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THE ENERGY INDUSTRY TIMES

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China pushes advanced clean coal projects

Shedding light on clean coal technology



Despite international perception, China continues to demonstrate leadership in its efforts to reduce emissions with the announcement of several projects and agreements that will demonstrate advanced clean coal technology, **writes Junior Isles**

China is addressing emissions from its coal fired plants through several international partnerships that will see the country set up projects using integrated coal gasification combined (IGCC) technology.

Most recently, Southern Company said that China will be the site for the first worldwide commercial implementation of Transport Integrated Gasification (TRIG) technology for producing low-emission coal-based electricity.

TRIG is an advanced IGCC technology that produces electricity

with lower emissions than traditional coal power plants. It is also compatible with the lower rank coals that are abundant in China.

The technology was developed by Southern Company, KBR Inc. and other partners including the US Department of Energy, at the DOE's research facility in Wilsonville, Alabama.

Under the terms of their technology licensing arrangements with KBR, the companies will provide Beijing Guoneng Yinghui Clean Energy Engineering Co., Ltd. with licensing, engineering services and proprietary

equipment for the implementation of TRIG technology at a power plant operated by Dongguan Tianming Electric Power Co., Ltd. (Dongguan TMEP) in Guangdong Province.

At the Dongguan TMEP facility, TRIG technology will be added to an existing gas turbine combined cycle plant so that it can use clean synthetic gas from coal as its fuel for generating electricity, rather than fuel oil.

The 120 MW Dongguan TMEP plant, expected to begin operation in 2011, would demonstrate an example of advanced US IGCC technology that is

being developed in partnership between the DOE and industry. This IGCC technology is compatible with carbon capture, and its deployment in China is an important step toward positioning IGCC for future integration with carbon capture technology.

Last month, the Chinese Ministry for Science and Technology signed a co-operation deal in the field of technologies for capturing and storing CO₂ with Italian energy company Enel.

The agreement, which follows a memorandum of understanding

Continued on page 2

Alstom and Siemens take next step in CCS commercialization

- Amine-based CCS starts at South Charleston
- E.On starts Staudinger Unit 5

Alstom and Siemens have both marked significant milestones in the commercialization of carbon capture and storage (CCS) technology.

In September, Alstom and The Dow Chemical Company celebrated the successful start-up and operation of a pilot plant to capture carbon dioxide from the flue gas of a coal-fired boiler at the Dow-owned facility in South Charleston, West Virginia, USA.

The pilot plant uses proprietary advanced-amine technology jointly developed by Alstom and Dow to capture approximately 1800 tonnes of CO₂ per year. Philippe Joubert, Alstom Executive Vice President and President of Alstom Power said: "As a leader in carbon capture technology, Alstom is excited to take the next step in commercializing an advanced-amine technology."

According to Alstom, the pilot will operate for the next two years, generating reliable, long-term data that

can be used to optimize this technology for implementation at coal-fired power plants around the world. The pilot is designed to evaluate the technology operating under power plant conditions, test proprietary innovations jointly developed by Dow and Alstom and provide data necessary to finalize the design of large-scale demonstration plants that will apply the technology.

"Integrating this process with new advanced coal and gas fired power generation equipment will allow customers to minimize CO₂ emissions while generating electricity as cost effectively as possible," added Joubert.

Siemens in partnership with E.On, meanwhile, began operation of its pilot CO₂ capture plant at the Staudinger hard coal fired power station in Grosskrotzenburg near Hanau, Germany. The pilot plant will be operated with part of the flue gas from Unit 5.

The pilot will run until the end of

2010 and the results and operating performance will serve as the basis for large-scale demonstration plants, which are scheduled to start operation in the middle of the next decade.

Michael Suess, CEO of the Fossil Power Generation Division of Siemens Energy said: "These technologies are available but have to be tested for deployment in large plants, developed further and brought to market readiness. The pilot in the Staudinger power plant will bring us a decisive step forward."

The project is being sponsored by the German Federal Ministry of Economics under the terms of the COORETEC Initiative, part of the federal government's 5th Energy Research Programme "Innovation and New Energy Technologies".

Bernhard Fischer, Member of the Managing Board of E.On Energie AG and E.On's Chief Technology Officer said: "E.On is planning industrial-scale CO₂ capture and storage for coal-fired

power plants starting in 2020... with the post-combustion process we are focusing on a highly promising CO₂ capture technology, which can be back-fitted in existing power plants."

The pilot will remove more than 90 per cent of the CO₂ from a power plant's flue gas using special cleaning agents. The cleaning agent's long-term chemical stability and the efficiency of the process are now being tested at Staudinger, under real power plant conditions. In parallel, the technology will be further optimized in terms of energy consumption.

At the beginning of September, Det Norske Veritas (DNV), authorities and major industry partners announced CO₂PIPETRANS, the world's first guideline for the transmission of CO₂. DNV says its unified approach will ensure that CO₂ is transmitted in offshore and onshore pipelines in a "reliable, safe and cost-effective manner".

(Continued from page 1)

signed in May 2008, calls for a feasibility study into the construction, at a Chinese coal-fired plant, of a system for capturing the CO₂ produced and injecting it into an oilfield, thereby increasing crude oil production.

Enel says it will contribute to the success of the programme by sharing with its Chinese partners the experience it has gained in designing and constructing a pilot system that will allow it to test CO₂ capture technology at its Federico II plant in Brindisi starting in 2010.

Following the technology world-first with Southern Company, China will also be the first to build a project based on new gasification technology from Pratt & Whitney.

ZEEP (Zero Emission Energy Plants Ltd.) has signed an agreement to form a joint venture with China's ENN Research & Development Co., Ltd. The initial objective of the partnership is to design and construct the first commercial demonstration plant incorporating the PWR (Pratt & Whitney Rocketdyne) compact gasification technology. The plant will include an approximately 400 tonnes per day gasifier and be located at ENN's existing facility in Zaozhuang City, Shandong Province, China.

Following completion and successful testing of the demonstration plant, ZEEP and ENN intend to design and construct an approximately 1500 tonnes per day gasification plant to incorporate the PWR technology for commercial operations.

Bruce Bernard, CEO of ZEEP said: "We are proud to partner with such well known and respected leaders in the field of coal-based clean energy technologies. This is the beginning of a clean energy technology breakthrough that could benefit not only China, but the entire world."

The deal between ZEEP and ENN is one of a number of recent technology transfer agreements between US companies and China aimed at combating greenhouse gas emissions.

Another recent significant deal will see Future Fuels exchange and share technical information with China's Thermal Power Research, Inc. (TPRI). Owned by a consortium of electric utilities, TPRI's majority stakeholder is China's largest power company, Huaneng Power Group.

Under the Memorandum of Understanding between Future Fuels and TPRI, Future Fuels will offer access to all relevant information from its IGCC facility in Good Spring, Pennsylvania. TPRI will similarly share information from its GreenGen IGCC facility in Tianjin.

TPRI's GreenGen facility is a 250 MW power plant designed to be China's most efficient and environmentally friendly coal consuming project with carbon sequestration. GreenGen is currently under construction and is scheduled to start operation in 2011. The Good Spring IGCC project expects to deliver 270 MW of electricity while capturing over 50 per cent of the CO₂ output initially and nearly 100 per cent by 2020.

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Countdown to Copenhagen

Hopes of Copenhagen agreement dwindle

Last month's UN climate change summit further diminished hopes of reaching a meaningful agreement in Copenhagen, writes Junior Isles

A growing rift between the US and Europe, highlighted at the recent UN climate change summit in Washington, USA, has left industry observers believing that there is little hope of achieving a meaningful global agreement on climate change at the Copenhagen meeting in December.

EU officials say that the US has fallen short on both its level of ambition to reduce emissions and on offering financial help to developing countries. Connie Hedegard, the Danish Environment Minister, lowered expectations for Copenhagen. She was reported in the *Financial Times* as saying that "things are looking difficult and too slow".

Europe believes that the US currently lacks focus as it is too tied up with its debate on healthcare, which might lead to the pushing back of its cap and trade legislation to next year. US officials, however, say that Europe fails to understand the US political process, which requires the administration to have the go-ahead from Congress before concluding any international agreement.

Sweden's environment minister urged the US Senate to pass the legislation, saying a delay in the vote is impeding negotiations on a new international climate treaty. Sweden currently holds the rotating EU presidency and plays an active role in the talks leading up to the Copenhagen summit.

Minister Andreas Carlgren said the US needs to vote on a climate bill to persuade other nations – especially India and China – to commit to lowering their greenhouse gas emissions at the summit.

The US House passed a bill earlier this year that would require factories, power plants and other sources to cut emissions by about 80 per cent by 2050. However, action on the bill in the US Senate has been delayed. Industry, economic and environmental groups are now making a final push to influence a climate bill that may go before the Senate within weeks.

If the US does not pass substantial climate legislation, few believe other nations, particularly developing countries, will cut emissions on their own. How the US will proceed on

climate change legislation was a major topic at the World Economic Forum in China in September.

Todd Stern, the US State Department's special envoy for climate change, said that it is crucial for the Senate to pass a climate bill. Doing so would give the US the "credibility and leverage" needed to convince other countries like China and India to cut their pollution.

India recently signalled that it would set national numerical targets for curbing emissions. Meanwhile, the UN summit saw China pledge to cut CO₂ emissions per unit of GDP by a "notable margin" by 2020 for the 2005 level. However, president Hu Jintao failed to set specific targets.

China's People's University of Beijing published a report which says that the cost of reducing the country's total greenhouse gas emissions is likely to reach \$438 billion a year within 20 years. Zou Ji, head of the department of environmental management and economics at the university said that China could be expected to pay for measures to slow emissions but the cost



Connie Hedegard:
things are looking difficult

Copenhagen Congress Center

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of doing more should be shared by the international community.

A recent UN report said developing countries need between \$500 billion and \$600 billion a year from rich nations to adapt to climate change while ensuring their economies grow.

At a meeting in Addis Ababa earlier in the month, Africa's climate negotiators led by Ethiopian Prime Minister, Meles Zenawi, threatened to walk out of talks if the summit in Copenhagen failed to consider Africa's position.

Last month, investors managing more than \$13 trillion in assets renewed a call for new global emissions laws. Speaking at the International Investor Forum on Climate Change, Lord Nicholas Stern, one of Britain's most influential economists, said the global debate over curbing greenhouse gases has reached a critical point.

"We have to act now," said Stern, chair of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics. "Some things you can postpone. This is not one of them."

Companies show confidence in UK nuclear programme

- EDF-Rolls-Royce agreement supports reactor construction
- Babcock International buys UKAEA Ltd

The tie-up between EDF and Rolls Royce and the sale of the UK Atomic Energy Authority demonstrates the growing confidence in the UK's nuclear power renaissance.

In September, Rolls-Royce and EDF Energy announced plans to collaborate on programmes that will initially support the construction of four new nuclear power plants in the UK. The four reactors, which will use Areva's European Pressurised Reactors (EPR) technology, are planned for Hinkley Point in Somerset and Sizewell in Suffolk.

The agreement covers engineering and technical support during both the pre and post construction phases. In addition, joint development, validation and supervision of the supply chain, together with the potential for the provision of nuclear related systems, will be explored.

In July 2009, Rolls-Royce announced plans to build a new factory to manufacture assemble and test systems and components for nuclear power stations. The facility will have strong links with the UK government-funded Nuclear Advanced Manufacturing Research Centre in which Rolls-Royce will be the lead industrial partner.

Lawrie Haynes, president of Rolls-

Royce Nuclear, said: "We are very pleased to be working with EDF Energy and this agreement is another step towards the delivery of our civil nuclear strategy. With the largest proven nuclear supply chain of any UK company, Rolls-Royce is uniquely placed to deliver world-class engineering and manufacturing capability to support the delivery of nuclear power programmes both here and around the world."

EDF has already secured a key position in the UK's nuclear sector through its acquisition of British Energy at the end of last year. Earlier this year, it finalised the sale of a 20 per cent stake in British Energy to Centrica.

Commenting on the agreement with Rolls-Royce, Humphrey Cadoux-Hudson, Managing Director of EDF Energy's Nuclear New Build business said: "Subject to the right investment framework being in place we intend to develop four EPRs in the UK by 2025 with the first operational by the end of 2017."

The investment framework is one area in which EDF has expressed its concerns. Earlier this year, Vincent de Rivaz, chief executive of the UK subsidiary of EDF said that nuclear should be given the same treatment

in terms of financial support that the government has extended to offshore wind and carbon capture and storage.

Meanwhile Keith Parker, chief executive of the Nuclear Industry Association welcomed the news of the tie-up.

"This is further evidence of the commitment by our leading member companies to delivering a new generation of low-carbon nuclear units which will help the UK achieve security of supply and lead in the global response in tackling climate change," he said.

Rolls-Royce has the largest nuclear skills base in the UK, with an existing nuclear certified supply chain of 260 companies, and supports a number of key phases of a civil nuclear programme, including providing advice to governments and operators as well as technical engineering support. Currently, the group provides safety-critical instrumentation and control in Europe, the USA and many other international markets, including all 58 operating nuclear facilities in France.

Following the news of the tie-up, the UK Atomic Energy Authority announced that it has reached an agreement with Babcock

International Group for the sale of 100 per cent of its commercial arm, UKAEA Limited, for £50 million.

Babcock already has one of the largest specialist nuclear services resources in the UK with established positions in both the civil and military nuclear operational support and decommissioning markets.

The acquisition represents a significant extension to Babcock's existing nuclear skills by bringing proven capabilities in waste categorisation, decommissioning of high hazard facilities, encapsulation and storage of hazardous materials and transportation of waste, which are applicable to both the civil and military sectors.

