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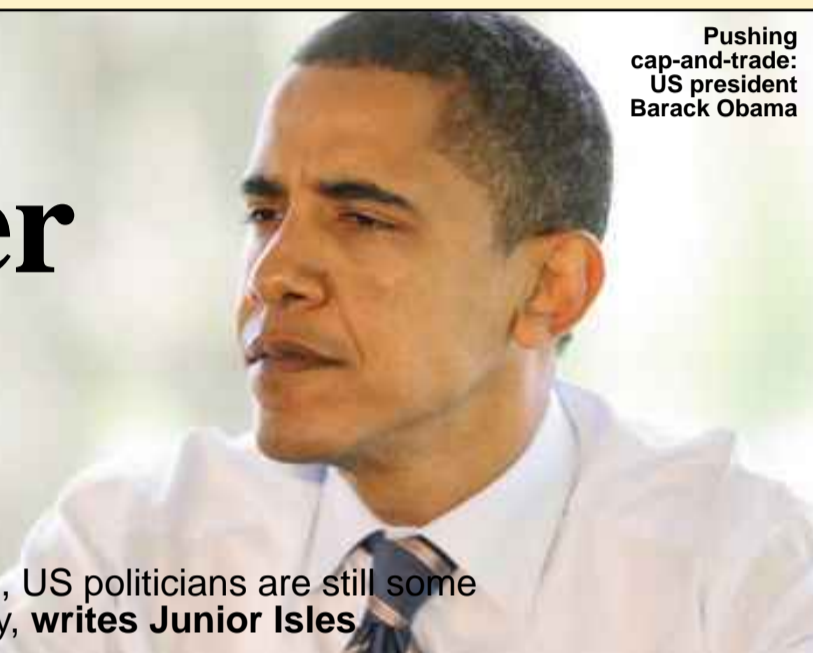
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# Politicians divided over cap-and-trade

Despite the passing of a draft climate bill, US politicians are still some way off agreeing a new US climate policy, writes Junior Isles

Pushing cap-and-trade: US president Barack Obama



The US draft climate change legislation passed by the state House may spur investment in clean technology but uncertainty remains over the creation of a regional 'cap-and-trade' system for pollution credits, a policy that is being pushed by president Barack Obama.

The bill passed in the state House last month is a significantly altered version of what started out as a cap-and-trade bill. The state has been directed to study the issue further and look at other ways to curb emissions, reporting back to the Legislature next year.

Originally, the bill capped the amount of carbon dioxide emissions large

industries could emit, starting in 2012. It also called for a regional market system for polluters to buy or sell credits if they pollute more or less than their limit.

However, most of the provisions environmental groups wanted were stripped from the bill in the Senate. The bill passed by the House neither limits pollution nor sets up a trade system, but directs the state to work with the Western Climate Initiative to influence any federal programme. Washington is one of seven Western states and four Canadian provinces that are part of the initiative.

Gaining bipartisan support on climate legislation will be difficult. Even before

congressional hearings in late April, Republican members of the Energy and Commerce Committee argued that the panel's Democratic leaders are moving too quickly to try to push the legislation through.

They said the draft bill, which calls for broad limits on carbon dioxide and other greenhouse gas emissions, was not ready for serious discussion because it does not say how emission permits would be distributed.

President Obama's 2010 budget calls for an auction of all permits. That auction could raise \$650 billion, which would be used to develop alternative energy sources and help consumers pay higher utility bills as electricity

generated from fossil fuel becomes more expensive

Republicans are opposed to the Democrats' cap-and-trade approach in general and a number of Democrats from coal-producing and industrial states argue if emissions are to be limited, the emission allowances should be provided free to energy-intensive industries, easing the cost.

In a letter to House energy and commerce chairman, Dem. Henry Waxman, the 23 Republican committee members wrote: "The manner in which you will address this issue is the cornerstone of the legislation. Without it, the bill is simply not finished and

*Continued on page 2*

# US tests international climate

## ■ India seeks US partnership ■ US-Mexico Bilateral Framework

At a forum on energy and climate change, US Secretary of State Hillary Clinton told representatives of 16 major economies representing the world's biggest emitters of greenhouse gases that the US will work tirelessly to forge a new international agreement but that it could not do it alone.

Clinton said that any agreement to combat global warming should require developing countries like India and China to reduce emissions – a position that prevented former president George W. Bush from signing an international pact.

"There is no sense in negotiating an agreement if it will have no practical impact in reducing emissions to safer

levels," Clinton told the participants at the start of the two-day meeting.

Clinton told leaders it was possible to have both a robust economy and control climate-changing pollution, noting: "Of course each economy represented here is different... we just hope we can work together in a way to avoid the mistakes that we made that have created a large part of the problem that we face today."

At the last major meeting on a new climate treaty in Bonn earlier in April, little progress was made on two key issues: the carbon emissions targets to be adopted by rich countries and how to raise an estimated \$100 billion a year to help poor countries adapt to

climate change.

Developing countries want industrial nations to reduce emissions of carbon dioxide and other greenhouse gases by at least 40 per cent from 1990 levels by 2020. The Obama administration has called for a 14 per cent reduction from 2005 levels by 2020. Legislation being considered by Congress would reduce greenhouse gases by 20 per cent by 2020 but opponents are already pushing for a more modest reduction.

India recently sought a partnership with the US in addressing the growing challenge of climate change. The Indian prime minister's Special Envoy on Climate Change, Shyam Saran, recently told a meeting of US corporate leaders organised by the US India Business Council (USIBC) that such a partnership between the two countries is essential to jointly meet the challenges of climate change.

Welcoming president Obama's Renewable Energy Initiative, Saran said: "The first component of our strategy for the future, for both Indian and US business is a renewable energy partnership covering different technological pathways."

Closer to home, president Obama and Mexican president Felipe Calderon met last month ahead of the Summit of the Americas in Trinidad and Tobago to discuss more cross-border efforts to address global warming and economic competitiveness.

Through the US-Mexico Bilateral Framework on Clean Energy and Climate Change, the two leaders agreed on the importance of promoting clean energy, combating climate change and the value collaborating to reach these goals. The framework will also allow for political and technical cooperation and information exchange.

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not ripe to be marked up or accurately discussed in the context of hearings.”

Rep. Ed Markey, chairman of the panel's energy and environment subcommittee, who along with Waxman crafted the draft legislation, has acknowledged that the permit distribution issue is a key area of disagreement, but said he is confident it can be worked out as the bill moves through the committee.

The draft bill calls for a reduction of greenhouse gases by 20 per cent from 2005 levels by 2020, and 83 per cent by 2050.

It also calls for a series of measures aimed at reducing the use of fossil energy such as requiring utilities to produce a quarter of their electricity from renewable sources, and calling for tougher standards to promote conservation.

Democrats hope the provisions will blunt the Republican attacks that are primarily aimed at emphasizing the economic impact of controlling for the first time carbon dioxide releases, especially electricity costs from power plants.

In the current tough economic climate, Republican critics of the bill believe the cost issue will resonate with the public and, in turn, with lawmakers.

“It would raise taxes on every American who drives a car, flips a light switch or buys a product manufactured in the United States,” House Republican leader John Boehner of Ohio declared when the draft bill was first unveiled in March.

He claimed every household would see their electricity bills increase on average by more than \$3000 under the cap-and-trade provision, citing a study by Massachusetts Institute of Technology.

Boehner's claim was quickly refuted by one of the MIT study's authors, who said Boehner had misstated the findings and that costs were closer to \$340 per household. Nevertheless, Boehner and other Republicans repeatedly have called the bill an unjustified energy tax.

Environmentalists, like the Obama administration, argue that the costs of dealing with climate change can be dramatically reduced by adopting programmes that will spur the development of energy efficiency and wider use of non-fossil energy such as wind, solar and biofuels.

Former Vice President Al Gore, the leading American voice on climate change, urged lawmakers to overcome partisan differences and take action to reduce greenhouse gases.

Gore, who won a Nobel Prize for his work on climate change, told a congressional hearing that “the dire and growing threat” of a warmer earth requires the parties to unite to deal with the environmental threat.

“It is a challenge that this Congress must rise to. I wish I could find the words to get past the partisan divide that both sides have contributed to... It shouldn't be partisan; it should be something we do together in our national interest,” he said.



# End in sight for Third Energy Package

Andris Piebalgs:  
Energy Commissioner

## ■ Unbundling requirement dropped ■ Consumer rights strengthened

A late compromise deal struck by EU institutions over a legislative package aimed at further liberalizing the region's energy markets means that the measures will not go far enough in breaking up energy monopolies, say critics.

The European Parliament has backed the new rules – laid out in the Third Energy Package – but gave in to demands by the European Council over the issue of unbundling, or the breaking up of vertically integrated energy companies. The text will now be forwarded to the EU Council of Ministers for adoption, bringing an end to the package's passage.

The European Commission has welcomed Parliament's endorsement of the legislation, but analysts point out that the Commission's initial

recommendation of forcing utilities to break up transmission networks from generation assets has been all but stripped out. Such full unbundling would have helped to promote competition in the markets and was aimed at national energy giants such as EDF and E.On, which control both electricity production and distribution assets.

MEPs voting against the new legislation said it was neither strong enough to contain energy giants' power, nor to provide genuine competition.

The final outcome is that EU member states will be able to choose one of three options to implement. If they do not opt for full unbundling, they can allow companies to opt for two alternative models that enable them to effectively retain ownership of their

gas and electricity grids.

Parliament's concession is a victory for Germany and France, among others, who were strongly opposed to full unbundling. Companies such as EDF and E.On will be able to retain ownership of their grids as long as they either hand over operation to an independent system operator (ISO), or adhere to rules that guarantee independent operation of generation and grid assets.

But where politicians have failed on liberalization, Europe's antitrust authorities may yet save the day, says market analyst firm Datamonitor, pointing to recent agreements struck by E.On and RWE to spin off their transmission networks, and to recent dawn raids carried out by the Commission on the offices of EDF.

The European Commission has championed the new legislation, however. “This is about getting a better deal for both consumers and businesses,” said Energy Commissioner Andris Piebalgs. “A

clear regulatory framework for a functioning internal gas and electricity market will help the EU to meet the challenges of climate change, increased energy import dependence and global competitiveness.”

The Third Energy Package is expected to lower energy prices across Europe by facilitating cross-border trade. It establishes an EU Agency for the Cooperation of Energy Regulators, with powers to adopt binding decisions. While national regulators will be responsible for dealing with national energy matters, the EU Agency will focus on cross-border issues and the internal market.

The legislation gives consumers the right to change their gas and electricity suppliers without charges, and gives them access to all relevant gas and electricity consumption data.

It also requires smart meters to be fitted to 80 per cent of homes by 2020 in order to promote efficiency and enable consumers to control their consumption.

## UK boosts CCS prospects

### ■ All new coal plants must have CCS facility ■ Government support for two to four projects

Prospects for commercialisation of carbon capture and storage (CCS) received a boost with the UK announcement that new coal-fired power stations must include plans to develop CCS.

Britain's Energy and Climate Change Secretary Ed Miliband said that if carbon capture techniques are proven following trials, all coal-powered plants would need to install and use them, most likely by a deadline of 2025.

UK chancellor Alistair Darling said that the government expects to back two to four pilot CCS projects. The previous policy had been for just one pilot, chosen through a competition to be supported by a state-funded subsidy. The only firm commitment of public funds so far, however, is £90 million to pay for detailed project design work by groups that have entered the competition. Final funding approval

on the subsidy will be taken at the government's next spending review.

Support of more than one pilot will allow the government to back different approaches. The government previously said it would only support post-combustion technologies and ruled out pre-combustion CCS such as the Hatfield IGCC-CCS project planned by Powerfuel. The decision could also see E.On revive its plan for an IGCC plant at Killingholme on Humberside alongside the company's Kingsnorth post-combustion plant.

ScottishPower chief executive, Nick Horler said: “In such difficult economic times, we welcome the Government's renewed and additional commitment to demonstrating carbon capture and storage...”

ScottishPower believes that through retrofitting CCS technology to its existing coal plant at Longannet, by 2014 it could demonstrate on a large

scale, a fully operational CCS system capable of being deployed in the UK and around the world. The company says that proving this retrofitable technology can provide a solution to drastically reduce emissions from the estimated 50 000 fossil fuel plants worldwide.

Post-combustion technology such as would be used at Longannet, however, has only been demonstrated at very small scale. The UK government's plans would mean much larger demonstrations.

The government will allow new coal power stations to be built even if only part of the plant – at least 400 MW of the capacity – is fitted with CCS. These would be allowed to operate until 2025, after which they would have to be fully fitted with CCS.

Critics, however, claim the technology is largely unproven and may not work on a commercial scale.

Greenpeace executive director John Sauven said concerns remain about the rate of carbon emissions before 2025, and what Britain's policy will be if CCS experiments fail.

