

Tense ties

Tension between Russia and the US may have nuclear implications for Iran.

Page 9

Google geothermal

Tata Power and Google see the potential of geothermal.

Page 10

Final Word

Junior Isles says rules are made to be broken, if you are the government.

Page 16



October 2008 • Volume 1 • No 8 • Published monthly • ISSN 1757-7365

www.teitimes.com

THE ENERGY INDUSTRY TIMES

IN BRIEF

Credit crisis may take its toll

Turbulent financial conditions and escalating construction costs are likely to take their toll on new US nuclear plants.

Page 4

Indian nuclear programme gains support

Having received approval in the US House of Representatives, India's nuclear expansion programme is now also gaining support from the European Union.

Page 6

CCS funding leaves Commission in a quandary

Observers are warning that an investment gap is threatening the future of CCS technology.

Page 8

Doosan takes on post-combustion CCS

Doosan Babcock has signed a licensing agreement with Canada's HTC Purenergy on carbon capture.

Page 10

Industry Perspective: Still a role for the private sector

Changing regulatory environment combined with volatile energy prices and low carbon initiatives is creating new opportunities for Asia's private power sector.

Page 12

Fuel Watch: Nigerian unrest threatens energy supplies

Violence and political corruption in the country have widespread implications for the EU energy sector.

Page 13

Energy Outlook: Signs of a slowdown

Although there will be a sharp slowdown, China's power sector growth will still be robust, particularly in the renewables arena.

Page 14

Subscribe

An annual subscription to *The Energy Industry Times* costs £295.

To subscribe, email: subscriptions@teitimes.com or visit: www.teitimes.com

Competition question mark over nuclear sale

EDF's relentless pursuit of British Energy has finally paid off. However, the creation of a group controlling nearly a quarter of Britain's generation market is likely to raise concerns.

by Siân Crampsie

EDF's proposed takeover of British Energy sets the stage for the construction of new nuclear power plants in the UK, but critics fear that it will have a negative impact on market competition and lead to higher power prices.

The French energy group finally secured itself a leading role in the

UK's nuclear power sector after several months of stalled negotiations and one rejected offer.

Its latest offer for British Energy has strong backing on both sides and EDF is confident that it will close the deal in early 2009. But concerns have already been expressed in the market as well as the political arena over the impact of the deal on market concentration.

The deal values British Energy at £12.5 billion and secures EDF as the largest generator of electricity in the UK. It also places EDF as the main player in the UK's nuclear renaissance.

A combined group consisting of EDF's UK subsidiary, EDF Energy, and British Energy would have an installed capacity of 16.5 GW, sales of €1.9 billion and employ nearly 20 000 people. EDF generates just under

six per cent of Britain's electricity and British Energy 19 per cent.

Both EDF and the UK government have played down fears over the impact of the deal on the market but small generators and suppliers are likely to be unhappy. Their fears will be heightened if Centrica – the UK-based diversified energy group – seals a deal to take a 25 per cent stake in British Energy on completion of the takeover.

Centrica owns seven natural gas-fired power plants in the UK with a total capacity of 3420 MW, sells electricity and gas through its British Gas brand, and also operates upstream assets. It is currently in negotiations with EDF over the deal.

British utility Welsh Power said that it is "amazed" by the deal and has voiced its concerns over its impact on competition in a strongly-worded letter to Energy minister Malcolm Wicks. It has called for the takeover to be delayed pending an investigation by the UK's Competition Commission.

"This deal has created one of the largest, most dominant players in a market in which concerns over the levels of competition were only recently highlighted," said Welsh Power CEO Alex Lambie in the letter.

He continued: "However, with as strong an economic interest in British Energy as the government holds it is impossible to believe that a deal would be done without the active connivance of the government ... indicating they have either a plan for dealing with the competition issues or don't care."

The UK regulator, Ofgem, as well as the Office of Fair Trading, plan to examine the proposed takeover and will pass their findings on to Europe's competition authorities. EDF has been in touch with antitrust authorities in the European

Continued on page 2

UK sets date for first emissions trading auction

The UK is likely to become the first country in Europe to hold an auction in Phase II of the EU Emissions Trading Scheme (ETS). The Exchequer Secretary to the Treasury, Angela Eagle MP, announced last month that the UK's first auction of carbon trading allowances under the EU ETS will be held on the 19 November, 2008.

The EU ETS sets a cap on the total emissions from the main industrial

sectors across Europe, covering more than 10 000 installations in the energy and industrial sectors. These sectors are collectively responsible for close to half of the EU's emissions of carbon dioxide.

Angela Eagle said: "The UK is leading the way across Europe in efforts to cut carbon emissions and ensure companies work now to put in place the long term solutions to

tackle climate change. Auctioning carbon allowances will create greater incentives for companies to reduce emissions and provide stability and transparency in this emerging market."

The Treasury has appointed Defra to conduct the auctions, and Defra has appointed the UK Debt Management Office (DMO) to act as its agent in running the auctions in Phase II. Environment Minister, Phil Woolas said: "Auctioning these allowances marks an important step forward in developing a system where market forces create financial incentives for major carbon emitters to reduce their emissions."

Emission allowances, each representing the right to emit 1 tonne of carbon dioxide, are issued to operators in the scheme and the limit is set by issuing a fixed number of allowances for each trading period.

Phase I was the first trading period

and covered 2005-2007. During this period, almost all allowances were allocated to participants for free. Phase II runs from 2008-2012, covering the first commitment period of the Kyoto protocol. In Phase II, the EU Directive sets a limit on the maximum amount of allowances that can be auctioned at 10 per cent.

The UK National Allocation Plan for the second Phase of trading in the EU sets aside 7 per cent of the allowance cap for auctioning, amounting to approximately 85 million allowances over the phase. As set out in the UK's Vision Statement on Emissions Trading, published in 2006, the Government supports the use of auctioning to allocate allowances, as it is the most transparent and open way to allocate the allowances. This will improve the efficiency of the EU ETS as allowances go to those who value them the most.

(Continued from page 1)

Union and expects Brussels to approve the deal, according to the *Financial Times*.

Concern has also been expressed in the UK about the loss of British Energy to a foreign investor. The UK government clearly believes that the need for new nuclear capacity in the country outweighs such concerns, while British Energy itself sees the deal as an opportunity to boost financial strength and market position.

"Together, the businesses of EDF and British Energy will have broader access to markets and a unique blend of engineering expertise, project management skills and physical assets available for the development of new nuclear build in the UK," said Sir Adrian Montague, Chairman of British Energy. "In addition, this combination will be better able to prolong the contribution of our existing fleet to the energy needs of the UK."

Ofgem is already carrying out an investigation into competition in the UK's energy markets, which it is due to publish in October. Its probe was launched earlier in the year in response to consumers' concerns over rising prices.

Meanwhile Peter Luff, MP, chairman of the House of Commons Trade and Industry Select Committee, is planning to summon Business Secretary John Hutton to answer questions about the deal, according to *The Times* newspaper.

The UK government has long supported a tie-up between EDF and British Energy as a means of kick-starting the construction of new nuclear capacity. EDF plans to build its first unit in the country at Hinkley Point in Somerset by the end of 2017.

It plans to construct a further three units – one at Hinkley and two at Sizewell in Suffolk – by 2025, and has also agreed to sell British Energy-owned land to other companies interested in new nuclear development.

The UK government will net £4.4 billion from the sale of its 36 per cent share in British Energy for the Nuclear Liabilities Fund, a segregated fund established to meet British Energy's decommissioning costs. It wants to see new nuclear capacity on-line by 2020 in order to increase energy security and reduce carbon emissions.

UK Business Secretary John Hutton said: "Nuclear has the clear potential to play a central role in giving our country a diverse energy mix. It will be indispensable for our long-term energy security."

"Our ambition is to have more than one nuclear operator and so to accelerate the building of new nuclear power stations. There are strong signals of an appetite for this from the power industry and today's announcements mean a number of sites could be made available for others to play a part."

EDF said it has already booked the main components needed for the construction of the first two EPR nuclear plants that it plans to construct in the UK. Together the four planned reactors will add 6.2 GW of capacity to the UK grid.

Schwarze Pumpe start-up marks CCS milestone

Start-up of the carbon capture pilot plant at the Schwarze Pumpe power station in Germany is a significant milestone in the development of CCS using oxy-combustion technology.

by Junior Isles

Last month's start-up of the Schwarze Pumpe pilot carbon capture and storage (CCS) plant in eastern Germany marked a significant in one of the technologies under development to commercialize near-zero emissions coal fired power plants.

The pilot plant, owned by Swedish utility, Vattenfall's, will demonstrate carbon capture using the oxy-combustion process for the first time and also signals the start of a trial on the feasibility of storing the CO₂ in the Altmark region between Hamburg and Magdeburg.

Built next to Vattenfall's existing lignite-fired 1600 MW Schwarze Pumpe power plant in Germany, the 30 MW pulverized coal demonstration plant, for which Alstom is supplying the oxy-boiler technology, contains all the necessary components to demonstrate the complete oxy-fuel chain, starting with oxygen production and ending with CO₂ purification and compression.

Of the three main technologies being developed for the capture of CO₂ emitted by a power station burning

fossil fuels, Alstom Power has opted to concentrate on post combustion and oxy-combustion. The company argues that these technologies must be a priority since they can be applied to both existing and new power stations.

Alstom ranks oxy-combustion "a close second" to post-combustion, due to the slightly longer ramp-up period needed to validate large scale capture. The technology also offers retrofit potential and access to difficult fuels with circulating fluidised bed technologies, which is of special interest for the high ash coals used in India, or the recovery of oil from tar sands in Canada.

In oxy-combustion the solid fuel is burned in oxygen instead of air. This produces a highly concentrated stream of CO₂, which is easy to recover at the end of the process.

The process, however, is expensive due to the cost of large-scale oxygen production and the energy required to produce the required amount of oxygen. Current cryogenic air separation units (ASUs) typically require electrical inputs of up to about 18 per cent of the power plant's gross electrical output (approx. 230



Schwarze Pumpe: site of the CCS demonstration

kWh/tonne of O₂).

However, Alstom believes that future ASUs for large power plants will be much larger than any existing today. It calculates that ASUs approximately four times larger will be required which, due to economies of scale, will require proportionately lower electrical inputs. It also said that technologies currently undergoing bench tests might eventually eliminate the need for the use of costly cryogenic oxygen.

The 30 MW pilot plant will provide the technical basis for the construction of a much larger 200-300 MW demonstration power plant to be constructed by 2015. Vattenfall hopes the pilot will firm up comparisons between oxyfuel and post-combustion capture, and the third option, pre-combustion capture – where fossil fuel is gasified to a synthesis gas from which CO₂ is removed before the remaining hydrogen-rich syngas is burned. Vattenfall plans to demonstrate oxyfuel on a commercial scale in one of the boilers of a plant in Janschwalde, Brandenburg; a parallel boiler will demonstrate post-combustion capture.

Following an initial three-year testing programme, the plant is planned to run

for at least 10 years. During the first test period, lignite will be the focus of the testing while bituminous coal will be used in a second test period. The tests will yield essential data on heat transfer, combustion efficiency, emissions, dynamic behaviour, plant design, performance, cost, and economics for both greenfield and retrofit applications.

Through a cooperation agreement signed between Gaz de France and Vattenfall, the CO₂ captured at Schwarze Pumpe will be used for enhanced gas recovery and storage at Europe's second largest onshore gas field, Altmark, during a three-year trial period. CO₂ will be injected at depths of 3000 m, and methods will be investigated for extending the natural lifetime of the gas field combined with permanent CO₂ storage.

Schwarze Pumpe is the first of a series of demonstrations in oxy-combustion CCS technology. Before the end of the year, Europe's second project will start-up at Lacq in South West France. Alstom's role in the project, run by Total, is to retrofit a 30 MW boiler for oxy-firing combustion.

Senoko sale reflects low level of privatizations

■ Five bidders but sale price short of Tuas
■ Will not earn "significant amounts"

The strong interest received in the sale of Senoko Power last month is, according to some analysts, a reflection of the few privatizations in the Asian power market.

A consortium, known as Lion Power, led by the Japanese trading company Marubeni and GDF Suez bought Senoko Power from the Singapore sovereign fund Temasek for S\$3.65 billion dollars in cash. Marubeni and GDF Suez each hold a 30 per cent stake in the consortium that includes Japan's Kansai Electric Power and Kyushu Electric Power, as well as the Japan Bank for International Cooperation.

Interest in the sale of Senoko Power was strong. Other bidders for Senoko

were Keppel Corp. of Singapore; OneEnergy, a 50:50 joint venture between Hong Kong's CLP Holdings and Japan's Mitsubishi; Tata Power of India and Malaysia's YTL Power.

"I think what made so many people bid for these assets is because there are not many privatizations taking place," said Simon Powell, head of power research at CLSA in Hong Kong.

But Powell said that the price was low compared to the Tuas Power deal and that Marubeni could improve the efficiency of some of the assets. Further, Singapore is considered a mature market and no longer has the heavy manufacturing industry that China and India have, which means

demand growth will be slow. "This is 25 per cent cheaper than Tuas on a per-megawatt basis," said Powell. "This is not a high price for the plant. It's not going to earn significant amounts of money, but it will be profitable."

Marubeni, which has bought power assets in the Philippines and is building plants in the Middle East and Indonesia, wants to nearly double its power capacity in two years.

Temasek said that the sale, valued at \$2.5 billion, would see Lion Power also assume \$323 million dollars of Senoko's net debt.

Michael Wheatley, an analyst at Deutsche Bank in Tokyo, said, "This is a huge deal in terms of scale and expense, but it looks to fit in well with Marubeni's previously announced power strategy, providing stable cash flows over a long period; although in terms of return on assets it is not likely to contribute hugely in the short term to earnings."

Senoko Power's installed capacity comprises 1250 MW thermal steam plants, 1945 MW of combined cycle plants and 105 MW open cycle gas turbine. With a combined installed capacity of 3300 MW, it generates 30 per cent of Singapore's electricity. Temasek began the process of disposing of its plants in the mid-1990s but poor market conditions have delayed the sell-offs. Analysts

say it is now taking advantage of the lack of privatizations in the power industry in Asia.

Senoko is the second of three generators to be sold by Temasek. Tuas Power was sold to Huaneng Group of China in March for S\$4.2 billion. Power Seraya is expected to be sold by the middle of next year.

"With the accelerated timeline and expeditious completion of this transaction, we are well-positioned to conclude our [power] divestment plan on schedule," said Gwendei Tung, director of investment at Temasek.

Bankers had warned that Temasek might have problems completing the sales by 2009 because of the credit crunch. Temasek had offered to arrange a short-term bridging loan to speed the sale of the Senoko. But, according to bankers, the consortium was able to secure its own financing. People with knowledge of the deal said the consortium of banks will provide S\$2.9 billion dollars in an 18-month bridging loan to back the bid, *Reuters Basis Point* reported.

