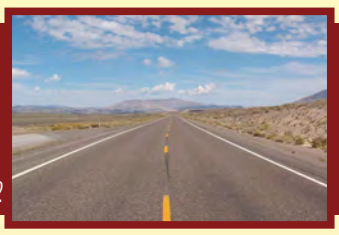
Dead in the Senate
Cap-and-trade seems to have died in the Senate. *Page 4*

Eyes forward
TEI Times finds that ABB's Peter Leupp is a man who likes to focus on what's ahead. *Page 12*



Final Word
Junior Isles looks for vision. *Page 16*

April 2010 • Volume 3 • No 2 • Published monthly • ISSN 1757-7365 www.teitimes.com

THE ENERGY INDUSTRY TIMES

IN BRIEF

US groups rally round CCS
North America's efforts to deploy carbon capture and storage (CCS) look set to benefit from recent initiatives by the private sector. *Page 2*

Philippines crisis raises regulatory questions
Prolonged drought has raised questions over the Philippines electricity market strategy. *Page 6*

Wind firms eye UK incentives
The UK is starting to attract offshore wind energy companies to its waters to help support the massive planned expansion in renewable energy. *Page 8*

Gazprom prepares for shift
Gazprom may be forced to reassess its priorities in the aftermath of the global financial crisis. *Page 9*

EDF amends corporate contracts
European regulators have agreed to drop antitrust charges against EDF following commitments made by the French utility. *Page 10*

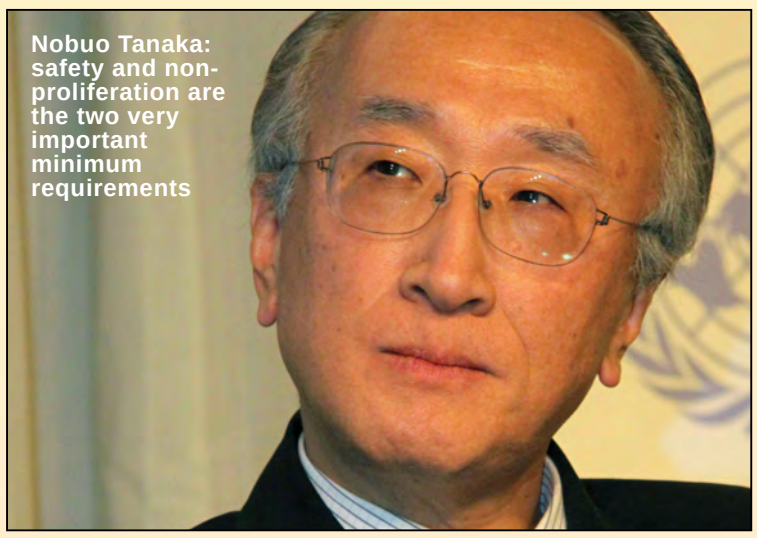
Energy Outlook: Thermal storage is the key
Concentrated solar power has great promise as a renewable generation technology but its ultimate success depends on the development of thermal storage systems. *Page 14*

Technology: Raising the temperature at RDK8
The end of next year will see the start up RDK8, a power plant that is designed to operate with exceptionally high steam temperatures. *Page 13*

Non-proliferation at heart of nuclear concerns

The international community remains concerned about non-proliferation as Middle East countries set out their nuclear ambitions.

Junior Isles



Nobuo Tanaka: safety and non-proliferation are the two very important minimum requirements

Nuclear non-proliferation was a major concern at the International Conference on Access to Civil Nuclear Energy held by the Organization for Economic Cooperation and Development (OECD) in Paris last month.

"It's clear that the nuclear development should be done with consideration of full safety and non-proliferation. These are the two very important minimum requirements to use nuclear power," said Nobuo Tanaka, Executive Director of the International Energy Agency (IEA).

"For international organisations like the IAEA, they have career conditions of safety rules and enforcement of them, and non-proliferation rules," so countries seeking sustainable nuclear use need to live with or stick to "the global standards of nuclear safety and non-proliferation," he added.

French President Nicolas Sarkozy, although promoting the global accessibility of nuclear, stressed the importance of non-proliferation. He urged rich lenders to help pay for global nuclear expansion. "I do not understand and I do not accept the ostracism of nuclear energy by international financing," he said, urging the World Bank and other global lenders to help fund nuclear investments in developing countries. However, he came out strongly against those who "cheat" and use nuclear technology to make weapons.

The comments came as Israel and Syria announced ambitions to develop nuclear energy.

A senior Syrian official said his country is looking at "alternative energy sources, including nuclear energy" to meet growing demand for energy in his country, noting its growing population.

Syria's Deputy Foreign Minister Faysal Mekdad said: "The peaceful application of nuclear energy should not be monopolised by the few that own this technology but should be available to all."

Israeli Infrastructure Minister Uzi Landau also said they would pursue nuclear power. He said Israel's need for nuclear energy was "imminent" but gave no timeline for a nuclear power plant. "We need this energy source because it is environmentally clean," he noted.

Landau said his country would

Continued on page 2

Eastern Europe and Central Asia may face energy crunch

The World Bank has warned that Eastern Europe and Central Asia may face an energy crunch by 2030 due to rising consumption unless massive investments are made to unlock capacity.

"The outlook for primary energy supplies, heat and electricity is questionable for Eastern Europe and Central Asia region, despite Russia and Central Asia's current role as major energy suppliers to both Eastern and Western Europe," the bank said.

According to the report, demand for primary energy in the region is expected to increase by 50 per cent by 2030, while demand for electricity is expected to increase by 90 per cent.

"Mitigation actions are required on both the supply and the demand side, and without a change in behaviour, the region as a whole could face an energy crunch, moving from being a net energy exporter to a net energy importer by 2030," said Peter Thomson, Director for Sustainable Development in the World Bank's Europe and Central Asia region.

The report showed the current financial crisis created some breathing room and a window of opportunity for the region to take mitigating actions since energy demand had been significantly dampened.

"But this is only a temporary respite before energy availability again becomes a serious concern. Once growth picks back up, so too will energy consumption," it said.

The World Bank said the energy crunch could not be avoided unless investments of more than $3 trillion were made in the next few decades.

Almost $1.3 trillion would be needed for primary energy development from 2010 to 2030 in order to ensure the availability of oil, gas and coal.

In addition, the region's power infrastructure was in desperate need of upgrading, with a massive investment of $1.5 trillion needed over the next 20 to 25 years and a further $500 billion dollars required for district heating.

Thomson said the huge amount of investment could not be provided in the region by the public sector alone, so changing the investment climate would be necessary for countries in the region to attract private sector investors.

Investing in energy efficiency was also important to not only enhance energy security, but also reduce greenhouse gas emissions and give the economies a more sustainable growth.

The report showed that an additional $1 dollar invested in energy efficiency might avoid more than $2 in production investment.

It said the challenge for these countries would be to secure additional energy supplies quickly and at minimum cost, while acting in an environmentally friendly fashion to limit the growth of greenhouse gases.

THE ENERGY INDUSTRY TIMES is published by Man in Black Media — www.mibmedia.com — Editor-in-Chief: Junior Isles — Creative Director: Jerome Hinds — For all enquiries email: enquiries@teitimes.com

(Continued from page 1)

open up any nuclear plants to international inspections – but said he saw no reason for his country to allow inspectors into what are believed to be nuclear weapons sites, or to sign the Nuclear Non-proliferation Treaty.

In a separate report in *The Jerusalem Post*, the Israel Atomic Energy Commission and the Israel Electric Corporation announced that it would begin planning the infrastructure for a civilian nuclear plant and training nuclear electrical engineers.

The Jewish state, widely seen as the only country in possession of nuclear weapons in the Middle East, is not a signatory to the international nuclear Non-Proliferation Treaty, and has adhered to what it calls a policy of ambiguity.

Thus in order to build a civilian nuclear power plant, Israel must seek some sort of reconciliation with the terms of the treaty or find a way to bypass it altogether, according to the report.

Sarkozy said the international community should be "steadfast in its opposition to those countries that violate the standards for collective security."

European Commission President Jose Manuel Barroso singled out Iran and North Korea, warning that their nuclear activities "present security risks for the global community". Barroso urged the rest of the world to join new EU nuclear security rules that make violations punishable by law. "All countries have the right to civilian nuclear energy... But for Europe, respect of the strictest safety, security and non-proliferation rules is not negotiable," he said.

The US and its allies including France suspect Iran's uranium enrichment activities are aimed at building weapons, while Tehran says they are only for peaceful nuclear energy. Iran has defied UN calls to halt enrichment and has so far faced three rounds of international sanctions as a result. Iran's first, Russian-built nuclear power plant in Bushehr is set to start-up this summer.

Meanwhile, Chairman of the Jordan Atomic Energy Commission JAEC Khalid Touqan [Tawqan] dismissed media reports of nuclear cooperation between the kingdom and Israel.

He said that it is premature to talk about any regional nuclear cooperation with Israel before resolving the Palestinian issue and the Arab-Israeli conflict. "Jordan will cooperate only with the signatories to the Nuclear Non-Proliferation Treaty," he added.

Touqan told the Jordan news agency, *Petra*, that Jordan will select the technology and strategic partner for the Kingdom's first nuclear power plant within one year.

The Kingdom is on track to construct two 1000 MW Generation III reactors in the next 15 years in order to increase the country's energy independence.

Overall plans call for the establishment of four reactors with the potential to produce over half of the Kingdom's electricity needs.

UK may yet see carbon tax


David Cameron: set out his party's energy strategy

The Conservatives plan to introduce a carbon tax if they regain power in next month's elections. But whichever party wins, low-carbon technologies including nuclear, look set to benefit, **writes Junior Isles**

The UK will see the introduction of a carbon tax if the main opposition party, the Conservatives, are elected next month.

Conservative leader David Cameron set out his party's energy strategy, which includes the introduction of a tax on carbon to encourage investment in renewables and nuclear power.

The Conservatives plan to reform the Climate Change Levy, charged on business energy use, to put a floor on the price of carbon for electricity generators. The proposed tax on generators' carbon emissions would be paid if the carbon price fell below a certain level. Any excess revenue would be returned to the industry, so it would cost no more than the existing levy, which raises £700 million a year.

The proposals are likely to be welcomed by some members of the industry who argue that the European Emissions Trading Scheme does not provide enough stability to promote investment, especially for technologies such as nuclear.

EDF of France, which still hopes to build the first of a new wave of nuclear power stations in the UK, has long argued that it would not be able to go ahead with the high level of investment needed if there is no mechanism for stabilising carbon prices.

Speaking to the *Financial Times*, Vincent de Rivaz, EDF's chief executive in the UK said: We have been strongly proposing a carbon floor mechanism for years."

Under the Conservatives' proposal, the price floor would be set at a low level but would rise towards the end of the decade when the first nuclear plant is expected to begin operation.

The Conservative strategy paper titled 'Rebuilding Security: Conservative energy policy for an uncertain world' includes 12 key actions aimed at rebuilding Britain's energy security.

The document was published just ahead of the Labour government's pre-election Budget, which also set out part of its plans for boosting investment in low-carbon technologies. It announced a £2 billion green investment bank. Paul Skinner, chairman of Infrastructure UK said the bank is likely to attract £10-20 billion of private sector investment in offshore wind, carbon capture and, in time, nuclear.

Skinner said that how much equity the bank will attract will depend on the risk of the projects but expected it to be "somewhere between five and 10 times" the £2 billion that is available.

The government has concluded that cutting-edge technologies such as offshore wind and CCS need support from the green bank and is studying options to encourage private sector investment in low-carbon technologies including nuclear.

These include paying power generators a premium on wholesale electricity market price, regulating to limit high-carbon generation, or providing a guaranteed revenue stream, which could mean regulators agree a fixed rate for low-carbon investment.

US groups rally round CCS

- Oil companies launch CCS coalition
- B&W and Fluor form strategic alliance

North America's efforts to deploy carbon capture and storage (CCS) look set to benefit from recent initiatives by the private sector.

Last month, a group of oil companies, utilities and developers launched the California CCS Coalition in an effort to advance CCS technology in the legislative and regulatory arenas.

The non-profit trade group's founding members include Aera Energy, Chevron Corp., Clean Energy Systems, Hydrogen Energy California, Sempra Energy Utilities, Southern California Edison, Shell and the Western States Petroleum Association.

The organisation's goal is "to bring voices to the table throughout the state to demonstrate that CCS is practical, effective and safe," said Executive Director Pete Montgomery in a statement. Montgomery, a consultant and lobbyist, is a former director of government affairs at BP North America.

The formation of the group was prompted by the publication in November of a report from Energy and Environmental Economics Inc. that recommended CCS as one of five broad approaches to help California meet its goal of reducing greenhouse gas emissions 80 per cent by 2050.