■ Dutch power and natural gas utility Nuon has announced that it will build a new test installation for CO<sub>2</sub> capture at its power plant at Buggenum in the Netherlands. Nuon has signed a building contract with Spie Controlec Engineering. All the permits have been issued and construction will start before the summer 2009. The installation will be in operation in the second half of 2010 and then the CO<sub>2</sub> capture will begin. Nuon plans to use the knowledge and experience gained to install large-scale CO<sub>2</sub> capture at the Nuon Magnum power plant in Eemshaven, near Groningen. The trial in Buggenum is expected to take two years and requires an investment of around €40 million.

## Australian global CCS initiative gains industry support

Several of the world's top industry players have demonstrated their support for the Australian government-supported initiative, Global Carbon Capture and Storage Institute (GCCSI).

The Electric Power Research Institute (EPRI), GE Energy and Peabody Energy all signed Memorandums of Understanding (MoUs) to become founding members of the GCCSI.

The GCCSI will provide international policy and management oversight with a goal of delivering commercial-scale CCS plants around the world. The new

organization has a mandate of facilitating development of 20 integrated, industrial-scale carbon capture and storage demonstration projects worldwide by 2020. Australian prime minister Kevin Rudd's government has pledged to provide up to \$100 million per year to fund the institute.

EPRI has already established industry research collaborations in support of a number of technology pilot and demonstration projects for CCS and other low-carbon technologies.

EPRI president and CEO Steve Specker

commented: “EPRI's analyses have shown carbon capture and storage will be an essential part of the solution if we are to achieve meaningful CO<sub>2</sub> emissions reductions at the lowest cost to the US economy. Now we're looking at CCS benefits on a global scale.”

Steve Sargent, CEO, GE Australia & New Zealand said: “Coal is critical to Australia – and the world's – power supply. The long-term viability of this industry depends on our ability to use our technology and know-how to reduce CO<sub>2</sub> emissions in the process of generating

electricity from coal.”

Peabody Energy, meanwhile, is advancing signature projects around the world to commercialize near-zero and low-carbon emission technologies, including GreenGen in China, the COAL21 Fund in Australia and FutureGen in the US.

“Initiatives such as these are essential to enable all of us to meet our shared goals of robust economies, sustainable energy and an improved environmental footprint,” said Peabody chairman and chief executive officer Gregory H. Boyce.

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# Draft climate legislation may spur investment

■ Regulatory clarity needed for major capital projects  
■ Alstom, Dow plan carbon capture plant

| Siân Crampsie

The release of draft legislation on a proposed nationwide greenhouse gas emissions trading scheme in the USA is expected to spur investment in and create regulatory certainty for renewable energy projects and low carbon technologies.

Advocates of a cap-and-trade system argue that regulation is a technical issue and that regulatory certainty is now needed in order to spur investment in infrastructure and advanced technology.

“Long-lasting climate change legislation must be based on three equal tenets – protecting the environment, the economy and consumers,” said Jim Rogers, president and CEO of Duke Energy. “The sooner Congress acts on climate change to provide the regulatory clarity business and industry needs to move ahead with major capital projects, the more rapid our economic recovery will be.”

A number of US states are already making moves to regulate carbon and other greenhouse gas emissions,

including New Mexico, where the Environmental Improvement Board has issued a decision allowing the state to regulate greenhouse gas emissions. Lawmakers in Montana are also seeking to regulate CO<sub>2</sub> storage, while New Hampshire has released its first-ever climate action plan.

In West Virginia – a state that has made little progress in enacting climate change policy – Alstom and Dow are planning to build a pilot plant capturing CO<sub>2</sub> from the flue gas of a coal-fired boiler at a Dow-owned facility in South Charleston. Alstom



Jim Rogers: protecting the environment, economy and consumers

will design, construct and operate the pilot plant, which is expected to capture approximately 1800 tons per year of CO<sub>2</sub> from flue gas using Alstom's and Dow's advanced amine technology.

Dow will provide the site and utilities, as well as the chemicals and its amine technology expertise for this project.

“We are thrilled to be part of this groundbreaking project in CO<sub>2</sub> capture,” said Janet Giesselman, President and General Manager of Dow Oil & Gas. “This technology has

immense potential – for the local community, industry, environment and our business. Developing advanced amine technology will provide sustainable energy solutions now and into the future.”

“Coal, which represents over two thirds of the world's power generation, is and will continue to be an essential part of the world's energy mix,” said Philippe Joubert, Alstom executive vice president and president of Alstom Power. “But only by reducing its CO<sub>2</sub> output can coal remain a viable source of power generation.”

# ARRA funds flow to US energy sector

■ Fuel cells, smart grids, energy efficiency benefit  
■ Industry survey unveiled

The US Administration is starting to disburse funds from the American Recovery and Reinvestment Act (ARRA) in an effort to stimulate the economy and spearhead the development of clean energy technologies.

In the last month, the US Department of Energy (DOE) has announced \$41.9 million of funding for fuel cell technology, \$3.2 billion for energy efficiency projects and \$4 billion for smart grid technology development.

The flow of funds from the US

stimulus package – signed into law in February 2009 – will bring relief to the country's clean tech and green energy sectors, which have been squeezed by the economic crisis and low oil prices. It comes as new research indicates that government stimulus packages such as ARRA will have a positive impact, but that the impact will take up to three years to materialise.

The \$787 billion ARRA package has earmarked a total of \$65 billion of funding for the energy sector, \$22 billion of which is in the form of tax

relief.

In mid-April the DOE unveiled a new solicitation to distribute more than \$3.3 billion in smart grid technology grants and \$615 million for smart grid demonstration projects. Under the grant programme, the DOE will provide grants ranging from \$500 000 to \$20 million for smart grid technology deployments, and \$100 000 to \$5 million for grid monitoring devices.

“We need an upgraded electrical grid to take full advantage of the vast renewable resources in this country – to take the wind from the Midwest and the sun from the Southwest and power areas across the country,” said vice president Joe Biden. “By investing in updating the grid now, we will lower utility bills for American families and businesses, lessen our dependence on foreign oil and create good jobs that will drive our economic recovery.”

The DOE has also announced that

it plans to invest \$3.2 billion in energy efficiency and conservation projects across the country, and has awarded a total of \$41.9 million to 13 projects to deploy fuel cells in a variety of applications.

“The investments we're making today will help us build a robust fuel cell manufacturing industry in the United States,” said Energy Secretary Steven Chu.

A recent survey of global infrastructure players by Allen & Overy concluded that over 75 per cent of respondents believe that government economic stimulus packages will succeed in having a positive effect, while 70 per cent believe that the impacts will not be felt for another one to three years.

The “Global Infrastructure Development and Delivery” survey, conducted in March 2009, represents the views of a sample of just under 300 of the leading players in the global infrastructure market.

# Latin American countries invest in wind

Brazil plans to hold its first auction for wind power projects on November 25, 2009 in an effort to expand electricity generation from a source that is currently hardly used, according to government officials.

The lowest bidders will be deemed the winners, according to the rules established by the government for all energy auctions, the Energy and Mines Ministry said.

Government estimates based on existing technology indicate that Brazil has the potential to generate 140 000 MW of wind power. According to official figures, in 2007 Brazil consumed 559 GWh of electricity generated via wind power, just over 0.1 per cent of the total

electricity used.

Northeastern Brazil, which has strong winds and is home to the majority of existing wind farms, has the greatest potential for development.

At the end of March, the Brazil Development Bank (BNDES) signed a \$135.6 million agreement with German Development Bank (KfW) to finance wind power plants in the country.

The two banks will finance the wind power projects from Brazilian private companies, according to a BNDES statement. Though Brazil has a particularly favourable environment for developing wind power, so far only two plants have been established due to the lack of financing.

Chile is also taking steps to develop its wind generation capacity. Ireland's Mainstream Renewable Power plans to invest more than \$1 billion in Chile over the next five years to build wind farms, the company's co-founder and CEO, Eddie O'Connor, said.

The project, part of a strategic alliance that the Irish company formed with Chile's Andes Energy, will have a capacity of more than 400 MW. Mainstream's general manager in Chile, Jose Ignacio Escobar, said the \$1 billion in investment was just “the starting point.”

“If we can install not 400, but instead 800, 1500 or 2000 MW, we're going to do it,” Escobar said. Mainstream officially launched its

operations in Chile at the end of March by announcing its first wind farm, which will be built in Laguna Verde, near Valparaiso, and could go online in 2010.

The project, which is in the last stage of the environmental impact study, calls for the installation of 16 wind turbines of 2.3 MW each, supplying power to 19 000 homes, Escobar said.

“Our research shows that Chile has the natural resources to develop 44 000 MW of wind energy and another 37 000 MW of solar energy,” O'Connor said, adding that, “renewable energy resources alone can turn Chile into an exporter of clean energies.”

# Canada rethinks GHG approach

Canada may be forced to re-think its greenhouse gas emission control policies to bring it in line with proposals for a hard cap-and-trade system in the USA.

A new report by a Canadian government advisory panel says that a cap-and-trade system for controlling greenhouse gases is the best way forward as it would set uniform standards for all industries and provinces. Canada's Harper government has so far favoured intensity-based targets as the best way forward.

The report by the National Round Table on the Environment and the Economy outlines the policies needed for Ottawa to meet its greenhouse gas emission targets in an efficient and low-cost way. It also rejects the idea of implementing a carbon tax.

The Harper government has set a target of reducing emissions 20 per cent below 2006 levels by 2020, and by 65 per cent by 2050. The report stresses that the government must act quickly if these targets are to be met.

The US, like many other countries around the world, is likely to implement a cap-and-trade system for reducing emissions of greenhouse gases. The advisory panel is concerned that Canadian exports to the US will be affected if it does not implement similar standards.

In addition to implementing policies to cut greenhouse gas emissions, Ottawa is funding seven projects aimed at developing and commercialising carbon capture and storage (CCS). Among the projects receiving federal funds is TransAlta's Pioneer project, which aims to demonstrate large-scale CCS at the Keephills power plant, and TransCanada's Belle Plaine integrated polygeneration CCS project.



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GE imagination at work



# India advances nuclear cooperation

India's nuclear ambitions are taking shape after striking a number of deals with foreign companies in recent months, writes Syed Ali



Kudankulam: location for four nuclear plants, each with a 1000 MW capacity

India is moving forward in its cooperation with international companies to develop its nuclear power sector.

The end of a three-decade global ban on nuclear trade with India last year has led several Indian companies such as Larsen and Toubro, National Thermal Power Company (NTPC) Ltd. and Bharat Heavy Electricals Ltd. (BHEL) to explore joint ventures with a number of global firms to tap this market.

India, which signed a civilian nuclear deal with the US last year, plans to now quickly add nuclear-based power generation capacity to meet a domestic shortage which is 10 - 15 per cent below demand during peak hours.

The country will finalise the techno-commercial deal for four new reactors with Russia by June this year said Nuclear Power Corporation of India Limited (NPCIL) chairman and Managing Director, S. K. Jain.

"India and Russia have already signed other enabling accords like

agreements on sharing of information and it is only the techno-commercial offer that has to be finalised and we expect it to be completed by June," he added.

In April, Larsen and Toubro signed an initial pact with Russia's Atomstroyexport for building these nuclear power reactors. The companies will cooperate on the construction of new power units at Kudankulam in the southern Indian state of Tamil Nadu and for the construction of plants designed with Russian light-water VVER 1000 reactors at new sites in India, Larsen said in a statement.

Four nuclear plants, each with a 1000 MW capacity, will be built at Kudankulam, said M.V. Kotwal, senior vice president of heavy engineering at Larsen. "We expect to sign final agreements with Atomstroyexport in one year from now," Kotwal added.

Larsen also has preliminary agreements for building nuclear

reactors with Atomic Energy of Canada Ltd. and US-based Westinghouse Electric Co., which is owned by Japan's Toshiba Corp. The company is also in talks with Areva of France and GE for similar pacts.

In late March GE Hitachi Nuclear Energy (GEH) signed separate agreements with NPCIL and BHEL as the companies prepare to collaborate on building multiple GEH-designed nuclear reactors to help meet India's energy production goals.

The two government-owned companies are helping lead India's efforts to expand electricity generation from nuclear energy more than ten-fold over the next two decades, from 4.1 GW today to 60 GW by 2032.

Under the preliminary agreements, GEH will begin planning with NPCIL and BHEL for the necessary resources in manufacturing and construction management for a potential multiple-unit Advanced Boiling Water Reactor (ABWR) nuclear power station. The 1350 MW ABWR technology is the

world's only commercially proven Generation III reactor design, with the first two of four units entering service in 1996 and 1997 and four additional units under construction today.

Countries like Sweden, which are leading names in providing nuclear risk management services, have now also shown interest in India's nuclear power industry. Sweden's ambassador to India, Lars-Olof Lindgren recently led an industrial delegation to India.