The bank consortium comprises ANZ, DBS Group, Bank of Tokyo-Mitsubishi UFJ, Dexia, Dresdner Bank, KBC, corporate bank of Mizuho Financial, Natixis, OCBC and Royal Bank of Scotland.

Morgan Stanley and Credit Suisse are advising Temasek on the sale of the power plant.



Senoko: Marubeni could improve the efficiency of some of the assets.

Advertise

in
The Energy Industry Times
by calling the hotline today:
+44 208 123 1685
or enquire:
paul.miosga@teitimes.com

CLEAN POWER TODAY!



Instead of imagining a better environment,
let us help you make it happen.

Our environmentally efficient technology is installed and working in thousands of power stations around the world. So, in partnership with our customers, we're already building a cleaner energy industry. You have the will. We have the way. Join us.

Visit www.power.alstom.com

We are shaping the future

ALSTOM

Visit us at CEPSI on booth no. C104

Credit crisis may take its toll

Developers of new nuclear power plants in the US appear enthusiastic about their proposed projects, but the turbulent financial conditions and escalating construction costs are likely to take their toll, writes Siân Crampsie.

The looming expiry date for federal tax incentives related to new nuclear power plant construction in the USA is leading to a rush of license applications from potential developers in spite of concerns over escalating construction costs and the credit crisis.

Detroit Edison, Luminant, Exelon and Entergy have all submitted applications in the last month to the US Nuclear Regulatory Commission (NRC) for the construction of new nuclear power plants, making them eligible for a share of a \$6 billion pool of federal money earmarked for new nuclear build.

But the recent takeover of Constellation Energy by MidAmerican has thrown the future of EDF's EPR reactor programme in the USA in doubt.

France-based EDF is planning to build four EPR-based nuclear power plants in the USA with Constellation through their joint venture firm Unistar Nuclear. The company is concerned that under new ownership, Constellation may reconsider its nuclear build activities leaving EDF to take on the projects by itself, or find a new partner.

MidAmerican Energy Holdings, a

unit of Warren Buffett's Berkshire Hathaway Inc., is to buy Constellation Group for \$4.7 billion in cash and stock, in effect rescuing the Baltimore-based utility from financial difficulties brought on by the turbulent financial markets. Buffett is known to consider new nuclear build a bad option for utilities due to rising construction costs.

The US entrepreneur cited rising costs in early 2008 as the reason for scrapping MidAmerican's plans to construct a new nuclear plant.

In spite of the difficult market and uncertain future of the nuclear power projects, French firm Areva is moving forward with plans for the construction of a new uranium enrichment plant in Idaho state.

The NRC has received 15 license applications for 24 reactor units since the beginning of 2007. It is expecting to receive three more applications before the end of 2008, and two in 2009. Areva says that even if only ten of the proposed projects are built, the USA will still need to boost enrichment capacity due to the expiry of the Megatons-to-Megawatts programme in 2013.

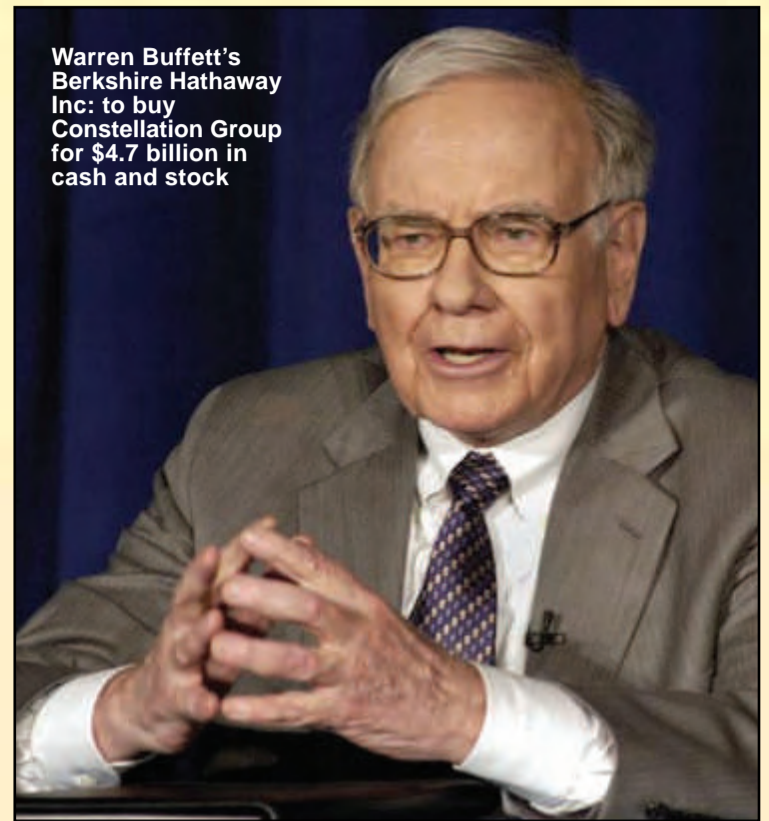
Detroit Edison's proposed 1500 MW nuclear plant near Newport,

Michigan, is expected to cost around \$10 billion, and the company has welcomed the passage of new legislation in the state that will increase regulation and remove consumers' right to choose supplier.

"In the face of challenging national energy issues, the Michigan legislature has taken comprehensive action to assure clean, affordable and reliable energy for Michigan's future," said Detroit Edison Chairman and CEO Anthony F. Earley Jr. "The legislation has also provided the certainty necessary to construct new power plants."

Detroit Edison, Exelon, and Entergy have all opted for GE Hitachi's ESBWR reactor design. Detroit Edison's application is for a single unit at its existing Fermi 2 nuclear plant. Exelon is planning two units in Victoria County, Texas, while Entergy is proposing the construction of a single ESBWR unit at its existing River Bend site in Louisiana.

The plants are required to meet the projected increase in energy demand and in particular the need for baseload power, say the developers. The US Department of Energy has forecast that electricity demand in the USA will increase by 25 per cent by 2030,



Warren Buffett's Berkshire Hathaway Inc. to buy Constellation Group for \$4.7 billion in cash and stock

and that 250-500 new baseload power plants will be needed.

Luminant is proposing to build two new 1700 MW nuclear reactors at its Comanche Peak nuclear plant near Glen Rose, Texas. The Texas-based utility has chosen Mitsubishi Heavy Industries' US-APWR reactor design for the project, and the two companies have formed a joint venture.

Under Michigan's new energy policy, ratepayers will finance most of the \$10 billion needed for the construction of Detroit Edison's proposed Fermi 3 plant. While electric rates for commercial customers will rise, residential rates will increase year-on-year under the new legislation.

According to French nuclear firm Areva, even if only ten new nuclear plants are built in the USA, they will require uranium enrichment services

equivalent to a minimum of 2 million Separative Work Units (SWU) per year. The first of the new nuclear plants could start operating as early as 2015.

EDF is planning to build EPR plants at Calvert Cliffs, Callaway, Bell Bend and Nine Mile Point. It has already submitted license applications for two of these units.

Areva is planning to submit an environmental impact assessment report for its planned Eagle Rock uranium enrichment facility to the NRC in October, according to local reports. The \$2 billion facility is scheduled to start operating in 2014, providing services for the country's nuclear industry, which currently relies heavily on imports.

Areva's new enrichment facility will have an annual production capacity of 3 million SWU.

Grid gets smarter

The pressing issues of energy security and climate change are bringing home the need for the development of a "smart" electricity grid in the USA, said the GridWise Alliance.

The organization, which was founded in 2003 to promote deployment of advanced technologies for the transmission and distribution grid, has added 15 new companies and academic organizations to its membership.

"In recent months energy issues have been on the minds of many Americans. With passage of the energy bill in 2007, Congress recognized the need for us to produce and consume energy more efficiently. One of the actions they proposed is the deployment of a smart grid," said Terry Mohn, Vice Chair of the GridWise Alliance, and Technology Strategist/Enterprise Architect with San Diego Gas & Electric.

These sentiments have been echoed by corporate giants GE and Google, which have formed an alliance aimed

at promoting investment in advanced transmission and distribution technologies. Meanwhile, Beacon Power Corp. said that it plans to start testing a newly developed flywheel matrix that could be used to enhance grid stability.

GE and Google will focus their activities on lobbying in Washington, DC and on the deployment of new energy technologies such as Enhanced Geothermal Systems and hybrid electric vehicle technology. Investment is needed in order to ensure energy security, enable energy efficiency and the connection of renewable capacity to the grid, said the companies.

BC Hydro, the Institute of Electrical Power Engineering, Open Systems International, Progress Energy and Solar Integrated Technologies are among the companies that have joined the GridWise Alliance. Its current membership includes ABB, EDF, Duke Energy, GE, National Grid, TVA and Siemens.



Brazil looks to nuclear future

- Seeks ITER membership
- Boosts thermal, renewable capacity

Brazil is continuing to develop its energy policy in the face of rising energy demand and uncertainty over fuel imports.

The government has in recent weeks announced plans to further develop its nuclear sector, while the latest market research indicates that the increased use of sugarcane bagasse will help the country to reduce dependence on hydropower.

Local reports indicate that Brazil is planning to construct a fleet of new nuclear power plants in order to improve energy security. As many as four new reactors could be built: Angra, the site of the country's only existing nuclear power facility, and possibly more at other locations.

Brazil is also considering the creation of an independent nuclear watchdog agency to support the development of its nuclear industry, and, supported by the European Union, has decided to negotiate full membership of the International Thermonuclear Experimental Reactor (ITER) project.

Brazil relies on hydropower for around 80 per cent of its electricity supplies. It is aiming to boost thermal generation capacity but there are question marks over the reliability of

imports from Bolivia and Argentina.

The creation of a new nuclear energy agency would help to bring Brazil's expanding nuclear power programme in line with international standards, particularly with regard to safety and security. Meanwhile, participation in the ITER programme, which involves construction of an experimental fusion reactor at Cadarache, France, would give Brazil a share in the project's intellectual property rights.

Brazil hopes to obtain the backing of ITER's current partners – the USA, Russia, Japan, China, India, South Korea, and the EU – and to pay part or all of its \$1 billion share in shipments of niobium, a mineral used to line the reactor.

Paraguay is also reported to be seeking renegotiation of a treaty covering the distribution of power from the Itaipu dam on the two countries' border. Brazil currently pays Paraguay around \$100 million per year for electricity from the project, but Paraguay's new administration wants more.

Brazil says it is not keen to renegotiate the treaty, but the move by Paraguay brings uncertainty for Brazil at a time when electricity demand is rapidly rising and a

political crisis in Bolivia has suspended exports of natural gas.

Petrobras, however, says that new natural gas discoveries and an increased number of pipelines will enable it to boost thermal generating capacity. The oil company currently operates 5510 MW of thermal plant and is aiming to increase this to 7150 MW by 2010.

Of that total, 5525 MW will operate on natural gas.

Brazil currently operates two nuclear reactors at Angra with a total capacity of around 2000 MW. It is currently finishing construction of a third, 1350 MW reactor at the site.

The country has large proven natural gas reserves but slack demand and a lack of transport infrastructure mean that they have remained largely unexploited.

Finnish firm Wärtsilä recently reported that it had received an order for the construction of two new power plants in Miranda do Norte in the state of Maranhao, Brazil. The two 331 MW plants will operate on heavy fuel oil and will start operating by the end of 2009.

Angra III is expected to start commercial operation within the next five years.

17th Conference of The Electric Power Supply Industry

2008.10.27-31

Macau SAR, China – Venetian Macao Resort-Hotel



Power Sector in a Fast Changing World

Climate

REGISTRATION is now OPEN! Log on to www.cepsi2008.org and join the most influential event for the power industry in the region.



António Cavaco
Former Director General
ECHO, Portugal



Franz Bauer
Head of Fossil Power Plants
VSB PowerTech, Germany



Geoffrey L. Chan
Chief Construction & Maintenance
Engineer
HK Electric, Hong Kong SAR, China



Guido Bartels
Chairman
GridWise™ Alliance, USA



Hans Jan Borge
Secretary General
EURELECTRIC, EU



Hwai Chiang Hsu
VP for Nuclear Safety, Generation &
Back-end Management
Taiwan Power Company, Taiwan



Ichiro Takekuro
Executive Vice President, Chief Nuclear
Officer
Tokyo Electric Power, Japan



K K Chan
Managing Director and Head of
Investments Greater China
Climate Change Capital, UK



James Locke
Project Director
Mott MacDonald, UK



Jeff Starba
Chairman, President & CEO
PJM Resources, USA



Jose Penedas
Chairman & CEO
Redes Energéticas Nacionais, Portugal



Justor Isles
Editor in Chief
The Energy Industry Times, UK



Mark Lortby
Manager, Reliability Assessments
NERO, USA



Mark McGranaghan
Director, Power Delivery & Markets Sector
EPRI, USA



Mohan Munasingha
Vice Chairman
Intergovernmental Panel on Climate Change
IPCC, Switzerland



Pier Nabuurs
CEO
KEMA, The Netherlands



Roy Adair
CEO
Sembak Power, Singapore



Shane Spurway
Head of Carbon Banking Asia
Fortis Bank, Belgium



Stuart Dalton
Director, Generation Sector
EPRI, USA



Thomas Brown
Emission Control Project Manager
CEP, Hong Kong SAR, China



Udo W. H. Niehage
CEO of the Division Power Transmission
Siemens, Germany



Wu Guanghua
Greater China Director
Climate Group, China



Wu Xiaochan
Chief of Power Grid Technology Research
Division
China Southern Power Grid, China

CEPSI 2008 Secretariat

Tel: + 66 2 7487881

Fax: + 66 2 7487880

E-mail: inquiries@cepsi2008.org

www.cepsi2008.org

Host

Organiser

Principal Sponsor

Supporting Organisations

Platinum Sponsor

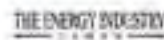
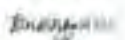
Gold Sponsor

Silver Sponsor

Bronze Sponsors



Media Partners



China demand may ease

Analysts are predicting an imminent slowdown in China's power demand. Its historical rapid growth in energy demand is also expected to ease in the next 10 years.

Analysts at Lianhe Securities are predicting slower growth in electricity demand over the next two to three months due to a drop in demand from high energy consuming industries. The analysts also argue that the growth rate of China's electricity demand in 2008 will not be higher than the average level over the past five years.

They said statistics show that China's four major high energy consuming industries consumed 38.16 per cent of the nation's total new capacity in the first half of this year, down 6.68 per cent from the figure for the same period of 2007.

Looking to the longer term, Chen Jiagui, vice-president of the Chinese Academy of Social Sciences said the country's rapidly rising energy demand may ease off by 2018 when the nation is expected to have realized its industrialization and urbanization.

