WEC 2010 Special
An 8-page pull-out supplement with views from the Montreal World Energy Congress.

Back to the Future
FutureGen leaves Mattoon for a new 2.0 look. Page 2

Final Word
Junior Isles speaks of friends and foes. Page 20

September 2010 • Volume 3 • No 7 • Published monthly • ISSN 1757-7365 www.teitimes.com

THE ENERGY INDUSTRY TIMES

IN BRIEF

New data lends weight to climate debate
US President Barack Obama is still hopeful that comprehensive climate legislation can be passed in spite of major setbacks.
Page 4

Vietnam OK to enrich uranium
The US looks set to give a full nuclear-cooperation proposal to Vietnam despite attempts at obtaining a promise from Hanoi not to enrich uranium.
Page 6

Clear policy will boost investment
The UK must handle the delicate task of balancing energy policy with investment needs in austere times.
Page 9

South Korea hopes for early nuclear deal
Turkey is moving forward with plans to build new nuclear power plants with foreign partners at two sites.
Page 10

GDF Suez boosts International Power
GDF Suez says it will drive its international development in energy infrastructure markets through New International Power.
Page 11

Industry Perspective: Building the corridors of power
A look at ENTSO-E's recently published pilot Ten-Year Network Development Plan.
Page 14

Technology: Alkaline fuel cells have landed
The first hydrogen fuel cell to be successfully trialled with underground coal gasification uses a technology that has its roots in space flight.
Page 19

German utilities willing to pay to keep nukes open

Germany's plans to impose a nuclear tax next year and close nuclear plants by 2021 look less certain as utilities offer to share their profits with the government, says **Junior Isles**

Johannes Teyssen: CEO of E.On AG

German utilities are willing to give the German government a share of their profits in return for keeping nuclear plants open for longer. The government confirmed that it is in talks with the four utilities that own the nuclear plants.

RWE CEO Juergen Grossmann told the *Bild* newspaper: "We are proposing to hand over half of our additional profits from longer nuclear plant production times to the government." Experts have estimated additional profits for all of Germany's 17 nuclear power plants at around €4-5 billion ($5-7.7 billion) a year.

The utilities are also proposing that the annual payment would replace government plans for a tax on nuclear announced earlier this summer. News of the tax, expected to bring in €2.3 billion a year from 2011, prompted fierce opposition by the energy companies. German media have reported the utilities might offer up to €30 billion if the government cancels the fuel tax.

Government spokesman Steffen Seibert said it is essential for the government to generate the tax's expected annual income but "the form of payment is being debated".

A study by Landesbank Baden-Wuerttemberg analysts found last year that 10 years of additional production time are worth up to €38 billion to the utilities; an additional 25 years could amount to €200 billion in extra profits and additional shareholder value, according to that study.

Speaking to the *Bild* last month, Johannes Teyssen, CEO of E.On AG said the utilities themselves demand "a solid two-digit number of additional years, in any case no less than 15 years".

Grossmann said clarity about nuclear energy's future in Germany and its integration in a viable energy concept is "urgently needed for our long-term investment plans".

Nuclear energy has long been unpopular in Germany, where the shutdown plan was drawn up a decade ago by a centre-left government.

Chancellor Angela Merkel's centre-right coalition wants to extend the lives of some plants beyond the 2021 closure date until more energy from renewable sources is available. However, it has been unable to reach a conclusion on how much longer they should be allowed to run.

While Environment Minister Norbert Roettgen is lobbying for a "moderate" extension of up to eight years, others in Merkel's conservative Christian Democratic Union want to add as much as 20 years to the plants' lifetime.

It also is unclear whether extending their lives would need approval from parliament's upper house, where the government lacks a majority. Opposition parties strongly oppose prolonging the plants' lifetime.

There is no political appetite for building new nuclear plants in Germany. Merkel has said she views nuclear power as a "bridging technology" pending work on

Continued on page 2

Bushehr heralds start of new nuclear programme

With Iran's nuclear power plant at Bushehr preparing to start generating electricity, Iranian officials say they are now ready to expand their civil nuclear power programme.

"Based on the parliament's approval we need to build new nuclear power plants to supply the country's electricity needs and the countries which are ready to build and launch the plants can step into this lucrative and important market under an international competitive atmosphere," Iranian Foreign Ministry Spokesman Ramin Mehman-Parast said during a press briefing in Tehran last month.

The Russian-built Bushehr plant has been put through major experiments over the last nine months and on August 21st, fuel was transferred into the main building of the power plant in a ceremony attended by senior Iranian and Russian nuclear officials. According to Iranian officials, warm tests have now been successfully completed.

Mohammad Ahmadian, Managing Director of Iran's Atomic Energy Generation and Development Company, a company affiliated to Atomic Energy Organization of Iran (AEOI) said: "We are completing this [warm] test and we can enter into the operational phase." Electricity generation is scheduled to begin in December.

Now the country is looking to further increase its nuclear generating capacity and has informed the International Atomic Energy Agency (IAEA) that it plans to build 20 nuclear plants to provide power to the growing Iranian population. It is now inviting the international community to build these plants.

Last month Iran's Foreign Ministry said it would "cooperate with any company from any country capable of building such facilities to a high standard". It specifically stated that US companies would be invited to participate in the bidding process.

The news comes as a surprise considering the ongoing standoff between Iran and the US over Iran's nuclear programme. The UN Security Council has already passed four sets of sanctions over Iran's nuclear programme on suspicions it is being used to produce weapons. Iran denies the accusations, saying its programme is geared toward generating electricity.

The UN Security Council imposed a fourth round of sanctions against Iran in June after the country did not accept a UN-backed plan to swap low-enriched uranium for uranium fuel rods needed for an Iranian medical research reactor.

The US indicated it would not oppose Iran's plan to operate its first nuclear plant, a shift from its previous position of firmly opposing the plant.

"We recognise the Bushehr reactor is designed to provide civil nuclear power and do not view it as a proliferation risk," a US State Department official said, noting that the reactor will be under safeguards of the International Atomic Energy Agency and that Russia is supplying necessary fuel while taking back the spent fuel, which would be the principal source of proliferation concerns.

The policy change apparently reflects Washington's compromise for Russia, which cooperated in adopting the US-led sanctions in June.

"Russia's support for Bushehr underscores that Iran does not need an indigenous enrichment capability if its intentions are purely peaceful," the official said.

"We expect Iran to meet the established international norm and practice to ensure the safe operation of the reactor and full safeguard monitoring by the IAEA," she said.

The official also said that this US position on the Iranian reactor "should not be confused with the fundamental concerns with Iran's overall nuclear intention."

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)

renewable energy.

Seibert said the government will not announce before the end of September how much additional production time the nuclear power plants will be granted. That decision will be part of a "comprehensive energy concept" that will define which energy sources – nuclear, fossil, or renewables – Germany will rely on in the future.

Germany's opposition parties are strongly against the government striking a deal with the utilities rather than setting the new production times by law and imposing the new tax.

The utilities, meanwhile, say the tax would impact their future energy strategy. RWE said in a statement that, "in view of the growing political risks and burdens," it will have to review medium-term goals announced in February that include at least matching the previous year's dividend for each year through 2013, as well as its investment plans.

Grossman criticised the nuclear fuel tax saying it would hurt earnings and investment in green technologies. He said: "Such a tax would substantially diminish our earning power – and thus our financial scope for investment in renewables, low-carbon power stations and smart grids. We'll consider which investments still make sense.

He added: "Possibly we will tighten the screws internally and raise our hurdle rates."

Teyssen estimated that a nuclear tax would have an impact of between €1.3 billion and €1.5 billion per year on his company's results and said it would consider legal action if the levy is introduced.

Power Feedback

Planning is easier with the lights on

Sir, In response to your *Final Word* last month *(Choking on Pragmatism, August 2010)*, it is entirely reasonable for electricity producers to seek a measured transition to meet new environmental standards.

In the face of massive uncertainty arising from the mix of political objectives, the industry must try to raise billions of pounds to replace ageing plant, meet EU renewable energy targets and pursue the low carbon agenda.

But, this takes time. Fossil fuel accounts for about 75 per cent of the UK's electricity production. 12 GW of plant will certainly close by the end of 2015 under the Large Combustion Plant Directive. We must wait for the Industrial Emissions Directive to be transposed into national legislation before we know how much more installed capacity may shut and when.

We do know, however, that planning for lower emissions is much easier with the lights on.

Yours faithfully,
David Porter
Chief Executive, Association of Electricity Producers
United Kingdom.

China makes progress on tackling emissions but struggles on energy use

While China's efforts to meet its carbon intensity target will be boosted by plans for an emissions trading scheme and a reduction in emissions from coal fired plants, it is having difficulty reducing energy intensity. **Junior Isles**

China appears to be making a serious attempt to stick to its carbon intensity targets with plans to introduce an Emissions Trading Scheme (ETS) under its next Five-Year Plan (2011-2015). However, it seems to be falling short on its target for energy use.

The ETS will help the world's largest emitter of greenhouse gases to hit its national 2020 carbon intensity target, which includes reductions of 40-45 per cent from 2005 levels. Although details are yet to emerge, it is possible that the ETS will only target carbon-intensive sectors such as coal-fired power generation.

By capping emissions in various industry sectors and putting a price on carbon, participating companies will be incentivised to invest in renewable energy and energy efficiency technologies in order to reduce the cost of compliance, thus raising national clean energy investment levels. The scheme will be independent of international negotiations regarding climate change.

China has already been clamping down on its dirty industry. In late July the government said that it had met its annual target to close outdated coal fired power generating capacity of 10 GW. A total of 468 generators with a generating capacity of 10.71 GW had been closed by July 15, said an official with the National Energy Administration.

The realisation of the goal, two months ahead of schedule, also meant the authorities had eliminated 70.77 GW of small-scale, outdated power capacity during the 11th Five Year Plan period from 2006 to 2010, the official said.

The generators would have consumed 81 million tonnes of coal, while emitting 164 million t of carbon dioxide and 1.4 million tonnes of sulphur dioxide annually if they were not decommissioned.

The country has also been working hard to change its generating mix. Last month it announced that it invested $34.6 billion in renewable energy industry in 2009, making the country the biggest investor in the industry in the world.

Its installed capacity of wind power is expected to hit 40 GW in 2010, and 100 GW by 2015, said Li Junfeng, deputy director of the Energy Research Institute of the National Development and Reform Commission.

However, cutting energy consumption has been an uphill struggle. The newly released half-year evaluation reports on energy consumption per unit of gross domestic product (GDP) shows that energy intensity increased by 3.2 per cent in the first quarter of this year.

The Chinese government has promised to cut the country's energy consumption by 20 per cent per unit of GDP in the 2006-2010 period.

Although the past four years have seen the national energy intensity figure fall steadily, the recovering economy disrupted the positive trend, according to the National Bureau of Statistics. At the end of 2009 China had reduced its energy intensity by 15.6 per cent from 2005 levels.

Revised FutureGen seeks sequestration site

- New plant to use oxy-combustion
- Project to receive stimulus funding

The future of the FutureGen project originally planned for Mattoon, Illinois, USA, once again looks uncertain after the town of Mattoon withdrew completely from the project following an abrupt revision of plans by the US Department of Energy.

It was originally planned that Mattoon would host a new coal fired plant featuring carbon capture and storage.

At the beginning of August, Mattoon and the FutureGen Alliance learned that the DOE now plans a $1.2 billion project known as FutureGen 2.0 to retrofit a coal-fired plant owned by Ameren Corp. in Meredosia, 120 miles west of Mattoon. It was hoped that even though the project had moved, Mattoon would still be used to store carbon dioxide generated from the new site.

"While we regret Coles County's decision not to participate in this first of its kind carbon capture and storage project, the Mt. Simon geological formation extends over much of downstate Illinois and offers many other possible locations for storage," said James Markowsky, Assistant Secretary for Fossil Energy at the Department of Energy.

The new plant would use an oxy-coal carbon capture technology developed by Babcock &Wilcox in collaboration with Air Liquide. The oxy-coal combustion process uses oxygen instead of air during combustion, producing flue gas composed of nearly pure CO_2, which is suitable for compression and storage.

FutureGen 2.0 includes $1.1 billion in federal stimulus money that would supplement the construction and operating costs of the 200 MW plant. The DOE says it needs to finalise revisions by September 30 to use the stimulus funds.

The new project is designed to capture and store approximately 1.3 million tons of CO_2 each year, or 90 per cent of the plant's CO_2 emissions.

Mattoon was chosen in December 2007 as the site for the original project. The DOE and FutureGen Alliance, a group of coal mining companies and other firms, planned to build a 275 MW power plant which would have tested a different technology to burn coal before capturing and storing the carbon.

The latest announcement continues the roller coaster history of the project, launched by the George W. Bush administration in 2003 only to be cancelled five years later after cost overruns. The project's backers had anticipated that the arrival of President Barack Obama, a one-time Illinois senator who has vowed to limit carbon dioxide emissions associated with global warming, would advance the clean coal plant. In late 2008, the group bought a 400-acre site for $7 million.

The optimism gave way to disappointment and anger when the DOE announced it had backed out of the plan and would instead use Mattoon as a storage site. The decision raised questions about the use of the $1 billion awarded by the US government along with the $200 million that companies had planned to invest for the new project.

Kyoto 'sustainable' policy promotes coal

The decision to subsidise new coal-fired plants in India and China under the Clean Development Mechanism (CDM) raises serious concerns about the framework's environmental integrity and the legitimacy of its contributions to sustainable development, according to industry analysts Datamonitor.

The UN CDM Board's recent controversial decision to allow efficient coal-based power plants to partake in the scheme resulted in the registration of the first project by India's Adani Power, which will see two new and more efficient supercritical 660 MW coal-fired units commissioned in 2010-11.

Datamonitor says with certification of Adani Power's project, the UNFCCC has sent a signal to the carbon market, which has resulted in the submission and re-submission of numerous coal power project applications with installed capacities that run in the several hundreds and thousands of megawatts.

The decision provides an incentive for some of the world's largest carbon emitters to burn and keep burning fossil fuels, albeit more efficiently, instead of transitioning to more expensive renewables. It is against this backdrop that CDM Watch – an initiative of international NGOs that provides an independent perspective on CDM projects, methodologies and the work of the CDM Executive Board – has claimed that all coal projects under validation within the CDM do not actually reduce any emissions and that CDM coal power projects "violate" the Kyoto Protocol.

The CDM is a project-based flexible offset framework under the Kyoto Protocol that makes it possible to earn credits for emission reduction projects in developing nations. It has two main goals: to help developing nations achieve sustainable development, and to provide industrialised nations with the flexibility to meet their emissions reduction targets in the most cost-efficient manner.

By widening the CDM to include advanced coal power plants in countries that are principally dependent on coal powered generation, the UN has drastically widened the sphere of the CDM's influence.

Datamonitor says the UN's decision to allow advanced power plants to be partly subsidised by the developed West under the CDM (subject to certain limitations and safeguards), is tantamount to parties of the UNFCCC treaty – whose overriding objective is the stabilisation of atmospheric greenhouse gas concentrations – having control of one of the world's largest sources of funding for new coal power.

New data lends weight to climate change debate

NOAA report says warming is "unmistakeable"
EPA denies petitions

US President Barack Obama is still hopeful that comprehensive climate legislation can be passed in spite of major setbacks in Congress.

Senate Democrats have abandoned plans to introduce a bill that would cap emissions of greenhouse gases, favouring instead a narrower measure that deals with the Gulf oil spill and energy efficiency.

Obama, however, has said that he intends to keep pushing for a broader energy bill that tackles climate change.

Obama's continuing support for climate change legislation was underpinned last month with the release of a report that appears to inject fresh evidence into the debate over global warming.

The report, released by the US National Oceans and Atmospheric Administration (NOAA), says that the scientific evidence that the world is warming is "unmistakeable". It is based on "comprehensive data from multiple sources" and "confirms that the past decade was the warmest on record and that the earth has been growing warmer over the last 50 years", according to the NOAA.