The transaction is expected to close by the end of 2009.

Also in September, Westinghouse said it would develop a plant for producing nuclear fuel for the new generation of reactors. The company says it is in talks with the Nuclear Decommissioning Authority to take a long-term lease on the nuclear fuel assembly plant in Springfields, Lancashire.

Securing the lease will allow Westinghouse to make the investment of up to £100 million that will be needed to modernise the site.

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Mexico wins support for climate change agenda

- IDB approves loan
- Climate change policies win praise

Mexico is adding to its increasingly strong climate change credentials with a project to examine potential opportunities for storing carbon.

The country has been recognised as one of the most forward-thinking in terms of long-term policies to combat climate change, and now says that it will work with both Colombia and Costa Rica on a joint system for storing carbon.

Its climate change agenda has also won financial support from the Inter-American Development Bank (IDB), which last month approved a \$400 million loan to help the government finance the National Climate Change Strategy.

Mexico has committed to reducing greenhouse gas emissions by 128.5 million tons between 2008 and 2012. Environment Secretary Juan Rafael Elvira Quesada told local media in September that it is determined to invest in climate change mitigation

because the costs of ignoring global warming will be far higher.

"Climate change clearly costs more than mitigation," Elvira told the *Xinhua* news agency. "We aim to emit less without sacrificing growth... the strategy helps boost foreign direct investment and budget efficiency and create a low carbon economy."

Mexico's climate change agenda establishes short and medium-term mitigation and adaptation objectives and includes commitments with measurable results for priority sectors such as agriculture, tourism and water resource management. Under its loan agreement with the IDB, Mexico will implement specific activities under its climate change programme, with results that must be verified as a condition for disbursement of the funds.

"Mexico is one of the very few developing economies that are

adopting emission reduction targets in advance of the UN's Copenhagen conference on climate change in December," said Juan Pablo Bonilla, chief of the IDB's Sustainable Energy and Climate Change Unit. "The government has set targets that could lead to an 18 per cent drop in emissions by 2012, putting Mexico at the vanguard of the global movement to curb emissions."

Mexico's efforts have also caught the attention of London-based think tank E3G, which said last month that Mexico as well as Argentina are leading a shift to make the global economy more climate friendly.

E3G measured national wealth per unit of carbon emissions to find out which countries would be most competitive under carbon limits. Only Mexico and Argentina were found to be improving carbon productivity at a rate that is consistent with staying below the



Juan Rafael Elvira Quesada: counting the cost of climate change

2°C global warming threshold.

"There is a growing global consensus that our best path toward strong economic recovery is through transitioning to a less vulnerable, low carbon economy," said E3G Chief Executive Nick Mabey. "The question is how fast we get there and which countries are best placed to benefit from the transition... Countries with strong policies to transition to low carbon technologies will be more competitive than those that cling to the status quo."

With the assistance of a \$200 million loan from the IDB in 2008, Mexico initiated a landmark study of the economic impact of climate change on its territory. That study provided the first compelling evidence that the costs of mitigation and adaptation to climate change could be considerably lower than the cost of doing nothing.

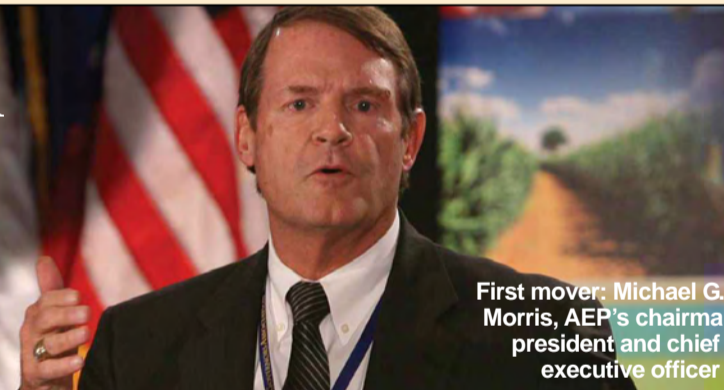
With the latest IDB loan, Mexico

will set in motion a series of financial mechanisms to jump-start investments in renewable energy and energy efficiency. These will include the Fondo de Transición Energética (energy transition fund) that was established under Mexico's recently adopted renewable energy law (LAERFTE); expanded participation in carbon markets; and new programmes to finance green energy through Mexico's national development banks.

Earlier this year Mexico became the first country to submit an investment plan under the Climate Investment Fund (CIF), a joint programme by the multilateral development banks. Specifically, Mexico has requested CIF funding for an energy efficiency programme focused on housing and for wind power projects. If approved, these projects will be co-financed by the IDB and the CIF.

USA seeks clean coal expertise

Clean coal and carbon capture projects in the USA are gathering pace with the help of federal and state funding, writes Siân Crampsie.



First mover: Michael G. Morris, AEP's chairman, president and chief executive officer

The USA has underlined its commitment to the commercialization of carbon capture and storage (CCS) technology with the release of millions of dollars of funding covering research, development and training in the sequestration field.

The release of funds comes weeks after utilities around the country submitted applications for federal stimulus funds to help with the construction of major CCS demonstration projects. Other key clean coal projects – including FutureGen and a 400 MW PFBC plant in Pennsylvania – have also reached key milestones.

Some 11 projects around the country are to benefit from just under \$50 million of federal economic stimulus funds to conduct site characterization studies of promising geologic formations for storage of carbon dioxide (CO₂), with a further 43 projects selected to receive a total of over \$12 million in funding for geologic sequestration training and research.

"Given the importance of coal to our energy future in the United States, China and other countries, it's crucial that we develop ways to capture and store carbon pollution," said US Energy Secretary Steven Chu. US utility AEP said in August that

it has applied for funding from the Department of Energy (DOE) to cover part of the costs of installing the country's first commercial-scale CCS system on its Mountaineer coal fired power plant in New Haven, West Virginia.

AEP's application will seek \$334 million, about half the estimated cost of installing the system that will capture at least 90 per cent of the CO₂ from 235 MW of the plant's 1300 MW of capacity. The captured CO₂, approximately 1.5 million metric tons per year, will be treated and compressed, then injected into suitable geologic formations for permanent storage.

The system will begin commercial operation in 2015, according to the company's application for funding.

"Commercialization of carbon capture and storage technology is an essential component in a successful climate strategy for this nation, which relies on coal-fired generation for about half of its electricity supply," said Michael G. Morris, AEP's chairman, president and chief executive officer, who also highlighted the high costs faced by first movers in the CCS technology field.

Dominion and its partner Virginia Tech Foundation have filed an

application with the DOE for federal stimulus funding to cover up to half of the estimated \$580 million cost of a CCS demonstration project proposed for a power station being built by Dominion in Wise County, Virginia.

Dominion's 585 MW Virginia City power station, which is scheduled for completion in 2012, is designed to burn coal, waste coal and biomass, and will be equipped with a CCS system designed to remove up to 1500 tons of CO₂ each day from the station's emissions. The CO₂ would be moved by pipeline for permanent storage in unmineable coal seams and underground saline formations in the region.

A side benefit of the project may be enhanced production of methane from the coal seams, says Dominion.

The DOE has also reached an agreement with the FutureGen Alliance for the continued development of the proposed 275 MW FutureGen plant in Illinois. The \$17.3 million shared-cost Cooperative Agreement covers preliminary design activities through the end of 2009 in support of the long-term project.

Under the agreement, the Alliance will work with the DOE and other partners to continue electric grid

interconnection studies, work on securing environmental permits, define alliance operational activities and update plant design and project cost estimates.

The Alliance and DOE will make a decision on taking the project forward to final design and construction in early 2010.

Another clean coal project involving the construction of a coal-fired test plant using pressurized fluidized bed combined cycle (PFBC) and CCS technology in Pennsylvania has received news of a \$1 million grant from the state of Pennsylvania. The project partners – Consol Energy, Sargas and PFBC – are aiming to eventually deploy a 400 MW commercial-scale plant.

In August, Chu announced more than \$8.4 million in funding to develop regional sequestration technology training projects, a move aimed at ensuring that the country has adequately trained personnel for functions such as site development, operations and monitoring of CCS projects.

A further 19 projects have been selected to receive funding for the development of technologies and protocols for the monitoring and verification of sequestered CO₂ in storage sites.

Venezuela denies nuclear ties

Venezuela's determination to start a nuclear power programme has raised concerns due to the country's close ties with Iran.

The South American nation denied in late September that Iran is helping it to develop nuclear energy and also underlined its desire to develop nuclear energy for peaceful purposes.

The move followed the revelation last month that Iran has been building a new uranium enrichment plant in spite of UN sanctions and against the wishes of the International Atomic Energy Agency (IAEA).

Venezuelan leader Hugo Chavez announced in November 2007 that the country would pursue a nuclear power programme. In 2008 the country signed a nuclear cooperation agreement with Russia, which has also been completing construction of Iran's first nuclear power plant at Bushehr.

Venezuela is a signatory of the Nuclear Non-Proliferation Treaty. It has identified a site for its first nuclear power plant in the northwestern province of Sulia.

Venezuela says that its desire for nuclear energy has been partially inspired by Brazil, where Eletrobras and Eletronuclear recently signed a nuclear cooperation agreement with France's GDF Suez. The agreement covers the exchange of information and experience to develop Brazil's nuclear power industry.

Brazil is preparing to resume construction of a third nuclear unit at Angra.

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Indian nationals eye nuclear investment

Indian Oil Corp. and National Aluminium Co., two of India's state-run companies, are in talks to invest in upcoming nuclear power projects being set up by Nuclear Power Corp. of India Ltd. (NPCIL). NPCIL chairman, Mr S. K. Jain said: "We are in talks with them and maybe very soon we will be entering into a memorandum of understanding with these companies."

Indian Oil is willing to invest Rupees10 billion (\$208 million) per year, while talks with National Aluminium regarding the size of its investment are ongoing, Jain added.

State-run NPCIL operates 17 plants in India with a total generating capacity of 4120 MW and is building six more plants with a capacity of 3160 MW.

NPCIL is also partnering with National Thermal Power Company (NTPC) Ltd to build up to eight nuclear power plants.

Jain said: "We have almost finalized the terms and conditions of the joint venture, which we are going to sign very soon." NPCIL will hold a 51 per cent stake in the joint venture and NTPC will hold the remaining 49 per cent. State-run NTPC – which has an installed capacity of more than 30 000 MW, four-fifths of which is coal-based – is looking to diversify its fuel mix to reduce its dependence on coal.

NPCIL and Indian power equipment manufacturer Bharat Heavy Electricals Ltd (BHEL) are also in technology transfer talks with Alstom, GE and Siemens regarding a nuclear turbine joint venture.

NPCIL and BHEL are looking for a third partner for a 700 MW nuclear turbine manufacturing joint venture in India. Jain said each company would hold a 33 per cent stake in the joint venture. "We will decide on the partner this (calendar) year," he said.

China moves to strengthen emission laws

China's legislature passed a resolution at the end of August signalling its interest in "actively dealing with climate change" by considering new laws and strengthening controls over greenhouse emissions.

The resolution, endorsed at the end of a four-day session by the Standing Committee of the National People's Congress, may help accelerate the country's attempts to tackle global warming, but does not break new ground from China's previous statements on climate change.

The resolution said China will play an active role in international conferences and negotiations on climate change. At the same time, it repeated China's long-standing position that it will firmly "maintain the right to development" as a developing country, and opposes "any form of trade protectionism disguised as tackling climate change."

It also set out China's position that developed nations should "take the lead" in setting clear targets in reducing carbon dioxide emissions and help developing countries with funds and technology transfers.

Philippines attracts renewable investments

The Renewables Energy Law passed last year is beginning to deliver results as a number of recent renewable projects are announced, writes Syed Ali.



Burgos, Ilocos Norte

The Department of Energy recently awarded six service contracts for wind and hydropower projects and a certificate of registration for a biomass project, which in total could generate as much as 379 MW. Two European companies also said last month that they are looking to build wind projects in the Philippines following the introduction of the Renewables Energy Law in 2008.

The six companies – four wind, one hydro and one biomass – are expected to invest a combined \$983.5 million in the country's renewable energy sector.

Three companies were awarded four new wind energy service contracts – Energy Development Corp. for its planned 86 MW wind farm in Burgos, Ilocos Norte; Northern Luzon UPC Asia Corp. for its 80 MW wind project on Pagudpud, Ilocos Norte; and PetroEnergy Resources Corp., which was awarded two contracts for a 30 MW project in Sual, Pangasinan and a 30 MW project in Nabas, Aklan. Meanwhile, Energy Logics Philippines Inc.'s pre-commercial contract for a 120 MW wind farm in

Pasquin, Ilocos Norte, was converted to a wind energy service contract.

At the same time, a hydropower service contract was granted to Oriental Energy and Power Generation Corp. for its 18 MW project in Madalag, Aklan. Mariwasa Siam Ceramics Inc. was also awarded two certificates of registration for its biomass gasification project in Sto. Tomas, Batangas.

Energy Secretary Angelo T. Reyes said investments for wind power projects are estimated to reach as much as \$2.5 million for every megawatt. He also noted that biomass projects could be more expensive as investors needed to invest as much as \$3.5 million to produce one megawatt.

With a total untapped wind resource of 76 600 MW and lower investment cost, the Philippines' wind market is likely to attract foreign investors.

French wind power company Vergnet sees bright prospects for wind power business in the Philippines. Emmanuel Bole, the company's sales manager said: "In the next two years, we see plenty of wind turbines being

built all over the country. The Philippines has great wind potential particularly in the northern part."