Speaking to the *China Daily*, Chen also warned of a "severe energy supply shortage" if China fails to accelerate its exploration of coal reserves and other energy sources. "We will encounter another decade of a tight energy supply-demand balance," Chen said.

Chen called for further measures to encourage businesses to conserve energy. "We cannot sustain the energy supply... And we also cannot pay the environmental costs of burning increasing amounts of coal."

The authorities have already taken measures to cut energy consumption per unit of GDP by 20 per cent from 2006-10, with further reductions expected after 2010. The government is also determined to increase the output of hydropower, nuclear and renewable energy.

In September, Three Gorges Power Company said that the last of the 26 planned power-generation turbines at the Three Gorges Dam will be completed this November, one year ahead of the original plan.

China will also begin construction of the world's first nuclear plant using the Westinghouse AP1000 nuclear reactor at Sanmen Nuclear Power Project (NPP) in Zhejiang Province in March 2009.

Vietnam soon to end shortages

State utility Electricity of Vietnam (EVN) expects to add some 3000 MW to the national grid late this year to bring an end to power shortages. EVN is working on 40 electricity generation projects, of which 28 are under construction and 12 are in the preparatory stage.

In addition, 10 other power projects, mostly thermal, built by other investors are also in the final stage of construction. However, the country's power development programme is being challenged by a shortage of coal. Demand for electricity is expected to increase by 17-20 per cent per year and thermal power plants will need more imported coal.

In an effort to meet domestic demand for coal, Vietnam will have to start importing coal in 2013, according to the Vietnam National Coal and Mineral Industries Group. In the 2012-17 period, domestic supply will be short about 11 million tonnes of coal each year.

Indian nuclear programme draws international support

■ Indo-US deal clears US House of Representatives
■ Companies set to move after NSG waiver

by Junior Isles

Having received approval in the US House of Representatives, India's nuclear expansion programme is now also gaining support from the European Union.

At the end of September, the EU said that it will cooperate closely with India on civil nuclear research and development. France's president, Nicolas Sarkozy and Indian Prime Minister Manmohan Singh announced the agreement at an EU-India summit. More specifically, the EU and India plan to boost their joint work in the thermo-nuclear experimental reactor project, which is aimed at the development of nuclear fusion reactors.

Just prior to the agreement, India received another boost to its nuclear hopes when the US House of Representatives approved a landmark deal that would pave the way for US companies to sell nuclear technology to India for the first time since Delhi tested a nuclear weapon in 1974.

Approval by the House meant that the deal now has to clear the Senate. US President George W. Bush and Mr Singh have been pushing hard to get the deal approved by Congress before Congress recesses ahead of the US presidential elections in November.

The deal has had to overcome a number of hurdles in order to satisfy concerns surrounding non-proliferation. In mid-September, the 45-member Nuclear Suppliers Group (NSG) approved an exemption allowing India to carry out trade in nuclear products and technologies despite not being a signatory of the Nuclear non-Proliferation Treaty.

The NSG waiver drew criticism from some countries such as China, which noted that the peaceful use of nuclear energy had to be balanced against concerns about weapons development. The Australian government said it will not sell uranium to India despite welcoming the NSG decision.

The waiver opens the door for global nuclear energy companies to enter a



France's president, Nicolas Sarkozy and Indian Prime Minister Manmohan Singh are now in close cooperation

nuclear reactor market worth tens of billions of dollars. A host of companies including France's Areva, Westinghouse Electric Co. and General Electric of the US and Russia's Rosatom, have all been jockeying for a slice of this lucrative market.

The government said it had started dialogue with overseas companies for setting up nuclear power plants. "In view of the public interest in developments relating to our civil nuclear initiative, I can inform you that following the NSG statement, which enables civil nuclear cooperation by NSG members with India, the government is taking steps to realise commercial cooperation with foreign partners in the field," External Affairs Ministry spokesman Navtej Sarna said in a statement.

Coastal sites of Maharashtra and Tamil Nadu will be the first beneficiaries of nuclear power after the NSG waiver for India's nuclear commerce as plants have been planned to generate at least 14 000 MW of power.

India plans to import eight 1000 MW nuclear-powered reactors by 2012 and the US hopes to win at least two contracts, which it feels will significantly boost its nuclear industry.

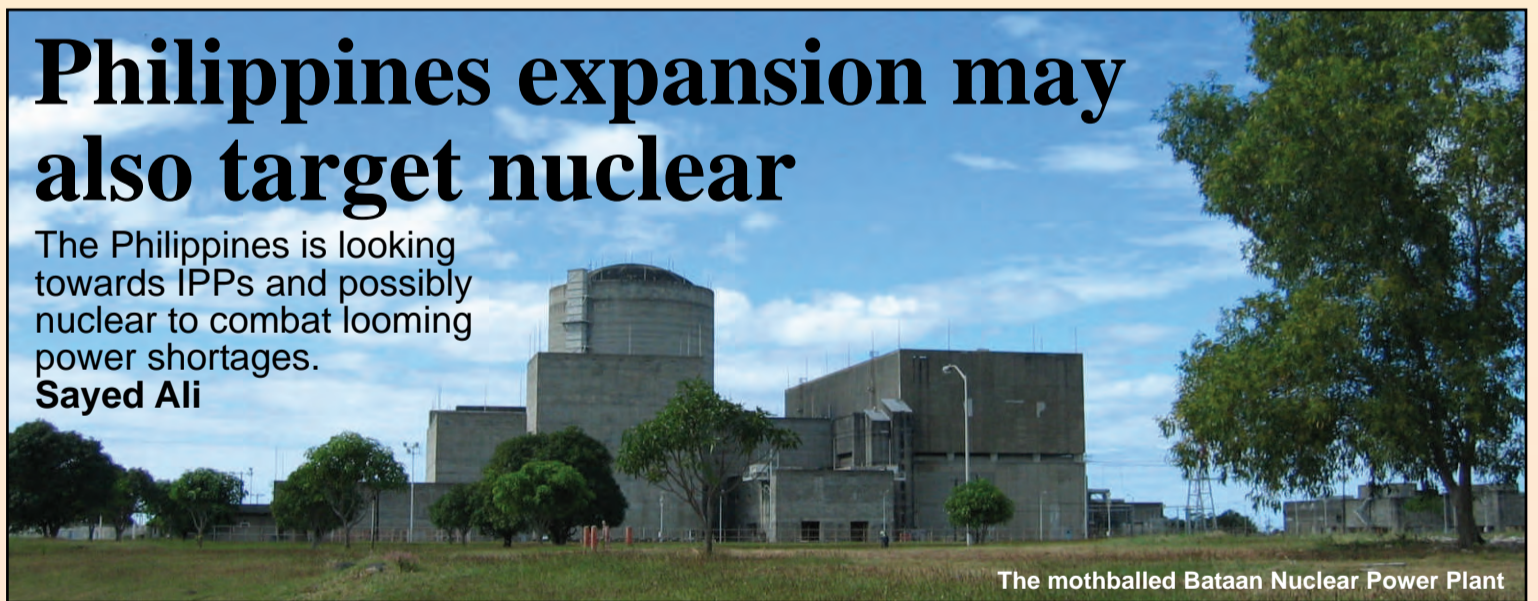
The envisaged sale of at least two reactors, to what it calls a "lucrative and growing Indian market", would create 3000-5000 direct jobs and 10 000-15 000 indirect jobs in the US nuclear industry, the US Department of State has said.

Meanwhile, according to recent reports a joint delegation comprising representatives of a Russian company and Nuclear Power Corporation of India Limited (NPCIL), visited Kudankulam to examine the feasibility of setting up four more units of 1000 MW each.

Both sides were in the process of installing four units of 1000 MW each as per an agreement signed before the NSG barred countries from entering into nuclear commerce with India as it was not a signatory to the NPT.

Philippines expansion may also target nuclear

The Philippines is looking towards IPPs and possibly nuclear to combat looming power shortages.
Sayed Ali



The mothballed Bataan Nuclear Power Plant

In the face of a looming power shortage, the Philippines is set to embark on a two-year study to determine the feasibility of using nuclear energy.

According to reports, the Department of Energy will form a core group to be headed by one of its undersecretaries and an official from state-owned National Power Corp. (Napocor). One source said the study, which will begin this month, will focus on the viability of rehabilitating the mothballed Bataan Nuclear Power Plant (BNPP).

Separately, several IPPs have announced plans for new thermal plants in the country.

Redondo Peninsula Energy Inc., a joint venture of Aboitiz Power Corp. (APC) and Taiwan Cogeneration, expects to start the construction of a \$500 million coal fired power facility in Subic shortly. APC vice president

Wilfredo Bacareza Jr. said: "If we could start the construction this year, it would be completed in three years in time for the projected power demand for that period."

Bacareza said they are also negotiating with several local and foreign banks to finance the 300 MW project.

The proposed project is Phase I of a 600 MW gross output coal fired power plant that uses circulating fluidized bed technology, complete with coal supply infrastructure, grid connection and ash disposal.

Aboitiz also said it expects to firm up a \$450 million loan for the proposed 246 MW expansion of the Toledo coal-fired power plant in Cebu.

Meanwhile, DMCI Power Corp., a wholly-owned unit of the Consunji family's DMCI Holdings Inc., is planning to borrow Peso5 billion from a group of commercial banks to fund

the construction of its coal fired power generation plants in the provinces of Masbate and Iloilo.

Ed Francisco, president of BDO Capital & Investment Corp., said he expects the financial closing for the two power plants by the end of the year as negotiations with electric cooperatives and other distribution utilities have yet to be completed.

The spotlight was put on IPPs in September when Senator Loren Legarda questioned why the Manila Electric Co. (Meralco) continues to buy power at more expensive rates from the Lopez family-owned independent power producers, when the National Power Corp. (Napocor) offers cheaper prices.

Citing a report by the National Association of Electricity Consumers for Reforms (Nasecore), Legarda said Meralco bought more than 50 per cent of its power needs from Lopez plants

at an average cost of 5.38 peso/kWh. Napocor's price for August was only 3.57 peso/kWh, and even the Wholesale Electricity Spot Market (WESM) pricing was only 3.09 peso/kWh. The national association said it obtained the data from Meralco's own website.

The senator said Meralco violated the terms of its franchise that require the utility to provide electricity to customers at the least cost. Meralco could lose its franchise if it is found to have violated the provisions of the Electric Power Industry Reform Act (EPIRA) by charging its customers higher electricity rates.

The news came just weeks after Meralco finally received approval from the Energy Regulatory Commission for the purchase of the sub-transmission assets owned by the National Transmission Corporation (TransCo).

Asia News

NZ set to pass climate legislation

The New Zealand government's controversial emissions trading legislation looks set to pass after New Zealand First said it would back the bill. The Green Party has already pledged support, meaning there is now a majority in favour of the legislation in Parliament.

Under the legislation, all sectors of the economy will eventually come under a regime that sets limits on the amount of greenhouse gas they can emit. Those that exceed their limit will have to buy carbon credits from those that are below their limit. The scheme is expected to result in an increase in the price of electricity.

New Zealand First leader Winston Peters said yesterday his party had gained several concessions in return for its backing. "We have secured a package that will ensure that all households will receive a one-off payment to mitigate the impact of the emissions trading scheme (ETS)," he said. The Greens, who announced their support just ahead of New Zealand First, persuaded the Government to set up a \$1 billion fund to insulate homes.

The scheme, which is at the heart of the government's climate change policy, remains opposed by the National party. Party leader, John Key has said if they won the election it would develop its own scheme and introduce it within nine months of taking office.

Thailand considers privatization fund

The Finance Ministry and the Securities and Exchange Commission are considering a new public utilities fund to help raise funds from the privatization of state assets.

The idea is likely to be controversial, considering the heavy public opposition to privatization. Pravej Ongartsittigul, a senior assistant secretary-general of the SEC, denied that the public utilities fund concept was aimed at indirectly privatizing state utilities or raising off-budget funds. He said several local fund managers had petitioned the SEC for permission to establish the fund structure, adding that the concept was in line with development policies set by the regulator.

The SEC has indicated that a public utilities fund could invest in a project or business related to electricity, water, power, roads, telecoms or airports. The fund itself could take on liabilities of up to 10 per cent of the net asset value, and would be subject to shareholding limits for foreign nationals as well as restrictions on the size of individual holdings.

Pichit Akrahit, the president of MFC Asset Management, said his company was interested in the idea. "MFC already has investments in alternative energy projects that are quite similar to a utilities fund."

Meanwhile, Egat is planning to sell two billion baht worth of bonds this month (October). The funds raised from the debt issue would be used to increase the state utility's working capital. The Government Savings Bank will underwrite the bonds. In September Gheco-One Ltd, a subsidiary of the SET-listed power producer Glow Group, signed a 25-year PPA with Egat for its 660 MW coal fired power plant. The plant is the first of the four licence winners in the second round of IPP solicitations to complete a PPA with Egat.

Indonesia moves to secure energy sources

Indonesia is making a concerted effort to secure energy sources to supply its power plants.

In August, State power company PT Perusahaan Listrik Negara (PLN) said it was accelerating its plan to acquire coal mines to ensure supply for its power plants. The company is already in talks with 15 potential mining companies.

"Some of these companies have large mining areas that are yet to be exploited. We will try to tap that advantage. By buying stakes of coal companies, PLN will guarantee its supply," Fahmi said.

PLN is currently the biggest single domestic consumer of coal, with consumption expected to reach 34 million tons this year, 43 million tons

in 2009 and 82 million tons in 2010.

The soaring coal demand is being driven primarily by the government's so-called Crash Programme aimed at securing 10 000 MW by 2011.

The Crash Programme, which PLN has struggled to finance, received a recent boost when the government sanctioned a plan by PLN to issue a global bond valued at \$1.1 billion. Bonds are favoured over asset securitization or bank loans as it will make PLN more transparent in the use of funds, a government official said.

Following the announcement, Japan's Sumitomo Corporation, said it may spend up to US\$1.5 billion to build two additional generators at Tanjung Jati B coal-fired power plant

in Jepara, Central Java. The expansion of Tanjung Jati B power plant would support the government's second 10 000 MW electricity program, which will commence in 2011.

J. Purwono, director general for electricity and energy usage at the Energy and Mineral Resources Ministry, said that Sumitomo would build two generator units with a combined capacity of 1320 MW to augment the existing generators at the plant. "Construction is to start in early 2009. Three years later the new units will go on-line," he said.

Purwono said Sumitomo would seek financial support for the project mostly from the Japan Bank for International Cooperation (JBIC). "The total investment will be between



J. Purwono: Sumitomo to build two new units

\$1.2 billion and \$1.5 billion. The largest investment will come from JBIC. Sumitomo is still finalizing the financial scheme for this project. Local banks are invited to join if they are interested."