The report lends weight to arguments made by the scientific community that the world is warming and that action needs to be taken to reduce greenhouse gas emissions. Such claims have been refuted by climate sceptics and were brought into question in the recent "Climategate" controversy.

US President Barack Obama: still hopeful that comprehensive climate legislation can be passed

Last month also saw the US Environmental Protection Agency step up its plans to control greenhouse gas (GHG) emissions by proposing two rules to ensure that businesses planning to build or extend new facilities will be able to obtain Clean Air Act permits that address their GHGs. In July the EPA also denied ten petitions that challenged its 2009 determination that climate change is real, is caused by human activity, and threatens human health and the environment.

"It is time to move beyond this year's contrived controversies over climate science," said Eileen Claussen, President of the Pew Center on Global Climate Change. "EPA's action … makes it clear that the scientific case demanding action to reduce greenhouse gas emissions is compelling and that the costs of inaction continue to grow larger."

The NOAA report used data from more than 300 scientists from 160 research groups in 48 countries and has defined ten measurable features that can be used to gauge global temperature changes.

"For the first time, and in a single compelling comparison, the analysis brings together multiple observational records from the top of the atmosphere to the depths of the ocean," said Jane Lubchenco, Ph.D., undersecretary of commerce for oceans and atmosphere and NOAA administrator. "The records come from many institutions worldwide. They use data collected from diverse sources, including satellites, weather balloons, weather stations, ships, buoys and field surveys.

"These independently produced lines of evidence all point to the same conclusion: our planet is warming."

Wind reports highlight emerging challenges

First-half 2010 installations down 70 per cent
Installation costs remain high

Two new reports indicate that the pace of growth in the US wind sector is slowing due to economic conditions and legislative uncertainty.

According to both the American Wind Energy Association (AWEA) and the US Department of Energy (DOE), 2009 was a record year for the wind farm market, with wind plants accounting for 39 per cent of all new US electric generating capacity.

But new reports from both organisations show that factors such as installation costs, low natural gas prices and uncertainty over climate legislation are likely to impact the pace of growth.

According to a mid-year report from AWEA, only 1200 MW of new wind capacity was added in the first half of 2010 – down 70 per cent on 2009. Manufacturing investment is also continuing to lag below 2008 and 2009 levels, says AWEA.

The key cause of the slowdown is the lack of support in Congress for a national renewable electricity standard (RES), according to AWEA. Failure to implement such a policy will lead to continuing boom-and-bust cycles in the US market and will result in a loss of global manufacturing market share to Europe and China.

AWEA has predicted a more active second half to 2010 but estimates that at best, 2010 installations will be 25-45 per cent below 2009 levels. It also says that beyond 2010 there is a "dramatic drop" in the project development pipeline.

Some 10 GW of new wind capacity was added in the US in 2009.

Power purchase agreements for new projects are difficult to obtain due to the drop in electricity demand, lower natural gas prices and the absence of a clear national renewable energy policy, says AWEA.

According to the DOE, wind power projects installed in 2009 reported installed costs had a capacity-weighted average of $2120/kW, which marked a nine per cent average increase from the weighted-average cost of $1950/kW for projects installed in 2008. Its report says that these costs will eventually fall but will remain high in the short-term as developers work through the backlog of turbines purchased at peak prices in early 2008.

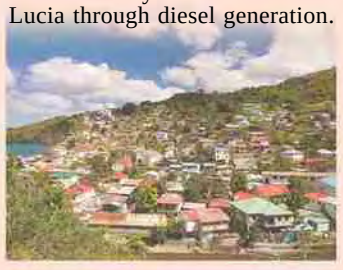
St Lucia licenses geothermal resources

US firm Qualibou Energy is to boost energy resources on St Lucia after signing a binding agreement with the government of the Caribbean island.

Qualibou is to develop up to 120 MW of geothermal energy on the island from proven steam resources in three phases. The first phase will consist of a 12 MW plant exploiting an existing reservoir while the second phase will add a 63 MW expansion.

Phase three will take the total plant size to 120 MW. A total of 50 MW of the plant's capacity will be transmitted to nearby Martinique via a submarine cable.

St Lucia has a peak electricity demand of 56 MW and St Lucia Electricity Services Limited (Lucelec) currently generates all of the electricity consumed on St Lucia through diesel generation.



Iberdrola targets Brazilian wind market

Iberdrola Renovables is aiming to become a major player in the growing Brazilian renewable energy market through a new agreement with Brazilian energy company Neoenergia.

The Spanish firm, whose parent company, Iberdrola Group, owns a stake in NeoEnergia, says that the two companies could eventually form a 50-50 joint venture. They will bid together on tenders issued by Brazil's energy agency ANEEL.

Iberdrola Renovables currently has one wind farm in Brazil with an installed capacity of 49 MW. Installed wind power capacity currently stands at around 700 MW, according to the Global Wind Energy Council, which has called Brazil's wind energy market "a sleeping giant".

In late 2009, ANEEL held its first wind-only auction and awarded developers the rights to 1800 MW of wind power capacity. Further auctions, namely the Reserve Power and A-3 auctions, were scheduled by ANEEL for late August 2010.

Iberdrola and Neoenergia say that they can leverage their respective strengths and experience – Iberdrola as the global wind energy industry leader and Neoenergia as the largest power distributor in northeast Brazil – to drive growth in "one of Latin America's most promising wind energy markets".

Areva's Brazilian bioenergy specialist unit Koblitz is to modernise ten cogeneration units located at Sugar refineries in northeastern Brazil.

Beacon closes Stephentown financing

Two key projects are moving forward in the US with the aim of demonstrating the ability of energy storage systems to stabilise and enhance the performance of the electric grid.

Beacon Power Corporation has closed the financing for a 20 MW flywheel energy storage plant that is under construction in Stephentown, New York, while Princeton Power Systems says that it will soon begin construction on an advanced solar-battery hybrid plant in Princeton, New Jersey.

Beacon's Stephentown project is the first of its kind in the world and will provide frequency regulation services for the New York power grid. The flywheels will "absorb" excess energy in the grid, store it as kinetic energy in a matrix of flywheel systems and then inject it back into the grid when needed.

The $69 million, 20 MW energy storage plant is due to be completed in early 2011 and will provide approximately ten per cent of New York's total frequency regulation capacity on a typical day. Beacon is also developing two more 20 MW flywheel systems – one in the PJM grid system and another in Glenville, New York.

Princeton's $1.5 million plant will consist of a 200 kW solar array and a 200 kWh lithium-ion battery storage system. The installation will demonstrate advanced smart grid functionality including microgrid operation, demand response, frequency regulation, and power dispatch.

Beacon has financed its Stephentown project with the help of a $43 million loan guaranteed by the US Department of Energy. Beacon has contributed $26 million in equity to the project.

Vietnam to win full US blessing as SE Asia turns to nuclear

Vietnam's imminent victory in negotiations with the US for the right to enrich uranium under its civil nuclear power programme could be significant, as other Southeast Asian countries turn towards nuclear. **Syed Ali**

The US looks set to give a full nuclear-cooperation proposal to Vietnam despite attempts at obtaining a promise from the Hanoi government not to enrich uranium. The likely final agreement comes as several other countries in Southeast Asia are turning to nuclear to meet increasing power demand.

The US had sought a no-enrichment pledge, which the State Department promotes as the "gold standard" for civilian nuclear cooperation accords.

It would have been modelled on a deal last year in which the United Arab Emirates pledged, in return for US nuclear equipment and reactors, not to enrich uranium or extract plutonium from used reactor fuel – procedures that would provide material that could be used in a nuclear weapon. The Obama administration has been eager to send out a strong non-proliferation message.

Asked if the US would agree to a deal that would allow Hanoi to keep its right to enrich, State Department spokesman P. J. Crowley said: "If a country decides to pursue nuclear energy, and a country decides that it chooses to enrich on its own soil, then we would prospectively work with that country" to make sure its programme would meet all international safeguards and work with the International Atomic Energy Agency.

Vuong Huu Tan, director of Vietnam Atomic Energy Institute, said "Vietnam does not plan to enrich uranium, which is a very sensitive issue."

The US and Vietnam signed an agreement in March meant to pave the way for US companies to help build nuclear power plants. The countries are now negotiating a broader deal that would allow US companies to enter Vietnam's nuclear power sector.

The final agreement could set the benchmark for further deals in southeast Asia where both Indonesia and the Philippines recently indicated a strong interest in nuclear power.

In July Philippines Energy Secretary Jose Rene Almendras said his office had "almost" finished studying a proposal to build a nuclear power plant. "We have to seriously, very seriously consider that [use of nuclear power] for the very long term," he said.

Reviving the mothballed Bataan Nuclear Power Plant, which was erected during the time of then-President Ferdinand Marcos, could not be considered because it would be very costly, President Benigno Aquino III said earlier.

Meanwhile, Indonesia's government recently selected the Bangka Belitung province as the location to develop the country's first nuclear plant with a capacity of 2600 MW.

State utility PLN says it will build the plant, although nuclear energy is not included in the power procurement plan of PLN set until 2019. PLN also says it would be ready to buy nuclear power if there is an investor that wants to invest in a nuclear power plant in the country.

Increasing renewables will not cost India

India can afford the cost of raising the share of renewable energy in national power output to 10 per cent by 2015 from under 4 per cent today, according to a new report by ratings firm Crisil Infrastructure Advisory.

A so-called national action plan on climate change recommends India should generate 10 per cent of power from solar, wind, hydro power and other renewable energy sources by 2015, and 15 per cent by 2020. But the high production cost and its effect on state power utilities' budgets is viewed as a deterrent.

The report assesses the renewable energy potential of states, the renewable energy purchase obligations of state utilities and its impact on tariffs. It says the additional costs will be minimal. "The maximum impact for any state would be 4.2 paise a unit in 2011, which would go down to about 1 paisa by 2015," it said.

The report comes as The Indian Oil Corporation (IOC) is looking to diversify into the renewable and nuclear energy sectors, and has earmarked $430 million for investment over the next five years.

IOC is looking to develop wind, solar and tidal energy for commercial sale of power. IOC is also looking to form a joint venture with the Nuclear Power Corporation of India to take full advantage of investment opportunities resulting from the India-USA nuclear deal.

S Korea to set out GHG reduction plan

South Korea will establish a comprehensive greenhouse gas (GHG) reduction plan by March next year.

The Ministry of Knowledge Economy said it will create a special energy conservation and greenhouse gas reduction committee that can set up policy goals and plot a course for future research and development (R&D) efforts.

"Overall costs associated with making cuts and R&D projects that can receive support will be prepared by November with public hearings to be held in the following months to ensure that all interested parties are involved in the process," a ministry official said.

Once the plan is established, sector-specific blueprints to reduce greenhouse gas emissions will be made to help Seoul meet its pledge to voluntarily contribute to curb global warming, he added.

Seoul pledged in late 2009 that it will reduce GHG emissions by 30 per cent from its 2020 'business-as-usual' (BAU) level. Making cuts compared to a BAU forecast does not necessarily translate into overall output reductions, but it does call for concerted efforts to burn less fossil fuels.

Philippine generators eye partnerships in power expansion

Philippines power distributor Manila Electric Co. (Meralco) and diversifying conglomerate San Miguel Corp are both looking at forming partnerships to build generating assets to help combat the country's power shortages.

Meralco is hoping to select a partner for its initial foray into the power generation business towards the latter part of the year, a top company official said.

Meralco first vice-president and treasurer Rafael Andrada told reporters that it is already in talks with a number of parties that have signified an interest to partner with them.

To ensure the stability of its power supply, Meralco is eyeing the construction of up to 600 MW of power facilities in the near term as the company moves towards the generation side of the business.

Andrada said those who have access to fuel and technology and long-term financing would have the advantage. He declined to name the interested companies, saying talks are in preliminary stages.

"We hope to make announcements before the end of the year. We're looking for partners that will bring substantial value to the table," he said.

He, however, pointed out that while Meralco is keen on partnering with existing power generation companies, it would still take a majority position.

"Everyone is talking to us. We're looking at power generation assets that would fit into our objective of lowering prices in the future. At the moment, coal would be the most competitive among other fuels available for power generation but there is also potential for LNG (liquefied natural gas)," Andrada said.

Meralco earlier disclosed plans of initially acquiring a stake in existing power plants to handle its short-term requirements and eventually putting up its own greenfield power plants as possible new sources of electricity.

Meanwhile, San Miguel Corp. is in talks with Korea Electric Power Corp. (Kepco) on a possible partnership over its planned coal fired power projects in Mindanao.

According to Kepco Philippines president and chief executive Bok-Yull Lee, the company was interested not only in investing in hydropower projects in Mindanao, but also in the proposed mine mouth coal projects on the island.

"That's why we are talking to San Miguel on a possible partnership. They have the money but they may not have the technology, so Kepco is interested in providing cutting-edge technology," Lee said.

The government estimates that Metro Manila and some provinces in Luzon might experience power shortages by 2013 should there be no facilities put up in the coming years.

The Department of Energy earlier said Luzon needed additional generating capacity of 11 900 MW from 2010 to 2030. However, committed power projects for Luzon during the period are estimated to generate only 600 MW.

Lopez-owned Energy Development Corp. (EDC), the leading renewable energy developer in the country, recently said it is lining up Pesos 67 billion ($1.48 billion) worth of new and expansion projects in the next six years, the company's top executive said.

The projects will see EDC increase its capacity to 1542 MW from 1116 MW over a five-year period starting 2011.

Thailand generators branch out

PTT Group is conducting a feasibility study on integrating all its power units to streamline its generating business before branching abroad. "This is in line with PTT's investment plan," Surong Bulakul, CEO of Thai Oil, a PTT unit, said.

Bringing all power units into one entity would reduce costs and redundancies and enhance the group's standing in dealing with authorities, he added.

Under Thai Oil, Thai Oil Power is also preparing to join the Energy Ministry's next round of small power producer (SPP) bidding, which is aimed at securing an additional supply of 2 GW.

Ratchaburi Electricity Generating Holding Plc, Thailand's biggest private power producer, also said it plans to join the upcoming auction by the Energy Ministry for the SPP programme.

This will be the first time that Ratchaburi is joining bidding for the SPP programme. It hopes to win about 400 MW from the scheme. Under the programme, private investors build small cogeneration plants and the output is sold to industrial manufacturers.

Ratchaburi sees the potential in the industrial sector and wants to expand capacity by about 2000 MW to 7800 MW by 2020, said Ratchaburi president, Noppol Milinthanggoon. The capacity addition will be through the acquisition of up to 10 overseas power plants.

n GE Energy has teamed up with the German wind-farm developer Pro Ventum to invest in wind power projects across Southeast Asia, starting with the Baht 5.8 billion ($185 million) wind farm in Thailand's northeastern province of Chaiyaphum

Bangladesh capacity boost

Summit Power Ltd, one of the country's fastest growing power generation companies, has partnered with GE Energy to boost its electricity generation by at least five times to 1667 MW in the next five years.

"We have signed a memorandum of understanding (MoU) with the US-based GE which has agreed to join us in our future combined cycle electricity generation projects," Summit Power Chairman Muhammed Aziz Khan said.

The deal follows the signing of a 35-year power transmission deal between state-run Bangladesh Power Development Board (BPDB) and Power Grid Corporation of India Ltd (PGCIL) for the import of 250 MW of power.

The agreement keeps the provision for Bangladesh to export power to India in the future while PGCIL was tasked to construct, own, operate and maintain a 400 kV double-circuit line to exchange 500 MW power between the two neighbouring countries.

Bangladesh currently faces electricity deficit of over 1500 to 1800 MW on an average against the de-rated capacity of 4500 MW in 132 state run and private units. The government has committed to add an additional 9426 MW of electricity by 2015.

Clear policy will boost investment, say business leaders

The UK's new government must handle the delicate task of balancing energy policy with investment needs in austere times.

Siân Crampsie

The UK government has come under fire from business leaders who are concerned that a lack of clarity on energy policy will undermine investment.

The Confederation of British Industry – a leading UK business organisation – has called on the government to deliver key energy and planning reforms within six months or risk undermining emissions targets and energy security.

