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THE ENERGY INDUSTRY TIMES

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UK details nuclear plans amid reactor safety concerns

Areva's CEO, Anne Lauvergeon: resolving safety issues

Financing and safety concerns surrounding nuclear reactor designs are clouding the UK's plans for a new fleet of nuclear power plants.

Junior Isles

The UK's plan for a new fleet of nuclear power plants is already being threatened by safety concerns over proposed reactor designs and the lack of financial incentives to invest in new plants.

A progress report published by the Health and Safety Executive (HSE) has highlighted important issues that need be addressed before approval can be granted for reactors designed by Areva and Westinghouse.

The issues were uncovered in the Generic Design Assessment of two proposed reactors for the UK market: the EPR from the French partnership of Areva and EDF; and the AP1000 from Westinghouse, the US-based nuclear engineer owned by Toshiba of Japan.

Kevin Allars, who is leading the design assessment for the HSE said that while some important issues had been highlighted, they had found no "show-stoppers" that would prevent either design being approved on schedule by 2011.

At the beginning of November, regulators from Britain, France and Finland issued a joint statement raising concerns about the EPR's safety systems.

The issue centred on the control and instrumentation systems. Regulators were concerned there was insufficient separation between the systems that controlled the reactor during normal operation and the safety systems that would take over in an emergency.

Areva and EDF have already outlined a solution, which Mr Allars said would work "in principle". However, he said the HSE needed to see a detailed design. Areva said it hoped the controls issue would be resolved before the end of the year.

Westinghouse said it recognised there were "many areas in the HSE report which identify work that still needs to be done in order to give the regulators confidence" in the AP1000 design. It was still confident, however, of meeting all the necessary requirements by June 2011.

The UK was recently presented with a third alternative design when GE-Hitachi opened talks with the HSE and the Environment Agency about securing approvals for its Economic Simplified Boiling Water Reactor (ESBWR), re-entering a process that it dropped out of in 2008.

No ESBWRs have yet been built anywhere in the world but the reactor is further advanced in the US approvals process than either the EPR or the planned modified version of the AP1000.

The news came as the UK government selected 10 sites for the building of a new generation of nuclear power plants with a total capacity of 16 GW. Five of the sites have been

Continued on page 2

CCS studies will help ensure capture readiness

An agreement between Alstom and Schlumberger could help to facilitate the future conversion of power plants to incorporate carbon capture and storage (CCS).

The two companies have signed an agreement for mutual collaboration in the joint offering of CCS-ready studies. The studies will be a technical analysis of a power plant to identify how it should be adapted to accommodate an Alstom CCS system. The studies will also include an evaluation of potential CO_2 storage sites for the power plant, as well as an evaluation of required investments for future CO_2 transport and storage.

Each study is expected to take 6-9 months and according to Patrick Fragman, Alstom Power's vice president of Environmental Control Systems and CO_2 Capture Systems, a few studies are already underway or in the pipeline. "The vast majority are either in Europe or North America. For example, both Alstom and Schlumberger are cooperating with Belchatow in Poland. We have performed studies separately in the past but now they will be undertaken together and in a more integrated way."

He said that the agreement goes beyond identifying whether a plant is just capture-ready but ensures it is both capture- and storage-ready. "It is not only about designing the plant or preparing it [in an existing plant] for a capture system but also the transportation and the storage options that will enable the utility to have a good concept for the overall system."

Assessing CCS readiness will be a mandatory requirement for all large fossil-fuelled power plants in Europe by 2011. Similarly, the State of Queensland in Australia recently announced that no new coal fired power station will be approved in the state unless it is CCS-ready.

As an original equipment designer, manufacturer and EPC contractor in the power market, Alstom says it will bring its know-how in post-combustion and oxy-combustion capture technologies. Schlumberger Carbon Services brings its resources, technologies, and expertise in managing all phases of geological CO_2 storage projects.

The agreement follows Alstom Power's acquisition of the engineering office of the former Lummus Global, a leading provider of technology for the hydrocarbon processing industry, in Wiesbaden, Germany. The unit, renamed Alstom Carbon Capture GmbH, will be integrated into Alstom's CO_2 Capture Systems activity.

Alstom Carbon Capture GmbH has extensive experience in numerous fields of chemical processing applications, especially for the oil and gas, petrochemical and chemical processing industries.

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identified by generators with specific plans – Sellafield (consortium of GDF Suez, Iberdrola and Scottish and Southern Energy); Wylfa and Oldbury (a joint venture between RWE and E.On); Hinkley Point and Sizewell (EDF).

Vattenfall said it had no plans to take part in the UK nuclear power programme. The company, which recently announced that Oeystein Loeseth, the head of Nuon Energy in the Netherlands, would replace Lars G. Josefsson as chief executive when Josefsson retires in 2010, had come under fire for plans to sell its domestic electricity distribution business in order to finance investment in UK nuclear power stations. Plans for the distribution sell-off were dropped last month.

Investment in new nuclear power stations could prove to be a stumbling block for the UK government.

EDF wants to open its first nuclear plant in the UK by the end of 2017 but says that the volatility in the price of carbon permits in the European Emissions Trading Scheme (ETS) creates too much uncertainty for it to justify the investment.

The company has long argued that nuclear should be incentivised like other low CO_2 technologies such as renewables and CCS. It calculated that an additional cost of £20-40 could be levied on annual bills to pay for a mechanism to support the price of carbon emission permits in the ETS.

US projects select IGCC technology

Siemens and GE technologies are to be used at two integrated gasification combined cycle (IGCC) plants in the US.

Tenaska said it has signed equipment contracts and licensing agreements with Siemens for four gasifiers to be installed at the Taylorville Energy Centre (TEC), the 730 MW (gross) advanced clean coal generating plant being developed near Taylorville, Illinois.

TEC's IGCC technology also will capture and provide storage for at least 50 per cent of the CO_2 from the $3.5 billion project. TEC is in advanced development, with the front end engineering and design (FEED) work required by the Illinois Clean Coal Portfolio Standard law under way. The FEED is expected to include more than 100 000 work hours by the time its facility cost report is presented to the Illinois Commerce Commission in early 2010. TEC is projected to be completed and in operation in 2014.

Meanwhile, Hydrogen Energy California has signed a technology licensing agreement with GE Energy for a proposed 250 MW IGCC power plant near Bakersfield, in Kern County, California. The project will be designed to capture up to 90 per cent of the CO_2 produced for enhanced oil recovery and sequestration in an adjacent oil field.

Climate **Change**

US-China talks bear fruit

US president Barack Obama's recent tour of east Asia has had a positive impact on moves to cut global greenhouse gas emissions, writes **Junior Isles**

US president Barack Obama's tour of east Asia last month appears to have had a positive impact on international efforts to reduce greenhouse gas (GHG) emissions.

Just little more than one week after Mr Obama's three-day visit to China and a few weeks before the Copenhagen climate change meeting, China announced that it intends to cut GHG emissions per unit of economic output by 40-45 per cent by 2020.

The carbon intensity target, although not the same as cutting emissions in absolute terms, underlines the seriousness with which China is treating the climate change debate.

The announcement came days after a pledge from the US to cut its emissions by 17 per cent by 2020, provided domestic legislation was passed.

Both announcements follow a close dialogue between the two countries in recent months.

In mid-November, Mr Obama set out his position on climate change at the Asia-Pacific Economic Co-operation summit, saying that while he was not expecting a legally binding treaty in Copenhagen, there could still be a strong political commitment to a global framework. All 21 participants, including China, supported this position.

Obama re-iterated his position during what was his first visit to China days later. Speaking at the Great Hall of the People in Beijing, together with China's president, Hu Jintao, Mr Obama said: "Our aim is not a political declaration [in Copenhagen] but rather an accord that covers all of the issues…"

Mr Obama and Mr Hu Jintao agreed that US and Chinese scientists and engineers will work together to speed the widespread use of electric cars, energy efficient buildings and cleaner coal-fired power plants.

Energy Secretary Steven Chu, who accompanied Obama on the visit, said the US stands to gain from an expanded market for exports and more jobs at home. Three weeks ahead of the visit, US and Chinese officials met at a high-level meeting in Hangzhou to resolve several trade dispute issues. Notably, China said it would relax restrictions on wind power components and government procurement.

Chu said the US would also gain from demonstration projects in China that serve as large experiments for solving problems in new technology.

The work will be anchored through a new US-China Clean Energy Research Centre. The $150 million funding over five years will be shared equally between the countries. "That's more than talking," Chu noted.

The use of coal is one area in which cooperation will be especially needed. China and the US together are responsible for about half of the world's coal consumption, and generate roughly 40 per cent of global GHG emissions. China already has GreenGen, a project to capture and store CO_2 from a 250 MW coal fired power plant. The US is restarting its own large demonstration, FutureGen, in Illinois.

The US goal is to bring costs down so that carbon capture and storage will be widely used worldwide in 8-10 years, rather than the 20 years or more commonly thought to be needed, Chu said.

Some experts have said that more commercial-scale demonstration projects in China are needed to speed up progress. The agreement, however, said only that the two presidents would "promote cooperation" on large carbon capture and storage projects.

The announcement on coal included some other investments that could lead to reduced GHG emissions. For example, US-based Peabody Energy announced that it had finalized a plan to invest in GreenGen, and Climate Solutions Asia, a subsidiary of AES Corp., entered a joint venture agreement with Chinese companies to use methane recovered from a coal mine to generate electricity.

In a separate announcement General Electric Co. (GE) and Shenhua Group Corp. said they plan to set up a joint venture to develop and promote clean coal technology.

A memorandum of understanding, signed as part of a wider US-China clean energy cooperation pact, aims to combine GE's expertise in gasification and cleaner power generation technology with Shenhua's expertise in building and operating coal gasification and coal-fired power generation facilities, GE said in a statement.

Financial boost for developing countries

Robert Zoellick: World Bank president

Countries in Africa, the Caribbean and Pacific will accelerate their efforts in tackling climate change and developing sustainable and affordable energy after being promised nearly $1.5 billion in funding from developed countries.

Six countries are set to receive $1.1 billion dollars in new financing for climate action, the World Bank said. Mozambique, Niger and Zambia will each receive up to $50-70 million dollars in additional resources to help transform their economies through climate resilience. Meanwhile, Morocco and South Africa will join Egypt in receiving very low-interest loans for $150 million dollars, $500 million dollars, and $300 million dollars respectively, to strengthen their investments in clean energy in support of national priorities for low carbon development.

The new financing for climate action was given the green light at a Trustee meeting of the Climate Investment Funds (CIF) in Washington, said the World Bank in the statement.

The Climate Investment Funds are a unique pair of financing instruments designed to test what can be achieved to initiate the transformation towards low-carbon and climate-resilient economy through scaled-up financing channelled through the Multilateral Development Banks.

The two funds are the Clean Technology Fund (CTF), financing scaled up demonstration, deployment and transfer of low-carbon technologies for significant greenhouse gas reductions within country investment plans; and the Strategic Climate Fund (SCF), financing targeted programmes in developing countries to pilot new climate or sectoral approaches with scaling-up potential.

Separately, the European Commission agreed to allocate €200 million ($295 million) to the African, Caribbean and Pacific (ACP) Group of States.

This was the second phase of the ACP-EU Energy Facility under the 10th European Development Fund for the period 2009-2013. By focusing on renewable energy solutions and energy efficiency measures, the ACP-EU led project supplements measures already taken to fight against climate change.

The second phase will co-finance projects to increase access to improved energy services for the rural poor in ACP countries. In line with the fight against climate change, the Energy Facility will give priority to projects encouraging the use of renewable energy sources.

Chinese companies move into US renewables market

Chinese companies, already dominant in their domestic renewables sector, are now expanding into the US market. The announcement of two recent ventures comes as some US plants are reducing production or outsourcing abroad.

China's Shenyang Power Group (SPG) recently entered into a joint venture framework agreement with the US Renewable Energy Group (US-REG) and Cielo Wind Power LP to develop a 600 MW wind farm in Texas. The agreement marks the first time China and US entities have agreed to jointly develop a utility-scale wind power project.

According to the JV Agreement, commercial banks in China are expected to finance the $1.5 billion required for the project through SPG.

In another announcement, China-based ENN Group and Duke Energy said they will jointly develop commercial solar power projects in the US.

Under the agreement the two companies will concentrate on two types of solar power generation – large utility-scale solar farms and commercial distributed generation solar projects.

Both announcements came amidst reports that General Electric Co. (GE) is to shut down its only solar-panel manufacturing facility because prices for panels have fallen below production costs.

In an interview with Clean Technology Insight, Milissa Rocker, spokeswoman for GE said: "On October 23 we announced the restructuring of our solar business to employees and our intent to close the Newark [Delaware] facility."

GE's production facility is a victim of a rapidly evolving solar market, where older US plants are shutting down, reducing production, or outsourcing abroad, even as some foreign manufacturers, like those from China, plan to open new manufacturing facilities in the US.

The decision to shut down production was "mainly due to the challenges in the solar industry, including overcapacity levels that are twice demand and industry pricing that's below the cost of producing the panels," said Rocker.

GE plans to stop manufacturing crystalline silicon panels on January 1, 2010. It will close the plant by the end of June of next year, she said.

Revised climate bill garners support

- Kerry-Boxer approved by EPW
- New CCS incentives included

Robert C. Byrd, Virginia's senator welcomes additions

US lawmakers debating federal climate change legislation are trying to make a proposed bill more attractive to the country's coal-rich states.

Recent additions to the Kerry-Boxer bill – the US Senate's version of a bill to cap greenhouse gas emissions – include new provisions to stimulate the development of carbon capture and storage (CCS) technology and incentives for coal-fired power plants to become early adopters of CCS.

The additions have been welcomed by coal-state senators such as Robert C. Byrd, D-W. Va., but other pro-coal lobby groups are concerned about the impact of the proposed legislation on the coal industry and the US economy as a whole.

The Kerry-Boxer bill – otherwise known as the Clean Energy Jobs and American Power Act – proposes a 20 per cent reduction in greenhouse gas emissions over 2005 levels by 2020. This compares with a 17 per cent cut in emissions required by the Waxman-Markey bill, which was passed by the House of Representatives in June 2009.

In early November the Kerry-Boxer bill was approved by the Senate Committee on Environment and Public Works, a move that sent "a clear message to the world that the United States is serious about tackling climate change and securing our clean energy future," according to Sen. John Kerry, D-Mass.

Other opponents of Kerry-Boxer argue that the legislation will result in a significant rise in energy bills. The debate has thrown the USA's dependence on fossil fuels into the spotlight, and has also renewed discussions around the role of nuclear power.

The bill's sponsors have called the legislation "a security bill" and have also highlighted the job creation potential of the legislation.

"It is our country's defence against the harms of pollution and the security risks of global climate change," Kerry said in a statement.