Bole said Vergnet is trying to work out a wind power project with the National Power Corp. Small Power Utilities Group (Napocor-SPUG) for its electrification programme. Napocor is planning to put up a hybrid wind-diesel system in Romblon, Tablas and Marinduque.

UPC Renewables, one of Europe's largest wind developers said it is looking to spend \$200 million on the construction of its 80 MW wind farm project in Pagudpud. Troels Carstensen, managing director and country manager of UPC Renewables, a subsidiary of UPC Asia, said the project is only the first phase of its plan, adding that it is looking at expanding the plant to 120 MW.

"We decided to concentrate on the first 80 MW. Everybody is eager to test the law. Now that the law is in place, we want to test it to see whether all incentives being stipulated in the law [are] making good for our project," Carstensen said.

Speaking at the recent

International Conference on Green Industry in Asia, Philippine President Gloria Macapagal-Arroyo cited the importance of the Renewable Energy Act of 2008 in her administration's strategy to integrate climate change initiatives in Philippine policies.

"Feed-in tariffs provide reassurance to investors in wind, solar, ocean, run-of-river hydropower, and biomass resources. The law also seeks to institutionalize a Renewable Portfolio Standard, requiring the country's electric utilities to obtain a certain portion of their electricity from renewable energy resources. It also exempts proceeds from the sale of carbon credits from all taxes," she added.

The Philippines expects to draw in as much as \$27 billion in new investments from the country's renewable energy sector over the next 20 years. This is expected to produce about 24 000 MW from various renewable energy sources such as geothermal, hydro and mini hydro, wind, solar, ocean and biomass bagasse.

Economic recovery may leave Thailand in the dark

- Consumption rises by 2 per cent
- Risk of natural gas shortages

While economic recovery is good news for Thailand, the resulting rise in electricity consumption is seeing state utility Egat struggle to meet demand.

Sutat Patmasiriwat, deputy governor for power generation of the Electricity Generating Authority of Thailand (Egat), said that the country faces a risk of natural gas shortages as industrial activity rises in response to the improving economy, resulting in higher power demand. Talking to the *Bangkok Post*, he said that the country might experience more frequent power blackouts next year as electricity

demand rises with the economic recovery.

National power consumption rose by 2 per cent in August, the first increase in eight months. Since October last year until August, power consumption has continued to decline in line with the slowdown in industry and consumers' purchasing power.

Even though the country's reserve margin is as high as 25 per cent, the risk of blackouts persists since the country may face shortages of some fuels to generate power at certain times.

In the past month, the country has

faced shortages of natural gas, which represents 70 per cent of total fuel use in power generation. The need to use more hydropower after PTT's gas pipeline supplies were disrupted has cost Egat about 1 billion baht (\$30 million).

According to Mr Sutat, the incidents not only damaged Egat but also reflected a poor policy that placed too much reliance on natural gas.

Egat is preparing to improve the early warning system at its power plants across the country to one day from three days. "Although new capacity

from the Nam Theun 2 hydropower plant in Laos will start operating in November, the 920 MW generator can secure power output only for the northeastern region, but the western and southern regions, where we had trouble lately, still need to be managed carefully as there is no new capacity there," said Mr Sutat.

Until this year, Thailand's power demand had fallen only once in the last 25 years – during the financial crisis in 1998, when demand slipped 2 per cent before growing 2 per cent the following year.

Asia News

Bhasha dam will help solve power crisis

The approval of 4500 MW Diamer-Bhasha dam project is a major step in Pakistan's struggle to alleviate its power crisis.

Minister for Water and Power, Pervez Ashraf said: "We have begun installing major hydropower projects to overcome the energy crisis."

He said the 272 m high concrete dam would irrigate more than 33 million acres (133 546 km²) and would also help reduce sedimentation in Tarbela Dam, the minister said. "This is the biggest project ever approved in the history of Pakistan. We spent 33 years in discussions while the country's biggest dam's capacity was declining because of sedimentation."

The Rs894.25 billion (\$10.8 billion) dam project in the Northern Areas, approved by the Executive Committee of the National Economic Council (Ecne), will have a foreign funding component of Rs312.94 billion.

The Minister for Information and Broadcasting, Qamar Zaman Kaira said generating funds for the project would not pose a problem because international financial institutions had expressed their interest in financing it. He said all stakeholders had been consulted before the project's approval.

GE to help bring smart grid to Korea

GE will work together with Korea's NURI Telecom Ltd. to build an advanced smart grid infrastructure in Korea.

Commenting on the agreement signed between the two companies Bob Gilligan, vice president of GE Energy's transmission and distribution business said: "GE recognizes the importance of collaborating with technology and delivery partners to realize the promise of a smarter grid. NURI's products and global expertise, especially in advanced metering infrastructure (AMI), fit well with GE's end-to-end smart grid capabilities."

Korea is currently embarking on several smart grid initiatives, including the development of a smart grid road map and a smart grid pilot project on Jeju Island.

"As Korea continues to raise its global economic profile, the need for a complete set of smart grid solutions becomes more critical," said Song-Man Cho, president and CEO of NURI Telecom. "We are excited about working with GE so that our complementary technologies can help deliver reliability and performance gains throughout Korea's energy infrastructure."

Indonesia moves to encourage private investment

In a move to encourage private investment in the power sector, Indonesia's government has introduced legislation to open up its power sector.

The landmark piece of legislation, which comes after five years of discussion, replaces the 1985 Law on Electricity Generation and removes PT Perusahaan Listrik Negara's (PLN) monopoly on selling electricity to consumers. Under the old law, independent power producers (IPPs) were restricted to selling power to PLN.

The new legislation now needs to be formally signed into law by President Susilo Bambang-Yudhoyono and is not expected to be implemented until next year or 2011.

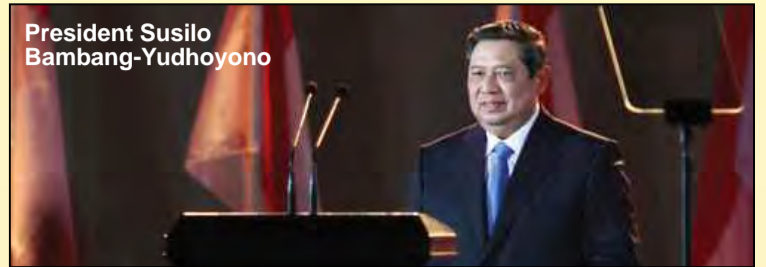
Speaking to the *Jakarta Globe*,

Purnomo Yusgiantoro, minister of energy and mineral resources said: "As long as producers have power transmission and networks to distribute power from their plants, they can sell power to the people directly. If they do not have any transmission and distribution networks, they can rent PLN's network, and we hope this could become PLN's main business in the future."

The new legislation also means PLN will now consult with central and regional governments to set regional power rates.

The new law is designed to reduce dependence on government subsidies, which are expected this year to hit rupiah 47.5 trillion (\$4.75 billion),

President Susilo Bambang-Yudhoyono



down from rupiah 82 trillion.

The law also allows power companies to export power. J Purwono, the director general for electricity and energy utilization at the Ministry for Energy and Mineral Resources, said that Indonesia had potential for electricity exports to its neighbours.

"State power company, PLN, and private companies can export power. For example, if a company finds gas reserves in a border area and uses it to generate power, the firm may export power to surrounding countries," said Purwono.

Exports would only be permitted, however, if domestic supply has been fulfilled. These could become a significant source of revenue for power

plant owners.

Ali Herman Ibrahim, president director of PT Bakrie Power, a private power producer that plans to build plants in East Kalimantan, East Java and North Sumatra, welcomed the new law, saying it would open up opportunities for the company.

"Now we can monetize all the resource potential in the country without having to worry about a complicated bureaucracy," Ali said. However, he warned that business and government would have to first agree on power prices and permits before investment came into the sector because of the high investment costs in building transmission and distribution networks.

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France makes commitment over competition

- Request for EU investigations to close
- EDF faces prospect of greater competition

The French government looks set to capitulate to pressure from the European Commission and implement reforms that would bring greater competition to its electricity supply market.

Prime Minister Francois Fillon has announced a new regulatory framework for the electricity market to be implemented starting in July 2010. The proposed new rules mark a significant change of policy in France, whose electricity market has been under investigation by the European Commission since 2007.

In a September statement, Fillon said

that the reforms aimed to preserve the benefits of low-cost nuclear generation for French consumers while encouraging new investment and meeting the requirements of European legislation on electricity market opening.

The reforms would preserve regulated tariffs for households and small companies, but would bring an end to regulated rates for industrial consumers by 2015. Crucially, EDF's competitors would be given access to the utility's low-cost nuclear generation at rates that would allow them to resell the electricity competitively.

France has previously been keen to preserve the position of EDF in the face of pan-European electricity market liberalization. The utility now faces the prospect of potentially aggressive competition from companies such as Poweo and GDF Suez.

"If the commitments made by the French government to the Commission are implemented, this large-scale reform has the potential to appreciably enhance competition on the French electricity market to the benefit of consumers," said European Competition Commissioner Neelie Kroes. "It will exert pressure on prices



Francois Fillon: announced new regulatory framework

and foster innovation and investment."

The European Commission launched an investigation into France's electricity market in June 2007 because it was concerned about the impact of the country's regulated tariff system on competition in the market. The investigation was widened in 2009 but has not covered the domestic supply market.

The degree of competition in France's electricity market is very low, according to the Commission, because EDF controls a large fleet of nuclear power plants with production costs that are lower than wholesale electricity

prices.

Earlier this year a French government-appointed commission led by Paul Champsaur published a report on France's electricity market, recommending that all suppliers in the market be given access to the low-cost electricity generated by EDF's fleet of nuclear reactors at a regulated price.

In a statement Kroes and European Energy Commissioner Andris Piebalgs said that they would take the French government's commitments into account in the two ongoing investigations provided that they are integrated into French law.

Offshore wind rides stormy seas

Europe's offshore wind industry is pushing hard for the financing and regulatory environment that it needs to meet its goals, writes Siân Crampsie.

Europe's offshore wind energy potential is in danger of falling foul of scarce finance, logistical difficulties and limited grid connections unless governments and industry work more closely to overcome challenges, the European Wind Energy Association (EWEA) has warned.

The Brussels-based industry association says that although existing and planned offshore wind projects in Europe would, if implemented, supply ten per cent of current electricity demand, banks remain reluctant to lend to even the most solid projects.

It has called on EU member states and the European Commission to take action to resolve planning, grid and other obstacles to harnessing Europe's offshore wind energy potential, and has also published a declaration signed by more than 140 companies in an attempt to highlight the industry's challenges.

EWEA has set offshore wind capacity targets of 40 GW by 2020 and 150 GW by 2030.

EWEA Chief Executive Christian Kjaer has likened the fledgling offshore wind industry to the offshore oil and gas industry in the 1980s, which required massive investment in infrastructure. "We really need to create an entire new industry," Kjaer told reporters in September. "Maintenance facilities need upgrading. Harbours need investment,"

he added.

Kjaer also says that there is a lack of ships available for installing turbines at sea, a factor that is driving installation costs up. Financing continues to be a problem for the industry and EWEA believes that the impact of the credit crunch will be greater in 2010 than in 2009.

EWEA's offshore wind energy declaration includes a pledge by business leaders to ensure that a sufficient supply of turbines, components, foundations, installation and cable-laying vessels are available. The organisation believes that growth and investment in offshore wind could match that seen in the onshore wind energy sector over the last 15 years.

One country taking action on the issue of grid connections is the UK, which announced in late August a proposal to revamp the way new power plants are connected to the grid. The new plans are designed to help speed up the "queue" for grid connections, especially for renewable energy projects, and could give greater confidence to investors in the sector.

In the UK alone there is currently over 60 GW of new generation capacity – or around 200 projects – waiting to be connected to the grid. Around 17 GW of this is renewable energy capacity, which must wait on a 'first come, first served' basis for a connection, even though construction

times for smaller renewable projects tend to be shorter than for large, conventional plant.

"Access to the electricity grid has been one of the key barriers to the generation of renewable energy in this country," said the UK's Energy and Climate Secretary Ed Miliband. "The government will do whatever is necessary to bring about the transition to a low carbon economy and to give investors the certainty they need so that new renewable energy generation is built."

EWEA has also highlighted the need for an offshore grid to support the development of offshore wind energy and has published a 20-year offshore network development plan. It says that development of a "truly European grid" will be essential for a single European energy market and for harnessing renewable energy, but requires coordinated action from transmission system operators, regulators, the European Commission and governments.

"2010 is a key year for planning Europe's future electricity grid, which needs massive upgrading, as the European Commission is due to publish a Blueprint for a North Sea Grid while European electricity network operators will publish a 10-year plan," says an EWEA statement.

"EWEA urges the European Commission to incorporate our plan



Bulgaria considers energy options

Bulgaria's new government is examining the country's energy policy as part of wider plans to streamline state-owned companies and tackle corruption.

Prime Minister Boiko Borisov, who was elected in July on an anti-corruption platform, has said that he is reconsidering the previous government's commitment to the proposed Belene nuclear power plant, and also wants to break up state energy group Bulgarian Energy Holding (BEH).

The government is also reviewing Bulgaria's participation in the South Stream gas pipeline and the Burgas-Alexandroupolis oil pipeline.

Borisov is reported in local media as saying that his government is studying "in detail" agreements made by the previous government, and that a decision on the projects will be made by November.