Swedish companies including Sandvik, Sweco, SKB International AB, Relcon Scandpower AB, all part of the delegation, are offering services in the areas of engineering and construction of nuclear power plants, risk management, nuclear waste disposal management and research and development.

Meanwhile, Russia has delivered the first batch of 30 metric tons of uranium pellets to India under a multi-million dollar long-term nuclear fuel supply deal struck between the two countries.

## Australia warns of ETS impacts

Australian energy suppliers have expressed concern about the impact of the proposed emissions trading scheme (ETS) on their capacity to refinance debt. Some \$A48 billion worth of debt must be refinanced in the next five years, while industry players face capital expenditure costs of \$A49 billion during this period.

They are also concerned that free carbon permits under the ETS will not be sufficient to offset the large asset write-downs they will be forced to make under the scheme.

The Australian energy sector is due to refinance around \$A100 billion by 2013, according to a survey by the Energy Supply Association of Australia. The industry said power stations could be bankrupt unless the government provides an additional \$A6 billion in permits under the greenhouse gas emissions trading scheme.

## Nuclear to help solve Bangladesh power crisis

Bangladesh is seriously considering options for nuclear power against the backdrop of a severe power crisis and bleak future for power generation from conventional energy sources. It hopes to build two nuclear units, each with a capacity of 1000 MW, by 2025.

Last month the government completed the groundwork for negotiating nuclear power deals with Russia, South Korea, China and France aimed at the construction of two medium-sized 600 MW nuclear power plants by 2017, officials said.

The countries all expressed interest in the installation of nuclear power plants in Bangladesh after the Awami League-led government assumed office. Bangladesh already has bilateral agreements on nuclear cooperation with the US, France and China.

But with costs estimated at \$900 million to \$1.2 billion for a plant with the generation capacity of 600 MW, experts are worried about possible sources of financing to set up such plants.

The country's immediate power outlook is likely to worsen following the recent news that the future of the planned 450 MW power plant at Bheramara has become uncertain as Petrobangla has failed to give assurance about the supply of gas before 2016. The gas supply shortage has already reduced the country's existing power generation capacity by nearly 650 MW.

In an attempt to alleviate the power crisis, experts held a roundtable discussion in March to set up a 7-point action plan to solve the crisis. The plan includes closing of shopping centres by 7 pm, introduce separate holidays for industries in different areas, restrict power supply to neon signboards, mandatory use of generators to operate air-conditioners by individual high rise buildings, rationing of gas to industries including fertilizer, ensuring installation of rental power plants by June this year and mass campaign for public awareness.

# Indonesia ramps up geothermal

■ Geothermal plant for West Java  
■ Government weighs state companies merger

Indonesia's plans to produce nearly half of the 10 000 MW under the second phase of its Crash Programme from geothermal sources is taking shape.

PT Geo Dipa Energi (GDE), recently inked a deal with state engineering company PT Rekayasa Industry and state-run Bank Negara Indonesia (BNI) to construct and finance a geothermal power plant in West Java.

GDE is a joint venture company of state oil and gas company PT Pertamina and state power company

PT Perusahaan Listrik Negara (PLN). The geothermal project, located in Patuha, Bandung, West Java, will have a capacity of 55 MW from a potential of 400 MW.

"This project is very vital to the second phase of the country's 10 000 MW energy Crash Programme because 4733 MW of it will be powered by geothermal energy," said GDE president director Praktimia Semawan.

The government is also weighing the possibility of merging the country's three state geothermal

companies, PT PLN Geothermal, PT Pertamina Geothermal Energy (PGE), and GDE.

"A team to oversee the merger has already been formed and is currently in full operation," said Sahala Lumban Gaol, deputy for Mining, Strategic Industry, Energy and Telecommunication at the State Ministry for State Enterprises.

State minister of State Enterprises, Sofyan Djalil approved of the merger plan to improve efficiency. "The presence of a state-owned geothermal sector potentially means relieving the

government energy subsidy, which can then be transferred elsewhere," Sofyan said.

In a separate announcement, PGE said it will resume next year the long delayed geothermal power plant project at Karaha Bodas in Garut, West Java. The 30 MW project was part of a package of 21 power projects reviewed by the government in 1997. However, it was then delayed because of problems related to the economic crisis. Abadi said PGE had finished the feasibility study and the Karaha Bodas project should start up in 2013.



## Asia News

## ADB supports Vietnamese projects

Vietnam needs more than \$3 billion annually over the next 10 years to bring electricity to the 9 per cent of households that currently lack power.

In April the Asian Development Bank (ADB) said it would provide a \$151 million soft loan to help construct power plants to bring electricity to remote areas of the country. The loan will finance between 5-10 mini hydropower plants to serve communes in mountainous areas in the northern and central regions. The projects are slated for completion by 2015.

Construction of two power plants with a combined electrical capacity of 1950 MW was scheduled to begin in April month according to contracts signed in Hanoi on April 9, 2009.

The projects are the 1200 MW Vung Ang coal-fired power plant in central Ha Tinh Province and the 750 MW Nhon Trach 2 gas-fired combined cycle plant in the southern province of Dong Nai.

Construction of the Vung Ang plant is scheduled for completion within 45 months. The first generator is expected to begin operation in August 2012, and the second in March 2013. Nhon Trach 2 is expected to take 30 months. The first gas turbine will begin operation working in 22 months and the second in 23 months. The plant is an independent power project, with PetroVietnam as the largest shareholder of 51.8 per cent.

## Korea spends on R&D

South Korea's government announced an injection of won174.4 billion (\$130.3 million) for research and development in the country's energy sector.

Some 250 individual projects will get R&D support in the coming months. Thirty four of these are mid-to long-term projects that will receive won109.9 billion or 63 per cent of money set aside for the year, with the remainder to be given out to 216 short-term projects.

Projects to be supported include technology to capture CO<sub>2</sub>, finding ways to find small-sized oil and gas wells, and recycling of battery cell modules.

CO<sub>2</sub> capture is an issue of increasing urgency to South Korea, as the country is the ninth largest producer of CO<sub>2</sub> in the world.

Developing technology to find small-sized oil and gas deposits could help improve the country's effort to reduce its near total dependence on foreign fossil fuel resources. Recycling technology can reduce waste and save valuable materials that the country imports.

R&D money will also be invested in systems to: build wind farms; create highly efficient bio-gas turbines for cogeneration plants; and develop advanced metering infrastructure for ongoing efforts to build a 'smart-grid'.

Funds will also be made available for manufacturing key components for locally designed nuclear reactors and nuclear fuel storage. South Korea's ability to store spent fuel rods in temporary holding facilities will reach full capacity by 2016.

The country is hoping to draw up a master-plan within the year to build a permanent repository for spent radioactive fuel.

# Pakistan to collaborate with US on tackling power shortages

## ■ Campaign to improve energy efficiency ■ IPP projects approved for grid connection

Syed Ali

Pakistan is to improve energy conservation in addition to bringing new capacity on line in its ongoing effort to tackle electricity shortages.

Last month the Ministry of Finance, Economic Affairs, Revenue and Statistics signed a Joint Statement of Collaboration with the US government to mark the start of a three-year, \$24 million 'Energy Efficiency and Capacity Building' project.

Some estimates indicate that 1500 MW per year could be saved with an effective national campaign.

The Energy Efficiency and Capacity Building project will increase awareness of energy-efficient practices; support

energy service companies working with Pakistani industries and improve demand-side management practices in distribution companies.

The Executive Committee of the National Economic Council also approved a Rs24 billion project to boost the distribution system of seven power companies owned by the Pakistan Electric Power Company (Pepco). It also approved the connection of six small independent power projects to the grid.

The country has made progress in plugging the electricity gap in recent months, with the agreement of financing for a number of larger power projects.

At the end of March, a consortium of foreign banks comprising BNP Paribas, HSBC Bank plc, the Export-Import Bank

of China, signed a Sinosure buyer credit facility agreement of \$150 million with Northern Power Generation Company Limited (NPGCL) for construction of a 425 MW combined cycle power project at Nandipur.

Notably, in April Pakistan gave the go ahead for construction of two more 340 MW nuclear power plants at the Chashma complex at a cost of \$2.37 billion, according to the *Business Recorder* newspaper. The two plants, to be supplied by China, will involve a foreign exchange component of \$1.75 billion, according the newspaper.

Also in April, a US-based company said it will construct two 250 MW power plants at Port Qasim and Karachi Port at an estimated cost of \$1 billion. M/s Matrix Group Consulting Limited (MGCL) will finance the development of the two facilities over the next two years.



Raja Pervez Ashraf: Federal Minister for Water and Power

This year will see a significant amount of new capacity come on line. Last month, the federal government signed an implementation agreement with the new management of Karachi Electric Supply Company (KESC) under which it would inject \$361 million investment into the power sector. In the first phase it will add 400 MW to the Karachi electricity system by December this year.

According to Pepco, as many as 19 power generation plants with the capacity to produce 3502 MW would start generation during this year. Federal Minister for Water and Power Raja Pervez Ashraf has said that 800-900 MW of power would be injected into Pakistan's national grid by June this year.

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# UK outlines green incentives

The UK government has announced a green budget to help economic recovery and boost the clean energy sector, but will it deliver? **Siân Crampsie.**

Walney II offshore wind farm in the Irish Sea

The UK government is planning to provide the offshore wind sector with a financial boost as part of economic recovery plans and to ensure that it can meet its commitments on renewable energy and greenhouse gas emissions.

The government has proposed to increase the incentive for offshore wind farm development through changes to the Renewables Obligation (RO) scheme. The plans were announced alongside a raft of other initiatives to support renewable energy in the country as part of the country's fiscal budget measures.

The UK has set itself ambitious targets on greenhouse gas emissions and has also been set tough renewable energy targets by the European Commission. In April it became the first country in the world to bind itself to a long-term framework to limit carbon emissions through a series of

five-year carbon budgets.

The proposed changes to the RO scheme would see offshore wind farms receiving two Renewables Obligation Certificates (ROCs) for every MWh of production, up from 1.5 ROCs. The move has been widely welcomed by the UK's wind industry and comes just weeks after the British Wind Energy Association (BWEA) warned that the future of the country's offshore wind industry was at risk due to high costs and a shortage of credit.

The UK government has put offshore wind at the heart of its renewable energy expansion plans. Overall, its April budget included over £1.4 billion of additional funding for the renewable and low carbon sectors, and extension of the climate change levy exemption for combined heat and power plants, and the availability of up to £4 billion of new capital from the European Investment Bank for renewable energy

projects.

Commenting on the proposed RO scheme changes, Dong Energy said that it would now go ahead with the construction of the Walney II offshore wind farm in the Irish Sea. "It's encouraging that the investment regime has now been created to allow us to implement our strategy of considerably expanding Dong Energy's position within sustainable energy," said Anders Eldrup, CEO of Dong Energy.

Dong Energy is also one of the partners in the proposed 1000 MW London Array offshore scheme, the economics of which have been under scrutiny due to the weakened pound and financing difficulties. Dong and its partners E.On and Masdar have applied to the European Investment Bank to help them fund the £3 billion project.

The partners say they will now await the findings of a review and

consultation process on the RO scheme before making a final investment decision. "The Government's decision recognises the difficulties that energy companies face when they look to build offshore wind," said Wulf Bernotat, CEO of E.On AG. "We feel optimistic about the future of the offshore wind industry in the UK and the London Array scheme."

The government estimates that the uplift in the RO scheme will be worth £3.5 billion over the lifetime of qualifying projects, but analysts say that not all offshore wind schemes will qualify. The assistance is for a limited period because market conditions are expected to improve in the next 12 to 24 months, according to law firm Eversheds.

Crucially, the increase in ROCs will not benefit the recently launched Round 3 offshore wind farms, which is of concern because "developers will

be expected to commit to these projects by the end of this year without the certainty of increased ROCs or improved market conditions," said Eversheds.

The government's first three carbon budgets will cover the period of 2008-2022 and set a target emissions reduction of 34 per cent by 2020, an increase on the previous target of 26 per cent by 2020. The targets are ambitious and could yet increase after this year's climate change negotiations in Copenhagen.

"Rather than keep announcing ever greater targets, the important issue for the government is to tell British businesses how they plan to achieve these targets; what will be required of business and how they will be supported in reducing their carbon emissions," said Michelle Thomas, head of clean energy and sustainability at Eversheds.

## Utilities sign up for Aker carbon capture programme

■ Programme to reduce cost, energy consumption

■ Siemens, Statkraft look at CCGT capture technologies

The addition of three leading European utilities to a major scientific research and development programme will boost efforts to commercialise carbon capture technology.

Statkraft, E.On and ScottishPower have joined SOLVit, a carbon capture technology research and development programme led by Norway's Aker Clean Carbon. Each company has committed financing of up to NOK15 million.

SOLVit was launched by Aker in 2008 and aims to develop processes and solvents that capture and manage carbon dioxide (CO<sub>2</sub>) emissions from power plants and process industries. The addition of the three utilities to the programme will provide Aker and its other partners with valuable input from an end-user's perspective.