If passed by the Senate, Kerry-Boxer will have to be reconciled with the Waxman-Markey bill and passed again by both houses before the legislation can be signed by President Obama.

Québec deal splits New Brunswick

Hydro-Québec could gain a strategic presence in Canada's Atlantic region, but its takeover of a neighbouring utility is far from certain, writes **Siân Crampsie.**

A proposed merger between Canadian power firms Hydro-Québec and New Brunswick Power is causing controversy in spite of promises that it will help to lower electricity rates in New Brunswick.

The Premiers of the two provinces have outlined the proposed deal, which would see Hydro-Québec acquire most of NB Power's assets for C$4.75 billion ($4.5 billion) – an amount equivalent to NB Power's debt.

The deal will result in a 30 per cent drop in industrial electricity rates in New Brunswick along with a five-year rate freeze for residential customers. The Atlantic province's debt burden would also be reduced by around 40 per cent.

Opinion polls in local media indicate, however, that most New Brunswickers are opposed to the deal, while concerns have also been raised by political leaders in Labrador and the US state of Maine.

New Brunswick residents appear unwilling to give up major assets to another state. Newfoundland and Labrador Premier Danny Williams is concerned that the deal will give Hydro-Québec a "stranglehold" over the Atlantic region.

Williams and Nova Scotia Premier Darrell Dexter want a written guarantee that New Brunswick will allow power from other Atlantic provinces to flow into markets in New England.

New Brunswick is an important conduit for power flows between Canada's Atlantic provinces and northeastern USA.

The takeover would give Hydro-Québec ownership of New Brunswick's transmission and distribution grid, its hydropower facilities and peaking plants. The Québec utility would takeover the Point Lepreau nuclear plant when its refurbishment is complete.

Thermal generating facilities at Coleson Cove and Belledune would continue to be owned and operated by the New Brunswick government, supplying electricity to Hydro-Québec under tolling agreements. However, Hydro-Québec could direct New Brunswick to shut them down.

New Brunswick's transmission grid would be regulated according to rules laid down in Québec. Hydro-Québec and Québec Premier Jean Charest say that NB Power would continue to operate as a separate entity and would maintain its corporate identity.

NB Power has a customer base of around 370 000.

Chilean policies pay off

- AES commissions energy storage system
- Major renewable energy investments planned

Chile is expecting a boost to its energy system over the next five years with some $34 billion of planned investments, according to a new report.

Private research firm Intelligence Unit on Projects and Businesses says that investments to 2015 in Chile's renewable energy sector will reach $2.5 billion while the country's Energy Ministry has increased its budgets for the promotion of energy efficiency.

The report was released in November, just weeks after the IEA praised Chile for making "remarkable strides" in energy policy and for continuing to attract investors from around the world.

According to the new report, one of the biggest projects in Chile is the 2100 MW Castilla thermal power plant in Atacama, which the Chilean unit of Brazilian power company MPX Energia is building at a cost of $4.4 billion. Another major initiative is the 2750 MW HidroAysen mega-project, which is being developed by Spain's Endesa and Chile's Colbun at a cost of $3.2 billion.

One of the most important renewable energy initiatives is the Talinay Wind Park, to be built in the Coquimbo region at a cost of $1 billion.

The IEA believes that Chile should accelerate its renewable energy development programme in order to boost energy diversity and security. The Paris-based energy agency said in October that the country's stable economic environment and active energy sector development programme made it an attractive investment environment.

US firm AES' Chilean subsidiary AES Gener recently announced commercial operation of a 12 MW frequency regulation and spinning reserve project at a substation in Chile's northern grid. The project will help the grid operator manage fluctuations in demand and has "the potential to support greater integration of renewable energy sources" into the grid, according to Chris Shelton, President of AES Energy Storage.

In all, AES Gener has six projects worth a total of $2.22 billion in the pipeline in Chile, according to the report. The company planning the largest levels of investment is Endesa, which is building seven hydropower projects worth $3.85 billion and is also spending $276 million on renewable energy projects.

Emergency measures help Ecuador crisis

Emergency deals struck with neighbouring countries are helping Ecuador to stave off an electricity crisis.

The country has declared an emergency in the electricity sector due to a shortfall in capacity at its largest hydropower plant caused by a severe drought.

In addition to a range of emergency measures that include power rationing, Ecuador's government has negotiated the import of an additional 1200 MW from Peru. Colombia is also reported to have increased exports to Ecuador.

And as Ecuador grappled with its power shortage, more than half of Brazil was left without power for several hours in mid-November after a fault at a substation knocked out three key transmission lines.

Ecuador's emergency measures call for the state oil corporation Petroecuador to deliver fuel without prerequisites to power generators. The government is also helping small enterprises with the cost of purchasing electricity generators.

The energy rationing programme is set to continue, according to local media.

The drought has affected Ecuador's southern Andean region for several weeks and has resulted in a major fall in water volumes at the Paute hydropower plant, which accounts for 35 per cent of Ecuador's electricity generation.

Meanwhile, Brazil's recent blackout has raised questions about the integrity of its infrastructure, particularly as it will host the 2014 football World Cup Finals and the 2016 Olympic Games.

The blackout, which affected 18 of its 26 states, was initially thought to have been the result of a severe weather event near the Itaipu hydropower plant on the Brazil-Paraguay border. Further investigations have since revealed that it was caused by short circuits in a power substation, prompting the automatic shutdown of the lines that carry energy to Brazil from Itaipu.

The event triggered the automatic shutdown of Itaipu and other power plants in Brazil, leading to the loss of power for 60 million people for up to four hours.

The Brazilian Olympic Committee says that host city Rio de Janeiro could be isolated from the country's power grid with its own energy supplies during the 2016 Games.

Ecuador: emergency measures

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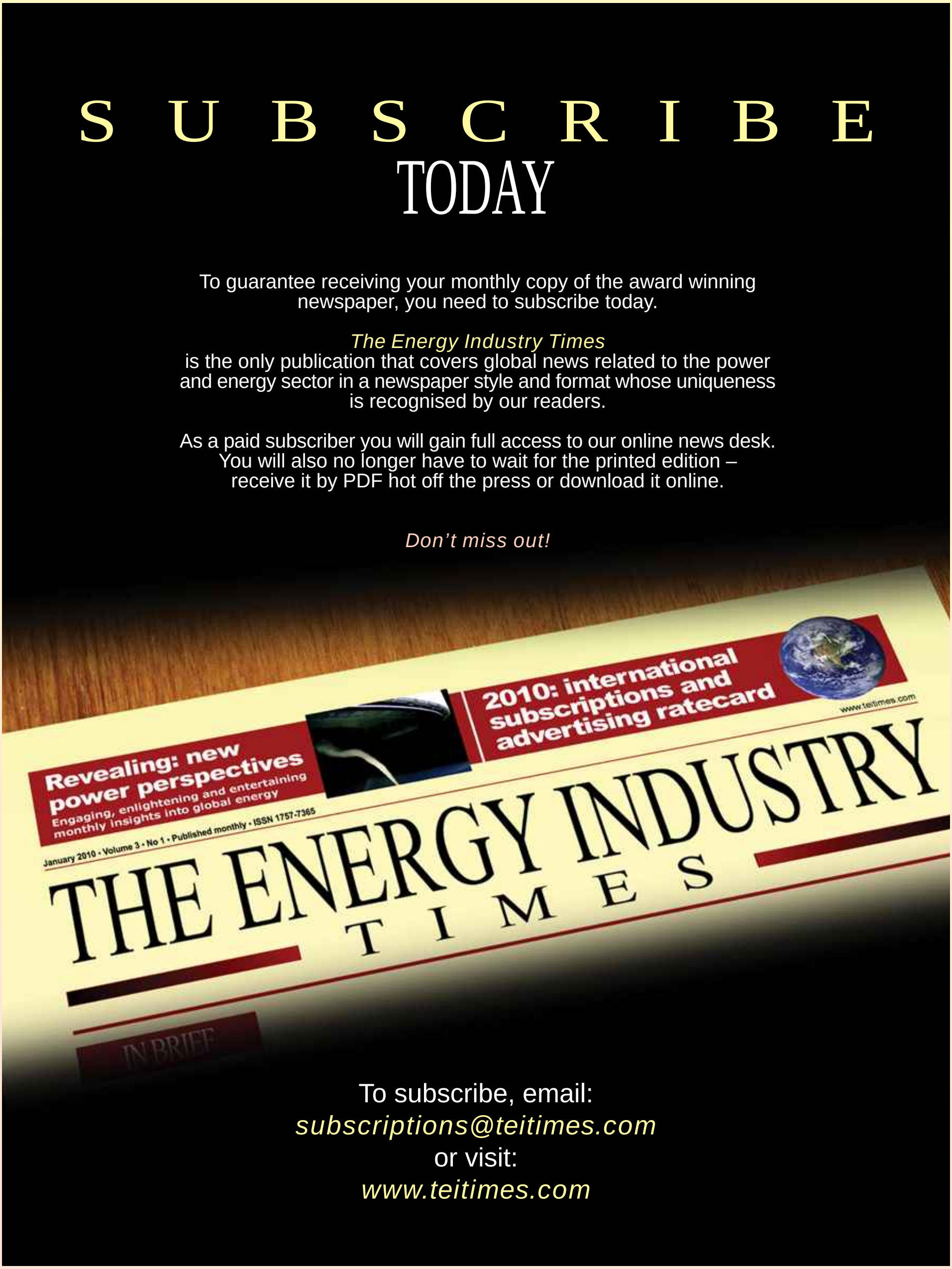

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Australian generators threaten ETS backlash

The Australian government has come under fire from power generators threatening legal action if the government does not increase the level of compensation under the emissions trading scheme.

Junior Isles

Power generators are threatening legal action in their bid for greater compensation under the proposed emissions trading scheme (ETS). The development follows a similar call for greater compensation from the Australian Coal Association in October, which claims the ETS will put 9000 jobs at risk.

The Liberal party in Canberra blocked the ETS earlier this year over increasing compensation for the generators after agreeing to exclude agriculture for an extended period.

Andrew Brandler, chief executive of Hong Kong's CLP, told the *Financial Times* that the level of free permits granted to generators in Australia should be tripled, while a proposed five-year compensation scheme should be extended to at least 10 years.

CLP argues that ETS risks breaching Australia's investment treaty with Hong Kong "exposing [Canberra] to a claim of hundreds of millions of dollars" in the event the company's investments are not "properly treated". The company said it would seek to recover losses if laws to cut carbon emissions led to a fall in the value of its Australian assets.

UK group International Power, which owns and operates 3723 MW of capacity, including the Hazelwood and Loy Yang B coal fired plants in Victoria, also threatened it would quit the Australian market if the government did not offer additional compensation.

Australia's Coal Association has also been campaigning in coal mining regions against the government's "flawed" emissions trading scheme.

"There's a real issue for the prosperity of these coal mining regions," Ralph Hillman, the association's executive director, said as he unveiled the campaign in Parliament House in October.

The government has proposed giving A$750 million ($697 million) to coal mining companies to help meet the costs of the ETS.

Citigroup commented that the planned carbon trading scheme would have only a very limited impact on the country's coal industry. It said the scheme would add only $2 per metric tonne to average production costs, or about 4 per cent.

Australia accounts for only around 1.5 per cent of global emissions but is the biggest per capita polluter in the developed world due to its heavy reliance on fossil fuels, mainly coal, for around 90 per cent of its electricity.

The aim is to reduce Australia's greenhouse gas emissions by at least 5 per cent by 2020 from their level in the year 2000.

The country is looking at developing clean coal technology with carbon capture, and possibly nuclear, as a means of reducing emissions.

The Age newspaper recently reported that the Victorian government is set to plough billions of dollars into clean coal technology.

Meanwhile experts from around the world attending a two-day climate change symposium, hosted by the Australian Academy of Technological Sciences and Engineering (ATSE) in November, predicted that Australia will eventually have to turn to nuclear power if it wants to substantially reduce carbon emissions.

Australian Nuclear Science and Technology Organization chief Dr Ziggy Switkowski said Australia should build its first reactor by 2020 and have 50 running by 2050, producing 75 GW of electricity.

South Asia energy demand to triple by 2030

- Generation mix will be dominated by coal
- Share of nuclear may more than triple

The Asian Development Bank's (ADB) energy outlook for Asia forecasts energy demand in South Asia will more than triple from 43.2 mtoe (million tonnes of oil equivalent) in 2005 to 165.7 mtoe in 2030, growing at an annual rate of 5.5 per cent. This projected growth rate is faster than the 3 per cent growth rate of final energy demand through 2030.

In order to meet the fast growth in demand, total electricity generation will increase from 735.7 TWh in 2005 to 2549.2 TWh in 2030. South Asia's power generation mix will be dominated by coal-fired generation.

Electricity demand in India will expand rapidly as a result of development of industry and electricity supply infrastructure. India is expected to continue relying on coal as the most cost-competitive option to meet its soaring electricity demand.

However, India's energy diversification efforts and other members' increasing generation capacity from other sources may reduce coal's share to 61.2 per cent in 2030 from 65.5 per cent in 2005.

In contrast, the share of nuclear in power generation may more than triple from 2.4 per cent in 2005 to 8.5 per cent in 2030 as a result of India's projected increase in nuclear power generation.

The share of natural gas fired generation may increase from 11.1 per cent in 2005 to 13.8 per cent in 2030 as India and Bangladesh make more use of domestic natural gas reserves.

Hydropower generation will double from 111.4 TWh in 2005 to 276.3 TWh in 2030, but its share will shrink to 10.8 per cent in 2030 from 15.1 per cent in 2005.

EU-India nuclear pact will boost research

India has signed a civil atomic energy pact with the European Union in a step that will mark its formal participation in the ambitious International Thermonuclear Experimental Reactor (ITER) project.

The agreement is aimed at intensifying cooperation to develop scientific understanding and technological capability underlying the fusion system in the long term.

The pact was signed after the India-EU Summit talks between Prime Minister of India Manmohan Singh and his Swedish counterpart Fredrik Reinfeldt along with European Commission President Jose Manuel Borosso.

Describing the agreement as an "important outcome" of the 10th Summit, Singh said at a joint press conference later that it "underscores the growing importance of energy security and clean energy in our cooperation".