The DOE has awarded some $3 billion for advanced coal technologies that use carbon capture and sequestration, including $308 million to the Hydrogen Energy California (HECA) plant in California proposed by BP Alternative Energy and mining giant Rio Tinto. If approved, HECA could be the first plant to capture CO_2 from a power plant and use it for enhanced oil recovery in a nearby oilfield.

In a separate effort to develop the deployment of CCS technology, Babcock & Wilcox Power Generation Group, Inc. (B&W PGG) and Fluor Corporation announced the formation of a strategic alliance to market and sell CO_2 capture systems for existing coal-fired power plants in the US and Canada.

B&W PGG and Fluor will jointly market and provide project execution for Fluor's Econamine FG Plus technology – an advanced version of an established Fluor process that has been successfully used in 23 commercial plants for the recovery of CO_2 from flue gas for more than 20 years. The process uses an advanced amine-based solvent to capture CO_2, which can then be permanently stored or used in other industrial applications.

The alliance hopes to combine the strengths of Fluor's established Econamine FG Plus technology and engineering, procurement and construction capabilities with B&W PGG's expertise in the retrofit supply and integration of air quality control systems.

The agreement also includes a license for B&W to use and market the technology in support of this collaborative effort. B&W will provide Fluor access to its research and development facilities and pilot plant in Barberton, Ohio for testing and advancing the process for future coal-fired plant scale-up applications.

Climate treaty will be "very difficult"

Danish minister Connie Hedegaard, the Danish minister who brought together world leaders for the climate change summit in Copenhagen, is not confident the world will reach an agreement on climate change in Mexico later this year.

"To get every detail set in the next nine months looks very difficult," she said in an interview with the *Financial Times*. "Europe would love it to happen, and I would love that to happen… but my feeling is that it is going to be very difficult to get a treaty."

European Union (EU) environment ministers met officially in March for the first time since last December to assess the outcome of Copenhagen.

Spanish Environment Minister Elena Espinosa told a news conference that the ministers had recognised the "positive outcomes" of the Copenhagen conference and that they had constructive debates on further cuts in emissions.

They reaffirmed the bloc's commitment to achieve a 20 per cent reduction of greenhouse gas emissions by 2020 from 1990 levels and the EU's conditional offer to move to a 30 per cent reduction if other countries aim high, the statement added.

The European Commission, the executive branch of the EU, is assessing the impact on the EU and its member states in view of the conditional increase to a 30 per cent emissions reduction commitment. It will deliver a final report by June.

According to a new report from the United Nations Environment Programme (UNEP), pledges by 60 countries to cut their greenhouse gas (GHG) emissions over the next 10 years will not be sufficient to hold global temperature rises to 2°C above pre-industrial levels.

In its Year Book 2010 released on the sidelines of the 11th Global Ministerial Environment Forum and the Chemical Ministerial Convention in Bali, UNEP said that countries will have to be far more ambitious.

Cap-and-trade dies in the Senate

Senators Kerry, Lieberman and Lindsey: spelling the end of cap-and-trade

Desperate for a compromise on climate legislation, US lawmakers appear to have given up on cap-and-trade and are turning instead to a sectoral approach.

Siân Crampsie

The White House has made a renewed push for long-stalled climate legislation to be passed by the US Congress this year.

President Barack Obama has made it clear that he wants a system in place that puts a price on carbon in order to provide a strong incentive for emission reductions.

But it looks increasingly unlikely that legislation based on a cap-and-trade system – such as that passed by the House of Representatives last year – will be passed due to opposition in the Senate.

The latest proposal in the Senate is a bill that would apply different carbon controls to different sectors of the economy, abandoning a cap-and-trade approach altogether.

The proposal has been met with scepticism by environmentalists but is likely to appease the oil sector, which had been concerned about the impact of cap-and-trade on their industry. In other developments, House Democrats and Republicans have introduced a resolution to block the US Environmental Protection Agency (EPA) from using the Clean Air Act to regulate greenhouse gas emissions.

Obama's team continues to advocate the importance of climate legislation to the US economy, warning that investors need certainty about the future costs of emitting greenhouse gases in order to place capital into clean technologies.

Private equity firm Warburg Pincus LLC recently said that a cap-and-trade programme in the US would create a $13.2 trillion industry and boost investment in energy markets.

However the new bill being proposed by Senators John Kerry, D-Mass., Joseph Lieberman, I-Conn., and Lindsey Graham, R-S.C., would spell the end of cap-and-trade in the US, and hinder the possibility of any future global carbon market.

Their bill proposes the use of a range of market-based instruments to price carbon. Instead of setting a national target, different carbon controls would be applied to the three major sources of US emissions: electric utilities, transportation, and industry.

Their bill is a considerable departure from the European model, says market analyst firm Datamonitor, and will also have implications for a wider international deal on carbon emissions.

"Given that the US is the second largest carbon emitter, its lack of action in this arena may discourage other countries, such as China, from employing a national cap-and-trade system," says a research note from Datamonitor, which also believes that the proposed US model would "reduce the effectiveness of Kyoto mechanisms" and also reduce "the probability of a replacement to the Kyoto Protocol being drawn up at future international climate change negotiations".

The trio of senators is proposing that power utilities would immediately be forced to comply with new greenhouse gas limits. Under one option, utilities could be required to buy emissions allowances, with revenue being redirected to consumers.

In the transport sector, a new 'linked carbon fee' would be imposed on fuels at the retail level. Manufacturers would face a slow phase-in of emission limits.

The proposal is also considering provisions to boost nuclear power, expand offshore drilling and promote technology to capture carbon dioxide released at coal-fired power plants.

The hybrid approach of the legislation means that it has an increased chance of being passed this year, but it still faces several hurdles such as regional divides concerning the desire for environmental legislation and a busy Senate calendar, says Datamonitor.

Brazil sets date for Belo Monte auction

Brazil is moving ahead with plans for the development of a controversial new hydropower project on the Xingu River.

The country's Ministry of Mines and Energy has approved the requirements for bids to build and operate the 1.1 GW Belo Monte dam project, and has set April 20, 2010 as the date for the auction.

The $10 billion Belo Monte project will be the world's third largest dam after Itaipu on the Brazil-Paraguay border and China's Three Gorges project. It will be built on the Xingu River in Para state but is opposed by environmental and indigenous groups who are concerned about the impact of the dam on the area's ecosystem.

The Ministry of Mines and Energy is expected to set a ceiling price for energy from the hydropower plant of BR83/MWh ($46/MWh) over 30 years starting in 2015. The winning bidder will also be required to pay $800 million in environmental compensation and contribute $280 million to a social development plan for the region.

Brazil says the project is vital to the country's energy security and to its plans to combat climate change. The government recently signed a memorandum of understanding with the USA on cooperation in the climate change field that includes a policy dialogue between the two governments and strategies to unify efforts to reduce emissions.

Environmentalists say that the Belo Monte project will flood 400 km^2 of agricultural lands and forest and require the relocation of thousands of families.

DOE abandons Yucca plans

Years of uncertainty surrounding the future of the proposed Yucca Mountain nuclear waste repository could be at an end after the US Department of Energy (DOE) withdrew its license application for the facility.

The DOE announced in March that it had filed the motion with the Nuclear Regulatory Commission (NRC) and that Energy Secretary Steven Chu has been directed by President Obama to establish a commission to study the issue of how best to dispose of nuclear waste.

The move came just weeks after the US government announced plans to kick-start the country's nuclear power revival with up to $54 billion in loan guarantees for the construction of ten new reactors.

The DOE's move has been opposed by the National Association of Regulatory Utility Commissioners (NARUC), which has filed a petition with the DOE.

NARUC says that the dismissal of the Yucca Mountain application would significantly undermine the government's ability to fulfil its outstanding obligation to dispose of the nuclear waste. It also says that there is no apparent rational or scientific explanation for the decision and that the decision would "effectively delay the DOE's ability to finally begin to accept waste for at least 25 years".

In another boost for the nuclear industry in the US, the DOE has announced awards totalling $40 million for two teams proposals for its Next Generation Nuclear Plant project.

Westinghouse Electric Co and General Atomics will use the funds to prepare for a demonstration project testing the viability of high-temperature gas-cooled reactor technology to produce electricity and heat for industrial applications.

Bolivia announces 2010 investment plans

Bolivia is moving ahead with plans to expand generation capacity to meet domestic demand and pave the way for future exports.

The government has announced plans to invest $125 million in 2010 in a number of generation projects, including three thermal power plants in La Paz and the southern provinces of Tarija and Chuquisaca.

Other projects slated for development are a geothermal project in Laguna Colorada and a biomass plant in Santa Cruz. The government is also planning to support a wind energy project in the highlands of La Paz that will require investments of $2.3 million.

Six hydropower plants are also due to begin operating this year.

Chevron sees solar vision

- Project Brightfield launched
- Environment America proposes solar future

Oil firm Chevron has launched what it says is one of the most comprehensive solar energy testing projects of its kind.

Project Brightfield is a demonstration of next-generation solar energy technologies on the site of a former refinery in the US state of California. It will evaluate seven emerging photovoltaic (PV) technologies provided by independent solar companies in an effort to determine the potential application of renewable power at other company-owned facilities.

Around 7700 solar panels will be installed at the 8 acre site – six emerging thin-film technologies and one emerging crystalline-silicon PV technology.

"By bringing together seven emerging solar technologies, Project Brightfield represents one of the most comprehensive solar energy tests of its kind and is an innovative approach to evaluating new technologies," said Des King, president of Chevron Technology Ventures. "Testing competing technologies side by side means that we can better understand their potential application at other Chevron facilities."

The company is also constructing a 1 MW concentrating solar power (CSP) solar facility in Questa, New Mexico.

Pressure group Environment America recently said that the US should set a target of obtaining ten per cent of its total energy consumption from solar energy by 2030 in order to reduce the cost of solar technology, meet climate targets and reduce dependence on oil imports. It said that a "comprehensive suite of public policy strategies can remove many of the common barriers to solar energy development and help to make this vision a reality."

Philippines crisis raises regulatory questions

The prolonged drought that has plunged the Philippines power sector to the brink of collapse has raised questions over the government's electricity market strategy.

The country introduced the Electric Power Industry Reform Act (EPIRA) in 2001 to increase competition in the industry. Since 2004 the government has been unbundling the market and privatising the state-run National Power Corporation (Napocor). However, plans to sell 70 per cent of Napocor's assets superseded the need to build generation capacity.

Industry analysts Datamonitor commented that the Electric Power Industry Reform Act (EPIRA) was perhaps too rigid. "Although it prevented any one power company generating more than 30 per cent of the total market capacity, an industry needs competition before it can impose anti-monopoly rules such as this," it said in a statement.

With the Luzon and Visayas grids in need of money, the government now needs to boost private investment. But with elections due in May, Datamonitor says "the government is likely to push through some very short-term solutions" which may have an adverse impact on investment.

At the beginning of March, the House Energy Committee gave the green light for the passage of a resolution calling for a special joint session that would grant President Gloria Arroyo additional powers to address the Mindanao power crisis.

On March 5, the National Grid Corporation said the Mindanao grid had a power supply deficit of 700 MW, caused by reduced reservoir levels. Mindanao sources 53 per cent of its electricity from hydropower sources.

The Visayas region, which imports power from the Luzon grid, recorded a deficiency of 25 MW. The Luzon grid, meanwhile, saw a shortfall of 236 MW.

With the unstable power situation, rotating blackouts swept across Metro Manila and nearby provinces serviced by the Manila Electric Co. (Meralco). Now Meralco, the country's biggest electricity retailer, says it may soon invest in its own power generation facilities in order to become an integrated power utility.

Diversifying conglomerate San Miguel Corp. also announced plans to put up a mammoth coal-fired power plant in Mindanao that it claims would be able to meet the entire island's electricity requirements.

On the sidelines of the inauguration of Cebu Energy Development Corp.'s 246 MW coal plant, San Miguel's president said that the company would begin construction this year of a 2000 MW coal plant in southern Philippines. The company is also planning a 300 MW mine mouth coal power plant in Mindanao to help shore up power supply in the island over the next few years.

Meanwhile the Philippines' Global Green Power PLC Corp. has promised to accelerate the construction of three of its biomass projects, which will have a combined capacity of 87.5 MW.

IPP expansion plans includes renewables

Thai independent power producer, Egco Group, has earmarked about $1 billion for expanding its generating capacity over the next five years by 20 per cent to 5000 MW, up from 4250 MW. The company plans to acquire both fossil fuel and renewable energy assets in Thailand and southeast Asia.

Egco's investments will be focused overseas. "Now we have 4 billion baht in credit for taking up any opportunity," said Egco's president Vinit Tangnoi. Some 90 per cent of the company's revenue currently comes from the Thai market but this would be cut to 70 per cent by 2014, he added.