"We are very pleased that some of the world's leading energy companies are joining SOLVit. The backing of these companies will enable us to develop better and cheaper ways to capture CO<sub>2</sub>," said Jan Roger Bjerkestrand, chief executive of Aker Clean Carbon. "We have a clear goal to bring the cost of CO<sub>2</sub>-capture down significantly. The programme aims to halve the required energy consumption in our CO<sub>2</sub>-capture technology."

Aker Clean Carbon has become a major player in Europe's efforts to develop and commercialise carbon capture and storage (CCS) technology. The company was recently awarded the contract to construct the amine plant at the European CO<sub>2</sub> Technology Centre at Mongstad, Norway, and is developing a CO<sub>2</sub> capture plant at a

natural gas fired power plant and gas reprocessing facility at Kårstø. The power plant at Kårstø is 50 per cent owned by Statkraft.

Separately, Statkraft is working with Siemens to develop CO<sub>2</sub> capture technology for combined cycle power plants. The two companies say they joined forces in early 2009 and aim to complete the project within two years.

"Technical innovations are the most important lever for combating climate change effectively," said Michael Suess, CEO of the Fossil Power Generation Division of Siemens Energy, which is already working on a proprietary process for CO<sub>2</sub> capture from coal-fired power plants. "Cooperation with Statkraft will allow us to now further develop this future-oriented technology to also permit its

use in gas-fired combined cycle power plants."

According to Siemens, capturing CO<sub>2</sub> from combined cycle plants presents considerable challenges because their flue gas has a lower CO<sub>2</sub> concentration compared with that of coal-fired plants. In addition, the flue gas has a high oxygen content, which affects the performance of solvents.

"We will also be matching the CO<sub>2</sub> capture process to the dynamic load profile of combined cycle power plants, which is characterized by frequent load cycling," said Tobias Jockenhoevel, head of Post-Combustion Technology in Siemens' Fossil Power Generation Division. "We will optimize the entire process to enable easy backfitting of a CO<sub>2</sub> capture system in future combined cycle power plants."

## Germany boosts connections

German transmission system operator (TSO) RWE Transportnetz Strom will play a major part in efforts to improve resource utilization in Western Europe through two new high voltage interconnections.

The German firm and its Dutch counterpart TenneT have completed the preliminary investigation into a new connection that will boost transmission capacity between their grids by up to 50 per cent. RWE Transportnetz Strom has also signed an agreement with Belgian TSO Elia to start the planning phase of a new interconnection.

Both RWE Transportnetz Strom and TenneT will invest around €70 million in the proposed 60 km-long, 380 kV connection, which will run from the Dutch city of Doetinchem to the German city of Wesel. The project could be completed by 2013.

Klaus Kleinekorte, CEO of RWE Transportnetz Strom, said: "Currently the interconnection capacity between both countries is approximately 3800 MW. The new connection increases this capacity by approximately 1000-2000 MW."

The proposed interconnector between Germany and Belgium would be the first between the two countries and would "contribute towards stable price convergence... as well as enhance reliability and security of supply for the consumers in the whole region," said Daniel Dobbini, CEO of Elia. A formal decision to build the interconnector will be taken once the planning phase is complete and regulatory and technical decisions have been made.



Clearing the air: Siemens is advancing CO<sub>2</sub> capture technology



# Global downturn leaves Gulf in a quandary

Forecasting energy demand has become a tricky task for the authorities in the Gulf region, and projects could be put on hold. **Siân Crampsie**



Shuweihat 2 project

Countries in the Middle East are pushing ahead with power sector investments but may be required to seek alternative means of financing for projects if the current tough credit market conditions persist.

The latest forecasts for the Gulf region indicate that electricity demand remains strong but is likely to be tempered by a slowdown in economic and population growth. Some projects are being delayed or placed on hold.

Projects that are moving ahead may be forced to seek new financing routes. The Abu Dhabi Water and Electricity Authority (ADWEA) recently said that it would consider issuing bonds to raise financing for its Shuweihat 2 independent water and power (IWPP) project if negotiations with banks fail.

The 1500 MW, 100 MIGD project is being developed by GDF Suez and is scheduled to go on-line in 2011. A

Siemens-led consortium recently bagged the contract to build the \$2.5 billion project, which is a key element in ADWEA's plans to meet rising electricity demand.

Recent research by the *Middle East Economic Digest (MEED)* shows that the United Arab Emirates (UAE) will require \$18 billion of investment over the next seven years to meet electricity demand. Overall, the Gulf Cooperation Council (GCC) countries will need more than \$50 billion, according to *MEED's* latest *Power and Water Annual Report*.

However, the research is based on economic and population growth figures for 2008 and these are expected to be tempered by the global economic slowdown, said *MEED*. The uncertainty has become a major challenge for the authorities in the region.

The uncertainty coupled with the poor credit markets and the rising costs of power plant construction are leading to some projects being put on hold. The Dubai Electricity and Water Authority (DEWA) has put one power project on hold, while another has suffered delays in tendering.

*MEED's* figures show that the UAE would need an additional 20 000 MW of capacity by 2015, with the emirates of Dubai and Abu Dhabi each accounting for 7000 MW. In the GCC, Saudi Arabia ranks second in demand growth, requiring an additional 16 000 MW to 2015, followed by Qatar.

Peak demand growth in the region ranges from 6-12 per cent, but these growth rates are expected to fall during 2009. Overall, GCC countries require the addition of 57 000 MW by 2015.

ADWEA holds a 60 per cent stake

in the Shuweihat 2 project, with GDF-Suez owning the remaining 40 per cent stake. The partners have experienced delays in securing finances for the project, but late last year ADWEA raised a \$900 million bridge financing facility to get construction underway.

The firms say that there are sufficient funds to meet project requirements until September 2009.

Meanwhile Qatar is pushing ahead with plans to construct a \$500 million polysilicon manufacturing plant to serve the domestic as well as international markets.

The country is planning to add around 100 MW of solar capacity over the next five years and the Qatar Foundation, in partnership with Qatar Petroleum, is aiming to have the facility up and running within two years.

## Europe backs renewable energy efforts

A European-backed project is set to boost Jordan's nascent renewable energy sector and help the country to reach goals set under its national energy strategy.

The European Commission and Jordan's National Energy Research Centre are exploring a pilot project to build Jordan's first small-scale solar power plant. The 5 MW project will be backed by a €10 million grant from the EC and could also become a centre for renewable energy training.

The initiative is one of a series of projects aimed at supporting the development of renewable energy in Jordan, which is aiming to install 600 MW of wind power capacity and 600 MW of solar energy by 2020.

The EC grant would also help to support the development of a wind power testing station as well as training facilities for graduates and engineers in Jordan.

The project will be located next to a planned 80-90 MW wind power plant that is scheduled to start operating by 2011.

## Ashkelon project in doubt

New natural gas discoveries and the global economic downturn mean that Israel Electric Corporation (IEC) should shelve plans for a new coal fired power plant, according to Israel's Minister of Environmental Affairs.

Environmental Protection Minister Gilan Erdan wants to convene an emergency government session to discuss the future of two proposed new coal fired power units at Ashkelon, and has also called for forecasts of electricity production to be updated.

IEC is planning to build two 650 MW units at its Ashkelon facility. The Ministry of Environmental Affairs has already tried to delay the project, citing the environmental impacts of the new units, and is urging the construction of power plants that either use natural gas or renewable energy.

The discovery of two new gas fields – Tamar and Dalit – off the Mediterranean coast of Israel negates the need for new coal-fired capacity, claims Erdan. With a combined potential capacity of around 162 billion m<sup>3</sup> (bcm), the two fields could provide Israel's energy needs for many years and boost its energy independence.

Erdan argues that the global economic downturn has resulted in a 10 per cent reduction in energy consumption in Israel and that further reductions could be achieved through the promotion of energy efficiency measures. A number of new gas-fired power plants are already in the planning process that will boost generating capacity over the next few years, while further upgrades and extensions of existing capacity are also possible.

Erdan has proposed delaying the construction of coal-fired power plants in Israel until advanced clean coal technologies such as integrated gasification combined cycle (IGCC) are fully commercialised.

# Iraq, Iran plan power projects

Iraq is set to turn to its neighbour Iran to help it rehabilitate its electricity infrastructure.

The two countries are reported to have reached an agreement on the

construction of two new power plants as well as electricity transmission lines in Iraq.

With assistance from Iran, Iraq plans to build new facilities in Al-

Najaf and Al-Haydariyyah. The transmission lines will be in the cities of Al-Kufah and Karbala to the south of Baghdad.

Iranian engineers are already active

in Iraq's reconstruction efforts, and Iran recently provided Iraq with a \$1 billion credit facility for the implementation of infrastructure projects.

## Turkey launches disco sale

The Turkish government is hoping that the difficult economic climate will not affect interest in the electricity sector privatization programme.

The country has launched the sale of two more electricity distribution grids as part of a drive to increase efficiency and boost investments in the sector.

The last date for bids for the two firms has been set for October 20, 2009.

The two grids up for sale are Çoruh Elektrik Dağ••m A.S. and Osmangazi Elektrik Dağ••m A.S. Applications for pre-qualification are due by July 15, 2009.

Turkey sold four distribution grids

### ■ Sale will test investor interest ■ Privatization will boost investment

in 2008 for a total of \$2.4 billion but delayed the sale of further assets due to weak investor interest. It is aiming to sell the country's remaining 16 distribution grids and is being assisted by the International Monetary Fund.

Çoruh Elektrik Dağ••m A.S. serves 927 000 customers in the provinces of

Trabzon, Rize, Giresun, Gumushane and Artvin in northeastern Turkey, along the country's Black Sea border. Osmangazi Elektrik Dağ••m A.S. has approximately 1.16 million customers in the western provinces of Afyonkarahisar, Bilecik, Eskisehir, Kutahya and Usak.



## GEH boosts RPV supplies

■ Agreement ensures adequate production capacity  
■ GE ratings downgraded

GE Hitachi Nuclear Energy has strengthened its global supply chain through a strategic agreement with Spanish manufacturing firm Equipos Nucleares SA (ENSA).

Under the agreement, ENSA will serve as a key supplier of reactor pressure vessel fabrication services for new nuclear power plants, helping GE Hitachi to take advantage of growing opportunities in the world nuclear energy market.

ENSA operates a production facility in Cantabria, northern Spain, and specializes in manufacturing heavy components for industrial facilities, including the nuclear steam supply system of nuclear reactors. The agreement will ensure that GE Hitachi has an adequate reactor pressure vessel production capacity for its advanced boiling water reactor (ABWR) and economic simplified boiling water reactor (ESBWR) designs.

ENSA has already taken delivery of the first of six forgings required to fabricate one ESBWR reactor pressure vessel, says GE, marking a milestone in the deployment of the company's Generation III+ reactor design.

"This strategic agreement adds to GE Hitachi's existing supply chain and allows us to support the demand we foresee in the near future," said Danny Roderick, senior vice president of Nuclear Plant Projects at GE Hitachi, a joint venture firm created in 2007.

GE Hitachi's ESBWR technology is currently undergoing design certification review at the US Nuclear Regulatory Commission (NRC). The NRC has also received five applications for ESBWR-based nuclear power plants since 2007.

In addition to deploying the ESBWR, GE Hitachi notified the NRC in December 2008 that the company intends to renew its design certification for the ABWR for an additional 15 years beyond 2012.

GE owns 60 per cent of GE Hitachi and the US firm was dealt a blow in March with news that it had lost its top credit rating.

GE has been downgraded by both Standard & Poor's and Moody's because of higher risks at its GE Capital lending unit. The downgrade means that the conglomerate will have to pay higher costs to borrow money.

GE says that it does not expect any significant operational or funding impacts from the ratings changes. "This action was not unexpected in the current environment, and while no one likes a downgrade, Moody's, like Standard & Poor's, confirmed the fundamental soundness of GE Capital and the strength of our industrial businesses," GE Chairman and CEO Jeff Immelt said.

## Amec strengthens Korea ties

■ Joint venture targets power project opportunities  
■ Four firms pool expertise

| Siân Crampsie

A British engineering firm and three South Korean companies are to pool their skills and resources to take advantage of business opportunities in the worldwide energy sector.

Amec plc, the Korea Electric Power Corporation (Kepeco), Korea Gas Corporation (Kogas) and the Korea Development Bank (KDB) are to form a joint venture company operating in South Korea and international markets.

The four companies signed an agreement in London in April that gives Amec a 54 per cent stake in the company, which is to be set up in October. They are planning to share their respective expertise in developing, constructing and managing a range of energy projects and facilities.

The formal agreement follows the signing of a memorandum of understanding between the companies last year.

Kepeco, Kogas and KDB will hold 19 per cent, 15 per cent and 12 per cent of the company's shares, respectively. The agreement was signed by the companies in the presence of the president of South Korea, Lee Myung-bak and UK prime minister Gordon Brown.