The move has heightened the debate in the UK – and in Europe as a whole – about how the investments that are required to meet emissions and energy security targets can be achieved in the current economic climate. It came just a week after the release by the government of its first annual energy statement outlining plans for energy policy for the next 40 years.

The CBI has warned that without more clear energy policy, the UK could lose up to £150 billion of private sector investment in low-carbon infrastructure. Uncertainty about the planning regime in particular is making energy investors nervous about committing to new projects.

The organisation has also criticised a call made recently by the UK, French and German governments for a toughening of EU emissions targets, and has voiced concern about the strong focus on renewable energy and a lack of focus on the new nuclear build projects.

"Investors are very worried that we are not seeing the same push from the government on nuclear new build," said Dr. Neil Bentley of the CBI during an interview on BBC Radio 4. "We need to sort out the planning system … this is the biggest issue that many investors tell us is worrying them. Timely decisions need to be at the forefront of ministers' minds when they are thinking of planning reform."

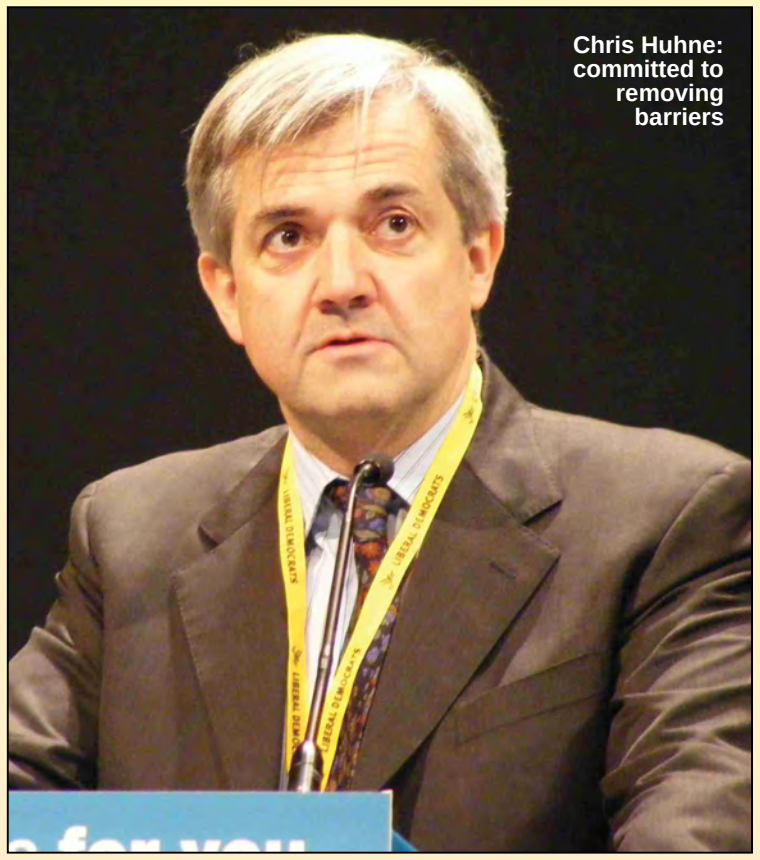
The CBI says it has identified 37 power projects in the UK that the new government has inherited that have still not received planning consent.

"The Government must get a grip on planning," said Bentley. "We need to build new low-carbon energy sources, including wind, biomass, gas, nuclear and clean coal plants. These are essential for securing our energy supplies and meeting emissions targets."

The new coalition government recently announced plans to scrap the Infrastructure Planning Commission and hand back final decision-making powers on key infrastructure projects to government ministers.

Other areas of concern highlighted by the CBI include uncertainty on plans for electricity market reform, slow progress on clean coal and nuclear power and the high cost of renewable energy.

The government is planning to hold a consultation and publish a white paper in early 2011 covering issues such as electricity market reform, carbon prices, feed-in tariffs and the renewables obligation. It is also planning to examine the effects of energy policies on energy bills.



Chris Huhne: committed to removing barriers

UK Energy Secretary Chris Huhne has stressed that the "era of cheap, abundant energy is over" and says that electricity is set to play an increasingly important role in the economy. He is expecting the private sector to drive the "low carbon revolution".

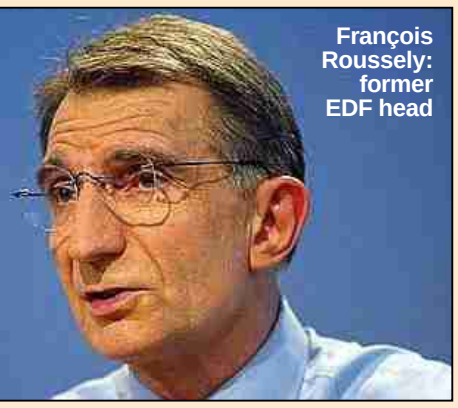
On nuclear power, Huhne says that the government is committed to removing barriers to investment. "What investors are looking at now are that the oil and gas prices are likely to be high and volatile and carbon prices will also be high," said Huhne. "We have made a commitment to consult on a carbon price floor … which we will be doing this autumn. Add all these together and there is a very strong signal that we are going ahead with new nuclear."

Some investors are sceptical of the Conservative-Liberal coalition government's commitment to new nuclear.

The Liberal Democrats have historically been opposed to nuclear power and campaigned against it during this year's election campaign. They favoured instead more investment in energy efficiency and renewable energy.

France considers nuclear shake-up

- EDF could increase Areva stake
- Li Ka-Shing buys EDF Energy Networks



François Roussely: former EDF head

The French government's ambitions for the country to become a leading player in the international nuclear power market could lead to a tie-up between its two main nuclear "champions", EDF and Areva.

A report commissioned by the French government to investigate the organisation of the country's nuclear industry says that a new strategic partnership between the two firms is essential if they are to win new overseas nuclear power plant contracts.

The government is already in the process of negotiating with industrial investors and financiers over the sale of a 15 per cent stake in Areva and has said that it is considering raising EDF's stake in Areva from 2.4 to seven per cent.

Such a deal would see EDF take the lead in "team France" when competing for overseas nuclear contracts, but would also require relations between the management of the two firms to improve.

The report, led by former EDF head François Roussely, was commissioned following the defeat last year of France's EPR reactor technology by a South Korean consortium in a $20 billion nuclear tender held by Abu Dhabi's government.

Roussely's report came as EDF posted a plunge in profits for the first half of the year. A large chunk of the decline was due to a €1.1 billion provision for risks related to a proposed nuclear power project in the US.

It has, however, announced a deal to sell its UK networks business, EDF Energy Networks, to Asian billionaire Li Ka-Shing for £5.8 billion ($9.1 billion).

Mr Li's (CKI) and , in which CKI has a 39 per cent stake, have teamed up to buy EDF Energy Networks. The deal is the first big transaction for EDF CEO Henri Proglio and will cut EDF's huge levels of net debt.

The sale price was also higher than analysts expected given regulatory uncertainties in the UK market and the general financial environment.

EDF is also facing turmoil in its home market due to electricity market reforms and a rising wage bill. The utility is under pressure to improve the performance of its 58 nuclear power plants in France.

Areva has posted strong first-half results thanks to the sale of its transmission and distribution division to French firms Alstom and Schneider Electric. It posted net profits of €843 million for the six months ended June, up from €161 million a year earlier.

However it booked hundreds of millions of euros in new charges for delays in building the first of its new EPR reactors for TVO in Finland. The project is years overdue and €2.6 billion in the red.

The sale of a 15 per cent share in Areva will help the group to cut debt and raise capital for expansion in the global nuclear power plant market.

HVDC HTS on the cards

Cable firm Nexans says it has made an important step forward in the development of underground high voltage direct current (HVDC) high temperature superconductor (HTS) technology with the completion of successful tests at its laboratory in Germany.

The voltage tests were carried out on what is the world's first 200 kV HVDC HTS power transmission cable, which could in the future be used to transfer bulk power at gigawatt levels.

The tests included operating at a voltage of 360 kV, representing 1.8 times the 200 kV operating voltage, over several hours. In addition the system was successfully submitted to superimposed overvoltages such as the ones occurring during lightning or switching events.

Nexans says that the next step is to adapt this HTS cable system to the very high currents (up to 12 500 A) required to transfer several gigawatts of power in order to take full advantage of the low-loss power transmission capabilities of HTS cables. Nexans will also develop suitable joints to enable the installation of long lengths of HTS cable as well as for repairs.

White paper proposes development zones for Ireland

The creation of several development zones in the seas around Ireland would enable the country to achieve a 500 MW target for wave and tidal energy capacity by 2020, according to a new report.

The Marine Renewable Industry Association (MRIA), which represents Ireland's wave and tidal energy industries, says in a new white paper that the government's target is achievable, but will require "a major coordinated effort across all government departments and agencies".

The white paper proposes the creation of four initial development zones (IDZs) around the coast in which development efforts should be focused. These should be located east of Wicklow, off West Clare, off northwest Mayo and off Kerry's Dingle peninsula.

The cost of producing the devices capable of meeting the 2020 target will be at least €1.5 billion, says the MRIA, with significant additional investment required in supporting infrastructure.

Several Irish companies – including Wavebob, Ocean Energy and Open Hydro – are already well-positioned in the wave and tidal energy markets.

Gibe III finds alternative financing

Africa's strong ties with China have again emerged to help push forward Ethiopia's development efforts.

Siân Crampsie

A controversial hydropower project in Ethiopia is to go ahead without European Investment Bank (EIB) funding after the Ethiopian government said that it had found alternative sources of finance.

The EIB said in a statement that it had been considering the possibility of financing the Gibe III project on the Omo River and had therefore been involved in a number of detailed technical, environmental and social assessments. A Chinese bank is now thought to be interested in providing financing for the dam.

The Gibe III project is being built at a cost of $1.7 billion by Italy's Salini Costruttori and is due to start operating in 2013. It is fiercely opposed by a number of international and local environmental groups, who have called on the EIB as well as the World Bank and the African Development Bank (AfDB) to refrain from funding the project.

In a statement EIB said that it "had secured finance for further studies, notably to study the impact of the project and related mitigation measures in the downstream area, including Lake Turkana". It also said that its "decision to discontinue its engagement with the project is based on the promoter having found alternative finance and not the results of these preliminary studies".

The Gibe III dam is currently around 35 per cent complete. It is one of several major power projects underway in Ethiopia aimed at alleviating power shortages resulting from rapid economic growth. Plans for the 1472 MW Gibe IV and 560 MW Gibe V projects are already underway.

Ethiopia is planning to export excess power from the 1800 MW Gibe III hydropower plant to neighbouring countries.

The possibility of China's largest state bank, the Industrial and Commercial Bank of China, financing Gibe III has heightened concerns over the Asian nation's growing role in the large hydropower sector. China is now the world's largest builder and funder of large dams, which environmental and human rights group continue to campaign against.

Large hydropower dams are becoming a popular choice because they provide developing nations with much needed electricity that is also carbon-free. More than one-third of Clean Development Mechanism (CDM)-registered projects in 2008 were hydropower, according to CDM Watch.

According to International Rivers, Gibe III will threaten the food security and local economies of more than half a million people living in southwest Ethiopia and along the shores of Lake Turkana. It says that the project's 243 m-high dam – the tallest in Africa – will disrupt floods in the Lower Omo valley and affect water levels in Lake Turkana.

The Ethiopian Electric Power Corporation (EEPCo) maintains that Gibe III is the best option for developing Ethiopia's power sector and supporting economic growth and said in a statement in June that the reason that it has sought financing from alternative sources is because "international financiers have taken much more time in approving [funding]". It also said that negotiations for a loan from the Industrial and Commercial Bank of China to cover around 85 per cent of the total cost of the project are in progress.

EEPCo maintains that the World Bank and the AfDB have backed its plans for Gibe III and have also "investigated the project in terms of its environmental and social impacts".

EEPCo had originally requested a $250 million loan from the AfDB to cover the cost of electro-mechanical equipment for the project and was expecting €100 million of funding from the EIB for equipment supply and installation.

South Korea hopes for early nuclear deal with Turkey


Mersin, Turkey

Turkey is moving forward with plans to build new nuclear power capacity with foreign partners at two sites in the country.

The government is thought to be keen to seal a deal with South Korea in November this year for the supply of a nuclear power plant at Sinop on the Black Sea coast.

Plans for the development of another nuclear facility by Russian partners in Mersin province have also progressed after the Turkish parliament adopted a bill permitting the construction and operation of the plant.

The contract between Turkey and South Korean firms is due to be signed in July 2011 but Turkey is reportedly keen to bring this date forward because the date for the Turkish presidential election has been moved forward to the end of 2010.

In June, Korea and Turkey signed a nuclear cooperation agreement. This followed an agreement signed in March between Korea Electric Power Company (Kepco) and Turkey's EUAS for Kepco to prepare a bid for the plant at Sinop.

Rosatom is currently in the process of establishing a project company to build a new nuclear power plant at Akkuyu, Mersin province. The Russian firm signed a deal with Turkey to build the country's first nuclear power plant in May.

Rosatom will own a 51 per cent share in the Akkuyu plant, which will be built on a build, own, operate basis.

Akkuyu will have a total capacity of 4800 MW.

Kepco's bid for the Sinop plant will consist of four APR-1400 reactors starting operation in 2019.

Controversial deal boosts Iceland

- Magma completes deal
- 230 MW expansion planned

Iceland's geothermal energy sector is set for expansion following the acquisition of HS Orka by Canadian firm Magma Energy.

Magma closed an agreement in August to purchase 38 per cent of outstanding shares in HS Orka from Geysir Green Energy, bringing its stake in the firm to just under 85 per cent. The deal was completed in spite of a political storm in Iceland over the deal.

Magma is planning to increase its stake in HS Orka – Iceland's largest private power generator – to just over 98 per cent. It is also planning to expand the firm's output by 230 MW by 2016.

The deal between Magma and Geysir Green Energy had been in doubt after Iceland's government bowed to pressure for an inquiry into the takeover. The move led Magma to consider pulling out of the deal, which represents the largest foreign investment in Iceland since the country's banking crisis.

Opponents to the deal accused Magma of skirting foreign ownership laws by channelling the deal through a Swedish shell company. They have also argued that Iceland's geothermal energy resources should be kept in public hands.

The Iceland deal represents Magma Energy's largest investment so far and is an important part of its international expansion plans. The Canadian firm says that the deal – and its promise of capital investment – will also be of significance to Iceland as it rebuilds its economy.

HS Orka currently generates 175 MW from two power plants.

Dams could boost rural Nigeria

- Local communities could benefit from conversion
- Okpai expansion planned

Nigeria is hoping to boost supplies of electricity in rural areas by converting irrigation and water supply dams for use in electricity generation.

The country is suffering severe power shortages and a number of government-led initiatives have so far failed to boost generating capacity.

According to Nigeria's federal government, a number of dams around the country could be converted to generate electricity and provide a total of 200 MW of capacity for local communities.

In July, Nigeria Agip and Natural Resources (NAER) and Allied Energy Plc said that they had concluded plans to double the generating capacity of the Okpai independent power plant (IPP) in Delta State.

The 480 MW Okpai IPP was originally commissioned in April 2005 and the Nigerian government is hoping that the plant's owners will fast-track development of a second plant at the site.

Nigeria's says that it wants the country's generating capacity to reach 25 000 MW by 2020. Available capacity in the country is currently around 4000 MW, equivalent to 60 per cent of installed capacity.

Earlier this year the government announced plans to invest over $1 billion in the power sector to deliver the economy from the lingering power crisis. Its aim was to add 1 GW of capacity to the grid this year but it is unlikely to reach this target.

Key target areas for the investment include the repair and rehabilitation of generation plant and expansion of the transmission and distribution network. The Ministry wants to diversify fuel sources away from natural gas and has identified a number of wind and hydropower projects for implementation.