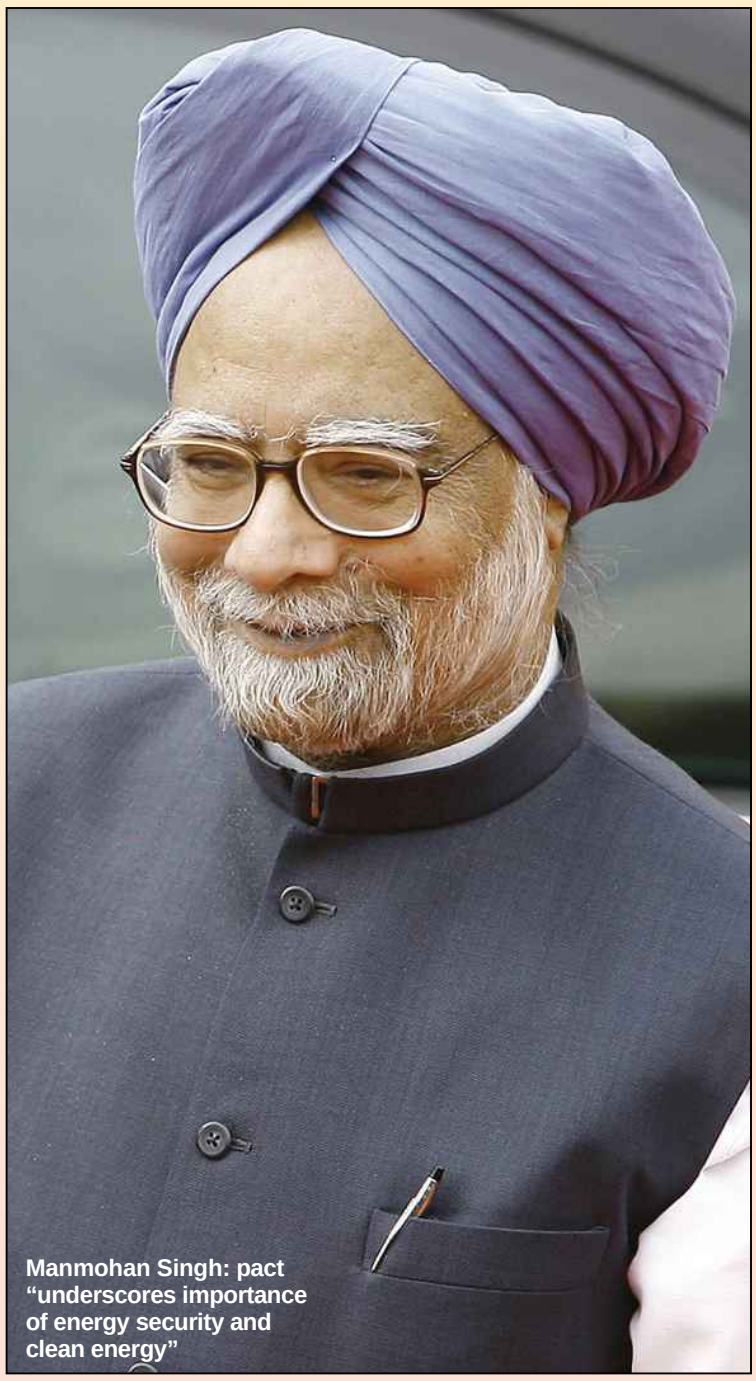
The announcement comes as the country is preparing to start work at the proposed 1650 MW nuclear power plant at Jaitapur in the state of Maharashtra.

"We have already signed an MoU [Memorandum of Understanding] between NPCIL, Areva and we are preparing for the construction of the civil nuclear plant located in Jaitapur," Foreign Trade Minister of France, Anne Marie Idrac told reporters at a CII [Confederation of Indian Industry] event.

French firm Areva would supply the equipment for the nuclear power project to be developed by state-run Nuclear Power Corporation of India (NPCIL).

Both India and France have agreed to set up six units of European Pressurised Reactors (EPRs) over the next 12 to 15 years.

The two countries signed a Civil Nuclear Cooperation Agreement in September 2008, which was approved by the French Senate (the upper chamber) this October. The agreement still needs the approval of the Parliament's lower chamber, the National Assembly, for its final ratification. The Assembly took up the review of the Agreement on October 28 and it is hoped that it will come into force by the end of the year.



Manmohan Singh: pact "underscores importance of energy security and clean energy"

Heavy investment in Philippines renewable sector

Syed Ali

The Renewable Energy Act is attracting heavy investment in the Philippines' renewable energy sector.

The Department of Energy (DOE) recently signed about $2.2 billion worth of new renewable energy (RE) contracts with 18 power companies.

"We are very happy to note that the Renewable Energy Act is working very well as reflected in the enthusiasm of investors in the RE development program of the country," said Rep. Miguel Arroyo, chairman of the House Committee on Energy.

He added that the National Renewable Energy Board (NREB) will soon release an attractive incentive package for investors.

The $2.2 billion investment involves 87 renewable energy contracts granted to 18 companies for the development of biomass, geothermal, solar, hydropower, ocean and wind energy resources.

Notably, the DOE awarded Trans-Asia Renewable Energy Corp (Tarec) 10 wind power contracts – the biggest number of wind power contracts ever granted to a single power generation firm in the country. With a combined capacity of 227 MW, it will make Tarec the country's biggest wind energy producer.

Meanwhile, the PNOC-Renewables Corp., the renewable energy unit of state-owned Philippines National Oil Co. (PNOC), said it expects to spend more than $550 million to put up 11 hydroelectric power plants. The 11 projects, once completed, will have a total capacity of about 276 MW.

S. Korea pledges emissions cut

Although South Korea is not among countries that must cut emissions under the existing Kyoto Protocol, its decision to voluntarily set a target for greenhouse gas emissions (GHG) could put pressure on developed nations to act more aggressively to fight global warming.

South Korea has pledged to cut greenhouse gas emissions by 4 per cent below 2005 levels by 2020. The cut represents a reduction of 30 per cent by 2020 compared with "business as usual". The cut was the most ambitious of three possible measures set out in July.

South Korea is one of the world's largest greenhouse gas emitters. In 2005, the country released 590 million tons of greenhouse gases, the world's ninth highest. If no action is taken to cut emissions, South Korea is expected to produce 813 million tons of GHGs in 2020. Under the new target, the country aims to cut the 2020 levels to around 569 million tons.

Following the decision President Lee Myung-bak said: "Though there are doubtful prospects for the Copenhagen meeting, South Korea's voluntary announcement of the national reduction target will be a chance to urge the international community to make responsible efforts."

Sang-Hyup Kim, secretary to the president for the nation's future and vision said the targets would spur the country into becoming a leader in low carbon technology, pointing to a commitment to invest two per cent of GDP a year to green technologies.

Seoul is in the spotlight as it prepares for next year's presidency of the Group of 20 leading economies.

Funding outlined for second 'Crash' programme

Indonesian state power firm PT Perusahaan Listrik Negara (PLN) and independent private power producers (IPPs) will need about $10 billion for power plant construction in the 10 000 MW second phase of the 'Crash' power programme.

Aside from funds to construct power plants, funds will also be needed for other areas of work, said PLN president director Fahmi Mochtar, which would mean that total associated investment would have to be much higher than $10 billion.

The second 10 000 MW programme is expected to be planned and implemented between 2010 and 2014. Under the programme, 83 power plants will be tendered, including 65 outside Java.

The government launched the first 10 000 MW power programme in 2006 in a bid to meet increasing demand for electricity, which is growing by 7 per cent annually.

While the first programme is based entirely on coal-fired plants, the second programme will generate 12 per cent of its power from hydro plants, 48 per cent from geothermal plants, and 14 per cent from gas plants, and the remaining 26 per cent from coal fired plants.

In a separate announcement, the Papua provincial administration said it is planning to build a 2000 MW hydropower plant to meet electricity demand and to support infrastructure needs in Papua.

China and Russia offer nuclear expertise

China and Russia are looking to participate in plans for new nuclear generation being developed by countries in Asia.

The Electricity Generating Authority of Thailand (Egat) recently signed an agreement with a Chinese developer of nuclear power technology, paving the way for the country's first nuclear power plant.

Last month Egat signed a memorandum of understanding (MoU) with the Chinese state-owned China Guangdong Nuclear Power Group (CGNPC) and CLP Holding Co, under which they agreed to knowledge and information exchange on nuclear power technology over the next three years.

Egat plans to build two nuclear power generators, with a total capacity of 2000 MW, under the current national power development plan. The power plants are planned to enter operation between 2020 and 2021.

Egat is now studying available sites, nuclear technology, related legal issues and human resource development. The final decision on whether the country will actually build its first nuclear power stations will be taken next year.

Meanwhile, Russia has signed a protocol agreement with Bangladesh to cooperate in the peaceful use of atomic energy, as the South Asian country plans to install a nuclear power plants to tackle crippling electricity shortages.

The accord was announced in late October following a visit to Moscow by a nine-member Bangladesh delegation headed by State Minister for Science and Information and Communication Technology, Yeafes Osman.

The delegation sought support from Russia in establishing nuclear power plants and Russia said it would extend possible assistance to Bangladesh in this regard. According to the protocol, a joint working group between Bangladesh and Russia will be formed and its composition and schedule of work will be defined.

It was agreed in the accord that there would be further exchange visits from both sides, particularly at experts' level. Bangladesh will prepare proposals by the end of this year for meetings of their experts with Russian specialists on "the most practical issues of mutual cooperation."

Following the deal, the issue of signing the framework agreement on the Rooppur nuclear power plant was discussed. The draft agreement is under examination and will soon be ready for signing.

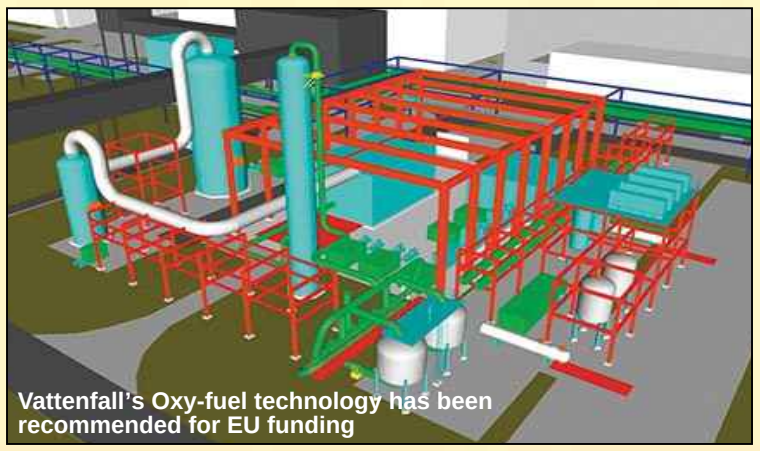
The state minister also said the government has outlined the target of generating 20 000 MW electricity by 2021 to ensure universal electrification in Bangladesh. Nuclear would help meet this target.

Bangladesh has been suffering crippling power shortages. Accordingly, in September the state-run Bangladesh Power Development Board (BPDB) floated a tender for installation of eight rental power plants with a total output of 530 MW on a fast-track basis.

A total of 117 sponsors including some global players purchased tender documents showing interest in building the rental plants. Of them, 63 submitted bids, said a senior official of BPDB.

Clean coal plants gain EU support

No objections raised to CCS projects
UK outlines clean coal drive


Vattenfall's Oxy-fuel technology has been recommended for EU funding

Siân Crampsie

Plans to build a fleet of clean coal power plants equipped with carbon capture and storage (CCS) look increasingly likely to go ahead with financial and political support from the European Union.

A mid-November deadline for the European Parliament to raise objections to the partial funding of six proposed advanced clean coal plants passed without event. The six plants form a major part of the European Commission's plans to have 12 CCS demonstration projects in operation by 2015.

The Commission has also targeted 2020 for the commercialisation of CCS technology.

The apparent willingness of the EU to support the projects is a boost for energy and technology companies involved in the development of CCS, who say that the technology cannot be commercialised without government assistance.

The six projects are set to share around €1.05 billion of funding from Europe's economic stimulus package. The projects – recommended by the European Commission in October – are Vattenfall's Oxyfuel project in Jaenschwalde, Germany, the Rotterdam Hub scheme in the Netherlands, a Polish project in Belchatow, Powerfuel's Hatfield project in Britain, Endesa's OxyFuel project in Compostilla, Spain, and Enel's scheme in Porte Tolle, Italy.

Five of the projects will receive €180 million each, while the Enel project will receive €100 million. The European funds will be matched by funds from the relevant national governments.

In the UK, Powerfuel's Hatfield IGCC plant is set to become one of the world's first IGCC plants equipped with CCS technology. The project has already received planning consent, and will be built in two phases.

The project is due to come on-line as a CCS-equipped IGCC plant in 2014. Carbon dioxide from the project will be pumped into depleted North Sea gas fields.

News that the Hatfield project is set to receive EU funds came as the UK government set out an ambitious new policy for the development of clean coal in the country.

The new Framework for the Development of Clean Coal was published in November alongside six other National Policy Statements on energy, and confirmed that all new coal fired power plants in the UK will have to show that they will demonstrate the full CCS chain on at least 300 MW net of their total outset in order to gain development consent.

In addition, a new CCS Incentive will help to fund the development of up to four commercial-scale CCS demonstrations in the UK, including pre- and post-combustion capture. Plants participating in this scheme will be expected to retrofit CCS to their full capacity by 2025.

The UK government also says that it will implement a review process to consider the case for new regulatory and financial measures to further drive the move to clean coal.

Green subsidies are gone with the wind

Financial mechanisms designed to support the construction of wind farms in Italy are being scrutinised following investigations by prosecutors in the country.

Italian anti-fraud and anti-Mafia investigators have arrested two of the country's most prominent wind energy sector businessmen after a two-year operation code-named "Gone with the Wind", according to the *Financial Times*.

Oreste Vigorito, head of Italian Vento Power Corporation (IVPC) and president of Italy's National Association of Wind Energy, and Vito Nicastri, a Sicilian business associate, are facing charges of fraud relating to obtaining public subsidies to build wind farms. The sale of wind farms to foreign companies is also being investigated, according to local media reports.

Police have requested information from a number of companies across Europe that have had dealings with IVPC, including International Power of the UK. It is thought that in some instances, wind farms have been built in Italy using public subsidies but never functioned.

Investigators have already blocked public subsidies worth €9.4 million granted by the ministry for economic development for wind farm projects, and last year confiscated seven wind farms with a total of 185 wind turbines in Sicily linked to IVPC.

International Power is one of the largest operators of wind farms in Italy. It has not been charged with any wrongdoing.

RWE exit puts Belene on the back foot

Bohunice moves forward
Belene has €10 billion price tag

Plans for the construction of new nuclear power plants in Central and Eastern Europe are having mixed fortunes, with positive news for the Bohunice project in Slovakia and a setback for Bulgaria's Belene project.

The European Commission has approved the joint venture between Czech energy company CEZ and Slovakia's Javys that will construct a fifth unit at the Bohunice nuclear plant. The news came in early November just days after RWE said it had pulled out of the joint venture set up to build and operate the 2000 MW Belene project in Bulgaria.