"As the world addresses the challenges of the 21st century there is a clear need for a long-term strategic approach to many of the issues involved," said Amec CEO Samir Brikho. "It will require a special combination of technology, engineering, financial and management skills to address demographic change, environmental impact, energy demands and security of resources, among many others."

"Amec, Kepeco, Kogas and KDB



Energy agreement: the president of South Korea, Lee Myung-bak and UK prime minister Gordon Brown

each have significant capability and expertise across a wide range of geographies, markets and assets and we have already identified opportunities and regions where our combined skills can be applied."

The new venture has strong support from both the UK and South Korean governments and marks a strategic step in cooperation between the two countries, says Amec. The UK-based engineering and project management firm has been active in South Korea since 1999.

The four companies will work together on a wide range of projects, including nuclear power, thermal power generation, gas, renewable energy and carbon reduction. It will

also support the Korean government's overseas development programme and its investment plans to strengthen the country's security of supply and energy asset portfolio.

The joint venture will also play a part in expanding and improving South Korea's engineering and project management consultancy skill base. AMEC's role in the venture will be to provide expertise in consultancy, front-end design, engineering, programme and project management, supply chain management, asset operation and maintenance.

Kepeco will contribute expertise in designing, constructing, operating and maintaining nuclear reactors and power generation facilities.

## Areva to expand EPR production

French engineering giant Areva is laying down plans to expand its business in the face of strong international demand for nuclear power plants.

The firm is bucking the general global trend and has announced plans to expand production at a key facility in France as well as continue its recruitment drive.

Areva's plans centre around its Chalons/Saint-Marcel production plant in eastern France, where it will make investments to bring annual production to an average equivalent of 2.7 EPRs, up from 1.7. The expansion will create 200 new jobs, bringing employee numbers at the site to 1300.

Investments have already been made

at the plant, which first opened in 1973. The need to expand the plant is just one example of a number of major investments that the company is planning to support its expanding business.

Recent market research from Frost & Sullivan indicates that nuclear power plants will become an attractive option to replace ageing capacity in an increasingly carbon-constrained Europe. The next few years will be a strong time for nuclear orders in spite of the financial crisis, according to Maciej Jeziorski, Research Analyst at Frost & Sullivan.

"The result is that many of the projects currently planned, proposed or at the pre-proposal stage are likely to be developed further," said



Anne Lauvergeon: Areva CEO

Jeziorski. "There are still challenges to overcome such as huge initial costs, getting the planning permission and long lead-time for critical components, but overall the prospects for nuclear in the longer-term look good."

It is estimated that Areva needs around €2 billion in new financing in the next four years to meet investment needs across its business. CEO Anne Lauvergeon has been quoted in *Le Monde* as urging the government to inject new money into the firm.

Areva experienced a sharp drop in earnings last year, which it blamed mostly on mounting losses at its EPR project in Finland. It has, however, forecast higher sales and profits this year.

## Siemens acquires solar thermal stake

Siemens is expanding its competency in the solar thermal power plant field through the acquisition of a stake in Italian firm Archimede Solar Energy.

The German engineering company is expecting to see rapid growth in the market for solar thermal technologies and says that the purchase of 28 per cent of Archimede will help it to become a leading player in the field.

Siemens currently supplies steam turbine generators for solar thermal power plants such as the Solar Tres project in Spain. Teaming up with Archimede Solar will give it access to the Italian firm's expertise in molten salt-based solar receiver technology.

The market for solar thermal power plants, which use mirrors to reflect the sun's energy onto a central receiver, will show double-digit annual growth rates over the next few years, according to Siemens. The German company has also committed to help Archimede expand its operations.

Archimede Solar Energy is a subsidiary of the Italian industrial group Angelantoni Industrie, S.p.A. and is the world's only company that uses molten salt as heat transfer fluid in its solar receivers for parabolic-trough power plants.

"By acquiring a stake in Archimede Solar Energy Siemens is underlining its intention to become the leading provider of solutions for solar thermal power plants," said René Umlauf, CEO of the Siemens Renewable Energy Division. "In the upcoming years the market for solar thermal power plants will grow at a rapid pace and the interest of our traditional customers in the energy sector in this promising future-oriented technology will increase significantly."

Archimede is expecting its revenues to increase after joining forces with Siemens, which will provide capital for an expansion of the Italian firm's production facilities. Siemens says it may acquire a majority interest in Archimede in "the mid-term".

"We chose Siemens Energy as our partner to enable us to better match the tremendous growth we are expecting in the solar thermal power sector worldwide," said Gianluigi Angelantoni, president of Archimede Solar Energy. "Construction of a new factory for the production of solar receivers, which is scheduled to be up and running in 2010, will begin before the end of this year."

Siemens has so far secured over 40 orders for steam turbine generators for solar thermal plants.

In October 2008, it was awarded a contract by Spanish engineering group Sener to supply an industrial steam turbine to the 19 MW Solar Tres plant, located near Seville, Spain. The project is the first commercial-scale demonstration of solar tower technology using molten salt coupled with a heliostat and a central tower.



## Tenders, Bids & Contracts

### Americas

#### Oncor orders transmission support

The transmission network in northern Texas is to receive a boost after US utility Oncor placed an order with ABB for a static var compensator (SVC) unit.

The SVC unit will be installed at the Renner substation in north Texas in a project due to be complete by the end of 2010. It will improve energy efficiency, help maintain an uninterrupted flow of electricity and enhance grid reliability in the region, according to ABB.

"The robust design and flexibility of static var compensators will allow Oncor to continue to reliably operate the transmission grid in North Texas with less dependence on local generation," said Oncor senior vice president Jim Greer.

SVC devices are part of ABB's family of Flexible AC Transmission Systems (FACTS) solutions that increase the capacity of existing transmission networks and improve their reliability.

#### ABB books substation order

ABB has won a contract to improve power availability and reliability in the city of Salvador, Brazil through the installation of a new substation.

The \$22 million contract has been awarded by Brazilian utility Neoenergia, which has a 30-year concession contract to own and operate the substation.

ABB will be responsible for the design, construction, supply and installation of the new 230/69 kV, 200 MVA Narandiba substation, which will help to meet growing domestic, commercial and industrial needs for electricity in Salvador. The project is scheduled for completion in 2010.

#### Portable power for Peru

Global energy firm APR Energy has placed an order with Tognum for the supply of 40 MTU onsite energy gensets for installation in the Peruvian utility grid.

The gensets will deliver supplementary power to the grid in the Trujillo Province in northern Peru, where electricity demand has grown rapidly in recent years. The scope of supply includes the gensets, switchgear as well as engineering support during the installation phase.

The gensets are powered by MTU's Series 4000 diesel engines and will add 60 MW to the Trujillo grid.

### Asia Pacific

#### Wärtsilä wins Pakistan order

Independent power producer (IPP) Liberty Power Tech Ltd. has placed a €137 million order with Wärtsilä for the construction of a 200 MW power plant in Pakistan.

Under the contract Wärtsilä will be responsible for the engineering, procurement and construction of the new plant, located 200 km west of Lahore. The plant is due to be commissioned in December 2010 and will supply electricity to the national grid.

The order is the fourth won by Wärtsilä for IPP projects in Pakistan since 2007 and will bring the total generating capacity delivered by the Finnish firm to Pakistan to more than 1700 MWe.

The Liberty Power Tech plant will comprise 11 Wärtsilä 18V46 generating sets and will operate with

an overall efficiency of 45 per cent when running on heavy fuel oil at site conditions. This level of efficiency on low-cost fuel oil will make generating costs very competitive, says Wärtsilä.

#### Switchgear reaches new heights

Technology firm ABB says it has made the biggest leap in the capacity and efficiency of AC power transmission in more than two decades by successfully commissioning a switchgear rated at 1100 kV.

The company designed, tested and commissioned the ultra-high voltage gas insulated switchgear (GIS) for a pilot project launched in 2006 by the State Grid Corporation of China. The GIS has a switching capability of 6900 MW.

The pilot project aims to demonstrate the feasibility of AC power transmission at ultra-high voltage, which reduces power losses and requires a smaller transmission corridor compared with conventional technologies. State Grid has announced plans to invest more than \$14 billion in the next three to four years to expand its ultra-high-voltage (UHV) network.

### Europe

#### ABB wins Eirgrid contract

ABB has overcome competition from Nexans, Siemens, Areva and Prysmian to win a contract to build an electricity interconnector linking Ireland and Wales.

Eirgrid is investing €600 million in the project, which will enable the exchange of 500 MW of power between the two countries when it starts operating in 2012. The European Union is contributing €10 million to the project.

The new link will run from Deeside in North Wales to Woodland in Co. Meath, Ireland via Rush, Co. Dublin. It will enhance the stability of both the Irish and UK transmission grids, and also expand capacity for the use of renewable power, according to ABB.

#### EDF-EN orders wind turbines

EDF Energies Nouvelles has placed an order with Danish firm Vestas Wind Systems for 37 wind turbines for a project in Sardinia, Italy.

The Vestas V90-2MW wind turbines will be delivered to the project site in the municipality of Bonorva in 2009 and 2010. The contract includes the supply, installation and commissioning of the turbines as well as a five-year service agreement.

The 74 MW wind farm will meet the needs of 50 000 Italian households and the contract illustrates the positive development of Italy's wind market, says Vestas.

#### Offshore wind order for Areva

Areva subsidiary Multibrid has executed a binding memorandum of understanding with Wetfeet Offshore Windenergy for the supply of wind turbines for the Global Tech-1 wind farm in the North Sea.

The agreement calls for the supply of 80 of Multibrid's M5000 turbines for the 400 MW project, located 90 km from the coast in the German North Sea. Delivery is scheduled to take place in 2011 and 2012.

Under the terms of the agreement Areva will also supply commissioning, testing and maintenance services. Foundations, transport and erection offshore are excluded from the scope.

The order is expected to be worth more than €700 million.

#### Sener contract is CSP record

Sener Ingeniería y Sistemas, S.A says that a major order for the supply of high accuracy two-axes drives for an advanced solar thermal plant in Spain will make it the world leader in the design, manufacture and supply of this type of equipment.

Sener has been awarded a contract to supply the electromechanical drives for the 2650 heliostats in the Gemasolar concentrating solar power (CSP) plant in Seville, Spain. The order is the largest contract awarded to date for two-axes drives for heliostats.

The Gemasolar plant is being developed by Torresol Energy and is scheduled to start operating in 2011.

The drives are a critical part of the plant as they position the heliostats, which concentrate the sun's energy onto the central tower. They must work with pin-point accuracy and work reliably for the 25-year life of the plant.

#### RWE signs Polish contract

RWE's plans to construct a new coal fired power plant in Poland are taking shape with the creation of a joint venture company to execute the project.

The German firm has signed an initial contract with Poland's Kompania Weglowa (KW) to build the €1.5 billion, 800 MW plant in Wola in the Silesia region of Poland. Commissioning is scheduled for 2015.

RWE and KW have also signed a coal supply contract for the new plant, which will boost generating capacity as well as energy security in Poland. While a feasibility study has been conducted and technical aspects of the project have been worked out, a final investment decision based on economic viability has yet to be made.

According to RWE, KW will play a significant role in the project by contributing the site, the supply of coal and the infrastructure required during construction. The plant will be the largest hard coal generating unit in Poland and will be located at the site of the former Piast Ruch II coal mine.

#### Alstom to modernise Belchatow

Alstom is to modernise part of the largest fossil fuel fired power plant in Europe under a €160 million contract awarded by Polish energy group PGE.

The French engineering firm is to retrofit Unit 6 of the Belchatow coal fired power plant in Poland with modern equipment in order to boost output and economic performance. The project will also extend the unit's lifetime and reduce emissions.

Under the contract, Alstom will carry out reconstruction work on the boiler and its auxiliary equipment, replace the high pressure and intermediate pressure parts of the turbine and install new high pressure heaters. The work will form part of a much wider long-term project to modernise the equipment at the 4440 MW power plant.

Modernisation of Unit 6 will allow PGE to operate the plant within the frame of new European emission regulations, while ensuring a 20 MW increase in the unit's power output and an increase in efficiency to over 41 per cent. Furthermore, the modernisation will extend the unit's lifetime by 20 years.

#### Vestas units head for Romania

Renewable energy group EDP Renovaveis has placed an order with Vestas Wind Systems for the supply of 76 wind turbines for two projects

in Romania.

The contract comprises supply and installation of the V90-3 MW units, as well as a Scada system and a five-year service agreement. Installation is scheduled for completion by the end of 2009.

### International

#### Sonelgaz seeks mobile solution

Algerian power company Sonelgaz has placed a number of orders with ABB for the supply of substation equipment that will help meet the country's growing demand for electricity.

The orders – worth a collective \$56 million – are for the supply of two substations and 10 mobile substations. ABB will design, engineer, supply, install and commission the substations, including switchgear, power transformers, automation and telecommunications, as well as other auxiliary systems.