Purwono said PT Central Java Power had agreed to sell electricity from the plant to PLN at a price of 4.3 cents/kWh. "This is a competitive price," he added. Currently, PLN buys electricity from the plant at between 4 and 5 cents/kWh – not including fuel prices.

UFI Approved Event **EP/China 2008** **Electrical China 2008**

The 12th International Exhibition on Electric Power Equipment and Technology

The 5th International Exhibition on Electrical Engineering, Electrical Equipment and Contractors' Supplies

November 12 - 14, 2008
China International Exhibition Center, Beijing, P.R. China (Hall 2 - 6)

The largest international platform in the power industry in China

Why EP China

- 1. 3M, ABB, Siemens, Schneider, Chint, Areva, GE Energy, Hyosung, Eaton, Toshiba, Hitachi, Xiamen Hilsaon, Japan AE Power, EDF, Menckies, Rochling, Tamco, Wohner, Du Pont, Dow, Corning, Yielix Hitech, Exide, Rittal, NRG, Formosa, Hyundai, etc.
- 2. International pavilions from Germany, Korea, United States, Spain & United Kingdom
- 3. Symposium on Power Transmission & Distribution Technology, Environmental Protection Technology, by Areva, GE Energy, Siemens, Schneider, Albemarle, Argillon GmbH, etc.
- 4. New concurrent event - "International Exhibition on Energy Conservation, Environmental Power and Desulphurization & Deminification", "China Power Business Convention"

Sponsor: China Electricity Council

Organizers: China Electricity Council International Electric Power Industry Office of China Consul for the Promotion of International Trade

Supporters: State Grid Corporation of China, China Huateng Group, China Huadian Corporation, China Power Investment Corporation, China Southern Power Grid Co., Ltd., China Datang Corporation, China GuoDian Corporation

Overseas Co-organizers: ADSALE, ABB, Siemens, Schneider, Hitachi, Toshiba, etc.

Concurrent Event: EPEC/China 2008 Environmental Power and Desulphurization & Deminification

Visiting & Symposium Pre-registration

www.2456.com/ep

R&D centre targets 10 GW wind machines

The drive to develop and commercialise next-generation wind energy technologies has been given a boost with a European 'campus' for research and development (R&D).

NaREC, a UK-based renewable energy research centre, is planning to develop a dedicated range of independent facilities for wind technology R&D, a move that it believes will enable European technology companies to move beyond the current 5 MW benchmark.

The plans are being driven by the increasing demand for wind energy, particularly in Europe, where strict and ambitious renewable energy targets have been proposed.

"Installed wind capacity worldwide is growing by 20 GW year on year," said Stephen Wilson, Director of Wind Energy at NaREC. "By 2050 the world could need over 1000 GW. The industry now needs to make rapid step changes in turbine technology; increasing capacity and improving reliability, to ensure that supply meets with such a demand."

Northumberland-based NaREC already supports wind turbine manufacturers in the testing and development of advanced wind turbines. It says that the new campus will include the world's largest drive train facility, able to test complete nacelle systems of up to 10 MW. Its proposals, which are subject to financing, also include the development of the world's largest blade testing facility, which will be capable of testing wind turbine blades up to 100 m in length.

The installation of wind systems offshore – where large turbine unit sizes are possible – is also gathering pace. Denmark's Dong Energy recently secured €160 million of financing from the Nordic Investment Bank for the Horns Rev II project in the North Sea.

A total of ten offshore wind projects are currently operational worldwide, according to the British Wind Energy Association. The European Wind Energy Association predicts that 5 GW of offshore capacity and 60 GW of onshore wind capacity will be installed by 2010.

At 160 MW, Horns Rev I is currently the world's largest offshore wind farm. The second phase of the project is likely to be around 200 MW in size.

Danish-Dutch link will boost EU security

A new power link proposed between Denmark and the Netherlands could significantly increase security of supply as well as allow for the integration of more renewable energy in the grid.

The feasibility of the so-called Cobra link is currently being investigated by the Dutch and Danish transmission system operators Tennet and Energienet, and is in line with the European Union's ambitions for a stronger and more interconnected European grid.

Tennet and its Norwegian counterpart Statnett recently marked the official opening of the NorNed HVDC link between Norway and the Netherlands.

The proposed Cobra link would help Denmark to integrate 40 per cent more wind energy into its power system, as well as help the Netherlands with its renewable energy expansion plans.

CCS funding leaves Commission in a quandary

Observers are warning that an investment gap is threatening the future of CCS technology, yet the European Commission remains hopeful that it will play a major role in its climate change goals.

Siân Crampsie

EU Energy Commissioner Andris Piebalgs: open to leveraging the ETS and EU state aid guidelines to fund CCS demonstration projects

The European Commission is moving forward with plans to promote the commercialization of carbon capture and storage (CCS) technology but appears unlikely to finance individual demonstration projects.

The Commission has launched a tender for assistance in developing a CCS 'project network' in Europe as part of its wider plans to tackle climate change. However, it says that the European Union has no extra budget to allocate for specific CCS projects and that financing must continue to come from individual member states.

The European parliament is currently debating a proposal under which funding for emerging technology could be procured from the European Union's Emissions Trading Scheme (ETS). Both the International Energy Agency (IEA) and consultants McKinsey & Company warned recently that the region needs to plough more money into development of CCS technology if the EU is to achieve its climate goals.

The European Commission wants to see up to 12 CCS demonstration plants up and running by 2015 and has made CCS a key element of its climate and energy package, put forward in early

2008. It has also implemented a Strategic Energy Technology Plan to promote low-carbon technologies.

Part of these initiatives is the development of a CCS project network that would allow early technology movers to exchange information and experiences from their demonstration projects. It believes that CCS could, by 2020, be able to stand on its own two feet in the ETS-drive environment.

The IEA has praised the European Commission for its forward-thinking and bold policies on energy and climate change, but says that the EU's current energy R&D spending level of €5.1 billion to 2013 will be inadequate to reach climate change targets. McKinsey says there is an economic gap of €0.5-1.1 billion per CCS demonstration project that must be filled if CCS technology is to take off.

British MEP Chris Davies is proposing to use €10 billion of allowances from the EU ETS to help finance large-scale CCS demonstration projects. The allowances would be taken from the EU ETS's New Entrant Reserve, a special pool of emissions rights earmarked for new installations joining the scheme.

He also proposes channelling the funds through the European Investment Bank and ensuring that the funds are paid for actual avoidance of CO₂ emissions.

EU Energy Commissioner Andris Piebalgs is reportedly open to leveraging the ETS and EU state aid guidelines to fund CCS demonstration projects. But opponents to such a scheme argue that the use of allowances from the ETS could negatively impact the scheme, and that it is unfair for it to be used to finance just one technology.

Other suggestions for CCS funding include shifting funds from other parts of the EU budget – for example, farm subsidies – towards CCS.

A recent report from McKinsey says that CCS technology could be competitive with other low-carbon technologies by 2030. CCS project costs are currently estimated to be €60-90/tonne of CO₂ abated and could fall to €30-45/tonne for new coal fired power by 2030.

This price range is "in line with expected carbon prices" under the EU ETS, says McKinsey.

Project costs for CO₂ capture projects include not only the construction and

operation of the carbon capture plant itself, but also the transport and injection of the CO₂ into underground rock formations. Costs will fall as CCS technology moves from the demonstration to the early commercial phase, says McKinsey.

However, the consultants note that, "if projects are delayed due to difficulties with permits or other uncertainties, CCS could struggle to reach large scale in 2030".

Other issues that CCS technology must overcome include long-term storage integrity, public acceptance of the technology, legal issues concerning property rights and ownership of stored CO₂, and the legal and regulatory framework that will govern the CCS market.

The IEA estimates that the use of CCS could account for 20 per cent of the achievable global greenhouse gas emission reductions by 2050.

A number of companies have already started investments in CCS technology development, including Shell, E.ON, RWE, Vattenfall and Statoil. Plans to construct CCS demonstration projects are underway in the UK, Norway and Germany, as well as the UAE and USA.

UK opts for voluntary levy

■ Governments under pressure to ease energy costs

■ Utilities escape windfall tax

The UK's plans to tap utilities' coffers to help fund measures aimed at reducing energy bills is yet another example of how European governments are finding ways to reduce the impact of high fuel prices.

British Prime Minister Gordon Brown has unveiled a £1 billion energy saving initiative that he says will drive "lasting change" in energy efficiency and consumption. It is in contrast to policy in other European countries, which has varied from taxes on energy companies in Italy, to the protection of energy 'champions' in Germany.

The UK's new package of measures was unveiled in September after much

speculation over the possibility of a windfall tax on utilities and direct payments to the 'fuel poor' to help meet the cost of heating homes.

Instead, Brown has opted for a more long-term strategy involving the funding of home improvements such as insulation and the provision of energy efficiency advice. The plan has been criticised by fuel poverty pressure groups, trade unions and Brown's opponents as it will do little to help those in need of help with fuel bills this winter.

The measures will be funded by the UK's "big six" energy companies: E.ON, npower, EDF Energy, Scottish Power, Centrica, and Scottish &



Southern. These companies have already agreed to triple their total annual spending on social assistance to £150 million by 2011.

In France, consumers have been less exposed to higher oil and gas prices due to the country's reliance on nuclear power. In Germany and Italy concerns have been raised over the possibility that energy companies have been profiteering from high prices.

In Germany, the energy companies are insisting that the required investments in new plants and renewable energy justify their earnings and the government has backed them up. In Italy, however, the government has introduced a tax on energy

companies to placate consumers. In Spain an investigation has been launched into the energy market, particularly into the relationship between the big oil companies and petrol retailers.

Other measures that had been touted in the UK include the auctioning of carbon permits to ease fuel poverty. Only about seven per cent of permits are currently auctioned and it is thought that the European Commission would be opposed to changing the scheme.

Brown says that he is confident that the utilities will not pass the cost of the scheme back to customers.

US-Russia tension has nuclear implications

Increasing tensions between Russia and the USA may ultimately have implications for Iran's nuclear power programme, writes Siân Crampsie.

The ongoing conflict between Russia and Georgia over the independent region of South Ossetia has led the USA to pull out of a new agreement with Russia aimed at advancing collaboration on nuclear energy.

The US Secretary of State Condoleezza Rice has announced that the US-Russia Agreement for Peaceful Nuclear Cooperation – the so-called '123' Agreement – has been rescinded. The pact was signed by the two countries in May and had been submitted to Congress for approval.

The move by the US is an indication of the deteriorating relations between the USA and Russia following the conflict, which saw Russian troops move into South Ossetia as well as take up positions in Georgia. The US has further signalled its support for Georgia with a \$1 billion package of economic and humanitarian aid.

The 123 Agreement would have cleared the way for extensive nuclear trade between the two countries and was a key element of the US

government's policy of promoting peaceful civilian nuclear energy technology around the world. The US has since announced a similar agreement with India.

The pact with Russia had met with some opposition, however, with concerns over Russia's involvement in Iran's nuclear programme.

Russia has labelled the USA's withdrawal a "mistake" that will harm their partnership and their plans for mutual cooperation in the nuclear energy field. The pact would have allowed Russia to import, store and possibly reprocess spent nuclear fuel from US-supplied reactors.

"The US non-proliferation goals contained in the proposed Agreement remain valid: to provide a sound basis for US-Russian civil nuclear cooperation, create commercial opportunities, and enhance cooperation with Russia on important global non-proliferation issues," said Rice in a statement. "Unfortunately, given the current environment, the time is not



The US Secretary of State Condoleezza Rice: the US- Russia Agreement for Peaceful Nuclear Cooperation has been rescinded

right for this agreement."

Russia's reluctance to implement a ceasefire agreement and withdraw its troops to pre-conflict positions caused outrage among international leaders. The Australian government said it would reconsider a deal allowing Russia to use Australian uranium in its nuclear power plants.

"When the government comes to consider ratification of the Civil Nuclear Cooperation Agreement with the Russian Federation, we will take into account not just the merits of the agreement, but events which have occurred in Georgia and ongoing events in Georgia and the state of Australia's bilateral relationship with the Russian Federation," said Australian Foreign Minister Stephen Smith.

Australia already exports uranium to Russia under an agreement signed in 1990. Under the agreement, Russia can use this uranium to manufacture nuclear fuel for third party countries, but may not use it in its own power

plants.

In 2007, the two countries began talks on expanding this agreement to allow Australian uranium producers to supply Russia's nuclear power industry. Agreement was reached in September 2007 but the deal must be ratified by both governments before uranium exports can begin.

Australia holds 40 per cent of the world's known uranium reserves, while the US controls much of the nuclear fuel market.

Russia has faced isolation over its offensive in Georgia, which began when Georgian forces attacked South Ossetia in early August. Russian forces countered the invasion and pushed into South Ossetia as well as Georgia.

Russia is heavily involved in Iran's programme to build new nuclear power stations, including the construction of and supplying fuel for the first unit at Bushehr, a 1000 MW nuclear power plant. Iran's foreign minister Manuchehr Mottaki was quoted recently as saying that the first 500 MW unit would start

operating in early 2009.

Iran has also indicated its intention to build more nuclear power plants, possibly as many as six by 2021. The US is concerned that the country's intent to develop enrichment capabilities could lead to weapons manufacture.

Iran's official news agency said in August that the country has begun designing its second nuclear power plant, a 360 MW facility in the southwest of the country.

Russia says that its contracts to build and supply fuel for Bushehr are in line with international agreements. However, the *New York Times* has reported that Russia has refused to participate in a meeting with the USA to discuss Iran's nuclear programme.

At the end of September foreign ministers from the US, China, Russia, France, the UK and Germany were forced to cancel talks on Iran after Russia said the talks were not urgent.

Nigeria seeks way out of power woes

Nigeria is maintaining efforts to keep the lights on in the face of an energy crisis by signing pacts with international partners aimed at increasing the generating capacity of its beleaguered power system.

The Nigerian government has signed a memorandum of understanding with Germany that it hopes will inject 6500 MW of new capacity into the power sector between now and 2020. It has also declared an intention of sourcing as much as 20 per cent of its energy needs from renewable sources by 2012.

Nigeria has followed up its pact with Germany by reaching agreement with Iran over the provision of nuclear energy technology. Nigeria currently has no nuclear power generating capacity, but is a major oil and gas exporter.

The agreements are an attempt at overcoming an energy crisis that is causing frequent blackouts and the closure of factories. The country's power generation capacity stands at around 6000 MW, although available capacity is thought to be only 1000 MW.

Under the deal, Germany has pledged to build 6500 MW of capacity in Nigeria, which is Africa's most

populous country and which has a rapidly growing industrial sector. German companies Siemens, ArGe, E.On, Evonik and Kfw Ipx Bank will be involved in the partnership.

The projects will involve the construction of new power plants as well as the expansion and upgrade of existing facilities. They will also include work to improve the country's transmission and distribution system.

