Throwing in the towel
The US abandons any meaningful initiatives on federal climate change. Page 4

Power to the poor
The World Bank's Jamal Saghir discusses the energy poor. Page 16

Final Word
Junior Isles questions EU pragmatism Page 24

August 2010 • Volume 3 • No 6 • Published monthly • ISSN 1757-7365 www.teitimes.com

THE ENERGY INDUSTRY TIMES

IN BRIEF

Pakistan deal increases nuclear tension
Pakistan recently defended its civilian nuclear cooperation with China to build two reactors.

Page 6

Commission proposes coal mine closure
The EC is aiming to end subsidy schemes for uncompetitive coal mines through new regulation.

Page 9

Russia, USA deepen energy ties
Energy institutions from the USA and Russia have signed an agreement on energy efficiency and clean energy technologies.

Page 10

Nuclear renaissance generates new alliances
New alliances are being struck as energy and technology firms plan for growth in the nuclear power market.

Page 12

Industry Perspective: Pathways to low-carbon growth
The Climate Foundation's 'Roadmap 2050' aims to provide an independent and objective analysis of pathways to achieving a low-carbon economy in Europe.

Page 14

Fuel Watch: Prices wait for signs of economic recovery
Crude oil prices have remained resilient amid fears concerning the euro and analyses cautioning of a double-dip recession.

Page 17

Special Report
TEITimes puts the spotlight on powering industry.

Page 19

Carbon price may not be best solution

Recent reports indicate that the world is making little progress in reducing global emissions and that placing a price on carbon may not be the most effective means of reaching 2050 targets.
Junior Isles

Fatih Birol: IEA chief economist

A new report from the International Energy Agency (IEA) says that policies that put a price on carbon emissions may not be the most effective way to achieve long-term emissions reductions.

The IEA's 'Energy Technology Perspectives 2010', which outlines a way to achieve a 50 per cent reduction in carbon emissions by 2050, states: "While such policies are likely to be an important driver of change, they are not necessarily the most effective way to deliver short-term investment in the more costly technologies that have longer-term emissions reduction benefits."

The report suggests that governments around the world should instead focus on spending on tax breaks and subsidies to encourage the development of low-carbon technology.

The IEA believes that while carbon-pricing programmes prompt consumers and companies to adopt technology that has already been developed, or is close to being developed, they are unlikely to spur investment in more expensive technologies that achieve long-term reductions.

"Government funding for [research and development] in low-carbon technologies will need to be two to five times higher than current levels," the report notes.

The United Nations Inter-governmental Panel on Climate Change has set a target to reduce global emissions by 50 per cent by 2050. The report says, however, that if governments do not adopt new energy and climate change policies, they will fail to reach this goal and the number of energy-related carbon emissions will roughly double by 2050 compared to 2007 levels.

The IEA said in order to achieve the 50 per cent reduction by 2050,

Continued on page 2

Big spending on smart grids

Governments and private interests worldwide are expected to increase investments in smart-grid technology, spending a total of more than $45 billion by 2015, says a new ABI Research report.

According to ABI, an estimated $41 billion will be invested on smart-grid transmission and distribution infrastructure, while $4.8 billion will be spent on smart meters for homes.

The report 'Smart Grid Applications: Smart Meters, Demand Response, and Distributed Generation' says the reason for the intense global interest in smart grids is a matter of good timing as well as the availability of the new technology and a desire to curb energy use.

The report comes as US government sources claim the administration of US President Barack Obama is planning to launch an international entity known as International Smart Grid Action Network, or ISGAN. The organisation will be tasked with developing a smart grid.

With the launch of the envisioned international body, the US government aims to expand the energy market through smart grid standardisation and take the lead in the new energy business, the sources said.

In addition to the US, South Korea and Italy are also expected to become core members of the organisation, and they will work closely with international organisations such as the International Energy Agency and the International Organisation for Standardisation to draw up concrete action plans, the sources said.

Smart grids will enable the use of smart meters that allow energy companies and consumers to monitor their energy consumption more closely.

In the UK, a battle is currently heating up between leading telecoms companies for contracts to provide connections to Britain's next generation of energy meters. BT, Vodafone and Telefonica are expected to go head-to-head for contracts to provide wireless networks for smart meters.

Smart meters are expected to play a significant role in cutting emissions and enable the use of smart appliances. However, it is likely to come at a price to the end customer.

Georgia Power, the largest subsidiary of Southern Company, one of the US' largest generators, recently asked the Georgia Public Service Commission for permission to increase its base rates approximately $615 million, or 8.2 per cent of the company's retail rates, to recover the costs of investments in cleaner generation sources, power lines, smart grid technologies, environmental controls and energy efficiency programmes to meet current and future customer demand.

If the request is approved, the typical residential customer using 1000 kWh per month will see an increase of about 10.1 per cent, or $10.88. For business customers, the average increase would range from about 7.7 per cent to 10.3 per cent.

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)

the electricity sector will have to generate half of its power from renewables, up from 18 per cent today. It also outlined a strategy that requires the annual construction of 30 new nuclear power stations and 35 coal fired plants fitted with carbon capture and storage capabilities.

A reduction in carbon emissions depends on the willingness of countries to adopt energy-efficient technology, the report says.

The report comes at the same time as a separate report from the Netherlands Environment Assessment Agency (PBL), which claims that the continued rise in carbon emissions in China and India have "completely nullified" the reductions achieved by industrialised nations. It notes that emissions remained constant in 2009, despite the economic crisis slowing down the growth trajectory of many countries.

The PBL's report 'No growth in total global CO_2 emissions in 2009' is based on calculations on recent data from sources including data on energy use from energy company British Petroleum (BP), on cement production from the US Geological Survey (USGS), and on the latest version of the Emission Database for Global Atmospheric Research (EDGAR).

The calculations show that emissions from fossil-fuel combustion in the industrial countries have decreased by seven per cent. But in China and India, they actually increased by nine and six per cent, respectively.

Ahead of Copenhagen in December last year, China promised to curb its emission intensity by 40 to 45 per cent by 2020, while India announced a target reduction of 20-25 per cent by 2020 on the 2005 levels.

According to recent preliminary IEA figures, China overtook the US last year to become the world's biggest energy user. The IEA said that China consumed 2.525 billion tonnes of oil equivalent of energy from sources including coal, oil, nuclear power, natural gas and hydropower, about 4 per cent more than the US.

Fatih Birol, the IEA's chief economist said: "To me it symbolises the dawn of a new era for the global energy landscape."

China's government, however, rejected the IEA's findings.

"The IEA's data on China's energy use is unreliable," said Zhou Xian, an official with the Chinese Cabinet's National Energy Administration, quoted by the official *Xinhua* News Agency.

Xinhua cited data from China's National Bureau of Statistics that said China's energy consumption last year was equal to 2.132 billion tons of oil, less than the figure cited by the Paris-based IEA.

According to *Xinhua*, Zhou said the IEA "still lacked understanding about China's relentless efforts to cut energy use and emissions, notably the country's aggressive expansion of new energy development."

Proposed NB nuclear plant causes controversy

Canada's plans for a second nuclear plant in New Brunswick and Areva's bid for AECL are courting controversy, **says Junior Isles**

Eyes on nuclear: Shawn Graham

An agreement signed between the provincial government of New Brunswick and French nuclear company Areva on the possibility of building a second nuclear reactor is creating controversy.

Under a letter of intent, Areva will conduct a study to determine the feasibility of constructing a light water reactor, the first of its kind in Canada.

Pending the outcome of the study, Areva would be responsible for managing the design, construction and financing of the reactor. NB Power, the province's public utility company, would operate the unit and provide any technical and regulatory support required during the licensing process.

If the plant and a proposed renewable energy park proceed, it could create 8000 construction jobs and close to 500 permanent positions.

But an energy expert with Greenpeace Canada criticised the idea, saying another nuclear generating station in the province would be an expensive mistake.

"All nuclear projects in Canada have gone drastically over-budget and been delayed," said Shawn-Patrick Stensil, energy and climate campaigner at Greenpeace in Toronto.

New Brunswick has Atlantic Canada's only nuclear reactor, the Point Lepreau generating station, which is undergoing refurbishment. But that project is about 18 months behind schedule and is expected to cost the province at least $475 million.

However, Premier Shawn Graham says he is eager to explore whether the construction of another nuclear plant would benefit his province as it tries to position itself as an energy hub in Atlantic Canada.

New Brunswick Conservatives argue that important steps should have been carried out before the province began discussions about building a second nuclear reactor in the province. The Liberals say this is the sort of thinking that would hinder economic development in the province.

Energy Minister Jack Keir was in Florida last month to meet with Areva about the possibility of establishing a merchant-model arrangement at Point Lepreau. Under the arrangement, construction of a nuclear reactor would be privately funded and NB Power would buy electricity for its own use or exportation to some other market.

Tory energy critic Paul Robichaud said that such a meeting should have never happened until the Liberals released an energy strategy for the future, and until the much delayed refurbishment at Point Lepreau was finished. AECL is managing the refurbishment of Point Lepreau, which was supposed to be finished by September 2009 but is now not expected to be completed before February 2011.

Robichaud called the talks between Keir and Areva "improvising at best".

Areva and the government say they hope a detailed agreement can be ironed out by the end of the year.

Areva has also come under fire in its attempt to snap up Atomic Energy of Canada Ltd.'s (AECL) reactor business, with critics saying the French nuclear giant may have been given an inside track.

Some industry observers and politicians are raising concerns about potential conflict of interest after learning that N.M. Rothschild and Sons – the investment bank hired by Ottawa to develop the restructuring plan for AECL – has also acted as financial adviser to Areva on numerous acquisitions and takeovers in the past.

Roger Alexander, president and CEO of Areva Canada Inc., confirmed his company "has been engaged with the Rothschild process with the federal government" related to restructuring proposals for AECL.

He would not confirm or deny that Areva has made an offer for AECL, citing confidentiality of the bidding process.

"I'm not aware of any prior relationships that Areva and Rothschild may have had in the past," he said.

The Canadian government announced 14 months ago that it was putting AECL's Candu nuclear reactor business up for sale.

Power plant costs show slight rise

- US up 1 per cent, Europe climbs 3 per cent
- Costs driven by increase in prices of commodities

The cost of building a power plant in North America and Europe has risen slightly, driven higher primarily by rising commodity prices, according to IHS Cambridge Energy Research Associates.

The global energy consultancy said its power capital-costs index for North America rose 1 per cent from the third-quarter of 2009 to the first quarter of this year. A similar index for Europe climbed 3 per cent over the same period. The index, which is released every six months, posted its first gains since early 2008.

The rise in costs were driven primarily by global increases in the prices of commodities such as steel and copper used in plant construction. However, Candida Scott, CERA's senior director for cost and technology said the climb in capital costs does not necessarily signal a shift for plant developers.

She said: "Despite the slight rise in costs, the results [of the indexes] reflect more continuity than change. Costs have remained relatively the same for the past year, displaying resiliency to downward pressures such as reduced electricity consumption."

The CERA index tracks the costs of building nuclear, coal, natural gas and wind power projects. The North American index stands at 215, indicating a group of power plant projects that cost $100 billion in 2000 now on average would cost $215 billion.

Scott said the greater increase in the European index was driven, in part, by a weakened euro, which makes equipment bought outside of the continent more expensive.

Demand for new power plants remains slow as the US and Europe both emerge slowly from recent recessions. In North America, CERA expects developers to focus on natural gas fired power plants, while the strong build of wind generation is likely to slow. Nuclear power projects continue to move forward slowly, yet interest in coal fired plants has all but dried up.

CERA analysts expect power plant building costs to remain relatively flat in the short term. One factor helping to hold down costs is strong competition among equipment makers.

Netherlands to develop world's first biomass market

The Anglo-Dutch energy exchange APX-ENDEX has signed a Letter of Intent with Rotterdam Port to develop the world's first biomass market.

APX-ENDEX said a recent survey indicates the need for standardised bio-energy products and it is responding to the market's request by investigating a market infrastructure.

"Biomass will be used as an alternative to fossil fuels, [and] a biomass exchange will encourage its supply and use," said Hans Smits, CEO of Rotterdam Port.

According to the agreement, APX-ENDEX will provide a trading platform as well as clearing and settlement services. Rotterdam Port will contribute its expertise and know-how with regard to shipping, storage and distribution of biomass products. Once the details of the market structure are established, major market players will be approached for consultation.

The exchange will facilitate wider use of biomass products to generate renewable energy by providing a safe trading and investment environment for producers and end users.

The first biomass product, focusing on industrial wood pellets that can be used as a substitute for coal, will contribute considerably to carbon dioxide reduction goals.

Senate throws in the towel

Failure to garner bipartisan support for legislation on carbon emissions has forced the US Senate to abandon any meaningful initiatives on federal climate change.

Empty-handed: Harry Reid said a comprehensive legislation such as the proposed Kerry-Lieberman bill would not be introduced

Siân Crampsie

The failure of US lawmakers to bring climate legislation to the Senate floor is a major blow to utilities and investors seeking greater regulatory certainty as well as to the prospects for a new global deal on global warming.

Majority leader Harry Reid has announced that comprehensive legislation such as the proposed Kerry-Lieberman bill would not be introduced to the Senate in its current session. Instead, he plans to introduce more limited legislation that would boost energy efficiency in vehicles and crack down on offshore oil exploration.

The decision indicates the lack of support for comprehensive legislation limiting greenhouse gas emissions from the US economy in the Democrat-controlled Senate, but is good news for the oil and industrial lobby that is vehemently opposed to a cap-and-trade approach.

However it has prompted the green lobby to criticise US President Barack Obama for his lack of leadership in the climate debate, and also leaves the control of greenhouse gas emissions to a patchwork of regional initiatives and the enforcement powers of the federal Environmental Protection Agency (EPA).

In July the Western Climate Initiative (WCI) partners released a comprehensive strategy for the creation of a regional cap-and-trade programme and other strategies to reduce greenhouse gases. The WCI partners – including seven US states and four Canadian provinces – plan to reduce greenhouse gas emissions to 15 per cent below 2005 levels by 2020.

"In the absence of federal action to address climate change, the WCI Partner jurisdictions believe it is important for state and provincial governments to keep moving forward on the transition to a clean-energy economy," said the WCI partners in a statement.

The EPA has made tackling climate change a priority, declaring greenhouse gases a hazard to human health and issuing regulatory actions under the Clean Air Act to tackle emissions.

However, it is facing legal challenges from a variety of opponents.

A recent study by the World Resources Institute (WRI) indicates that in the absence of federal legislation, aggressive action by the EPA, other federal agencies and US states on the climate change front could put the country on a near-term course to considerably reduce greenhouse gas emissions. However WRI says that "longer-term reductions remain uncertain".

"Robust federal regulatory action and strong state leadership, combined with significant political will, are the needed ingredients to achieve significant reductions using existing authorities," said Jonathan Lash, president of the WRI. "The study also highlights that cap-and-trade legislation is needed to drive longer-term reductions and provide investors with the certainty they will need to transform the US economy and add jobs."

Another analysis by the Pew Centre on Global Climate Change makes the case that a federal cap-and-trade approach is the best approach for reducing emissions and spurring investment in clean energy technologies. "Climate change isn't going away," said Pew Center on Global Climate Change President Eileen Claussen. "While the Senate may have avoided taking up meaningful legislation this year, eventually we are going to need a serious climate and energy policy in this country or suffer the consequences of a warming planet, energy insecurity, subdued innovation, and diminished international competitiveness.

"Done right, cap-and-trade should be a recipe for attracting the bipartisan support necessary to pass a strong climate bill."