In January 2008 Bulgaria signed a contract with Russia's Atomstroyexport to build a nuclear plant at Belene, 250 km northeast of Sofia. German utility RWE joined the project as a strategic investor in late 2008.

Earlier in September Borisov said that the government would break up BEH and list minority stakes in some of its key subsidiaries on the Bulgarian stock exchange. BEH was created in September 2008 by Bulgaria's previous government in an attempt to strengthen the position of the country's energy market in Europe.

Borisov's plans include a 15 per cent listing of NEK and Bulgargaz shares when market conditions improve.

Nile states launch interconnection project

- Power exchange will boost investment
- Uganda secures World Bank funds

Siân Crampsie

The development of a power exchange market among Africa's Nile equatorial lakes countries took a step forward in September with the official launch of a major project to interconnect the electricity grids of five countries in the region.

The Nile Basin Initiative (NBI), the Nile Equatorial Lakes Subsidiary Action Program (NELSAP) and the African Development Bank (AfDB) say that work on the project – interconnecting Burundi, DR Congo,

Kenya, Rwanda and Uganda – will begin by early 2011 and will take around four years to complete.

The AfDB is leading the mobilization of funds for the initiative and has already approved a grant of \$162 million. It says that the creation of a power exchange in the region will help to lower the cost of power supplies and improve system stability and security.

The project will be overseen by NELSAP, and a second phase could widen the project to include Egypt, Tanzania and Sudan. It will form a key

part of the NBI's overall vision of promoting peace and security in the region alongside the sustainable development of Nile Basin water resources.

Each of the five countries will implement the project in their own respective territories. The whole project will see the construction of 700 km of new transmission lines to strengthen the networks of each of the five countries.

The project will also benefit the five countries' rural electrification programmes. Other donors, including



the World Bank and the Japanese International Cooperation Agency, could contribute to the project.

Other interconnections being planned by NBI and NELSAP include the extension of the Uganda electricity network to Beni and Bunia in DR Congo, and an interconnection from Tanzania to Kenya.

Uganda recently secured a \$325 million credit from the World Bank for its energy and education sectors. Some \$75 million of the funds will go to the second phase of the energy for rural transformation programme.

Namibia seals power deals

- Zambia helps ease shortage
- Nuclear cooperation with India

A power supply deal between the power utilities of Namibia and Zambia will strengthen ties between the two countries as well as help to overcome electricity shortages in Namibia.

Zambian state-run utility Zesco is to export 50 MW of power to its counterpart in Namibia, Nampower, for ten years. The deal will help Nampower to improve living standards in Namibia, according to the utility.

Nampower Managing Director Paulinus Shilamba told local media in September that inadequate power generating capacity has led to critical shortages of electricity in parts of southern Africa. The problem has led the Namibian government to investigate the construction of nuclear generating capacity.

Earlier in September the Namibian government signed a nuclear cooperation deal with India, covering the construction of nuclear capacity, personnel training, plant design and uranium trade.

Namibia has two significant uranium mines that are capable of providing around ten per cent of world mining output, according to the World Nuclear Association. Around half of the country's electricity demand is met by imports from South Africa, and the government has committed to the construction of a nuclear power plant by 2018.

The government of Namibia is currently working on a nuclear regulatory framework to deal with issues such as licensing, building, commissioning, operation and decommissioning of all nuclear establishments and facilities.

RusHydro plans rebuild for Siberia plant

Russian utility RusHydro is seeking funds to repair damage at the Sayano-Shushenskaya hydropower plant in Siberia after a fatal accident at the site in August.

The company is in talks with the European Bank for Reconstruction and Development for a loan to help rebuild the 6.4 GW facility, and a loan from Sberbank is also expected.

A total of 75 people were killed in the accident on August 18th. The circumstances of the accident are still

under investigation, although it is thought to have been caused by a hydraulic shock focused on one of the plant's ten units.

Russia's Ministry of Energy is seeking approval from the federal government to reserve part of its 2010 budget for the rebuild work, which will focus initially on the least damaged of the plant's 640 MW units.

The repair programme is unlikely to be complete before 2014 and could cost more than Rouble 40 billion (\$1.3

billion).

The accident has highlighted the poor state of repair of Russia's infrastructure, say analysts.

Sayano-Shushenskaya is RusHydro's largest facility and is located on the Yenisei river at the foot of a 242 m-high dam. The dam was not affected by the accident, which destroyed one turbine and three generators.

The findings of the investigation into the cause of the accident are due

to be published this month. Other damage caused by the accident includes electrical and mechanical damage to five generating units, electrical damage to one unit and flood damage to another unit.

Damage has also been found in the tailrace area of the plant.

Sberbank is thought to be considering a \$660 million loan to help RusHydro meet rebuild needs. The Ministry of Energy could provide as much as \$307 million in funds.

SinoHydro takes over Cameroon project

China's SinoHydro has made further inroads into Africa's power plant construction market with a preliminary agreement to build the 200 MW Memve'ele hydropower plant in Cameroon.

The government of Cameroon and SinoHydro say that they expect to reach a final agreement soon, allowing construction to start in early 2010. If the deal is closed, SinoHydro will take over the contract that had originally been awarded to a British-led consortium.

The deal is the latest won by the Chinese firm in Africa after it took on a road project in Gabon in early 2009. More recently it won a contract to build a 230 kV transmission line in Ethiopia.

First power from Memve'ele on the N'tem River in Cameroon's South province is expected in late 2014. The plant was to have been built and operated by Britain's Globelec, which signed a contract with the government of Cameroon in August 2007.

The contract between Globelec and the Cameroon government was terminated in May 2009.

The northern parts of the Congo Republic, Gabon and Equatorial Guinea are also set to benefit from the project.

Step forward for Jordan nuclear plant

- Site study work starts
- Korea ExIm approves CCGT funds

Site assessment work for Jordan's first nuclear power plant will begin this month after the country's Atomic Energy Commission awarded a key contract to French-Belgian firm Tractebel.

The \$12 million, two-year site study contract is an important step in Jordan's plans to establish a nuclear power programme, which will help the country to improve energy security and meet rising electricity demand. It is also

planning the construction of a large-scale natural gas fired combined cycle plant.

Jordan's first nuclear plant is expected to generate 750-1100 MW and could be in operation by 2020.

Tractebel's work will cover public health, safety and security issues and will also involve specialized surveys to assess geological stability, geo-physics, soil characteristics, water proximity and cooling water requirements, risk

assessment, electricity grid connectivity, environmental and health impact, and natural and human induced events.

It will pave the way for further reports assessing the environmental and safety impacts of the proposed nuclear plant, to be built at a site near Aqaba.

Another key power project for Jordan has also taken a step forward with an announcement by the Korean Export-Import Bank that it

will provide \$225 million of funding for the Al-Qatrana power plant.

The 400 MW gas-fired facility is being developed by Korea Electric Power Corp. and the Korea Southern Power Co. The ExIm Bank is planning to provide \$125 million in the form of loans and \$100 million in credit guarantees.

The funds will provide around 64 per cent of the project's total financing needs. The plant is due to be operational by 2011.

France examines Areva bids

■ T&D attracts three bids
■ Olkiluoto 3 dispute continues

Siân Crampsie

Areva's transmission and distribution subsidiary may well end up in foreign hands after both GE and Japan's Toshiba submitted offers for the unit.

The French government is reported to have accepted three initial offers for the T&D unit, which is being sold as part of an €11 billion financing plan. GE has placed a bid in partnership with private equity group CVC, while the third bid comes from a French partnership of Alstom and Schneider Electric.

The bids are to be assessed in the next phase of the sale process, which will last until November.

The bids are thought to be in the region of €3.5 billion – short of the €4 billion ballpark touted by Areva in

recent weeks. The government, which owns 91 per cent of Areva, is also planning a capital increase in order to raise funds for the Paris-based company's investment needs.

While the Alstom/Schneider Electric bid seems an obvious choice given the French government's track record of creating national champions, this could raise competition issues in Brussels. Moreover, it would probably lead to job cuts – something that the French unions are already nervous about.

The GE offer overcomes these issues because the US giant has no T&D presence in France. The acquisition of a major T&D business would boost the company's portfolio and its market share against Siemens.

French newspaper *La Tribune* reported that Toshiba has offered the

most money for Areva T&D. Areva bought its transmission business for €920 million from Alstom in 2004. Last year the T&D division generated sales of about €5 billion.

Areva is under pressure to make investments to meet rising demand worldwide for its nuclear reactors. The company made a €550 million provision in the first half of 2009 to cover additional costs incurred on the Olkiluoto 3 nuclear power plant project in Finland, which has suffered ongoing delays and which is the subject of a dispute between the French firm and its client TVO.

Areva, which is building Olkiluoto 3 in partnership with Siemens, said in September that it might be forced to stop work on the reactor unless the issues at the centre of the dispute are

resolved. It maintains that TVO is responsible for the delays, an allegation that the Finnish utility refutes.

"The fact that the client TVO has not yet implemented the specific measures for speeding up the work, which were agreed upon in June 2008, is causing delays and additional costs," said Areva CEO Anne Lauvergeon. "Areva has sent proposals to TVO in order to get back to methods of execution that are in line with usual practices for major projects."

TVO maintains that the Areva-Siemens consortium is responsible for the construction and commissioning of the plant and for the project schedule under the terms of the fixed-price turnkey contract. Areva-Siemens initiated arbitration proceedings over the delays in late 2008.



Tired of delays:
Anne Lauvergeon

Siemens sets sights on smart grid future

German conglomerate Siemens has set out its plans for the nascent smart grid sector and has further expanded its portfolio in that sector with the acquisition of an intelligent metering and billing firm.

The company says that it wants to receive orders worth more than €6 billion for intelligent power networks over the next five fiscal years and is also targeting a seven per cent annual growth rate for that part of its business.

"We are already on the optimal course in the smart grids business and will be running at top speed in the future," said Wolfgang Dehen, CEO of the Siemens Energy Sector. "A new age for power supplies is dawning with smart grids... we want to grow twice as fast as the overall market."

Siemens says that the smart grid market will see increasingly dynamic growth fuelled by climate change and economic stimulus programmes. It anticipates that orders for smart grid technologies will reach nearly €1 billion in the current fiscal year.

Siemens recently announced two new investments – a 60 per cent stake in SAP solutions provider Energy4U and a \$15 million investment in Avara Power Company, one of the Israeli market leaders in solar power plant development.

"The world needs intelligent power grids in order to meet the growing demand for energy in a way that is eco-friendly and reliable," said Dehen. "We estimate that the demand for electricity will double by 2030, due to trends like e-mobility, which is just emerging."

The Energy4U acquisition will strengthen Siemens' position in the power data management field. Germany-based Energy4U has 90 employees and provides consulting and implementation services for SAP-based customer information and billing systems for utility companies.

Christoph Kollatz, chief executive at Siemens IT Solutions and Services, said: "Turning power networks into smart grids entails a number of challenges for the utilities industry. New sales models, tariffs and services are part of this transformation process. The expertise at Energy4U now allows us to further extend our portfolio with innovative smart metering to CRM systems solutions, and provide even better support for our customers."

Siemens' investment in Avara Power has secured it a 40 per cent stake in the firm and will kick-start the development of Israel's first commercial solar farms. Siemens will serve as the engineering, procurement and construction contractor for the projects, which will be located in the region between the Dead Sea and the Red Sea.

Siemens and Avara are initially planning the development of 40 MW of capacity in Israel.

Siemens also announced in September that it has successfully completed the trial operation of the world's most powerful gas turbine at the Irsching 4 power plant in Germany. The SGT5-8000H unit has operated for 1500 hours – 1200 h at full load – and its original rated output of 340 MW was raised to 375 MW in simple cycle duty.

Expansion of the plant to combined cycle operation has started, and E.ON is due to take over the plant in 2011.

Doosan targets turbine market with Skoda acquisition

■ Acquisition provides access to steam turbine technology
■ Additional revenues of \$4.26 billion predicted

Doosan Heavy Industries and Construction has secured a position as one of the world's top-tier power plant equipment makers with the acquisition of Czech firm Skoda Power.

The Korean firm has signed an agreement to buy 100 per cent of Skoda Power, a move that will boost its product range as well as its presence in key European markets such as the UK, Germany and Poland.

It will also give Doosan access to Skoda's proprietary steam turbine technologies, and means that the

Korean firm will now be a complete plant supplier with the ability to provide single-source engineering, procurement and construction solutions.

Doosan is planning to set up a new unit – Doosan Power Systems – to oversee the operations of Skoda Power and Doosan's UK subsidiary Doosan Babcock in Europe and the USA. It is aiming to grow turbine genset revenues and says that it has set its sights on becoming a top tier supplier in the global turbine market.

Skoda Power is one of only a few companies worldwide to possess proprietary technologies in the steam turbine field. This, and strengthened capabilities in the core technologies for boilers, turbines and generators, will help Doosan to improve its competitiveness in the power plant equipment market as well as gain entry to new markets.

The deal also makes it possible for Doosan to enter the retrofit and other profitable power plant services markets, enabling the company to



Geewon Park: spearheading Doosan's expansion in Europe and the US

compete with global industry leaders across the entire power generation value chain.

"In the coming years, Skoda Power and Doosan Babcock will spearhead our progressive expansion in Europe, the US, and other developed markets," said Doosan Heavy Industries & Construction President and CEO Geewon Park. "We expect the synergies of the Skoda Power acquisition to generate an additional \$4.26 billion (€3.0 billion) in annual revenue in 2020."

BP sells Indian wind division

Oil group BP has underlined its strategy to focus its renewable energy activities on the US wind market by selling its Indian wind business to Green Infra Limited.