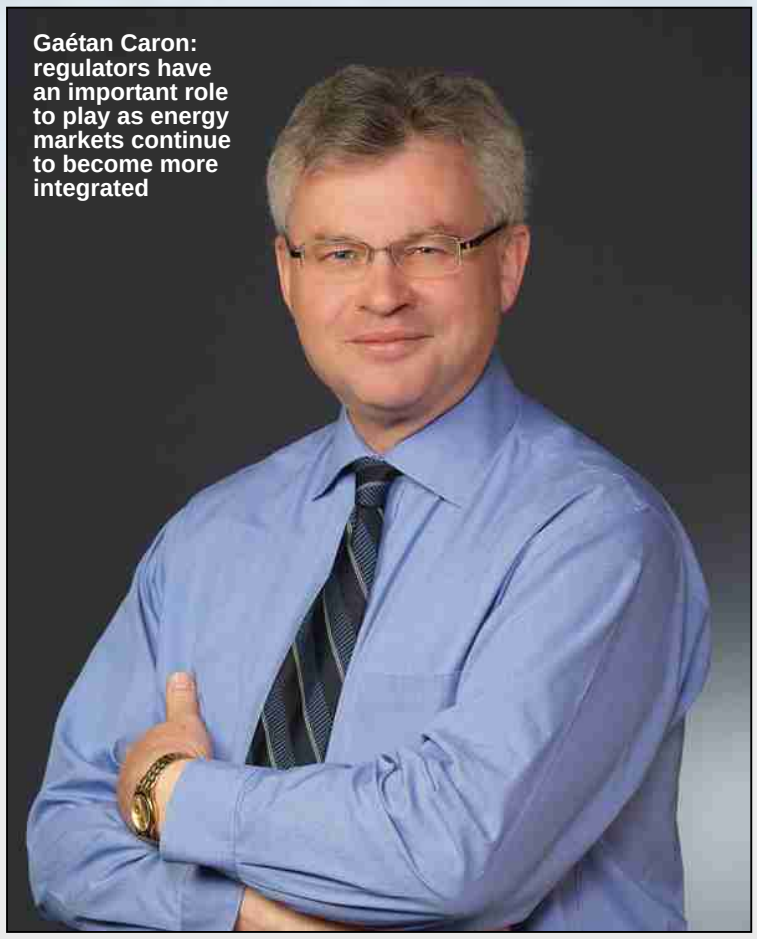
THE ENERGY INDUSTRY TIMES

WEC 2010 SPECIAL

CONTENTS

Sustainability through energy integration

Countries justifiably strive to achieve energy security. Basic economic theory shows that nations can best achieve this goal when properly regulated markets are open and countries can trade freely. **Gaétan Caron**



Gaétan Caron: regulators have an important role to play as energy markets continue to become more integrated

Canada

Globally we use an enormous amount of energy to provide the basics of human health and comfort and to fuel our economic growth. As our economies continue to grow and more nations increase their standard of living, energy demand, already at record levels, is expected to continue to rise. Meeting this growth in demand will be very challenging. We have yet to find a way to decouple continual improvements in quality of life from growing energy consumption.

We are all seeking a sustainable energy future – a future where we have enough energy to meet the needs of today without compromising the ability of future generations to do the same.

Sustainability means more than just having enough energy. It means integrating environmental, economic and social considerations, which, when taken together, assist us in choosing a course of action.

The theme of this WEC conference is *"Acting now on global challenges: Energy in transition for a living planet"*. It is important that energy leaders from around the world have come to Montreal to discuss these issues since no single country or jurisdiction can expect to meet these challenges working alone.

The National Energy Board (NEB) is Canada's federal energy regulator. Established in 1959, it regulates the construction and operation of 71 000 km of inter-provincial and international pipelines and 1400 km of international power lines. The NEB authorises pipeline tolls and tariffs and oversees certain energy imports and exports. It regulates oil and gas exploration and production in the Northwest Territories and Nunavut, and in offshore areas other than offshore Nova Scotia and offshore Newfoundland and Labrador. It also carries out advisory work, which includes providing information to the government, industry and the public on developments in energy supply and markets.

Countries justifiably strive to achieve energy security. Basic economic theory shows that nations can best promote energy security when properly regulated markets are open and countries can trade freely, leading to improved environmental and economic outcomes.

Over the past two decades, the North American energy market has become increasingly integrated. From Canada's perspective, energy moving in and out of the country has more than doubled since 1990. While demand for energy has increased in Canada and globally in the past 20 years, this trend has been further fuelled by new pipe and power lines, projects to increase pipeline capacity, new global supply sources and an increasing demand for energy.

> …trade allows nations to specialise in producing more of the things they do well, while importing more of those that they produce less efficiently

For example, in 1990 there were five pipelines importing natural gas into Canada. Today, there are ten. Likewise, imports of gas have increased from about 1.7 million m^3/day (60 million ft^3/per day) in 1990 to almost 57 million m^3 (2 billion ft^3 per day) in 2009.

The idea is that trade allows nations to specialise in producing more of the things they do well, while importing more of those that they produce less efficiently. One of Canada's advantages is its abundance of a range of natural resources. For example, there are numerous major energy projects underway in this country that take advantage of these resources, such as the large scale development of the Western Canada Sedimentary Basin,

Continued on page 2

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 oil sands, and hydroelectric generation projects.

All of these projects were economic due to access to wider markets outside the Canadian economy. They were all able to capture the necessary economies of scale. The integration of energy markets has served Canada well in the past and will likely serve Canada equally well in the future.

Looking towards the future, as we adapt to changing conditions in an integrated energy market there will be challenges such as product nationalism, regulatory and jurisdictional incompatibilities, or conflicting product standards. These barriers represent challenges that are difficult to identify and often result from well meaning efforts, yet yield unintended consequences.

While energy integration has and is expected to continue to benefit Canada and its trading partners economically, what about other goals that are important to Canadians and to people around the world? Energy integration has and will continue to contribute to a sustainable energy future, enhancing both environmental and social objectives. The goal of energy integration goes hand-in-hand with the goal of a sustainable energy future.

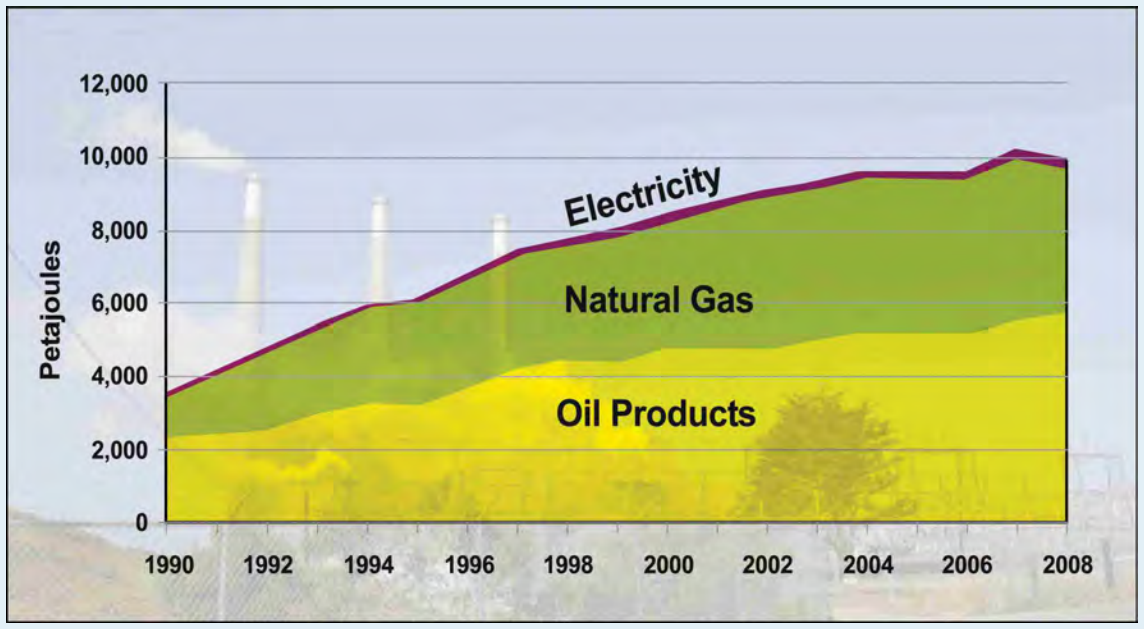
Consider environmental goals. The various sources of renewable power – from hydro to wind to solar to tidal – have their own unique benefits and drawbacks. Green forms of energy are often located far from demand centres, may be productive only intermittently, or may have high upfront costs. With this variety of advantages and disadvantages, the gains from improving integration between different energy sources and regions may be substantial.

For example, two renewable energy sources that stand to benefit greatly from further integration are wind and hydro. On its own, electricity generated from wind can be variable since the wind does not always blow. As a result, other sources of generation, like gas fired plants, are usually needed to back-up wind resources. Similarly, hydro jurisdictions benefit greatly from their water resources but in years with lower water levels, other forms of generation may be needed to supplement output.

However, if these two resources could be better integrated, the disadvantages of both energy sources can be reduced to the mutual benefit of both regions, environmentally and economically. Wind power can be exported to hydro regions during times when the wind is blowing, saving the hydro jurisdiction water. In a sense, the hydro dam can act as a battery for wind power. When the wind is not blowing, electricity from hydro jurisdictions could then be imported to wind jurisdictions instead of running fossil fuel plants.

Integrating environmental, economic and social goals will be challenging and take time. While the outcomes may seem clear, achieving transformation is complex.

Transformation is not all on the supply side; the demand side must shift as well. Some of these challenges can be managed through the continued advancement of technologies such as energy-efficient vehicles and the electric smart grid. There is a trend toward more distributed generation rather than centralised production, reducing the amount of supply communities need from the bulk electricity system. Demand side management programmes and options for demand response also represent an opportunity to balance the variability of renewable energy sources. Again, thinking globally will benefit everyone.



Energy integration trends: energy movement across the Canadian border (imports + exports)

As energy markets continue to become more integrated, regulators have an important role to play. Effective, timely, and goal oriented regulation allows markets to achieve optimal outcomes while the regulator pursues objectives that integrate society's environmental, economic and social goals.

Continued cooperation between regulators allows approved cross-jurisdictional energy transportation projects to be regulated in a more comprehensive and coherent manner. One success in this vein is the memorandum of understanding between the NEB and the Federal Energy Regulatory Commission (FERC). The agreement recognises that the two agencies oversee interconnecting facilities or activities, and assists both parties to coordinate their responsibilities. It is another step in Canada's commitment to smart regulation and the development of regulatory strategies that protect the health and safety of Canadians and of the environment, while contributing to economic efficiency.

Looking to the future, there will be challenges as we adapt to changing conditions in an integrated energy market.

There is a phrase that reflects that the regulatory regime and the energy industry are not static, but rather very dynamic: "It's getting better all the time". The journey to a sustainable energy future will require regulators in Canada and around the world to continue to be creative, extremely good listeners, good partners, committed to continual improvement and passionate about the pursuit of the public interest.

Gaétan Caron is Chair and CEO of Canada's National Energy Board.

Setting sail for Cancún

The United Nations argues that governments have both the opportunity and responsibility to build on past efforts at the next round of climate change talks in Cancún. **Christiana Figueres**

Climate Change

Last year, the world saw the emergence of high level political will to tackle climate change as the defining challenge of our time. A powerful wind is blowing from societies, science, and business to meet the climate challenge. Governments must now set full sail ahead to capture these winds of change that humanity wants to release.

In Cancún, governments can set those sails higher. They can capture pledges they have made and begin to implement them, fully appreciating that what is agreed may not be at the level which science demands. But that it is the next essential step in the right direction.

Governments have both the opportunity and responsibility to build on past efforts in five key areas.

First, they need to resolve what to do with their public pledges to cut emissions. All industrialised countries have made public pledges to cut emissions by 2020, and all major developing countries have submitted plans to limit their emissions growth. How these pledges can be captured and entered in a binding way into an international agreement is a key question for governments. But even if all current pledges were delivered on time, the response would remain inadequate in the longer-term to keep within safer global temperature rises.

Therefore, more stringent actions to reduce emissions cannot be much longer postponed and industrial nations must lead.

International agreements that incorporate effective mechanisms to speed up and scale up action between economies can undoubtedly help individual countries raise their efforts to cut emissions. To progress, governments also need to have a serious conversation about the Kyoto Protocol, which is the only existing international agreement with legal status to verify emission reductions, not least for the sake of clarity on the future of the carbon market.

> More stringent actions to reduce emissions cannot be much longer postponed and industrial nations must lead

Second, governments seem on track to agree to a comprehensive set of ways and means to allow developing countries to take concrete climate action. This includes adapting to climate change, limiting emissions growth; getting adequate finance; boosting use of technology; promoting sustainable forestry; and building up the skills and capacity to do all this. All developing countries need help to take these actions, but the poorest and most vulnerable among them need the support most urgently.

Third, industrialised nations can turn their pledges of funding into reality. Last year, these countries promised $30 billion in fast-track financing for developing country adaptation and mitigation efforts through 2012. Developing nations see the transparent and real allocation of this money as a critical signal that industrialised nations are committed to progress in the broader negotiations. Industrialised countries also pledged to find ways and means to raise $100 billion a year by the year 2020.

The Secretary-General's Advisory Group on Finance is looking at possible sources of this funding and will report to governments at the end of October.

Fourth, countries want to see that what they agree with each other is measured, reported and verified in a transparent and accountable way. The concept of "MRV", as it is called in the negotiations, is not complex. Countries simply want to know that what they see is what they get. Progress here will be a gauge that countries are moving to common ground.

Fifth, and last, governments agree that pledges need to be captured in a binding manner. But they still need to work out how to do that. Binding agreements among governments can be on an international level, on a national level, or can be based on compliance with rules and regulations. They could also involve a mix of all three, and governments are currently considering them all.

It is important to note that the combination of the last two elements, accountability and binding action, is essential for societies, science, and business to be confident that clean, green strategies are being pursued and will be rewarded globally, as well as locally.

The challenge governments face is not a small one. What is at stake is the long term, sustainable future of humanity.

We know the milestones science has set – by when and by how much emissions must drop to have a chance of avoiding the worst. This requires nothing less than an energy revolution both in production and consumption.

Governments have been building common ground since the UNFCCC began in Rio in 1992, and then, consecutively, at major gatherings in Berlin, Kyoto, Marrakesh, Bali, Copenhagen and now Cancún. The idea that a single magic, global agreement could solve all climate issues does not do justice to the crucial steps already achieved and, most importantly, dangerously ignores the need to keep innovating.

In Cancún, governments can harness the politically possible in order to achieve concrete and unmistakable progress.

Christiana Figueres is Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC).

Renewables

The power of renewable energy

Following massive generating capacity additions in the last two years, renewables have arguably become Europe's mainstream power source.**Professor Arthouros Zervos**

Renewables in Europe

In 2009, for the second year running, more renewable energy power capacity was installed than any other electricity generating technology. In two successive years neither gas, coal nor nuclear power have reached anywhere near the amount of newly installed renewable electricity generating capacity. Renewable electricity's share of newly installed capacity increased from 57 per cent in 2008 to 62 per cent last year. Both in 2008 and 2009 renewable electricity (RES-E) was investors' first choice, led by wind power, PV and biomass.

Professor Arthouros Zervos: forecasts for renewables have been consistently surpassed

If Europe was to continue in this trend of newly installed RES power capacity of 5 percentage points per annum over the years to come, this would avoid the need to build a single new conventional power plant after 2020. Newly installed renewable power capacity would then make up 100 per cent of new installations in Europe. This is not only feasible, but necessary if the EU wants to meet its long-term climate target of reducinggreenhouse gas (GHG) emissions by 80-95 per cent by 2050 and fully decarbonise its power sector.

In absolute terms, renewables produced 19.9 per cent (608 TWh) of Europe's electricity consumption in 2009. Hydropower contributed the largest share (11.6 per cent), followed by wind (4.2 per cent), biomass (3.5 per cent), and solar power (0.4 per cent).

Very few could have imagined that the renewable energy sector would have developed as fast as it has in the past few years. Photovoltaics (PV) for example, reached a cumulative installed capacity of 16 GW in 2009. This is more than five times as high as the target foreseen for 2010 in the 1997 European White Paper. Wind energy at the same time exceeded the White Paper target of 40 GW by more than 80 per cent – its cumulative installed capacity accounted for more than 74 GW last year.