The Commission says that after analysing the potential threat of the CEZ-Javys joint venture to the market, it has concluded that the transaction would not impede effective competition. CEZ and Javys hope to conclude financing for the project in 2011 and will call tenders for one or two PWR units after the conclusion of an 18-month feasibility study.

RWE's withdrawal from Belene came after months of speculation and the company itself cited spiralling project costs and delays from the Bulgarian government as the reason for its exit.

The German utility held a 49 per cent stake in the Belene Power Company, with Bulgarian utility NEK holding the remaining shares. The Bulgarian government has provided financial guarantees for the project, although the state's current financial position has made these unviable, according to market analyst firm Datamonitor.

The project has also been undermined by weaker electricity demand and the fact that demand projections made in 2007 are now deemed optimistic. The drop in demand has also eliminated the advantage that nuclear power has over coal-fired generation in a carbon-constrained environment, says Datamonitor.

The total cost of the project is now estimated to be €10 billion, according to the World Nuclear Association.

The newly-elected Bulgarian government said in September that it planned to re-examine the country's energy policy as part of plans to streamline government-owned companies and tackle corruption. The country's previous government signed a contract with Russia's Atomstroyexport to build the Belene plant in January 2008.

RWE joined the project as a strategic investor later that year.

Stockholm aims to be sustainable city

The city of Stockholm is moving forward with plans to cut its carbon emissions through a new smart grid project led by technology firm ABB and Finnish utility, Fortum.

The two companies are to test the concept of a flexible, low-emission power network in the Stockholm Royal Seaport area in a project backed by the Clinton Climate Initiative.

Several other cities around the world, including Miami in the USA, Malaga in Spain, Salerno in Italy and Amsterdam in the Netherlands, have already launched smart grid initiatives.

ABB and Fortum say they will develop a variety of solutions that will help to maximize the use of renewable energy from sources such as rooftop solar panels as well as store energy and enable the use of electric vehicles. The new district will comprise 10 000 homes and 30 000 offices, and will also have an innovation centre to showcase the technologies being tested and deployed.

"In terms of scale, this is a big step forward in the development of a smarter and more flexible urban grid that can integrate distributed and renewable energy sources and help realize the vision of sustainable cities," said Bazmi Husain, head of ABB's smart grids initiative.

"Besides seeking energy-efficient solutions that help to address climate change, the evolving grid will also need to accommodate the more active involvement of electricity consumers," said Per Langer, CEO of Fortum Sweden.

The European Commission has called for more investment in smart grid technology demonstration as part of its latest Strategic Energy Technology plan.

UAE nuclear programme gears up

The historic US-UAE 123 Agreement paves the way for the UAE to award the first contracts for its civilian nuclear energy programme, **writes Sian Crampsie.**

The United Arab Emirates' plans for a civilian nuclear energy programme received a boost in November with the approval of a nuclear agreement with the USA.

The US Congress has approved a '123 Agreement' between the USA and the UAE, a move that will allow US companies to provide technologies and services for the Gulf state's nuclear programme.

The UAE is currently preparing to award a contract to develop civilian nuclear power plants that would be the first in the Arab world. It is also continuing work on formalising the creation of the Emirates Nuclear Energy Corporation (ENEC), which will oversee the nuclear build programme as well as act as a government investment arm.

The contracts for the construction of the first nuclear plants will be worth an estimated $20 billion. The plants are likely to have a combined capacity of up to 5500 MW and are scheduled to be on-line by 2020.

The UAE is turning to nuclear power in order to diversify its energy sources and meet rapidly rising energy demand. Other countries in the region are following its strategy, although few have taken such concrete steps.

Companies that are thought to have submitted bids to the UAE include France's Areva, GE-Hitachi, and a South Korean venture that includes Korea Electric Power Corporation and Hyundai Engineering & Construction.

GE has praised the US-UAE 123 Agreement, which contains non-proliferation provisions. "We applaud this landmark agreement, which marks a historic moment in the future development of civilian nuclear energy in the UAE and the region," said Jack Fuller, president and CEO of GE Hitachi Nuclear Energy.

"The UAE has shown strong leadership demonstrating the role nuclear energy plays in a diverse energy portfolio to address growing domestic demands for clean and cost-effective power generation for generations to come."

The UAE recently put into place a law establishing the regulatory framework for a civilian nuclear energy programme and has also prohibited domestic uranium enrichment.

The country's power demand is expected to reach 40 000 MW by 2020.

Other initiatives to increase generating capacity include the construction of a new electricity and water desalination plant in Abu Dhabi, for which the Abu Dhabi Water and Electricity Authority (ADWEA) says it will issue a call for tenders in the first half of 2010.

The new project will have a minimum output of 1500 MW and 60-100 MIGD and will enter operation in late 2013 or early 2014.

Uzbekistan threatens withdrawal from regional grid

- Dispute threatens energy supplies, economic growth
- MHI to provide CCGT plant

Central Asian countries could face a winter of energy shortages after Uzbekistan said it would withdraw from the Central Asian power grid over an on-going resource-sharing dispute.

Uzbekistan is a key transit route in the regional grid that serves five former Soviet states but officials from Uzbekenergo have said in local media that Tajikistan is taking more than its allocated volume of electricity from the network.

Uzbekenergo believes that Tajikistan's behaviour is a threat to the security and stability of its own power system and that it will not be able to continue to operate in the grid.

Tajikistan has appropriated around 100 GWh from the system since late 2008, according to Uzbekenergo, which helps to transit electricity from resource-rich Kazakhstan to Kyrgyzstan and Tajikistan. Both Kyrgyzstan's and Tajikistan's existing energy shortages would deepen if Uzbekistan's withdrew from the grid.

Uzbekistan's stance follows that of Kazakhstan, which in March 2009 pulled out of the unified grid because Tajikistan was taking more energy than it should. That move resulted in rolling blackouts in Kyrgyzstan.

All five countries operating in the grid suffer from energy shortages – particularly during winter – a problem exacerbated by the state of the Soviet-era infrastructure. They are also highly dependent on one another's power and water supplies, but have not reached any consensus on how to share resources.

The shortages and the dispute are a threat to continued economic growth in the region.

In an effort to boost its own power supplies, Uzbekenergo recently announced plans to raise $3.5 billion over the next five years to finance the development of its electricity sector. It is planning to build 24 new power plants, adding 2700 MW of capacity to the grid, and to execute 12 projects adding over 1400 km of transmission lines.

Construction of a new combined cycle power plant is already underway in Uzbekistan, at Uzbekenergo's Navoi thermal power plant. The 478 MW cogeneration facility is being built by Initec Energia, which recently placed an order with Mitsubishi Heavy Industries (MHI) for the plant's main equipment.

GCCSI seeks diversity in its Ideal Portfolio

- Role for developing and transitional economies in CCS
- Over 200 CCS projects underway worldwide


Nick Otter: GCCSI CEO

More carbon capture and storage (CCS) demonstration projects should be deployed in developing countries in order to help accelerate the deployment of the technology, according to a new report.

The Global Carbon Capture and Storage Institute (GCCSI) has revealed the findings of an in-depth analysis of current CCS projects around the world, and says that the cost advantages that exist in Latin America, the Middle East, India, Russia and CIS countries would help in the commercialisation of CSC technology.

In its report – titled 'Strategic Analysis of the Global Status of Carbon Capture and Storage' – the Australia-based organisation says that activity in the CCS field is growing in line with the G8 objective of deploying at least 20 commercial CCS projects globally by 2020.

However, it notes that commercial, regulatory and technical barriers to CCS commercialisation exist and has called on governments and industry to take more coordinated action. As well as greater geographic diversity, industries such as natural gas processing, fertilizer production, cement, aluminium and iron and steel should be encouraged to undertake CCS development projects, says the GCCSI.

Supported by its membership of more than 20 national governments and over 80 commercial and non-government organisations, the GCCSI is planning to identify 26 CCS projects for which it will prioritise support. Its "Ideal Portfolio" will consist of a diverse range of projects demonstrating different technologies in a variety of industries around the world.

"Deploying CCS is about deploying technology," said GCCSI CEO, Nick Otter. "If we want rapid deployment we must build on the technology set and take advantage of the regulatory conditions that exist in those countries that have been part of the advance guard."

He continued: "The iron and steel, and cement industries are responsible for over 20 per cent of the world's CO_2 emissions. If CCS is to contribute to the deep cuts in emissions the world needs, then industry must be part of the solution."

The Institute has prioritised the power generation sector due to its contribution to global emissions and the scale and effort it is putting into CCS. It has recommended a minimum of 17 projects from the power generation sector for its Ideal Portfolio, spreading them across different fuel and technology combinations.

Six projects are allocated to the iron, steel and cement sectors.

Geographically, the majority of prioritised projects will be in North America, Europe and China due to those regions' share of emissions. Australia and Japan are also classified as priority regions with an allocation of approximately 15 per cent of projects, due to their favourable policy and regulatory environments.

The report recommends that other regions should represent up to 25 per cent of the Ideal Portfolio and says that increased geographic diversity will help to build support for CCS technology. It also notes that "some countries with no dedicated domestic CCS legislation but with transitional economies and widespread state ownership of assets and enterprises may be better able to expedite CCS projects than certain other economies".

The GCCSI's research, which was carried out by a Worley Parsons-led consortium, found that there are currently 213 active or planned CCS projects around the world, 101 of which are of commercial scale. Some 62 of the projects are fully integrated, demonstrating every stage of the CCS process chain.

AfDB approves Morupule B loan

Botswana has edged closer to energy self-sufficiency with the approval of a loan by the African Development Bank (AfDB) for a major new power plant.

The AfDB has inked a €153 million facility with the government of Botswana to finance specific components of the Morupule B power station and associated transmission infrastructure.

The 600 MW project will boost Botswana's generating capacity as well as support economic growth and reduce poverty, says AfDB. The country currently imports around 80 per cent of its electricity needs from neighbours including South Africa.

Morupule A, a 25-year old plant, currently generates the remaining 20 per cent of electricity supplies. AfDB believes that Botswana will be able to stop all imports of electricity by 2013, and could be a net exporter of electricity by 2014.

The Morupule B project is estimated to cost $1.4 billion. Other contributors include China's ICBC Standard Bank, the Government of Botswana and the World Bank.

Alstom-Schneider wins in Areva T&D sale

Considering social consequences: French industrial minister, Christian Estrosi

Both GE and Toshiba are reported to be disappointed after Areva rejected their bids for the French group's transmission and distribution (T&D) unit in favour of a bid from a French consortium.

As *TEIT* went to press, the supervisory board of Areva announced that it would enter exclusive negotiations with an Alstom-Schneider Electric venture for the sale of its T&D arm.

The announcement has surprised some in the market as the government said in November that the price of the offers would be its main consideration in the sale. The Alstom-Schneider venture is thought to have placed the lowest bid.

French industrial minister Christian Estrosi had also said that the potential social consequences of the bids and the bidders' proposed social plans would be considered.

Areva confirmed in November that it had received bids for the T&D unit from GE, Toshiba of Japan, and a French consortium of Alstom and Schneider Electric.

The Alstom/Schneider consortium was initially thought to have been favoured by the French government – which owns most of Areva – for its potential to create a national engineering "champion". However Alstom and Schneider's proposed plan to break up the T&D unit between them was thought to be opposed by Areva's management.

GE placed a bid of around €4 billion and Toshiba €4.2-4.5 billion, according to media reports. Areva says that Alstom-Schneider offered €2.29 billion in equity value, or €4.09 billion in enterprise value.

The government was hoping to raise as much as €5 billion from the T&D sale in order to fund the expansion of the Areva group.

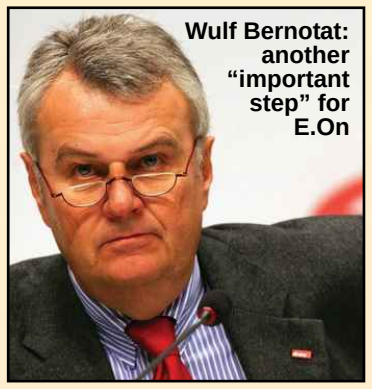
GE said in November that it had placed its bid without a financial partner but that it would offer minority stakes in the Areva T&D to strategic investors such as sovereign funds if its bid was successful. It had pledged to preserve the "manufacturing capability, domain expertise, and business leadership that Areva T&D has built globally".

General Electric had been expected to submit a bid alongside Luxembourg-based private-equity fund CVC Capital Partners Ltd., but CVC withdrew from the alliance ahead of the deadline, according to reports. The US firm had also promised to combine its own T&D activities with Areva T&D to create a global company headquartered in France.

Toshiba's bid included similar pledges.

TenneT leads market integration vision

Dutch TSO buys German network
Unified German grid now unlikely



Wulf Bernotat: another "important step" for E.On

TenneT's acquisition of E.On's German transmission network has been hailed as a major step forward in the creation of an integrated European energy market.

The Dutch electricity transmission operator has sealed a deal to buy transpower stromübertragungs GmbH, part of E.On AG, for €885 million. The sale will create the first cross-border transmission system operator (TSO) in Europe.

According to TenneT, its takeover of transpower will deliver a range of benefits, including price equalization, improved grid balancing, greater insight into grid situations, and better possibilities for sustainable development in both countries. It also brings the company a step closer to its ambition of making the Netherlands a "hub" in the European energy grid.

"TenneT's takeover of transpower is a major step forward in developing a truly European electricity market," said TenneT CEO, Mel Kroon. "Integrating the transpower grid with the Dutch transmission grid will allow us to take a leading role in Europe, and continue developing an effectively functioning electricity market in northwest Europe."

E.On is selling its high voltage grid network, which stretches from Germany's North Sea coast and the Danish border to the Alpine border of Austria in the far south of Germany, as part of a commitment to the European Commission to reduce the utility's market dominance. It has also sold 4800 MW of generation capacity.

As transpower's new owner, TenneT will be expected to make significant investments in the network over the next few years to upgrade the grid and facilitate the integration of renewable energy.

Vattenfall is also in the process of selling its German high voltage network in order to fulfil the requirements of the European Commission's Third Energy Package.

"We are convinced that TenneT will ensure the necessary high investments needed in network expansion including the ambitious task of connecting offshore wind farms," said E.On CEO Wulf Bernotat. "Furthermore, the merger of the TenneT and transpower networks gives rise to Europe's first cross-border power transmission network. This is another important step towards integration of the European electricity market."

The sale of transpower to TenneT brings an end to the prospect of a single, unified German high voltage electricity network, a plan favoured by the country's federal network agency.

Germany's network is currently divided into four separate TSO areas. Merging them into a single "Netz AG" would "open up substantial possibilities such as enhanced synergies, simplified market structures as well as a stronger position for Germany within the European network," said the Federal Network Agency in a July 2008 statement.