Opponents of cap-and-trade based climate legislation include groups such as the American Chemistry Council, the American Council for Capital Formation and the Small Business and Entrepreneurship Council, who say that proposals such as the Kerry-Lieberman bill would be harmful to the economy.

There are also concerns over the impact of climate change legislation on coal and natural gas consumption.

The American Public Power Association (APPA) has released the results of a study examining the new infrastructure investments that would be required in the event of federal climate change legislation being passed.

It says that utilities would face significant hurdles converting from coal to natural gas and that it has concerns about how utilities would extract, store, and move natural gas to where it is needed in a reliable, sustainable, affordable and environmentally sound way.

The study finds that investments in pipeline capacity to meet the additional natural gas demand will need to total about $348 billion should all coal fired generation need to be replaced with natural gas, and that storage capacity would need to increase by 1.4 tcf (39.6 billion m^3) at a cost of close to $12.5 billion.

The APPA study also raises concerns about the impact of fuel switching on natural gas prices.

Puerto Rico plans for renewables

The government of Puerto Rico is planning to stimulate the development of renewable energy capacity through a series of new policies.

The country's governor, Luis G. Fortuno, has signed into law several measures that set specific renewable energy goals and create economic incentives for investors.

"We need to aggressively encourage the development of renewable energy sources for the benefit of all that reside and work in Puerto Rico. Establishing the right public policy will be the anchor to make it happen," said Fortuno.

The Energy Diversification Act and the Green Energy Incentives Act establish a Renewable Portfolio Standard requiring energy retailer to produce or purchase a specified percentage of their electricity from renewable energy sources. They also establish a scheme of Renewable Energy Certificates (RECs) that can be traded.

A target of 15 per cent renewable energy production by 2020 has been set, with energy retailers required to prepare a plan for reaching 20 per cent by 2028.

A Renewable Energy Commission will also be created under the new legislation.

CNNC eyes Argentine opportunity

Argentina is likely to add China National Nuclear Corp. (CNNC) to its list of potential bidders for construction of a new nuclear power plant after an official visit by Argentine President Cristina Fernandez to China.

Argentine Planning Minister met with the head of CNNC, Mao Xiaming, during the July visit to discuss the tender of construction contracts.

A Chinese delegation is due to visit Argentina in August while representatives from Argentina's National Atomic Energy Commission will visit China in September.

Argentina is currently building a third nuclear reactor – Atucha 2 – and wants to build a fourth unit – Atucha 3 – to come on line in 2016-2017. The additional nuclear capacity will help the country to diversify its energy sources away from natural gas.

Atucha 2 is due to be completed in early 2011 and the Argentine government has already identified four other possible firms for the construction of Atucha 3: AECL, Areva, Rosatom and Westinghouse.

Nuclear site hosts CSP demos

- DOE funding for CSP technology
- Xcel starts up solar-coal hybrid

The US Department of Energy (DOE) is boosting the development of advanced solar energy technologies through a range of new initiatives.

In July the DOE announced the creation in Nevada of a new Solar Demonstration Zone that will host a number of innovative, advanced solar energy projects.

President Barack Obama has also announced plans for a $1.45 billion loan guarantee to finance the construction and start-up of the Solana concentrating solar power (CSP) plant in Arizona. DOE also said it would provide $10.8 million of funding for eSolar Inc and Babcock & Wilcox Power Generation Group (B&WPGG) to design, build and test a modular, baseload molten salt power plant based on CSP technology.

The 250 MW Solana plant is being built by Spain's Abengoa and will be the largest plant of its type in the USA.

B&WPGG and eSolar say that the goal of their project is to achieve the lowest levelized electricity cost of any utility-scale CSP plant.

Located in a corner of the Nevada Test Site – a former nuclear site – the Solar Demonstration Zone will serve as a proving ground for new solar technologies and provide a critical link between the DOE's advanced technology development and full-scale commercialisation efforts.

"The Nevada Test Site is about to play a new role in securing America's future – but instead of testing nuclear weapons, we will test new solar technologies that will help put America on a sustainable energy path," said US Energy Secretary Steven Chu.

The 65 km^2 site will be used to demonstrate advanced CSP technologies.

In a separate development, US utility Xcel Energy has announced the start-up of a hybrid solar-coal power plant at its Cameo power plant in Colorado. Consisting of a parabolic tough CSP plant integrated with a coal-fired plant, the demonstration project will test the commercial viability of the technology as well as reduce carbon emissions.

In California, Martifer Renewables says that it has cancelled plans for the construction of a 109 MW solar-biomass hybrid power plant due to economic and biomass supply issues.

30%* off your data centre's energy bill is just the beginning

Imagine what we could do for the rest of your enterprise.

Saving up to 30% off your data centre's energy bill is no small feat, and as energy prices continue to climb, every watt of energy you save matters. But data centres don't operate in a vacuum. They support and are supported by systems—process, HVAC, and security, to name a few—that also require vast amounts of power.

Enterprise-wide energy savings

Today, only EcoStruxure energy management architecture by Schneider Electric™ can deliver up to 30% energy savings to your data centre, and beyond... to the entire enterprise. Reducing data centre energy costs by up to 30% is a great beginning, and thanks to EcoStruxure energy management architecture, the savings don't have to end there.

Learn about saving energy from the experts!

Download this white paper, a €170 value for FREE, and register to win a Kindle™ e-book reader!

Visit www.sereply.com **Key Code** 78508t
Call +1 401-398-8560 **(For calls outside of the US) or** 800-789-7038 **(toll free)**

EcoStruxure

Active Energy Management™ architecture from Power Plant to Plug™

Industrial plant

Open standard protocols allow for system-wide management of automated processes with minimized downtime, increased throughput, and maximized energy efficiency.

Buildings

Intelligent integration of security, power, lighting, electrical distribution, fire safety, HVAC, IT, and telecommunications across the enterprise allows for reduced training, operating, maintenance, and energy costs.

Data centres

From the rack to the row to the room to the building, energy use and availability of these interconnected environments are closely monitored and adjusted in real time.

Schneider Electric

Pakistan deal increases nuclear tension

Political tension is rising as long time rivals Pakistan and India form international relationships to develop their civil nuclear programmes. **Syed Ali**

Pakistan recently defended its civilian nuclear cooperation with China to build two nuclear reactors as Washington expressed concern that the deal does not have the necessary approval from the Nuclear Suppliers Group (NSG). Washington has called for China to provide more information. Pakistan says the plants will be open to the inspection of the International Atomic Energy Agency (IAEA).

"In the past half-year or so, making peaceful use of nuclear energy has been a sensitive issue," said Wang Lian, an associate professor in the School of International Studies at Peking University. "The US government has been urging the Chinese government to make the process more transparent."

However, some see the US as employing double standards in its differing stance towards India and Pakistan, neither of which has signed the Nuclear non-Proliferation Treaty. Both countries have nuclear weapons.

The deal came shortly after a wide-ranging deal that allowed the US to sell nuclear fuel, technology and reactors to India, a regional rival of both China and Pakistan.

Mark Hibbs of the Carnegie Endowment for International Peace said in an April report that the US-India deal was given the go-ahead by member states of the NSG – which seeks to limit the spread of nuclear-related equipment – only after "considerable arm-twisting... by the United States, France and Russia". He said: "The United States and other NSG states may object to the pending transaction but they cannot prevent China from exporting the reactors."

Adnan Bukhari, an associate research fellow at the S. Rajaratnam School of International Studies of Singapore's Nanyang Technological University said: "This deal comes at a time to assure the people of Pakistan that despite their repeated requests to the West to give them such a deal... it is China once more that they can rely on as an all-weather friend."

In July, Pakistan's president Asif Ali Zardari's made a week-long visit to China, his fifth since he came to office in September 2008. He met President Hu Jintao and signed six agreements, including one on economic and technology cooperation. Details were not made public.

Bukhari said the China-Pakistan deal is sending a message in particular to India, whose relationship with Pakistan has been strained for decades.

The international community has been clamouring to be part of India's plans to add 20 GW of nuclear capacity by 2020. At the end of June, Canada's Prime Minister Stephen Harper signed a much-coveted civilian nuclear cooperation deal with India, ending decades of chill over its acquisition of a nuclear bomb using Canadian nuclear reactor technology a generation ago. He said he believes India's Cold War duplicity has been consigned to history and that the Asian economic powerhouse would not use Canadian uranium to build nuclear bombs.

Japanese Prime Minister Naoto Kan and Indian Prime Minister Manmohan Singh recently agreed to cooperate in the civilian use of nuclear power when they met on the fringes of a two-day G20 summit in Toronto, Japanese officials said.

Last month, Indian and South Korean officials held the first round of talks aimed at forging a bilateral deal on the peaceful uses of nuclear energy that would enable Seoul to break into India's civil nuclear energy market.

Philippines needs $12.8 bn to avoid crisis

The Philippines needs some $12.8 billion in new investments for new power projects in Luzon alone, to avert a possible crisis by 2011.

"Is there an impending power crisis? No, the crisis is already here and next year the crisis will reach Luzon, according to the Department of Energy," said Alan T. Ortiz, an independent energy consultant who previously headed the National Transmission Corp.

Speaking at The Power Outlook Forum, Ortiz said that demand would outstrip supply in Luzon by 2011, resulting in intermittent brownouts until the availability of new supply by 2012.

The country has been experiencing rotating brownouts since the beginning of the year due mainly to insufficient capacity to cover growing demand. As of late-June 2010, the Luzon, Visayas and Mindanao grids registered power supply deficits of 47 MW, 169 MW and 150 MW, respectively.

Ortiz said the real challenge is how to encourage more investments to build new capacity in the next five years.

"The situation is not hopeless if we act immediately to close the supply gap. At this point, only the private sector can provide the much-needed financing for about 8000 MW in Luzon alone. At $1.6 million per megawatt, this amounts to about $12.8 billion or Peso 602 billion," Ortiz explained.

Data from the Department of Energy showed that from 2010 to 2030, Luzon should have additional capacities of 11 900 MW; Visayas, 2150 MW; and Mindanao, 2500 MW. However, committed power projects for Luzon, Visayas and Mindanao were estimated to generate only 600 MW, 654 MW and 100 MW, respectively.

At the end of June, Steag State Power Inc. said it plans to expand its coal-fed power plant in Mindanao. It will expand its 232 MW facility in Villanueva, Misamis Oriental by another 150 MW in light of the region's power supply deficiency.

More recently, Philippine Solar Power Alliance (PSPA), a newly formed group of solar power developers in the country said it expects to build an additional 300 MW of solar power capacity over the next three years.

It said solar plants in the country would be driven by new feed-in tariffs for renewable energy soon to be introduced by the government.


Philippines: struggling to keep the lights on

Tariff adjustment will not impact renewables investment

Energy Minister Wannarat Channukul has said that new tariffs for renewables projects will not impact potential foreign investment in Thailand.

Tariffs to support renewable energy projects will be changed to reflect more realistic costs as the previous programme to encourage investment in the sector has already achieved its targets.

Wannarat said: "The new system is calculated on an international basis. With the [new] feed-in tariff, we remain an attractive place for renewable energy investment given the various supportive programmes.

"Thailand received overwhelming support from private investors [with the adder tariff] and the capacity of renewable energy that will be built over the next 10 years is already much higher than expected. So it is time for us to drop the subsidy."

The new feed-in tariff scheme will be applied to all new renewable energy operators who have yet to sign purchasing contracts with power buyers, except for the solar power sector which will still receive an adder tariff but at a lower rate of 6.5 baht/kWh down from 8 baht.

The new tariff will be calculated based on real investment costs and an appropriate return on investment for operators.

With the feed-in tariff, suppliers of renewable energy will need to propose and negotiate their tariff or power price with the Electricity Generating Authority of Thailand (Egat).

The ministry will set up a special panel to consider the feed-in power price on a case-by-case basis. The criteria for paying a high or low rate will depend on the size of each project and the quality of its energy. The ministry said the new scheme would offer better rates across the board, even to very small projects.

Under Thailand's Renewable Energy Development Plan from 2008-22 total renewable energy supply would rise to 5600 MW by 2022. As of the first quarter of the year it had reached 1750 MW. Notably last month Sharp Corporation signed an agreement with Natural Energy Development Co., Ltd to establish a solar power generation plant with a generating capacity of 73 MW.

The new tariff announcements came as environmental activist group, Greenpeace, called on Thailand's Energy Minister to divert all energy-related investments away from the nuclear energy option towards clean renewable energy.

Thailand plans to build five nuclear power plants at an estimated cost of $15.4 billion under its proposed Power Development Plan (PDP 2010-2030). Greenpeace says the plan carries huge economic risks.

According to the PDP, power reserves for Thailand over the next five years may reach critical levels unless a new power plant can be built on schedule. Suthep Chimklai, director of the system planning division of Egat, said the latest protests by environmentalists in Chachoengsao resulted in the operators of two power plants – Siam Energy Co and National Power Co – deciding to change locations.

This is likely to result in the two gas-fired power plants being delayed by at least one year to 2014 and 2015.

Mega plans to alleviate crisis

Bangladesh is looking to the private sector to build a 1350 MW coal fired plant that it hopes will help alleviate its power crisis. The government also recently embarked on setting up a massive 3000 km electricity transmission line to transmit power to consumers across the country.

The coal-fired $1 billion IPP project, the first of its kind in the country, is likely to be initially run on imported coal but will later use local coal when coal extraction in local mines begins.

The country's two state-owned power entities also joined forces for the first time to build a power plant in Mymensingh at a cost of €127 million.

State-owned Power Development Board (BPDB) and Rural Power Company Limited (RPCL) signed a memorandum of understanding (MoU) in early July to build a dual fuel 150-225 MW power plant capable of running on both furnace oil and natural gas.

Meanwhile, state-owned Power Grid Company of Bangladesh Ltd (PGCB) is to build the new East-West and North-South transmission lines and upgrade the necessary infrastructure with a view to transmitting 20 000 MW of electricity, five times higher than the present 4000 MW capacity. The transmission project is said to be worth over $1 billion.

ADB considers Uch funding

Asian Development Bank (ADB) is considering providing $100 million for the Uch-II power project.

The 404 MW project, to be built under a 25-year build, own, and operate (BOO) structure, will address Pakistan's growing energy deficit.

The new combined cycle plant, which would run on low-Btu gas, will be located on the site of the existing Uch power station.

According to an ADB report, Pakistan, like most developing countries, faces a shortfall of power that is expected to continue.

In late June, Pakistan said it expects to finalise four wind power deals worth $500 million this year. The exploitation of wind has been barely tapped in the country's efforts to tackle power shortfalls.

According to the US National Renewable Energy Laboratory, the South Asian nation's coastal belt holds particular promise for wind power, with a potential of producing 50 000 MW.

Ministers argue for 30 per cent emission cuts

France, Germany and the UK believe that higher emission targets will help the private sector to refocus on green investment, writes **Siân Crampsie.**

Call for action: (l-r) Chris Huhne, Norbert Röttgen and Jean-Louis Borloo say moving to a higher target would send a strong signal of commitment to a low carbon policy framework in the longer term

Raising the European Union's greenhouse gas emissions target will help to stimulate green investment and ensure that the region does not lose out in the race to compete in the low-carbon world, say environment ministers from France, Germany and the UK.

Writing in the *Financial Times* newspaper last month, UK climate change secretary Chris Huhne, German federal environment minister Norbert Röttgen and French environment minister Jean-Louis Borloo proposed that the EU should target a 30 per cent reduction in greenhouse gases from 1990 levels by 2020.

Setting this target would be "a genuine attempt to restrict the rise in global temperatures to 2°C" and would also make "good business sense", say the ministers. The current target is a 20 per cent reduction over 1990 levels by 2020.