> **European industry expects renewables to meet 39 per cent of overall electricity demand by 2020**

All forecasts on the expansion of renewable energy have consistently been surpassed.

According to the latest figures released by the European Commission's Joint Research Centre (JRC), up to 1400 TWh of electricity could be generated from renewable sources in 2020, if current growth rates are maintained. This would account for approximately 35-40 per cent of overall electricity consumption in the EU, depending on the success of community policies on energy savings and efficiency.

This correlates with the estimations of the European Renewable Energy Council (EREC) in its recent report RE-thinking 2050. The European industry expects a RES-E share of overall electricity demand of 39 per cent, with renewable electricity generation of 1370 TWh by 2020.

There is an urgent need for Europe to invest in new energy production capacity to replace ageing plants while meeting future demand. Approximately 330 GW of new power capacity needs to be built by 2020, which represents 42 per cent of the current EU capacity. The European renewable energy industry would like to see the EU using the opportunity created by this upcoming large turnover in capacity to construct a new, modern renewable energy power supply and grid system – a system capable of meeting the energy and climate challenges of the 21st century, while enhancing Europe's competitiveness and creating hundreds of thousands of jobs. The new power system must be supported by a well-functioning internal market in electricity in which investors, rather than consumers, are exposed to carbon and fuel price risk.

Certainly, 2009 saw a remarkable result in a difficult economic year. The figures, however, underline once again that renewable energy delivers enormous carbon reductions, while creating much needed economic activity and new high quality jobs. The renewables sector is ready to play its part for a 100 per cent renewable energy future and has proven to be reliable even in economically challenging times.

Within just two decades, renewable energy has developed from an alternative energy source in a niche market to one of the most important energy sources worlwide and a driving force for a sustainable 21st century economy. Renewable energy is currently on its way to becoming the mainstream source of Europe's energy system in the foreseeable future.

Professor Arthouros Zervos is President of the European Renewable Energy Council (EREC). For further information on the EU´s energy future see: www.rethinking2050.eu

IEA offers clear directions to climate goals

As international climate negotiators wrangle over the Copenhagen Accord, the publication of the IEA's *Energy Technology Perspectives 2010* is a timely reminder of current emission trends as well as what needs to be done in order to change those trends. **Siân Crampsie**

Technology Options

With global climate negotiations in apparent disarray, the International Energy Agency (IEA) this summer attempted to focus policymakers' minds onto the measures that need to be taken to limit global greenhouse gas emissions.

The Paris-based agency says that there are early indications of an "energy technology revolution" taking place that could transform the way that energy is produced and used around the world, limiting greenhouse gas (GHG) emissions to levels suggested by the United Nations Intergovernmental Panel on Climate Change (IPCC).

However, the IEA says that the rate of progress in energy technology development and adoption is "still far too low to prevent dangerous increases in global temperatures". It has called current developments "fragmented and fragile" – words that could perhaps also describe developments in global climate negotiations.

Since the endorsement of the Copenhagen Accord late last year, climate negotiators from countries around the world have been meeting in order to produce a text for politicians to work on at the next major climate meeting in Cancun, Mexico, later this year.

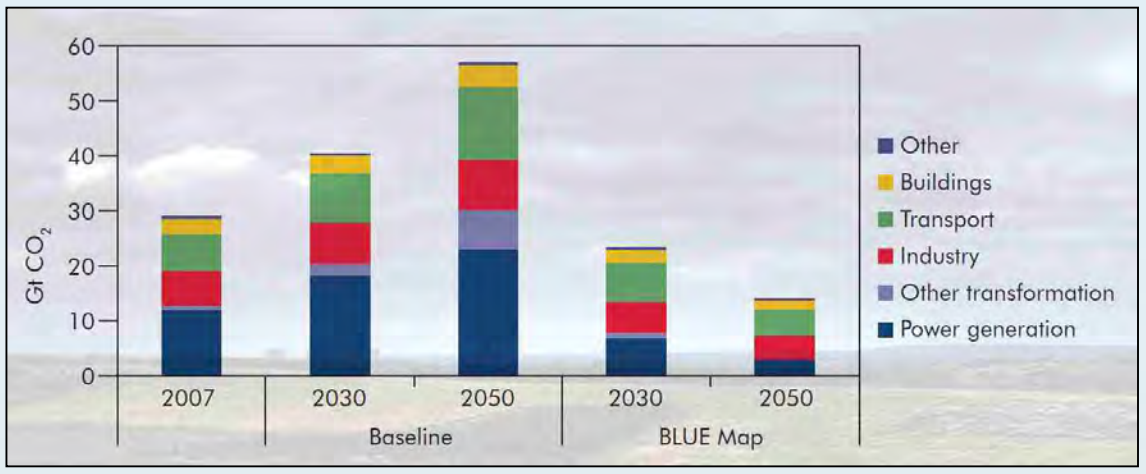
The Copenhagen Accord forms the basis of this text and the idea is that a new global climate deal will be reached at Cancun in November-December. However, the divisions between developed and developing nations that scuppered hopes of a deal being reached in Copenhagen in 2009 are continuing. Although some important developments in the text have been achieved, clashes between some countries have been described as almost farcical in some media reports.

The publication by the IEA of its *Energy Technology Perspectives 2010* (ETP 2010) is therefore timely, reminding us of current emission trends as well as of what needs to be done in order to change those trends. And in what appears to be a message to the world's climate negotiators, the IEA says in ETP 2010 that, "all countries and regions must contribute to emissions reductions… Even in the unlikely event that the member countries of the OECD were to emit no CO_2 by 2050, non-OECD countries would still need to reduce their own CO_2 emissions below current levels if significant climate change is to be avoided."

According to the IEA, current trends in energy consumption and GHG emissions are unsustainable and will harm the environment, energy security and economic development. From 1990 to 2000, global CO_2 emissions increased by an average of 1.1 per cent per year. Over the following seven years, the annual growth rate in emissions jumped to 3 per cent.

The main drivers behind these trends are the rise in energy demand in coal-based economies, and an increase in coal fired power generation in response to higher oil and gas prices. These trends can be reversed, says the IEA, but will require major investments as well as a huge, coordinated push from governments and the private sector.

In ETP 2010, the IEA highlights the "green shoots" of change, including increased investment in renewable energy, improvements in the rate of energy efficiency, the nuclear renaissance and increased investment in research, development and demonstration (RD&D). However, it believes that more rapid and fundamental change is required if the IPCC's suggested target of a 50 per cent reduction in global CO_2 emissions compared with 2000 levels by 2050 is to be achieved.



Global CO_2 emissions in the Baseline and Blue Map scenarios

The next decade is critical. "What we need is rapid, large-scale deployment of a portfolio of low-carbon technologies; we need a massive decarbonisation of the energy system, breaking the historical link between CO_2 emissions and economic output, and leading to a new age of electrification," said IEA Executive Director Nobuo Tanaka.

In ETP 2010, the IEA presents two main scenarios for energy production and consumption: a Baseline scenario that assumes no new energy and climate policies, and a Blue Map scenario that sets a goal of halving global energy-related CO_2 emissions by 2050 (compared to 2005 levels). Blue Map examines the least-cost means of achieving that goal through the deployment of existing and new low-carbon technologies.

The respective outcomes of the two scenarios are very different and might remind climate negotiators of the reasons why a new global climate deal is needed. In the baseline scenario, energy-related CO_2 emissions roughly double by 2050, primary energy use rises by 84 per cent while the carbon intensity of energy use increases by seven per cent. In addition, fossil fuels supply more than two-thirds of power generation and CO_2 emissions from power generation more than double.

In contrast, the Blue Map scenario sees energy-related CO_2 emissions reduced by 50 per cent by 2050 and primary energy use rising just 32 per cent. Over the same period, the carbon intensity of energy use falls by 64 per cent and renewable energy grows to account for almost 40 per cent of primary energy supply. CO_2 emissions from power generation fall by 76 per cent, with renewables accounting for 48 per cent of power generation, nuclear 24 per cent and CCS-equipped plants 17 per cent.

In the Baseline scenario, non-OECD countries are responsible for almost 90 per cent of growth in energy demand and account for nearly three-quarters of global CO_2 emissions. In the Blue Map scenario, non-OECD countries achieve CO_2 emissions reductions of around 30 per cent compared to 2007; OECD countries account for less than one-quarter of global CO_2 emissions, having reduced emissions by 70-80 per cent below 2007 levels.

To achieve the Blue Map scenario – which would limit the global temperature increase to 2.0-2.4°C – the IEA has identified a number of top priorities. The first of these is energy efficiency, which offers the greatest potential for cutting CO_2 emissions over the period to 2050 through a number of low-cost, readily-available technologies. "This will require that current rates of energy efficiency seen in OECD countries are replicated across the world and maintained over the next 40 years," says the IEA in ETP 2010.

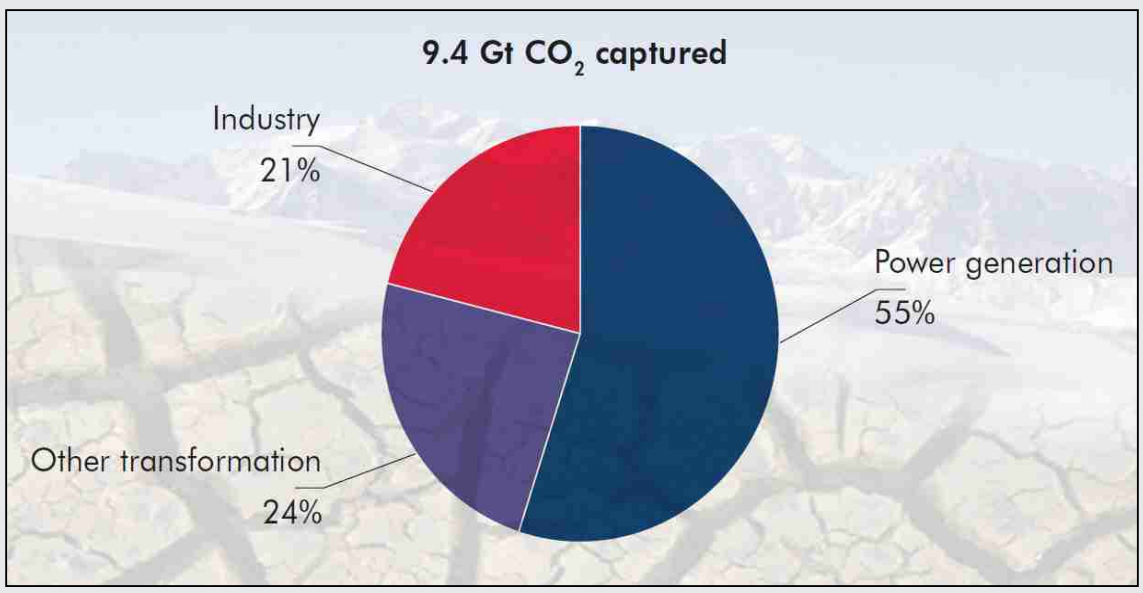
Another priority is decarbonising the electricity sector, which currently accounts for 41 per cent of energy-related CO_2 emissions. The IEA's Baseline scenario projects a doubling of these emissions over the period to 2050, because of continued reliance on fossil fuels. By contrast, the Blue Map scenario achieves almost a 90 per cent reduction (compared to 2007 levels) in the carbon intensity of electricity generation, with renewables accounting for almost half of global production and nuclear for slightly less than one-quarter. The other key change is that most remaining electricity production from fossil fuels has much lower CO_2 emissions thanks to the widespread adoption of CCS.

"More than 30 new nuclear power stations and 35 coal-fired plants fitted with CCS would be needed on average every year to 2050," says the IEA. "A decarbonised electricity supply, combined with smarter grids, would then offer substantial opportunities to reduce CO_2 emissions in end-use sectors through increased electrification (for example, through the introduction of electric vehicles and efficient electric heat pumps)."

The total investment required in the power sector alone to achieve the Blue Map scenario is $32.8 trillion – 40 per cent more than the $23.5 trillion that would be invested under the Baseline scenario. More than half of this would be directed towards new power plants.

Overall, the cost of achieving the '50 per cent by 2050' goal of the Blue Map scenario would be $316 trillion in total to 2050 – 17 per cent more than the estimated $270 trillion invested under the Baseline scenario.

According to ETP 2010, annual investments in low-carbon technologies have averaged around $165 billion over the last three years.



Use of carbon capture and storage in the Blue Map scenario, 2050

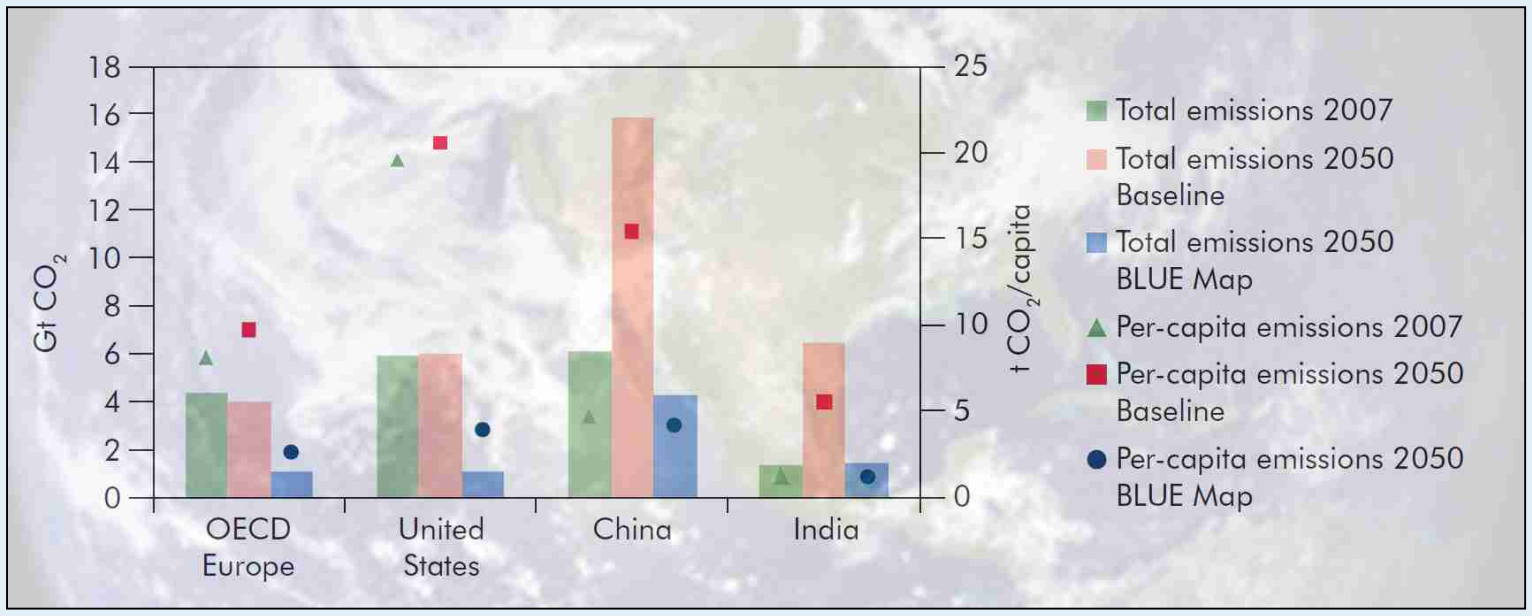
Technology Options

(Continued from page 5)

With global climate negotiations in apparent disarray, the International Energy Agency (IEA) this summer attempted to focus policymakers' minds onto the measures that need to be taken to limit global greenhouse gas emissions.

The Paris-based agency says that there are early indications of an "energy technology revolution" taking place that could transform the way that energy is produced and used around the world, limiting greenhouse gas (GHG) emissions to levels suggested by the United Nations Intergovernmental Panel on Climate Change (IPCC).

However, the IEA says that the rate of progress in energy technology development and adoption is "still far too low to prevent dangerous increases in global temperatures". It has called current developments "fragmented and fragile" – words that could perhaps also describe developments in global climate negotiations.