The \$95 million deal allows BP to focus efforts on its growing development portfolio in the US, where

favourable policies and fiscal incentives make it an attractive market for wind power project development. Its Indian wind business consists of three wind farms with a total capacity of 100 MW.

Over the past three years, BP has built a wind business in the US with

interests in over 1000 MW of installed gross generating capacity and more than 1000 MW gross capacity at an advanced stage of development. In total, BP's US wind energy portfolio contains almost 100 projects, with a total potential generating capacity of up to 20 000 MW.

BP currently operates six wind power units in the United States and has begun construction of two more this year.

Green Infra Limited is an independent power producer owned by funds managed by India's leading infrastructure-focused private equity company, IDFC Private Equity.

Tenders, Bids & Contracts

Americas

Alstom wins Médiçi retrofit

Alstom has signed a €30 million contract with Brazil's Companhia de Geração Térmica de Energia Elétrica (CGTEE) to retrofit two boilers at the Presidente Médiçi III power plant.

Under the contract, Alstom will design, manufacture and install upgraded components at units three and four, which both have a capacity of 160 MW. The work will take place in the first half of 2011.

Alstom is the original manufacturer of the boilers at Médiçi, which is located near Candiota city and which first started operating in 1986.

CFE strengthens grid

Mexican utility Comisión Federal de Electricidad (CFE) has placed an order with ABB for a Static VAR Compensator (SVC) device to help strengthen the transmission grid in southern Mexico.

The SVC unit will be installed at the La Ventosa substation, close to the city of Ixtepec in the state of Oaxaca. It will enable better voltage control, improve grid reliability in the area's 400 kV transmission network and help to stabilize oscillations in active power caused by a nearby 1900 MW wind park.

The order is the third such contract received by ABB from CFE this year, following SVC orders for substations at El Palmar and Escárcega.

National Grid orders ABB network management

National Grid has placed an order with ABB for a network management solution for its transmission and distribution networks in northeastern USA.

Under its contract, ABB will implement its Network Manager SCADA/EMS system in National Grid's up-state New York and New England operations control centres. The project will help to improve the efficiency, reliability and security of the region's transmission network.

The Network Manager platform includes the SCADA system, advanced power system applications, user interface with advanced visualization and situational awareness, as well as a fully integrated operator training simulator. It also has system integration capabilities, including the use of CIM (Common Information Model), full system redundancy and offers scope for expansion.

Alstom makes Mexico breakthrough

Equipment maker Alstom has won a contract to install air quality control systems at a power plant in Mexico, a move that the firm says will help to create further opportunities in the country's emission control market.

Under a €24 million contract with Double V Holding, a leading Mexican environmental solutions firm, Alstom will engineer, design and supply three electrostatic precipitators for units 1, 2 and 3 of the 616 MW oil fired Mazatlán power plant in the state of Sinaloa. The equipment will reduce particulate emissions at the plant, enabling its owner, Comisión Federal de Electricidad (CFE) to comply with environmental requirements.

Asia Pacific

Areva signs MOX contract

Japanese utility Chugoku Electric Power Company has awarded Areva a contract to supply 40 MOX fuel assemblies for Unit 2 of the Shimane nuclear power plant.

Under the terms of the contract Areva

will fabricate the fuel at its Melox plant in southern France using plutonium recovered from the treatment operations at the La Hague plant.

The award of the contract will strengthen Areva's position on the global MOX fabrication market, says the firm.

Wärtsilä wins floating barge contract

Leading gold firm Lihir Gold Limited has awarded Wärtsilä a contract to supply a barge-mounted power plant to serve a mining operation in Papua New Guinea.

Under the €57 million contract, Wärtsilä will provide a barge-mounted plant based on its 20V32 engines and operating on heavy fuel oil. The plant will provide electricity for the Lihir Island gold mine and will start operating in early 2011.

Lihir Gold opted for a barge-mounted solution as the plant is only an interim solution for the company's power needs at that site, which is being extended.

Bangladesh launches power plant tenders

The government of Bangladesh has issued a tender calling for the construction of ten oil-fired power plants with a total capacity of 830 MW.

The projects included in the tender include the 100 MW Gopalganj plant, the 100 MW Hathazari plant and the 70 MW Bera project.

The tender also includes the 200 MW Ghorashal dual-fuel plant. BPDB will buy the electricity from these plants under 20-year power purchase agreements, while the government will provide the land for the projects.

The Bangladesh government is also examining bids placed by four groups in the tender for the construction of the 450 MW Bibiyana power plant in the northeastern Sylhet region. The \$300 million natural gas-fired plant will be implemented on a build-own-operate basis.

In a separate development, eight companies – including five from China – have submitted technical and financial bids for the construction of a 150 MW peaking power plant in Sirajganj.

A-Power to build Inner Mongolia wind farm

Wind turbine manufacturer A-Power Energy Generation Systems is to develop a 49.5 MW wind farm in Guba County, Inner Mongolia after signing a \$90.5 million contract with Jihe Orient Wind Energy.

A-Power will supply the wind turbines, towers and foundations as well as oversee the construction, subcontracting and installation for the project, which is due to be completed by June 2010.

The wind farm project, which will be located in the township of Saiwusu, has been approved by the National Resources Bureau of the Inner Mongolia Autonomous Region. Its feed-in tariff has also been approved by China's National Development and Reform Commission.

AstroEnergy wins 2 MW PV bid

AstroEnergy has won the competitive bidding process to construct a 2 MW rooftop photovoltaic (PV) plant at the Hangzhou Energy and Environment Industrial Park in China.

The plant will be the first large-scale on-grid PV system in Zhejiang Province. AstroEnergy will design and install the entire project with a combination of crystalline silicon based modules and high efficiency tandem

thin film PV modules.

The project is being financed by the China Energy Conservation Investment Corporation, and will feature PV modules on the rooftop of the industrial park's Green Science and Technology Hall and on the curved building wall of the site's Energy Conservation Hall.

BHEL to supply Vallur equipment

NTPC-Tamil Nadu Energy Company has placed an order with Bharat Heavy Electricals Limited (BHEL) for the supply and installation of the boiler, turbine and generator package at the Vallur thermal power project at Ennore, Tamil Nadu.

The order has been valued at INR13 billion (\$270 million). BHEL's scope of work includes the design, engineering, manufacture, supply, erection and commissioning of the steam turbine, generator, boiler, associated auxiliaries and control and instrumentation system for the 500 MW unit.

Europe

Fortum smart meter roll-out

Half a million electricity customers in Finland are to have smart meters installed after Fortum decided on the use of technology from Telvent and Echelon Corporation for an advanced metering infrastructure project.

The project is the largest advanced metering deployment to date in Finland, where there are around 3.1 million electricity customers. It will see the installation of Echelon's Networked Energy Services (NES) system integrated with Telvent's Smart Metering Titanium for 550 000 customers.

The smart meters will enable consumers to make energy savings, view hourly measurement of energy and also provide bi-directional net energy measurements for customers with their own energy generation systems.

E.On biomass plans

E.On has submitted a planning application to the UK's Department of Energy and Climate Change for a 150 MW biomass-fired energy plant in Somerset, south-west England.

If given the go-ahead, the new plant could be operational as early as 2013, burning carbon-neutral fuels such as wood to produce enough power for around 200 000 homes.

Dave Rogers, regional director for E.On's renewables business, said: "This project, and biomass generally, has a vital role to play in the UK's future energy mix as we look to produce affordable, secure and lower carbon energy for generations to come."

"This scheme alone will displace more than 450 000 tonnes of CO₂ every year, which is the equivalent of taking around 150 000 cars off UK roads."

Vestas supplies 40 units to Spain

Danish wind turbine manufacturer is to supply 40 wind turbine units for three projects in Spain after signing a contract with Eufer, a joint venture between Enel and Union Fenosa.

Under the contract, Vestas will supply and install 24 of its V90-2.0 turbine and 16 of its V90-1.8 MW turbine. The first units are expected to be installed by the end of 2009.

The contract also includes a VestasOnline Scada solution and a five-year service agreement.

Fortum plans wind project

Finland's Fortum and the national forest

company Metsähallitus are to develop a wind power project in Lapland and are planning to embark on environmental impact assessments this autumn.

The two companies are hoping to install around 18 wind turbines of 2-3 MW capacity each in the Kuolavaara-Keulakkopaa area of the Kittila and Sodankyla municipalities. The project would produce between 100 and 120 GWh of electricity per year, covering around 40 per cent of the municipalities' total electricity consumption.

Andritz wins Albania contract

Austria's Verbund has awarded a €100 million contract for the supply of equipment for a new hydropower plant in Austria to Andritz.

The Ashta hydropower plant, located in northern Albania near the town of Shkoder, is due to start operating in 2012. It will be equipped with Andritz's Hydromatrix technology, which allows for an efficient use of water, according to Verbund.

The new plant will be constructed in two stages, each of which will consist of 45 Hydromatrix turbine-generator units. The total installed capacity of the completed plant will be over 50 MW.

The Ashta plant will have an annual output of 230 million kWh and will meet the needs of around 100 000 Albanian households. Construction of the €160 million plant is due to start in 2010.

International

Kuwait selects Sabiya suppliers

Kuwait's Ministry of Electricity and Water has signed a \$2.65 billion turnkey contract with GE and Hyundai Heavy Industries for the construction of a new 2000 MW power plant in Sabiya.

The new plant will be the largest combined cycle power plant in Kuwait and is an important part of the country's strategy to boost power generating capacity to meet demand.

Under its share of the contract, GE will provide equipment and long-term services for the project, including six Frame 9FA gas turbines, emission control equipment, three steam turbines, nine generators and a turbine and plant level control and protection system. Hyundai will be in charge of engineering, procurement and construction.

GE will also operate and maintain the plant for seven years.

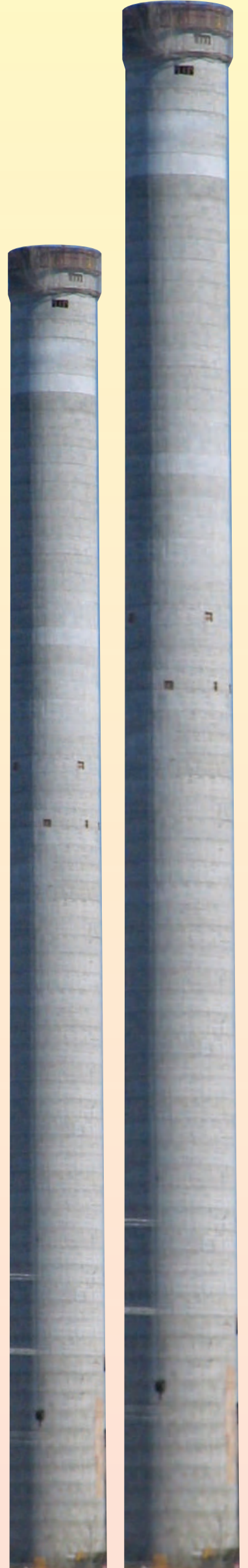
Siemens secures Dubai GIS order

The Dubai Electricity and Water Authority (DEWA) has awarded Siemens Energy a €90 million contract to supply a 400/132 kV gas insulated substation in the Al Mamzar district. The turnkey order is part of plans to expand Dubai's power supply network in the face of rising electricity demand. The project is due for completion within 22 months, says Siemens.

The order encompasses the supply and installation of fourteen 400 kV switchgear bays, thirty 132 kV switchgear bays, four 500 MVA power transformers and protection and control equipment.

Aggreko wins KenGen contract

The Kenya Electricity Generation Company (KenGen) has awarded a \$30 million contract for emergency electricity supplies to Aggreko. Under the 12-month contract, Aggreko will install power generation sets at Embakasi, near Nairobi and at a site near Naivasha. The company has already supplied KenGen with 150 MW of temporary power at Embakasi and Eldoret.



Tightening pollution standards

In June, EU governments agreed on a proposed new directive aimed at tightening pollution standards for heavy industry and power plants. EU lawmakers, however, still need to agree on the final shape of the law.

Marianne Wenning

Starting in 2006 the European Commission undertook a two-year review with all stakeholders to examine how the legislation on industrial emissions could be improved. The Commission's objective was to maintain the highest level of protection for the environment and human health, while simplifying the existing legislation and cutting unnecessary administrative costs.

The review led to the adoption of a proposal by the Commission for a directive on industrial emissions in December 2007 – a proposal that is presently going through the co-decision process.

Industrial activities account for a considerable share of overall pollution in Europe including emissions to air of dust, organic substances, heavy metals and acidifying substances and wastewater emissions.

Recognising such impacts, a range of industrial emissions legislation currently apply with the aim of controlling the environmental impacts of industry, including the energy sector. This includes Directive 2008/1/EC concerning integrated pollution prevention and control (the IPPC Directive) and Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (the LCP Directive).

Indeed the Commission has long been developing directives aimed at controlling emissions from industry.

The IPPC Directive adopted in 1996 a set of common rules for permitting and controlling industrial installations and their emissions. IPPC is about preventing and minimising pollution from the major industrial sources throughout the EU. Operators of installations operating the activities listed in Annex I of the Directive (including energy, metal, mineral, chemical and waste management industries as well as intensive livestock rearing) are required to obtain a permit from the competent authorities in each member state. About 49 000 installations are covered by the Directive in the EU, of which approximately 2800 are large combustion plants.

IPPC is based on four key principles: (1) The integrated approach - Permits must take into account the whole environmental performance of the plant, covering emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, and restoration of the site upon closure.