The three ministers say that the 20 per cent target is insufficient to drive the low carbon transition, partly because emissions have fallen during the recession and the price of carbon has been driven down. "By moving to a higher target, the EU would have a direct impact on the carbon price through to 2020 and also send a strong signal of our commitment to a low-carbon policy framework in the longer term," wrote Huhne, Röttgen and Borloo.

"Moving to a 30 per cent target would provide greater certainty and predictability for investors."

The July article came as concerns were raised in a number of reports about Europe's ability to meet its 2020 renewable energy and climate targets. Several EU countries also missed the June 30 deadline for submitting their Renewable Energy Actions Plans to the European Commission.

The environment ministers note in their article that European companies currently have a 22 per cent market share in the global low carbon goods and services sector. However, there is a real risk that they will lose this position to other countries – notably China, India and Japan – that are currently attracting large levels of green investment.

They say that the recession puts Europe in a good position to make the needed investments. "Because of , the annual costs in 2020 of meeting the existing 20 per cent target are down a third from €70 billion ($89 billion) to €48 billion," they wrote. "A move up to 30 per cent is now estimated to cost only €11 billion more than the original cost of achieving a 20 per cent reduction.

"In addition, delayed action would come with a high price tag: according to the International Energy Agency, every year of delayed investment on low carbon energy sources costs €300 billion to €400 billion at the global level."

The three ministers' call for action is an acknowledgement that there are concerns over whether the EU will meet its so-called 20-20-20 renewable energy and climate targets.

Although the latest "Renewable Energy Snapshots" report published by the European Commission's Joint Research Centre shows that growth in renewable energy continued apace in 2009, it also noted some key issues that need to be resolved if renewable energy targets are to be met.

These include fair access to grids, public R&D support and the adaptation of current electricity systems to accommodate renewable electricity.

There are also concerns over the impact of the recession on the green energy sector.

In June the UK's Commission on Climate Change issued a dire warning that the country needs to take "urgent action" to ensure that targets are met, and also said that the amount of electricity generated from renewables fell by 7.5 per cent in the first quarter of 2010.

More recently EEF, the manufacturers' organisation, made a call for the UK government to get energy policy back on track by making support for renewables more cost-effective, and by reforming the price of carbon.

Commission proposes coal mine closure

The European Commission is aiming to bring an end to subsidy schemes for uncompetitive coal mines through new regulation.

The EU executive has presented a proposal for a regulation designed to ensure the definitive closure of uncompetitive mines by October 2014. It would allow EU member states to continue supporting coal mines over the next four years only if they present plans for closure.

Subsidy levels would also have to fall by at least 33 per cent every 15 months under the proposed regulation.

"Companies need to be viable without subsidies. This is a question of fairness *vis-à-vis* competitors that operate without state aid," said Joaquín Almunia, Commission Vice President in charge of competition policy. "This is also in the interest of taxpayers and of government finances that are considerably constrained.

"The Commission will only allow operating aid to mining companies that have a closure plan and the subsidies should go increasingly towards supporting the social and environmental costs of doing so."

The proposed regulation concerns hard coal, EU production of which is small compared with demand. Total aid to the sector halved from €6.4 billion in 2003 to €2.9 billion in 2008.

The current regulation concerning coal sector aid ends at the end of 2010. An outright immediate ban of operating aid "would have dire social and economic consequences" and could also result in an increase in greenhouse gas emissions as more coal would have to be imported in order to make up for the loss in production in the EU.

"Renewable, clean energy is the way to go, but we cannot ignore the dire regional economic and social consequences that would follow a sudden closure of the loss-making mines at this time of low or no growth and high unemployment," said Almunia.

Almunia: companies need to be viable without subsidies

According to the Commission, the mines that rely on operating subsidies are located mostly in Germany's Ruhr region, in north-west Spain and in the Jiu Valley in Romania.

Commission finds €1.4 billion for ITER

The European Commission has proposed a financing plan that it says will ensure that the EU meets its commitments to the international nuclear fusion research project ITER.

The EU executive has proposed the use of €1.4 billion of EU funds in 2012-2013 to meet the short-term financing needs of ITER, which aims to construct and operate an experimental nuclear fusion reactor in France.

The Commission says that the move was necessary because of "substantial overall cost increases for ITER, which have more than doubled the costs for Europe from the initially expected €2.7 billion".

France itself is liable for a further €1.3 billion of funding as the host nation of the project.

The Commission has proposed covering the €1.4 billion with unused funds from the EU budget and redeployment of €460 million from the 7th Framework Programme for Research.

"ITER can provide a safe, clean and inexhaustible source of energy for the future. This is an immense prize – especially when you consider that the EU had a trade deficit in energy of nearly €400 billion in 2008," said EU Budget Commissioner Janusz Lewandowski and Research Commissioner Maire Geoghegan-Quinn. "The EU needs to show the vision and the resolve beyond the immediate financing difficulties and meet its international commitment to this project."

Earlier in July a consortium led by Iberdrola Ingeniería was awarded a €156 million contract to manufacture the toroidal field coils for ITER.

Along with Elytt Energy of Spain and Italy's ASG Superconductors, Iberdrola will engineer and manufacture ten large superconducting coils that will form the "technological heart" of the project. The works are expected to last for seven years.

Weighing over 100 tonnes each, the coils will generate the magnetic field that will keep the plasma inside the reactor chamber.

n Finland's parliament has voted overwhelmingly for the construction of two nuclear reactors, endorsing construction permits awarded by the government to TVO and Fennovoima earlier this year. It has also approved a plan to build an expanded nuclear waste repository.

UK, French power prices react in heat

High summer temperatures have forced up electricity prices in both France and the UK, with peak load prices in the latter reaching a 17-month high in mid-July.

Prices in both countries have been boosted by additional electricity demand from air conditioners and fans. The high temperatures have also led to cooling water problems and restricted power plant output in France.

Peak prices in the UK reached £56.25/MWh in mid-July, the highest level since February 2009. Demand from France through the 2 GW UK-France interconnector has risen alongside wholesale prices.

France's fleet of nuclear power plants generates the bulk of the country's electricity needs but become less efficient at high temperatures because the water used to cool the reactors is warmer than normal.

Energy consultancy M&C Energy Group warns that the pattern of increased power prices in the UK will be repeated due to a forecasted "energy gap" in France.

"At a time when the UK is facing its own looming energy gap, the news that France is likely to demand imported power from us is likely to both drive up peak prices and tighten our own supply margins further," said David Hunter, Energy Analyst at M&C. "The UK market is linked to the continent's via interconnectors, and so that extra power will most likely go to the highest bidder."

Final tests complete at Bushehr

- Power shortages force holiday
- Fusion project launched

The scheduled September start-up of the Bushehr nuclear power plant cannot come soon enough for Iran, which last month [July] suffered severe electricity shortages.

The Russian firm building the nuclear reactor has announced that final tests were completed at the facility on July 7.

At the same time a public holiday was extended for two days. The official reason given for the shut-down was the unprecedented levels of summer heat.

However, media reports suggest that the government's real motive was the severe shortage of electricity in the country, where the state is the largest employer. Energy Minister Majid Namjoo was seen on state television requesting people to consume electricity "more considerately".

The 915 MWe Bushehr nuclear facility is due to start commercial operation in mid-September.

Iran's ability to keep pace with electricity demand has suffered because of President Mahmoud Ahmadi-Nejad's policy of transferring oil revenues to the poor, rather than investing in electricity and oil refining infrastructure. Electricity consumption in Iran has grown by eight per cent this year, according to Namjoo.

International sanctions imposed on Iran are also likely to have an impact on efforts to develop the electricity sector.

July also saw the official launch of a programme in Iran to develop nuclear fusion technology. Initial studies would last for two years while construction of a fusion reactor would take a further ten years, according to the head of Iran's fusion research institute.

The institute will have a budget of around $8 million and employ 50 scientists.

Final tests at the Bushehr plant were completed last month

WB approves loans

Ghana is hoping to reduce electricity shortages with the help of a $70 million loan from the World Bank.

The loan has been approved as part of the Ghana Energy Development and Access Project (GEDAP) and will be used to overhaul old substations and supply lines to reduce technical losses as well as connect more customers and increase revenue collection.

"It is the hope of the World Bank that this additional financing will be utilised with dispatch to minimise electricity outages," said World Bank Country Director Ishac Diwan. "We also hope that this can help further increase access, in deprived areas, to reliable electricity."

In July the World Bank also approved a credit of $180 million for the government of Ethiopia to support efforts to scale-up electricity access for the country's population.

Ethiopia's Energy Access Project has so far helped to increase access to electricity from 700 000 to 1.87 million. It is also designed to improve energy efficiency, develop renewable resources and improve the quality of electricity supplies.

Czech bank gets renewables boost

Czech bank Ceska Sporitelna is to continue supporting the country's renewable energy industry after receiving a credit enhancement from the IFC.

IFC has provided Ceska Sporitelna with a risk-sharing facility of €47.5 million ($61.7 million) equivalent in local currency on a portfolio of loans of up to €100 million equivalent.

The bank will use the funds to develop greenfield projects in renewable energy power generation in the Czech Republic that could reduce greenhouse gas emissions by 570 tons a year, equivalent to burning 270 kilotons of coal in Czech power plants.

The investment also meets the IFC's strategic objective of reducing greenhouse gas emissions, particularly in Europe and Central Asia.

"We are very pleased to continue supporting an existing client, Ceska Sporitelna Bank, on its expanded focus in the renewable energy area, which will help reduce greenhouse gas emissions and contribute significantly to our regional climate change goal," said Snezana Stoiljkovic, IFC Director for Central and Eastern Europe.

Ceska Sporitelna is a market leader in financing renewable energy projects in the Czech Republic, and its renewable energy portfolio has reached over €340 million.

- Chinese firms Polar Photovoltaics and Wiscom have started the construction of a solar power plant in Ihtiman, 50 km south of Sofia in Bulgaria. The 2 MW plant is scheduled for completion in August 2010.

MIST provost resigns

The UAE's flagship Masdar Initiative has suffered a setback with the resignation of two key figures from its renewable energy institute.

In July the government-run company said that Dr. John Perkins had decided to leave his post as Provost of the Masdar Institute of Science and Technology (MIST). His departure came just weeks after the resignation of Tariq Ali from his post of vice president of research and industry relations at MIST.

Perkins and Ali – the Institute's two most senior employees – were appointed in 2009. Their departure comes in the wake of apparent troubles at Masdar's carbon-neutral city development known as Masdar City.

According to Masdar, Perkins is returning to the UK for personal reasons. He joined MIST from the University of Manchester, where he was Vice-President and Dean of the Faculty of Engineering and Physical Sciences.

Ali was a former UK government energy adviser and director of the Energy and Environment Office at London's Imperial College.

Masdar Institute of Science and Technology (MIST)

Plans for Masdar City include development of a solar-powered, car-free city that would host MIST, the International Renewable Energy Agency (IRENA) and a slew of international clean energy technology firms.

Masdar said earlier this year that it would carry out a strategic review of Masdar City, a move that is widely thought to have been prompted by the global economic conditions.

Masdar is at the heart of the United Arab Emirates' efforts to become a global leader in renewable energy technologies. In June the company appointed Abengoa Solar and Total as its partners to build Shams 1, the largest concentrated solar power (CSP) project in the world.

Abu Dhabi has set a target of making seven per cent of its electricity generating capacity renewable by 2020.

Russia, USA deepen energy ties

- USAID signs efficiency pact
- Russia supports UN sanctions

Energy institutions from the USA and Russia have signed an agreement on energy efficiency and clean energy technologies in a move that further signals improved relations between the two countries.

The US Agency for International Development (USAID) and the Russian Energy Agency (REA) signed a Protocol of Intent in July aimed at collaborating on energy efficiency, smart grid technology and clean energy.

It follows news in May 2010 that US President Barack Obama would resubmit to Congress a cancelled nuclear power pact with Russia.

The new energy efficiency agreement will foster partnerships between US and Russian utilities, regulators and others to share information and best practices. The signing occurred as a part of a larger programme of the US-Russia Bilateral Presidential Commission Energy Working Group under the leadership of US Secretary of Energy Steven Chu and Russian Minister of Energy Sergey Shmatko.

"We both have a lot to gain from new cooperation," said USAID Deputy Assistant Administrator for Europe & Eurasia Jonathan Hale. "By bringing people together, we can have a more significant impact on global issues, including promoting energy efficiency and combating climate change.

"I look forward to meeting with the Russian Energy Agency in Moscow within the next several weeks to keep this opportunity moving forward."

US Energy Association Executive Director Barry K. Worthington also noted that American and Russian businesses have a lot to gain from the partnership. "We [both] have specific experiences … that can benefit our industry."

The proposed US-Russia nuclear power agreement – known as the 123 Agreement – was originally drawn up in 2008 and sent to Congress by then-President George W. Bush, but was later withdrawn after Russia invaded neighbouring country Georgia.

Revival of the pact would pave the way for extensive nuclear trade between the US and Russia, which recently gave its support to sanctions imposed on Iran and approved in June by the UN Security Council.

Nuclear renaissance generates new alliances

Generation mPower to develop SMR technology

Shaw, Toshiba, Exelon target Saudi Arabia

New alliances are being struck as energy and technology firms plan for growth in the international nuclear power market.

July saw an announcement from Babcock & Wilcox Nuclear Energy (B&WNE) and Bechtel and another from GE Energy and Doosan Heavy Industries concerning the development of nuclear technologies.

The Shaw Group, Toshiba Corporation and Exelon Nuclear Partners last month also announced an agreement to pursue opportunities in Saudi Arabia.

B&WNE and Bechtel have signed a formal alliance to design, license and deploy the world's first commercially viable Generation III+ small modular nuclear power plant. The alliance – to be known as Generation mPower – will use B&W's mPower small modular reactor technology, which has been under development for two years.

The first mPower plant – with a capacity of 125 MW – could be operational by 2020. The technology will make nuclear energy more accessible to utilities and more affordable for consumers, say the two companies.

"The formation of Generation mPower is a turning point in the nuclear power plant industry – it has the potential to be a real game changer," said Jack Futcher, president of Bechtel's power business.

GE Energy and Doosan Heavy Industries are to develop advanced designs for nuclear and fossil steam turbines and generators under an agreement that extends an existing cooperation deal between the two companies.

The two companies have collaborated in nuclear and fossil steam turbine and generator projects since 1976 and say that the immediate focus of the new agreement will be the development of a larger output steam turbine-generator for next-generation nuclear reactors in South Korea.

Elsewhere, Shaw, Toshiba and Exelon have announced plans to pursue jointly opportunities to design, engineer, construct and operate new nuclear generating plants in Saudi Arabia. Shaw and Toshiba are already working collaboratively with customers to build four nuclear units in China and six new nuclear units in the US. They would be able to use Toshiba's ABWR design or Westinghouse's AP1000 nuclear technology.

Saudi Arabia is planning to construct nuclear power plants in order to reduce carbon emissions, meet growing energy demand and diversify its energy sources.

Google enters energy market

Google Energy says that its first deal in the wholesale energy market offers direct support to wind farm developers.

Siân Crampsie

Internet giant Google says that a 20-year green power purchase agreement (PPA) will allow it to take responsibility for its carbon footprint as well as foster growth in the renewable energy sector.

The company has signed a deal to buy the output from a 114 MW wind farm in Iowa and will sell the energy on to the local grid operator in exchange for Renewable Energy Certificates (RECs).

The deal is part of Google's strategy to become carbon neutral by building energy-efficient data centres, powering some of its facilities with renewable energy and purchasing carbon offsets.

While the output from the Iowa wind farm is enough to power several of Google's data centres, the company says that incorporating such a large quantity of wind power into its portfolio will be tricky. It will therefore sell the energy directly into the regional spot market but will retire the RECs.