CO_2 emissions by region/country in the Baseline and Blue Map scenarios

Since the endorsement of the Copenhagen Accord late last year, climate negotiators from countries around the world have been meeting in order to produce a text for politicians to work on at the next major climate meeting in Cancun, Mexico, later this year.

The Copenhagen Accord forms the basis of this text and the idea is that a new global climate deal will be reached at Cancun in November-December. However, the divisions between developed and developing nations that scuppered hopes of a deal being reached in Copenhagen in 2009 are continuing. Although some important developments in the text have been achieved, clashes between some countries have been described as almost farcical in some media reports.

The publication by the IEA of its *Energy Technology Perspectives 2010* (ETP 2010) is therefore timely, reminding us of current emission trends as well as of what needs to be done in order to change those trends. And in what appears to be a message to the world's climate negotiators, the IEA says in ETP 2010 that, "all countries and regions must contribute to emissions reductions… Even in the unlikely event that the member countries of the OECD were to emit no CO_2 by 2050, non-OECD countries would still need to reduce their own CO_2 emissions below current levels if significant climate change is to be avoided."

According to the IEA, current trends in energy consumption and GHG emissions are unsustainable and will harm the environment, energy security and economic development. From 1990 to 2000, global CO_2 emissions increased by an average of 1.1 per cent per year. Over the following seven years, the annual growth rate in emissions jumped to 3 per cent.

The main drivers behind these trends are the rise in energy demand in coal-based economies, and an increase in coal fired power generation in response to higher oil and gas prices. These trends can be reversed, says the IEA, but will require major investments as well as a huge, coordinated push from governments and the private sector.

In ETP 2010, the IEA highlights the "green shoots" of change, including increased investment in renewable energy, improvements in the rate of energy efficiency, the nuclear renaissance and increased investment in research, development and demonstration (RD&D). However, it believes that more rapid and fundamental change is required if the IPCC's suggested target of a 50 per cent reduction in global CO_2 emissions compared with 2000 levels by 2050 is to be achieved.

The next decade is critical. "What we need is rapid, large-scale deployment of a portfolio of low-carbon technologies; we need a massive decarbonisation of the energy

Can CCS and CDM make progress in Cancun?

It feels like *déjà-vu*; once again the industry is on the road to important UN climate talks and again there are hopes for progress on the inclusion of carbon capture and storage (CCS) in the Clean Development Mechanism (CDM). **Milton Catelin**

Coal

There is only one more week of UN climate talks (in China) before we hit the big one in Cancun – COP16/CMP6 at the end of November. Talks were recently held in Bonn to try and lay the groundwork for the Cancun negotiations… and repair some of the fractures from Copenhagen. Whether this has been achieved is questionable.

The Bonn talks were highly technical and focussed on draft texts developed by the Parties to the climate treaties. One delegate reportedly described a "text explosion" when one section of draft text grew from three to 11 pages in the course of three hours of discussion. Some delegates even commented that things seem to be going backwards – draft text that was previously all-but agreed in Copenhagen now seems to be up for grabs. Unfortunately, this does not resemble progress.

A lot of commentators were hoping that Bonn would deliver a better idea of what might be possible at Cancun. However, not much will have become clear which leaves a lot of work to be done in Tianjin in China in October.

With regards to coal there has been a big focus over the past few years on getting CCS included in the Clean Development Mechanism (CDM). It has been a bit of a roller coaster, though with more downs than ups, and unfortunately we are still riding it. CCS and the CDM were not covered in any detail at the Bonn talks because it has been referred to Cancun. It is therefore difficult to gauge at this stage whether any progress will be possible at the end of the year.

The inclusion of CCS in the CDM has, to date, been prevented due to the opposition of a small number of countries. This is disappointing because the inclusion of CCS in the CDM is an important means of increasing investment in this essential technology. CCS technology has an important role to play in ensuring both a reduction in CO_2 emissions and continued energy security. Getting CCS included in the CDM will be a key issue for the World Coal Institute (WCI) at the Cancun talks. As such, the WCI recently wrote to more than 40 countries calling on them to support the inclusion of CCS in the CDM and highlighting that developing countries should have access to the same low carbon technologies that are available in the developed world.

Looking to the future, it is going to be just as important to make sure CCS is included in any future financing mechanisms that are developed through this process.

If you look at energy projections, it becomes clear why it is essential that we use every mechanism available to help push CCS forward. World energy demand continues to rise. International Energy Agency (IEA) figures show that the use of coal is expected to rise by over 60 per cent from 2006 to 2030, with developing countries responsible for 97 per cent of this increase.

If the world is to meet its climate goals, enhance energy security and continue on the path to poverty alleviation in developing countries, clean, affordable and accessible electricity will be essential. And all credible scenarios that limit global temperature rises to less than 2°C show that an effective response to climate change necessitates the rapid and large-scale deployment of CCS in both developed and developing countries.

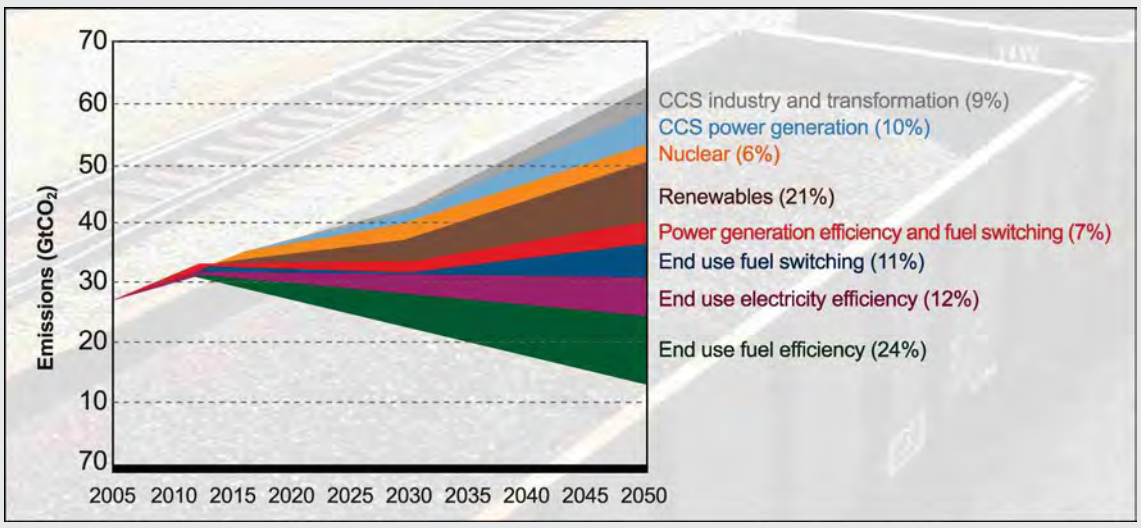
The IEA estimates that additional investment costs in the electricity generation sector will be $4.7 trillion (or 78 per cent) higher if CCS is not included in the suite of technologies deployed to address the climate challenge. The IEA sees the bulk of CCS deployment eventually occurring in the developing world. However, current investments in CCS are tiny relative to the sums being invested in renewables. This does not mean that investment should be shifted from renewables to CCS. It is about using all available options, including mechanisms set up under the Kyoto Protocol, to achieve significant emissions reductions at a global level.

Milton Catelin: the coal industry will be pushing UN negotiators

Demonstration projects are already well under way in developed and developing countries and the research associated with CCS is at an advanced stage. The knowledge to manage the risks associated with CCS is well developed and new projects under the CDM would benefit significantly from work already undertaken.

Developing countries do not always have to be the receiver of developed country knowledge. This presupposes a world where developing countries do not lead or innovate and are constrained by progress in the developed world. It is quite conceivable that developing countries, supported by the CDM, could develop a commercially applicable CCS technology and export that to the developed world.

The inclusion of CCS in the CDM has, to date, been prevented due to the opposition of a small number of countries



The role of various technologies in cutting CO_2 emissions. Source: IEA Energy Technology Perspectives 2008

Risks and challenges exist for all projects that are registered under the CDM. As with other projects, those unique to CCS can be dealt with under modalities and procedures to be approved by the CDM Executive Board. Studies by the IEA Greenhouse Gas Programme, the Intergovernmental Panel on Climate Change and others have all clearly demonstrated pathways to managing the issues identified.

The inclusion of CCS in the CDM will be an important precursor to the further development and deployment of this essential technology. It will also ensure a clear pathway to the inclusion of CCS in other financing mechanisms to be developed under the UNFCCC framework.

A special briefing on financing was held at the Bonn talks by the Secretary-General's High-Level Advisory Group on Climate Change Financing. They are exploring ways to raise the $100 billion a year for climate financing committed to under the Copenhagen Accord.

At the briefing, prominent British economist Lord Nicholas Stern said potential revenue sources include auctioning the right to pollute, taxes on carbon production, an international travel tax, and a tax on international financial transactions, as well as government grants and loans. He also said private capital will be crucial, and governments need to adopt policies that reduce the risk to investors. This is a key point for CCS, where risks to investors are a key stumbling block that governments must resolve.

It is good to see there is constructive work being done by the Secretary-General's group. Their report is due out shortly before Parties convene in Cancun so it can make an important contribution to discussions about financing. If serious progress can be made on financing, it might give Parties the energy and confidence they need to resolve other issues as we look towards a future agreement.

While there has been a lowering of expectations going into the Cancun talks, the WCI has high expectations of what negotiators can achieve on CCS and the CDM. This has been debated, delayed and discussed enough; it is now the time for a decision.

As the UNFCCC has stated: "Fossil fuels will be part of the energy mix for many years to come. It makes sense that the CDM should be used to reduce the emissions associated with that fossil fuel use". The coal industry will be pushing for negotiators to heed the words of the UNFCCC and make a positive decision on the inclusion of CCS in the CDM.

Milton Catelin is CEO of the World Coal Institute. Further information on the World Coal Institute is available at www.worldcoal.org

Vestas reports mixed market

- 2Q loss but order volumes strong
- Suzlon reports loss

Wind turbine manufacturer Vestas has reported a second consecutive quarterly loss, reflecting reduced levels of activity following the credit crisis.

The Danish firm – the world's largest wind turbine manufacturer by market share – has cut its profits guidance for the year but maintains that the long-term outlook for the wind turbine market was good. It reported an order intake of 3031 MW for the second quarter of 2010 – the highest level ever recorded and on a par with the order intake for the whole of 2009.

The results reflect the volatility of the wind turbine market caused in part by the financial crisis and also by regulatory uncertainty in key markets such as Spain and the USA. Vestas says that some orders from Europe and the USA have been delayed because of difficulties in obtaining financing.

The conditions in the wind turbine market were also reflected in the results of Indian firm Suzlon, which posted a loss of $191.1 million for the first quarter ended June 30, 2010. The loss was largely due to lower sales volumes.

Tulsi Tanti, Chairman and Managing Director of Suzlon Energy Limited, said: "This has been a challenging quarter for us. However, we see strong momentum for the wind sector led out of emerging economies – particularly India, China, Brazil and Western Europe, while the US and selective European markets remain difficult."

Vestas reported a 17 per cent drop in revenues for the second quarter of 2010, down to €1007 million. Net losses were €119 million, compared with a €43 million profit for the same quarter in 2009.

It says that its order intake for 2010 is on target to reach 8-9000 MW, with Europe contributing 50 per cent, the Americas 30 per cent and Asia-Pacific 20 per cent.

Vestas is facing competition from rivals such as GE and Siemens as well as from Asian manufacturers such as Sinoval, Dongfang and Goldwind.

The global wind turbine market showed strong growth in 2009 but this is expected to wane in 2010 – especially in Europe and the USA – as government support for renewable energy drops due to austerity measures. The American Wind Energy Association (AWEA) has already reported a dramatic fall in wind turbine installation activity for the first half of 2010 in the USA.

Other risk factors in the market include low fossil fuel prices and low energy demand, says Vestas.

Vestas also reported that more banks are venturing into project funding, but said that processing times and documentation requirements had gone up.

GDF Suez boosts International Power

- Cash dividend sweetens deal
- "Compelling" industrial logic

Siân Crampsie

GDF Suez says that it will drive its international development in energy infrastructure markets through New International Power after its board approved a "reverse takeover" of its Energy International business by UK-based International Power.

The two companies have agreed to the deal, which will see GDF Suez's non-European energy assets, plus some assets in the UK and Turkey, transferred to International Power along with €4.4 billion (£3.7 billion) of net debt.

The deal will create one of the world's largest independent power generating companies and will allow GDF Suez to attain its goal of 100 GW of electricity generating capacity. The French firm will own 70 per cent of the merged company – known as New International Power – and International Power the remainder.

The deal was clinched after GDF Suez agreed to pay International Power shareholders a one-off special cash dividend totalling £1.4 billion to compensate them for the loss of control. The two companies say that the industrial logic behind the merger is "compelling".

"This agreement, which combines these two businesses, creates the leading global energy player in IPP with strong market positions in Latin America, North America, UK-Europe, the Middle East, Asia, and Australia," said Gérard Mestrallet, Chairman and CEO of GDF Suez. "The combined business will have both the operational expertise and the financial flexibility to capture the significant growth opportunities in international energy infrastructure markets over the next decade."

The merger will make GDF Suez the world's second largest utility by generating capacity, with 107 GW. It will also give International Power access to more financing at better rates than it currently gets.

New International Power will have a gross generating capacity of over 66 GW around the world, plus a pipeline of 22 GW of committed projects. It will have a leadership position in a number of key markets, including Latin America, North America and the Middle East, and a balanced portfolio of assets.

International Power and GDF Suez say that they will sign a non-compete agreement covering the continental European market.

Firms make smart investments

- Smart meter market set for growth
- ABB, CapGemini invest

Big-name firms are expanding their expertise in smart grid technologies by acquiring existing firms specialising in utility IT and smart meter technologies.

Most recently, ABB and CapGemini have made key investments that will enhance their knowledge bases and market offerings.

ABB has invested $20 million in California-based Trilliant as part of a syndicate, while CapGemini has bolstered its energy management offerings by buying Skvader Systems AB, a Swedish provider of smart meter energy services.

ABB's investment in Trilliant follows its more than $1 billion acquisition of Ventyx, a leading software provider to global energy and communications businesses. The Trilliant deal builds on an existing cooperation between the two companies and gives ABB a link to Trilliant's end-to-end system for smart grid communications.

Trilliant provides utilities with wireless mesh networks that enable two-way communication from the head-end operations centre to all devices on the grid – a solution that encompasses not only meters and in-home energy management devices but also substations and grid equipment such as transformers and capacitor banks.

"Solutions for intelligent and secure communication from the neighbourhood level to the wide area network are what many utilities are seeking," said Bazmi Husain, head of ABB's smart grids initiative. "The Trilliant investment demonstrates ABB's commitment to partnering in a variety of ways with innovative companies to advance the evolution of smart grid solutions."

According to Swedish analyst firm Berg Insight, the number of smart electricity meters is expected to increase rapidly across Europe as people attempt to gain control over energy costs. It says that the installed base of smart electricity meters in Europe will grow at a compound annual growth rate of 17.9 per cent between 2009 and 2015 to reach 111.4 million at the end of the period.

"Providing consumers with detailed information about their electricity consumption the new generation of meters give customers control over energy costs and create financial incentives for energy savings," said Berg Insight's CEO Johan Fagerberg.

Skvader Systems will now be a part of Capgemini's Smart Energy Services business, further extending the company's share of both the Swedish and European smart energy market.

Capgemini estimates that over €300 million of smart energy service contracts will come to the Nordic region over the next three years, underlining the strategic significance of the acquisition.

GEH prepares for India projects

GE Hitachi Nuclear Energy (GEH) is gearing up to develop projects in India, signing a preliminary agreement with Tata Consulting Engineers to explore possible project design and workforce development opportunities.

The agreement paves the way for the two companies to collaborate in areas such as workforce skills development, early feasibility design studies and product and project engineering work.

India's government has identified two possible sites for new nuclear units featuring multiple reactors based on GEH's 1520 MW ESBWR model.