(2) The permit conditions including emission limit values (ELVs) must be based on the Best Available Techniques (BAT), as defined in the Directive. To assist the permitting authorities and companies to determine BAT, the Commission organises an exchange of information between experts from the member states, industry and environmental organisations. This work is co-ordinated by the European IPPC Bureau in Seville, Spain. This results in the adoption and publication by the Commission of the BAT Reference Documents (BREFs).

(3) The Directive contains elements of flexibility allowing the licensing authorities, in determining permit conditions, to take into account the technical characteristics of the installation, its geographical location and local environmental conditions. (4) The Directive ensures that the

public has a right to participate in the decision making process, and to be informed of its consequences.

The IPPC Directive is supplemented by several sectoral directives, such as the LCP Directive, that lay down specific "minimum" provisions, including emission limit values, for certain industrial activities. Hence, compliance with these sectoral directives does not necessarily mean that the IPPC Directive is being complied with.

Adopted in 2001, the LCP Directive applies to combustion plants with a total rated thermal input equal to or greater than 50 MW. Its purpose is to limit the emissions of sulphur dioxide, nitrogen oxides and dust and the Directive sets limit values for different categories and ages of LCPs accordingly. These limits apply across the entire EU and cannot be exceeded. For existing LCPs, member states may choose to apply a National Emission Reduction Plan instead of applying the limit values to each individual plant, but aiming at an equivalent environmental outcome.

The Commission began a review of the existing legal situation in 2006, involving a substantial amount of research. This included studies on competitiveness and options for streamlining legislation, reports on individual industry sectors, and intensive discussions with stakeholders.

Following this review, clear evidence was found of the need for action to be taken at a Community level in order to:

The proposal strengthens the application of BATs across the EU, particularly by restricting divergence from BAT associated emissions levels to specific cases...

■ Improve implementation of BAT – current implementation of BAT is insufficient in many member states.

■ Improve compliance, enforcement and environmental improvements – significant variation in member state practices and legal limitations hinder the legislation's effects.

■ Reduce unnecessary administrative burdens caused in part by the complexity and inconsistency of parts of the current legal framework.

■ Clarify the scope and provisions of the IPPC Directive hindering the achievement of the objectives set in the Commission's Thematic Strategies. These issues need to be addressed in order to offer higher levels of protection for the environment and human health, to maintain a level playing field for industry while and to reduce unnecessary administrative burden. Consequently, the Commission adopted a Proposal for a Directive on industrial emissions (COM (2007) 844 final) on 21 December 2007 that recasts seven existing Directives, including the IPPC and LCP Directives, into a single clearer and more coherent legislative instrument.

The proposal strengthens the application of BATs across the EU, particularly by restricting divergence from BAT associated emissions levels to specific cases and placing greater emphasis on justifying transparently the conditions laid down in the permits. It introduces minimum standards for environmental inspections of industrial



Marianne Wenning: the Commission recognises that there are certain issues of particular concern to some member states that will need to be addressed

installations and allows for more effective permit reviews.

The proposal also tightens the minimum emission limits for large combustion plants where progress to reduce pollution is presently insufficient.

Using the BAT Reference document for Large Combustion Plants adopted in 2006, the limit values in the Commission's proposal are based on a stricter application of BAT for this sector. The proposal takes the upper end (least strict) of the current emission levels associated with BAT and makes them mandatory from 2016. The Commission's proposal does not distinguish between older and newer member states – all LCP would be subject to the same rules. However, the derogations for newer member

states under the existing LCP Directive would continue to apply until the date specified in the accession treaties. Several studies on the economic impacts were carried out in close collaboration with stakeholders to underpin the Impact Assessment of the proposal. These studies confirmed that no significant long term impacts on competitiveness, detrimental social impacts or negative effects on economic growth have been identified as a result of a higher uptake of BAT. The emission reductions achieved at large combustion plants would offer net benefits ranging between €7 to 28 billion per year and reduce premature deaths and years of life lost by 13 000 and 125 000 respectively. Significant health and environmental benefits are also expected in other sectors.

During the first reading in the European Parliament (March 2009) and in Council (Political Agreement in June 2009), both institutions were broadly supportive of the Commission's proposal. The streamlining of seven existing Directives into a single Directive has been supported by all. However, discussions have been dominated by three issues – BAT and the role of the BREFs, the emissions limits for LCPs and the scope of the Directive.

The European Parliament and the Council generally support the objectives to strengthen the application of BAT and to increase transparency in setting permit conditions on the basis of the BREFs. However, with regard to the 'derogation clause' allowing the emission limits in the permits to deviate from the BAT levels only in specific and well-justified cases, calls were made for additional flexibility in the text. Furthermore, given their strengthened role in the Commission's proposal, member states have clearly indicated the wish for their greater involvement in the BREF development and adoption process.

The European Parliament has also voted an amendment creating a 'European Safety Net' in the form of maximum allowable emission limit values to be set through comitology for all industrial sectors.

With regard to LCP, member states generally support the principle of strengthening the LCP emission limit values by aligning them with BAT. However, a number of member states called for additional flexibility and time to implement the limit values for existing plants. The arguments for such changes centred on security of supply issues and insufficient time to carry out the necessary improvements for the plants concerned.

Concerning scope, despite general support for the clarifications proposed in the formulation of the current scope of the IPPC Directive there has been some opposition in the Council and in the European Parliament to the proposed extension of the scope to new activities.

The proposal will be subject to a second reading with an expectation of agreement being reached in 2010. In reaching an agreement the Commission believes that implementation of BAT as set out in the BREFs must remain the cornerstone of the proposal to ensure a high level of environmental protection, greater consistency in permitting across the EU and a more level playing field.

The Commission also places particular importance on the new minimum emission limit values for Large Combustion Plants in order to help achieve the objectives of the Thematic Strategy on Air Pollution. However, the Commission recognises that there are certain issues of particular concern to some member states that will need to be addressed without jeopardizing the objectives of its original proposal.

Marianne Wenning is the Head of Unit for industrial emissions, ozone depleting substances and fluorinated gases within the Directorate General Environment at the European Commission.

Oil

Crude steadies as forecasts see improved demand

■ Economy improving
■ Global demand forecast to return to growth in 2010

David Gregory

The price of crude oil remained in the \$60-75/b range throughout most of the third quarter and will likely remain near the top of that range for most of the fourth, depending on the state of the global economy. Stocks remain plentiful within the OECD countries and there is around 120 million barrels of crude oil and products in floating storage around the world. For now fundamentals are having little impact on prices.

This is fine with Opec, which decided at its last meeting in Vienna on September 9 to stick with the crude oil production target of 24.845 million b/d for the Opec-11 (excluding Iraq), a target the group set at the start of the year.

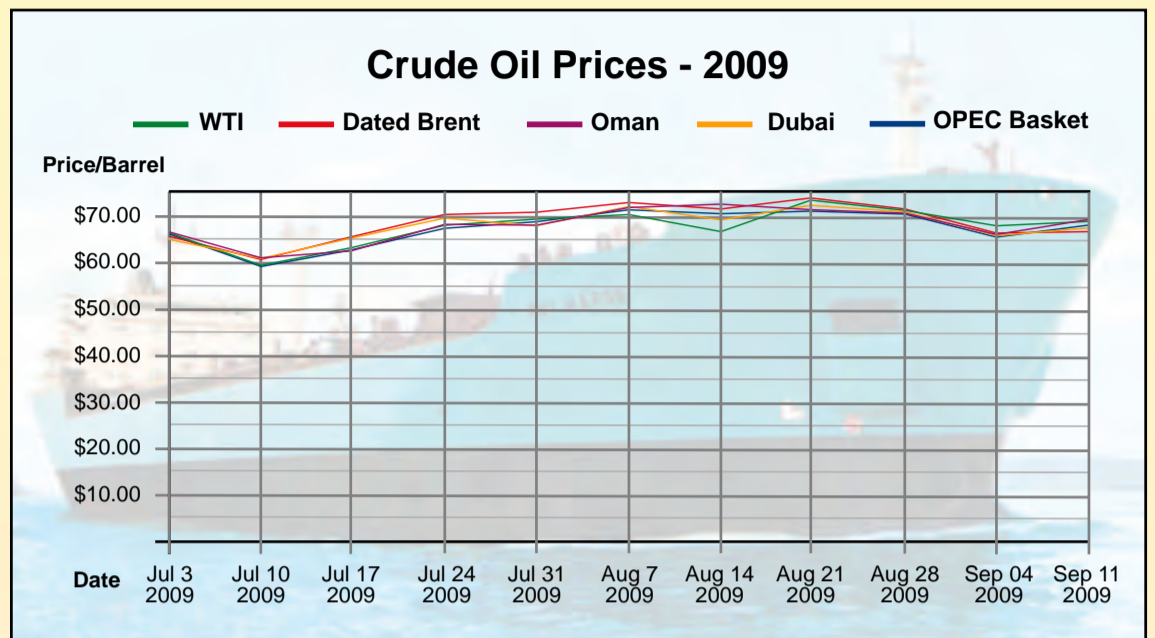
In recent weeks, analysts have been somewhat confounded by the buoyant price of oil, which, with all the crude available to the market and bulging inventories, is paying little attention to fundamentals. Crude has behaved as a commodity, its price keeping tempo with the market reaction to economic data and fluctuations in the US dollar. Speaking in Vienna during the Opec

meeting, Saudi Arabia's Minister of Petroleum and Mineral Resources, Ali Naimi, said the price of oil had "not been about fundamentals for a long time," remarking that high inventories no longer have an impact on price.

"There is a fundamental change in the market," Mr. Naimi said. "Economic growth is the name of the game. That is what is going to drive the price. Oil today is a commodity, like equities, stocks and so forth. As long as economic growth is there, prices are going to go up."

In its September *Monthly Oil Market Report*, Opec said evidence of an impending upturn in the world economy appears to be gathering. But it added that despite the noted improvements, the rally in the equity markets "seems to be factoring in higher growth than the real economy can support and it is therefore likely that markets will remain at best within the current range for some time."

The *MOMR* estimated world oil demand in 2009 to average 84.1 million b/d, down 1.6 million b/d from 85.6 million in 2008. "In 2010, global demand is forecast to return to growth following two years of consecutive



declines, increasing 0.5 million b/d to stand at 84.6 million b/d," the report said.

Demand for Opec crude during 2009 is expected to average 28.5 million b/d, according to the report, down 2.3 million b/d from 2008. Demand for Opec crude in 2010 is forecast to average 28.1 million b/d.

Keeping crude oil off the market has been the prime mover in the drastic cuts that Opec has made over the course of the last year, when the group saw soaring oil revenues plummet as the global economic downturn began to take hold. In September 2008 total Opec production averaged 32.371 million b/d. By March 2009, Opec output fallen to 28.082 million b/d, while in August it averaged 28.915 million b/d.

By comparison, the US Energy Information Administration (EIA) said

in its *Short-Term Energy Outlook* for September that "the combination of higher prices and Opec's historical tendency for weaker compliance with production targets over time suggests the Opec crude oil production could rise over the remainder of the year, unless prices fall sharply from current levels." EIA projected Opec crude oil production at 29.3 million b/d during the second half of 2009 and an average of 28.9 million b/d in 2010.

But according to the US Department of Energy, there are indications that the global economy is improving. "The current macroeconomic outlook assumes that the world economy begins to recover at the end of the year, led by non-OECD Asia. As a result, EIA expects world oil consumption to grow in the fourth quarter of 2009 compared with year-earlier levels, the first such growth in five quarters."

For its part, the Paris-based International Energy Agency (IEA) said that a first glance at the data available on the world economy, appears to validate the perception that an "ongoing, stronger-than-expected global economic recovery" is under way. The agency said there is "growing evidence that the global economy may be finally stabilizing," and said it had revised its estimates for growth in demand upward for 2009 and 2010. But it added: "Despite these upward adjustments, demand is poised to remain weak in the OECD for the remainder of the year, while the underlying strength of non-OECD demand has been obscured by massive stock building in China."

The IEA said its revised forecast put demand for crude oil at 84.4 million b/d in 2009 and 85.7 million b/d in 2010.

Gas

Repsol gas discovery boosts Venezuela reserves

An offshore gas discovery in Venezuela last month has made a significant boost to the Latin American country's gas reserves and provided Venezuelan President Hugo Chavez with an opportunity again express his political views.

Mark Goetz

Spain's international energy company Repsol YPF announced on September 11 that its Pearl 1 well had discovered a significant volume of gas in the offshore Cardon IV Block. Reserves at the discovery well are estimated at 7-8 billion cubic feet (bcf) – the equivalent of 1.4 billion barrels of oil. Repsol said the discovery is the largest gas find in Venezuela and one of the largest in the world.

Repsol said if the reserves are confirmed, they are equivalent to five years of domestic demand in Spain.

The chairman of Repsol, Antonio Brufau, announced the discovery in Madrid in the presence of Venezuelan President Hugo Chavez, who was completing a tour to Algeria, Libya, Syria, Iran, Turkmenistan, Belarus and Russia.

The discovery is located near the mouth of the Gulf of Venezuela in 60 m of water, the reservoir itself is reported by Repsol to cover 33 km² with a thickness of 240 m. Further testing of the well is underway and results confirming the initial estimate should

be known within several weeks. Repsol's partner in the 2006 license is Italy's Eni.

Repsol, operator of the license, and Eni each hold a 50 per cent stake. When the discovery moves into the development phase, the shareholdings for Repsol and Eni will be reduced to 32.5 per cent and Venezuela's state-owned oil company, Petroleos de Venezuela SA (PDVSA), will take a 35 per cent share.