"By obtaining RECs through the purchase of green power, our deal has a greater impact on the renewable industry than simply buying "naked" RECs from third parties," said Google in a statement. "Our long-term commitment directly frees up capital for the developer to build more wind projects."

In an official blog, Google Senior Vice President for Operations Urs Hoelzle said: "The inability of renewable energy developers to obtain financing has been a significant inhibitor to the expansion of renewable energy. We've been excited about this deal because taking 114 MW of wind power off the market for so long means producers have the incentive and means to build more renewable energy capacity for other customers."

Google announced in 2007 that it wanted its business to be carbon-neutral. It has constructed one of the largest solar installations on any corporate campus in the USA, at its Mountain View campus in California.

Google: Mountain View campus in California

Siemens boosts presence in Russia and China

A deal between Siemens and two Russian companies will put the German firm "out front" in the promising market for renewable energy in Russia.

Rostechnologii, RusHydro and Siemens will establish a wind energy joint venture with production facilities in Russia. Siemens will hold the majority stake in the joint venture, which will also be responsible for sales and service of Siemens wind turbines in Russia and other markets.

"This strategic partnership will put us out front on the highly-promising market for renewable energy in Russia," said René Umlauft, CEO of the Renewable Energy Division of Siemens. "In the coming five years we intend to install wind turbines with a total capacity of 250 to 500 MW per year."

Russia is planning to have a wind power capacity of approximately 5000 MW by 2020. The deal is also in line with Siemens' strategy to establish regional manufacturing facilities in important growth markets.

The German technology company says that in the current year alone it will bring three wind turbine component manufacturing facilities on line in the USA and China. Other production facilities are planned for India and the UK.

Siemens recently increased its share in Shanghai Electric Power Generation Equipment Co., Ltd. (SEPG) from 33.7 per cent to 40 per cent and announced plans to set up a new service joint venture with SEPG for the rapidly growing Chinese steam and gas turbine power plant market.

"The share increase in the joint venture is another important step for Siemens to enforce its market penetration in the huge Chinese energy market and underlines our successful strategic partnership with Shanghai Electric," said Wolfgang Dehen, CEO of Siemens' Energy Sector. "Power demand in the fast-growing Chinese economy is expected to rise on average by four per cent annually over the next two decades."

IP, GDF Suez reopen talks

International Power and GDF Suez have revived talks over the creation of a large, independent power producer (IPP) with a presence in key international markets.

The two companies are discussing the possibility of merging International Power with GDF Suez's non-European assets, as well as its assets in the UK and Turkey.

The new vehicle would be UK-listed with GDF Suez as the majority shareholder.

The board of International Power says that the deal "warrants consideration" because of the strategic rationale behind it and the potential for synergies that it presents. International Power has outright ownership of around 21 GW of generating capacity around the world, while the GDF Suez assets being considered for the deal amount to 32 GW.

The two companies have complementary portfolios and a tie-up with International Power would strengthen GDF Suez's presence in the UK and the Middle East. Other potential synergies include GDF Suez's presence in North America's liquefied natural gas (LNG) market and International Power's large generating portfolio there.

Earlier talks between GDF Suez, which is 35 per cent owned by the French state, and International Power were abandoned in early 2010.

GDF Suez's assets in Latin America, North America, the Middle East, Asia as well as in the UK and Turkey would be part of the deal.

Emerson acquires ICS

Emerson Process Management has expanded the breadth and depth of its turbine control solutions for the global power generation market through the acquisition of New York-based Innovative Control Systems Inc. (ICS).

According to Emerson, ICS's capabilities complement its own and will help it to expand in the turbine control retrofit market. ICS provides turnkey solutions – including planning, engineering, configuration, installation and commissioning – for turbomachinery automation retrofits.

Emerson is a leading supplier of automation and control systems for the global power generation industry.

"Emerson's global reach and technological leadership will help us to better serve our valued existing customers, as well as expand our customer base," said Pat Nolan, president of ICS. "We couldn't ask for a better fit."

Founded in 1991, ICS has completed more than 300 turbine control retrofit projects on turbines manufactured by GE, Siemens, Pratt & Whitney, Alstom, Rolls Royce, and Solar, among others. ICS employees have extensive engineering applications expertise and experience with customers located across the globe, primarily in North America, the Middle East and Latin America.

Americas

Alstom books first Brazil wind project

Alstom has signed a contract worth €100 million with the Brazilian renewable power generating company, Desenvix, to build a 90 MW wind farm complex in Bahia, Brazil.

The contract for the Brotas project is Alstom's first in the Brazilian wind power market and will involve construction of three separate wind plants – Macaubas, Novo Horizonte and Seabra. Commissioning is planned for July 2011.

The project will strengthen Alstom's position in Brazil's renewable energy market, says the firm. Alstom will provide 57 ECO 86 wind turbines of 1.67 MW each, for which the main components will be manufactured in Spain and Brazil.

In December 2009 Alstom signed a Memoradum of Intent with the government of Bahia state to install a wind turbine assembly factory at Camaçari.

Vestas receives US orders

Wind turbine manufacturer Vestas has announced two major contracts from wind farm developers in the USA, including one order that is the company's largest for a single site.

Vestas has received an order for 190 of its V90 3-MW turbines for Terra-Gen's Alta Wind Energy Center in California. It has also announced an order for 139 turbines from Renewable Energy Systems Americas for a 250 MW wind farm being built in Colorado.

Terra Gen's purchase is its largest order for a single site. The contract includes delivery and commissioning as well as a five-year service and maintenance agreement.

Delivery is scheduled for late 2010. The first 50 turbines will be commissioned by the end of 2010 and the remaining ones will be online in the first half of 2011.

The 250 MW wind farm at Cedar Point, Colorado, is slated to be the second-largest in the state. It is scheduled to be completed in late 2011.

Vestas will manufacture the equipment for the two projects at its Colorado facilities.

Alstom to supply Ontario hydro project

Alstom has signed a contract with Kiewit Alarie Partnership (KAP) to supply three turbine generator sets to Ontario Power Generation's (OPG) Lower Mattagami project in Northern Ontario.

Under the C$110 million contract, Alstom will supply three hydro turbine generator sets at the new Smoky Falls generating station that will replace the existing station and optimise water utilisation. When installed, the new turbine generators will have a combined capacity of 267 MW.

Smoky Falls is one of four stations to be redeveloped as part of OPG's C$2.6 billion Lower Mattagami project.

Alstom will provide a complete turnkey package, including installation and commissioning of the units, which is planned for the end of 2013.

Tower Tech supports Gamesa turbines

US firm Tower Tech is to supply wind turbine towers to Spain's Gamesa Technology Corp. for use in wind farms being developed in the USA this year.

The towers are scheduled for delivery to Gamesa in the last three months of 2010. Tower Tech, which is owned by Illinois-based Broadwind, specialises in the production of heavier and more complex wind towers that enable turbine manufacturers like Gamesa to expand the geographic footprint of wind power facilities.

Asia Pacific

Siemens to build Indian CCGTs

The Torrent Group has awarded Siemens turnkey contracts for the construction of two combined cycle power plants in India.

The German engineering group will build the 1200 MW DGEN power plant in the Dahej, Gujurat as well as the 400 MW Unosugen plant near the city of Surat, also in Gujurat. It will supply all of the major equipment for the two plants, including four SGT5-4000F gas turbines, four SST5-5000 steam turbines, four hydrogen-cooled generators, and the entire electrical systems as well as SPPA-T3000 instrumentation and control systems.

Azur to build Pakistan PV plant

Germany's Azur Solar is to build a 50 MW solar photovoltaic power station at Dhabeji in Thatta District, Pakistan.

The announcement of the project follows a Memorandum of Understanding signed by Azur with Raza Impex Pvt Ltd Pakistan earlier this year.

The project will involve the initial development of a small-scale solar plant to provide free electricity to local schools and a health centre.

Emerson to automate Huadian Lingwu power plant

Emerson Process Management has received a $2.72 million contract to install its Ovation expert control system at Huadian Lingwu power plant units 3 and 4, which are the first 1000 MW, ultra-supercritical units in China to utilise air-cooling condenser technology.

Owned by Huadian Lingwu Power Generation Company, the plant is located in Yinchuan City in northwest China. It currently consists of two 600 MW, coal-fired units (units 1 and 2) that have utilised Ovation technology since they went into commercial operation in 2007.

Units 3 and 4, expected to begin commercial operation in August 2010 and December 2010, respectively, are being built to spur economic development by serving the growing electricity needs of industry in the region.

Europe

Metso extends Lielahti life

Metso has signed an agreement with Tampereen Energiantuotanto Oy for the renewal of the automation, field devices and electrification at the Lielahti power plant in Tampere, Finland.

The natural gas fired cogeneration plant has an installed capacity of 147 MWe and 160 MWth and was commissioned in 1988. Metso's €4 million contract to remove the old automation system and install a new one with integrated steam turbine controls will extend the plant's life by around 20 years.

"In the future, one operator will be able to control and monitor the operation of the Lielahti power plant as well as the production and distribution of district heat in Tampere, which is a city of over 200 000 inhabitants. Also, it will be easier to find the causes of disturbances," said Sales Director Heikki Mylläri of Metso.

GE plans offshore demonstration

GE Energy is moving forward with development of its offshore wind technology with plans to install up to five demonstration wind turbines through two separate partnerships.

The company has signed a cooperation agreement with Norwegian energy companies Statoil and Lyse to jointly carry out technical and environmental feasibility studies for building an offshore wind demonstration project in Rogaland County, off the southwest coast of Norway. It is also planning an onshore installation in Gothenburg Harbour, Sweden, in cooperation with Gothenburg Energy.

All five projects involve the 4.0-110 wind turbine, a 4 MW unit that is the largest wind turbine in GE's fleet.

Austria chooses Voith for Rodund II rehab

Voith Hydro has been chosen by Voralberger Illwerke to rehabilitate the Rodund II hydropower plant in Austria after the facility was damaged by a fire in 2009.

Under a €40 million contract, Voith will supply a reversible pump turbine, an air-cooled motor-generator and ancillary equipment. The project will increase the plant's output in turbine mode from 276 MW to 295 MW and is due to be completed by the end of 2011.

Rodund II was commissioned in 1976 and will also be equipped with a new energy management system. Only the power house, spiral case and the draft tube and some mechanical auxiliary equipment will remain in place.

Tognum wins French industrial orders

The Tognum Group has won two orders from France for the supply of gas engine gensets to industrial customers.

The orders were placed by French power plant manufacturer SDMO and include a total of nine cogeneration power plants for installation at factories owned by Peugeot and Smart. The total order volume is worth over €2.5 million.

The orders count among the biggest ever received in the 30-year history of the Tognum production site in Augsburg. The supply scope also includes maintenance services such as the provision of spare parts and on-call technical support for the user.

The gensets will each comprise an MTU gas engine Type 16V 4000 L62, the generator, and the control system. The combined heat and power plant destined for the Peugeot factory in Mülhausen is capable of generating over 12 MWth and up to 11 MWe. The plant for the Smart factory in Hambach provides over 3 MWth and 3 MWe.

International

ABB wins Saudi deal

Swiss firm ABB has won an $89 million deal from the Saudi Electricity Company (SEC) to build a new substation for the supply of power to the King Abdullah Financial District in Riyadh.

The substation will be completed within 22 months and will feed four smaller substations located within the financial centre.

ABB will deliver the 380/132/13.8 kV substation on a turnkey basis and will also be responsible for civil works.

GE wins Salalah IWPP contracts

GE is to supply 6FA gas turbines and long-term services to the Salalah independent water and power project (IWPP) in Oman after signing contracts with Sembcorp Salalah Power & Water Company.

The plant, will have a capacity of 445 MW of electricity and 15 million imperial gallons per day of desalinated water to help meet the region's growing power and clean water needs.

GE is supplying five heavy-duty Frame 6FA gas turbines, which are equipped with advanced emission control technologies. GE also has signed a 15-year contractual service agreement (CSA) for the project, which will include the supply of parts, repairs and field services and will provide performance services for the gas turbine-generators and related equipment.

Saudi Arabia awards Ras Al-Zour contract

Saudi Arabia has awarded a SR59.9 million ($16 million) engineering contract for the Ras Al-Zour power plant on the Gulf coast to a consortium led by WS Atkins International.

The $6 billion power and water project will have the capacity to generate 2400 MW of electricity and produce 1025 million m^3 of desalinated water a day. It will be located 60 km north of the industrial city of Jubail.

Siemens wins first Czech PV project

Siemens Energy has received its first order from the Czech Republic for the turnkey construction of a large ground-based photovoltaic (PV) plant.

Prague-based DPES sro has contracted Siemens to build a 4 MWp power plant in Dobré Pole near Brno. The project is scheduled to be completed by the end of 2010.

As the general contractor, Siemens is responsible for the turnkey construction, engineering and project management of the power plant. Its scope of supply includes the full balance of plant range with Siemens components, such as inverters, transformers, medium-voltage equipment as well as the control system.

ABB to supply Qatar development

ABB has won an order to supply two the Ezdan Real Estate Company, one of Qatar's biggest property developers.

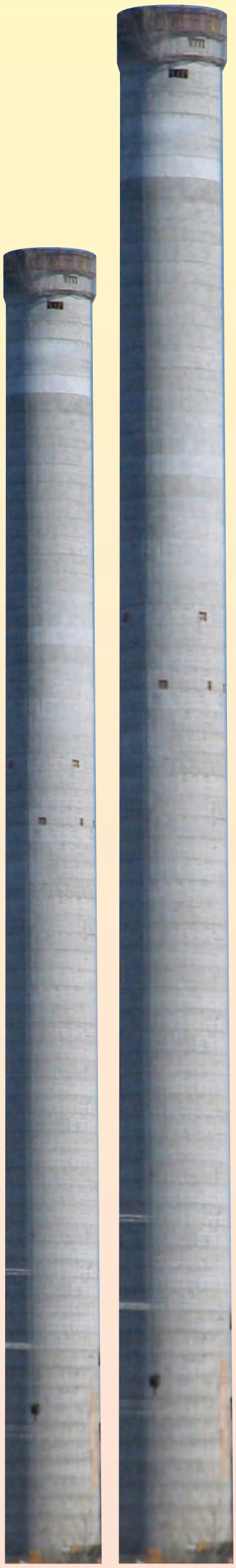
Under the turnkey contract, ABB will design, engineer, supply, install and commission a 132/11 kV substation that will supply power to two new shopping malls being built in Doha. Another substation, rated at 66/11 kV, will serve a new residential area.

Ovation system selected for Rabigh

SEPCO III has awarded Emerson Process Management a contract for the installation of an Ovation control system at the new 1320 MW oil fired Rabigh power plant units 1 and 2 in Saudi Arabia.

At each unit, an Ovation control system will perform data acquisition, and monitor and control the boiler, turbine and heat recovery steam generator (HRSG), all supplied by Donfang Electric Corp.

The Ovation system will also control the modulation control system, sequence control system, furnace safety supervisory system, electric control system, flue gas desulphurisation (FGD) system, feedwater pump turbine and balance-of-plant processes.



Pathways to low-carbon growth

Roadmap 2050 aims to provide a practical, independent and objective analysis of pathways to achieving a low-carbon economy in Europe, in line with the energy security, environmental and economic goals of the European Union.
Jules Kortenhorst

Roadmap 2050: A practical guide to a prosperous, low-carbon Europe was launched in Brussels in mid-April. It was a timely opportunity not only to present this substantial and considered piece of work but also to concentrate the minds of European policy makers on how the EU can successfully make the transition to low carbon growth.