EDP pledges US investment

$4 billion wind farm investment
CEO calls for renewable energy standard

EDP Renewables says that the leadership shown by the USA's federal government is the main reason behind its decision to invest $4 billion in the country over the next three years.

The Portuguese renewable energy company says that it will use the investment to build new wind farms in the US, where it already has a presence in 21 states and operates more than 2500 MW of wind energy capacity.

However, it says that a renewable electricity standard is still required in the US in order to further incentivise investment in green technologies.

EDP Renewables' US domestic operations have grown from 60 employees to nearly 300 in just three years, an expansion that the firm puts down to the US government's 1603 Program, which provided a regulatory framework to accelerate construction of new renewable energy capacity.

"EDP Renewables is serious about partnering with the United States for a number of reasons, but most of all because of the leadership we have seen from the federal government," said António Mexia, CEO of EDP and Chairman of EDP Renewables. "The Obama Administration and Congress signaled that they are serious about fostering production of renewable energy and that has assured us that America is the right place to invest."

The 1603 Program gives wind and other renewable energy producers the chance to offset the costs of new projects with a 30 per cent grant. Companies that take advantage of the programme agree to give up certain tax credits that they would have been eligible for in the future.

The direct payment spurred development by companies that did not have a federal tax liability and encouraged immediate re-investment of renewable energy profits.

In 2009 alone EDP Renewables has installed or started development of 800 MW of wind energy capacity in the USA – equivalent to an investment of $1.5 billion. It says that its future planned investments will result in the creation of thousands of jobs in construction as well as manufacturing.

"We are bringing new construction and operation permanent jobs to towns and cities of all sizes and seeing the economic activity that comes with those jobs," said Mexia. "EDP is committed to reinvesting all funding received from the 1603 Program into new renewable energy projects and jobs in the United States.

"However, more needs to be done; the next step is to enact an aggressive Renewable Electricity Standard that will ensure more companies like EDP can make longer term investments in this sector."

An RES would require electricity utilities to ensure that a minimum portion of their sales is derived from renewable electricity. A solid RES would create "competition, efficiency and innovation" and deliver renewable energy at its lowest possible cost, argues EDP Renewables.

Resignations create uncertainty for Eskom

The resignation of the Chairman and CEO of South Africa's Eskom has created further difficulties for the beleaguered state-owned utility.

South Africa's Minister of Public Enterprises, Barbara Hogan, has appointed an acting chairman for the group after CEO Jacob Maroga and Chairman Bobby Godsell departed in early November.

Mpho Makwana, a long time Eskom board member, has been tasked with guiding the company until a new Chairman and CEO are appointed. His fundamental role "is to ensure that Eskom continues with and focuses on its mandate of providing secure electricity", according to a statement from Eskom.

The departure of Maroga and Godsell – which followed a reported disagreement between the two men about Maroga's future at the company – comes as the utility strives to secure funds for the expansion of its electricity infrastructure.

"Of fundamental importance for South Africa is that along with providing a reliable electricity supply, Eskom remains financially sustainable as we proceed with the tariff application process and, going forward, that we are able to secure sufficient funding to proceed with our build programme," said Makwana.

The African Development Bank (AfDB) recently announced a €1.86 billion, 20-year loan for Eskom to be used for construction of the Medupi power plant.

The loan follows a $500 million loan from the AfDB in 2008.

Barbara Hogan: South Africa's Minister of Public Enterprises

Americas

TVA to buy Great Plains power

The Tennessee Valley Authority (TVA) has signed power purchase agreements (PPAs) with two wind energy companies in an effort to boost its renewable energy portfolio.

The TVA, which is the USA's largest public utility, has sealed 20-year deals with Maryland-based CVP Renewable Energy Co. and Chicago-based Invenergy Wind LLC for electricity generated by wind farms being built on the Great Plains of North Dakota and South Dakota.

The deals are the result of a call for proposals from the TVA in December 2008 for up to 2000 MW of renewable energy. The call attracted more than 60 proposals and the TVA says it is expecting to sign further wind power contracts by the end of 2009.

GE and E.On sign major O&M deal

GE and E.On Climate & Renewables (EC&R) North America have signed a seven-year operation and maintenance (O&M) agreement covering EC&R's complete fleet of 529 GE wind turbines installed in the US. The deal is one of the largest wind services agreements ever signed by GE.

The agreement is designed to maximize turbine availability and energy production across EC&R's US installed base of GE wind turbines.

Siemens wins first wind turbine order in Mexico

Siemens Energy has been awarded an order for 70 wind turbines for the Los Vergeles wind farm in Tamaulipas, Mexico. This is the first order received by Siemens for wind turbines in the Latin America region.

The purchaser, Grupo Soluciones en Energias Renovables (GSEER), is a Mexican wind energy developer. With a total installed rated capacity of more than 160 MW, the Los Vergeles wind farm is expected to provide clean power to 200 000 households, making it Mexico's largest wind farm. The order value exceeds $270 million.

Vestas to supply Oaxaca I turbines

Vestas Wind Systems has won an order to supply 51 wind turbines for the Oaxaca I project in Mexico.

The order was placed by Dragados Proyectos Industriales de Mexico S.A. de C.V. and includes the supply, installation and commissioning of V80-2.0 MW wind turbines. It also includes a 10-year service contract.

The project, located in the municipality of Santo Domingo de Ingenio, Juchitan de Zaragoza, Oaxaca, is expected to be completed by December 2010.

SPX wins FGD contract

SPX Corporation says that its Thermal Equipment and Services segment has won a contract worth $47 million to install a state-of-the-art flue gas discharge system at the coal-fired Cardinal power plant in Brilliant, Ohio.

The project represents the first installation of a flue gas discharge system at a US coal-fired power plant, and will also include other upgrades to enhance the existing natural draft cooling tower at the plant, which is owned by American Electric Power and Buckeye Power.

Preliminary on-site work on the cooling system retrofit will begin as early as this year.

Asia Pacific

Nordex equips Chinese project

German wind turbine manufacturer Nordex has secured contracts from Chinese utility Ningxia Electric Power to equip the Sunhill II and Hongsipu II wind farms in China's Ningxia Province.

Nordex will supply 22 of its 1.5 MW wind turbines for the project, which are located near Yinchuan. Some of the turbines will be fitted with rotors with a enlarged diameter of 82 m.

The Sunhill II wind farm will have a capacity of 28.5 MW and the Hongsipu II project, 4.5 MW. The 22 turbines will be manufactured at Nordex's Yinchuan and Dongying facilities using components sourced from Chinese partners.

Areva to build substations in India

Areva T&D India has signed an engineering procurement and construction alliance agreement worth approximately INR9 billion ($195 million) with Maharashtra State Electricity Transmission Company for the design and construction of 220 kV and 132 kV substations.

Under the agreement, Areva will install 36 substations at various locations in Maharashtra state over a three-year period. It will deliver the project in consortium with Jyoti Structures, whose scope covers transmission lines worth around INR8.33 billion.

Emerson to supply simulation technology

Korea District Heating Corp (KDHC) has awarded Emerson Process Management a contract to install simulation technology at the new 515 MW Paju combined heat and power plant in Paju city, Gyeonggi.

Emerson will equip the plant with its Scenario simulation system, which will enable operators to verify the plant's control logic prior to commissioning, helping to ensure a smooth start-up.

The Paju plant, which is expected to be up and running in November 2010, will supply district heating water and electricity to approximately 57 000 apartments in Paju city. Equipment delivery is slated for June 2010.

Europe

MW Power wins biomass contract

Finnish joint venture firm MW Power is to supply Affarsverken i Karlskrona with a biomass boiler plant for combined heat and power (CHP) production in the municipality of Karlskrona in Sweden.

MW Power, a joint venture between Metso and Wärtsilä, will deliver the boiler plant, while Metso's power business line will supply environmental systems equipment. The plant is scheduled for start-up in early 2012.

The CHP plant will be equipped with bubbling fluidized bed boiler technology and will use wood chips as the main fuel. It will produce around 36 MW of district heat for the Karlskrona area and 13 MW of electricity for the national grid.

The order value is approximately €30 million.

B&W Volund to supply WTE technology

Indaver Group Ireland has awarded Babcock & Wilcox Volund A/S (B&W Volund) a contract to supply the boiler equipment for a waste-to-energy (WTE) plant in Meath, Ireland.

Denmark-based B&W Volund, a subsidiary of Babcock & Wilcox Power Generation Group, will design and supply the 20 MW plant's boiler, with delivery scheduled for early 2010. The plant is Ireland's first municipal WTE facility.

Indaver will manage the overall construction of the plant, which is scheduled for completion in 2011 and which will process up to 200 000 tonnes of household and industrial waste each year. Construction of the plant has already started.

ABB and Alstom-Bouygues win Linth-Limmern orders

Swiss utility Kraftwerke Linth-Limmern (KLL) has placed orders with ABB and with an Alstom-Bouygues joint venture for the supply of equipment for a new pumped storage hydropower facility in eastern Switzerland.

Under an order worth $120 million, Swiss technology group ABB will supply electrical equipment for the project, while Alstom-Bouygues' €178 million contract is for four 250 MW variable speed pump turbines and motor generator units.

The Linth-Limmern hydropower plant will help to meet future electricity demand in Switzerland and will be operational by 2015. ABB will provide transformers, medium voltage switchgear, instrumentation and automation systems as well as a 380 kV GIS (gas insulated switchgear) substation.

Alstom and Bouygues will design, engineer, manufacture, install, test and commission the turbines as well as provide training services.

The facility will be used to pump water from a lower reservoir (the Limmernsee) in the valley to an upper reservoir (the Muttsee), 600 m above the station. During peak demand, water will be released from the upper reservoir to generate power.

Energia Pulita orders Wärtsilä engines

Italian utility Energia Pulita SpA has placed an order for two Wärtsilä 18V46 engines for a biofuel power plant planned for Gorizia, northern Italy.

As well as the two engines, Wärtsilä will provide liquid biofuel auxiliaries, the control system and radiators. The 34 MW plant will generate baseload electricity for the national grid.

Wärtsilä will deliver all of the equipment by May 2010 and the plant is expected to be in operation in the autumn of that year.

Alstom to build Welsh wind farm

Welsh firm Pennant Walters has enlisted Alstom to build a new wind farm in South Wales.

The 26 MW Maesgwyn facility, to be built on the site of the former Maesgwyn and Derlwyn coal mines north of Glyn-neath in south Wales, will comprise 13 of Alstom's ecotecnia 80 wind turbines. It will become operational in October 2010.

Under the terms of the €30 million contract, Alstom will supply, install and commission the wind farm, followed by operation and maintenance for the first five years.

MAN power barge order

Germany's MAN has signed a contract with Karadeniz Powership Co. Ltd. of Turkey to supply up to 24 engines to be installed on mobile diesel power plants.

According to MAN, 21 engines will initially be installed on board four former freighters that are being converted to power barges. The deal, which is worth more than €100 million, also includes electromechanical equipment.

The ships have their own propulsion and will be used by Karadeniz Powership around the Mediterranean, Africa, Pakistan and the Middle East to temporarily cover power demand.

Nordex wins Turkish order

German wind turbine manufacturer Nordex has secured a contract to supply Bilgin Enerji with 36 of its N90/2500 turbines for the Soma wind power project in Turkey.

The Soma project is being built in the province of Manisa in western Turkey, with the 36 turbines distributed over a large area of mountainous terrain. The facility will generate over 300 GWh/year.

International

Syria expands Tishrin plant

India's Bharat Heavy Electricals Ltd (BHEL) has signed a €300 million contract with Syria's Public Establishment for Electricity Generation and Transmission (PEEGT) to expand the Tishrin power plant.

Under the contract, BHEL will add two 200 MW units to the Syrian plant, supported by a $240 million export credit facility from the Indian government. The project is scheduled for completion within 33 months of contract signing.

Ormat to build solar PV plants

Geothermal Energy firm Ormat Technologies is moving into the solar power market through a joint venture with Sunday Energy, a private Israeli company.

The two companies have signed an agreement to develop, construct and operate solar photovoltaic (PV) energy systems in Israel with a total capacity of 36 MW. They expect to invest around $195 million in the projects.

Ormat and Sunday Energy will act as joint engineering, procurement and construction contractors on each of the projects, and will also operate them jointly. Electricity from the PV systems will be sold to Israel Electric Corporation under 20-year power purchase agreements.

Each project will be financed with 80 per cent non-recourse project finance debt.

Jordan to expand Samra

Jordan's Samra power plant is to become the country's largest electricity generating facility after Samra Electric Power Generation Company (SEPGCo) signed a deal with Korean firm Hanwha Engineering & Construction.

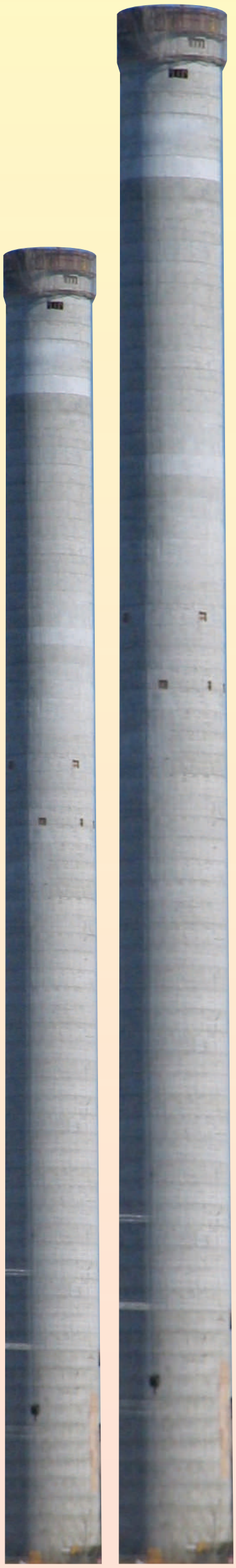
Under a contract signed in October, Hanwha will install two natural gas fired generating units each with a capacity of 143 MW at the plant. Following the expansion, Samra will have a total generating capacity of 900 MW.

The two gas turbines will be GT13E2 units supplied by Alstom.

BHEL wins Oman order

Petroleum Development Oman has placed an order with India's Bharat Heavy Electricals Ltd (BHEL) for the supply of a gas turbine-generator for a power plant at Qarn Alam, Oman.

Under an order valued at INR2.05 billion ($44 million), BHEL will supply and supervise the installation of the new 126 MW unit, which will be manufactured in Hyderabad, India.



Paradigm shift needed in energy policy

Eurelectric's *Power Choices* study shows it is feasible to attain carbon-neutral electricity in Europe by 2050 through the market system, with a CO_2 cap-and-trade system driving technology deployment. However, the key to Europe's low-carbon future will require a paradigm shift on the demand side away from direct use of fossil fuels to energy-efficient electric systems in key sectors.