Egco is in talks to gain shares in coal-fired and gas-fired plants in Indonesia, Vietnam and the Philippines but also has plans for renewables. "While we still have plans to acquire operating power plants, either big or small, we also have to invest in renewable energy to maintain our revenue," said Vinit.

Meanwhile, Wind Energy Holding Co, a Thai energy engineering group, aims to build wind power projects with a total capacity of 800 MW within five years.

CEO Nopporn Suppipat said: "Reaching our target of 800 MW would need a massive amount of land – of about 80 000 rai (one rai=1600 m^2) – but we believe we can acquire enough land to reach our target."

The company last year received two licences from the Energy Ministry for building wind turbine farms with a combined capacity of 240 MW, on which construction is expected to start soon.

Last month Wind Energy signed a purchasing contract with Siemens Wind Power Co. to supply wind turbine equipment for the two projects.

In another development, Ratchaburi Electricity Generating Holding Plc is planning three renewable energy projects with a combined capacity of 100 MW by 2016.

Green light for linkage to power

India's coal minister Sriprakash Jaiswal has approved fuel linkages to 11 new thermal projects coming up in a move that will help improve the power situation in states facing power shortages such as Bihar and Uttar Pradesh. "Coal linkages for the 11 supercritical units of 660 MW each, which would come up in the 12th Plan-Period (2012-17) have been sanctioned," a top coal ministry official said.

These 11 units include nine units of NTPC's power plants at Nabinagar in Bihar (3x660 MW), Meja in Uttar Pradesh (2x660 MW), Solapur (2x660 MW) and Mouda (2x660 MW), both in Maharashtra, and two units of Damodar Valley Corporation's Raghunathpur plant in West Bengal.

EVN plans new plants

National power utility Electricity of Viet Nam (EVN) says it will generate an additional 2000 MW from 15 new hydropower and thermal projects this year.

These projects include Ban Ve, Srepok 3, Dong Nai, An Khe – Kanak, the first turbine group of the Son La hydropower plant, and the second turbine groups of the Quang Ninh and Hai Phong thermal power plants.

In late February, the UK-based International Power, Japan's Sojitz, and the local Thai Binh Duong Joint Stock Company received approval from Deputy Prime Minister Hoang Trung Hai to develop the infrastructure for the Son My thermal power plant in central Binh Thuan province.

The province's Department of Industry and Trade said the $4.9 billion plant would be developed under a BOO (build-operate-own) or BOT (build-operate-transfer) model. It will have three generating units, Son My 1, 2, 3, with a total capacity of 3600 MW.

The plant, to be built in the Son My 1 Industrial Park in Ham Tan district, is expected to be completed in 2018, with the first unit put into operation in 2015.

EVN says it will also this year complete the transmission grid for Ha Noi, a 500 kV transformer station for Pleiku and speed up other transmission projects in the Central Highlands and southern regions to ensure stable power supplies after 2012.

This year, EVN will start constructing six more thermal and hydropower plants with a total capacity of 5356 MW and prepare for four other projects capable of generating 2760 MW that will begin construction next year.

Bangladesh floats IPP tenders

State-owned Power Development Board (PDB) has floated the pre-qualification tenders separately for the second unit of the 450 MW Bibiyana 450 MW plant, the second unit of the 225 MW Bhola project, Syedpur 100 MW and the Katakhali 50 MW plant.

This is the first time that tenders for as many as four IPP projects have been floated simultaneously in the country.

Interested sponsors must submit applications along with qualification statements for each of the projects by May 2, 2010 and the winning bids will be named in November.

The government is also expected to float a number of other IPP power projects including several coal-fired power plants, solar power plants and wind-based power plants to meet the country's mounting electricity needs.

The PDB says the country will require $9.5 billion for its power sector by 2014. Of this total, $7.0 billion will be required for generation, $1.0 billion for transmission and $1.5 billion for distribution.

In February, Bangladesh and India agreed to form a joint venture company to set up a two-unit coal-fired power plant of total 1320 MW capacity in the Khulna district, 180 km southwest of the capital, Dhaka.

China and India work on climate change

China will work closely with India in future negotiations on climate change and is keen to step up cooperation with New Delhi in areas of forestry, energy efficiency and renewable energy.

In March the two countries signed up to the Copenhagen Accord, which calls for a voluntary cut in greenhouse gas emissions.

"In future negotiations and cooperation on climate change, we will continue to be good partners. The government of India and China have signed an MOU enhancing our climate partnership," Xie Zhenhua, top Chinese Climate negotiator, told a news conference in Beijing.

In a report in the *China Daily* newspaper, China said it plans to have "clean energy" account for 15 per cent of its total consumption under a 10-year renewable energy promotion programme soon to be made public.

Renewable energy accounted for 9.9 per cent of China's total energy consumption last year, up from 8.5 per cent the year before, the newspaper said. Under the plan, the government intends to raise that to 15 per cent by 2020.

Renewables were given a boost with the recent agreement by the French Development Agency (AFD) to double its loans to €120 million to support enterprises engaged in energy saving and renewable energies in China.

Meanwhile, the Indian government has proposed a coal cess (tax) of Rs50 ($1.09) per tonne to create a fund for promoting clean energy, a move that might push up fossil fuel prices. "To build the corpus of the National Clean Energy Fund announced earlier. I propose to levy a clean energy cess on coal produced in India at a nominal rate of Rs50 per tonne," Finance Minister Pranab Mukherjee said while presenting the Union Budget 2010-11.

The country is also investing heavily in nuclear to help meet growing demand and tackle climate change by reducing its dependence on coal.

In a visit to India in March, Russian Prime Minister Vladimir Putin said that Russia will build nuclear reactors and supply fuel and waste disposal to India under the nuclear cooperation pact with New Delhi.

During Putin's visit the two countries signed a contract on top-priority design works for the construction of the third and fourth units at the Kudankulam nuclear power plant.

Good partner: climate negotiator, Xie Zhenhua

Commission grants €2.3 billion for priority projects

Gas pipelines and electricity links win funds

Global spend of recovery funds is slow

The European Commission says that its financial support of 43 major energy projects will provide leverage for up to €22 billion of investment from the private sector.

The EU executive body has announced a second round of grants to be awarded to energy projects as part of its €4 billion economic recovery package. It has selected 31 gas projects and 12 electricity projects including the Nabucco pipeline and the Estlink-2 electricity interconnector.

The grants total €2.3 billion – the largest amount the EU has ever spent on energy infrastructure. The money will be used to co-finance the projects by up to 50 per cent, and will be disbursed over the next 18 months.

The Commission says that the projects selected were at risk of major delay because of economic slowdown, and hopes that the funding will provide the push needed to bring private financing to the energy sector.

"Never before has the Commission agreed such an important amount for energy projects. We have selected key projects which will help in creating a more integrated energy network in Europe, ensuring flexible energy flows across Member States' borders," said Günther Oettinger, European Commissioner responsible for Energy.

"Europe's energy and climate objectives require large and risky infrastructure investments with long pay-back times," added Oettinger. "The problem is that, in today's economic climate, such projects risk to be delayed."

The Commission said in a statement that €910 million will go to the electricity projects, and €1390 million to the gas pipeline projects. The projects that have been selected "reflect the energy priorities of the EU".

Günther Oettinger: ensuring flexible energy flows

A recent report from HSBC bank indicates that economic stimulus funds earmarked for environmental and infrastructure projects have so far achieved little and that just a fraction of funds announced around the world have actually been spent.

HSBC estimates that around $82 billion of public sector stimulus funds were spent in 2009, equivalent to 16 per cent of the total pledged to schemes such as renewable energy and electricity grid upgrades. Around $61 billion of these funds have been spent in China, where projects that were already planned have been brought forward.

In March 2009 the EU set aside a total of €3.98 billion to assist economic recovery. In December 2009 it announced €1.5 billion of funding for offshore wind and carbon capture and storage projects and says that the recovery programme budget is now 97 per cent committed.

Wind firms eye UK incentives

The UK is starting to attract offshore wind energy companies to its waters to help support the massive planned expansion in renewable energy, **writes Siân Crampsie.**

Powering ahead: Alex Salmond

Initiatives aimed at making the UK a world leader in the offshore wind technology industry are attracting the interest of major turbine manufacturers.

At the end of March both GE and Siemens announced plans to invest in building UK offshore wind turbine manufacturing plants following the British government's Budget measures to boost private sector investment in the industry. Spanish firm Gamesa is also rumoured to be interested in establishing a factory in the UK.

Earlier in the month, the government also announced an extension to the Carbon Trust's £4.8 million Offshore Wind Accelerator programme. The UK also unveiled its first training tower for offshore wind.

These initiatives came as Japanese firm Mitsubishi Power Systems announced plans to invest up to £100 million in a new research and development facility for offshore wind in the UK.

GE, Siemens and Mitsubishi's plans are good news for the UK government, which wants to draw the wind industry supply chain to the UK in order to support the massive expansion in offshore wind planned over the next few years. Grants of up to £30 million are being offered for projects such as Mitsubishi's, according to Datamonitor.

"The UK now has a key opportunity to become a world leader in the creation of offshore wind farms and technology, an opportunity that was sadly thwarted two decades ago as a result of a lack of government support or investment," says Datamonitor in a research note.

The Offshore Wind Accelerator programme is a collaboration between the government-owned Carbon Trust and offshore wind companies that aims to develop innovative technologies that could cut the cost of wind farm development. Its focus includes innovative foundation designs and cheaper or safer ways of accessing wind turbines.

The UK's offshore energy sector received a further boost last month with the signing of ten agreements by leading marine energy developers to build up to 1.2 GW of tidal and wave energy capacity off the coast of Scotland.

The UK's Crown Estate, which leases seabed development rights, announced the deals to develop six wave and four tidal schemes ranging in size from 50 MW to 200 MW. Together the projects will require up to £4 billion of investment.

The schemes represent the world's first commercial-scale leasing round for wave and tidal power and will be developed by companies including E.On, Scottish Power, Scottish and Southern Energy Renewables Developments, Pelamis Wave Power and Marine Current Turbines.

"Leading international energy companies and innovators continue to be drawn to Scottish waters, which boast as much as a quarter of Europe's tidal and offshore wind resource and a tenth of the continent's potential wave capacity," said Scotland's first Minister Alex Salmond. "Together with some 11 GW of planned offshore wind developments, these latest marine renewables projects show that Scotland is powering ahead in the development and deployment of clean, green energy."

In its Budget, the UK announced its £2 billion green investment bank, which it says is likely to attract between £10 billion and £20 billion in private sector investment in offshore wind, carbon capture and storage and eventually nuclear.

Germany cuts solar subsidies

Germany's plans to trim subsidies for solar energy could harm the country's efforts to reduce greenhouse gas emissions.

Germany is on track to exceed its target for renewable energy set out under the European Renewable Energy Directive, but its government is planning deep cuts in solar power subsidies from July in an effort to lower electricity prices for consumers.

In its recent renewable energy national forecast submission to the European Union, Germany indicated that it would be sourcing 18.7 per cent of its energy needs from renewable energy by 2020 – 0.7 percentage points above its target. It has strong wind energy and solar energy sectors, largely thanks to generous subsidies.

However government plans mean that the price paid for electricity from solar panels on roofs will be cut by 16 per cent, and that from larger solar power stations by 15 per cent starting this summer. The cuts will come on top of a nine per cent cut made at the beginning of the year.

The solar industry has protested against the plans and believes that the decrease will cost thousands of jobs and will drive companies into bankruptcy.

Germany announced in early March that its greenhouse gas emissions fell by 8.4 per cent in 2009 due to the drop in industrial activity. The emissions reduction of 80 million tons was the deepest in 60 years, according to German environment minister Norbert Roettgen.

Germany pledged under the Kyoto Protocol to reduce greenhouse gas emissions by 21 per cent by 2012. It has already exceeded this target, but Roettgen said in March that more measures are needed to combat climate change and continue the downward trend as the economy recovers.

The German government is considering a reversal of an earlier decision to phase out nuclear power. It is also restarting the exploration of a controversial potential nuclear storage site at Gorleben.

Poland cites favourite site

Poland's plan for the development of its first nuclear reactors by 2020 is moving ahead.

A recent study of potential sites has put Zarnowiec, a town on the northern coast 40 km from Gdansk, as the most favoured location for two planned nuclear reactors.

The study was undertaken as part of the government's drive to implement a framework for the introduction of nuclear energy in Poland. Zarnowiec had previously been chosen as the site for two reactors planned during the 1980s.

Other sites considered by the study include Kopan, Nowe Miasto and Warta-Klempicz.

Poland has Europe's largest coal reserves and coal currently accounts for over 90 per cent of electricity generation. The government wants to introduce nuclear power to help combat greenhouse gas emissions and is aiming for nuclear to account for ten per cent of generation by 2030.