The importance of the launch was underlined by the attendance of both the Climate Change Commissioner, Connie Hedegaard and the Energy Commissioner Guenther Oettinger as well as representatives from both the European Council and European Parliament. Experts from the energy industry, policy and environmental worlds also attended.

The EU currently has a target of reducing greenhouse gas emission by 80-95 per cent by the year 2050. The mission of Roadmap 2050 is to provide a practical, independent and objective analysis of pathways to achieving a low-carbon economy in Europe, in line with the energy security, environmental and economic goals of the European Union.

The Roadmap 2050 project, funded by the European Climate Foundation (ECF), is based on extensive technical, economic and policy analysis by leading organisations, utilities, transmission operators, equipment manufacturers, academics and NGOs in the field.

The fact-based analysis illustrates why a zero-carbon power sector is required and how that can become a reality in line with Europe's long-term climate and energy security commitments through to 2050.

The roadmap examines four decarbonisation scenarios for the power sector and, based on a back-casting methodology, sets out the near-term implications for this long-term commitment.

These four decarbonised scenarios focus on the economic, service reliability, infrastructure, energy security and policy implications for the European power system in 2050. Only one of the scenarios relies on imported electricity and all are based on existing or late state development technologies including renewables such as solar, wind, biomass, geothermal and also non-renewable low-carbon resources such as carbon capture and storage (CCS) and nuclear. The four scenarios are:

1. Forty per cent renewables, with the remaining 60 per cent split evenly between non-renewable low-carbon technologies.
2. Sixty per cent renewables, with the remaining 40 per cent divided evenly between non-renewable low-carbon technologies.
3. Eighty per cent renewables, with the remaining 20 per cent supplied evenly between non-renewable low-carbon technologies.
4. The study also assessed the technical and economic feasibility of a scenario with 100 per cent renewable electricity, requiring no nuclear power and limiting CCS application to heavy industry, including solar power from North Africa and breakthroughs on enhanced geothermal power generation.

The ECF used a back-casting methodology to take the stipulated minimum desired 2050 outcome, expressed by European leaders as a reduction in greenhouse gas emissions by at least 80 per cent, and derive plausible pathways from today to achieve them. This methodology is fundamentally different to forecasting where an end-state is derived.

A back-casting approach can help highlight where momentum must be broken and re-directed in order to achieve future objectives, while forecasting tends to extend current trends out into the future to see where they might arrive.

Action before 2015 is a prerequisite for decarbonisation by 2050 and the immediate policy development and implementation will need to focus on five specific areas:

- Energy efficiency measures, which will create cost savings and reduce demand.
- Investments in regional grid inter-connection, which will minimise back-up supply and load-balancing requirements, plus a broad programme of smart grid pilot projects to anticipate the rapid expansion that will follow.
- Continued and accelerated technology development involving favourable policymaking and investment in research and development.
- Market reform to ensure an effective long-term investment case for business.
- Laying the foundation for a rapid fuel switch to electricity in the buildings and road transport sectors.

The project analysis started in August 2009. Over the eight months of the project, a vast amount of analytical work took place, including specific detailed sessions with industry collaborators on the assumptions that could be reasonably made regarding each technology contributing to the decarbonised scenarios. No breakthrough technologies were factored into the study and only those technologies already commercially available or in late stage development were considered.

When the Roadmap 2050 project started, a number of widely shared assumptions dominated the debate on the future of the European power sector. These included assertions that high-renewable energy scenarios would be too unstable to provide sufficient reliability, that high-renewable scenarios would be uneconomic and much more costly, and that technology breakthroughs would be required to move Europe to a zero-carbon power sector. Roadmap 2050 has found all of these assertions to be incorrect.

The project finds that in each of the low/zero-carbon pathways, and assuming an average carbon price of at least €20-30 per tCO_2e over 40 years, the future cost of electricity is comparable to the future cost of electricity under the current carbon intensive infrastructure. Baseline costs, which draw on IEA data, put the average, levelised costs of electricity between now and 2050 at 66-95 €/MWh in real terms versus 73-90 €/MWh for the 40 per cent renewables scenario, 78-97€ for the 60 per cent renewables scenario and 78-97€ for the 80 per cent renewables scenario.

It is important to note that there is a difference in the balance between how these figures break down. The capital expenditure (capex) and the operational expenditure (opex) change significantly in each of the scenarios. The higher the percentage of renewables, the higher the capex, but the lower the opex will be.

By capex here we mean the upfront investment costs of manufacturing and building the electricity generating capacity. Opex refers to the ongoing costs of running the system, which in this case is principally the primary fuel required to generate the electricity, but also includes the cost of workers and facility expenses such as rent and utilities. In the case of coal and gas fired plants this is a positive number; in the case of wind and solar it is zero.

Capex on energy infrastructure will need to increase by 50-100 per cent in the next 15 years to deliver a zero-carbon power sector by 2050. But in that scenario the overall energy bill for the economy will be heading downward by 2020, and the opex will fall fast throughout the period. This is the result of many of the inputs to renewable energy being free (sun and wind) as opposed to the often high and fluctuating prices of fossil fuels.

Roadmap 2050 also shows that with the necessary investments in energy efficiency and Europe's power network infrastructure, a decarbonised power sector using available technologies can provide the same high level of reliability that consumers enjoy today, in all low/zero carbon pathways. Energy efficiency improvements will need to more than double annually to keep the increase in power demand manageable.

Jules Kortenhorst: action before 2015 is a prerequisite for decarbonisation by 2050

> When the Roadmap 2050 project started, a number of widely shared assumptions dominated the debate on the future of the European power sector… Roadmap 2050 has found all of these assertions to be incorrect.

With greater electrification of transport and of heating in buildings and industry, electrical energy requirements are estimated to increase by 80 per cent in 2050 against 2005 levels. Energy efficiency across the economy, including more efficient electric vehicles, a buildings retrofit programme and other measures, can offset the demand created by the move away from fossil-fuels towards electricity in other sectors.

Energy efficiency improvements of up to 2 per cent per year will be required. This project assumes that energy efficiency measures like those identified in the McKinsey 2030 Global Greenhouse Gas Abatement Cost Curve for Europe are implemented fully and in all sectors. We also assume that the energy efficiency measures identified in the abatement curve penetrate further as the timeframe continues to 2050.

With the exception of existing hydroelectric facilities, almost all of the power generation capacity required to supply Europe in 2050 will need to be built in the next 40 years. This is a major undertaking regardless of the energy mix, and would pose a massive challenge even in a high carbon scenario.

The key finding of the Roadmap 2050 project is that the challenge is basically the same in either a high-carbon, low-carbon or zero-carbon energy scenario, in terms of overall cost to consumers and the European economy.

As well as studying the technical requirements of the grid and power infrastructure and the economics of the various scenarios, the Roadmap 2050 project has also delivered an analysis of the policy requirements for decarbonisation of the power sector by 2050.

Action before 2015 is a prerequisite for decarbonisation by 2050 for many reasons not least of which is that high carbon energy generation, which is built in the next five years, will still be in operation in 2050. Immediate policy development and implementation will also have to focus on:

- Energy efficiency measures, creating cost savings and reducing demand
- Investments in regional grid inter-connection, minimising back-up supply and load-balancing requirements, plus a broad programme of smart grid pilot projects anticipating rapid expansion.
- Continued and accelerated technology development.
- Market reform to ensure an effective long-term investment case for business.
- Laying the foundation for rapid fuel switch to electricity in the building and transport sectors.

Roadmap 2050 shows that existing policy frameworks can be adapted to support decarbonisation of the European power-sector, but that an historic approach is needed, with rapid action over the next five years at both regional and national level being required.

The Roadmap 2050 project shows that the benefits of the low-carbon transition far outweigh the challenges and that a commitment now to a systemic low-carbon transformation of the energy sector is ultimately the winning economic strategy for competitiveness and low-carbon prosperity in Europe.

Achieving at least 80 per cent greenhouse gas reductions in 2050 based on zero carbon power generation in Europe is technically feasible and fully reliable, including pathways based on very high contributions from renewable energy sources, and makes compelling economic sense.

Jules Kortenhorst is CEO of the European Climate Foundation – an organisation that aims to promote climate and energy policies that greatly reduce Europe's greenhouse gas emissions.

Power to the poor

The World Energy Congress will be an opportunity for developing countries to have a voice in the debate on strategies to make electricity accessible to all. The World Bank's **Jamal Saghir**, who will be leading a session on global energy demand, speaks to **Junior Isles.**

In this day and age, it seems hard to believe that 1.4 billion people still have no access to modern energy services and electricity.

In South Asia, 38 per cent of the population are without access to electricity. The problem in sub-Saharan Africa is even more acute, where this figure rises to a staggering 72 per cent, corresponding to 587 million people. These alarming statistics clearly illustrate that continuing energy poverty is a major challenge for the world.

The ongoing issue of energy poverty is high on the agenda at next month's World Energy Congress in Montreal, Canada.

Jamal Saghir, Director of Energy, Transport, and Water at The World Bank, who will be chairing one of the main sessions on the global demand for energy, said: "The World Energy Congress is an important event. Electricity demand is growing, especially in China, India and other developing countries. But we must not forget the demand from those in developing countries who do not have access to energy services and who don't have the ability to pay, i.e. the 'energy poor'. The debate has to address both energy security and energy equity."

The 48 countries that form sub-Saharan Africa have a total installed capacity of just 30 GW, excluding South Africa. This is approximately the same as Argentina and only 6 GW more than the Netherlands. "Sub-Saharan Africa installs 1 GW every year, this is what China installs ever week," added Saghir.

Yet the problem of sub-Saharan Africa and other regions without access to electricity is one that is not easily solved. In some countries, electricity access is as low as 6 per cent and even with current efforts, globally there will still be 1.4 billion people without access to electricity in 2030.

Low energy access has a detrimental effect on a country's entire economy. There is an important link between electricity access and economic growth. "Businesses in sub-Saharan Africa lose 6-16 per cent of turnover due to power outages. The cost of load-shedding and power cuts has an economic cost of 1-2 per cent of GDP," said Saghir.

According to a World Bank report entitled *Africa Energy Poverty*, presented to the G8 in May last year, redressing Africa's power deficit could boost economic growth by 1.9 percentage points. To cope with widespread outages, a number of countries have had to contract short term leases for emergency generation in the form of containerised mobile diesel gensets costing as much as $0.35 per kWh, with lease payments absorbing more than 1 per cent of GDP in many cases.

The impact on GDP is not the only effect of low energy access. "There are also the health impacts. Lack of energy contributes to clean water shortages and water-borne diseases. It also leads to social disempowerment. For example, collecting fuel and carrying water deprives women and children of economic and educational opportunities. This is why the issue of access to modern energy has to be discussed," noted Saghir.

A major problem is the amount of financing that is required. More than $165 billion in investment is needed per year for the electricity sector in the developing world to achieve universal access by 2030. Africa alone will require nearly $42 billion per year through 2030. This is the cost of expanding generating capacity to achieve a demand-supply balance.

With around $10 billion per year currently being invested in Africa, there is a financing gap of almost $31 billion.

The lack of financing is largely attributed to poor legal and regulatory frameworks, as well as risk perception.

Saghir explained: "Some people prefer to invest in countries where it is easier to make good returns. There is also the risk environment, and the financial crisis didn't help. Not only did it increase uncertainty in investments, it also reduced resources for development assistance and investment flows."

According to the Africa Energy Poverty report, in recent years there have been 34 IPP contracts in Africa. These involved investments of $2.4 billion for the construction of 3 GW of new generating capacity. But although these projects have provided much needed generation, they represent a small portion of the 7 GW that is needed annually to achieve a demand-supply balance by 2030.

Private sector sponsors and operators and financing from capital markets will be key to the success of access expansion programmes. Certainly private sector expertise will be needed to develop the large complex generation and transmission projects (especially cross-border projects) that are needed, for which the World Bank believes project finance will be the most appropriate. The World Bank notes that regional power trade could save sub-Saharan Africa about $2 billion per year, since for some countries it is cheaper to buy electricity from a regional power pool as opposed to building a whole system for themselves.

In its Africa Energy Poverty report, the World Bank said that more support will be required if any substantial inroads are to be made in closing the financing gap. It said that bilateral and multilateral support can be used strategically to improve the terms on which private foreign investment flows by refining and accelerating the use of guarantees and other innovative financial instruments.

Among these ideas, the World Economic Forum Energy Poverty Action Partnership (EPA) pilot programme aims to demonstrate how rural access can be accelerated through focusing on the empowerment of local entrepreneurs, small and medium-sized enterprises and community cooperatives.

Jamal Saghir will be chairing a session on energy demand at this year's WEC in Montreal

> We have to get more than a flavour. We have to get the voice of the developing countries to the table

The global credit crisis made it more difficult to obtain financing, resulting in projects with perceived higher risk or higher cost being passed over.

Although the financial crisis hit many developing regions, Saghir believes these regions will be important in the global recovery. "While the financial crisis did not help, it is in the developing countries where the future growth will happen. Therefore, they will be the engine to pull the world out of the economic crisis."

He added: "If you look at the new global economic order, you have to underline the importance of Asia. The Asian stock market accounts for 32 per cent of global market capitalisation. Last year China overtook Germany to become the world's biggest exporter. Most of the recovery has been through imports by developing countries. The BRIC countries have an increasingly important role to play in the global economic order."

It is important, however, that bringing energy to the poor is not done at the expense of climate change. The cost of decarbonising is expected to add another $30 billion to the estimated $165 billion of bringing universal access to electricity by 2030 but it is not a case of one or the other.

Saghir stressed: "It's not a trade-off, i.e. achieving green growth or access to energy. The two have to be complementary. An important aspect is how to use the climate investment funds and carbon finance. We have to support low carbon energy to help countries leapfrog in terms of technology. The solutions of the past are not the solutions of the future."

Solutions will include the implementation of energy efficiency programmes, renewable energy and intelligent grids to support large-scale integration of wind. At the same time, a diversified energy mix has to be promoted. In many African countries, hydropower will be an important source. Saghir commented: "Energy planning will have to return to the top of the agenda. Unfortunately it has been missing in many places around the world."

Multiple barriers must be overcome to tackle the twin challenges of energy access and sustainability. In addition to high financing and investment needs, weak institutional capacity at national and local levels, low access to, and high cost of, technologies, distorting subsidies must be removed from the sector.

Nevertheless, sub-Saharan Africa and other countries can draw confidence from other energy access programmes in which the World Bank has been involved. Vietnam, Laos and Tunisia are all good examples.

In 1975, less than 3 per cent of Vietnam's rural households had access to electricity. By 1993, this had gone up to just 15 per cent, which still meant more than 70 million people were still without electricity. But by 2008, Vietnam achieved near universal access with over 95 per cent gaining access to electricity.

The World Bank has been a strong partner in this success story, with its assistance accounting for 70 per cent of the programme cost of $1 billion.

The programme saw 5 per cent of the national GDP invested in energy infrastructure. A dedicated and autonomous institution – Electricity of Vietnam (EVN) – was created to implement the programme. Under the leadership of EVN there was clear demarcation of responsibilities – regional power companies develop medium voltage network; local communities build the low voltage network; and provinces provide decentralised oversight.

If poor nations are to ultimately achieve the same living standards as the developed countries, electricity access has to be addressed. The World Bank has just completed an exhaustive consultation process toward developing a new energy sector strategy. This has involved 45 meetings in 37 countries, as well as over 170 written submissions.

Saghir, who has been heavily involved in the new strategy, says discussions in Montreal will not only be centred around the G20 or OECD countries.

He summed up: "The organisers have been working hard to put the issues [of developing countries] on the table. We have to get more than a flavour. We have to get the voice of the developing countries to the table."