Lars G. Josefsson

Climate change and its impacts have emerged as the most serious environmental challenge of our time and it is clear that the way the world produces and uses energy will be a crucial factor in keeping the global temperature rise to 2ºC above pre-industrial levels by drastically reducing emissions of greenhouse gases (GHGs).

The European Union has just enacted two major packages of legislation – one designed to address the energy-climate challenge by capping GHG emissions and providing for auctioning and trading of emissions allowances, boosting deployment of renewable energy sources (RES), plus creating a legal framework for geological storage of CO_2 and a support mechanism for demonstration of carbon capture and storage (CCS) technologies; the second aiming to enhance competition and drive forward liberalisation and integration of EU energy markets.

Eurelectric advised the policymakers during the drafting of this legislation, and continues to make constructive suggestions on the many details – *inter alia* ensuring integration of national markets via greater interconnection and harmonised rules on a regional and inter-regional basis; making optimum use of cross-border cooperation mechanisms in promoting RES development; driving forward the CCS demonstration process; setting up an appropriate platform for the auctioning of GHG emissions allowances – which will determine whether implementation of the on-paper requirements really achieves the policymakers' aims.

However, it must be underlined that the 2020 deadline to which the EU energy-climate package is geared is one that poses some difficulties for our industry, which is characterised by extremely long-lived assets and capital investment programmes on a very long time-scale. The 2050 horizon is a more appropriate timeframe for strategic planning towards a carbon-neutral future.

The 4th Assessment Report of the International Panel on Climate Change (IPCC) indicated that, in order to stabilise atmospheric carbon dioxide emissions within a threshold of 440 ppm geared to the 2ºC temperature target, global emissions would have to fall by 50 per cent on current levels and that the OECD countries would have to reduce their emissions by 60-80 per cent. This implies that the OECD power sector would have to be virtually carbon-free by 2050.

With this in mind, chief executives of power companies representing over 70 per cent of total EU electricity production signed in March a declaration making a commitment to a carbon-neutral power sector by mid-century and Eurelectric embarked on a study – *Power Choices: Pathways to Carbon-Neutral Electricity in Europe by 2050* – to examine how this vision can be made reality. Setting a domestic reduction goal of 75 per cent – mid-way on the IPCC's 60-80 per cent scale – the study looks at technological developments, investments and regulatory framework that will be needed in the coming decades and examines policies that will have to be put in place. It uses the PRIMES energy model developed by Professor Pantelis Capros at Athens Technical University, which is also used by the European Commission for energy scenarios, updated as to macroeconomic and power sector data and assumptions.

The study develops two scenarios for the EU-27 area during the 1990-2050 period. The Baseline scenario assumes all existing energy policies are followed: *inter alia* the current EU targets for reducing CO_2 emissions and promoting RES are pursued beyond 2020 but not re-set, nuclear energy is phased out in countries envisaging such a move, and electricity does not become a major transport fuel in the period to 2050.

The *Power Choices* scenario sets a 75 per cent CO_2 reduction target across the entire EU economy to be achieved domestically – equivalent to some 80-95 per cent when offsets are included, as in the official EU targets – and aims for an optimal power generation portfolio based on an integrated energy market. In this scenario, policymakers make climate action a priority and an international carbon market defines the price of CO_2, which applies uniformly to all economic sectors, ensuring that all sectors internalise the cost of GHGs they emit. Subsidies for RES are phased out by 2030 and the carbon market becomes the sole driver for deployment of low-carbon technologies. Energy efficiency also becomes a top priority and is pushed by specific policies and standards on the demand side. In contrast to Baseline, electricity becomes a major transport fuel as plug-in hybrid and electric cars are broadly rolled out.

Lars G. Josefsson: energy efficiency will be the major driver for the carbon-neutral Europe of tomorrow

Power Choices confirms the need for massive development of RES and shows that deployment can be achieved without the wasteful subsidies that will drive up the price of electricity

The *Power Choices* scenario sees electricity claim a greater share of final energy consumption, as the energy-efficiency drive squeezes out less efficient vectors. However total EU power generation reaches a level not much greater than under Baseline, rising by around 50 per cent from some 3100 TWh in 2005 to around 4800 TWh in 2050.

The optimal power generation portfolio developed under this scenario sees RES-electricity increase dramatically, taking over 50 per cent of all power investment and more than half of total installed capacity, to reach almost 1800 TWh in 2050, up from 500 TWh, and become – despite the phase-out of national subsidy schemes by 2030 – at 38 per cent of total EU generation, the greatest single source of power. Among RES, wind power takes the lead, with on-shore wind providing 32 per cent of the RES share and off-shore wind 24 per cent. Hydropower remains stable through the period, accounting for 20 per cent of the RES total. Biomass-fired electricity also sees a substantial increase, although in relative terms its share of RES power slightly decreases, while solar power also comes into the picture.

Nuclear power reaches almost 1300 TWh, with new capacity installed as of 2025, accounting for 27 per cent of total net power generation in 2050. Electricity from solid fuels increases slightly, from 850 TWh in 2005 to 870 TWh in 2050, especially from 2025, due to deployment of CCS. Gas-fired power peaks in 2040, followed by a slight decline as gas and carbon prices rise and CCS becomes necessary for gas-fired plants, stabilising at 750 TWh in 2050, 16 per cent of total EU electricity. Oil-fired power retains only a marginal role, progressively falling over time to just one per cent of total EU power by 2050.

With this mix, the electricity industry achieves a major reduction in CO_2 emissions, the main results being seen from 2025 to 2040. While policy action under Baseline reduces sector carbon emissions by 66 per cent, still leaving 492 Mt emitted in 2050, *Power Choices* sees CO_2 emissions plummet by 90 per cent versus 2005, from 1423 Mt to just 128 Mt in 2050.

This brings us very close to carbon-free electricity. To achieve credible carbon-neutrality it is essential to calculate sector emissions accurately and transparently, reduce emissions to the fullest extent feasible within the sector, then offset residual emissions through actions to reduce GHGs elsewhere – via technology transfer, afforestation, etc – such that net carbon emissions equal zero.

The *Power Choices* scenario also shows primary energy consumption across the economy falling from 1795 Mtoe to 1402 Mtoe by 2050, a reduction of 22 per cent on Baseline. The major part of this is due to considerably lower demand in the transport and residential sectors, as electricity replaces less efficient uses of oil and gas in cars and heating. This fall in primary energy demand translates to an even steeper decrease in final consumption, from 1170 Mtoe to 817 Mtoe, a saving of 30 per cent on Baseline. A sharp reduction in oil and gas, from 52.5 per cent of final energy demand under Baseline to only 36 per cent under *Power Choices*, is mirrored by a rise from 20 per cent to 45.5 per cent in electricity's share.

With the fall in oil and gas demand, *Power Choices* also delivers a reduction of 40 per cent on Baseline in net energy imports. Overall energy cost in the economy also decreases, from just under 11 per cent of GDP in 2010 to just below 9 per cent in 2050.

If the world is to achieve a low-carbon future, at reasonable cost to the economy, without jeopardising energy supply security, then policymakers will have to set a legal framework that dovetails with the demands indicated by climate science and the commercial availability of the right technologies.

The *Power Choices* study shows the positive outcomes for economy, society and the environment that result from making the correct choices on both supply and demand side of the energy equation. It shows the vital need to ensure all low-carbon technology options – RES, CCS, nuclear power, plus the 'smart' networks needed to transport power and better manage demand – are available to the market. If the necessary capacity is to be built, policymakers must also encourage public acceptance of modern energy infrastructure and CO_2-storage sites, and take action to streamline authorisation procedures.

Power Choices confirms the need for massive development of RES and shows that deployment can be achieved through a market system without the massive wasteful subsidies that will drive up the price of electricity for consumers large and small. The policymakers should therefore support the carbon market so as to deliver the CO_2 cap at least cost, ensure all sectors internalise the cost of their GHG emissions, and – since the global challenge of climate change requires a global solution – actively promote an international climate agreement. The Eurelectric study also shows that any delay in deploying CCS will cause serious delay in meeting the CO_2 reduction target.

However, the study shows that energy efficiency will be the major driver for the carbon-neutral Europe of tomorrow. Public authorities must therefore take a leading role in energy efficiency, adopting standards and incentives to help consumers choose energy-efficient technologies in their domestic appliances, heating and cooling and road transport.

It's time for a paradigm shift. The supply and demand sides of the energy equation must work together. Anything less and our ambitious attempts to meet the challenge of climate change will end in failure or prove an unnecessary drain on the economy.

Lars G. Josefsson is CEO of Vattenfall and President of Eurelectric, the association representing the European electricity sector

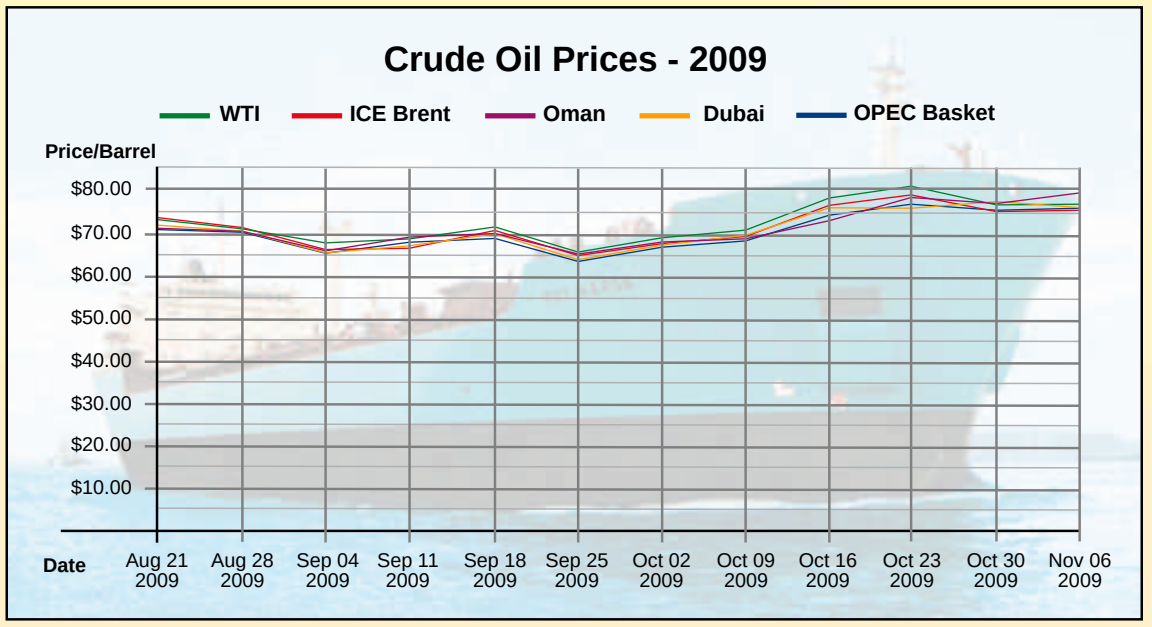
Oil

‘Fair Price’ for crude as demand set to return

New component will be added to the crude oil market

Increase in global crude oil demand forecasted

David Gregory



Crude oil has reached the “fair price” that Opec has been looking for. A year ago, moderate Opec leaders, particularly Saudi Arabia, were stating that $75 would be a fair price for a barrel of crude oil. At $75/b, revenues would be sufficient to allow most Opec members to stick to their budgets and continue with essential development projects designed to expand capacity to meet future demand – and thus avoid future price spikes.

Still, analysts are expecting to see the return of the $100 barrel in the coming months, provided the recession really is over.

A new component will be added to the crude oil market at the end of this year – the Argus Sour Crude Index (ASCI). The New York Mercantile Exchange (Nymex), which is owned and operated by the Chicago-based CME Group, and London’s Intercontinental Exchange Inc. (ICE) have launched futures contracts for ASCI futures contracts.

The development follows an announcement made in late October by *Argus Media*, which publishes the price of ASCI, that Saudi Aramco will as of January 2010 begin using ASCI as the current benchmark for all grades of its crude oil sold to US customers. Since 1994, Saudi Aramco has used WTI, which is published by *Platts* and traded on Nymex, as its benchmark. The daily ASCI price is the volume-weighted average of all deals done for the US Gulf Coast crudes Mars, Poseidon and Southern Green Canyon. It was launched in May 2009 to represent the daily value of US Gulf coast medium sour crude, based on physical spot market transactions.

The change is being made because WTI, a light sweet crude, has come to be seen as increasingly unrepresentative of the US sour complex. WTI is priced at its delivery point in Cushing, Oklahoma. Rising stocks at that location are seen as contributing to price distortions that led to WTI trading at a lower price than Brent crude for lengthy periods and thus not synchronized with the real value of Saudi crudes.

Argus Media said on October 28 in a statement announcing the Saudi Aramco decision: “This fundamental change in policy reflects the increased importance of the US Gulf coast sour crude market, in which both production and trading activity is rising sharply.” During 2008, the US imported an average of 1.5 million b/d of Saudi crude.

Meanwhile, the International Energy Agency (IEA), the US Energy Information Administration (EIA) and Opec have all forecast an increase in global crude oil demand in coming months. All three agencies see improvements in the world’s economic condition and say that demand for crude is returning, especially in Asia, and in China in particular.

The IEA predicted that crude demand would average 84.8 million b/d in 2009, and increase to an average of 86.2 million b/d in 2010. The EIA forecast demand for 2009 to average 84.14 million b/d and 85.4 million b/d for 2010. Opec’s monthly report said demand for 2009 would average 84.31 million b/d and 85.07 million b/d in 2010.

The IEA said in its November *Oil Market Report* that it had revised global oil demand upward by 210 000 b/d for 2009 and by 140 000 bpd for 2010 from its last report. The Paris-based agency said the revision was made based on stronger preliminary data in OECD North America and buoyant demand in non-OECD Asia/Middle East. Global demand is on track for year-on-year growth in the fourth quarter of 2009 for the first time since the second quarter of 2008, it said.

In the November issue of the *Short-Term Energy Outlook*, the EIA said: “Sustained economic growth in China and other Asian countries is contributing to the beginnings of a rebound in world oil consumption.” It added that although OECD oil inventories remain high, optimism for a continued economic turnaround, combined with the impact of Opec production cuts, have driven oil prices higher. But it said that if the economic recovery stalls and oil consumption does not rebound, oil prices could weaken given the high level of inventories.

Opec’s *Monthly Oil Market Report* said most economic signs are aiming toward higher world oil demand growth in 2010, but it added that downward risk factors warrant caution. “As the global economy turns the corner, global oil demand is bottoming out and growth is set to resume,” the Opec report said. But it added that weak economic recovery could dampen potential demand growth during 2010.

Gas

Natural gas oversupply looms

The changing outlook for gas is sparking calls to sever the link between gas and oil prices.