Polska Grupa Energetyczna (PGE) is leading the development of the two proposed reactors and will make the final decision on siting. Media reports indicate that the company is considering bids from GE, Westinghouse, Areva and companies from Japan and South Korea.

Construction of the new reactors is scheduled to begin in 2016.

World Bank considers Eskom loan

Loan to finance coal and renewable projects
Nersa grants tariff increase

Eskom is waiting for the World Bank to make a decision on a $3.75 billion loan application that will allow the South African utility to boost power supplies and enhance energy security.

The bank is facing criticism over the loan from labour and environmental groups in South Africa because it will increase Eskom's debt burden as well as help to finance the massive Medupi coal-fired power plant.

Eskom says, however, that the loan is a crucial element of its investment programme and that the World Bank represents the cheapest money available for financing large scale projects. The World Bank also says in a document published in March that the loan will help to support economic growth objectives and accelerate South Africa's long-term carbon mitigation strategy.

"The proposed funding will combine favourable financing rates with a structured repayment profile thereby making it an economically attractive option to contribute to South Africa's future economic growth," said Eskom Finance Director, Paul O'Flaherty.

Just over $3 billion of the loan is earmarked for the 4800 MW Medupi coal-fired power plant. Another $260 million will be used to finance wind and concentrating solar power (CSP) projects, while $485 million will be used for low carbon energy efficiency programmes.

Eskom is relying on a combination of existing shareholder equity and borrowings from international and domestic markets to finance its R385 billion ($51.77 billion) capital expansion programme.

The massive investment is required to expand generating capacity and upgrade the country's power system in response to a sharp rise in energy demand in recent years.

The utility is also relying on tariff increases to help improve its financial position and in late February was granted a multi-year tariff increase of between 24 and 26 per cent for the next three years by Nersa, South Africa's energy regulator.

In response to criticisms that the bulk of the loan will be used to finance a project that will increase South Africa's carbon emissions, the World Bank has pointed out that the loan will finance renewable energy projects and will serve as a "down-payment on a greener future".

The 100 MW CSP project would be the "biggest grid-connected solar thermal power project in any developing country, the biggest ever solar thermal project with storage, and the biggest ever central receiver-type solar power project", says the bank.

Nersa's approval of a 24.8 per cent tariff increase for 2010, 25.8 per cent for 2011, and 25.9 per cent for 2012 has been widely criticised due to the impact that it will have on households and industry in South Africa. Eskom had originally requested an annual tariff hike of 45 per cent for three years, but then revised this to 35 per cent in response to protests from consumers.

South African organisations such as the National Union of Metalworkers fear that the tariff increases will exacerbate job losses. The SA Chamber of Commerce and Industry (SACCI) estimates that approximately 250 000 jobs will be lost and also says that the tariff increases will impact inflation.


Paul O'Flaherty: Eskom Finance Director

Eskom says that the tariff increase is required for it to run a viable and sustainable business and to help finance the capital expansion.

The utility is also facing a legal challenge from its former CEO Jacob Maroga, who was fired in October 2009 after reneging on his decision to resign. Maroga is claiming R85.7 million in compensation or reinstatement.

Gazprom prepares for shift

Gazprom may be forced to reassess its priorities in the aftermath of the global financial crisis, according to a new market study.

Consulting firm Wood Mackenzie says that the combination of a global oversupply of gas and lower demand projections is resulting in a competitive European gas market, which may lead to soft prices for the next five years.

The challenging environment will force the Russian gas giant to increase its focus on Asian and domestic markets, says Wood Mackenzie.

"Europe has been hardest hit by the global gas glut and there are two key uncertainties for Russian gas: demand growth and future gas pricing," says Tim Lambert, Study Director and Vice President of Energy Consulting for Wood Mackenzie. "In contrast the Asian gas market is potentially very attractive for Russia as it provides diversification and the potential to monetise large quantities of remote East Siberian gas."

Lambert also notes that Chinese gas demand is forecast to quadruple by 2030, providing Russian gas with a market that it would not have been able to find in Europe.

There are already signs of the impact that the market conditions are having on Gazprom, which recently agreed changes to gas contracts with major European clients such as GDF Suez, E.On and Eni.

The Russian firm is reportedly allowing up to 15 per cent of sales to be linked to spot market gas prices, which are currently around 25 per cent cheaper than the oil-linked prices specified in long-term contracts.

Mmamabula developer announces new project

The developer of one of the largest private sector projects in Africa has announced plans for a new power plant to serve the energy needs of Botswana.

CIC Energy Corp is hoping to develop a 300 MW coal-fired power plant at the Mmamabula coalfield in Botswana and is in talks with China's Golden Concord Holdings Limited (GCHL) over an equity stake in the project.

Late last year CIC put on hold plans for a 1200 MW power plant known as the Mmamabula Energy Project serving the needs of the South African market after it failed to obtain a commitment from South Africa's government on the purchase of energy from the plant.

It is hoping to resume work on the Mmamabula Energy Project, which also includes development of an integrated coal mine at the complex in southern Botswana, later this year.

The latest 300 MW project is known as the Mookane domestic power project, and the memorandum of understanding signed by CIC and GCHL aims for GCHL to be a majority investor in the plant. GCHL affiliates would construct and operate the plant, while CIC Energy would be responsible for overseeing the development and operation of the mine.

"After CIC Energy decided to defer further development work on the MEP due to the ongoing unresolved regulatory issues in South Africa, the discussions with GCL quickly focused on the possibility of jointly developing a smaller power project specifically for the Botswana market," said Greg Kinross, President of CIC Energy. "We have also briefed the government of Botswana on the [Mookane project], and we believe that it will be of interest to them."

Mookane will help Botswana to overcome a growing power deficit, which is expected to reach over 200 MW this year, according to the Botswana Power Corp (BPC). Other key projects being developed in the country include the 600 MW Morupule B plant, which is being built by the China National Electric Equipment Corporation.

In late 2008, CIC Energy appointed Shanghai Electric Group Co. Ltd. as the main engineering, procurement and construction contractor for the Mmamabula Energy Complex.

The close and growing ties between African nations and China has reportedly prompted concerns from the West but such claims were rejected recently by the World Bank and by Beijing.

South Korea moves in on Turkish nuclear territory

A joint declaration on cooperation in the nuclear energy field between Turkey and South Korea is a major step forward in the Asian nation's ambitions to win deals in emergent nuclear countries.

Signed in March, the deal paves the way for the two countries to examine whether the Korean-built APR1400 nuclear reactor could be used for the proposed Sinop nuclear power plant on Turkey's Black Sea coast.

It has also enabled Turkey to rescue its nuclear power programme, which stalled late last year after a court ruled that a tender held to build the country's first nuclear power plant was unlawful.

Russian firm Atomstroyexport had been declared the winner of that tender – although it was the only firm to place a bid – and is still in negotiations to revive the deal.

The pact between South Korea and Turkey calls for the two sides to set up a task force to conduct detailed studies for the construction of the nuclear power plant. South Korea's Kepco has five months to conduct feasibility studies and produce a bid for the project, which could involve the construction of four reactors totalling 5600 MW.

Kepco recently won a bid to construct new nuclear power plants in the United Arab Emirates. South Korea said in January that it aims to export 80 nuclear reactors by 2030 and become one of the top three atomic energy powers in the world.

South Korea's involvement in Turkey's nuclear programme could also give Turkey leverage in its negotiations with Atomstroyexport.

The Russian firm has proposed the construction of four VVER-type nuclear reactors at Mersin and was declared the preferred bidder even though Turkey said that the price was too high.

EDF amends corporate contracts

Joaquin Almunia: decision marks an important step

Antitrust charges dropped
Another step towards liberalisation

European regulators have agreed to drop antitrust charges against EDF following commitments made by the French utility over the treatment of some of its corporate customers.

The European Commission has made the commitments legally binding and says that the decision will increase competition in the French wholesale electricity market.

Under the deal announced in mid-March, EDF will have to ensure that its competitors in France will have access to its customers that are tied into long-term contracts. There will be a restriction on the length of contracts that EDF signs with consumers, and resale restrictions have also been imposed.

The European Commission says that the commitments were offered after it raised concerns that EDF's contracts with large electricity consumers might be hindering the entry and expansion of EDF's competitors on the French market. It took the view that the company's current practices effectively amounted to an abuse of its dominant position.

"Today's decision marks an important step towards the effective liberalisation of the French electricity markets to the benefit of large customers and, by extension, the economy as a whole," said EU Vice President for Competition Joaquin Almunia.

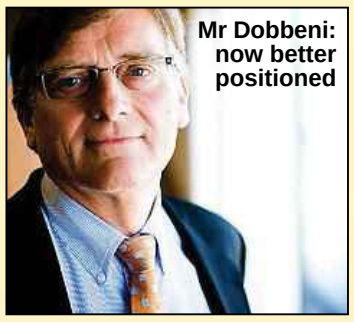
EDF will now have to ensure that an average of 65 per cent of the electricity that it has contracted with large consumers will return to the market every year, either because a contract ends or because the customer decides that it wants to opt out for free. It will also have to offer non-exclusive contracts, which will enable consumers to source energy from other suppliers in addition to EDF.

The European Commission sent a formal statement of objections to EDF in December 2009 expressing concern over long-term contracts with industrial consumers. It is also investigating other areas of the French electricity market in an effort to improve the competitive landscape.

EDF reported in February that the group's performance on its home territory had been affected by industrial action and maintenance issues with its ageing fleet of nuclear reactors. The company's debt had also risen to €42.5 billion by the end of 2009.

To reduce debt levels, EDF is considering a disposal of its UK electricity distribution network. Parties interested in the sale are reported to include Global Infrastructure Partners, Macquarie and Canada Pension Fund.

Elia buys 50 Hertz



Mr Dobbeni: now better positioned

Belgian TSO takes operational control
E.On and TenneT complete sale

The decision by Vattenfall to sell its German electricity network subsidiary 50 Hertz Transmission to Elia and IFM means that two of Germany's four high voltage grids are now in the hands of independent operators.

In a €810 million deal announced in mid-March, Belgian transmission system operator (TSO) Elia and Australia-based Industry Funds Management (IFM) have agreed to buy 50 Hertz, which operates around 9700 km of high voltage lines in eastern and northern Germany.

The agreement comes less than a month after E.On closed a deal to sell its German high voltage grid to Dutch TSO TenneT.

The deal will see Elia take a 60 per cent stake and full operational control of 50 Hertz, while IFM will own 40 per cent of the firm. It marks a "major step forward" in the development of the European electricity market, says Elia.

"With this investment in close partnership with IFM, we will be better positioned to participate in the growth of a truly European electricity market in the region that takes into account the integration of a larger part of renewable energy sources… in line with national and European energy policy," said Daniel Dobbeni, CEO of Elia.

Vattenfall Europe AG, Germany's third largest electricity generator, put its grid operations up for sale in order to conform with the European Commission's third energy package, which mandates the operational separation of generation and transmission assets. Elia and IFM are taking on €320 million of debt in the transaction, and have also pledged to pursue Vattenfall's investment commitments.

"With Elia and IFM, we have found outstanding investors that fulfil all of our criteria for financial strength and long term reliability," said Tuomo Hatakka, Chairman of the Management Board of Vattenfall Europe. "This is not only relevant to achieve the objectives of the national and European energy market, but it is also in our own best interest as an electricity provider: ultimately, without a functioning grid, we cannot transport the electricity generated in our power plants to our customers and end consumers."

The investment commitments include the construction of interconnectors and line extensions in preparation for the addition of renewable generating capacity to Germany's grid. Elia and IFM also say that they will participate in the development of offshore transmission grids in the North and Baltic Seas.

Elia plans to finance the acquisition by a capital increase in the second quarter of 2010 and says that the deal will result in improved reliability and security of supply.

"This will give market players in Belgium and Germany a secure access to a larger and greener energy mix, thus reinforcing security of supply, while simultaneously increasing system security in a context where international electricity flows and variable generation constantly increase," said Dobbeni.

First Solar joins Desertec

The ambitious Desertec Initiative received a boost last month with news that First Solar would join it as an associated partner.

First Solar is the first pure photovoltaic (PV) manufacturing firm to join the project, which aims to construct renewable energy plants in North Africa and export the energy to Europe. Other companies involved in the initiative include E.On, ABB, RWE and Siemens.

As an associated partner of Desertec for an initial period of three years, First Solar will contribute utility-scale PV expertise in Desertec working groups and prepare the ground for reference projects and a roll-out plan. The company has already built utility-scale solar power plants in desert conditions in the USA and United Arab Emirates and is preparing the way for a 2 GW solar power plant in Ordos City, Inner Mongolia.

First Solar's PV products are based on thin film technology.

Flat performance makes GDF Suez cautious

Gerard Mestrallet: scaling back profit targets

A slower-than-expected economic recovery in Europe has caused French energy group GDF Suez to scale back its profit growth targets for the next two years.