India is a potentially huge market for nuclear power plant constructors with the government targeting an installed nuclear capacity of around 50 GWe by 2050. The National Power Corporation of India Ltd (NPCIL) has projected a nuclear capacity of 63 GWe by 2032, according to the World Nuclear Association.

Americas

CFE awards Norte II contract

Mexico's Federal Electricity Commission (CFE) has awarded the contract to build a combined cycle power plant in the north of the country to a consortium comprising Argentine conglomerate Techint and two Korean firms.

The Norte II project will have a generating capacity of 375 MW and will cost $417 million to build. The winning consortium – which includes Korea Electric Power Corporation and Samsung C&T Corporation – will develop, build, own and operate the facility for 25 years.

Other consortia that placed bids for the contract include Spain's Abengoa-Abener with Iberdrola, and Japan's Mitsubishi-Kyushu Electric with Mitsui.

Norte II will be located 33 km southeast of Chihuahua city and will enter commercial operation in May 2013.

FuelCell Energy sells 1.4 MW plant

FuelCell Energy says that a project to install one of its 1.4 MW power plants in California will demonstrate how fuel cells can help agricultural operations to manage their waste streams, improve their economics and generate clean electricity.

The fuel cell manufacturer has announced the sale of a DFC1500 fuel cell power plant to G3 Power Systems for installation at a poultry ranch. The plant will use renewable biogas for fuel, converting what is currently a waste problem for the ranch into clean electricity.

The project will involve the installation of an anaerobic digester which will turn the ranch's waste stream into methane gas. The fuel cell power plant will use this gas to generate electricity.

Voith to overhaul BC plant

BC Hydro has awarded Voith Hydro a contract for the complete overhaul of five Francis turbine units at the Gordon M. Shrum hydropower plant in British Columbia, Canada.

Voith Hydro's scope of supply includes five new 310 MW turbines, site construction, installation, and start-up. The first unit is scheduled for commissioning in 2012, with subsequent units commissioned at yearly intervals after that.

The project is the largest turbine replacement project ever awarded by BC Hydro. The overhaul will improve the availability and reliability of the units, which were originally commissioned in the late 1960s.

HHI to build solar plants in USA

South Korea's Hyundai Heavy Industries has signed a $700 million contract to build solar power plants in the USA.

Under an agreement with Matinee Energy Inc, Hyundai will build two solar plants in Arizona – one of 150 MW and one of 25 MW capacity. The projects are due to be completed by the end of 2012 and will help Hyundai to diversify its business and build its presence in the solar power market.

Siemens wins US wind order

Oklahoma Gas & Electric (OG&E) has placed an order with Siemens Energy for the supply of 98 wind turbines for the Crossroads wind power plant in Oklahoma, USA.

Under the contract Siemens will supply 95 of its SWT-3.0-101 wind turbine unit as well as three SWT-3.0-101 units, its new gearless direct drive wind turbine.

The scope of supply for the Crossroads wind farm includes the delivery, installation and commissioning of all turbines. Siemens will also provide services for turbine service and maintenance for an initial period of three and a half years.

Construction of the 227.5 MW project was schedule to begin in late August, with the first wind turbines being delivered in April 2011.

Asia Pacific

Emerson to automate Guizhou Xingyi

Emerson Process Management has been awarded a contract to install its Ovation expert control system at Units 1 and 2 of the new Guizhou Xingyi power plant in China's Guizhou Province.

At each unit, the Ovation system will perform data acquisition as well as monitor and control the Beijing Babcock boiler and Harbin turbine. It will also manage the plant's flue gas desulphurisation (FGD) system, modulating control system, sequence control system, electrical control system, furnace safety supervisory system, feed-water turbine control system, common system and balance-of-plant processes.

The coal-fired Guizhou Xingyi plant will ultimately feature four 600 MW supercritical units and is being built in two phases. Units 1 and 2 will enter commercial operation in February 2011 and June 2011, respectively.

The plant will serve as an important baseload plant and will also help to stabilise the grid in Guizhou Province, where there are few existing fossil-fuelled power plants.

Vestas wins China deals

Danish wind turbine manufacturer has received two orders totalling 74 MW of capacity from a Chinese independent power producer.

Under the deal with the unnamed client, Vestas will deliver 37 of its V90-2.0 MW wind turbine units in the fourth quarter of the year. The contract includes installation and commissioning of the turbines as well as a SCADA system.

Shaw to support Chinese AP1000 units

The Shaw Group has signed an initial contract with State Nuclear Power Engineering Corp. Ltd., a subsidiary of China's State Nuclear Power Technology Corp. Ltd. (SNPTC), to provide technical support services for additional AP1000 nuclear power plants in China.

Beginning with two new AP1000 units at the Xianning nuclear power plant project in Hubei province, Shaw will provide technical support services, which include engineering and design management, project controls, quality assurance, construction management and project management, as well as health, safety and environmental management.

In April 2009, Shaw signed a strategic cooperation agreement with SNPTC to support China's rapidly growing nuclear power infrastructure. Shaw's contract is the first project announced under the 2009 strategic cooperation agreement.

Wärtsilä boosts Bangladesh grid

Finland's Wärtsilä is to add 300 MW of generating capacity to Bangladesh's electricity grid after receiving four new power plant orders.

The latest four orders – worth a combined €100 million – are in addition to contracts for six power plants awarded to Wärtsilä earlier this year. All of the contracts are part of the government of Bangladesh's urgent plan to deal with power shortages in the country.

The four orders include two from Guangdong Power Engineering Corporation for power plant projects in Dohazari and Hathazari, and two from Khanjahan Ali Power Co for plants being constructed at Noapora and Northern Katakhali.

BHEL wins mega power plant package

Bharat Heavy Electricals Ltd (BHEL) has signed a contract with independent power producer Abhijeet Infra Limited to supply the main plant package for a 1080 MW thermal power plant in Jharkhand, India.

Under the contracts BHEL will supply and install the boilers, steam turbines, generators and I&C equipment for the Matrishri Usha Jayaswal mega power plant, located at Latehar district of Jharkhand, near Ranchi.

The plant is being built in two phases and will comprise four 270 MW units when complete.

Agreement for 420 MW wind farm

Australian Gas Light Company (AGL) has signed an agreement with New Zealand's Meridian Energy to build the largest wind farm in the southern Hemisphere.

The A$1 billion wind farm will be built near Hamilton in Australia's Victoria state and will have a capacity of 420 MW. It will be equipped with 140 Vestas V112-3.0 MW wind turbines and will be completed by early 2013.

Europe

Vestas wins Fullabrook order

Devon Wind Power has placed an order with Vestas for the supply of 22 wind turbine units for the Fullabrook wind farm project in north Devon, UK.

Vestas will supply its V90-3MW units to the project, which will be the largest onshore wind farm in England when completed. The contract includes supply, installation and commissioning of the turbines, a SCADA system and a ten-year service agreement.

Devon Wind Power is a subsidiary of ESB Wind Development.

Westinghouse to dismantle RV internals in Spain

Spain's Empresa Nacional de Residuos Radiactivos (Enresa) has awarded Westinghouse Electric Company a contract to dismantle the reactor vessel (RV) internals at the José Cabrera Nuclear Power Station (also known as Zorita), located in Almonacid de Zorita, near Madrid, Spain.

The contract covers dismantling and segmentation of the reactor vessel internals, including the up-front engineering studies. It also includes plant modifications, equipment supply, and loading of primary and secondary waste, respectively, into multipurpose canisters for the activated material, and into dedicated containers for low and intermediate-level waste.

Westinghouse will be the lead contractor, and Monlain will be its main subcontractor. The project began in June 2010 and is expected to take 31 months to complete.

Zorita, a 142 MWe Westinghouse pressurised water reactor (PWR) operated by Gas Natural Fenosa, was closed by ministerial order in April 2006, after 38 years in operation.

Gas Natural Fenosa extends O&M contract

Gas Natural Fenosa has signed an extension of an operation and maintenance contract with Alstom for two of its combined cycle power plants in Spain.

Alstom designed, built and commissioned Gas Natural Fenosa's Besos and San Roque power plants in 2002 and has been responsible for their operations and maintenance up to now. The scope of the extended contract includes the provision of spare parts, maintenance services, inspection and operation support for the two Alstom KA26 units.

E.On awards CCS FEED contract

E.On UK has placed an order with a Foster Wheeler-led consortium to support the front-end engineering design (FEED) for a post-combustion carbon dioxide (CO_2) capture and compression plant proposed in Kent, UK.

The carbon capture facility is being proposed as part of a planned new 800 MW coal fired supercritical power plant at Kingsnorth, Kent. It will be designed to separate and capture CO_2 from flue gas generated by the new coal fired units, enabling the CO_2 to be transported and stored permanently within a depleted gas reservoir under the North Sea.

International

Morocco opts for fuel flexible GTs

GE and partner Cegelec SAS have received a contract totalling more than €200 million for the supply of fuel-flexible gas turbine technology for the Kenrita power plant in Morocco.

The new 300 MW power plant will be located in the harbour of Kenitra, which is 40 km north of Rabat, and will feature three GE Frame 9E gas turbines that offer the flexibility to burn heavy fuel oil, with distillate as a backup. The project is part of the Moroccan government's plan to develop and modernise the nation's harbours, to help support economic growth.

Electricity consumption in Morocco is growing at 6-8 per cent per year.

Ness signs CEZ contract

Ness Technologies is to upgrade the Czech Republic's distribution network management system after signing a contract with CEZ Distribution.

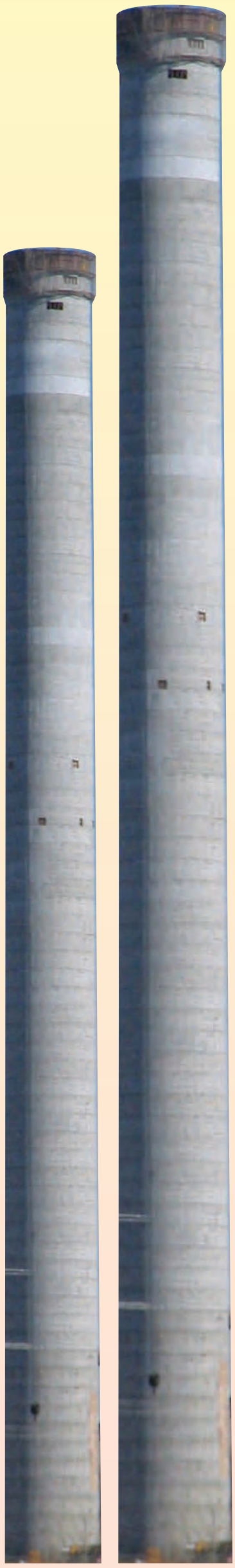
In a deal worth $12.2 million, Ness will deliver a distribution network management system that will replace five different existing dispatching systems. The new system will ensure that the management of one region can be taken over by another, and will also pave the way for smart grid projects.

The project will also enable CEZ Distribution to improve its services and the quality of its energy supplies.

Emerson to modernise Ukrainian hydro turbines

UkrHydroEnergo has awarded Emerson Process Management a $28 million contract for automation systems to manage and control 100 turbine generators in nine hydroelectric power plants in Ukraine.

The contract is part of UkrHydroEnergo's Hydropower Rehabilitation Project to upgrade and modernise the series of eight plants built between 1939 and 1975 and make up the Dnieper River energy cascade, plus the Dnestrovskaya hydroelectric power plant that was built in 1983.



Building the corridors of power

ENTSO-E recently published its pilot Ten-Year Network Development Plan. The core of the report focuses on the coming 5-15 years and represents the most up-to-date and accurate information on the planned or envisaged transmission investment projects of European importance. **Sébastien Lepy**

For more than 100 years Europe's transmission network, which is central to the region's economic evolution, has been adapting to the needs of each era.

What is particular to today's conditions is the magnitude and speed of the changes stimulated by EU legislation and the technological advances in the sector, but within a regulatory and infrastructure permitting context that does not favour the rapid expansion of transmission infrastructure.

Recognising this challenge, in 2009 as part of the Third Energy Package the EU adopted Regulation (EC) 714/2009 on electricity cross-border exchanges. This will come fully into force in March 2011.

The Regulation mandates the European Network of Transmission System Operators (TSOs) for Electricity (ENTSO-E), with new important tasks: besides the drafting of network codes, which become legally binding, ENTSO-E is also required to draft every two years a non-binding Union-wide Ten-Year Network Development Plan (TYNDP).

In anticipation of the Third Package, ENTSO-E was founded in December 2008, building on a long history of TSO cooperation of its six predecessor associations. Only a few months later, in summer 2009, ENTSO-E started preparations to launch the pilot TYNDP.

Preceded by a six-week-long public consultation, giving all stakeholders an opportunity to comment on the draft TYNDP, ENTSO-E published the finalised pilot edition of its TYNDP on June 30, 2010.

Such an early release of the first edition of the TYNDP in the form of a pilot project before the Third Package's schedule has mainly been driven by three significant factors.

Firstly, the overwhelming response of the European society to the climate change issue translates into massive investments in renewable energy sources whose efficient integration into the grid is a challenge that has to be urgently and adequately addressed.

Secondly, the wide scope and ambitious objectives of the TYNDP require a large number of dedicated resources, as well as the conception and implementation of processes and methodologies that have not yet been applied on a pan-European level.

Thirdly, TSOs need to continue contributing to the Internal Energy Market (IEM) by ensuring maximum transparency concerning operation and development of transmission grids. The TYNDP is instrumental in this respect.

The TYNDP has several main features. As demanded by the Regulation, the core of the report focuses on the coming 5-15 years, split into mid-term (until 2014 for the present release) and long-term issues. As such, all planned or envisaged transmission investment projects of European importance proposed by TSOs to address required investment needs are presented in the TYNDP and is characterised by the following features:

- The TYNDP represents the most up-to-date and accurate information of the planned or envisaged transmission investment projects of European importance.
- It provides an outlook of the future condition of the electricity power system in Europe and discusses the development and evaluation of generation-demand scenarios, based on which analyses (such as the System Adequacy Forecast) will be performed.
- Moreover, it describes the challenges related to the development of the transmission network.
- It initiates a "learning-by-doing" process to build TYNDP reports in an open and transparent manner, with the strong involvement of stakeholders, the European Regulators and the EC.

There are several key drivers for grid investment. The objectives of the TYNDP are to ensure transparency regarding the electricity transmission network and to support decision-making processes at regional and European level.

The TYNDP identifies close to 500 investment projects, worth €23-28 billion over the 2010-2014 period, to help achieve the European policy goals of:

- Increasing the use of renewable energy sources (RES) to 20 per cent of total energy production by 2020
- Further promoting the IEM by alleviating congestion on the transmission network
- Ensuring security of supply (SoS) and system reliability of an increasingly complex transmission system connecting 525 million people across the ENTSO-E area.

Meeting these goals requires some 35 000 km of new transmission lines and 7000 km of existing line upgrades. Given that the ENTSO-E transmission network consists of about 300 000 km of lines, the planned investments correspond to more than 14 per cent of the existing network in either new (12 per cent) or refurbished (2 per cent) power lines for the next ten years.

Out of this total of 42 000 km, TSOs plan to complete 44 per cent of the work in the coming five years, and about 56 per cent in the following five-year period. What is more, many projects respond to more than just one of the three energy policy goals, making the network as a whole worth more than the sum of its individual components.

The TYNDP is organised along the lines of seven main investment clusters: *Massive renewable integration in the North part of Europe:* The connection of renewable sources, mainly wind, is one of the most important drivers of this plan as these plants are often located in remote areas of low load requirements inducing changing flow patterns within the area concerned. Investment needs are threefold: connection to the network; increased onshore transmission capacity; and efficient balancing of the system. For the latter, both offshore interconnections and optimised usage of available hydroelectric facilities will trigger new investment requirements.

Massive renewable integration in the southern part of Europe: The connection and transmission of renewable sources, mainly wind, hydro and solar in the Iberian Peninsula, are major investments in the south-west and central-south regions of Europe. Moreover, internal reinforcements and increased interconnection capacity with the rest of the continent, especially France, are required.