Corruption, a lack of investment, and poor maintenance have all contributed to the poor state of the country's power sector. President Umaru Yar'Adua, who came to power last year, has made power sector reform a key policy.

"It is evident that the original objective of the partnership, which is to address Nigeria's energy challenge while guaranteeing Germany's short and long term energy security, has been properly addressed," said Yar'Adua at the signing ceremony.

In August Iran announced that it had agreed a deal with Nigeria to share peaceful nuclear technology in a bid to help its OPEC partner boost generating capacity. Nigeria was quick to stress that the agreement relates to power production technology and should not be misconstrued as an attempt to start a weapons programme.

n Off-grid renewable boost proposed

n Iran agreement on nuclear power

A committee set up by the government to review the status of the power sector said in June that the country needs \$85 billion of investment to meet power demand, which it estimates to be 20 000 MW. Former president Olusegun Obasanjo failed to deliver on his target of increasing generation capacity by 10 000 MW.

The lack of power supply has become a major hindrance to Nigeria's economic expansion and development. The country is Africa's largest producer of oil, but even its refining capacity is hampered by poor power supplies.

The government recently agreed to use \$5.3 billion of funds from the country's Excess Crude Oil account to help overcome power shortages.

Nigeria's government also says that it wants to dramatically increase the level of off-grid renewable energy generating capacity in order to overcome power shortages in a sustainable manner. The Nigeria Special Climate Change Unit says that although renewable energy currently makes up less than one per cent of the country's energy mix, solar power, wind and small hydro could make a real contribution to the power sector.

Jordan seeks independence through nuclear

n Kepco negotiates IPP contract
n Nuclear reactor sought

Jordan's efforts to increase its power generating capacity and improve energy independence are gathering pace.

The country is currently negotiating with Korea Electric Power Corp (Kepco) over the construction of what will be Jordan's largest private sector natural gas fired power plant, and is also planning to purchase a nuclear reactor from France, according to the official news agency.

Unlike its oil-rich neighbours, Jordan lacks energy resources and depends on imports for 96 per cent of its energy consumption.

Jordan has also recently signed energy pacts with China, the USA, Canada and Great Britain, and inked a uranium mining deal with France's Areva.

The negotiations with Kepco follow an international tender to build, own and operate a 400 MW, \$500 million power plant in Qatranah. Government officials expect to finalise contracts soon and plan for the new power plant to be operational by 2011.



Jordan's King Abdullah

The new plant will be the second to be implemented by the private sector after the 370 MW Amman East power plant, which started operating in August. Amman East was built by a consortium of AES Oasis and Mitsui and Co. Ltd.

In August Jordan signed an accord on nuclear cooperation with France following meetings between French President Nicolas Sarkozy and Jordan's King Abdullah II.

In 2007 Jordan's King Abdullah II announced a civil nuclear energy programme that aims to have the first facility operational by 2015.

Energy East ticks Iberdrola's boxes

- Targets increase in generating capacity
- Boosts retail operation

Iberdrola has consolidated its position as the world's fourth-largest electricity company through the friendly acquisition of US utility Energy East.

The €6 billion deal has allowed the Spanish utility to fulfil one of its key strategic objectives and to increase its assets in the USA to around \$20 billion. Regulators have imposed certain conditions on the deal, however.

Iberdrola is to pay €3.2 billion in cash and take on €2.9 billion in debt to buy Energy East, which markets electricity and gas to just under 3 million customers in northeastern USA. It also owns a small amount of generating capacity.

The New York State Public Service Commission (NYPSC) was the last regulatory body to approve the deal but says that Energy East will have to divest fossil fuel generating capacity in New York state. The regulator is concerned about the impact of vertical integration on the market, and will also impose \$275 million in tariff adjustments.

The deal will significantly enhance Iberdrola's presence in

the USA, where it is already the second largest wind power operator with nearly 2000 MW of capacity. Iberdrola expects the US to account for around ten per cent of its total group earnings within three years.

Iberdrola, which has made the USA one of its target markets, aims to reach 6900 MW of generating capacity in the country by 2012. Last year it bought British utility Scottish Power. Its renewable energy subsidiary, Iberdrola Renovables, operates its US wind farms and is planning the construction of additional wind capacity in the northeastern USA.

The acquisition will increase Iberdrola's volume of electricity distributed by 24.7 per cent to 198.4 TWh and its customers by 8.1 per cent to 24 million. It will raise its number of gas customers by 42.9 per cent to 3 million, while its overall installed capacity will increase by 0.3 per cent to 42 650 MW.

Iberdrola's enterprise value now stands at €65 billion and it is the world's fourth largest electricity group by market capitalization.

Doosan takes on post-combustion CCS

Doosan Babcock has extended its technology range and put itself at the forefront of carbon capture technology through a licensing agreement with Canada's HTC Purenergy.

The UK engineering firm now has a product portfolio containing both pre- and post-combustion carbon capture technologies. It will also take a 15 per cent equity stake in HTC through a C\$10 million investment.

Doosan Babcock expects around half of the global new build coal and gas fired power projects in the world (80-100 GW annually) will use carbon capture and storage (CCS) technology to reduce carbon emissions. It says that HTC's carbon capture technology, which is a scrubbing-type system,

delivers 30 per cent greater efficiency than existing CCS technologies.

The agreement will enable Doosan Babcock to participate in large-scale CO₂ capture projects around the world, and also gives HTC access to Doosan's engineering and construction expertise.

The agreement gives Doosan Babcock the right to use products and technologies developed by both HTC and the University of Regina Green House Gas Technology Centre located in Saskatchewan, Canada, a leading institution in CCS technologies.

"This agreement is an important step towards the full-scale demonstration of carbon capture and storage," said Iain Miller, CEO of Doosan Babcock.

Westinghouse builds UK supply chain

- Support for UK projects in place
- Shaw on board for US market

Westinghouse Electric Company is gearing up for the deployment of its advanced nuclear reactor technology in the UK, signing key supply chain agreements with three major companies.

The US-based nuclear engineering firm is looking to collaborate with BAE Systems, Rolls-Royce and Doosan Babcock to bring its AP1000 reactor to the UK, which is planning the construction of several new nuclear power plants.

Westinghouse has also announced a letter of intent with The Shaw Group to collaborate on the construction of AP1000 nuclear power plants in the USA and certain global markets where in-country supply is not available.

The company has a "buy where it builds" policy and the agreements

covering the UK market will lead to between 70 and 80 per cent of the work and services required to construct the AP1000 being provided by the UK supply chain.

The UK's nuclear new build programme received a boost in September when France's EDF reached an agreement to buy British Energy.

Westinghouse has signed separate memoranda of understanding with BAE, Doosan and Rolls-Royce covering various areas of work, including design, production, fabrication and integration of the modules; development of a supply base in the UK; on site erection and assembly of components; support for commissioning, nuclear component manufacturing, and safety and technical support.

Rolls-Royce recently announced that it plans to establish a new civil nuclear power business unit based on its current nuclear skill set, which is currently focussed on the Royal Navy's nuclear submarine programme. It believes it has the largest nuclear skills base of any UK company, with around 2000 specialist nuclear-focused employees in the UK, France and the USA.

It also has the UK's most substantial nuclear supply chain, comprising around 260 proven suppliers.

Rolls-Royce estimates that by 2023 the global civil nuclear market, currently worth around £30 billion a year, will be worth approximately £50 billion a year, with £13 billion in support to existing nuclear plant, £20 billion in new build and £17 billion in support for new reactors.

Tata, Google to tap earth's heat

- "Baseload" potential of EGS to be exploited
- Australia, USA are key markets

The potential of enhanced geothermal systems (EGS) technology has been highlighted in the past month with news that both Tata Power of India and US corporate giant Google are to make investments in the technology.

Tata Power has announced an agreement to purchase an 11 per cent stake in Geodynamics Ltd., an Australian company specialising in EGS. Separately, Google says that it will invest over \$10 million in EGS, the only form of renewable energy capable of producing large baseloads.

EGS, also known as Hot Fractured Rock (HFR) relies on existing technologies and engineering processes and taps the energy stored in granite rocks located 3 km or more below the earth's surface.

Tata's purchase of a stake in Geodynamics for A\$44.1 million will strengthen its renewable portfolio as well as give it a foothold in Australia's growing renewable energy market. Geodynamics has geothermal exploration interests in three Australian states, including a license for exploration of part of the Cooper

Basin.

Google is to use its philanthropic arm, Google.org to invest in EGS technology as part of its Renewable Energy Cheaper than Coal initiative. It will invest in two start-up firms and give a university grant for the study of the potential of EGS.

Google is to invest \$6.25 million in AltaRock Energy Inc. and \$4 million in Potter Drilling. One of the main aims of the investment programme is to achieve significant cost reductions, improved performance and promote the large-scale deployment of EGS.

Australia's Cooper Basin contains the hottest granites on earth and is estimated to be capable of providing a thermal resource equivalent to 50 billion barrels of oil. Tata and Geodynamics have also agreed to review the potential of geothermal prospects outside Australia.

An EGS power plant uses techniques established by the oil industry, such as drilling and hydraulic fracturing, to circulate water through the granites. The extracted heat is then used in a conventional geothermal power plant to produce electricity.

Suzlon snaps up REpower

The global expansion strategy of Indian wind turbine manufacturer Suzlon has continued with the company reaching an agreement to purchase a 22 per cent stake in Germany's REpower.

Martifer, the Iberian construction and energy group, has agreed to sell its stake in REpower to Suzlon for EUR270 million. The deal will take Suzlon's holding in REpower to approximately 90 per cent, allowing it to unlock further synergies from their collaboration.

In June, Suzlon acquired a 30 per cent holding in REpower from France-based Areva.

REpower is Germany's largest wind turbine manufacturer while Suzlon has a ten per cent share of the global wind turbine market.

Tenders, Bids & Contracts

Americas

Alstom bags Santo Antônio

The consortium building the 3.15 GW Santo Antônio hydropower plant in Brazil has awarded engineering group Alstom a €500 million contract to supply key equipment for the project.

Construction firm Construtora Norberto Odebrecht, which is the project's main EPC contractor and also the leader of the Madeira consortium, has signed a contract with Alstom for the supply of electro-mechanical and hydro-mechanical equipment. The plant is scheduled to start commercial operation by mid-2012.

The Santo Antônio plant is being built on the Madeira river in Brazil's northwest Rondônia state. It will consist of 44 bulb-type generating units, which are especially suited to low-head and run-of-river projects such as Santo Antônio.

Alstom will provide 19 bulb turbines and 22 generators as well as 50 per cent of the project's hydro-mechanical and lifting equipment.

The concession to develop Santo Antônio was awarded to the Madeira consortium – led by Odebrecht and Brazilian power firm Furnas – in December 2007. Power from the new plant will be split between the regulated market (70 per cent) and direct clients (30 per cent).

Siemens keen on US wind

Siemens has won an order to supply wind turbines to the 101 MW Keenan wind farm in Oklahoma, USA, bringing its total wind orders for the US power market this fiscal year to 1500 MW.

Siemens will supply 44 of its 2.3 MW wind turbines to the project, which is being developed by CPV Renewable Energy Company, a subsidiary of Competitive Power Ventures (CPV). A service and warranty agreement is included in the order.

The USA is the largest market for its wind turbine business, says Siemens. Oklahoma has a current wind power capacity of 700 MW.

The project is due for completion in 2009.

Power Machines to supply Sao Joao

Russia's Power Machines and its Latin American partner, Energ Power, are to supply equipment to the Sao Joao hydropower plant in Brazil under a contract with Electrosul.

The two companies will supply two 41 MW hydrogenerators to the project under a €7 million contract. Start-up of the units is planned for early 2010.

Asia Pacific

Vestas wins Sigeng order

China National Offshore Oil Corporation Energy Investment has awarded Denmark's Vestas a contract to supply 24 wind turbines for a project in China.

Vestas will supply its V90-2MW units to the Sigeng wind farm, located in Dongfang City on the Southern Chinese island of Hainan. The contract includes supply and commissioning of the wind turbines, a SCADA system and a two-year maintenance agreement.

Developers target UP projects

Up to 23 developers have submitted proposals for two power projects in Allahabad in Uttar Pradesh, India.

The two projects – the 1320 MW Karchhana plant and the 1980 MW Bara plant – are being developed in

response to rising demand for electricity in the state. Some 14 proposals have been submitted for the Karchhana project and nine for the Bara project.

Reliance Power, KSK Energy, Indiabulls, Jai Prakash, HDIL Energy, Lanco and GVK are among the companies that have submitted proposals for the projects.

Europe

Dalkia awards biomass contract

Dalkia France SCA has awarded Metso a contract valued at over €60 million to supply the boiler for a new biomass-fired combined heat and power (CHP) plant in France.

Located at the Smurfit Kappa paper mill in Fature on the south-west coast of France, the new plant is scheduled to start-up in late 2010. The project is the largest in France's national green energy programme.

Metso will supply a 124 MWth boiler as well as the external fuel handling system, flue gas cleaning equipment and the automation and information management system. The bubbling fluidised bed boiler will burn biomass such as bark and forest residues to produce electricity for the national grid and steam for the paper mill.

Wärtsilä to supply Madeira plant

Finland's Wärtsilä is to supply a 54.5 MW power plant in Madeira, Portugal under an order placed by Empresa de Electricidade de Madeira, a publicly-owned utility.

The Vitoria III plant is an extension of an existing facility and will consist of three 18V50DF dual fuel engines. Wärtsilä will also supply the generators, most of the mechanical auxiliary equipment, emission reduction equipment, electrical control equipment, various buildings and engineering services and carry out supervision and plant commissioning.

The first engine is scheduled to be in commercial operation in December 2009, with the remaining two scheduled to become operational a year later in December 2010.

Fortum, Genencor target woodchip plant

Finnish generator Fortum and US biotechnology firm Genencor International are to build a renewable woodchip fuelled power plant in Hanko, Finland.

The new plant will produce 18 MW of industrial steam for a Genencor production facility as well as district heating for the town of Hanko. It will be commissioned by the end of 2009, replacing the use of heavy fuel oil.

International

Suzlon bags first Romanian project

India's Suzlon, together with Martifer, has secured a contract to supply wind turbines for projects in Romania and Portugal.

Suzlon Energy, Suzlon's Denmark-based subsidiary, and Martifer, a Portugal-based construction firm, will deliver 29 units for a number of projects in Romania, and nine wind turbine units for two wind farms in Portugal. The contract represents Suzlon's first wind turbine order in Romania.

The Romanian projects will be equipped with Suzlon's S88-2.1 MW units and have a combined capacity of 60.9 MW. In Portugal, the Baiao and Vila Franca de Xira wind farms will also use S88 turbines and will have a combined capacity of 18.9 MW.