The cautious outlook from the utility came as it reported a flat performance for the year ended December 31, 2009, with a net income of €4.5 billion compared with €6.5 billion for 2008.

Revenues for the year ended December 31, 2009 were €79.91 billion, compared to €83.05 billion for the year ended December 31, 2008.

The company said that the performance was largely due to the continued depressed demand for electricity and gas from industrial consumers and the resulting drop in prices. Gas prices remain low due to a glut of LNG on the market, said Gerard Mestrallet, chairman and CEO of GDF Suez.

"GDF Suez reports profitability growth despite a sharp drop in gas activity worldwide, which was impacted by the effects of the economic downturn and by commodity prices," said Mestrallet. "This performance follows a record 2008.

"Despite the downturn, the group continued to make substantial investments, close to €20 billion over the past two years. The return on these investments will contribute to EBITDA growth for the group, starting this year and at a higher pace in 2011."

GDF Suez believes that its earnings before interest, tax, depreciation and amortisation (EBITDA) will rise by at least 15 per cent between 2009 and 2011, resulting in an operating profit margin of €16.1 billion. This compares with a previous guidance of €17-18 billion.

Mestrallet also said that GDF Suez was in a good financial position, with low levels of debt, compared to other utilities in the sector. It has around 19 GW of electricity generation capacity under construction and is also intending to increase the levels of cost savings that it makes over the next two years.

The utility recently terminated talks with the UK's International Power over a possible tie-up. Those talks foundered due to disagreements over valuations, according to media reports.

Siemens expands Charlotte facility

Siemens has reaffirmed the importance of the US market to its energy business by committing $135 million to the construction of a new 60 Hz gas turbine production plant at its existing facility in Charlotte, North Carolina.

The investment decision is the latest in a series of moves designed to support its growth strategy in the US, which remains the most important single-country market for the German firm.

Production at the new facility is slated to start in autumn 2011. Meanwhile the production of 60 Hz gas turbines at Siemens' Hamilton, Canada site will be phased out.

"Over the next five years, we expect employment at the Charlotte site to grow to nearly 1800 people, with more than 1000 of those positions new to Charlotte," said Peter Löscher, President and CEO of Siemens AG.

"The new plant in the US will be the most advanced gas turbine production plant in North America and sets new benchmarks in terms of efficiency, quality and competitiveness."

Americas

Hydro One installs new EMS

Areva Transmission & Distribution (T&D) has equipped Hydro One Networks, an operating subsidiary of Ontario-based Hydro One Inc., with a new energy management system (EMS).

The new EMS is based on Areva's e-terra application suite and is running at Hydro One's primary control centre in Barrie, Ontario, and at its backup control centre in Richview, Toronto. The system monitors and controls 97 per cent of Ontario's electricity transmission system.

The new EMS will help Hydro One to comply with the North American Electric Reliability Corporation's (NERC's) Critical Infrastructure Protection (CIP) standards.

Siemens to supply Colorado IPP

USA-based independent power producer (IPP) Black Hills Colorado has placed an order with Siemens Energy for the supply of two steam turbines for two new combined cycle power plants in Pueblo, Colorado.

Siemens' scope of supply includes two SST-400 steam turbines, transport to the site and technical advisory services. The power plants will have a rated output of 100 MW each and will start commercial operation in early 2012.

Siemens will deliver the first unit in February 2011 and the second in March 2011.

T&T to modernise distribution grid

The Trinidad & Tobago Electricity Commission (T&TEC) has selected Open Systems International Inc. (OSI) to supply a comprehensive new Scada system for its distribution grid.

Under a contract between the two firms, OSI will supply its Monarch technology, which is expected to improve the security, reliability and functionality of Trinidad & Tobago's national power distribution system.

T&TEC is currently the sole distributor of electricity for Trinidad and Tobago, serving approximately 407 092 domestic, commercial, industrial and street lighting customers throughout five regional divisions.

Acciona wins Mexico wind project

Acciona Energy is to build and operate three wind parks in the Mexican state of Oaxaca after winning a tender held by the country's Federal Electricity Commission (CFE).

The three facilities, which will use Acciona's 1.5 MW wind turbine technology, will have a combined output of 306 MW.

Spain-based Acciona has said that the deal accounts for 12.7 per cent of the wind power implementation objective to 2013 envisaged in its strategic plan.

Construction work on the three facilities will get under way in the second half of 2010 and will come into operation in 2011.

Asia Pacific

L&T orders Suzlon units

Suzlon Energy has announced that it has received its first ever order from a subsidiary of Larsen & Toubro (L&T) for an 8.7 MW wind power project in Tamil Nadu.

L&T Infrastructure Development Projects Ltd has placed the order to construct, operate and maintain the project, which will consist of three of Suzlon's S82-1.5 MW units and two of its S88-2.1 MW units.

Suzlon has also received an order from Gujurat State Petronet Ltd for a 52.5 MW wind energy project in Rajkot and Porbandar, Gujurat.

Suzlon is to build, operate and maintain the project, supplying 35 of its S82-1.5 MW wind turbine generators. The project is due to be completed by July 2010.

BHEL to develop two Maharashtra plants

Elena Power & Infrastructure has placed orders with India's Bharat Heavy Electricals Limited (BHEL) to build two new thermal power plants in the Indian state of Maharashtra.

The orders are worth a combined INR57.78 billion ($1.28 billion) and will result in the development of two 5 x 270 MW power plants, at Nasik and Amravati. BHEL's scope of work will include design, engineering, manufacture, supply, erection and commissioning of the steam turbines, generators and boilers, associated auxiliaries and electricals, controls and instrumentation and electrostatic precipitators.

Areva secures substation order

Areva's Transmission and Distribution (T&D) division has been awarded a €60 million contract by Uttar Pradesh Power Transmission Corporation Limited to build an extra high voltage substation in the Indian state of Uttar Pradesh.

Located at the Anpara D thermal power plant, the new substation will improve power transfer capacity and reliability from eastern Uttar Pradesh, the regional power generation hub, to the consumer centres in the western part of the state. The project is scheduled for completion by the end of 2011.

Vietnamese firm wins $2 billion dam project

A Vietnamese development company has won the contract for a multi-billion dollar hydroelectric dam on the Mekong River in Cambodia.

The Vietnam Urban and Industrial Zone Development Investment Corporation received its licence December 9, 2009, and now has two years to complete impact and output studies, according to the Cambodian Ministry of Industry, Mines and Energy.

The project could cost between $2 billion and $3 billion to develop and would have an installed capacity of up to 980 MW. It would provide a major boost to the generating capacity in Cambodia, where electricity demand is rising rapidly.

The Vietnamese developer replaces Russia's Bureya GES Stroy, which signed an agreement with the government in February 2009 but failed to report to the government on time.

Europe

RWE orders Vestas units

RWE Innogy, the renewable energy arm of German utility RWE AG, has placed an order with Danish firm Vestas for the supply of wind turbines for its second Italian offshore wind farm.

The Ururi wind farm, with a total capacity of 26 MW, will be located southeast of Termoli on Italy's Adriatic coast. Commissioning is scheduled to take place by the end of 2010 and annual production will be around 55 million kWh.

The project is a 51/49 joint venture between RWE Innogy Italia and local Fri-El Green Power SpA.

GA Solar selects ABB

Engineering firm ABB has won an order worth $30 million to construct a 13 MW photovoltaic (PV) power plant in Spain.

The order has been placed by Spanish developer GA Solar and requires ABB to design, engineer, build and commission the facility, which is scheduled to start commercial operation within a year.

The new plant will feature ABB's 1 MW PV plant modules and a control tracker system. It is expected to generate up to 22.6 GWh/year of energy.

Steam turbine for UK industrial park

Sembcorp UK has placed an order with Siemens Energy for the supply of a steam turbine generator to extend the turbine building at its industrial park in Wilton, UK.

Siemens will supply an SST-400 industrial steam turbine with an installed capacity of 52 MW. The Germany-based firm anticipates that the order – which includes an extraction condensing turbine and a generator – will be delivered within 13 months.

The new steam turbine will be put into operation next to an existing Siemens steam turbine at the industrial park.

Siemens and Statkraft sign solar deal

Siemens Energy and the Norwegian utility Statkraft have signed an agreement to build solar plants in Italy with a total capacity of 40 MW.

The deal is the largest photovoltaic (PV) framework agreement that Siemens has negotiated in Europe to date and includes Statkraft's project pipeline for PV plants in Italy. Construction of the first solar plant is expected to begin in the spring of 2010.

For the projects under the framework agreement with Statkraft, Siemens will provide engineering, procurement, construction and maintenance. The scope of supply will include support structures, connection boxes, cabling, photovoltaic modules, inverters and medium-voltage equipment.

International

AP1000 qualifies for Temelin

Czech utility CEZ has notified Westinghouse Electric Company that it has successfully qualified to participate in the bidding process for the construction of a new nuclear power plant at Temelin.

USA-based Westinghouse announced its intention to participate in the tender in late 2009 and is planning to submit a bid based on its AP1000 reactor. The company says that the project would also involve Czech industries through the localisation of manufacturing and construction.

Areva has also been qualified by CEZ for the tender along with a consortium of Skoda, Atomstroyexport and Gidropress. A decision is expected in 2012, according to the World Nuclear Association.

CEZ wants to build two new reactors at Temelin, totalling up to 3400 MWe of capacity. It could also order three additional reactors for projects in the Czech Republic or elsewhere in Europe.

Siemens selected for Denizli

Siemens Energy has received an order to supply key components for the Denizli combined cycle power plant, which is being built in Turkey by Greek firm Metka.

The Siemens scope of supply encompasses two SGT5-4000F gas turbines, one SST5-5000 steam turbine, three SGen5-1000A air-cooled generators, the associated electrical equipment and SPPA-T3000 instrumentation and controls. The order volume is approximately €110 million.

The plant with its installed capacity of approximately 775 MW will be located on the outskirts of Denizli in west Anatolia, a region with strong economic growth.Commercial operation is slated for 2012.

Alstom wins Kusile automation order

Eskom has awarded the contract for the automation of its Kusile thermal power plant to Alstom Power.

Under the €90 million contract, Alstom will engineer, supply and install its Alspa Series 6 distributed control system (DCS) at the plant, which will have a capacity of 4800 MW and which is a major part of Eskom's plans to expand capacity in South Africa.

The contract follows a similar order for Alstom in November 2009 for Kusile's sister plant, Medupi.

Boiler order for Doosan

South Korean equipment supplier Doosan Heavy Industries & Construction Co. has won an order worth $347 million to supply two boilers for a new power plant in Egypt.

Under a contract with East Delta Electricity Production Co., Doosan will supply two boilers to the 1300 MW plant, which will be located in Ain Sokhna, 150 km east of Cairo.

The plant is being built to help meet Egypt's electricity demand, which is growing at about five per cent per year.

GDF Suez selected for Saudi plant

A joint venture between GDF Suez and the Saudi Aljomaih Group has been appointed the preferred bidder for the development of the Ryadh PP11 power plant in Saudi Arabia.

The new gas-fired plant will have a capacity of 1730 MW and will be located 125 km west of Riyadh. Its development will cost over $2 billion.

The project partners bid in conjunction with GE and Hyundai Heavy Industries. When operational, they will sell electricity to the Saudi Electricity Company through a 20-year power purchase agreement.

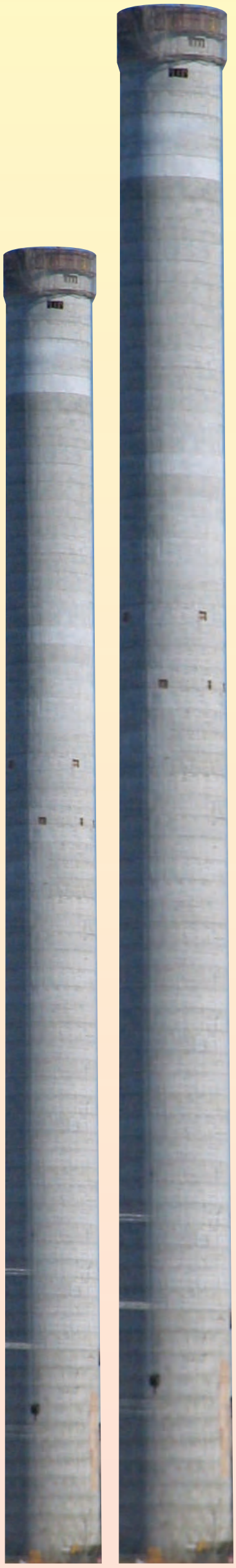
Siemens to expand UAE network

Siemens Energy has received an order worth approximately €30 million from the Federal Electricity and Water Authority (FEWA) to supply a turnkey substation in Fujairah and modernise four other substations.