Mark Goetz

The rapid development of unconventional natural gas resources in North America is transforming the gas market outlook, the International Energy Agency (IEA) said in its *World Energy Outlook*, released last month.

The development in the US and Canada of shale gas through new technology involving horizontal drilling combined with hydraulic fracturing has led the IEA to forecast an abundance of gas supply in the years ahead.

US demand was so promising that it led many foreign gas producers to construct liquefied natural gas (LNG) plants to supply the US market. Now it appears that demand for foreign gas imports are slipping in the face of reports that the US has technically recoverable gas reserves amounting to 2000 trillion cubic feet (56 677 billion m^3), according to *Reuters* – sufficient for 90 years at the current production rate.

The global economic slowdown has contributed to a decline in demand and price. For example, spot market prices for LNG in Asia have in recent weeks seen a price of $7-8 per million British thermal units (/mBtu). In mid-2008, when crude oil prices were at an all-time high, spot LNG prices hit $22/mBtu, but later fell to as low as $5/mBtu when crude oil prices plunged. The situation has fuelled a debate as to whether gas pricing should be de-linked from crude oil prices.

With the US no longer in the position of insatiable consumer of imported gas, LNG producers are turning to Europe and China as delivery points. Furthermore, the viability of proposed gas pipeline projects like Russia’s South Stream are being questioned as demand for natural gas is forecast to decline.

The *World Energy Outlook 2009* said the introduction of shale gas as a supplement to regular supply, combined with weak demand and a large amount of gas in storage, has led to a decline in US gas prices from around $9/mBtu in 2008 to less than $3/mBtu in September 2009, reducing the need for LNG imports and putting downward pressure on prices in other regions.

But it remains to be seen if the technology that has been applied in North America to develop shale gas can be used in other parts of the world. “The extent to which the boom in unconventional gas production in North America can be replicated in other parts of the world endowed with such resources remains highly uncertain,” the *WEO 2009* said.

The report said unconventional gas output worldwide rises from 367 billion m^3 (bcm) in 2007 to 629 bcm in 2030, with much of the increase coming from the US and Canada. Globally, the share of unconventional gas rises from 12 per cent in 2007 to 15 per cent in 2030 but there is potential for output to increase after 2020, it said.

The *WEO 2009* said the shale gas production “boom’ in North America, together with the recession’s “depressive impact” on demand for natural gas, “is expected to contribute to an acute glut of gas supply in the next few years.”

It also stated “the looming gas glut could have far-reaching consequences for the structure of gas markets and for the way gas is priced in Europe and Asia Pacific.” It said the much reduced need for imports into the US could lead to less connectivity between the major regional markets in the coming years. Relatively low North American gas prices are expected to discourage imports of LNG, the report added.

According to *WEO 2009*, if oil prices rise in the coming years, gas prices will tend to rise in Europe and the Asia-Pacific because of the predominance of oil indexation in their long-term supply contracts. But, it added, sliding spot prices for LNG could increase the pressure on gas exporters and marketers in those regions to move away from, or to adjust, the formal linkage between gas and oil prices in long-term contracts.

“If the major exporting countries bend to pressure from importers to modify the pricing terms in their long-term contracts and make available uncontracted supplies to the spot market, lower prices would result. This would help boost demand, especially in power generation… and reduce the overhang in supply capacity in the medium term,” the report said.

Keeping a cool outlook

Energy accounts for about 65 per cent of the world's greenhouse-gas emissions and so must be at the heart of any climate change solution. The IEA's *World Energy Outlook* analyses measures in the energy sector which might stabilise the concentration of greenhouse gas emissions in the atmosphere at 450 parts per million CO_2-equivalent.

Maria Argiri

Past editions of the International Energy Association's (IEA) *World Energy Outlook (WEO)* have highlighted the unsustainability of current energy trends – environmentally, economically and socially – and the urgent need for action to bring about a wholesale global shift to low-carbon technologies. The issue was particularly pertinent this year, as countries around the world eyed a new global deal on action to address climate change.

This year's edition of *WEO* includes an in-depth analysis of climate policies. Two scenarios have been modelled in detail: a *Reference Scenario* and a *450 Scenario*. The Reference Scenario is a picture of how global energy markets would evolve if governments make no changes to their existing policies. Thus, 450 Scenario analyses measures in the energy sector which might be taken in order to fulfil a co-ordinated global commitment ultimately to stabilise the concentration of greenhouse-gas (GHG) emissions in the atmosphere at 450 parts per million CO_2-equivalent.

The Reference Scenario: The Reference Scenario takes account of government policies and measures enacted or adopted by mid-2009, although many of them have not yet been fully implemented. This includes a number of policies to limit greenhouse gas emissions, as well as various policies to enhance energy efficiency and promote renewable energy. Policies under consideration and "targets" not backed up by commensurate policy measures are not included. The Reference Scenario also assumes that energy subsidies are gradually removed in all countries where they currently exist.

In the absence of new initiatives to tackle climate change, rising global fossil fuel use in this scenario increases energy-related CO_2 emissions from 29 Gt in 2007 to over 40 Gt in 2030 and contributes to the deterioration of ambient air quality, with serious public health and environmental effects. The rise in emissions is due to increased fossil fuel use, especially in developing countries, where per-capita energy consumption still has far to go to approach that in OECD countries. The IEA's analysis indicates that the Reference Scenario – when projected out to 2050 and beyond and taking into account emissions of all GHG from all sources – would result in a concentration of GHG in the atmosphere of around 1000 ppm over the long term.

The 450 Scenario: The 450 Scenario analyses measures to force energy-related CO_2 emissions down to a trajectory that, taking full account of the trends and mitigation potential for non-CO_2 greenhouse gases and CO_2 emissions outside the energy sector, would be consistent with ultimately stabilising the concentrations of all GHG in the atmosphere at 450 ppm. This level of concentration is expected to give rise to a global temperature increase of 2°C.

The long-term GHG concentration limit set – 450 ppm CO_2-equivalent – is less than half the concentration which occurs in the Reference Scenario. The trajectory is an overshoot trajectory, i.e. concentrations peak at 510 ppm in 2035, then stay steady for around 10 years and then decline to 450 ppm. The IEA analysis focuses on energy-related CO_2 emissions to 2030, which peak just before 2020 at 30.9 Gt and decline steadily thereafter, reaching 26.4 Gt in 2030.

The emission reductions in the 450 Scenario can be achieved only by taking advantage of the mitigation potential in all regions. Thus, all countries are assumed to implement mitigation measures, while respecting the principle of common but differentiated responsibilities. Three regional groups have been considered: *OECD+* countries – OECD countries and countries that are members of the European Union but not of the OECD; *Other Major Economies* (OME) - Brazil, China, the Middle East, Russia, and South Africa, that is the largest emitters outside OECD+ (based on their total emissions of energy-related CO_2 in 2007) with per capita GDP expected to exceed $13 000 in 2020; and *Other Countries* (OC) – all other countries.

Until 2020 OECD+ countries are assumed to have national commitments and to implement various mitigation policies, including a cap-and-trade system for power generation and industry. Other countries reduce their emissions through nationally appropriate mitigation actions (NAMAs), with international financial and technical support. All regions participate in sectoral agreements for cement, iron and steel, passenger vehicles, aviation and shipping that establish emissions intensity targets. After 2020, Other Major Economies are assumed to be part of the cap-and-trade system in power generation and industry.

Maria Argiri: This year's *WEO* includes an in-depth analysis of climate policies

There were some key results from the 450 Scenario.

All countries achieve substantial levels of abatement relative to the Reference Scenario. OECD+ emissions decline steadily, from 13.1 Gt in 2007 to 7.7 Gt in 2030. Emissions in Other Major Economies peak at 12.6 Gt in 2020 and then decline to 11.1 Gt in 2030, still 14 per cent above 2007 levels. Emissions in Other Countries increase steadily. Most of the emission reductions from the Reference Scenario are achieved through energy efficiency measures. Significant reductions also come from changes to the mix of power generation technologies.

End-use efficiency is the largest contributor to CO_2 emissions abatement in 2030 compared with the Reference Scenario, accounting for more than half of total savings. Energy-efficiency measures in buildings, industry and transport usually have short pay-back periods and negative net abatement costs, as the fuel-cost savings over the lifetime of the capital stock often outweigh the additional capital cost of the efficiency measure, even when future savings are discounted.

> The measures assumed in the 450 Scenario would require additional investment over the period 2010-2030 of $10.5 trillion

Early retirement of old, inefficient coal plants and their replacement by more efficient coal fired power plants, mainly in China, accounts for an additional 5 per cent of the global emissions reduction. The increased use of biofuels in the transport sector accounts for 3 per cent of CO_2 savings, while increased deployment of renewables in power generation accounts for 19 per cent. CO_2 capture and storage in power and industry represents 10 per cent of the savings in 2030, relative to the Reference Scenario.

WEO-2009 estimates that implementing the measures assumed in the 450 Scenario would require additional investment over the period 2010-2030 of $10.5 trillion. The largest increase is in transport, where most of the additional $4.7 trillion covers the cost of purchasing more efficient, but more expensive, vehicles. The additional investment in buildings, including appliances and equipment, amounts to $2.5 trillion. An extra $1.7 trillion is needed for the power sector. Investment in industry rises by $1.1 trillion, mainly for more efficient processes and electric motors. Facilities to produce biofuels require additional investment of $0.4 trillion. The energy efficiency investments in the buildings, industry and transport sectors are recovered through energy cost savings.

More than three quarters of the additional investment is needed in the last decade because most of the CO_2 emission reductions occur after 2020 (global CO_2 emissions are cut by 3.8 Gt in 2020 and by 13.8 Gt in 2030, relative to the Reference Scenario). About 48 per cent of the additional investment is needed in OECD+ countries. Other Major Economies and Other Countries need 30 per cent and 18 per cent of the additional investment respectively. The rest is needed for international aviation.

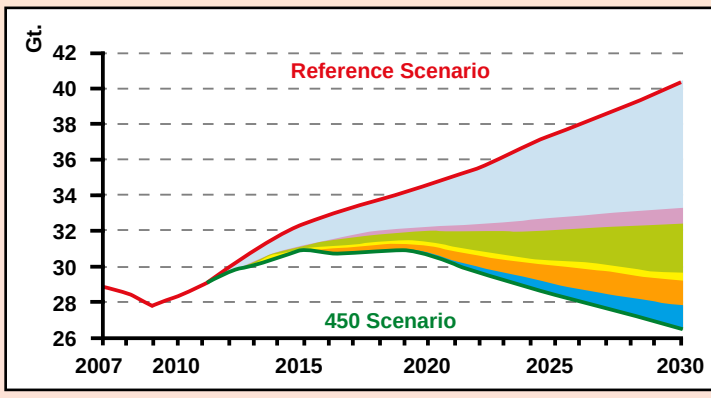
The cost of the additional investments needed to put the world onto a 450 ppm path is at least partly offset by economic, health and energy security benefits. Energy bills in transport, buildings and industry are reduced by $8.6 trillion globally over the period 2010-2030. Fuel cost savings in the transport sector alone amount to $6.2 trillion over the projection period.

Oil and gas imports and their associated bills in the OECD and developing Asia are much lower than in the Reference Scenario and are lower than in 2008 in OECD countries. Cumulative OPEC revenues in 2008-2030 are 16 per cent less than in the Reference Scenario but are still four times their level in real terms of the previous 23 years. Other implications include a big reduction in emissions of air pollutants, particularly in China and India, and in the cost of installing pollution-control equipment.

In the 450 Scenario, the geographical and sectoral distribution of abatement expenditure and investment does not equate to how those actions will be funded. This is entirely a matter for negotiation. UNFCCC Parties have agreed that developed countries must provide financial support to developing countries, but the determination of the exact level of support is not a matter for the IEA. It is clear that there is a wide range of possible funding outcomes. Under the assumptions adopted in the 450 Scenario, $197 billion of additional investment is made in non-OECD countries in 2020 and an illustration is given of how OECD+ might contribute anywhere between $13 billion and $151 billion of this, in addition to supporting technology transfer and adaptation.

Maria Argiri, is Senior Economist at the International Energy Agency.

World energy-related CO_2 emission savings



	Abatement (Mt Co_2)	
	2020	2030
Efficiency	**2 517**	**7 880**
End-use	*2 284*	*7 145*
Power plants	*233*	*735*
Renewables	**680**	**2741**
Biofuels	**57**	**429**
Nuclear	**493**	**1 380**
CCS	**102**	**1 410**

Gasification goes compact

The start up of a new compact gasification pilot plant in Illinois, USA, could dramatically cut the cost of IGCC, writes **Junior Isles**

At the start of November, Pratt & Whitney Rocketdyne began the commissioning of a pilot gasification plant at the Gas Technology Institute in Des Plaines, Illinois, USA. According to the company, the pilot plant is the first step towards the global commercialisation of an innovative technology that will dramatically reduce the size of the gasifier and consequently the cost of the technology.

Gasification is a process that converts carbon-containing material such as coal or biomass into synthesis gas (syngas). The syngas can then be burned in a gas turbine to produce electricity or further processed to manufacture chemicals, fertilizers, liquid transportation fuels, synthetic natural gas or hydrogen.

Although the technology has been around for many years, its commercial use for power generation has been slowed predominantly by the high capital cost of integrated gasification combined cycle (IGCC) plants, which currently are upwards of $3500/kW.

Pratt & Whitney designs and manufactures aircraft engines, space propulsion systems and industrial gas turbines. Pratt & Whitney Rocketdyne, a part of Pratt & Whitney, develops propulsion, power and energy systems used in government and commercial applications, including the main engines for the space shuttle.

The company first began looking at developing an advanced gasification process in the 1970s and 1980s through several US Department of Energy (DOE) contracts. Alan Darby, Pratt & Whitney Rocketdyne's Programme Manager for gasification recalls: "At the time we were using our approach to designing a rocket engine as the baseline for that concept. Rocket engines are compact, high pressure devices, and by using that design philosophy we thought we could build a more competitive gasifier."

The main feature of the gasifier is what the company calls "rapid mix injectors", of which there can be up to 36 in the gasifier. The injectors allow the fuel feed streams to be broken down with oxygen in much smaller quantities to produce a much faster gasification reaction in the gasifier. The rapid mix approach reduces the residence time needed to complete the reactions from several seconds in existing gasifiers to about 0.5 s.

The gasifier also operates at a much higher pressure and temperature than conventional gasifiers. The higher reaction temperature calls for special cooling techniques. "Through our analysis of heat transfer in high temperature environments, we can handle the heat load and make a smaller gasifier," said Darby.

The gasifier is about 14-15m (45-50 ft) long, a reduction of 90 per cent in size. Thickness of reactor walls is also much smaller. A 3000 t/day gasifier would have reactor walls of about 1.2 m (4 ft) in thickness compared to 3-3.6 m (10-12 ft) in current comparable gasifiers.