Ukraine powers up with coal mine gas cogen

Ukraine's coal mining industry is continuing its regional leadership to reduce emissions with plans to install up to 20 Jenbacher coal mine gas-fuelled cogeneration units.

Austria-based Jenbacher, a subsidiary of GE, has signed a framework agreement with Ukraine's JSC Coal Company Krasnoarmeiskaya Zapadnaya for the supply of the engines, which will use the active mine's own methane gas to generate all of its heat and electricity requirements. The initiative will also reduce site emissions and support workplace safety initiatives. The privately owned mine is located near the town of Krasnoarmeisk in the coal-rich Donetsk region in eastern Ukraine. The country is one of Europe's leading coal-producing nations and a founding member of the United Nations-backed Methane to Markets Partnership.

The project's EPC contractor Sinapse CHNPP of Kiev will install up to 20 of GE's 3 MW rated JMS620 GS-S.L. systems, which are designed for projects with low methane contents. The units will operate in parallel with the local grid, giving outputs of 60.9 MWe and 67.8 MWth.

When the Krasnoarmeiskaya Zapadnaya project reaches full operation, it is expected to reduce CO₂ emissions by the equivalent of more than two million tons per year, compared to venting the gas into the atmosphere – qualifying the plant for carbon emission trading certificates.

"Ukraine is encouraging its coal mines to modernize their operations, including the use of mine gas as a new source for on-site power to improve energy efficiency and support the nation's economic and energy security objectives," said Alex Pavlov, GE's Jenbacher gas engine sales manager for the Ukraine. "Generating nearly 129 MW of power with mine gas could save about 122 million cubic meters of natural gas a year."

GDF Suez wins Al Dur

GDF Suez Energy International and the Gulf Investment Corporation (GIC) have won a contract to build, own and operate a major new Greenfield independent power and water project in Bahrain.

The companies each own half of a consortium that will construct the \$2 billion Al Dur 1 plant, which will have a capacity of 1234 MW and 218 000 m³ of desalinated water/day. It is part of major plans in Bahrain to increase power generation and desalination capacity in response to rising demand.

The country's Electricity and Water Authority (EWA) will be the sole off-taker for the plant under a 20-year power and water purchase agreement. Al Dur 1 is due to start operating in 2011.

Al Dur 1 will use reverse osmosis desalination technology, which will be supplied by Degrémont, a subsidiary of Suez Environnement. Hyundai Heavy Industries has been selected as the main EPC contractor for the plant, which will use GE turbines in the power island.

Turkey nuclear plans on track

Turkey's energy minister said that the country's plans to build a nuclear power plant remain on track, and that the government expected to start examining bids for the project at the end of September.

The government has issued a tender to build a 4000 MW nuclear plant in the town of Akkuyu on the Mediterranean coast to help meet power demand that is rising by eight per cent a year.

Korea Electric Power Corp (Kepeco) has said that it intends to submit a bid in conjunction with Turkey's Enka Group.

Turkey will also build a second plant near Sinop on the Black Sea coast.

Alstom to build Shoaiba stage 3

Alstom and the Saudi Electricity Company have signed a contract worth around €1.9 billion for the construction of stage 3 of the Shoaiba power plant on the Red Sea coast in Saudi Arabia.

The new extension will add 1200 MW of capacity to the existing 4400 MW plant, which is located 100 km south of Jeddah. It will comprise three 400 MW units that are able to burn either crude or heavy fuel oil.

Alstom will design, supply, install and commission the entire plant, including the boilers, STF40 steam turbines, Gigatop turbogenerators, seawater flue gas desulphurization system and auxiliary equipment. The company's consortium partner, Saudi Archirodon, will carry out associated civil and marine works.

The boilers will be equipped with Alstom's advanced low nitrogen oxide tangential firing technology.

Negev plants attract interest

Israel's Ministry of Finance has reported that it has received seven expressions of interest in the initial stages of the tender to construct two thermosolar power plants at Ashelim in the Negev.

The two power plants will have a combined capacity of 250 MW, equivalent to two per cent of Israel's electricity demand, and will cost a total of \$650 million to construct. Local reports indicate that Ormat Industries, Shafir Civil and Marine Engineering Ltd., and IC Green Energy have all submitted expressions of interest.

The tender criteria are the financing and construction of the power plants, and their operation and maintenance for 25 years. The government will examine the bids before inviting formal submissions from qualified bidders.

Consortia that have submitted a proposal include Housing and Construction Holding Co. Ltd. with Solel Solar Systems, Luz II Ltd. with Veolia Environnement, IDB Holding Corp. with Abengoa Bioenergy, and Solar Millennium with Minrav Holdings and Dor Alon Energy.

Tanzania seeks hydro consultants

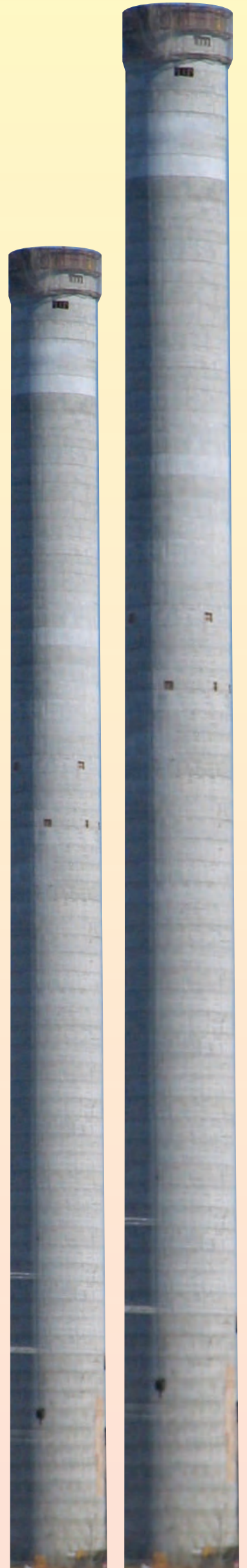
The government of Tanzania has issued a tender for consultancy services related to the construction of a 358 MW hydropower plant in the south of the country.

The Ministry of Energy and Minerals is seeking consultancy services to support the government and the Tanzania Electricity Supply Company (Tanesco) in the preparation, negotiation and finalization of project financing and other transactions. The \$800 million project is part of the government's power master plan and will help to reduce dependency on woodfuel.

The Ruhudji River project will be part-financed by the World Bank and developed on a public-private partnership basis. The government also says it will engage a legal advisor to support the project.

Other power projects planned in Tanzania include the 200 MW Mchuchuma coal fired plant and the 222 MW Rumakali hydropower project.

Wood fuel accounts for 90 per cent of energy consumption in Tanzania.



Still a role for the private sector

Onshore developers have come to fill the void left by international investors following the Asian crisis. Changing regulatory environment, volatile energy prices and low carbon initiatives are also creating new opportunities for the private sector.

Joe Anderson

Although the track record for independent power generation in most Asian markets is mixed, private sector investment has endured over the years and is now moving in new directions. Privately-owned power generation plays a role in key Asian markets such as China, India, Indonesia, the Philippines, and Thailand. However, the nature of such private sector investment varies significantly from country to country. Conventional cross-border project financings, led by international utility sponsors, are no longer the norm. Onshore equity investors and lenders now have the lead role in markets such as China, India and Thailand. Private sector participation may also be shaped in new ways as unconventional off-take models emerge following regulatory changes in markets such as India and the Philippines, and investors seek different paths to create value, such as through the development of renewable power projects.

Approximately 20 years have passed since policymakers in Asian markets turned to the private sector to meet the escalating demand for electricity generation fueled by growing economies. Those early years of activity resulted in major projects such as the Hub River hydroelectric project in Pakistan, the Dabhol Project in India, Shajiao B and C in Guangdong Province, China, and Indonesia's Paiton Project. Virtually every major US and European utility with international ambitions came to Asia to build independent power businesses, joined by Japanese trading companies and a small group of regional developers such as China Light & Power and Singapore Power.

These first generation developers were attracted by the prospect of profiting from the growing electricity demand of Asia's tiger economies, and the prospect of scalability in the major markets of China, India and Indonesia. Investors would indeed reap profits from the Asian power generation market, but not in every country, and not necessarily in the first wave of investment.

Structural weaknesses in power purchase arrangements for many of the first wave of IPPs resulted in significant difficulties for the initial group of investors. There were numerous instances in which a project's contractual structure, painstakingly negotiated over a period of years, could not withstand the inability of utility customers to afford the required tariffs. For example, the Asian financial crisis resulted in the collapse of the value of Indonesia's rupiah against the US dollar. Indonesia's state-owned utility, PLN, had agreed to take financial responsibility for negative fluctuations in the exchange rate, but did not have the financial resources to meet this obligation. Most of its power purchase agreements had to be restructured.

Pakistan's Water and Power Development Authority went through a similar renegotiation to reduce the tariff payments required under its power purchase agreements.

Enron's Dabhol Project in India spiralled into a multi-year dispute with the utility purchaser, the Maharashtra State Electricity Board. During the project's development period, critics had claimed that the tariff payments were unaffordable to the cash-strapped state utility. Dabhol's proponents

argued that the "fast-track" project was supported by a state government guarantee and a central government counter-guarantee, and that a "pioneer premium" was needed to encourage the initial wave of international investment in the Indian electricity sector.

In China, certain international developers were forced to renegotiate tariffs after utility customers were unwilling to pay the contractual rate, placing the IPPs in an untenable situation.

Amid such difficulties, there were country markets that proved more fertile ground for investment by international developers. The Philippines had launched an emergency IPP program under the administration of President Fidel Ramos. In order to attract foreign investment, substantial returns were granted to IPPs, and government guarantees were provided to stand behind the power purchase obligations of the National Power Company. Even though the Philippines was hard hit by the Asian financial crisis, no defaults were reported to have occurred under any of its power purchase agreements.

Thailand organized one of the most diversified markets for private electricity investment in Asia. In addition to an independent power program launched through competitive tender, the Electricity Generating Authority of Thailand spun off generating assets to create the Electricity Generating Public Company Limited and Ratchaburi Electric Public Company Limited, a cross-border IPP program was implemented under the auspices of an MOU signed between the governments of Laos and Thailand, and a small power purchase program allowed captive power projects, renewable projects, and other small-scale producers to sell electricity to EGAT under a standardized power purchase agreement.

Onshore equity investors and lenders now have the lead role in markets such as China, India and Thailand

Similar to the Philippines, Thailand was hit hard by the Asian financial crisis with the devaluation of the Baht against the US dollar. Despite this hardship and the presence of foreign exchange indexation obligations in its major power purchase agreements, EGAT did not default under its power purchase obligations. Similar successes were found on a smaller scale in niche markets such as Bangladesh and Vietnam, each of which had a small number of IPPs developed and financed with cross-border non-recourse debt.

These outcomes set the stage for the market conditions of recent years. Due to the Dabhol Project dispute and other project defaults in India, international developers and lenders have been largely absent from the Indian market in recent years. However, Indian companies such as Reliance, Tata, GVK, GMR and others have filled the void, taking advantage of robust Indian debt and capital markets to finance their projects. Similar conditions can be found in China, where domestic independent power producers have found significant opportunities as the country has added over 50 000 MW in new capacity annually in recent



Joseph Anderson: regulatory changes in certain markets have created new possibilities

years. The availability of onshore bank debt and capital markets options (including Hong Kong) have helped to drive this activity.

The remaining pool of international developers active in Asia have tended to focus on those markets which did not experience default problems following the first wave of IPP investment. Thailand has been a very competitive market, with local companies successfully gaining a significant share of domestic projects and cross-border IPPs developed in Laos. Similar to China and India, the

purchase agreement with a single state electricity board as the sole source of revenue. In fact, many states have adopted their own reforms leading to the unbundling of formerly vertically integrated state electricity boards. This has opened the possibility of greater commercial discipline and the assumption by the general state treasury of any obligations to provide free or subsidized power to certain constituencies.

In the Philippines, the EPIRA Act passed in 2001 has led to the privatization of assets which had been owned by the National Power Corporation, and forced IPPs under development to develop new off-take models based on sales to cooperatives, industrial customers and the spot market now that NPC no longer enters into power purchase agreements with IPPs. A number of investors are seeking to develop and finance projects based on this new model.

Finally, the prospect of carbon credit finance and favorable regulatory treatment has generated significant interest in the renewable power sector. Advantageous tax treatment has resulted in the creation of approximately 8000 MW in wind power capacity in India, along with a flurry of activity in the biomass sector.

If the prices of gas and coal continue their upward trend of recent years, the development of renewable energy projects is likely to become a compelling value proposition in other Asian markets if challenges such as the security of biomass feedstock can be overcome. While conventional IPP investment with cross-border non-recourse debt and a single power purchase agreement may no longer be the standard regional template, private sector investors will likely have a place in the market through pursuing these new opportunities.

Joseph Anderson is Managing Partner at international law firm Morrison & Foerster LLP (Singapore Office).

existence of domestic debt and capital market options has helped facilitate the rise of onshore developers. International developers have retained a strong interest in Vietnam, in the hope of replicating the successful Phu My 2.2 and Phu My 3 IPPs, each of which was financed with international non-recourse debt.

However, the government of Vietnam has taken a cautious, gradual approach to new IPPs, and may be reluctant to offer the same level of support granted to the first generation of IPPs. With improvements in its financial condition, PLN, the Indonesian utility, has attracted renewed international interest to the country's electricity generating industry. Progress can be painstaking, however, as the country's decentralization of governmental authority and on-going development of new political norms has slowed the project development process. Beyond conventional IPP development, regulatory changes in certain markets have created new possibilities for onshore and international developers alike. India's Electricity Act of 2003 has created opportunities for sales to multiple industrial and utility customers. IPPs need no longer rely on a power

Oil

Global economic crisis puts pressure on oil

■ Economic crisis forces down oil prices
■ Not in world interest for OPEC to keep price above \$100/B

by David Gregory

Demand for crude oil is poised to continue its downward trend, bringing prices down in the near term. With the US economy reaching a crisis during the second half of September and tough times expected in the future, demand for petroleum in the US is expected to slip further as the economic downturn widens and repercussions start to be felt around the world. Should demand continue to grow it will be in developing economies such as India and China, but with US-China trade being in the billions of dollars, it seems unlikely that the US economic troubles will not be felt in the Far East and ultimately impact China's economic growth as well.

The US financial crisis has sparked concern among OPEC members that have earned hundreds of billions of

dollars from oil revenues and whose financial investments in US and Western institutions are experiencing losses in the billions of dollars. Speaking at the UN General Assembly on September 27, Saudi Foreign Minister Prince Saud al-Faisal said his country's greatest fear "is the imminence of a worldwide recession," according to *Reuters*.

The Saudi Prince called for a global agreement that would "secure a financial system that offers equal opportunities to all parties while...providing appropriate liquidity for the developing countries and safeguarding their monetary reserves from the collapse of any of the major international currencies."