The contract is part of FEWA's plans to expand its power supply network in the face of rising electricity demand. The projects are due to be completed within 15 months.

The substation for the 132 and 33 kV voltage levels will be supplied together with Siemens transformers, protection equipment, and instrumentation and controls. It will be erected in the town of Qidfa, in the northern emirate of Fujairah, and will strengthen the network in the north of the UAE.

Four existing substations will also be modernised in the neighbouring emirates of Ras-al-Kaimah and Ajman.



Eyes in front

With the current attention surrounding energy efficiency and smart grids, *TEI Times* decided to catch up with **Peter Leupp**, the man at the helm of ABB Power systems who always keeps his eyes in front.

Peter Leupp, is a relative veteran of the power systems business. More than 30 years in the industry, has given the current Head of ABB Power Systems and Member of the Group Executive Committee of ABB Ltd, headquartered in Switzerland, a relaxed, cool demeanour, no doubt borne of experience.

But despite having the benefit of history on his side, Leupp is not one to dwell on the past. While realising the importance of learning from the past, Leupp is a person who always likes to look forward. It is a good philosophy for a man who still enjoys a bit of downhill skiing as a form of exercise and relaxation.

"I try to manage this work-life balance. It's mainly work, then life; but as long as work is life as well, that's good," he jokes. Some may find this difficult to understand but Leupp explains: "If you like your work, then it's part of life in a positive sense."

With the limited time he has, Leupp enjoys outdoor activities, whether hiking, biking or skiing. "It's good to get a bit of fresh air, open the mind and relax a bit," he says. Although Leupp travels extensively for business, he also likes to travel in his private life. "This makes my wife happy. As a keen photographer, she likes to travel as well."

Leupp sees himself as a pragmatic, transparent and down-to-earth person who likes working with people from all over the world – qualities that have influenced his career path.

"With one exception, I have never done the same job for more than four years," he notes. That exception was a six-year posting in China, an experience that has given him a keen affinity for Asia. "I like the history, the culture. And I like the people."

Since graduating from the Swiss Federal Institute of Technology (ETH) in Zurich with a degree in Electrical Engineering, Leupp has essentially been with ABB for almost all of his working life.

He began his career in 1977 at what was then known as Brown Boveri Company (BBC), holding various positions within the high voltage business until 1988. Following a brief spell at Technochemie, Leupp returned to ABB in 1989 following the merger of Asea and BBC. Since then he has worked his way through the ranks, taking his current position in 2007.

ABB is an engineering company, where managing risks and finding engineering solutions are central to day-to-day operations. Leupp comments: "Throughout my career, I have been challenged by different problems that have to be fixed. As a young R&D engineer it was about achieving R&D plans. But I like working with people, which quickly led me into management. Now it's more about dealing with large projects and keeping things under control. I have a high level of inter-cultural sensitivity, which helps in integrating teams and motivating people."

It is this international, global aspect of his current role that Leupp enjoys most. "Seeing the different parts of our business in the all parts of the world is interesting. It is also probably the best industry you can be in at the moment."

It is widely agreed that there will be tremendous growth in electricity demand in the coming years. Electricity consumption per capita in developing countries such as China, India and Brazil is still low, and the developed countries are already highly dependent on electricity. As Leupp puts it: "You cannot run a data centre on gasoline."

Leupp also pointed towards needs arising as a result of ageing grids, security of electricity supply and the global will to act on climate change. "Despite what people say about Copenhagen, if you look at the details you can see that the whole world has clear intentions to change. This will mean more renewables, more hydro power and even nuclear. This will bring challenges and opportunities on the transmission side. If you build a city in one corner of a country, you have to build roads. The power highways that were built 30-40 years ago are not sufficient or necessarily in the right place – nor are they equipped to cope with new forms of generation and other developments in the evolving grid."

Despite the obvious requirements, the power systems industry has not been immune from the effects of the financial crisis. The lack of available financing or postponement of the construction of buildings or industrial facilities has led to a delay in transmission and distribution projects that were in the pipeline. But Leupp believes that the availability of stimulus money for energy efficiency projects will see the re-start of some of these projects.

He also sees revitalised activity arising from the increase of electric vehicles and the associated charging infrastructure, combined with the need to integrate intermittent power. This will call for a grid that is capable of better balancing demand and supply.

Unlike water and gas grids, where there are tanks to balance demand and supply, electrical grids have no storage capability. Demand is predicted and the grid stability is controlled from the supply side. In the future this may not be possible when 30 or 40 per cent of generation comes from sources that are difficult to predict. "There will have to be a big breakthrough in storage but this will come," comments Leupp.

He also said that the distribution sector and the consumer will begin to see a greater degree of control, which has been available in the transmission grid for a number of years. "But demand management will need a completely new setup. People will not just change the way they use appliances. Intelligence will have to be built into the systems and appliances. Perhaps they will have to automatically follow tariffs or frequency. But you need an interface at the point of consumption that automatically follows signals from outside. Consumers will also need incentives from the utilities if they are to be persuaded to alter their behaviour or living standards."

Leupp believes that the industry will continue to see advances in automation – e.g. IT intelligence, communications, and sensor technology – mainly at the distribution level. "This already exists at the transmission level. At the distribution level, you need IT that can manage huge amounts of information, perform fault location, isolation and self-healing functions, etc. And we should also not forget cyber-security."

He also says there will be a huge need for equipment that helps better utilisation of the existing grid – equipment such as flexible ac transmission systems, storage and everything related to DC systems.

"ABB is extremely well positioned with its complete portfolio to provide all of these things and help utilities, industry and other consumers meet targets for energy efficiency and climate change. In terms of energy efficiency, on the transmission side we can also do a lot by providing more efficient transformers and power electronics based technologies that reduce losses in transmission and distribution. There is a general drive towards higher transmission capacities and greater efficiency and reliability," says Leupp.

Peter Leupp has seen ABB's best year despite the financial crisis

> "…If you build a city in one corner of a country, you have to build roads. The power highways that were built 30-40 years ago are not sufficient or necessarily in the right place"

The importance of advancing HVDC systems will also have a big role to play in improving overall system efficiency and combating climate change. "If you look at China, it has plenty of hydropower resources but they are thousands of kilometres away from where the power is needed. Here HVDC is an important technology where power superhighways can help bridge long distances with minimised losses."

ABB now has HVDC links in operation in China that can achieve voltage levels up to 800 kV. The next important area notes Leupp, is in developing technologies to "tap" into these lines to take energy out. "Like on a highway, you have to have entries and exits to the line. I don't believe you can build a power line from Canada to Texas where all the states in between can only look at the line and not see any benefit from it. The ability to take energy feeds from exit points from the power superhighway presents huge opportunities. It would allow, for example, regulating hydro facilities at one end of a line to provide balance for intermittent renewables at the other end of the line."

Certainly big changes are under way in the power systems business. Just a few months ago saw the sale of Areva T&D to Alstom Power and Schneider. Asked whether ABB considered bidding for Areva T&D, Leupp said: "We did not pursue it as it could have created some anti-competitive concerns. But the fact that Areva T&D is now part of Alstom and Schneider is not really a big concern for us – we always welcome healthy competition."

In the meantime, for ABB's power systems business, 2009 was probably the best year it has ever had, in terms of order intake according to Leupp. "We had fantastic growth in a year that witnessed one of the worst economic crises in memory."

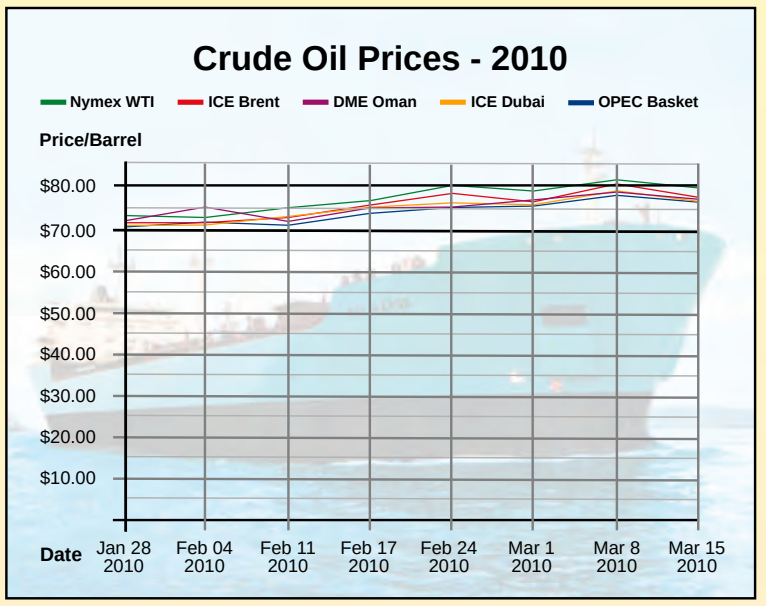
The Power Systems division saw orders increase by 70 per cent in the third quarter of 2009 compared to 3Q 2008, reaching $1991 million. Fourth-quarter orders also grew strongly and contributed to a record annual order intake for the division. The growth was largely driven by continued emerging market investment in power generation and transmission capacity as well as related grid enhancements. The division closed out the financial year 2009 with an order intake of $7.8 billion, revenues in excess of $6.5 billion and an order backlog of around $9.7 billion.

"If you look at the bottom line, it was a tough year and it will continue to be tough. We hope that the industrial sector returns when the economy bounces back. But overall we had a very good year in 2009."

After such a good year, perhaps Leupp can relax a bit. Talking to *TEI Times* was one of his last tasks before setting off for a weekend in the Swiss mountains for some skiing. "My wife is not such a keen skier so perhaps I can go a bit faster while she takes in some sunshine," he laughs. It may be his form of relaxation but, as always, Leupp will be keeping his eyes fixed firmly ahead.

Oil

Opec sees positive signals but watches for downside



Opec ministers "happy" with the oil market
Downside risks include mounting public debt

David Gregory

With the Opec basket price settling within the $70-80/b range for most trading days this year, Opec ministers said they were happy with the oil market during their ministerial meeting in Vienna last month. Steady prices have allowed Opec members to proceed with investments in projects previously delayed when crude prices slumped to nearly $30/b during the economic downturn.

"Looking at the overall economy, we expect that things will get better and better," Opec President and Ecuadorian Oil Minister Germanico Pinto said. "The economy is coming out of recession – and this is good news for everyone," he added.

After moving within the $70-80/b range for months, Nymex crude is now averaging a daily settlement in the low $80/b range, and if projections for demand growth ring true, prices are expected to be in the $75-85/b range towards the end of 2010.

But in its communiqué, issued at the end of the meeting, Opec couched its optimism, noting that, "while the global economy is clearly rebounding from the late 2008 and early 2009 recession… serious threats remain." The statement listed downside risks as: "the mounting and potentially unsustainable public debt in the most advanced economies; a degrading fiscal position which might lead OECD governments to tighten fiscal and monetary policy, despite rising unemployment; weak demand; persistent global imbalances; and rising protectionism."

Furthermore, it expressed its concern that while world oil demand is seen as increasing narrowly during 2010, most of this rise will be offset by increased non-Opec supply, "meaning that 2010 is likely to witness a decline in the demand for Opec crude oil for the third consecutive year."

Opec also noted that OECD stocks remain high – at 59-61 days advanced cover – indicating a contra-seasonal stock-build during the first quarter of this year. It added that an overhang in terms of forward cover is expected to continue throughout the year.

But with current prices and everyone now happy for the first time in a while, Opec decided to rollover its production target of 24.845 million b/d, fearing that an adjustment might upset the fragile economic recovery that appears to be underway.

Despite noting that OECD stocks remain high, Opec ministers paid scant attention to the fact that compliance with country production targets had declined from around 80 per cent at their best to 54 per cent during February when output among the Opec-11 (which excludes Iraq) averaged 26.59 million bpd, 1.745 million b/d over the target. Total Opec crude production during February (including Iraq) averaged 29.192 million b/d.

In the March issue of its Monthly Oil Market Report (MOMR), Opec forecast world oil demand to grow by 0.9 million b/d in 2010, following a contraction of 1.4 million b/d in 2009. It forecast world oil demand for 2009 at 84.36 million b/d and for 2010 at 85.24 million b/d.

Oil demand has been highly dependent upon the pace of the global economic recovery, the MOMR said, and added that OECD demand is expected to continue with negative growth of around 0.15 million b/d in 2010, while non-OECD demand is seen growing to 1.0 million b/d, driven by China and the Middle East.

The Opec report estimated demand for Opec crude during 2009 at 28.98 million b/d and put demand for 2010 at 28.94 million b/d.

Meanwhile, in its own monthly Oil Market Report, the International Energy Agency (IEA) estimated world crude oil demand in 2009 at 85.0 million b/d and forecast 2010 demand at 86.6 million b/d. It added that OECD stocks increased during January by 34.4 million barrels to 2.703 billion barrels.