The mobile substations will be used as temporary replacements for fixed installations and will allow Sonelgaz to carry out maintenance work and respond rapidly to outages. They can be transported by road trailer and be up and running in less than 24 hours.

ABB will also supply two 60 kV GIS substations, one of which will replace an existing installation in Algiers. The second will be installed in Oran, Algeria's second largest city, to supply electricity for a planned recreational and commercial development.

#### Siemens secures Shuweihat II

German firm Siemens has won a major order from GDF Suez for the construction of a new integrated power and water desalination plant in Abu Dhabi.

Together with partners Samsung Engineering & Construction and Doosan Heavy Industries, Siemens will construct the 1500 MW, 455 000 m<sup>3</sup>/day Shuweihat II plant on a turnkey basis. Siemens' portion of the contract is worth over €50 million.

Shuweihat II is a key part of Abu Dhabi's plans to expand its energy infrastructure in the face of rapid population growth and rising energy and water infrastructure. The new plant will feed its water output into the local drinking water network when it becomes operational in September 2011.

Siemens' scope of supply is the power plant's main components comprising four SGT5-4000F gas turbines, two SST5-6000 steam turbines, six generators, the electrical systems and I&C package. Doosan Heavy Industries will build the seawater desalination plant based on MSF technology while Samsung Engineering & Construction will be responsible for civil works.

#### Banks boost Kenyan plans

Kenyan power firm KenGen has secured a €20 million facility from the French Development Agency (AFD) to finance the construction of a third unit at the Olkaria 2 geothermal power plant.

The funds will be supplemented by \$24 million from the World Bank and \$50 million from the European Investment Bank and will be used for the engineering, manufacturing and supply of equipment as well as the commissioning of the project. The new plant is expected to be operational by May 2010.

Kenya is aiming to expand generating capacity by 500 MW over the next five years.





# Working towards a sustainable energy future

The electricity industry is ready to play a pro-active role in achieving a more energy-efficient, carbon-neutral economy but political leadership based on a functioning market will be required.

**Lars G. Josefsson**

Chief executives from more than 60 European electricity companies handed over to EU Energy Commissioner Andris Piebalgs in Brussels on 18 March a declaration of their joint commitment to action to achieve a carbon-neutral power supply by 2050, work for an integrated European electricity market that will deliver power cost-efficiently and reliably, and promote energy-efficient electricity applications as a key part of the solution to the great energy-climate challenge.

The way energy supply and use are organised will be a key factor in the effort to stay below the crucial 2°C global warming level. A secure, carbon-neutral electricity supply, delivered through a competitive market, will be a major part of the solution to the challenge. This will require clear thinking, determined action and close cooperation among the various actors.

The advent of a new investment cycle – the European electricity industry will have to replace almost its entire power generation fleet by 2030, with overall investments in plant and grids totalling around €1.8 trillion – provides a unique chance to get on the path to a secure, carbon-neutral electricity system. Available synergies with key sectors such as transport and buildings offer further opportunities to move Europe towards a more energy-efficient, carbon-neutral economy by mid-century and brake the acceleration of climate change.

The declaration by CEOs from companies producing 2500 TWh electricity per year, equivalent to more than 70 per cent of total European power generation, shows that the power industry is ready and willing to play a pro-active role in achieving the common purpose, but political leadership will still be required to create the right market structure and incentives for companies and their customers to choose low-carbon or energy-efficient options.

EU legislators recently finalised two major ‘packages’ of legislation – the third package of energy market legislation within a dozen years plus an energy-climate package requiring a 20 per cent cut in greenhouse gas (GHG) emissions by 2020, updating the EU Emissions Trading Scheme (ETS), revising the Directive on Renewable Energy Sources (RES) with a view to boosting to 20 per cent the RES share in total energy consumption, and setting out a framework for deployment of carbon capture and storage (CCS). Eurelectric sees these new directives and regulations as a step forward – towards establishing a single European energy market and in bringing greater clarity for investments in low carbon technologies.

However, many practical details arising from the two packages remain to be worked out and the member states still have to pass over the next 18 months national legislation to implement their provisions. Much therefore remains to be done and the implementation process will be key to creating an effective framework across the European Union.

One thing that needs to be done is to drive forward regional integration as a step on the way to a single European electricity market. We welcome provisions in the third package such as the new obligation for transmission system operators (TSOs) to integrate their systems at regional level for capacity allocation; the creation of a

reasonably balanced decision-making process between the new TSO-cooperation body ENTSO-E and the regulators’ agency ACER; and requirements for extensive involvement of market stakeholders in the drawing up of the network codes needed to make the markets work. We hope that cooperation between ACER and ENTSO-E will enable fast, effective adoption of binding codes.

During this implementation phase, Eurelectric will try to bring further impetus to discussions on regional markets, stressing the importance of integrating day-ahead and cross-border intraday markets – a basic requirement to enable the large-scale deployment of intermittent RES-power generation. In addition, given the important role of TSOs as facilitators of market development, incentives should be put in place to integrate grid operations at regional level. We also want to see ENTSO-E focus on socio-economic benefits from a regional perspective when implementing the 10-year grid investment plan mandated by the new Electricity Directive.

Investment in distribution networks will also be of great importance in terms of supply security, integrating the power markets and deploying the vast new volumes of RES-power. Eurelectric welcomes the move initiated by the European Commission, in its Green Paper on Energy Networks, to extend the scope of EU energy network policy to include the distribution segment.

However, many constraints currently hinder grid operators from proceeding with capital expenditure, and Eurelectric has called on regulators’ group ERGEG to draw up guidelines on best practice so as to inter alia shorten current timelines for members states’ consenting procedures for new lines. Carbon-reduction benefits of new investment, where demonstrated, could also be taken

...we would have liked to see real opportunities for companies to trade RES-power cross-border...

into account in authorisation decisions. Specific regulatory incentives are also needed for smart grids so as to facilitate integration of distributed power generation, a broad roll-out of smart meters and demand-side management devices, plus integration of electric vehicle recharging points into the distribution networks.

The CEO declaration underlines the basic mission of electricity companies to provide a secure power supply and stresses that this can be best achieved through a diversified portfolio of generation plants, decreasing dependency on imported fuels. The Eurelectric *Role of Electricity* (RoE) project has shown how the triple challenge of ensuring secure supply while reducing GHG emissions and promoting economic competitiveness can be met through a broad energy mix deploying all zero- or low-carbon technology options – CCS and a continuing role for nuclear power alongside RES – plus energy-efficient electro-technologies in key demand sectors.

Building on RoE, Eurelectric has now launched a ‘2050’ project, using scenario analysis to better quantify aggregate investment requirements towards a carbon-neutral power sector by mid-century and get a better handle on costs.



**Lars G. Josefsson: The implementation process will be key**

It remains to be seen however whether the various GHG/RES/CCS provisions and mechanisms in the energy-climate package will work together to create a consistent, market-based framework which ensures that the 2020 targets can be met at affordable cost to the economy.

First, the policymakers must work out the practicalities of the third phase of ETS. Eurelectric accepts the logic that allowances to emit GHGs should be auctioned, not free of charge, provided all sectors are treated equally. We regret this level playing-field has not yet been achieved – free allowances will continue in special cases – but we welcome the intention to make auctioning the rule for all soon. The way it is handled will be crucial. To be consistent with the integration of electricity markets, a common auctioning platform should be set up for the whole of Europe.

approach. Part of the framework should be a robust carbon price based on an international emissions trading system. As a basis we urge the parties meeting in Copenhagen in December to forge a solid international climate action accord to succeed the Kyoto Protocol.

Meanwhile the International Electricity Partnership (IEP), set up by 30 electricity CEOs from Australia, the EU, Canada, Japan and the USA last October, has been working on a roadmap designed to drive forward development and deployment of commercial technologies that will reduce carbon emissions. Speaking in Bonn on the sidelines of the international climate talks in April, IEP delegates unveiled an estimated timeline on CCS, showing that the technology is likely to be commercially available by 2020-2025 and that – provided investment is forthcoming – widespread deployment should follow in the following 10 years.

The electricity industry is certainly doing its bit towards a sustainable energy future. There are also major opportunities in other sectors of the economy to replace less energy-efficient or more carbon-intensive processes by carbon-neutral power. Energy-efficient lighting, heat pumps for spatial heating/cooling and electric or plug-in hybrid cars all provide a means to reduce GHG emissions. The Eurelectric task force on electric vehicles is liaising with power companies and car manufacturers to ensure a widely accepted standard for re-charging infrastructure.

Europe’s electricity companies are working with customers, legislators and regulators towards a competitive, secure and low-carbon energy supply. But policymakers must play their role by setting the right framework. Decisions regarding the ETS, RES-deployment, CCS-financing, new nuclear power plants, infrastructure authorisation and regional market integration will be crucial. Informing the public on energy issues and incentivising consumers to choose energy-efficient and low-carbon options is a no-less-important task of government. Leadership and cooperation are both needed, and we must all work together to get it right.

*Lars G. Josefsson is CEO of Vattenfall and president of Eurelectric, the association representing the European power sector*

In addition, the provisions facilitating RES-access to the grid must be implemented in a way which, while promoting energy security and low-carbon supply, does not work counter to the competitive market.

Of course climate change is a global challenge and requires a global



## Oil

# Slack demand for crude through 2009

- "Fair price" of \$75/b expected to remain elusive
- Market will remain under pressure

by David Gregory

The main monitors of global crude oil demand – the International Energy Agency (IEA), the US Energy Information Administration (EIA) and the Organization of Petroleum Exporting Countries (OPEC) – have in their latest monthly reports revised downward their forecasts for oil demand during 2009.

The downward monthly revisions reinforce observations made by analysts that the fundamentals of supply and demand do not support crude oil prices rising much above \$50/b for 2009, nor much beyond \$60/b in 2010. Despite

the occasional bursts of economic optimism that has led to brief rallies in the international stock markets that have resulted in crude prices rising to the low-\$50/b range, OPEC's stated desire to see crude reach a "fair price" of \$75/b is expected to remain elusive until 2011 or beyond.

In the latest reports, all issued in mid-April, global demand for crude oil for 2009 was forecast in the range of 83-84 million b/d. The Paris-based IEA put 2009 average demand at 83.4 million b/d, the EIA, a branch of the US Department of Energy, forecast it at 84.09 million b/d, and OPEC saw demand averaging 84.18 million b/d

for the year.

This compares with crude oil demand for 2008 put at 85.8 million b/d by the IEA, 85.45 million b/d by the EIA and 85.55 million b/d by OPEC.

OPEC has attempted to boost crude oil prices by cutting back on production from the first of the year. However, OPEC has yet to reach its production target and output remains, by some estimates, at more than 700 000 b/d over the quota.

Due to concern over the global economy, OPEC decided not to attempt to force prices higher with further production cuts. The group will meet again on May 28th when they will assess market conditions yet again. If prices have failed to firm above \$50/b by its next meeting, OPEC can be expected to press for greater quota compliance rather than push for additional production cuts.

But as for now, \$50/b oil is the

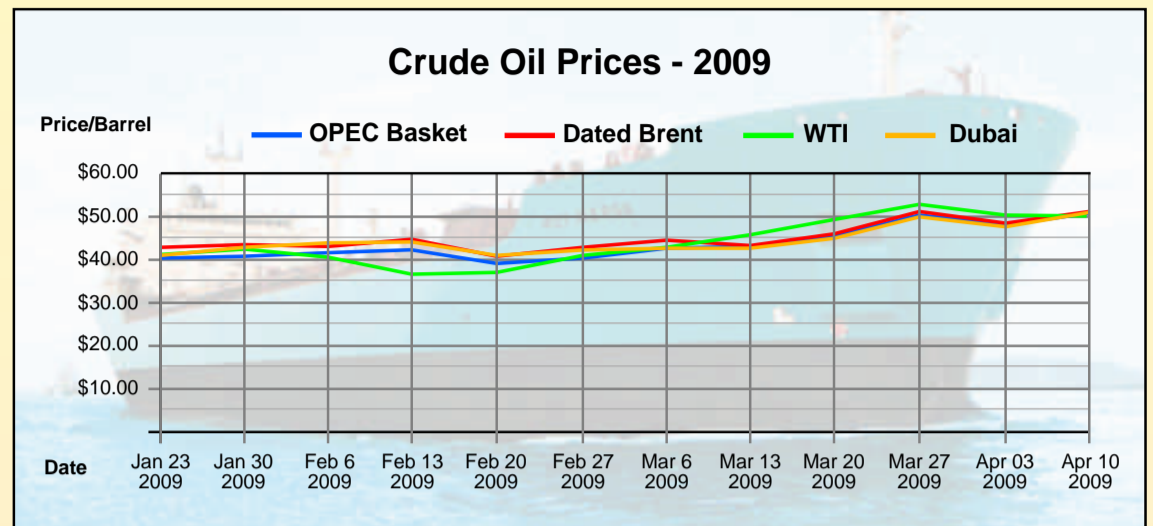
challenge. In a recent oil market commentary, Société Générale said: "The bearish view is based on immediate oil fundamentals – steep recession, sharp oil demand contraction, and high crude and product stocks. The bullish view is based on the perception or hope of economic recovery, or at least the emergence of a clear bottom, in the second half of this year or next year." The bank went on to say that it is "unconvinced about the sustainability of \$50 crude" during the second quarter of this year.