While OPEC members argue that they have had no power to influence the price of crude oil, some energy analysts think that it is not in the best

interest of the world economy for OPEC to attempt to maintain the price of crude oil above \$100/B by cutting back on production.

During the OPEC meeting in Vienna in early September, when it was clear that crude oil prices were indeed beginning to decline, ministers agreed that the group would reduce production by 520 000 b/d. But for its part, Saudi Arabia backed away from that stance, saying it would continue to supply oil to any of its customers who requested it.

Some analysts believe that Saudi Arabia should make use of its idle production capacity and place more crude oil on the market than their customers request. This, they say, would indeed bring the price of crude down and allow some respite for the global economy. The trouble with such a suggestion is that oil producers have become so accustomed to high oil

revenues that lower revenues could have a negative impact on their own economies.

Saudi Arabia, Kuwait and other OPEC producers have said at times that they do consider the price of crude to be too high. They are now seeing the consequences of OPEC's policy of keeping oil supplies tight.

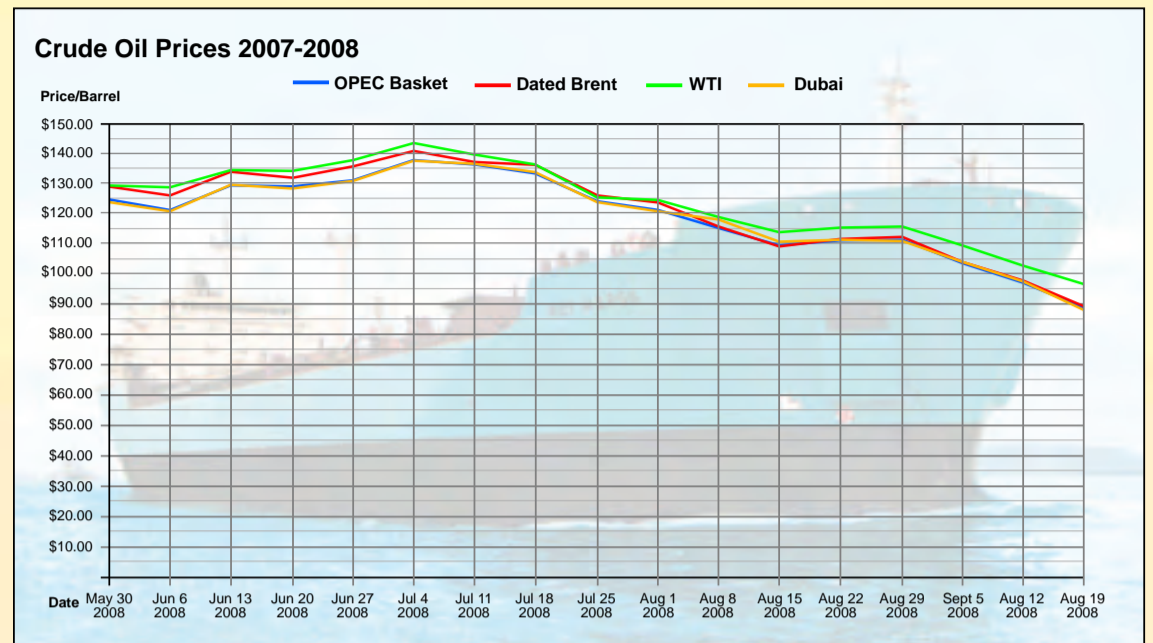
Few analysts would deny that high crude oil prices have had a negative effect on demand, especially in the US, and figures show that demand in Organization of Economic Cooperation and Development (OECD) countries is down by about 1 million b/d from a year ago. The London-based Centre for Global Economic Studies (GCES) said in its latest monthly report that "outlook for oil demand is weakening almost daily, shifting the sentiment of oil markets from bullish to bearish."

"More hawkish members of OPEC

have certainly put pressure on Saudi Arabia to defend a \$100/B oil price, but this may be too high for the Kingdom," the CGES report said. "It is also facing pressure to allow prices, which are still 20 per cent higher than they were a year ago, to ease amid the current financial crisis."

While US lawmakers hammered away in Washington, seeking the correct method for making billions of dollars available to institutions in an effort to prevent a complete economic disaster, OPEC President and Algerian Petroleum and Mines Minister Chakib Khelil, said in Algiers that a depreciating dollar would probably cause the price of oil to rise.

"The price [of oil] depends on the dollar," Mr. Khelil said according to *Bloomberg*, "it has nothing to do with oil demand and supply. If the dollar weakens, oil will go up."



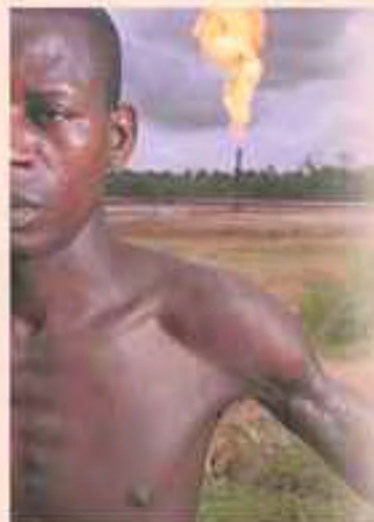
Gas

Nigeria's domestic unrest threatens domestic and international energy supplies

Gazprom and the EU have their eyes firmly set on Nigeria, a country where violence and political corruption have widespread implications for the energy sector.

by Mark Goetz

Nigeria marked the 48th anniversary of its independence on October 1 amid calls by local politicians for an end to the corruption and violence that is damaging its energy sector.



The country is facing crises on numerous fronts with a constitutional challenge against the legitimacy of President Umaru Yar'Adua's election to get underway in the Nigerian Supreme Court on October 23, and a growing uprising in the southern oil producing regions, led by the Movement for the Emancipation of the Niger Delta (MEND). Furthermore, Nigeria is facing a domestic energy supply crisis of its own, and the government has threatened foreign companies with the suspension of all LNG projects if they do not arrange a plan to boost domestic gas deliveries.

Nigerian officials announced in late September that a target for 2009 oil production had been set at 2.3 million b/d, down from a missed target of 2.45 million b/d for 2008. Nigeria's crude oil reserves are estimated at more than 36 billion barrels. Gas reserves are put at 5.3 trillion m³ and gas production during 2007 amounted to 35 billion m³ but a considerable portion of that was flared.

Despite its natural gas resources, Nigeria is facing a serious shortfall in

power generation capacity, complicated by foreign companies' focus on exports as well as long-term corruption and mismanagement.

The government has given foreign companies, including Chevron, Shell, ExxonMobil, Total and Eni, until the end of October to present a plan that will deliver more natural gas to Nigerian power companies. The country's growing demand will also warrant construction of many new power generation facilities. Nigeria has an installed generation capacity of 6000 MW but struggles to produce 3000 MW.

Gas Minister Emmanuel Odušina is reported to have told the companies that the government's policy and regulations on gas supply to the domestic market "are not up for discussions or negotiations any more," according to *Reuters*. Companies must allocate 280-350 million cubic feet of gas for the domestic market, he said. "We must prioritize domestic gas supply over any LNG project, since the country needs power," *Bloomberg* quoted Mr. Odušina as saying.

Nigeria's largest LNG plant is the \$10 billion Nigeria Liquefied Natural Gas (NLNG) plant on Bonny Island in which state-owned Nigerian National Petroleum Corporation (NNPC) holds 49 per cent, Shell 25.5 per cent, Total 15 per cent and Eni 10.4 per cent. Other LNG projects include the \$7 billion Olokola (OKLNG) facility which is due to come on-stream in 2011 and involving NNPC, Chevron, Shell and BG, and Brass LNG in which NNPC holds 49 per cent and Total, ConocoPhillips and Eni hold 17 per cent each.

Meanwhile, the EU has offered Nigeria financial and political backing for a €5 billion trans-Saharan pipeline to pump its gas directly to Europe. The EU is keen to reduce its dependence on Russian gas and also fears that Gazprom, the Russian gas monopoly will further tighten its grip on energy supplies to Europe if it succeeds in its efforts to back the trans-Saharan pipeline. In September Gazprom also signed a memorandum of understanding with state-owned Nigerian National Petroleum

Corporation to cooperate on gas exploration and transportation.

Andries Piebalgs, the EU energy commissioner said the EU had been slow to back the pipeline project but said the Georgia conflict had now focused its mind. The pipeline could provide 20-30 billion m³ to Europe.

Meanwhile, Nigeria faced the continuing threat of spiraling violence and criminal activity in its hydrocarbon sector. In mid-September MEND, allied with other militant groups Niger Delta Volunteer Force and Niger Delta Strike Force, declared war on the country's oil industry and proceeded to attack oil installations and pipelines used by the international oil companies.

Attacks by militants in the Niger region have brought considerable damage to oil and gas infrastructure. The disruptions to oil production and export impacts international oil market prices, causing market analysts to see Nigeria as a wild card. Some reports say disruptions to oil operations have reduced the country's production by 1 million b/d.

Signs of a slowdown

The Chinese power sector has experienced double-digit growth for most of the last decade. Although there will be a slowdown as the economy slows, growth will still be robust, particularly in the renewables arena.

Joseph Jacobelli

China has grown rapidly since it opened to the world in 1979 but it is in recent years that the electric power industry has experienced its strongest growth. In the 1980s, the sector experienced just one year of double-digit growth (10.6 per cent in 1987). This compares to three continuous years of double-digit growth in the 1990s. This decade, power generation has seen double-digit growth every year with the exception of 2001 when growth was 8.4 per cent. Between 2002 and 2008E, growth has been 12-15 per cent.

It is expected that in 2010 China should generate over 4500 TWh, 3.7 times the level of that at the end of the last decade. Installed capacity growth lagged behind in the first half of the decade but the addition rate accelerated significantly from around 2004. In 2010 capacity should surpass 940 GW, approximately 3.2 times the level of that at the end of the last decade.

Growth has principally been driven by growth in thermal generation. Thermal generation, mostly coal-fired, accounted for 82.7 per cent of total electric power generation in year to end-August 2008, hydro accounted for 14.4 per cent, nuclear for 1.9 per cent,

sharp slow down. In the first five months, monthly generation and consumption increased 12-17 per cent and 9-14 per cent year-on-year. However, in June-August the growth entered a single digit growth trend. Part of the reason may be because of the Olympics but many observers believe that after the sharp growth of 2002-2007, the numbers will be a little more even paced in the short term. Specifically, generation is expected by the China Electricity Council to rise 12.5 per cent year-on-year in 2008 vs. around 14-15 per cent in 2003-2007. Assuming a GDP of over 9 per cent in 2009-2010 and an elasticity of 1.15 times, power demand of 11.7 per cent in 2009 and 10.6 per cent in 2010 seem realistic generation levels. However, with the current global economic climate, the risk to these forecasts is likely to be on the downside.

The financial health of the key nationwide electric power generation groups, which share about half of China's electric power generation and installed capacity, is a big question mark. Few detailed audited financial numbers are available publicly. However, the financial health of the power companies listed on the



Joseph Jacobelli: a closer look at the numbers reveals a sharp slow down

and Shenzhen has declined from 6.6-7.4 per cent in 2005-2007 to -0.6 per cent in the first half of 2008, while the median for all 56 Shanghai and Shenzhen listed power companies, including hydro and diversified companies, fared somewhat better recently.

The weak financial health was created by sharply rising thermal coal costs in the past few years combined with static on-grid (wholesale) tariffs. This is because thermal coal prices are now largely market driven while on-grid tariffs are tightly controlled by authorities. In recent years thermal coal prices have risen tremendously and the generation companies have had to absorb the bulk of the increase. To use a 9 GW power company as an example, its fuel costs (mostly coal) as a percentage of revenue per kWh rose to 75.1 per cent in the first half of 2008, from 64.9 per cent one year earlier while its EBITDA (earnings before interest and taxes, depreciation and amortization) as a percentage of revenue per kWh declined to 9.0 per cent in the first half of 2008 from 15.5 per cent in the first half of 2007.

Most electric power market participants believe that the thermal coal price rise in China has peaked and thus operating margins should somewhat bottom out. However, even if these observers are correct and despite two on-grid tariff increases in the past few months, the financial health of many of the key groups is likely to have significantly weakened and may find it difficult to recover in the short term particularly given high levels of total debt which has been accumulated to sponsor the sharp growth in installed capacity; much of the 500 GW that China has built in the

past eight years was built by key nationwide power generation groups.

For the best part of a year or more, there has been limited news-flow on regulatory reform. It is believed that reforms were put on hold due to the sudden rapid generation growth (2004-2007) and then by concerns over the rising inflation (2007-2008). Further inertia would have been created as the sector looked for stability ahead of the Olympic Games.

Some believe, however, there is a good chance that at the very least the provisional measures regarding the tariffs for transmission and distribution of electricity issued in 2005 could be executed in the next 12-24 months.

The fastest area of growth in terms of the types of electric power generation is renewable and alternative energy (RAE) sources, particularly wind, biomass and solar power generation. These types of generation have seen sharper growth than national forecasts or estimates from independent experts.

Some believe that already high forecasts are most likely to go higher for three reasons.

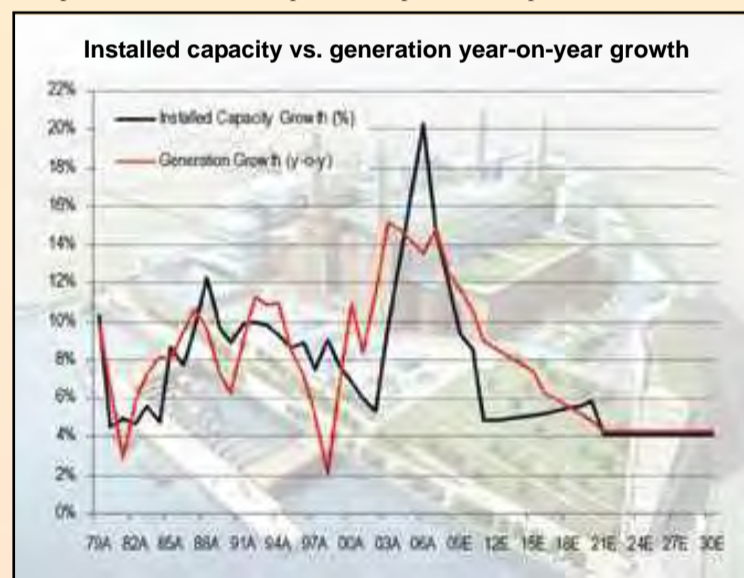
Firstly, China has domestic 'logistical' energy security considerations; namely all of the key fuels are logistically far from the key load centres and supply disruptions have not been rare.

Secondly, the Chinese government at all levels has been actively concerned about the impact of the fast paced economic growth on the environment and has undertaken stronger environmental protection policies.