This all impacts the infrastructure around the gasifier, since all the surrounding systems can be made smaller. For example, the small size of the gasifier means it uses about 20 per cent less oxygen to complete the reaction, which allows for a smaller air separation unit (ASU).

According to Pratt & Whitney Rocketdyne, this results in a 20 per cent reduction in the capital cost of the gasification system.

The increased efficiency of the reaction and the smaller reactor reduces heat loss through the reactor walls, which will reduce CO_2 production by about 10 per cent.

Operating costs are also expected to be lower. The gasifier is being designed for an availability of 95-99 per cent. "We are driving reductions in operating costs. For example, we are looking to reduce time to repair. Operating costs will be about 25 per cent lower," said Darby.

The gasifier uses a dry solid, dense-phase feed system, where fuel is added straight to the tank – no gas or water is added to the solid stream when feeding it to the gasifier. The lock-hoppers are replaced by a dry solids pump. The pump will transition feedstock from a low-pressure tank at atmospheric conditions to 83 bar (1200 psi) in a single step.

According to Pratt & Whitney Rocketdyne, apart from moisture content there are no limitations on the fuels that can be fed into the gasifier. Darby said: "We can take lignites all the way up to the bituminous coals and petcokes. However, we want the feedstock to be in a condition where there is no extra moisture on the particles so that our dry feed system will work."

Fuel is ground to a standard utility particle size and fed to the gasifier via a splitter that splits the single feed stream into multiple feed streams. Each fuel stream is then reacted with oxygen and steam individually inside the reactor.

The gasifier typically operates at 69 bar (1000 psi) with a reaction temperature of about 2760ºC (5000ºF) and a slagging temperature of around 1427ºC (2600ºF). It has water-cooled walls to freeze the molten slag on to the water-cooled tubes so that it becomes a thermal and chemical barrier.

The syngas then passes through a partial quench system. Darby explained: "The philosophy is to not saturate the gas but just cool it down to about 370ºC (700ºF) so that the particulates are dry enough to be separated by a cyclone and candle filter."

Pratt & Whitney Rocketdyne's approach is to deliver a particulate-free syngas. After the syngas leaves the gasifier, how it is used depends on the customer.

Some $25 million is being spent on the current power plant programme to test an 18t/day gasifier.

First test operations are scheduled to start this month (December 2009). The testing marks the culmination of a project that was re-started in 2000 following the early bench-scale reactor work from the 1970s and 80s. "These early reactors only operated perhaps 2-4 hours at a time. The work was halted when the Reagan administration decided that the programme was not necessary and the market could not support the work. But when oil prices began climbing, we brought back gasification as a potential business growth area," noted Darby.

Since 2000, the company has been performing studies and carrying out lab-scale work. In 2004/05 it won a DOE contract for material development work, and following this received funding in 2006 to start work on a pilot plant.

The funding is split equally between the public and private sector, with the Illinois Department of Commerce and Economic Opportunity (DCEO) and the Alberta Energy Research Institute representing the public sector. Pratt & Whitney Rocketdyne, and ExxonMobil Research and Engineering are providing private funding.

Testing of the pilot plant will run through to 2012. Three feedstocks will be tested – Illinois No. 6 coal, petcoke from the Alberta oil sands region and an Alberta coal. The test programme will run for a total of 1000 hours to help Pratt & Whitney Rocketdyne understand the longevity of the hardware.

Engineers will look at the efficiency of the gasifier and analyse its design to determine whether it has performed according to the specified criteria. "The heat flow, thermal environment of the gasifier i.e. wall temperatures, injector temperatures, and the overall performance will all be studied," said Darby.

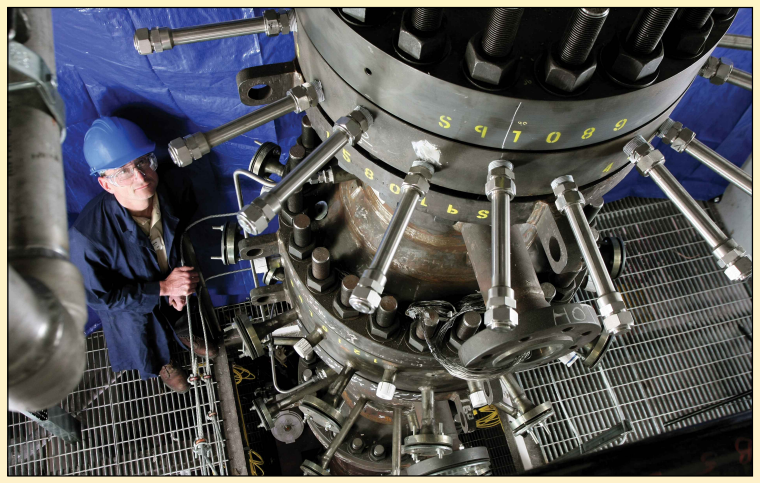
The pilot plant has a thermal capacity of 5.4 MWth. When commercially scaled up this is expected to be 900 MWth.

As this is a pilot plant, Darby expects the coal-gas efficiency of the reactor to be in the 70 per cent region but says it will be a lot higher in a commercial gasifier. "Because the pilot plant is so small, we lose a lot of heat in relation to the volume. We expect to reach 82-85 per cent coal-gas conversion efficiency in a commercial gasifier," he said.

There is also a dry solids pump programme to test the dry feed system. This system will be tested without a pump, instead it will use a lock-hopper. If the pilot plant works and demonstrates good reliability, Pratt & Whitney Rocketdyne expects to have customers requesting testing of their feedstocks.

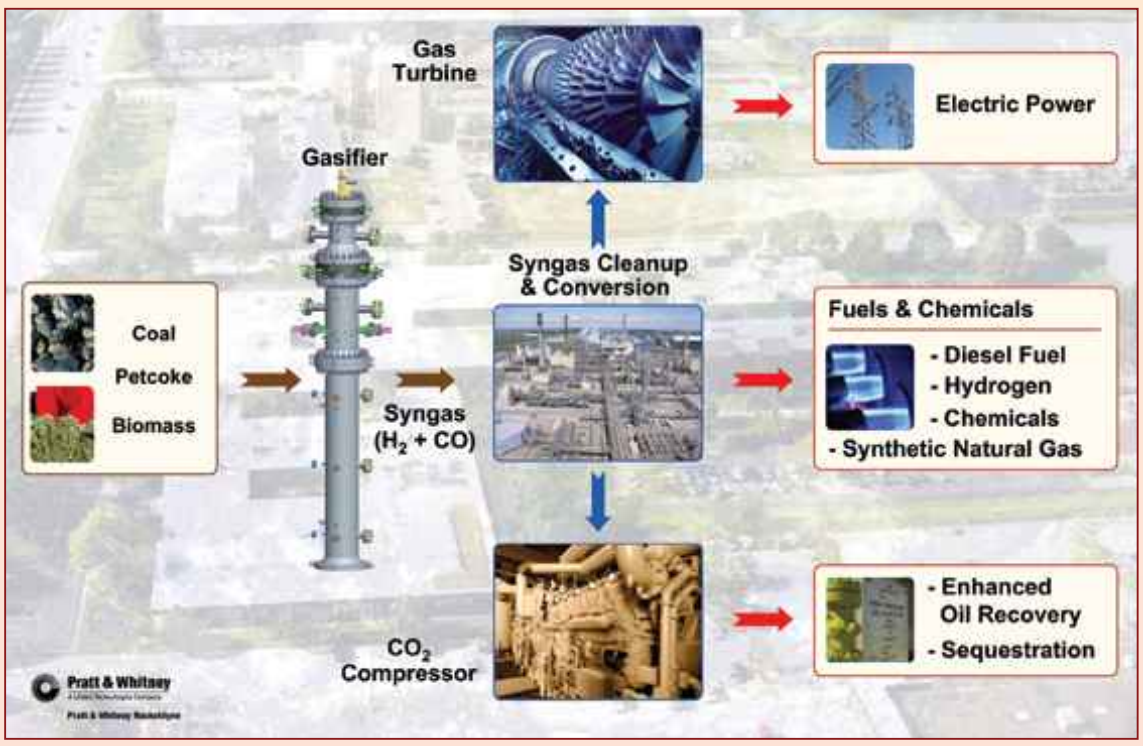
In the meantime, the company is looking for a partner that is willing to install a 400t/day gasifier at a demonstration plant. Darby explained: "This would operate like a 24/7 commercial plant and would be the next step in testing our technology. We are currently in discussions with various potential partners."

It is hoped that such a demonstration will go forward some time in 2010. This will be an important step on the road to developing a commercial gasifier of about 3000 t/day that will, according to Darby, offer a "20 per cent reduction in capital costs and 25 per cent reduction in operating costs compared to today's units."



The pilot plant has a thermal capacity of 5.4 MWth. The gasifier will be 90 per cent smaller than existing units

Testing of the pilot plant will run through to 2012. Three feedstocks will be tested – Illinois No. 6 coal, petcoke from the Alberta oil sands region and an Alberta coal



Gasification is a process that converts carbon-containing material such as coal or biomass into syngas

Junior Isles

Think global, act local

We often hear large global companies use the phrase, "think global, act local". New climate change agreement or not, it is how any strategy to reduce greenhouse gas emissions will have to be implemented as we walk the green path towards a low carbon economy.

It is encouraging to see that the philosophy is taking roots in the European political community, even if the "think global" part from governments around the world has been somewhat slow and fragmented over the past few years.

This summer GE Energy, the largest global equipment manufacturer in the energy sector, announced that it had formed a partnership with the Assembly of European Regions (AER). Through the partnership, GE Energy and AER are hoping to create a gateway between energy experts and regional public decision makers, with the aim of examining the energy challenges facing European regions and to promote possible solutions.

AER is the largest independent network of regions in wider Europe. Bringing together more than 270 regions from 33 countries and 16 inter-regional organisations, it is the political voice of its members and a forum for inter-regional co-operation.

Certainly, the magnitude of the challenge of meeting greenhouse gas reduction targets requires companies like GE to work hand-in-hand with all the different stakeholders – utilities, policy makers, NGOs etc.

Commenting on the partnership, Magued Eldaief, GE Energy Country Manager, UK, said: "To set clear policies and understand the challenge of what is feasible, governments have to understand the technology standpoint from companies like GE. They also need to understand what is economically effective, affordable, and what can be achieved in the given timeframes. Through the cooperation with AER, we are attempting to reach out to governments in an advisory role."

On the face of it, the cooperation makes a lot of sense. The regions are probably best placed to harness local energy potentials and develop innovative solutions to meet Europe's energy needs while respecting the environment.

The AER recently revealed the initial results of a major ongoing survey covering 66 regions in 24 countries across Europe. Commenting on the survey, AER president Michèle Sabban said: "The first results of the survey prove what we at AER have been repeating for many years. Regions, when given the right competences and funding, can lead the charge in tackling Europe's biggest challenges. When it comes to turning local energy assets into advantage, finding tailor-made solutions to meet energy needs and addressing environmental concerns, there is no better guiding philosophy than to 'think global and act local'. That is how the principle of subsidiarity works, and that is how European energy policy should work."

The AER said the survey of regions found that 91 per cent position energy as one of the key priorities in the next 15 years, that 75 per cent already have an energy strategy in place, and that those strategies usually include a specific plan for developing renewable energy sources (RES). Regions in France and Hungary pointed out, however, that the harnessing of RES is being hampered by a lack of relevant competences. That concern is a recurring theme in the survey findings. The regions, it said, need to be empowered rather than hampered in order to effectively tackle Europe's energy challenges.

According to Klaus Klipp, AER Secretary General, the importance of including the regions was highlighted by the Lisbon strategy on innovation, which began almost 10 years ago. "After five years the EU noted that nothing had happened because they had forgotten to include the regions and the small and medium enterprises in this strategy on innovation. This is where the real innovation and economic development is happening."

He added: "The media leads you to think that it is all being driven at the global and national level and sometimes the EU. But in reality, in terms of economic growth and energy, it's really happening at the local and, more so, the regional level."

In Europe there are 22 million small and medium enterprises (SMEs), which means there are nearly 2 million SMEs in a country like France. A large number of them are the companies that are very important for a modern economy. Klipp argues that the AER can be in contact with these companies, unlike national governments, which have no means of creating a real dialogue with these companies.

Whether there is dialogue and leadership at the global or national level or not, it looks like the green revolution will continue.

"Even without an agreement [on climate change], most regions will continue [with green developments]. They have said this is the most important topic for them for the next 15 years. Green energy is creating jobs, and small and medium enterprises," said Klipp.

> To set clear policies and understand the challenge of what is feasible, governments have to understand the technology standpoint

The importance of wealth creation from the green sector cannot be underestimated. A report by Roland Berger, the German management consultancy, for the German government estimated that by 2020, Germany will earn more money from green products than car production.

While green policy will remain a part of regional policy Klipp agreed that things would move a lot quicker with a global climate change agreement. In most countries, there is the same level of government all over the world. A global agreement will help the joint AER-United Nations Development Programme (UNDP) initiative aimed at global cooperation at the regional level.

Funding to combat climate change will continue to be an issue and agreements at the global or national level will affect the regions since the projects are executed at this level. "A large part of any agreed funding has to go to the regional governments since this is where investments are done. It is a strategic point but in the end someone has to put it in place. If there is any delay in [specifying] investment at the global or national level, the investments will either not happen or will happen much later. "

Governments, therefore still have an important role to play. This was demonstrated last year when a reduction in subsidies by some governments for solar power had a negative impact on the sector. The same will hold true for technologies such as CCS.

GE has been sharing its views with the AER on the current status of the various clean coal and CCS technologies. Eldaief noted: "CCS is proven in terms of the capture part and the storage part but what is not proven is their integration in terms of an economic model. The technology has to be demonstrated at commercial scale not just pilot scale to see how we can bring the costs down. New technologies will follow a similar development path as wind where costs have fallen dramatically over the last 25 years. Initially government support will be required, but as long as there is a long-term commitment and opportunity in the market, costs will scome down."

The AER together with its partners from the UNDP and GE Energy addressed an audience of 500 regional politicians, experts, and EU officials at its General Assembly in Belfort, France, just before Copenhagen to appeal for recognition of the role of regions and federal states in the fight against climate change.

It was the first event where all the partners convened. The annual 'European Regions Energy Day' meeting is planned for Brussels in April next year, where it is hoped that concrete projects will be identified that will lead to opportunities.

Hopefully we will see more of this type of collaboration between experts and policy makers at the local, grass roots level. If governments can also provide clarity on global targets and a roadmap, this will help everyone in making decisions on how to invest in resources and technology and speed our journey to a low carbon economy.