Global production during February rose to 86.6 million b/d, the IEA said. Non-Opec supply for 2009 was estimated at 51.5 million b/d and forecast to reach 51.8 million b/d in 2010.

The Energy Information Agency (EIA) of the US Department of Energy put world oil demand at 84.04 million b/d in 2009 and forecast demand at 85.51 million b/d in the March edition of its monthly Short-Term Energy Outlook. It said that expected increased growth in 2010 oil consumption supports a firming of crude oil prices at above $80/b this summer and accommodates a further drawdown of commercial oil inventories. It also said that Opec's surplus capacity "remains ample, dampening the likelihood of a large upward swing in prices."

Gas

Algeria urges gas producers to cut output

Algeria is calling for gas producers to take a similar role to Opec as gas prices are hit by a fall in oil prices and US development of shale gas deposits.

Mark Goetz

Algeria's Minister of Petroleum and Mines, Chakib Khelil, intends to propose that natural gas producing countries cut back on output in order to boost prices on the international spot market when the Gas Exporting Countries Forum (GECF) meets in Oran, Algeria, on April 19.

Dr. Khelil, who has advocated that the GECF take on a role similar to that of the Organisation of Petroleum Exporting Countries (Opec) said that all gas producing countries need do is "take back some of your production."

The fall in the price of oil during the global recession has seen gas on the spot market go from around $22 per million Btu to under $5/million Btu. Dr. Khelil, who is president of the GECF, said with crude now selling at around $80/b, spot gas would be at parity with crude at $13-14 per million Btu. He said to arrive at that figure, divide the price of oil by the number six.

The global spot gas market is also suffering from low prices because of the advent of new technology that is allowing the US to develop its shale gas deposits and thus eliminating the need for it to import gas. Countries such as Qatar that developed large LNG capacities – 77 million tons by the end of 2010 – have turned to Europe and the Far East for markets.

Meanwhile, the US shale gas industry suggests that the country may have enough to meet its gas needs for up to 100 years. Its usage is seen as having an impact on spot LNG prices for the short- to medium-term.

Most gas is delivered under long-term agreements that allow the purchasing partner the option to reduce the volumes they have agreed to take by a certain percentage. Under the present circumstances, customers with long-term contracts are declining to receive their full contracted volumes at high prices in order to purchase gas on the spot market where it can be obtained considerably cheaper.

Dr. Khelil is suggesting that in order to reduce the extra amounts of gas from finding their way on to the spot market, gas exporters should cut back on gas production. However, this could prove difficult not only because gas exporters must meet their own contractual obligations, but such countries are competing with one another for market share. Any gas producer that reduces output in order to boost share prices could find themselves losing out to other countries that have not cut back on production.

This is key to why it would be difficult for the GECF to transform itself into a 'Gas Opec', because gas as a commodity cannot be dealt with in the same manner as oil. The costly construction of pipelines and LNG plants requires secure long-term markets as well as long-term contracts with committed partners.

Like Qatar, Algeria is a key gas producer and supplies Europe with roughly a third of its imports. The North African country ships natural gas to Europe through the Trans Mediterranean and Maghreb Europe pipelines, while the Medgaz pipeline to Spain is under construction and the Galsi pipeline to Italy is in planning. It is also expanding its own LNG production with a new facility at Skikda and the Gassi Touil project. With these projects in mind, it is in Algeria's best interest to seek gas prices that reflect a more favourable correlation to the price of crude oil.

Algeria is joined in the GECF by other Opec members: Qatar, Iran, Libya, Nigeria, the UAE and Venezuela; plus Russia, Egypt, Trinidad and Tobago, Brunei, Bolivia, Indonesia, Malaysia and Equatorial Guinea. Together, the GECF controls around two-thirds of the world's gas reserves. Last year, Russia, Iran and Qatar formed a gas triad with the intention of coordinating gas policies, but there is little indication as yet that any joint action will take place.

For the most part, all gas producers are aware of just how difficult it will be to function anything like Opec, even if they do wish to have more control over the market.

For their part, gas consuming states oppose efforts by GECF to take on an Opec mantel. The Paris-based International Energy Agency (IEA), which monitors oil and gas supply and demand, has voiced its opposition to the formation of a gas cartel.

Thermal storage development is the key to CSP

Concentrated solar power has great promise as a renewable generation technology but its ultimate success depends on the development of thermal storage systems. **Dr. Justin Zachary**

The main issue with deployment of renewable energy conversion systems is their intermittent nature. Wind, photovoltaic (PV) and concentrated solar thermal power (CSP) generate power only when the wind blows and the sun is shining. In the current effort to increase the share of electricity generated from renewable sources, the benefits of energy storage are invaluable in improving the grid stability, power quality and continuity of supply.

Although a number of energy storage solutions are available, none of them can be optimised for all types of applications. Wind and PV, by the nature of their energy conversion process, require either direct electricity storage in batteries or conversion of electricity to and from mechanical systems such as hydro, compressed air energy system (CAES) and flywheels. With CSP, however, there is an alternative option in the form of thermal storage.

Thermal storage is key to the large-scale deployment of CSP. It allows power production to be shifted closer to the peak demand, to minimise fluctuations due to clouds, and to reduce the consumption of fossil fuel needed for start-up. Thermal storage can also boost the plant utilisation factor, a key element of any economic analysis.

Thermal storage generally requires a larger solar field, where part of the heat generated is not used immediately to produce electricity but is transferred to the storage device.

Typically there is a discrepancy between the electrical demand and generation from the solar field. The demand peaks around 17:00 while maximum power generation occurs between noon and 13:00. A storage system allows more balanced daily electricity production when the heat stored during the maximum solar insolation hours is released to produce electricity at the peak demand times. A storage system can also be used to extend operating hours into the late evening, or even for boosting base load operation.

CSP systems require several components to produce electricity: a concentrator, receiver, storage or transportation system, and a power conversion device. There are several concepts: trough, linear Fresnel and tower. The type of technology determines the most suitable storage system.

Existing storage systems under development include a variety of technologies and materials, with specific characteristics, applications and performance. However, irrespective of the storage technology, there are temperature differences between the charging and discharging modes of the storage medium. Therefore the final steam temperature going to the turbine is lower when the heat is coming from storage as opposed to directly from the solar field.

The parabolic trough is considered the most proven CSP technology. In a typical arrangement, during the charging mode part of the hot heat transfer fluid (HTF) from the solar field is diverted to a heat exchanger and the heat is transferred to the storage medium. In reverse mode the cold HTF is heated by the storage medium and then sent to the steam generator.

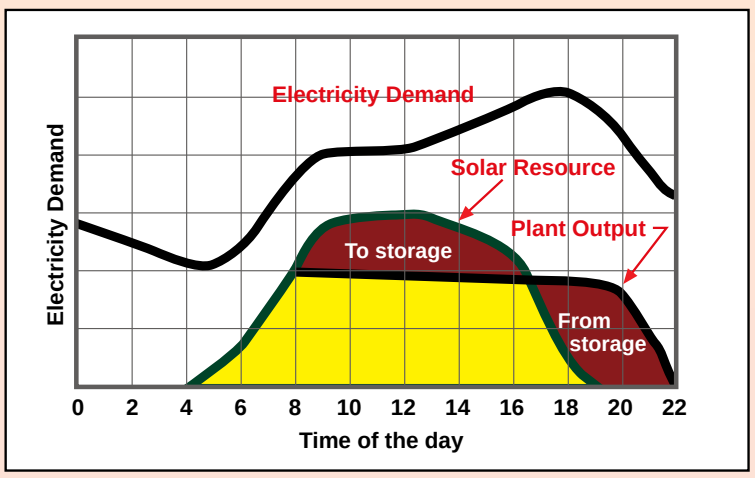
Water and steam: Water and steam is one possible storage medium. Using water as the storage medium and working fluid eliminates the need for heat exchangers between the two different media. This type of storage has a small capacity but can provide a high output and very rapid response time. It is mostly used as buffer storage for transient events such as clouds passing over the solar field.

The device is a pressurised tank containing water. During charging mode the process steam is fed inside the vessel and through condensation heats the water. In the discharging mode the tank is depressurised and the saturated steam generated is returned to the process. Constant-pressure operation of the system is not possible since the temperature of the water in the tank decreases continuously during the discharge mode. Any increase in tank size and operating pressure could significantly affect its cost.

M*olten salt:* Molten salt is the most proven technology in parabolic troughs and solar towers. It uses a mixture of sodium (60 per cent) and potassium (40 per cent) nitrate salts as the storage material. There are two tanks: one 'hot' and one 'cold'. For a trough-based system, during the charging period the salt from the cold tank, at about 290ºC, is pumped through a heat exchanger where the heat from the trough HTF heats up the salt. The salt is then stored in a hot tank at approximately 390ºC.

The parabolic trough is considered the most proven CSP technology

Electricity demand and generation with thermal storage



During the discharge period the reverse salt flow occurs from the hot to the cold tank. According to studies, two tanks 9 m (30 ft) tall and 24 m (80 ft) in diameter could be used to generate 100 MWe for four hours.

Some proposed systems could use the salt directly, either in the tubes of the trough collector or in a boiler on top of a tower. The elimination of the HTF as the working fluid in the solar field allows operation at much higher temperatures (540ºC), which greatly reduces the amount of salt needed. However, the integration of the molten salt storage directly with a steam cycle requires heat exchangers where the molten salt releases only sensible heat and the water undergoes a phase change to steam-latent heat. In this configuration there is therefore a mismatch in heat transfer properties and less than optimal 'temperature approaches' (i.e. the temperature difference between hot and cold fluids entering and leaving the vessel). This is not the case for molten salt to HTF, where both fluids exchange only sensible heat.

In addition to its high capital cost, molten salt has several disadvantages. It has low thermal conductivity. Since molten salt freezes at quite a high temperature, maintaining it in liquid form, when solar heat is not available, requires substantial external heat sources, thus increasing the plant parasitic losses. Large quantities of salt are needed and their market price becomes a significant factor in total storage cost.

Molten salt is also a corrosive material requiring special types of pumps and valves.

The research community is investigating the use of salts that have a much lower freezing temperature. Another advance is the use of a single tank for storing the hot and cold salt instead of two tanks, in a thermocline system. The hot fluid is on top and the cold on the bottom of the tank. A low cost filler material is utilised to reduce the amount of salt. The stratification is achieved through thermal buoyancy. This option, currently under development, could offer significant cost savings.

Phase-changing material: Phase-changing materials (PCMs) with solid-liquid phase transformation are an efficient substitute to sensible thermal storage such as molten salt. Exploiting the latent heat released or absorbed during a change of state of aggregation makes more sense thermodynamically, since in this case there are very small temperature differences between the charging and discharging modes. PCMs such as nitrate salts also have a higher energy density compared to conventional sensible heat systems, and thus offer more compact, economic systems.

Unfortunately, however, PCMs exhibit very low thermal conductivity and future commercial-scale storage systems will need to solve the heat transport problem. One option is to use heat exchangers with large heat transfer areas.

The alternative is to enhance the heat conductivity of the storage materials using good heat transfer materials such as graphite in the form of plates separating layers of the working substance. The technical feasibility of such systems has been demonstrated but a substantial amount of development work is still required before these composite PCMs can be deployed commercially.

Concrete, graphite, and ceramic materials: The search for alternative, less expensive storage mediums has led to the use of solid materials such as concrete for parabolic trough applications. Pipes are embedded in a concrete block and the HTF used in the parabolic troughs is circulated to move the heat in and out of the storage media.

Experimental work has been carried out in Germany by the German Aerospace Centre and at a site in Spain. The attraction is the relatively low cost of the storage medium. It also fits well with a single-phase working HTF. However there are concerns about the long-term effects of thermal cycling on the contact between the concrete and the pipes. The type of concrete used for this application must sustain temperatures close to 400ºC, a condition where conventional concrete loses its strength. It is expected that some commercial installations will appear in the near future.

While applications in the medium temperature range can be accommodated by more conventional means, the development of high temperature storage above 540ºC faces substantial technological challenges. Selecting a suitable operating medium and materials for the storage facility that are capable of coping with the mechanical and thermal stress, is a complex undertaking.

Ceramic solid materials coupled with carbon dioxide as the working fluid are currently being investigated as a potential contender for high temperature applications.

Graphite is another promising candidate in the search for a solid medium. Its thermal properties allow operation at very high temperature, above 600ºC, and its low coefficient of thermal expansion accommodates thermal cycling without excessive stress. As the temperature rises, the graphite heat capacity increases.

In certain configurations, the graphite storage may be used to extend the storage capacity of low temperature solar thermal applications.