Thirdly, and possibly to a lesser extent, the promotion of cleaner energy is a poverty alleviation tool - RAE sources can provide rapid distributed generation solutions.

There are also other factors that are boosting the growth of RAE, the positive track record of build up and target shattering with wind being the best example. Also, RAE sources have benefited by the impact of higher fuel prices, which are likely to remain high due to the demand/supply parameters and potential new emissions related costs. Finally, the continued strong growth in thermal coal as the key generation fuel will put more pressure and urgency to accelerate RAE investments.

Joseph Jacobelli is group director of Carbon Ventures, CLP Holdings Ltd, Hong Kong



the remaining 1 per cent came mostly from renewables such as wind.

In terms of consumption, the key driver has been demand from industry, particularly heavy industry, which accounted for 76.1 per cent of consumption in August 2008.

But while generation and consumption growth look strong, a closer look at the numbers reveals a

Shanghai, Shenzhen and Hong Kong stock exchanges provides some clues that the key generation groups must be under some financial duress. The bulk of the listed companies are actually owned by the key generation groups.

One benchmark is to look at the median return on equity for these firms. The median for 27 largely thermal power listed companies in Shanghai

Estimates from China's renewable energy sources medium to long-term development plan									
(MWh)	Estimated resources	2010A	2015E	2020E	2025E	2030E	2035E	2040E	2045E
Hydro ⁽¹⁾	400,000	117,000	140,000	160,000	180,000	190,000	195,000	198,000	199,000
Hydro Pumped storage	n/a	22,000	40,000	50,000	55,000	58,000	60,000	61,000	62,000
Small hydro	n/a	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Geothermal	n/a	2,000	5,000	10,000	15,000	20,000	25,000	30,000	35,000
Wind ⁽²⁾	1,000,000,000	1,200	5,000	10,000	20,000	40,000	80,000	150,000	300,000
Solar	0.0001 MWh/m ²	70	400	1,800	1,700	1,700	1,700	1,700	1,700
Geothermal	0.000	-	-	100	100	100	100	100	100
RE capacity		130,330	230,000	341,900	441,500	541,500	641,500	741,500	841,500
RE capacity on-grid		2,200	10,000	21,000	41,000	81,000	161,000	311,000	611,000
National capacity		877,700	940,200	1,290,200	1,590,200	1,940,200	2,290,200	2,640,200	2,990,200

Notes: (1) Exploitable amount is 540 GW but commercially exploitable amount is only 400 GW. (2) Wind resources including 300 GW on-shore and 700 GW off-shore. Source: National Development and Reform Commission; "Renewable Energy Sources Medium to Long Term Development Plan" report published in August 2007, released September 2007. *National capacity (MLE) = Merrill Lynch AsiaPacific Utilities Research Estimates

Technology

Power sharing with a common goal

On September 12, *TEITimes* was present to witness the inauguration of the world's longest submarine cable. The link will bring the goal of a reliable, fully interconnected European network closer to reality.

Junior Isles

In 1954, the world's first high voltage direct current (HVDC) system was installed between Sweden and the island of Gotland. The cable system it used was 100 km long and was rated at 150 kV, 20 MW. How times change. Last month, a cable linking the power grids of Norway and The Netherlands, known as NorNed, began operation. The cable is 580 km long and is rated at ± 450 kV, 700 MW.

The NorNed connection is a joint project between the Norwegian and the Dutch transmission system operators (TSOs), Statnett and TenneT. NorNed is the first direct power link between Norway and the Netherlands.

David Rus, executive vice president of Statnett commented: "This project represents 10 years of cooperation between The Netherlands and Norway. Construction began in 2005 and was commissioned on May 6th this year. Three years is not a long time for such a huge project. It has delivered half of the electricity used in Amsterdam this summer. Initially, it is really an export cable."

More specifically, the system links the Norwegian and Dutch power networks so each can trade and

transmit electricity to the other, increasing the reliability of electrical supply in each country. Norway, which has a predominance of cheap hydropower, uses the link to export power to The Netherlands during the day when it is able to command a good price for electricity. Norway buys power from The Netherlands at night when Dutch power prices are at their lowest and comparable to its own hydropower prices.

In the first four months of operation, Norway has exported 1.6TWh, representing €75 million in trading revenue. According to Statnett the "basic economics are good" and the project will pay for itself in 15 years.

In addition, the trading of power via the link allows TenneT and Statnett to increase the reliability of electrical supply in each country. The Dutch grid can use Norwegian hydropower to manage peak power loads during the day and, by offering an alternative to fossil fuel-based generation, grid operators expect to reduce CO₂ emissions by about 1.7 million tons per year.

In the broader scheme, the link is part of the European Union's plan to improve cross-border power infrastructure, reduce blackouts and help create more efficient power



The valve hall at the Feda converter station in Norway is part of the NorNed HVDC transmission link. The valves convert electricity from AC to DC for long-distance, low-loss power transmission. A similar station at the other end of an HVDC link converts DC back into AC electricity

markets within Europe. At the same time, the EU also needs to adapt, upgrade and develop existing transmission networks to eliminate transmission bottlenecks and congestion, while integrating generation from intermittent renewable sources such as wind and solar.

In a further step towards a harmonized European power market, in July this year eight transmission system operators in Central Europe set up an office to allocate cross-border electricity transmission and provide payment within their region.

HVDC links are a key technology in cross-border trade. In 2003, the EU identified 22 interconnections as priority projects. Five have been built so far. The technology has some key advantages compared to HVAC.

Power flow in a DC line can be precisely controlled. This stabilizes the transmission network and prevents cascading outages such as those seen in Europe and the US in recent years. They are widely used to connect asynchronous networks. Electricity can flow in both directions in a DC link, to enable power trading between different networks. DC power losses are much lower than AC lines over long distances and are the only option for underground and underwater transmission.

The underwater NorNed link comprises eight sections, six of which were delivered by ABB. The other two were delivered by Nexans. The contract was originally awarded to ABB in 2000, but restructuring in the power utility sector caused the project to be delayed. Finally, ABB received the go-ahead to

proceed with the project in December 2004.

The cable, which crosses international waters, called for 22 agreements and 24 licences involving four countries. Weighing a total of 45 000 t, a special vessel was used to lay it at depths of up to 420 m. To reduce cable costs and cable losses NorNed uses two fully insulated DC cables. This makes the current small and the cable losses low, just 3.7 per cent for the NorNed link, but requires a higher converter voltage. According to ABB NorNed is the only 900 kV valve hall in the world.

The cable lands on the Dutch shore, at the Eemshaven converter station where it is connected to the 380 kV high voltage grid. On the Norwegian side, HVDC is converted back to AC at the Feda converter station before being fed to the 300 kV Norwegian transmission grid.

ABB's scope of the project covers the two converter stations and the cable system for the major portion of the cable route. Installation of the first sections began in early 2006; the final section was laid by the end of 2007.

Commercial operation started on 5 May 2008 with a capacity auction. The first commercial power transfer took place the next day, on 6 May. The NorNed link passed operational testing on June 27.

Other European interconnectors will be energised in the coming years. The BritNed link is scheduled to begin operation in 2010; Skagerak 4 (between Norway and Denmark) will begin in 2014. Other possible connectors will link Norway to Germany, Norway to UK and NorNed 2.



The Feda HVDC converter station is situated in a valley in southern Norway

Light work at BP offshore platform

The Feda substation connects to another transmission project that demonstrates another HVDC technology developed by ABB. The substation is also connected to the AC switchyard at Lista. Lista is the onshore part of a connection that will transmit power to a group of off-shore platforms in the North Sea owned by BP.

Some of BP's existing platforms at Valhall in the North Sea are to be refurbished, while one new platform will be built. In order to provide power to the platforms, BP will replace the existing gas turbines with

an HVDC Light transmission system that will supply the platforms with 78 MW of power from shore.

Unlike ABB's Classic HVDC system used at NorNed, HVDC Light uses different converter electronics, based on transistors, to provide greater voltage and power control. The converters can control the quality of the voltage so that they can provide reactive power for voltage support. The converter electronics allow the power direction to be changed without changing the polarity. This results in less stress on the cable, which means that

lightweight pre-extruded cable can be used with plastic insulation, avoiding the need for oil. ABB claims they are easy to install and pre-manufactured joints can be used. Further, the converter electronics use high frequency switching which allows the size of the installation to be reduced.

According to ABB, all of this makes the technology ideal for applications that include underground power links, offshore platforms, connecting wind farms, powering islands and in-feeds for weak systems.

The technology made economic and environmental sense for BP. According to ABB, the transmission link will save 300 000 t of CO₂ and 250 t of NO_x annually compared to a combined cycle plant. The line from Lista to Valhall will cross 292 km of water. The Lista station will be in operation this year, whilst the offshore module will be operational in 2010. In the interim period, the Lista station will act as a flexible AC transmission station to provide reactive power compensation to the Norwegian grid.



HVDC Light valves: BP will use the technology to power its new Valhall platforms



Junior Isles

Gorillas in the midst

Right now, the world is a jungle. Normal rules do not seem to apply.

As a result of the global financial crisis, governments around the world have been stepping in to save banks, which under any other circumstances would (and some argue should) have been allowed to fail. In the world of energy, we have also seen developments in the nuclear sector that demonstrate how governments change the rules to suit themselves.

At the end of September, the US-India nuclear accord, which has been under negotiation since 2005, cleared the penultimate hurdle when the US House of Representatives voted 298-117 in favour of the deal.

The deal has been attacked by a number of critics. The House itself came under fire for approving the deal without the usual examination by Congress. Howard Berman, the chairman of the House of foreign affairs committee, agreed to expedite the process by bypassing his committee, which would have debated the deal at the request of the administration.

At the time of writing, the deal still had to win the vote in the Senate but Henry Sokolski, head of the non-proliferation Policy Education Center, said Congress should have taken time to place more stringent safeguards in the deal. Edward Markey, a democratic congressman from Massachusetts said: "It is outrageous that such a critical vote, one that will forever change the global non-proliferation regime, was taken without the benefit of full congressional review and oversight."

Earlier in the month the US spearheaded a successful effort to persuade more than 40 of the 45-member Nuclear Suppliers Group (NSG) to waive a rule that does not permit countries to transfer nuclear technology to non-signatories of the NPT. India has persistently refused to sign.

Notably China voiced its concerns in the run-up to the NSG meeting. An editorial in the *People's Daily* newspaper, the mouthpiece of the Communist Party, said the US-India nuclear agreement posed a "major

blow" to international non-proliferation. "Whatever the future of the US-India nuclear agreement, the multiple standard that the US has on the issue of non-proliferation has caused doubts in the world," it said.

Certainly the Bush administration could be accused of being inconsistent on the issue of non-proliferation, having one rule for India and another for Iran. But the Bush administration rejects criticism that the accord undermines efforts to prevent the spread of nuclear weapons.

In an interview with the *Financial Times*, John Rood, the top arms control official said: "India is a growing power. They are going to play a bigger

The multiple standard that the US has on the issue of non-proliferation has caused doubts in the world

and bigger role on the world stage. So if you are dealing with the challenge of, for example, Syria or Iran, it's far better to have the strong support of countries like India."

That may or may not be true but where is the challenge of Syria or Iran to justify the waiver? Further, the fact remains that the rules have been flouted, setting a dangerous precedent when dealing with other countries that have also not signed the NPT.

Some have argued that the decision may be a move by the US to accelerate the development of India's nuclear generation industry in order to lower its dependence on the world oil market. The more likely truth is that the US, like many of the members of the NSG, simply do not want to miss out on the tremendous opportunity presented by India's nuclear sector.

Speaking to reporters in India after the NSG announcement, United States Assistant Commerce Secretary, David Bohigian, said the nuclear energy business in India would be in the order of \$100 billion in about 10 years if the Indo-US nuclear deal goes through. He said that some American companies were making enquiries about nuclear trade opportunities in India.

India said it had started dialogue with overseas companies for setting up nuclear power plants. It is expected

that Maharashtra and Tamil Nadu will be the first to benefit from the NSG waiver, with mega plants already planned to generate at least 14 000 MW. Jaitapur in Ratnagiri district of Maharashtra has the potential of generating 10 000 MW. Apparently details are being worked out for setting up either eight units of 1200 MW, 10 units of 1000 MW each, or six units of 1600 MW.

The NSG waiver was hailed by French minister of state for external trade, Anne Marie Idrac, as an "historic achievement". It opened the way for the signing of a bilateral agreement between India and France that was concluded during the visit of French

president Nicolas Sarkozy in January.

Certainly September was a good month for France. In another move which some believe is another apparent bending of the rules by government, EDF agreed a deal to buy British Energy (BE).

The deal immediately ran into a storm of controversy. Some industry players believe that the deal allows further concentration in the UK electricity sector, which is already under investigation by the regulator, Ofgem, because of persistent concerns about a lack of competition. The British government clearly perceived that the need for nuclear power outweighed any competition concerns.

In a letter to UK energy minister, Malcolm Wickes, Alex Lambie, the boss of Welsh Power called the EDF-BE tie-up "a stick up at the expense of the UK's electricity customers." He added that he found it impossible to believe that a deal would be done without the active "connivance" of the government.

He said any deal should be delayed until completion of an ongoing investigation into the energy sector had been concluded by the Competition Commission. In any event, he said there should be a referral to the Office of Fair Trading.

The energywatch campaigns director,

Adam Scorer, said: "Our concerns are not about foreign ownership or the rights and wrongs of nuclear power, they are around putting more power into the hands of the big six energy groups. We think the current level of concentration has already led to prices being higher than necessary, and this situation has just got worse."

Others raised concerns because BE, which had no supply business, would now be tied to two big suppliers – EDF and Centrica – in a vertically integrated group.

EDF defended its position saying that BE generated about 19 per cent of the UK's electricity and EDF less than 6 per cent. Vincent de Rivaz, chief executive of EDF's UK business said: "So 75 per cent is in the hands of our competitors, which is very far from a dominant position."

The UK government also insisted that competition was not undermined pointing to agreements signed by EDF to dispose of land at most of its nuclear sites.

The deal may yet flounder. Ofgem was unable to comment beyond saying: "On submission of the formal notice of the merger we will provide our view to the relevant competition body, probably the EU antitrust authority."

With France holding the EU presidency, I would not place any bets on the deal being rejected. EDF expects Brussels to approve the deal in the first phase of its investigation, meaning that the takeover could be completed by the end of the year.

On the news of the takeover of British Energy, John Hutton, the UK's business secretary said: "The landscape for new nuclear build is beginning to take shape; the mist is clearing."

In the 1988 movie classic *Gorillas in the Mist* the lead character in the film, based on a true story, thought she knew and could trust the gorillas. But gorillas can be unpredictable. In the nuclear business, the mist may indeed be clearing but as it does, the business world is realising that in the jungle, governments are the gorillas and it is they that make and change the rules, especially when the stakes are high.