The US Chevron Corporation and Russia's Gazprom have both explored in the same area but failed to make discoveries. Chevron has explored the Cardon III Block, while Gazprom has been active in the Urumaco I and Urumaco II Blocks. Chevron is evaluating the results of a well completed earlier this year in Cardon III, while Gazprom is currently drilling in Urumaco I.

All the licenses are part of the Rafael Urdaneta project, launched in 2005 and which includes 29 blocks with reserves estimated as high as 26 trillion cubic feet (tcf). Venezuela has in recent years taken an interest in exploring for offshore gas resources. It has launched the Plataforma Deltana gas exploration

project off the country's eastern coast, where estimated reserves are put at 38 tcf. Other offshore gas areas include the Tortuga and Blanquilla Est acreages.

Venezuela's proven gas reserves were estimated at 170.9 tcf (4.84 trillion m³) according to the *BP Statistical Review 2009*.

When announcing the Cardon IV discovery, President Chavez said it would make Venezuela one of the largest gas producers in the world.

President Chavez's extended tour took him to a number of countries that share his political view of the US. In Iran, the Venezuelan leader promised to ship 20 000 barrels of gasoline per day to the Gulf state, which lacks the refining capacity to meet domestic demand for gasoline and which, due to its nuclear energy research programme, risks having further sanctions imposed on it, including restrictions on gasoline imports. Iran imports some 120 000 b/d of gasoline, about 40 per cent of domestic demand.

Venezuela agreed also to invest \$760 million in Phase 12 of Iran's offshore South Pars gas project. South Pars, the northern, Iranian section of the giant



Big deposits: the gas discovery near the mouth of the Gulf of Venezuela

Gulf gasfield shared with Qatar, which calls its portion the North field, has 24 development phases. Many of those phases involving the LNG projects are having difficulty finding foreign partners because of the sanction already imposed.

From Iran, President Chavez flew to Turkmenistan where he urged Turkmen President Gurbanguli Berdimukhamedov to join the Gas Exporting Countries' Forum (GECF), calling it the 'Gas Opec'. Venezuela is a member of the group, and earlier this year leading members Russia, Qatar and Iran formed a 'troika' to examine ways

on how to coordinate export policies, in effect looking for a way to influence gas prices the way Opec members adjust their production in order to effect crude prices.

Turkmenistan, which is cultivating improved relations with the west while coping with Russia's control over its exports, claims its natural gas reserves range from 14-24 trillion m³. According to the *BP Statistical Review 2009*, Turkmenistan's gas reserves in 2008 stood at 280 tcf (7.94 trillion m³).

Later, President Berdimukhamedov declined President Chavez's invitation.

Ready to climb mountains

The World Energy Council believes it has a key role to play in creating the dialogue needed to tackle the major challenges facing the power and energy industry.

TEITimes caught up with **Christoph Frei**, the WEC's new Secretary General, and found a man with the kind of resolve needed to address the issues politicians will face in Copenhagen.

When Gerald Doucet, the World Energy Council's dynamic Secretary General, passed away last year, it was a great loss to the industry. And while Mr Doucet will never be truly replaced, the WEC has found in his successor, a man who is quietly determined and equally passionate about the energy industry.

Swiss-born Dr Christoph Frei was appointed Secretary General in April this year. It is a role to which he is able to bring his personal qualities. As a husband and father of a two-year old son, Dr Frei, the capacity to work as part of a team is obviously important. When he is not with his family, Dr Frei's main pastimes are mountaineering and playing classical music on the piano.

"Maintaining the best possible work/life balance is important," he says. "I am a person who likes to move ahead and always see the positive side of things. Perhaps that is partly why mountaineering is a key passion. Apart from the sheer beauty, I have always enjoyed the sporting challenge and the commitment it requires. When you are climbing a mountain, you cannot just stop. It is the same with a piece of music. You set yourself an objective and there is no straight way to it; it takes perseverance and commitment to get there. Also, you cannot do mountaineering alone, you have to work as part of a team."

Dr Frei also has a genuine passion for energy. Although an electrical engineer by training, his interest in energy was sparked in the early 1990s after witnessing a tour of solar vehicles travelling across Switzerland. He reflects: "I found it fascinating. When you combined that with my concerns for environmental issues, it brought me to the question of energy and the realisation that energy was not just a major issue for our civilization but was also a great opportunity. This was a critical moment for me."

Following his training in electrical engineering, Dr Frei expanded his expertise by obtaining a Masters degree in econometrics and Masters degrees in energy systems and applied ethics. He also holds a PhD in Energy Policy/Sustainable Development.

His journey to the WEC in some ways began with what he calls a "defining moment" in 1998 when he was involved in the Youth Programme at the World Energy Congress in Houston. "Prior to that I had been focussing more on national issues. The World Energy Congress exposed me to international energy issues," he said.

This ultimately led to another key moment in Dr Frei's career when he took a position at the World Economic Forum (WEF) in 2001.

From 2001 to 2008, whilst serving as senior director of Energy Industry and Strategy at the WEF in Geneva, Dr Frei was in charge of all energy related aspects of the Forum. He directed multi-stakeholder projects in the areas of energy security, energy poverty (Energy Poverty Action), sustainable cities (SlimCity), biofuels (Roundtable on Sustainable Biofuels) and anti-corruption (Partnering Against Corruption Initiative).

"Here I found the dynamics of international policy and strategy fascinating. It was not just about academic thinking and learning; it was also about learning how to make things happen. Now I see the WEC as the key place where this platform is provided. WEC provides a privileged



Dr Frei:
the WEC has a unique position in advancing dialogue

combination of community learning and translating some of this into action."

The WEC focuses on all forms of energy – oil, gas, coal, nuclear and renewables. It looks at energy in its widest context, not just electricity. "When you look at the major challenges in the world today, whether related to climate change, water, food or the financial crisis, they are all related to energy; or energy is part of the solution," comments Dr Frei.

The WEC sees climate change and the capital needed for massive infrastructure projects as the top two concerns today. Dr Frei says that these issues stand out because they are where its 93-member committees – consisting of ministries, CEOs and experts – see huge uncertainties.

covers all aspects of energy. This gives us a unique position in advancing the dialogue. We can also come up with concrete proposals on how to address some of the issues."

He also notes that many of the key constituents with the ability to make decisions at Copenhagen are reachable through the WEC's member committees. The WEC believes it has two key contributions to make to the Copenhagen talks – its recently published *Trade and Investment Rules for Energy* and its *Energy and Climate Policy Assessment* document.

The rules of energy trade document essentially explains that there is no solution to a global problem without a global approach. It argues that energy trade is a critical issue in climate change. Dr Frei notes, however, that

measure whether they are effective. Dr Frei comments: "WEC is a very visible and credible organisation to do this. We have direct access to governments and are in the developed as well as the developing world. When you think of the challenges, you have to be on all sides of the table. The WEC has this unique position." With its position, the WEC perhaps provides a glimpse of the monumental task of gaining a global agreement at Copenhagen. While it is easy to agree on long-term goals, the critical issue is agreeing on short-term commitments i.e. the next 5 - 10 years.

Dr Frei comments: "If we can agree on short-term commitments, we can say that Copenhagen has been a success. But it will not be easy. Expectations among our members are mixed. During our executive assembly we saw two sides of the story. On one hand, some of our chairs believe that if we do not reach an agreement, then uncertainty will increase. This means the necessary investments to improve energy security and improve climate change will not happen. On the other hand, some believe taking a couple more months to reach an agreement is OK, as long as it means getting clear commitments. They prefer a clear commitment in the longer term as opposed to a vaguer commitment in the short-term."

Despite the gap that exists in the positions between the US and China, India and other developing nations, Dr Frei remains optimistic about the ongoing climate change dialogue. "The good news," he says, "is that the agendas are moving. Three years ago all parties were far away from even looking at a joint agenda. Although there are various reasons why all the parties are at the table, today each party understands that it is in its own interest to move the agenda forward."

Indeed we should not underestimate the importance of moving forward, even if it is not at the pace we would like to see. It is a concept that Dr Frei can more than appreciate as a mountain climber. Let us hope that the Copenhagen participants can at least remember this much in tackling the mountain they have to climb.

...this brought me to the realisation that energy was not just a major issue for our civilization but was also a great opportunity

The link between capital markets, climate change and energy security is one that the WEC sees as very critical. "The big picture is changing and the uncertainties make it difficult to move ahead to a future that has good energy security," notes Dr Frei. It is a challenge Dr Frei says is referred to as "energy security" in the developed world and "energy poverty" in developing countries.

Climate change is an issue that according to Dr Frei will "keep us awake for decades to come". Yet he stresses that the next five years are crucial. "While climate change defines us in the long term, what we do in the short term will have a huge impact on the transition to a cleaner environment while guaranteeing energy security."

With Copenhagen just around the corner, Dr Frei believes that the WEC can play a key role in addressing the challenges of energy security and climate change. He stresses that both issues are global and have no solutions within national boundaries. "The instruments, mechanisms and dialogue all have to be global. The WEC is the only truly global organisation that

the WTO has no energy focus. At the same time, he concedes that the WEC in the past has not looked at the trade issue. "There has therefore been a gap," he says. "By looking at the trade and climate issues in an integrated way from an energy perspective, we can make a critical contribution."

The report published in September this year highlights the WEC's position that any measures to reduce greenhouse gas must be aligned with all GATT and WTO agreement rules on trade. Dr Frei adds: "The problem cannot be solved through nationalistic policies. The longer we stick to national solutions, the longer we keep uncertainty high. There has to be an integrated international policy that supports climate change and energy security at the same time. He believes that the most effective measure would be the introduction of an international carbon price mechanism.

The Energy and Climate Policy assessment, meanwhile, is produced every year. Through it, the WEC will call on its member committees to review the constantly changing policies and new initiatives, and

Going green at Drax

The environment is seen as the biggest challenge facing Drax, the UK's biggest coal fired station. A project to equip the plant to co-fire coal with biomass could go a long way to improving the plant's green credentials writes **Junior Isles.**

The coal stockpiles loom high in the background of Drax, the UK's largest coal fired power station. With a generating capacity of 4000 MW, the plant consumes about 10 million t/year of coal to meet 7-8 per cent of the country's power requirements.

Drax operates in baseload for six months of the year and at about 50 per cent load factor during the other six months. In the winter about 250 000 t of coal arrives at the plant by rail each week, while a stockpile of up to 2.5 m t is kept on site to manage commodity exposure. With this amount of coal consumption, it is no wonder that Drax Power Limited sees the environment as its biggest challenge.

Peter Emery, Production Director, Drax Power Limited, said: "The single biggest challenge facing coal fired generation is environmental. Our primary focus is climate change; the secondary is exposure to nitrogen oxides."

Emery claims that Drax is the UK's cleanest and most efficient coal fired power station. Its generating units are fitted with flue gas desulphurization equipment to remove 90 per cent of SO_x from emissions and work has been completed to reduce NO_x. The 1.4 m t of ash and 600 000 t of gypsum produced by the plant each year are used in the construction industry.

Drax also produces around 22 million t/year of CO₂, emitting 809 kg of CO₂/MWh compared to an industry average of 950 kg of CO₂/MWh. The CO₂ issue is an important one for the company and Emery believes that the plant has an important role to play in the transition to a low carbon economy.

"Addressing the CO₂ issue is critical to our business for three reasons," he said. "It matters to our employees, investors, neighbours, NGOs and politicians. It's also a credibility issue; we have to do something about CO₂. But it also makes good business sense."

In the UK, companies do not have to pay for CO₂ emission permits for power produced from biomass. This means a saving of £15/t of CO₂. Also, under the Renewables Obligation (ROC) regime, co-firing will allow Drax to receive half a ROC for each MWh produced when burning non-

energy crops and one ROC per MWh for energy crops such as willow or miscanthus that has been grown specifically for energy production.

Drax Power is currently making two major carbon abatement investments, which together will cut CO₂ production by over 3.5 million t/year; this equates to a 17.5 per cent reduction in CO₂ emissions compared to 2006 levels.

It is spending £100 million on what it claims is the largest steam turbine modernisation programme in UK history. This will reduce CO₂ emissions per MWh by driving thermal efficiency up from 38 per cent to 40 per cent.

It is also spending another £85 million on expanding its biomass capability to reduce CO₂ per MWh by displacing coal. Part of this investment will be on strengthening the biomass supply chain. Drax has constructed a straw pellet plant with a 100 000 t capability and, under a separate investment of around £2 billion, also has plans to develop three 300 MW biomass fired power stations in the UK.

The current centrepiece of its biomass efforts, however, is a new system that will enable the Drax power station to co-fire biomass with coal. According to the company, it will be the largest co-firing project in the world when it is completed in 2010.

The plant will burn a variety of biomass such as peanut husks, straw and wood from the UK and even wood from overseas. This will allow Drax Power to burn biomass according to the market price and conditions.

At the moment the project is designed to maximise biomass up to the limit where the generating units can be maintained at full capacity

The company has also put in place a sustainability policy whereby it will not burn any biomass that does not reduce CO₂ by less than 70 per cent compared to the coal alternative.

Drax began preparations for burning biomass in 2004 when it first put biomass through its mills with coal. Then in 2005 it started a direct injection pilot project on one of the



Looming large: Drax is the UK's biggest coal fired station

plant's six 660 MW generating units.

The success of this pilot led to a decision to replicate the pilot across the other five units. This project, which will take 36 months from design to commissioning, has a capacity of 400 MW, meaning that 10 per cent of the plant's generating capacity was fuelled by about 1.5 million t of biomass.