Commenting on crude prices in its April *Oil Market Report*, the IEA noted that oil prices exceeded \$50/b for the first time in four months in late March but said "pervasive weak supply and demand fundamentals cast a long shadow and could limit any further gains for now." It added that OPEC production cuts "have yet to dent stubbornly high oil stocks and the full

impact of the reduced volumes may take some time to translate into a significant stock-draw."

In its *Short-Term Energy Outlook*, the EIA projected the price of West Texas Intermediate (WTI) crude to average \$53/b during 2009 and \$63/b in 2010. It said: "A stronger-than-expected economic recovery, lower non-OPEC production because of the current low oil prices and financial market constraints, or more aggressive action to cut production by OPEC countries could lead to a faster and stronger rise in oil prices."

OPEC said in its *Monthly Oil Market Report* that oil demand is "suffering more and more" from the world economic recession. "In the coming months, the market is expected to remain under pressure from uncertainties in the economic outlook, demand deterioration and the substantial overhang in supply."



## Gas

# Turkmen pipeline dispute may signal westward turn

Cooling relations with Russia may see Turkmenistan go it alone in entering western energy markets.

by Mark Goetz

Events in recent weeks indicate that Turkmenistan is orchestrating a separation from Russian natural gas monopoly Gazprom, which purchases practically all of Turkmenistan's gas exports.

Russia is keen to retain control over Central Asia's oil and gas resources and has made agreements with Turkmenistan to buy up the bulk of its gas production for some time to come. Most of the 50 billion m<sup>3</sup>/year (bcm/y) of gas that Gazprom now buys from Turkmenistan is sold to Ukraine – albeit at a higher price – and deals exist that provide for Russia to purchase up to 80 bcm/y after 2010.

In May 2007, Russia proposed a new

gas pipeline in Turkmenistan to facilitate increased exports of Turkmen gas to Russia. The new Pricaspiysky pipeline would run from the Cheleken and Kotur-Tepe region near Turkmenbashi on the Caspian coast, north into Kazakhstan where it would connect with the Soviet-era Central Asia Center (CAC) pipeline network at Beyneu. From there, Central Asian gas runs to Aleksandrov Gay in Russia.

Gas produced at the offshore Cheleken field and Kotur-Tepe would feed into the 30 bcm/y Pricaspiysky, which would also draw upon gas from the South Iolotan/Osman gas region in eastern Turkmen – where reserves have been estimated as high as 14 trillion m<sup>3</sup> – through a new East-West pipeline to be built by Gazprom.

The plan was designed to dissuade Turkmenistan from entertaining offers from the European Union and the US to join the Nabucco Gas Pipeline project, which would entail the construction of an underwater trans-Caspian gas pipeline connecting Turkmenistan with Azerbaijan's BP-operated South Caucasus Pipeline to Turkey and once there, to Nabucco.

## The East-West pipeline seems to be the bone of contention between Ashgabat and Moscow

The Russian deal also included upgrading the ageing CAC system, which consists of six pipelines. Five of them pass from Turkmenistan, through Uzbekistan, and Kazakhstan en-route to Russia.

Over the last two years little progress has been made on this project but in late March Turkmenistan's president Gurbanguli Berdimukhamedov visited Moscow for further talks with Russian president Dmitry Medvedev. However, the talks on the project failed.

The East-West pipeline seems to be the bone of contention between Ashgabat and Moscow. Some reports say that Gazprom has become so strapped for cash in the midst of the global economic downturn that it cannot follow through with the construction of

the East-West section. Other reports say that Moscow wanted a guarantee from Ashgabat that the pipeline would be used exclusively for the transport of gas destined for Russia.

Both sides say that further negotiations would take place and that the deal would be signed later this year. Shortly after the Turkmen president returned to Ashgabat it was announced that an

international tender would be issued for the design and construction of the East-West pipeline. Its length has been estimated at 800-1000 km and its cost put at around \$1.5 billion.

A statement on the Turkmen website said: "The era of monopolies in this segment of the world economy is a thing of the past... Rapidly growing demand for energy stimulates the search for new configurations, schemes and project models of alternative energy supply routes."

The statement also said: "The issue of sovereign rights of countries to choose the manufacturer of the supply routes of their energy is inextricably linked to the right to formulate prices for them. In this context, the only correct pattern for the formation for natural gas

prices is direct agreements between the seller and buyer. In doing so, logically, that it is the country of production determines the price based on cost of gas production."

The remarks indicate that Turkmenistan it will decide for itself how it will develop and sell its natural gas resources.

Following the statement, on April 9th an explosion occurred on the CAC-4 pipeline near the Turkmen-Uzbek border. On April 10th, the Turkmen Foreign Ministry issued a statement that said the explosion "was caused by a gross unilateral violation by Gazprom Export of the norms and rules of the natural gas sales agreement."

Various parties in Russia attributed the blast to the CAC's ageing infrastructure adding that the accident was just that – an accident, and a small one that would not disrupt deliveries to customers.

Current circumstances may cool relations between the two countries and provide Ashgabat with the opportunity to turn to the lucrative European markets. Such a move, as difficult as it might be for Ashgabat to pull off, would breathe new life into the European-backed Nabucco and other "Fourth Corridor" gas projects, but fracture Moscow's design on Central Asian energy.



Turkmenistan president: Gurbanguli Berdimukhamedov



# Enough stamina for the job

**Steve Bolze** is the president and CEO of the recently formed Power and Water business within GE Energy Infrastructure. He speaks to *TEI Times* about his love for a challenging environment, including a passion for triathlons.

As president and CEO of the world's largest equipment manufacturer for the power industry, work, understandably, consumes most of Steve Bolze's time.

The little time he does have outside of work is spent with his family and staying fit. Mr Bolze is married with three sons, the eldest of which is about to go college. "The time that isn't spent on the road is spent with the family. There's not a lot of time for golf," he jokes.

While he does get some time to take in biographies or business books when on a plane, one of Bolze's favourite 'pastimes' is a lot more strenuous than golf or reading. He enjoys taking part in triathlons, no less – an endurance event that involves running, cycling and swimming distances of tens of kilometres. "I do the shorter triathlons. Whenever I travel, I take my running stuff with me. I'll do a workout in the morning, which helps me adjust to the different time zone, and then I'm ready for the day."

Anyone who enjoys triathlon clearly relishes a challenge. "I do like a challenging environment and working on big complex global problems," says Bolze. This is one quality he believes clearly defines him; another is his desire for consistently learning and looking for ways to make the business better.

"A lot of the discussion in our group is centred around: how do we ensure that we have the strongest expertise in our team? We are always looking to find people that can make us smarter and help us execute better. For example, GE acquired Jenbacher Austria six years ago. I have been working with the Austrian team for four years. This business has tripled in size, all organically. Now almost 40 per cent of the engines sold in the 1-4 MW range operate on non-natural gas. Today we have 120 machines in Russia alone that can burn flare gas. It's a huge opportunity and I get excited about stuff like that."

A third personal quality, which Bolze traces back to childhood and parents, is his ability to listen and be humble. It is something he sees as important in a global organisation. He explains: "Travelling around the world, you see different cultures and interact with different teams. There's a lot you can learn, especially in terms of tackling global problems at a local level. I've been at GE for 16 years and for me, it's important to have an environment where you are challenged and open to ideas from everywhere and the entire team."

Bolze is well equipped to work with his peers at all levels. He has a Bachelor of Science degree in electrical engineering from Duke University, USA, and an MBA from the University of Michigan. He started his career as an engineer in the defence and aeronautical industry. Before joining GE, Bolze was a management consultant at Corporate Decisions, Inc., often working with global companies on bringing products to market.

Since joining GE in 1993, Bolze has spent most of his time in the energy business. In 1995, he joined GE Energy as manager of Competitive Strategies and later became the product general manager for large steam turbines. He subsequently held several leadership roles in Energy Services including president and general manager of Energy Management Services. He was named vice president, Power Generation in November 2005.

Bolze now sits in the building in

Schenectady, New York where the business was founded. He comments: "Energy is one of the oldest and most global businesses in GE. What brought me to the business is its global nature. Also, it's one where technology is clearly a differentiation point."

Another aspect that attracted Bolze is what he calls a "very experienced and diverse team". He recalls: "It was the same then as it is today – we are focussed on solving the challenge of how to meet energy demand given the issues of efficiency, emissions and reliability. We win as one team, with a common focus."

Like many, Bolze sees this as an exciting time to be in the industry. "Today we are seeing the impact of investments that our teams made 10 years ago. For example, we have invested more than \$850 million in renewables since we got into the business in 2002. Since then that business has expanded more than 10-fold. Today our global sales are over \$6 billion."

Bolze attributes such rapid expansion primarily to a focus on clear product differentiation, for example, through its 1.5 MW wind turbines. Industrialising the product through the company's global manufacturing and supply chain as well as localising it has also played an essential part. "We now have operations in China for the units, as well as expanded operations in Germany and Spain," he says.

Globalising operations is important in serving a global customer base. Bolze recently returned from visiting eight countries in 10 days. "We spent time with the local teams, partners and customers in Eastern Europe and the Middle East. Some of our oldest and most established customers are in Saudi Arabia and we are about to expand our service and technology centre in Dammam. You learn a lot [on these visits]. In Saudi Arabia, fuel flexibility and the need to be able to burn heavy crude is important going forward. This will require significant investment in a new technology solution."

Bolze sees diversity in energy solutions as a dynamic challenge going forward noting a need for energy independence while being mindful of fuel prices. He believes that challenges

## I do like a challenging environment and working on big complex global problems

like this are the same now as they will be in the long term. "The demand for power is expected to double between now and 2030. The need for clean water solutions, whether industrial or municipality, is expected to triple over the same period."

In the near term, one challenge according to Bolze is sustainable and predictable energy policy. He explains: "There are some large-scale global policies, e.g. for carbon. However, most of the policy work is at the country level, so it becomes very complex and dynamic. In our industry we develop global product platforms, which means we have to have people on the ground and support our customers in their government discussions and help them to be competitive in their local markets."

The current state of the global economy is, however, the main short-term challenge as power companies face increasing difficulty in financing projects. "Our customers now have to be mindful of how to finance their



**Bolze likes to spend time with his family and staying fit**

investments in this dynamic time," comments Bolze.

Despite the economic turbulence, GE continues to see strong demand for its products and services. Last year, GE Energy and Infrastructure reported sales of \$29 billion, up from \$22 billion the previous year. Much of this was driven by strong demand for power generation-related products and breadth of services. This has created a strong order backlog on which the company has a "tremendous focus in execution excellence".

funding by over \$250 million. We have spent a significant amount in our renewables business, particularly in solar. Just over 18 months ago we made an investment in thin-film photovoltaic technology. In wind, we recently introduced our 2.5 MW wind turbine. We are also investing in coal gasification. Under our contract with Duke Power in the US we will build a 630 MW IGCC plant. Nuclear is another area. We have an established design in the Advanced Boiling Water Reactor and a strong alliance with Hitachi. We will continue to expand our service and fuel businesses."

With various renewable portfolio standards being implemented around the world, Bolze sees the move towards renewables as a trend that will continue. He argues that wind will be the most economic, except in countries that have hydro resources. At the same time, he says there will be a need for high efficiency baseload power and thus a need for gas and coal fired plants "balanced against a lower emissions footprint".

Notably, Bolze also highlights the importance of reducing water usage in power generation. "A lot of the world's water is used for once-through cooling of power plants," he explains, "now there is a major focus on water re-use, especially in water-scarce areas. We are developing technology solutions for advanced water-re-use and waste treatment. This is getting a lot of our attention, as well as the ongoing need for desalination in the Middle East."

Despite the global downturn, keeping all of these balls up in the air will keep Bolze occupied for some time to come. But with his triathlon conditioning, no doubt he will have enough stamina for the job.

Bolze notes: "I don't think we will see the strong double-digit growth experienced in 2007/08 but we are in a long-cycle business. We get orders one or two years in advance of when they need to be delivered to customers. We have had a number of awards to deliver wind turbines. Delivering to customers is the number one priority and we will see healthy growth as we deliver on the backlog."

The company is also seeing a shift towards doing more business with governments. "With the governments' stimulus packages, more governments are becoming our customers," says Bolze. In December, GE Energy secured the largest single gas turbine order in its history – 56 Frame 9 gas turbines for the government of Iraq.