Jamal Saghir is Director of Energy, Transport, and Water at The World Bank. Mr. Saghir is also an appointed member of the United Nations' Secretary-General's Energy and Climate Change Advisory Group, and a member of the Global Energy Assessment.

Oil

Prices wait for clear signs of economic recovery

- Oil markets in transition period
- Demand growth to be driven by non-OECD countries

David Gregory

During the last month, the price of West Texas Intermediate (WTI) crude has fluctuated within the mid-$70/b range, reacting to economic data that has yet to show clear signs of a global economic recovery. Amid fears concerning the future of the euro and analyses cautioning of a double-dip recession, crude oil prices have stayed resilient in a price range that Opec considers comfortable. This comes despite the fact that crude stocks remain plentiful and that Opec continues to produce crude far above its target.

"Oil markets are in a transition period, where mediocre demand should leave room for better oil consumption," Credit Agricole said in a recent analysis of oil prices. "Even under the assumption of a slow and painful economic recovery, oil balances should tighten in the second half of the year, supported by seasonal increases in demand."

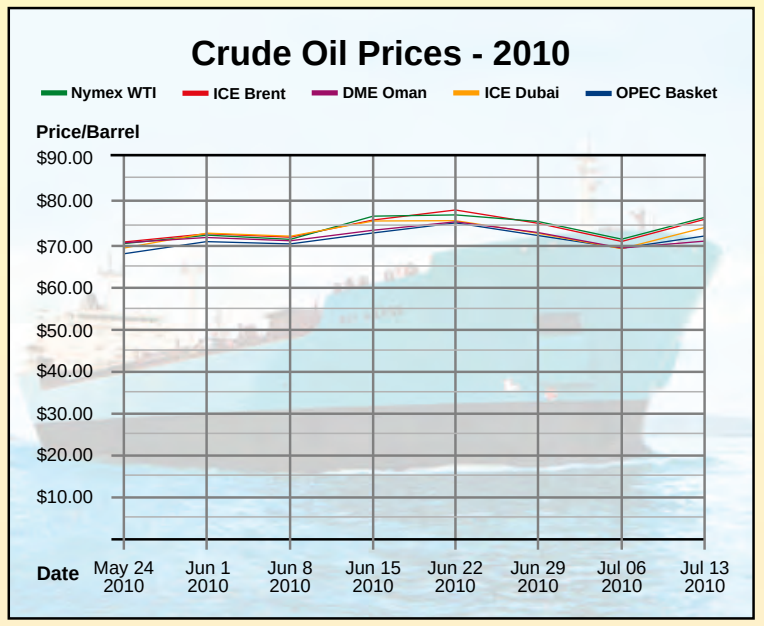
This demand may manifest itself in the traditional way – increase in US spending on gasoline during the summer driving season. But even so, Credit Agricole forecasts that crude oil prices will remain in the $75-80/b range during the second half of 2010.

Opec leaders have stated on several occasions that a $70-80/b price would be ideal. Late last month, Opec's Secretary General Abdullah al-Badri told *Bloomberg* that there was no need for adjustment in the organisation's output. "The economic recovery is sluggish, unemployment is still high and the debt crisis is causing a lot of uncertainty, so if you look at all these factors, the current price is comfortable," he said, adding that there was no need to call an Opec meeting in advance of the one scheduled for October or to change the production target. He did however urge Opec members to comply more closely with the production target of 24.845 million b/d.

But the global economic recession has left its mark on the international oil market, and the years ahead are likely to show a shift in its dynamic as the developing countries of Asia – China in particular – become the markets where demand growth is greatest.

"Oil demand growth in 2011 is expected to be driven entirely by non-OECD countries," the Paris-based International Energy Agency (IEA) said in the latest issue of its monthly Oil Market Report, released on July 13.

The IEA report forecasts that demand growth from 2010 would increase 2.1 per cent, or by 1.8 million b/d, over 2009 to 86.5 million b/d. For 2011, the agency said global oil demand would rise by 1.6 per cent, or 1.3 million b/d, over 2010 to 87.8 million b/d.



Oil demand in the OECD during 2011 is projected by the IEA as averaging 45.3 million b/d – down by 0.5 per cent, or 210 000 b/d from 2010. The report said: "North America will cease to act as an engine of demand growth in the OECD as the 2010 economic rebound, fuelled by government spending and private-sector restocking, fades. This region's oil demand decline will compound the fall expected in Europe and the Pacific."

By contrast, non-OECD oil demand during 2011 will rise by 3.8 per cent, or 1.6 million b/d, to 42.5 million b/d. "Non-OECD Asia, the Middle East and Latin America will continue to command the lion's share of oil demand in 2011, but at a somewhat slower pace when compared to 2010," the report said, adding: "China should account for about 30 per cent of global growth next year [2011], versus almost half this year [2010]."

The IEA report said the market would likely remain comfortable through mid-2011, but with tightening market fundamentals possible from the second half of the year. Commenting on its projected "call" on Opec crude oil, which is expected to average 29.2 million b/d in 2011, up from 28.8 million b/d in 2010, the IEA said the organisation may have to "grapple with largely static year-on-year demand for its crude" until around the middle of 2011.

"Markets in 2011 may prove 'not too hot, not too cold'," the report said. "Whisper it quietly," it added, "but we might, just might, be in for some market stability for a while longer."

Gas

'East-Med' gas sparks Middle East controversy

Recent discoveries of large natural gas deposits offshore Israel have prompted Lebanon to warn its southern neighbour against encroaching upon reserves that may be in its own offshore territory. The deposits in the eastern Mediterranean have sparked new interest in the next offshore bidding round to be held by Cyprus next year.

Mark Goetz

Over the last 18 months, Houston-based Noble Energy, in partnership with Israeli companies, has made significant discoveries in waters offshore Israel. Last year it announced the discovery of the Tamar gas field and has recently increased the size of estimated reserves there to 238 billion cubic meters (bcm) or 8 trillion cubic feet (tcf).

Earlier this year, Noble identified the Leviathan Prospect, which is estimated to hold 453 bcm (16 tcf). Tamar, where production is targeted to begin in 2012, has the potential to supply Israel with its domestic gas needs for the next 30 years. Leviathan, if its estimated potential is realised, could turn Israel into a gas exporter.

Lebanese politicians, however, have claimed that the Tamar and Leviathan prospects extend into its offshore territory and warned Israel against attempting to extract natural gas from those deposits.

"Israel is racing to make the case a *fait accompli* and was quick to present itself as an oil emirate, ignoring the fact that, according to the maps, the [Tamar] deposit extends into Lebanese waters," Lebanon's speaker of parliament, Nabih Berri, said in June, adding: "Lebanon must take immediate action to defend its financial, political, economic and sovereign rights."

Lebanon's parliament has taken quick steps to draw up an energy law that will enable it to proceed with exploration activities of its own. Experts say that even if the energy law is passed tomorrow, it will take years for Lebanon to catch up with Israel, which is said to be four years ahead in terms of its exploration of the eastern Mediterranean.

Accusations made by Mr. Berri and other Lebanese officials resulted in Israel's Minister of National Infrastructures Uzi Landau warning that Israel would use force if necessary to protect its offfshore discoveries. "We will not hesitate to use our force and strength to protect not only the rule of law, but the international maritime law," Mr. Landau was quoted as saying by *Bloomberg* in late June.

Meanwhile, Israel is drafting a law that will define an exclusive economic zone (EEZ) in the eastern Mediterranean and which should go before the Knesset by the end of summer. Drawing up an EEZ will allow for Israel to join the 1982 UN Convention on the Law of the Sea. The next step will be to finalise a maritime border with the island state of Cyprus, which has declared an EEZ and held its first offshore licensing round in February 2007. Israel and Cyprus are on good terms and an agreement is expected to be reached in the near future.

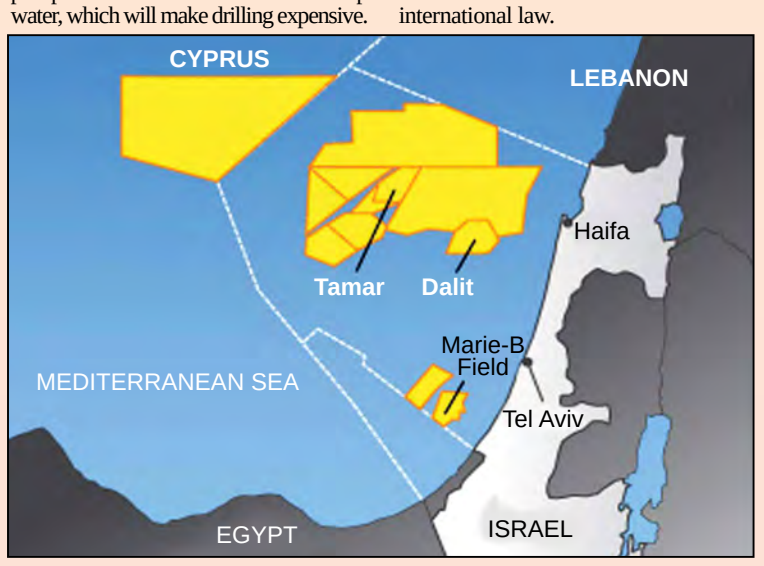
Negotiations between Israel and Lebanon on respective EEZ's cannot be expected to take place for as long as the two countries remain technically in a state of war. Some Israeli technocrats have argued that it is best that Israel not declare an EEZ as it will provide Lebanon and Syria with a legal basis to challenge the demarcation line – a legal situation that could go unresolved for years.

The fracas with Lebanon is not expected to deter exploration activity, however. Nobel Energy is expected to begin drilling in the Leviathan Prospect by the end of the year and it has estimated its chances of making a discovery at 50 per cent.

According to a report published recently by the US Geological Survey on the Levant Basin, the eastern Mediterranean area holds potential reserves of 122 tcf (3.4 tcm) of natural gas and 1.7 billion barrels of condensate. Most of the prospects identified so far are in deep water, which will make drilling expensive.

The discoveries in Israel have brought renewed interest in Cyprus' offshore blocks, most of which will be put up for auction for a second time during the first half of 2011. Of the 11 blocks offered in 2007, only one was awarded – Block 12 to Noble Energy. Cyprus Block 12 lies adjacent to Israel's offshore territory and in close proximity to the Tamar and Leviathan structures. The Tamar discovery and the anticipation over Leviathan has led to many oil and gas companies – including all the majors – to purchase the data on the offshore blocks, according to Cypriot officials.

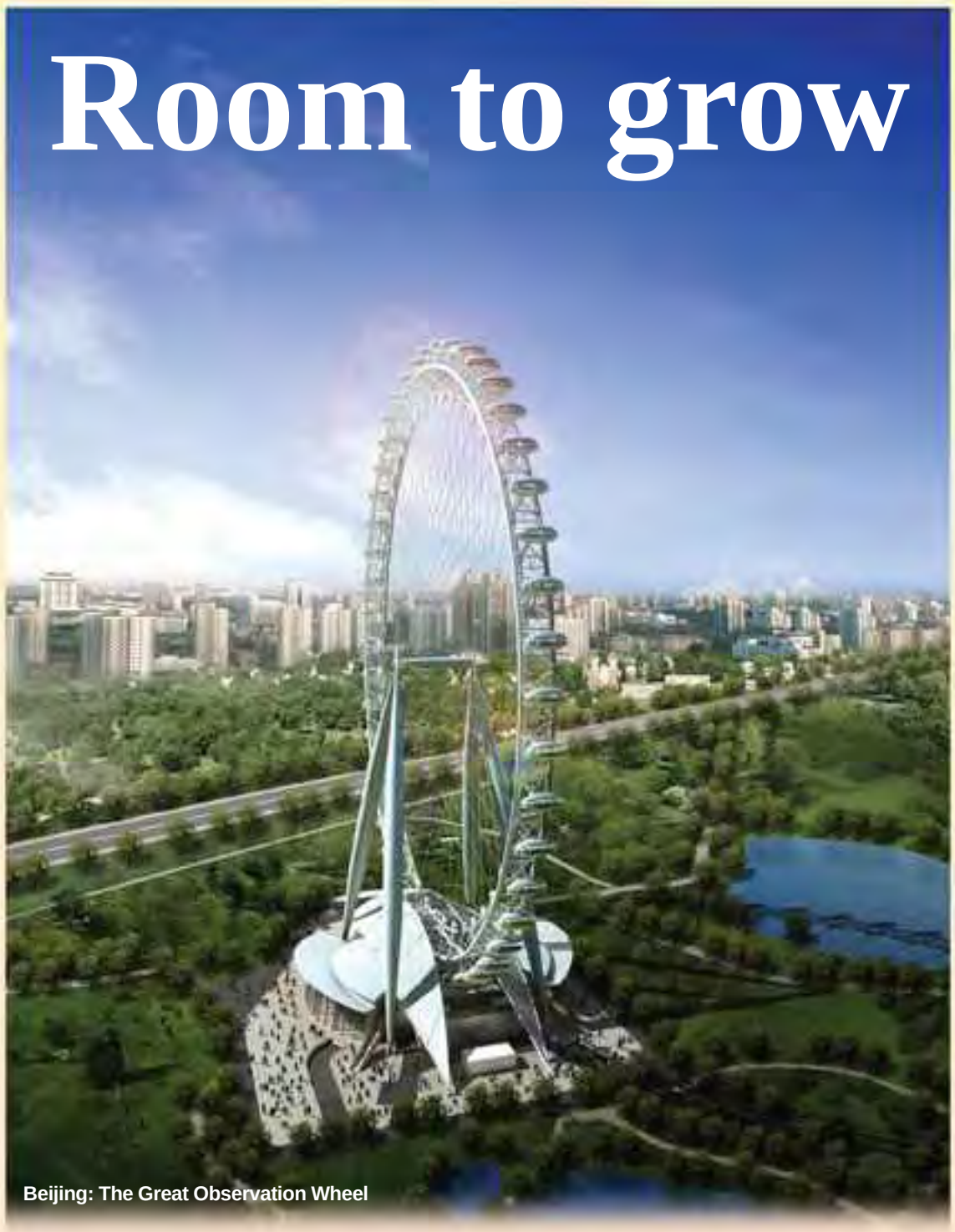
But Cyprus is facing political opposition to its offshore activities from Turkey, which claims that the Greek government does not represent the entire island. Turkey has registered its complaint about Cyprus' offshore activities with the United Nations. However, Nicosia's actions are considered well within the confines of international law.



SPECIAL REPORT

Powering Industry

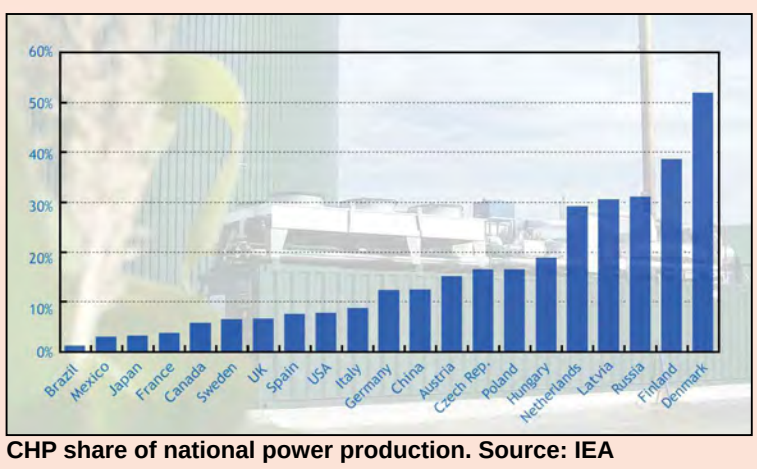
Room to grow



Beijing: The Great Observation Wheel

Combined heat and power presents an opportunity for countries around the world to improve the efficiency of their power generation sectors. *The Energy Industry Times* looks at China, where CHP is already helping to reduce carbon emissions. **Siân Crampsie**

In 2007 leaders from the G8 group of nations meeting in Germany highlighted the importance of combined heat and power (CHP) in the global fight against climate change and published a communiqué directing countries to "adopt instruments and measures to significantly increase the share of CHP in the generation of electricity".