Research and development efforts by universities and equipment suppliers to improve existing technologies and revolutionise the industry will continue. Advanced high temperature heat transfer fluids, ultra-high performance concrete storage systems, low melting point salts with better heat transfer properties, enhanced nano-technology materials, use of thermo-chemical cycling processes are a few examples of the ongoing work.

More mature technologies such as molten salt are also being scrutinised in a drive to reduce costs and improve efficiency.

It is impossible to predict if or when one particular concept will emerge as the predominant storage solution. The answer not only depends on successful technology but also on the economic constraints of power production costs from renewable sources.

Projects with thermal storage, planned to be on line in the near future, will offer a glimpse of things to come.

Dr. Justin Zachary is Technology Manager and Bechtel Fellow at Bechtel Power Corporation based in Frederick, MD, USA.

Raising the temperature at RDK8

Increasing plant efficiency is currently the only real technology option for reducing CO_2 emissions from coal-fired plants. Germany is making steady progress in advancing ultra-supercritical technology. The end of next year will see the start up RDK8, a power plant that is designed to operate with exceptionally high steam temperatures.
Junior Isles

While the use of technology to capture CO_2 from coal-fired plants will be of paramount importance in the longer term, in the near term increasing efficiency has a more crucial role to play.

The importance of improving plant efficiency cannot be over-stated. Industry estimates that every one per cent increase in efficiency reduces CO_2 by 2-3 per cent. Alstom, a major player in the design and supply of longer term technology such as carbon capture and storage as well as supercritical technology, notes that state-of-the-art supercritical technology saves 35 per cent of the specific CO_2 emissions compared to today's worldwide average.

Andreas Lusch, Senior Vice President, Thermal Systems, Alstom Power comments: "Today, increasing efficiency is the only solution we have in addressing CO_2 emissions from coal plants until carbon capture and storage becomes economically viable in the near future."

Increasing plant efficiency is especially important in countries that have a high reliance on coal. It is therefore unsurprising that Germany is among Europe's leaders in developing high efficiency coal fired power plants. With the plan to phase-out nuclear power and the retirement of old coal-fired plants, Germany will have an urgent need for new base load plants.

Coal represents 44 per cent of the country's generating capacity, and the building of new efficient coal fired plants will be central to plugging the potential generating gap while reducing CO_2 emissions. Accordingly, Germany is in the process of building a new fleet of supercritical coal fired projects that will have a net electrical efficiency in the region of 45 per cent – far in excess of the country average of 38 per cent.

Alstom is currently involved in the building of two ultra-supercritical plants in Germany – RDK8 in the Karlsruhe region and Mannheim 9 just outside of Mannheim.

RDK8, a 910 MWe plant that is being built in the Rhine Harbour power plant

View of the future: Artist's impression of the Mannheim 9 supercritical plant

park in Karlsruhe owned by German utility, EnBW. The plant will have a net electrical efficiency of 46 per cent. When considering the district heating the plant will also supply, its overall fuel conversion efficiency will reach 58 per cent.

These high levels of efficiency will have a corresponding impact on emissions. CO and NO_x emissions will be less than 100 mg/Nm^3 and CO_2 will be less than 740 g/kWh.

Although not the first supercritical plant in Germany, according to Alstom RDK8 is said to be the "first of its kind in Germany" with respect to steam conditions. Notably, it will operate using steam conditions that are among the highest of any coal fired plant worldwide. Until now, the nearest reference to RDK8 is the Niederaussem plant, also in Germany, which operates at steam temperatures of 580ºC/600ºC (live steam/reheat steam).

Supercritical steam conditions represent a physical point just above the triple point of water. When the boiler pressure reaches above the critical pressure of 221.2 bar and temperature of 374ºC, two-phase mixtures of water and steam cease to exist, and are replaced by a single supercritical fluid. These steam conditions allow a once-through boiler design where the high steam temperature and pressure results in greatly increased efficiency compared to a drum-type boiler.

> When complete at the beginning of 2012, the plant will be the most efficient in EnBW's fleet of coal-fired plants

RDK8 will operate with live steam conditions of 600ºC and 275 bar at turbine inlet. The reheat steam temperature will be 620ºC. These steam conditions are significantly above the supercritical point and represent state-of-the art in the upper range of steam conditions commonly referred to as 'ultra'-supercritical. Explaining the significance of the project, Lusch says: "It is the reference on which Alstom bases its current and future offerings."

The need to withstand steam temperatures in excess of 600ºC and a feedwater temperature of 370ºC calls for the use of special materials inside the 118 m-high boiler at RDK8.

Austenitic materials and P92 steel alloy, that are resistant to high temperature and pressure will be used in the areas of the boiler that are subjected to the ultra-supercritical steam conditions i.e. partly for superheater and reheater tubing, as well as the thick-walled components i.e. mainly the high pressure outlet headers and the main piping.

Similar alloys will also be used at the inlets of the high pressure and intermediate pressure sections of the steam turbine – these include the valves, first few blading stages and the rotor. Alstom's welded rotor design, will allow the use of these high temperature materials in the sections exposed to the very high temperatures.

RDK8 will predominantly use imported hard coal with a small amount of coal from Germany. The boiler is therefore designed to burn a wide range of coals. The boiler has a sophisticated firing system that incorporates corner-mounted tangential and tilting burners. The tangential firing introduces swirl in the combustion of the boiler. Air staging reduces NO_x emissions and protects the furnace walls from corrosion. The tilting burners allow control of the furnace outlet reheat temperature to enable operation over a wide load at high efficiency.

With the massive influx of wind energy into the German grid, high operational flexibility over a wide load range is becoming increasingly important. "Germany has high levels of intermittent renewables that feed into the grid as well as nuclear which can only operate in base load, so there will be greater demand for flexibility in the future," noted Lusch.

The plant will be capable of operating according to Germany's grid code. It is designed to operate from a minimum load of about 25 per cent up to its maximum. We have an ongoing programme that is looking at different ways of improving plant design and adding innovative features, so that plants are more able to offer frequency support to the grid or meet rapid load changes when demanded."

The plant is being built under a turnkey contract, under which Alstom will supply and install all the major equipment – boiler, mills, air pre-heaters,, as well as the steam turbine and generator, condenser and cooling water systems, and electrical and control systems.

The plant is being built on a tight 44-month schedule. The turbine hall is complete; the condenser is already installed, awaiting the arrival of the steam turbine. When complete at the beginning of 2012, the plant will be the most efficient in EnBW's fleet of coal fired plants.

Germany's drive to greater efficiency coal fired plants will continue with the commissioning in 2013 of the Mannheim 9 plant owned by Grosskraftwerk Mannheim. This plant will also have a net electrical efficiency in excess of 46 per cent.

In the future, Alstom expects steam temperatures to go even higher. The company has been involved in the AD700/COMTES 700 programme, partly funded by the European Commission. These projects and test rigs are aimed at testing materials for 700ºC live steam temperatures and developing the test methodology accordingly. A significant portion of the material tests has already been successfully completed.

Under construction: RDK8 is being built on a tight 44-month schedule

Junior Isles

Alms for the blind

As the UK approaches its next general election, much of the world will be looking to see what energy policy will be adopted by the elected government – not because the UK is more important than any other country but because it has often been among the frontrunners in energy market development.

In a recent report titled 'Rebuilding security: Conservative energy policy for an uncertain world', David Cameron, leader of the Conservatives, who are attempting to regain power after 13 years, said: "Security and sustainability are two sides of the same coin." Whether they are part of the same coin or different coins, the point is they are equally important and should always go hand-in-hand.

The Conservatives may now be preaching the importance of energy security but they, like the current Labour government, have in the past been just as guilty of not looking before leaping. It is fair to say that both parties – and it is not just an affliction of the UK – have been too blind to see the impact of energy policy on security of supply.

When the Conservatives under Margaret Thatcher decided to liberalise the electricity sector in the late 1980s, energy security was given little consideration *(see TEI Times September 2009, 'Hints of a soft shoe shuffle?')*. When the Labour government, like many countries around the world, decided to set targets for renewables, insufficient attention was given to security of electricity supply.

But there is little point in crying over spilt milk. It is far more useful to implement solutions that can address what could be a potentially serious issue in the not too distant future.

In a recent journalist roundtable session held by ABB, Peter Jones, Head of Technology, commented: "The UK has a hell of a challenge due to the high penetration of wind that we are likely to have."

Jones first showed a National Grid Seven-Year Statement document extrapolated to 2023, which highlighted the beginning of a reduction in capacity margin in 2016 as coal fired power plants are closed due to the Large Combustion Plant Directive. With other plants coming on line, sufficient capacity in itself may not be a problem. But Jones drew our attention to a report produced by Redpoint on behalf of the UK government. He highlighted what many see as the real problem, i.e. a reduction in the 'capacity credit' of wind, which he says will result in an actual capacity margin reduction.

Jones commented on a scenario that sees 29 per cent of electricity generation coming from large-scale renewables. "As you get a larger volume of wind on the system, the capacity credit of wind goes down, i.e. the amount of thermal that can be effectively displaced by wind, goes down. The view is, it will become tighter and tighter to manage the UK power network. The margin between available generation and demand is going south." This, said Jones, could result in "potential lights out in the UK as early as 2016".

Whichever government is elected in May, it would do well to start adopting technologies that are available to tackle the problem. "The issue is not technology, it's regulatory," noted Jones.

> Security and sustainability are two sides of the same coin

In addressing the sustainability challenge through the integration of renewables, governments must not neglect transmission systems and the tremendous demands that will be placed on them. Unfortunately the UK, like many countries around the world, has treated transmission like the poor relation to generation.

This is an attitude that will have to change, especially with the influx of renewables. Jones, like other proponents of smart grids and transmission solutions, believes that it is about implementing better ways of matching supply and demand. "If you don't get enough generation to match the demand, the system frequency drops. If the frequency drops, gas fired generators go offline and we get brownouts. As it becomes more difficult to control generation, we will have to put more emphasis on managing demand."

As an electrical island, the problem caused by an imbalance between demand and supply is exacerbated in the UK. Adding more HVDC interconnectors to the rest of Europe will help alleviate the potential problem. Indeed construction of the Brit-Ned HVDC link between Britain and the Netherlands is well under way. This will be the second link between Britain and mainland Europe when it begins commercial operation next year.

Some hope these HVDC links will form the basis of what is being dubbed as the European 'Supergrid'. Such a grid would help to reduce the need for spinning reserve and allow the shutdown of the least efficient power stations in the European mix. Equally importantly, it would also help link offshore wind farms being built in the North and Irish Seas.

Yet Jones believes that while HVDC interconnectors will alleviate the problem, they will not eradicate it. He argues that in the event of high domestic demand during a cold winter for example, a country is likely to give its domestic needs priority over that of its European neighbour.

Whether more interconnectors are built or not, in terms of system efficiency it still makes sense to develop transmission systems that allow better balancing of supply and demand through careful management of the demand side. This is one of the key drivers for smart grids.

ABB believes that combining flexible ac transmission systems (FACTS) technology with energy storage will be a key component in realising smart grids.

In December 2008, ABB and French battery specialist, Saft, announced a project to develop a battery-based energy storage system that would be able to instantaneously provide power to the grid. The system includes ABB's SVC (static var compensation) Light system to allow high frequency switching for dynamic voltage and frequency control. Saft will supply the storage part of the system – a lithium-ion battery capable of discharging a large amount of power in a short timeframe.

ABB says that at present, the rated power and capacity are typically in the 20 MW range for tens of minutes but adds that the technology permits up to 50 MW for periods of 5-60 minutes. Such a system, it says, could be used to feed the grid with exactly the right amount of active and reactive power when needed.

It can be argued that these power levels for such short periods will have limited value but Jones sees things differently. "Studies we are conducting with Durham University show it can offer a number of benefits at peak times. You can avoid a large amount of capacity investment since it gets you through the peak times. But it also offers a number of network benefits by allowing distribution networks to become more efficient. Some of the network functions include voltage control, power flow management, regulation and network management."

An SVC Light with energy storage system will be installed on one of EDF's networks in the UK this summer. The industry will be watching to see how the system performs, especially the storage system. How the batteries age with cycling and depth of discharge will be key performance parameters.

Developing smarter transmission systems with embedded storage will not be without challenges. Although not openly against it, large energy companies are unlikely to blaze a trail to develop any technology that slows down the need for new capacity. It will therefore be important that policies are in place to provide the right incentives.

In its 'Rebuilding Reliability' report, the Conservatives stated: "…we have a golden opportunity to put the building blocks of the smart grid in place and make Britain a leading centre for smart grid innovations and enterprise." It also stated that it would establish an offshore grid which "…would not only provide the most efficient way of connecting offshore renewable sources, but also of strengthening interconnections with neighbouring power grids."

Mr Cameron tells us sustainability and security of supply are two sides of the same coin. Yet words are often of little value. As the 19th century French writer Jules Renard once said: "Words are the coins making up the currency of sentences, and there are always too many small coins."