal gas engine for CMG power generation needs to have a compact design with high power density, small footprint and if needed available in a suitable containerised solution. In addition to that the engine should be very robust, easy to operate and maintain, with the spare parts available in time."

Tapping coal mine methane in China

China is the world's largest producer of coal mine gas, with approximately 11 billion m^3 of unused methane per year. But new government policies, from tax exemption to favourable pricing, support tapping methane as an energy source there as well.

Coal mine gas is regarded as a killer in China, claiming the lives of 6000 miners there each year. According to the Energy Bureau of the National Development and Reform Commission, 80 per cent of deaths in major mining accidents in China are related to gas. When the Pansan coal mine began producing power using coal gas in 2005, deaths there decreased 10-fold.

The Sichuan Coal Group (China) is using GE Energy Jenbacher gas engines for a coal mine methane project at its Furong site to utilise mine gas to generate on-site power for the active mine. The plant is located in XunChang Town, Gongxian County, 40 km from YiBin City in Sichuan Province.

The project involves two Jenbacher gas engines, each providing an output of 3.048 MW. The plant will also utilise the engines' exhaust gas to produce steam, which will be used in a steam turbine to generate additional power for the site.

China has been adopting stricter environmental policies that are driving the development of more CMM power projects. In April 2008, to reduce the country's greenhouse gas emissions, China's Ministry of Environmental Protection prohibited coal mines from releasing gases containing more than 30 per cent methane, methane being the second largest global contributor to greenhouse gas emissions after CO_2.

In addition to power generation, the plant is eligible for carbon credit trading under the UN-backed Clean Development Mechanism programme, providing Sichuan Coal Group with additional financial support for the project.

Junior Isles

Forever young?

This is not a tribute to the late pop legend Michael Jackson (R.I.P). It is more of a question prompted by a statement at last month's *Annual Eurelectric Conference* in Bucharest.

"Infant industries never grow up," said Professor Richard Green, Director of the Institute for Energy Research and Policy at Birmingham University, UK. Professor Green's comment is one that in many ways describes how many see renewables and the mechanisms behind the drive to increase their share in the power generation market.

As the organisation representing electric utilities in Europe, many of Eurelectric's members have the task of attempting to implement the EU's directive of increasing the share of renewables to 20 per cent by 2020. It was therefore no surprise that one of the most interesting topics of debate was how to best integrate renewables into the power sector.

In the opening keynote address, Mr Didier Houssin, Director General of Energy Markets and Security at the International Energy Agency (IEA) said that renewables would account for 40 per of generation in 2030. However, not all agree with such ambitious figures.

Power generators argue that in some countries, the targets that have been set by government for offshore wind, for example, are unrealistic. Leonhard Birnbaum, member of the executive board of RWE AG said: "There is no way we will see 20 GW in Germany. Maybe we will get to 7-8 GW. We have given the government this message. As a generator, we will do what we think we can do and the rest is really a political decision. There is no point in fighting political battles. It is better to fight for efficiencies and go for the technologies that have a chance to be competitive in a reasonable time scale."

Indeed the time scale for reaching the targets is a major reason behind such heated debate. David Porter, head of the UK Electricity Association said: "Renewables will come anyway but it's the forcing of it into a 10-year time scale that is making us ask all sorts of questions now, that we would have dealt with fairly naturally had there been more of an evolution."

Instead of asking how to integrate the maximum amount of renewables into the system perhaps it would make more sense to ask how to integrate renewables into the system in the most cost-effective way.

The way renewables are being forced into the system in many ways goes against the spirit of the EU's supposed free market ideals. Currently, we have a European target and European directive but not a European mechanism.

This begs the question of how important the market actually is to politicians at the European level. Mr Porter noted: "Although they talk very strongly about markets, when they prescribe what they want markets to deliver, it suggests they don't believe that strongly in markets in the first place."