CHP share of national power production. Source: IEA

Three years on and policy makers are still looking for tools and measures to implement in order to take full advantage of the potential benefits of CHP. According to the International Energy Agency (IEA), while some countries have been able to achieve a high share of CHP in electricity production – up to 50 per cent – most countries have been much less successful.

CHP has an important part to play in the reduction of emissions of carbon dioxide (CO_2) – an important greenhouse gas – from the power sector. This is achieved through the dramatic difference in fuel efficiency between CHP plants and conventional power plants, and can also result in major cost savings for the end-consumer. Other benefits of CHP deployment include the reduced need for investment in transmission and distribution networks, reduced emissions of other pollutants and the potential for using local fuel resources such as waste and biomass.

But in spite of obvious benefits, many countries have been slow to take up CHP and CHP still only accounts for around ten per cent of global power generation. Only countries where dedicated CHP-friendly policies have been put in place have succeeded in boosting the share of CHP in power generation. These include Denmark, Finland, Russia, Latvia and the Netherlands. An analysis carried out by the IEA in 2008 demonstrated that the growth in CHP in both Denmark and the Netherlands could be correlated with a decline in CO_2 emissions in those countries.

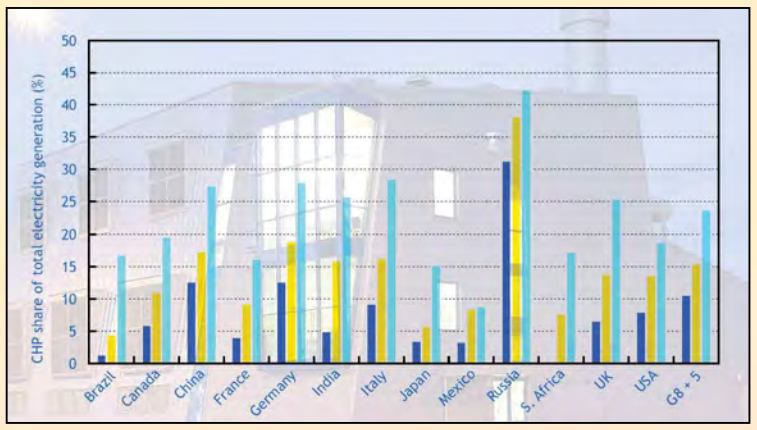
In its 2008 report on CHP, the IEA gathered data from around the world and estimated that global capacity stood at 330 GWe. Russia's 65 GWe of installed CHP capacity is largely down to its pursuit of heat supply to all sectors while the 85 GWe installed in the USA is the result of pro-CHP policies. Germany, with around 21 GWe of installed CHP capacity, has made significant progress in recent years due to incentives provided for industrial CHP.

The German CHP target was in 2007 raised to 25 per cent – a doubling of the current share – in 2020, based on a National Potential Study conducted by the government under the European Union's CHP Directive. This study also cites economic CHP potential to be up to 50 per cent of electricity capacity. According to the IEA, a number of studies into the potential for CHP in Europe indicate that installed capacity could reach 250 GW by 2025, giving CHP a 17 per cent share in electricity generation.

Elsewhere, the Canadian government has identified a potential for CHP of 15.5 GWe, equivalent to around 12 per cent of projected national capacity in 2015, while estimates of CHP potential in the USA are an additional 48-88 GWe. CHP potential in Japan for 2030 has been identified as up to 29.4 GW, around 11 per cent of projected total capacity for that year.

In 2009, the IEA carried out further analysis of the potential for CHP in the G13 countries using an "Accelerated CHP Scenario" where policies in the G13 mirrored those in some of the most successful CHP countries. It found that by 2030 the CHP share of G13 electricity generation could rise from 10 per cent to around 24 per cent.

In the IEA's Accelerated CHP Scenario, there would be a three per cent reduction in overall capital investment in the power sector by 2015, amounting to $150 billion of investment savings. By 2030, these cost reductions could climb to seven per cent. These savings are largely derived from savings from avoided transmission and distribution network investment, and have a direct link to the reduction in consumer retail costs that the IEA modelling also projected.



Major economies' CHP potential under an accelerated CHP scenario, 2015 to 2030. Source: IEA

These savings are also of significance in the current financial climate, especially in light of the IEA's warning in its World Energy Outlook 2009 that falling levels of energy investment will have far-reaching consequences.

Similarly, CO_2 emissions are projected by 2015 to be reduced by more than four per cent (170 million tonnes (mt)/ year), comparable to around 40 per cent of the EU-25 and US Kyoto targets. In 2030, this saving could increase to more than 10 per cent (950 mt/year). To put this in perspective, this emissions reduction is comparable to one and a half times India's total annual emissions of CO_2 from power generation.

> "It shows the tremendous potential for reducing greenhouse gases while at the same time reducing delivered power costs. This can be a win-win for the environment and the economy in China."

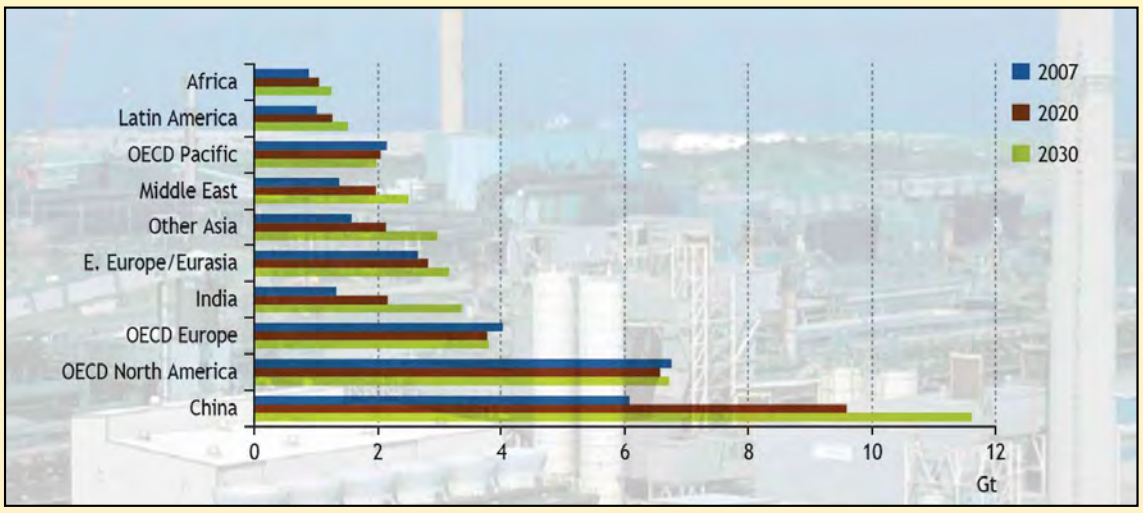
The potential for CHP in countries around the world represents a significant opportunity for investment in low-carbon technologies, said the IEA in its 2009 report, and this is particularly true in countries such as China, where the CHP shares of electricity generation could rise to 28 per cent by 2030. CHP currently accounts for around 13 per cent of electricity generated in China.

A recent analysis of CHP in five key industrial areas of China by the World Alliance for Decentralized Energy (WADE) found that existing CHP in China is mostly coal-based and integrated with municipal or industrial district heating systems or tied to power plants selling steam to adjacent industrial sites or district heating loops. These systems are often based on old, inefficient coal

(Continued from page 19)

boilers and heating loops, so energy efficiency and GHG reduction benefits of this CHP are limited. Average district heating boiler efficiency in China is 60 to 65 per cent, while heat loss from district heating pipelines is estimated to be 25 to 50 per cent.

In its analysis, WADE developed a detailed estimate of the technical potential for CHP in high electric/thermal energy intensive industries and large commercial/institutional applications within five target provinces in China: Shanghai, Liaoning, Shandong, Jiangsu and Sichuan. It also estimated the potential energy, economic and greenhouse gas savings benefits that could be made by reaching technical potentials of CHP.



Energy-related CO_2 emissions by region in the IEA World Energy Outlook 2009 Reference Scenario. Source: IEA WEO 2009

WADE found that officials in most of the target areas were familiar with customer-based CHP and would like to promote its development by, for example, incorporating it into urbanisation plans. However, they see many barriers to the deployment of CHP.

According to WADE, many of these barriers could be overcome through the development of appropriate policies and guidelines by national and provincial governments. One factor that is having a positive impact on the development of CHP in China is the growth in wind power, which is paving the way for the deployment of CHP by being a driving force in the use of clean, decentralised energy.

The growth in wind power is also driving discussions about grid interconnection standards and procedures that can be easily adapted to CHP installations.

In the five study areas, WADE found that there is potential for CHP in application areas such as industrial retrofits, new commercial developments and waste fuels and biomass-based applications such as waste gas to power in chemical and steel facilities. The total technical potential for clean DE and CHP within the five target regions is estimated to be 143.7 GW of electric generating capacity. This represents 38 per cent of the 371.5 GW increase in central station generating capacity projected to be required in these five regions between 2010 and 2030.

Deployment of CHP can save energy and CO_2 emissions by displacing coal-based central station generation with more efficient coal, natural gas and waste fuel/waste heat CHP and distributed energy located at or close to the users. Energy savings from CHP result both from the avoidance of coal consumption at the central station power plant and the avoidance of coal and some natural gas that would have been used to generate needed thermal energy at the point of use.

In Wade's analysis, the total energy savings resulting from full deployment of the 143.7 GW of CHP potential in the four provinces and Shanghai amounts to about 6.3 billion GJ annually in 2030. This equals an energy savings of about 19 per cent over an energy future that relied solely on central station generation. In addition, deploying 143.7 GW of customer based CHP would result in a 33 per cent reduction in CO_2 emissions compared with the central power generation scenario.

The ultimate impact is the macro economic savings of deploying CHP/DE systems at the provincial level, where, for example, end-consumers would benefit because utilities would save substantial capital costs by not having to build power plants and transmission and distribution facilities. The cumulative macroeconomic impact, for the four provinces and Shanghai of deploying the full CHP technical potential during the period of 2010-2030 would be a saving of about $82 billion dollars.

Furthermore, WADE found that deployment of the full CHP technical potential for the five study areas would result in a 16.52 billion GJ annual decrease in coal use in 2030. It would also result in an increase in annual projected natural gas use of 8.21 8.66 billion GJ in 2030.

WADE's new report, which was produced with support from the United States Department of State and the Asia-Pacific Partnership on Clean Development and Climate (APP), is intended to help develop policy options and action plans at the provincial level in China. It also highlights the benefits of CHP to the country, says WADE.

"This report demonstrates how important the deployment of CHP and clean distributed energy can be for China," said David Sweet, Executive Director of WADE. "It shows the tremendous potential for reducing greenhouse gases while at the same time reducing delivered power costs. This can be a win-win for the environment and the economy in China."

References
1. The Potential for Clean DE and CHP in China, WADE 2010.
2. World Energy Outlook 2009, IEA.
3. Combined Heat and Power: Evaluating the Benefits of Greater Global Investment, IEA 2008.
4. Cogeneration and District Energy: Sustainable Energy Technologies for Today and Tomorrow, IEA 2009.

Switching strategies

Power semiconductors – switching devices that control the flow of electrical power and convert electricity into the waveform and frequency needed – are at the heart of many industrial applications. In April, ABB showed a group of journalists around its newly expanded semiconductor factory in Lenzburg, Switzerland. **Junior Isles**


Silicon wafers have to be produced in environments that are far cleaner than a modern operating theatre

The vast majority of semiconductors are used in the consumer electronics industry. Many of these low-power semiconductors, which are typically in the nanowatt to milliwatt range, are used to modify the form of electrical energy i.e. to modify its voltage or frequency. At higher power levels, they are also used in transport – e.g. control of ship motors or frequency conversion in railway systems – and industries such as aluminium smelting.

Similar devices can, however, also be used to modify electrical energy in the megawatt range. They work in much the same way as the low power devices in the consumer electronics industry but at a much higher current and voltage level, acting as high power switches that are either on or off.

High power semiconductors above 1200 V/300 A form a small but sizeable segment of the total semiconductor market. ABB estimates the market at around $1.5 billion. However, it is a market segment that has seen rapid growth in the last five years. Power electronics are a crucial part of HVDC transmission systems and variable speed drives. They are also central to the development of smart grids.

These growing markets have led ABB to expand its semiconductor production facilities in Lenzburg, Switzerland.

The expansion is the result of a three-year, $140 million investment, which includes new buildings and additional manufacturing lines. It substantially increases production capacity at the Lenzburg unit to help meet market demand.

Speaking at the opening of the new facility, Peter Leupp, Head of Power Systems and Member of the Executive Committee at ABB Group said: "You may ask why we have made such an investment at a time when people are talking about shrinking markets and difficulties in the economy. We strongly believe there is a growing market for these products. The market is being driven by the need to balance the need for more power against climate change."

The demand for semiconductors in the power industry has risen significantly with the growth of HVDC systems used for transporting bulk power over long distances or, for example, connecting offshore wind farms to the grid. The converter stations in the HVDC systems use power semiconductor components – ultra-thin silicon chips that switch power in microseconds – to convert power from DC to AC and vice versa.

According to ABB, the facility will produce a new generation of high-power semiconductors with significantly improved performance characteristics. The company claims it also widens the scope of application of high power semiconductors across a range of technologies, for greater efficiency.

Two types of semiconductors are manufactured in the Lenzburg (Aargau) clean rooms: conventional bipolar transistors and the newer, more difficult to manufacture, BiMOS devices with insulated gate bipolar transistor (IGBT) chips. Dedicated production lines are used for each type.

The two technologies are distinguished by their switching properties and power ratings and can be precisely tuned to match the application.

The highly sensitive IGBT silicon wafers for these transmission systems have to be produced in environments that are far cleaner than a modern operating theatre. At the Lenzburg facility for example, in some zones the room air is filtered so that a maximum of 10 particles no larger than 0.0005 mm in diameter per cubic metre of air is permitted. This is essential to maintain product quality. The temperature of the air is also kept constant and vibration is minimised.

Silicon wafers are not much thicker than a human hair. They are built up layer on layer until they have the properties required for fast switching. This is achieved using a complex 200-step process. Atoms are implanted or migrate deeper into the material when it is placed in diffusion furnaces operating at temperatures of up to 1250ºC.

In the yellow room, photolithography is used to structure the silicon wafers, which are then immersed in various baths in an etching room. Each of these process steps is applied multiple times i.e. for every layer. In the final step, the wafers are accurately cut to size.

When the silicon semiconductor element is completely manufactured, it is carefully tested. Some 25 voltage and current properties are measured for every chip at various frequencies and temperatures.

Chip quality is paramount as it defines switching speed, the rating and life of a semiconductor element. A 1 cm^2 silicon chip made in Lenzburg is able to switch high currents on and off several thousand times per second.

Bernhard Eschermann, Head of ABB Semiconductors said: "There are many semiconductor manufacturers but this factory is one of the few that can manufacture the semiconductors used in this niche but growing application."

With the continued growth in renewables, HVDC systems and other potential applications such as in power transformers, the $140 million investment in Lenzburg could be money well spent.