But one thing that is not changing according to Bolze is the investment the company is making in new technology development. "We continue to invest even in this challenging environment. In the last three years we have increased our development



# Battery storage goes distribution scale

A pilot high voltage lithium-ion battery system will begin operation in the UK before the end of this year. The system will be an important trial in the development of large-scale battery-based systems for energy storage and grid support, writes **Junior Isles**

Systems that allow energy to be stored for hours or even days are not uncommon. These are typically large systems, such as pumped storage systems, which in many respects compete with forms of generation such as gas turbine power plants that can be brought on line fairly quickly.

The increasing amount of variable energy sources on the grid such as wind and solar, however, requires systems that can be located close enough to the point of power generation and that can instantly inject power into the grid to cover power variations caused by, for example, a sudden fall in the wind.

In December last year, ABB and French battery specialist, Saft, announced a project to develop a battery-based energy storage system that would be able to instantaneously provide power for up to several minutes at a time.

Under a contract ABB signed with EDF Energy Networks, the two companies are working on a collaborative research, development and demonstration project in the UK to install a system that will allow the power harnessed from the wind to be used more efficiently than would otherwise be possible.

Electrical networks are subject to frequency disturbances, voltage fluctuations etc. ABB's FACTS Systems Group develops flexible AC transmission systems, which improve the stability of distribution grids. Its SVC (static var compensation) Light system allows high frequency switching for dynamic voltage and frequency control.

The driver behind this latest collaboration with Saft, was ABB's need for a powerful energy storage solution. In order to simultaneously provide voltage control and control of active power flow in the grid, ABB needed an active energy storage system capable of discharging a large amount of power in a short timeframe. "They were looking for a technology that could pass energy in and out of the battery for several years. They also needed to have this capability in a small footprint," commented Michael Lippert, head of marketing for industrial batteries at Saft.

The system is the latest step in a collaboration with ABB that began a number of years ago. In September 2003 Saft commissioned the world's largest battery energy storage system (BESS) to support the Golden Valley Electric Association grid in Alaska. This is a 5 kV nickel-cadmium battery capable of providing 27 MW of AC current for 15 minutes, long enough to start up a backup generator to replace one that fails. During commissioning this system was discharged at 46 MW for five minutes, qualifying it as the world's most powerful battery.

The new Li-ion system will be installed at the Martham substation in EDF Energy



The battery has been delivered to ABB in Sweden where it has been qualified through functional tests

Networks' distribution network on the Norfolk coast. According to Lippert, it will help validate the capability of such a system. "In future it will help ABB to go the market with even bigger systems in terms of megawatts," he said.

The installation will provide dynamic voltage control in an 11 kV distribution system and at the same time enable dynamic storage of surplus energy from

Creating a battery system of 5 kV requires a number of technical developments, particularly with regards to isolation and reliability since the system cannot support any open-circuits.

The inherent lifetime capability of Li-ion made the technology attractive for the application. The battery can provide 200 kWh of nominal energy storage and is able to discharge at 600 kW for up to 15 minutes. It can be charged and discharged over a typical lifespan of 20

where there is a high penetration of renewables, there may be applications in other industries that have short-term power needs. These can be industries with momentary high power demands or, for example, hospitals and semiconductor fabrication plants in which critical and sensitive loads are highly distributed throughout to facility. "There is an economical rationale for these systems compared to the option of having to do grid upgrades or installing multiple UPS systems throughout the facility," said Lippert. While he was unable to comment on the cost of the Martham project, he indicated that there was potential for substantial cost savings.

The system for Martham is well advanced. The battery has been developed and delivered to ABB in Sweden where it has been qualified through functional tests in the laboratory. Actual installation in Norfolk is planned for this summer, with full operation before the end of the year.

The pilot will prove the feasibility and capability of the technology; the next step will be to improve overall system optimisation. "This system is based on existing flexible modules that are not optimised for a particular application. We want to develop a system that is optimised in terms of cost and performance. This will involve making a number of small improvements such as reducing the number of sub-units and PC boards in those sub-units," explained Lippert.

Other future developments will be focussed on increasing voltage and power outputs. Lippert concluded: "Currently, we are in the area of several kV and hundreds of kW. We want to be at tens of kV and tens of MW, the level needed for industrialised systems."

In the future we will aim to build systems that can provide power for longer periods, say, 15 minutes to half an hour

nearby wind farms, which can be utilized to level out peaks in grid loading. The project is being supported through UK industry regulator Ofgem's Innovation Funding Incentive Scheme.

The battery system is a customised version of Intensium Flex, a flexible, modular Li-ion battery system previously developed by Saft for stationary applications. "We have Li-ion technology in-house which we adapt to different market requirements. Intensium Flex is positioned for use in various emerging markets and energy storage. Together with ABB, we have now made a high power version that can achieve 5 kV."

"This is the initial goal," added Lippert. "In the future we will aim to build systems that can provide power for longer periods, say, 15 minutes to half an hour. Such systems would take over so-called ancillary services such as frequency regulation and synchronised reserves, that are normally provided by fossil-fuelled generation with little energy delivery to the final consumer. This is where energy storage has greatest value."

years

Controlling a large battery of this kind is far more complex than controlling the likes of a single car battery. The control of this battery system was one of the challenges during development. Importantly, Saft's base models already include control and monitoring electronics which are needed for the supervision of each individual cell within the Li-ion battery. An additional ABB system for overall system control and interfacing was customised by the two partners. "Here we worked with ABB since the interfaces had to be defined and tested in common," said Lippert.

The battery is divided into eight sub-units and an optical interface that uses a CAN-based communications protocol communicates between the ABB SVC Light system and the eight battery units. The battery provides overall operational data to the controller such as voltage, current flowing in and out of the battery, information about the battery's state of charge as well as alarm information.

In addition to using these systems

## Li-ion battery technology

Lithium-ion batteries are a type of rechargeable battery in which lithium ions move between the electrodes. Lithium ions move from the negative to the positive electrode during discharge and in reverse, from the positive to the negative when charging.

The three primary functional components of a lithium ion battery are the negative and positive electrodes, and electrolyte. Lithium ion batteries were first proposed in the 1970s. These early units used titanium (II) sulphide as the positive and lithium metal as the negative. Today, a variety of materials may be used. Commercially, the most popular material for the negative is graphite. The positive is generally one of several lithium-bearing materials: lithium cobalt oxide, lithium nickel oxide (doped with cobalt and aluminium), lithium nickel oxide (doped with cobalt and manganese), lithium iron phosphate or lithium manganese oxide.

Lithium-ion batteries have the advantage that they can be formed into a wide variety of shapes and sizes to efficiently fill available space in the devices they power. They are also much lighter than other equivalent secondary batteries and have a low self-discharge rate.

Battery service life depends on the choice of material for the positive electrode, the voltage to which the battery is charged, and the number and depth of charge/discharge cycles.





Junior Isles

## Monetise my ride

Forget "Pimp my Ride". For those of you unfamiliar, it's a television program where they take an old car and 'customize' it – shiny spinning rims, ridiculously loud stereo systems, on-board TVs; the lot. Not my cup of tea. Here is an idea I much prefer – a car that can earn me money when I "fill up".

There has been much talk about the importance of electric vehicles in transforming the future power and energy landscape. Yet it is only in recent years that an 'all-electric' future seems a real likelihood. This has been partly due to advances in electric vehicle technology and partly due to government drives to cut global GHG emissions.

However, most of us like what we know, which is unfortunate for any vision of roads filled with electric vehicles. If we are required to change habits, it usually does not happen unless there are immediate, visible, economic incentives – or we have no other choice.

While governments realise this, it is only the deep economic crisis and the knock-on effect on the car manufacturing industry that has prompted them to start offering financial incentives to make the switch to hybrid or low CO<sub>2</sub> emissions vehicles.

The UK recently announced that it would offer cash incentives to motorists who choose to buy new cars. The scheme will see drivers able to claim a grant (part from government and part from the car retailer) of up to £2000 towards the purchase of a new vehicle if they decide to trade in an old car for a newer, more fuel efficient model. A similar scheme in Germany saw car sales jump by nearly 40 per cent. At least eight of the European Union's 27 countries now have incentive schemes in place to encourage drivers to trade in their old cars for new greener models.

Similarly, in the US last month vice president Joe Biden announced that \$300 million in federal stimulus money would go to cities and towns to purchase more fuel-efficient vehicles. State and local governments and transit agencies are eligible to apply for the funds, although they must agree to match half the amount

they are allocated.

The money can be put towards the purchase of hybrid, fuel cell and natural gas vehicles and finance the infrastructure to fuel them. The money can also be spent on public awareness campaigns and training programs on advanced technology vehicles.

In addition to saving the car industry, it is hoped that these initiatives will have the added benefit of helping to cut overall carbon emissions.

Looking further ahead, the UK government announced it would offer even greater cash incentives for people who choose to buy electric-powered cars. The scheme could typically knock as much as £5000 off the price of electric vehicles when it is introduced in 2011.

While incentives for newer, cleaner vehicles may well have an effect, it is questionable whether we will see the same thing happen with 'all-electric' vehicles.

Tim Urquhart, an automotive analyst with IHS Global Insight, was recently reported as saying that the subsidies were unlikely to spark a sales boom

minutes, was unveiled at the Hannover industrial technology fair.

"A car must be able to be recharged in Italy in exactly the same way as in Denmark, Germany or France," said RWE spokeswoman, Caroline Reichert, in an edition of *Die Welt*. She gave no timeframe for the introduction of the plug, saying that talks between the companies were ongoing.

The agreement on a common standard for the plug comprises several major car-makers, including Volkswagen, BMW, Ford, General Motors, Fiat, Toyota, and Mitsubishi.

Energy firms signed up to the accord include E.On, Vattenfall Group, EDF Energies Nouvelles SA, npower, Endesa, and Enel.

Berlin hopes that 1 million electric cars will be on the road by 2020. RWE and Daimler launched a pilot project in Berlin in September.

While the development of a common plug is a major step towards the mass production of electric cars, more will have to be done to make these cars attractive – if not visually, then

computer did for computing, and what the mobile phone did for telecommunications," UTS research project director Chris Dunstan said.

The extra batteries can store energy at off-peak times and feed power back into the grid at times of peak demand. "On a large scale, this could level out peaks and troughs in power supply across regions," noted Dunstan.

Based on a 30 km commute, UTS claims its prototype, called Switch, would cost as little as 50 cents a day to charge with off-peak power. The prototype would save up to 2.8 tonnes of greenhouse gas emissions a year, according to UTS.

NSW Environment Minister Carmel Tebbutt admitted V2G was a long way from becoming widespread, but said Switch would become part of her department's car fleet for a trial period. The Department of Environment and Climate Change helped fund the vehicle.

She admitted a financial incentive, such as a feed-in tariff, would be necessary to create demand from motorists for the new technology.

"You could envisage a world in the future where many people have these cars and there is an opportunity to say 'tomorrow we need everyone to feed their cars back into the grid', and that will help us address a power need on that particular day," she said.

"There would obviously need to be a financial incentive for people to do that, but we're a long way away from that at the moment."

The success of the V2G car would rely on the support of energy companies, whose willingness to buy back the unused electricity would be critical.

"If there is not the demand from the electricity industry to provide this power back in at a reasonable price and a rate that makes sense for consumers, then there is no point in pursuing the technology," Mr Dunstan said.

Let us hope that the electricity industry is sufficiently excited about this technology. A hybrid-electric vehicle that can reduce emissions and potentially pay for some of its own running cost is certainly my kind of ride.

### Australian engineers have developed a plug-in hybrid car that can pump power back into the grid

since the public has shown little interest in the small cars. According to the *Clean Green Cars*, an internet-based environmental car guide, only 156 electric cars were sold in the UK from January to October 2008. This was down nearly 60 per cent compared to the same period in 2007.

There would also have to be huge progress in the infrastructure for charging vehicles. The *Clean Green Cars* site said that, as of March, there were just 120 charging stations in use in the UK, about a third of them in London.

Certainly some of the potential problems with vehicle charging are now being addressed. In April, leading automotive and energy companies reached agreement on a common "plug" to recharge electric cars, a spokeswoman for German energy company RWE AG said.

The three-point, 400-volt plug, which will allow electric cars to be recharged anywhere in a matter of

fiscally. The fiscal option is probably safer than any type of "Pimp my ride" approach.

Here is a major incentive. Australian engineers have developed a plug-in hybrid electric car that not only generates power but can pump (not pimp) it back into the grid, potentially reducing running costs.

Researchers at the University of Technology Sydney (UTS) are developing what they call the vehicle-to-grid (V2G) prototype.

Taking a standard 2006 Toyota Prius, engineers at UTS converted it to plug-in, and then installed additional batteries in the rear so it can store electricity, which can then be transferred back into the power grid.

UTS is the first in Australia to develop the V2G technology, and one of the first in the world.

"The vehicle-to-grid technology this car presents could do for the automotive industry and the electricity industry what the personal