Countries within the EU have taken national approaches as to the best way to support renewables. Looking at Germany, Mr Birnbaum said there should be more trade of renewables as opposed to fixed feed-in tariff regimes: "Feed-in tariffs show that governments believe they cannot rely on markets. Politicians and industry are really on two different planets."

Getting 27 nations to agree on a single market approach is always going to be an uphill struggle; and to some degree it is understandable. Mr Porter noted: "The national mechanisms came first. They were already there and companies were building investment plans on them. Feed-in tariffs may be controversial in Germany but in the UK, they are held up as a perfect way of supporting renewable energy."

> Renewables will come anyway but it's the forcing of it into a 10-year timescale that is making us ask all sorts of questions now…

And so the question arises: what is the best support mechanism for renewables in the EU going forward taking into account national interests? Mr Birnhaum said: "There is no 'best' solution, what is best for the system depends on the objective defined for the system. Therefore different people looking at the same problem will come to a different 'best' solution. I would prefer to see no support schemes at all. There should be national targets and it should be then left up to generators and the market as to how to most cost-efficiently fulfil those targets."

One delegate from E.On echoed RWE regarding the support scheme for renewables saying: "It is completely crazy to pay nearly ¤2 billion a year for 4TWh."

Speaking on the sidelines of the conference, Lars G. Josefsson, President of Eurelectric and CEO of Swedish utility, Vattenfall said: "The target for renewables is 20 per cent by 2020, which is fine; but the execution on how to get there is questionable. Today we have 30 different support schemes in Europe, at the national or even sub-national level, which means that money is going to companies building in high subsidy regimes. The end result is that customers will end up paying more. Eurelectric conducted a study that showed that if our recommendations for a European market for green certificates were followed, the industry could save ¤17 billion annually. Essentially more renewables could be brought into the system for the same amount of money."

Supporting industries can get in the way of cross-national positives. "Politicians often like to see something in their own country because that's where they think the jobs will be," said Professor Green. "For example, some people comment on the amount of money being wasted on solar in Germany. I can imagine the political difficulties of installing solar panels in Spain paid for by German subsidies, provided that they were built by German industries. I guess there is a small chance that in 20 years time, Germany will be selling cost-effective solar panels to places that are sunny and making lots of money. People may have been making similar comments 20 years ago about the amount of money that Denmark was wasting on subsidising wind energy but now Vestas is laughing all the way to a very good market position."

While Professor Green's opening comment on infant industries crystallizes the danger of support schemes it is also worth noting that the stability of schemes is perhaps more important than finding the best possible scheme.

Professor Green explained: "There are many ways in which some schemes could be better than others. If renewable projects cost a lot to build and may be difficult to operate, maybe the support should be something that deals with the problems of predictability, reduces the cost of capital and perhaps installation costs. However, having made that diagnosis and committed to targets, no one will be sent to jail for missing those targets. So there has to be some form of penalty. At the moment we have to trade certificates. It is not a good scheme but if you change it, there will be a two or three year hiatus where no one knows what the rules are going to be."

In order to get renewables onto a level playing field, we have to start by changing a mindset. At some point we have to stop thinking of renewables as something completely different that needs special support. As Mr Porter put it: "Eventually we will get to a point where renewable energies that prove to be cost-effective are just part of the system. The sooner we start to think like this, the better. Subsidies only make matters worse."

No doubt the type and level of ongoing subsidies is something that will be seriously considered in the next review of the renewables directive in 2014. Juuka Ruusunen, Vice President of ENTSO-E and President and CEO of Fingrid noted: "I would like to see support schemes stop in 2020."

In 10 or 11 years, some of Europe's various renewable support schemes will have reached the ripe old age of 20, and while the industry may still consider this as relatively young, hopefully by that time the renewable sector will be able to stand on its own feet and no longer be seen as some kind of Peter Pan of the power generation industry. The premature death of pop music's greatest performer, however, ensures that he will indeed remain forever young.