Changing the game

Reciprocating engines are often used in industrial cogeneration installations. GE recently introduced what it claims to be the world's first two-stage turbocharged gas engine. The technology will be applied to its Jenbacher J624 engine to enable a significant increase in power and efficiency. **Junior Isles**

The high efficiency, reliability and ability to maintain high power output at high ambient temperatures makes reciprocating engines a natural choice in many applications where there is a requirement for both electricity and heat. Any development in technology that can result in higher efficiency or power output is therefore important to industrial users.

In response to this market need, in June this year GE unveiled a new gas engine that incorporates technology, which it says will significantly improve the power output and efficiency in its existing engine range.

Together with specialists from ABB Turbo systems, GE has developed two-staged turbocharging technology with much higher charging efficiency, which is being applied to its J624 gas engine. According to GE, the advanced boost-pressure with two stage turbocharging allows it to significantly push the gas engine operating range and maintain full output and efficiency at high ambient temperatures or elevations.

Speaking at the press launch, Prady Iyyanki, CEO Gas Engines for GE Power and Water said: "The J624 two-stage turbocharged is a real game-changer, especially for applications in countries with hot and humid conditions. The objective here was to respond to our customers' call for better performance and lower costs."

The existing single-stage turbocharged J624 is a 24-cylinder gas engine with a power output of 4 MW. The new two-stage turbocharger version will increase power density by 10 per cent to give a power output of 4.4 MW. It will also increase electrical efficiency to 46.5 per cent, an improvement of about 1 percentage point. Under hot and humid conditions, GE says the efficiency increase is as much as 2.5 percentage points.

In cogeneration applications such as in industry, under standard conditions efficiency reaches 89 per cent, according to GE.

The dimensions of the new engine are similar to the existing engine, which is a benefit in industrial settings where space can often be an issue.

The operational flexibility, however, has been extended. The standard operation conditions under which there is no need to derate output or efficiency are 500 m above sea level and ambient operating temperature of 30ºC, with 40ºC intercooler water temperature required. With the new engine the new standard conditions at which the engine can operate without derating are 1500 m above sea level and 40ºC ambient temperature.

Required Intercooler water temperature is increased from 40 to 70ºC. Karl Wetzlmayer, Product Line Management Leader at Jenbacher Gas Engines, GE Power and Water commented: "This has an impact on the cooling equipment. Here our customer can save some money on the cost of this equipment. Aside from all this, there is no impact on emissions, start-up times, part-load performance or service intervals."

Outside of the industrial sector, GE believes the new engine opens up a new area in terms of markets. Independent power producers (IPPs) who would normally consider gas turbines can now consider multi-engine installations. It could be particularly well suited to developing countries where the grid is unreliable. In developed countries, they could provide spinning reserve or grid stability services.

Cogeneration, however, will be an important application area. In the EU, the 20-20-20 target is driving technologies that lower greenhouse gas emissions. Cogeneration is one of those technologies. Supported by the EU's Cogeneration Directive, the technology is helping to cut CO_2 emissions by ensuring more efficient conversion of fuel to heat energy.

According to Wetzlmayer, the new engine will save 7000t/y of CO_2. He also said that a customer in Germany would make €50 000/y additional heat sales compared to the current technology. In hotter countries, where the efficiency improvement is more marked, savings in fuel cost would amount to €100 000/y per engine.

Commenting on the new technology Dr Volker Schulte, General Manager of engineering at GE Energy Jenbacher Gas Engines said: "In the past we have always been limited by the turbochargers in the sense that they did not provide enough pressure."

In the beginning GE investigated the idea of using a single-stage, larger turbocharger with a much higher pressure ratio. In the end, however, it was decided that a two-stage unit offered other advantages. Schulte explained: "The biggest advantage is the ability to intercool, which gives a much better thermodynamic efficiency for the turbocharger system. The pressure ratios from a single stage would also run into severe operational limits. These turbo compressors, which have such high pressure ratios i.e. above 6, have very narrow operating windows. They would therefore not be easy to operate. A two-stage system is also better from a cost standpoint, if you consider the additional power density you achieve."

In the two-stage turbocharging system, exhaust gas enters the first turbine and then a second turbine to further extract waste energy from the gas. This drives a second stage where the air is sucked in, compressed and fed to an intercooler. It is then fed to

> With the new engine the new standard conditions at which the engine can operate without derating are 1500 m above sea level and 40ºC ambient temperature

Higher power density: the new J624 gas engine

the second compressor stage and again cooled before being fed back to the engine. Dr Ulf Christian Muller, Head of Turbocharging Solutions at ABB Turbo Systems noted: "The result is that we multiply the overall pressure ratio of the charging system. For example if the low pressure charger charges at a pressure level of 4, and the high pressure charger charges at a level of 2, it delivers an overall pressure level of 8."

Although the two-stage turbocharging is central to the new engine, GE says it is not the whole story. According to the company, it allows a number of other technologies to be introduced for much better performance in gas engines.

"Two-stage technology allows us, for example, to introduce better combustion systems that use much higher pressures. We can now use more advanced technology and materials throughout the engine," noted Schulte.

The first thing GE did was introduce a much more extreme Miller cycle. This is a combustion process used in a type of four-stroke combustion engine that allows a wider operating range. Schulte noted: "This pushes the knocking limits for the engine, which leads to greater efficiency. There is a new crankshaft that has more potential for even higher pressures and therefore higher outputs in the future."

Commenting on other technologies, he added: "There are other elements such as pressure-based control. We can use pressure instrumentation inside the cylinders, which allows us to further optimise combustion. We also recently introduced steel pistons, which increases efficiency and extends component life. This has lifecycle cost advantages. As we move to higher brake mean effective pressures, we will also look at the ignition systems to overcome limits that may be experienced in spark ignited engines."

As part of a new technology introduction programme, GE began working with ABB on developing a two-stage turbocharger about five years ago. "We have these NTI programmes, so that we can validate technology upfront," said Schulte.

Prior to the start of development of the new J624 gas engine, GE installed a two-stage turbocharger on an experimental engine to test the principles of the technology. This was used to validate the operating principles of the turbocharger and other new technologies such as the combustion system before installation in the new engine.

The new engine was developed over a two-year programme.

GE has a careful strategy for bringing new engines to the market. It starts with component and system level pre-development steps to develop particular technology items. This stage is followed by a full engine test at the test facility in Jenbach, Austria. GE has more than 1000 hours on the test stand for the new engine.

The full engine test includes accelerated life testing where the engine is subjected to overload tests under conditions that the sengine would not experience in normal operation. "We try to simulate the whole life of the engine in a 500 hr test," said Schulte.

GE focuses on some key parameters during engine validation. The first, says Schulte, is the performance validation to see if the efficiency levels are as expected.

In terms of thermodynamic combustion development, GE also operates single cylinder engines. It has a development centre in collaboration with the University in Graz, which allows fairly accurate predictions on the efficiency of new engines.

Various functional tests are also undertaken. But perhaps the most important tests are to verify mechanical integrity.

Schulte explained: "We look at the design limits of certain components to identify the design limits and determine the margins in the design. Some of the components are therefore stressed to the limits in the component test and the engine tests. We break some of the critical components such as crankshafts and connecting rods. We have specific rigs where we subject the cranskshaft to loads until they break. Similarly, we cycle the conrods until they break so that we know the design limits."

During the validation tests, GE also looks at components such as seals, the lubrication system and the cooling system. "Sometimes you can find issues there that relate to matching and the durability of the sealing system. These are the things that we try to identify when we have the engine on the development test stand inside the factory," said Schulte.

Following the factory validation pilot engines are then shipped out to site for testing under commercial conditions. The pilot customer for the first engine is Red Harvest, a large Dutch greenhouse plant operator.

Schulte added: "We have four more pilot engines that will be installed in the field. Although the engines will be in a commercial setting, we have the consent of the customer to use the engines for validation. We will therefore have the final durability assessment after one year of operation with these launch customers."

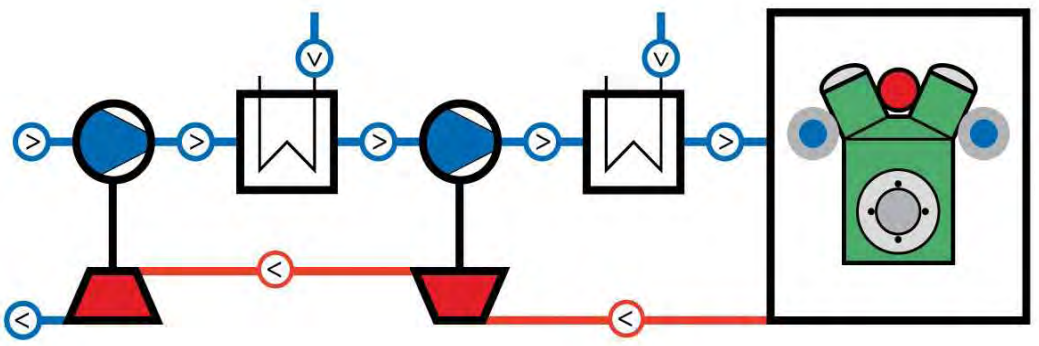
The pilot engines will run almost continuously. "Red Harvest will run the engine for almost 8000 h/year. So we will probably get a minimum operating time of about 6000h per engine," said Schulte.

Successful operation of these pilots will then be followed by a full global release of the engine.

GE says it already has hundreds of requests for the new engine and believes it will soon be a fleet leader in terms of sales numbers.

The new engine will be available worldwide by the summer of 2011.

Two-stage turbocharging concept



Junior Isles

Choking on pragmatism

Taking a practical, realistic approach to problems is often the best way forward. Some will argue that the European Parliament should be commended for its pragmatic thinking in reaching a compromise that resulted in last month's passing of the new Industrial Emissions Directive (IED).

Yet one must question whether there is room for pragmatism when it comes to an issue as important as curbing harmful industrial emissions.

During the first week of July, the European Parliament endorsed a new directive, which it says strengthens pollution limits that industrial installations will have to comply with. Clearer rules and cleaner air are among the aims of the IED, which combines seven existing air pollution directives, including the Large Combustion Plant Directive and the Integrated Pollution Prevention and Control (IPPC) Directive. It obliges around 52 000 industrial and agricultural installations to obtain environmental permits.

The endorsement of the new IED essentially ends a long-running battle between industry, which warned of losses in competitiveness, and environmentalists who argue that cleaning up Europe's industry is a prerequisite for sustainable production.

The 1996 Directive on IPPC introduced a permit system to prevent and limit pollution from large-scale industrial installations. Sectors covered include everything from metals, chemicals and paper to processed food, oil refineries and large-scale pig and poultry farms.

The European Commission initiated an overhaul of the directive in 2007 to address abuses of built-in flexibility mechanisms. It proposed to recast the seven existing air pollution directives into a single law.

In March last year, the European Parliament adopted a first-reading position on the new law. At the time, MEPs called for a 'European safety net' whereby legally binding minimum emission limit values could not be exceeded by any installation in order to avoid widespread exemptions.

Then in June 2009, EU environment ministers reached a political agreement, giving national authorities a transition period for implementing national ceilings for nitrogen oxides, sulphur dioxide and dust.

Faced with stiff opposition from countries such as Britain, Poland and Italy regarding the minimum emissions limit, the Parliament's environment committee dropped the concept of a European safety net in its second-reading vote in May this year.

On 16 June, the EU institutions reached a compromise agreement on the text. Now stricter limits on nitrogen oxides, sulphur dioxide and dust emissions will be introduced from 2016.

Crucially, however, member states will have some flexibility to extend deadlines for power plants or waive the rules for other installations in special cases.

MEPs ultimately agreed that Member states can use 'transitional national plans' to allow large combustion plants (including fossil fuel power stations) up to July 2020 to meet the rules. Some older plants may not have to meet the targets, as long as they close by the end of 2023 or 17 500 operating hours after 2016, whichever happens first. Newer power stations must still meet the 2012 deadline that applies to them.

To receive a permit, installations covered by IPPC rules must apply "best available techniques" (BATs) to optimise their all-round environmental performance. Emissions to air, soil or water, as well as noise and safety are all considered.

In some cases, member states will be allowed to ease the normal rules, as long as a high standard of overall environmental protection is maintained. However, assessments must be provided to ensure the rules are not being circumvented without proper justification. It must be proved that costs would be disproportionate compared to environmental benefits, due to technical reasons or local circumstances.

The revised IED was largely seen as the result of pressure from the British government and energy companies. Britain argued that it faced an energy crunch before large-scale wind farms and nuclear stations came on stream closer to 2020 and that the proposed regulations would lead to the closure of Drax, the UK's largest coal fired plant, and other coal-fired power stations within six years.

David Porter, Chief Executive of the Association of Electricity Producers, welcomed the outcome of the vote on the IED.

He said: "Electricity producers in the UK will be satisfied with the outcome of the debate about the Industrial Emissions Directive. The original proposals would in practice have forced up to one quarter of the UK's generating capacity to close by 2016, requiring a huge and costly construction programme to replace this plant in order to keep the lights on. The flexibility mechanisms now included in the Directive, the transitional national plan and 17 500 hour derogation will allow the UK's older coal and gas plant to be upgraded or retired on a more sensible timescale. Environmental emissions will also be reduced because the running of the plants in question will be restricted."

He said that electricity generation in the UK faces the threefold challenge of maintaining secure electricity supplies and making the transition to a low carbon economy while ensuring competitive prices for the consumer. "A solution to these sometimes conflicting objectives cannot be reached overnight. The timeframes agreed in the IED will go some of the way towards ensuring a measured transition to a low carbon future for the UK, with a mix of technologies for producing electricity."

Porter added: "Some £120 billion of investment in electricity generation is needed over the next 15 years and this vote gives further clarity to the companies needing to take these investment decisions. The UK government must now make sure that national energy policy takes into account the IED, and provides a transparent and consistent policy framework which allows prompt implementation of the Directive."

> "It wasn't possible to achieve more....it is a European tragedy that a number of outdated coal fired power plants will be allowed to pollute for another decade"

While the European Parliament seems satisfied with the outcome, not all appear entirely happy.

Germany's MEP Holger Krahmer, who steered the legislation through Parliament commented: "It wasn't possible to achieve more." He said the compromise is an improvement on existing regulation in terms of environmental protection and creating a level playing field for European industrial areas.

"After more than two years of difficult negotiations we have a compromise that will help to improve the implementation of the directive. Compared to the current situation, this offers more clarity and a better chance of a level playing field across Europe on environmental requirements for industrial installations," said Krahmer.

Notably, however, he added: "It is a European tragedy that a number of outdated coal-fired power plants will be allowed to pollute for another decade. This is also grossly unfair on the member states who took early action to meet the requirements."

The fact that old coal fired plants will be allowed to continue to pollute for another 10 years is the real travesty. NO_x, SO_x and dust represent a major health and environmental hazard, contributing for example to cancer, asthma and acid rain. Chronic respiratory disease is a leading cause of premature deaths in Europe.

In May, Kirsty Clough, a campaigner in the climate change team at the World Wildlife Federation, said the successful lobbying by Britain sent "completely the wrong message" to Europe and the rest of the world about how serious Britain was about moving to a low carbon economy.

Generators may have a valid point in saying they need more time to make the transition to a clean generating portfolio, but unfortunately it is human nature that the more time we have to do things, the longer we take to do them – especially if there is an immediate financial impact. No doubt we will therefore continue to see member states take full advantage of their right to waive rules and extend deadlines.

The European Parliament should take some credit in showing the flexibility needed to reach a compromise and agreeing on what it sees as realistic for the entire EU.

Nevertheless, the simple fact remains that the longer heavily polluting installations are allowed to run, the more the health of the general public will continue to be jeopardised.

Pragmatism cannot only choke sensible political decision-making but also the average man in the street, literally.