Drax Power took the decision to build a commercial project in 2008. The project was split into three

separate contracts: the processing works to receive, handle, store and process various biomass materials; direct injection co-firing equipment; and the rail unloading facility.

The £50 million contracting for the processing works was awarded to Alstom Power in early 2008. Alstom's experience with co-firing goes back 18 years. More recently, it installed a system at Fiddler's Ferry that has been firing biomass project since 2005. Sam Saimbi, Alstom Power's UK head of business development for boiler retrofits explained the project challenges. "The throughputs are huge. You are looking to process nearly 250 t/h very quickly and firing that fuel. It is quite demanding and close attention has to be paid to handling since the fuel is much more volatile than coal. Being a retrofit project, the new equipment has to be squeezed and constructed into the existing footprint of a plant that has to remain in operation."

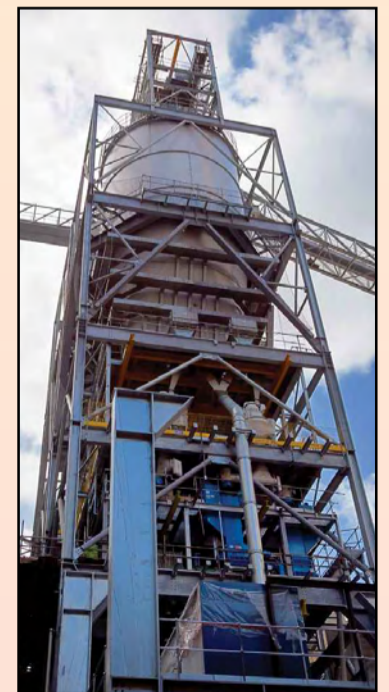
Because of the retrofit challenge, much of the unloading and storage of the biomass is undertaken in a coal stockyard away from the boiler building. The biomass is unloaded into a purpose built building, capable of handling six trucks an hour, and onto conveyors. A series of processes including agitation and magnetic separation are used to separate out any metallic objects or stones from the biomass before it is fed into storage silos. From the storage silos, the biomass is transported to smaller (day) silos and milled to the required size.

The biomass will then be fed from the silos to an existing pulverized fuel line where it is mixed with coal and fed to the burners of each boiler. Due to the wall-fired design of the boilers at Drax, no modifications are needed to the existing burners.

With the low ash content of biomass, Drax Power Limited does not foresee any increased in NO_x production. Also, with biomass accounting for only 10 per cent of fuel throughput, no corrosion problems are expected.

Emery commented: "At the moment the project is designed to maximise biomass up to the limit where the generating units can be maintained at full capacity. In the future it might be economic to eat into our generating capacity but increase our biomass burning capability. This flexibility is the attraction of our system. Because we use the same burners, we only need to install more injection facilities to put biomass through more of the burners."

According to Drax Power, the project is on budget and on schedule. The first two units are scheduled to begin operation in late 2009 and the project will be completed in June 2010.



The biomass is transported to smaller (day) silos

Burning biomass

Biomass is a renewable fuel that is considered to be 'carbon neutral' since it draws CO₂ from the atmosphere when growing and releases it again on burning.

The types of biomass that can be co-fired include wood-based materials such as forestry residues, agricultural by-products such as straw and sunflower husk pellets, and purpose-grown energy crops such as short rotation coppice willow and miscanthus.

There are three main methods of co-firing biomass in utility boilers. The biomass can be added to the coal before it is milled and then passed through the existing milling system. Using an existing coal milling system, however, limits the quantity and type of biomass that can be fired.

Alternatively, the biomass can be gasified to produce low calorific value gas, which can then be fired in either a boiler or combustion turbine. However, this can be a complex and relatively expensive process when used upstream of an existing conventional utility boiler.

Another method is to use a dedicated co-firing system (being installed at Drax), where the biomass is processed separately and combined with the milled coal. According to Alstom, this method offers the best CO₂ abatement versus cost ratio of all co-firing solutions. Alstom also says it increases the proportion of biomass that can be fired and the overall firing efficiency.



Junior Isles

You cannot be serious

With Wimbledon and the commentary of John McEnroe now a distant memory, it is fairly safe to say that summer is now officially over, at least for us in northern Europe. If there was any doubt, the fact was made clear in no uncertain terms during a recent ABB press visit to a solar plant near Alicante, Spain. Our arrival at the usually sun-drenched holiday locale for British tourists was met with unseasonal rain. Even more bizarre was the storm of giant hailstones that lashed the town earlier in the day.

Such severe weather is perhaps more than simply an indication of the end of summer. Perhaps it lends weight to the argument that climate change is real and that there is consequently an urgent need to accelerate the roll-out of renewable technologies such as solar.

The freak weather set the perfect backdrop for Peter Leupp, head of Power Systems for the ABB Group, who offered his perspective on balancing the need for more power with lower climate impact. "We live in a world that is changing very fast, as is the way in which electricity will be supplied in the future. Climate change, security of supply, reliability, and efficiency are high on the agenda of politicians and the technical community. It is clear that today's grid will not be able to manage the challenges of the future," he said.

Electricity demand is expected to double in the next 20-30 years. With a significant amount of this demand expected to be met by renewables, Leupp believes that generation will become more distributed, for example in the form of rooftop generation from solar.

Installations such as these, and indeed the successful deployment of other intermittent renewable generating sources, will call for investment in the advanced grid automation solutions offered by companies like ABB.

In the US, just a few months ago the DOE announced the availability of almost \$4 billion for demonstration and grants for smart grid projects.

Advances in solar technology combined with government incentives,

has seen an increase in market interest. According to ABB, in 2008 grid-tied solar photovoltaics (PV) grew by 70 per cent, and the capacity of utility-scale solar PV (larger than 200 kW) tripled to 3 GW. The market for concentrating solar power (CSP) systems grew by 15 per cent.

Last month, US company First Solar announced that it will build what will be the world's largest solar plant in the Ordos desert in the Chinese region of Inner Mongolia. When it is completed in 2019, the solar plant will cover an area of nearly 65 km² and have a generating capacity of 2 GW. The first phase of this mega-plant will begin construction in June next year.

The project is huge but represents just a portion of China's impressive solar plans. Since May, nearly 9 GW

price.

With the subsequent rush of solar projects looking to exceed government targets, the feed-in tariffs were cut by 30 per cent for solar. This resulted in a level of pain for players in the Spanish market and a fall-off in solar growth.

Nevertheless, according to the European Photovoltaic Industry Association, the annual global growth rate of installed solar power systems is expected to quadruple from 5 GW in 2008 to 22 GW by 2013.

Falling costs of solar panel production will no doubt continue to accelerate growth. Leupp commented: "As fuel price goes up and carbon taxes are introduced, the cost per kWh of solar will at some point be comparable with conventional plant. There could

Four decades is being touted as the time in which the Desertec project might come to fruition – hardly a schedule that suggests any urgency

of solar projects have been announced. Nationwide, China plans 20 GW of solar by 2020 – a quarter of which will likely be built in Inner Mongolia.

In Europe, Spain was a particular hotspot for solar in 2008. The country accounted for more than 40 per cent of the world's total solar installations last year. In addition to building PV solar projects the country also led the way in CSP-based technology. October 2008 saw the start-up of Europe's first commercial solar power tower project in Andalusia. The 11 MWe project known as PS10 is the first of nine to be built by Spanish engineering giant Abengoa Solar.

Unfortunately, the cloud of poorly thought out policy has since cast a shadow over Spain's solar market.

The feed-in tariff established by Spain in 2007 guaranteed fixed electricity rates of up to 44 euro cents per kilowatt-hour to all new solar panel projects plugged into the electrical grid by September 2008. Also, a loophole in the tariff allowed bundles of small, ground-based projects to receive up to 575 per cent of the average electricity

be grid parity in as little as 6-8 years."

The application of solar at thermal power plants will also accelerate its deployment. At the end of August Abengoa Solar was selected by US utility Xcel Energy to build a demonstration CSP plant at its Cameo coal fired power plant near Grand Junction, Colorado. The project is the first to integrate an industrial solar installation into a conventional electrical power plant. The goal of the project is to prove that the heat produced by a solar facility can increase the efficiency of a conventional power plant while lowering CO₂ emissions.

Certainly solar holds immense promise. The potential of exploiting north Africa and the Middle East has been well reported. Covering just one per cent of the Sahara with parabolic mirrors for CSP would meet the world's demand for electricity. The Desertec Industrial Initiative (DII) announced a few months ago hopes to exploit the potential of north Africa in the hope of harnessing solar in north Africa and the Middle East for export to Europe.

With no talk of exporting power to sub-Saharan Africa, one hopes however, that Desertec is not purely a project in Africa developed to supply the power needs of Europe. Leupp commented: "It is a project to integrate the whole MENA region. We should also remember, where there is electricity, there is water. If there is a way to generate cheap electricity, we can provide drinking water to Africa and the Middle East. It would also generate a lot of jobs since a tremendous industry would have to be created close to where the solar cells are needed."

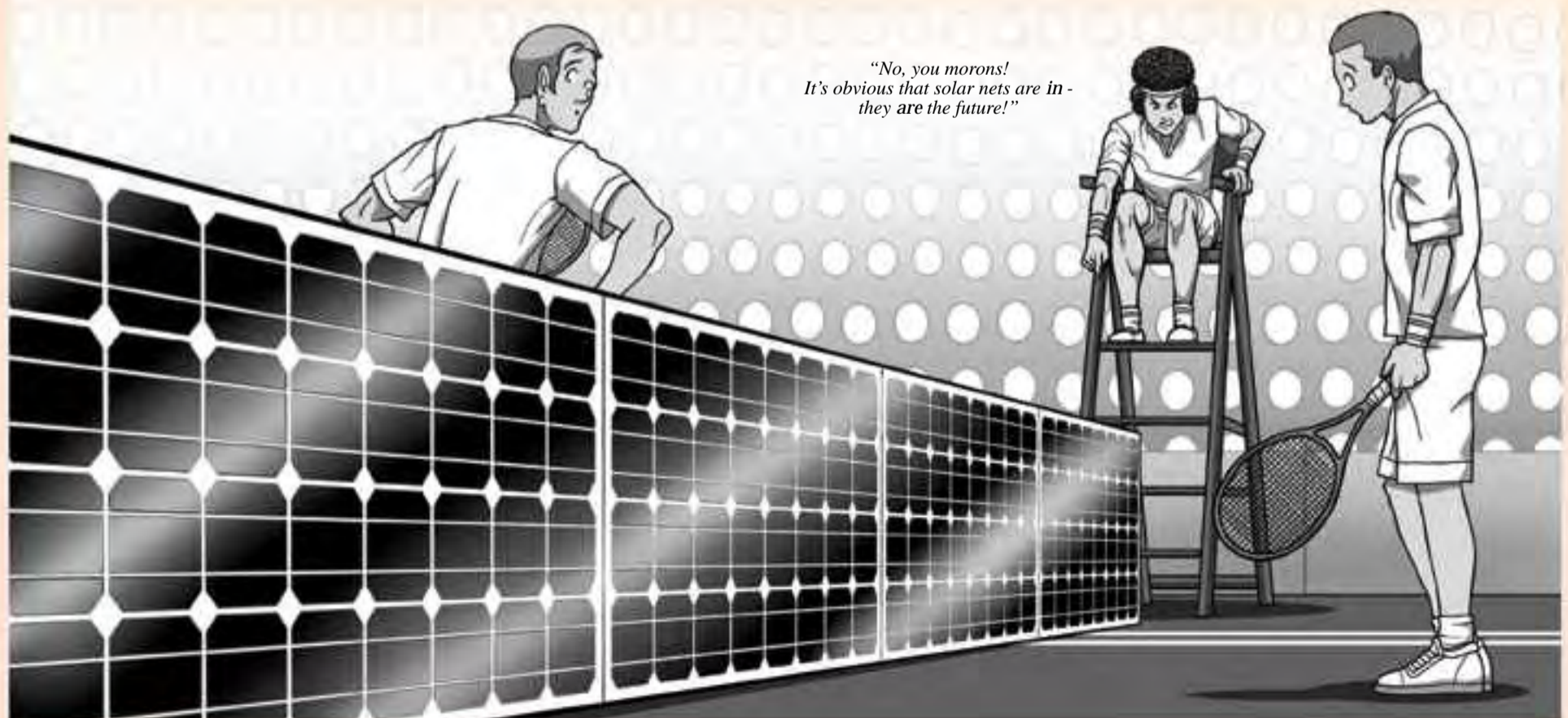
Desertec is somewhere between a vision and a concrete project. It would involve the building of very long HVDC lines, which is technically feasible. Both ABB and Siemens have built HVDC lines in China that are in the 2000 km range.

Point-to-point connections of the type built in China, however, have no exit points and it is unlikely that a country will be happy to simply allow an HVDC line to cross its borders without seeing any benefit. The main problem facing Desertec will, therefore, be political.

Four decades is being touted as the time in which the Desertec project might come to fruition – hardly a schedule that suggests any urgency. Certainly it is not a schedule that suggests there is much faith in the political will needed to make the project a reality.

Over the next three years, the DII will focus activities on the development of a viable investment plan. At around €400 billion, the cost of the project may make it appear unrealistic. But consider what governments have spent in propping up the financial system and bailing out banks. Also consider the cost of implementing the corresponding equivalent of carbon-free thermal generating plants.

If governments are really serious about climate change, they can make this project happen, and in a much shorter timescale. Certainly if John McEnroe ever decides to trade tennis for political commentary we would hear him chastise: "You cannot be serious!"



"No, you morons!
It's obvious that solar nets are in -
they are the future!"