Important east-west and north-south flows in the southeast and central south regions: The power balances and market prices of the member countries dictate these investment needs. The area including Greece, FYR of Macedonia, Albania and Italy usually imports electricity, requiring reinforcements. The north-south flow will rise in importance as new generation in Bulgaria, Hungary and Croatia will be connected to the network. A similar trend will be observed for the east-west flows but for different reasons e.g. the interconnections of new systems.

Baltic States integration: Two initiatives – the Baltic Sea Energy strategy from the Baltic Council of Ministers' Energy Committee in 1999 and the EU Commission Energy Market Interconnection Plan (BEMIP) – launched in 2008 are aimed at the full integration of the three Baltic States into the European energy market, through the strengthening of interconnections with their EU neighbouring countries. Thus, the new connections to Finland, Sweden and Poland will create a need for internal investments in the Baltic countries.

New conventional power plants: Complementary to the integration of renewable energy sources, the connection of new conventional power plants totalling more than 100 GW is foreseen all over Europe in the nextdecade either to replace old, decommissioned plants or to cope with load growth and system balancing.

Reinforcements in cities: The power supply of some European cities and regions will need reinforcements and could become an issue in Europe (Spain, France, Hungary, Slovakia, Poland, etc.) as they could interact with other investment needs in the area, or limit the available cross-border capacity.

Efficient market integration: With new locations and clustering of generation units, and greater variations in the power produced, efficient market integration is key to ensuring that wherever power is available, it can be efficiently brought to consumption areas.

While the pilot TYNDP has just been published, work on the second edition, to be finalised and released in 2012, has already started. The next edition will be aimed at updating present bottom-up scenarios, as well as developing shared, long-run, top-down, scenarios, involving regulators, stakeholders, policy and decision-makers. It will look at building a common ENTSO-E pan-European market model as well as developing further an ENTSO-E-wide common framework for the regional network studies, based on pan-European scenarios and an integrated network model for mid- and long-term.

Ultimately, the European TSOs are willing and able to make the significant investments that are required to ensure the future adequacy of the electricity infrastructure. But setting the appropriate regulatory and financial frameworks for such projects as well as overall social acceptance are of paramount importance.

Most notably, TSOs experience an increasing lack of social acceptance by affected local communities. Such social opposition usually comes on top of already long and complex permitting procedures. Consequently, delays in implementation processes may be significant or even end up in projects being cancelled.

Therefore in order to reduce the duration of the permitting procedures, the TYNDP proposes the following aspects for improvement:

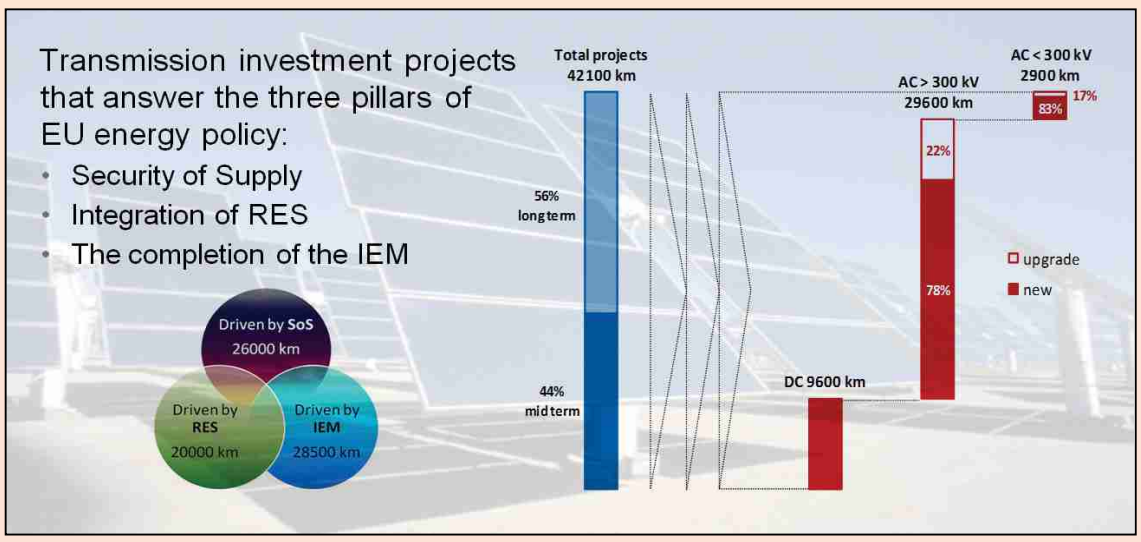
- Adapt the legal frameworks to propose a harmonised, efficient, and clear permitting procedure with compulsory time limits;
- Ensure so-called 'infrastructure corridors' for high priority infrastructure projects, reserving some land in advance;
- Recognise formally the importance of priority electricity infrastructure projects by the respective national legislation, according to EU requirements. Knowing these lines are only a means to implement policies, support from appropriate decision makers should be granted;
- Address the cultural and political issues relating to electricity infrastructure.

Sébastien Lepy is ENTSO-E Convenor of Working Group TYNDP. The full document and executive summary can be accessed on ENTSO-E's website: www.entsoe.eu

Sébastien Lepy: European TSOs are willing and able to make significant investments

The TYNDP identifies close to 500 investment projects, worth €23-28 billion over the 2010-2014 period

TYNDP drivers for investment



NUCLEARPOWER

MIDDLE EAST & NORTH AFRICA 2010

Register Before 3 August 2010 to Save S$400!

28-29 SEPTEMBER 2010

Grand Hyatt Cairo, Egypt

Key global nuclear companies:

- **CEZ Group**, Czech Republic
- **China Nuclear Power Engineering**, China
- **Electricité de France**, France
- **E.ON Kernkraft GmbH**, Germany
- **GDF Suez**, Belgium
- **Iberdrola Engineering and Construction**, Spain
- **JSC Atomstroyexport**, Russia
- **Korea Power Engineering**, Korea
- **Nuclearelectrica SA**, Romania
- **TVEL JSC**, Russia

Key MENA NPP stakeholders:

- **Ministry of Energy**, Turkey
- **Iran Nuclear Regulatory Authority**, Iran
- **National Atomic Energy Commission**, Yemen
- **Tunisian Electricity and Gas Company**, Tunisia
- **Jordan Atomic Energy Commission**, Jordan

For nuclear power industry experts who wish to:

- Uncover the region's new build outlook, key developments, challenges and opportunities identified by key stakeholders in the industry
- Formulate an effective nuclear power programme by identifying a suitable financing option and applying suitable risk mitigation strategies
- Learn from leading nuclear power countries like France, Russia, Korea on how they have successfully implemented a NPP
- Exchange ideas and build relationships with the leading utilities, regulators and service & solutions providers involved in shaping the nuclear power industry in the MENA region





I am Interested in:

By: ☐ **Speaking** ☐ **Sponsoring** ☐ **Attending**

Name: _____

Job Title: _____ Company: _____

Telephone: _____ Email: _____

Platinum Sponsor: EXCEL SERVICES CORPORATION Nuclear Engineering Consulting

Gold Sponsor: NORTON ROSE

Silver Sponsor: Herbert Smith

Round Table Sponsor: FRESHFIELDS BRUCKHAUS DERINGER

Media Partner: THE ENERGY INDUSTRY TIMES

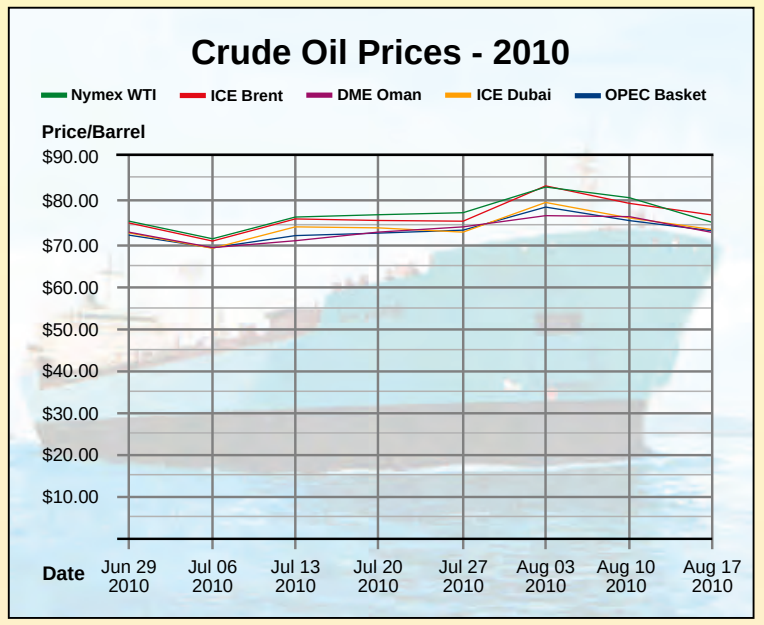
Organised by: synergy CLARION

www.nuclearpowermena.com

Fax: +65 6401 1501 Email: ciara@synergy-events.com Call: +65 6401 1358

Oil

Crude prices dip as economic recovery stays elusive



Pace of increase in demand likely to slow
Prices show no sign of "breaking decisively in either direction"

David Gregory

Crude oil prices experienced some dog days of summer in late August when prices slipped to the low $70/b range as economic data failed to show any pickup in the world economy. While prices remain in a range that is satisfactory to oil producing countries, international markets remained disappointed over the fact that global economic recovery has yet to make the advances investors are looking for. The economic data has prompted some analysts to warn of a double-dip recession.

The price of West Texas Intermediate (WTI) crude went above $82.50/b in early August but dipped below $72/b three weeks later.

According to data released by the US Department of Energy (DOE) in August, US demand for petroleum products has declined by 6 per cent to 19.7 million b/d since the recession began in December 2007, a sign that growth in the economic recovery has failed to return in a significant manner.

However, the DOE's Energy Information Administration (EIA), in the most recent issue of its *Short-Term Energy Outlook*, released on 10 August, forecast that global crude oil and liquid fuels consumption during 2010 would increase by 1.6 million b/d, with countries outside the Organisation of Economic Cooperation and Development (OECD) such as China, Saudi Arabia and Brazil expected to show the largest rise in consumption. It said of the OECD countries, only the US was expected to show significant increases in oil consumption of about 0.15 million b/d in both 2010 and 2011. It added that global oil consumption was expected to grow by another 1.5 million b/d in 2011. Again, the bulk of this will be in non-OECD countries.

The price of crude for 2010, the EIA forecast, would average $81/b in the fourth quarter of 2010 and $84/b in 2011.

Despite the disappointing economic data, the Paris-based International Energy Agency (IEA) has predicted in its latest monthly *Oil Market Report (OMR)* that demand for crude oil will rise during 2010 and 2011 to 86.6 million b/d and 87.9 million b/d respectively, with global demand growing by 80 000 b/d in 2010 and 50 000 b/d in 2011.

The IEA said total OECD demand would rise to 45.5 million b/d in 2010 and 45.3 million b/d in 2011, while total non-OECD demand would increase to 41.0 million b/d during 2010 and 42.6 million b/d in 2011. In the report, released on 11 August, the IEA said: "As non-OECD demand becomes the main driver of global oil demand growth, it is also starting to alter the world's demand seasonality, which until now followed the mould of OECD demand."

Crude prices have remained in the $70-80/b range since October 2009, London-based Centre for Global Energy Studies (CGES) noted in its latest market forecast, issued on 23 August, adding that they show no sign of "breaking decisively in either direction".

CGES said global oil demand is rising as the economy recovers, but added that the pace of the increase in demand is likely to slow during the second half of 2010 and into 2011 compared to levels seen during the first half of this year. It said that it did appear that the recovery is beginning to "run out of steam," particularly in the OECD countries. Things are also slowing in developing Asian countries, the Centre pointed out, as demand for exports from those countries has not developed as hoped.

Meanwhile, the $70-80/b oil price leaves oil producing countries "comfortable" as well as the oil industry, the CGES said. The price allows them to pursue new projects that offset the decline from older fields. These prices are also acceptable to major oil consuming countries, the Centre added, saying that it allows them to pursue environmental objectives.

CGES said at present Opec is in a position to keep prices in this range, but that it will come at a cost. This cost, it said, is that the global economy will recover more slowly and the oil market will not grow as fast as it would have done with more moderate prices.

Gas

Sanctions force Iran to abandon LNG dream

Following the latest international sanctions, in early August Iranian officials announced that the country would not proceed with plans to develop two long-planned LNG projects.

Mark Goetz

International sanctions directed at Iran over its nuclear programme have forced the country to abandon its plans to develop a major LNG industry on par with that of its Persian Gulf neighbour Qatar, where output is set to reach 77 million tons annually later this year.

US and European sanctions to see Iran stop its enrichment of uranium, effectively bar any transfer of technology or equipment to Iran by Western companies that have long desired to participate in Iran's natural gas reserves, the second largest in the world. This latest round of sanctions affects Total, Shell and Repsol, which have for years been involved in negotiations to develop offshore reserves that are part of Iran's South Pars multi-phased gas programme.

The political situation has finally led to those European companies being forced to bring negotiations – which have lasted for years because of the political situation – to an end. If South Pars development is to move ahead, Iranian companies will take responsibility, perhaps with some assistance from the China National Petroleum Corporation (CNPC), which is expected to adhere to the trade restrictions set by the UN.

Sanctions have not only put a stop to investment in Iran's gas industry by most foreign companies, but they have also forced a drastic reduction in petroleum product imports into the country, which is unable to refine enough to meet domestic demand.

In early August Iranian officials announced that the country would not proceed with plans to develop two long-planned LNG projects – Pars LNG and Persian LNG – projects in which Total, Shell and Repsol YFP had originally planned to participate. Gas reserves that would have been produced from Phase 11 (Pars LNG) and Phases 13 and 14 (Persian LNG) are now to be developed by Iranian firms and either re-injected into oil fields or directed into the national gas grid.

Work is to continue on the Iran LNG project, but it is not expected to come on-stream in the near future as it too is lacking essential technology and equipment.

Despite the fact that it has been clear for some time that Iran's LNG sector has been beset with drawbacks, the Iranian authorities have insisted that the country could be producing large volumes of LNG by the middle of this decade.

As its sole means of earning foreign currency from gas exports, Iran said it would seek to expand its natural gas exports by pipeline rather than LNG, which it now says is more costly and technically complex. But this option also poses problems.

For several years Iran has been talking of boosting exports through its pipeline to Turkey for export to Europe – via Nabucco or the Trans Adriatic Pipeline (TAP). Nabucco stated last year that it does not intend to involve Iranian gas in the project at this time, and while TAP has a contract to purchase 5 billion m^3/year of Iranian gas, EU sanctions now make that deal highly unlikely.

Furthermore, despite having the second largest gas reserves in the world after Russia, Iran has been unable to meet its own domestic demand during the worst months of winter. At times it has had to halt its exports to Turkey, which amount to around 23 million m^3/day.

It has imported about that amount from neighbouring Turkmenistan, but a new agreement and pipeline from there is expected to boost Turkmen imports to around 32 million m^3/day this year. Iran also has a deal to import a small amount of natural gas from Azerbaijan in return for shipments to the Azeri enclave of Nachichevan.

Iran recently completed a gas pipeline sales agreement with neighbouring Pakistan and had hoped to extend the proposed pipeline to India. However, the severe recent flooding in Pakistan has placed even more financial strain on that country and the future of the project looks uncertain.

Recently, Iraq gave Tehran permission to export natural gas across its territory to customers in Syria and the Mediterranean (very likely Lebanon). Yet, while the plan appears to be workable, the practicality is not there. Iraq itself has huge undeveloped natural gas reserves which Baghdad would like to export to Syria, Turkey and European countries through Egypt's soon to be completed Arab Gas Pipeline (AGP), but the infrastructure does not exist.

Iranian officials have stated that the country would export through Iraq using its IGAT-6 pipeline, which is still being constructed. The IGAT-6 is to have a 110 million m^3/day capacity (40 billion m^3/y). Of this 50 million m^3/day (18.25 billion m^3/y) would be distributed throughout Iran, the remaining 60 million m^3/day (21.75 billion m^3/y) would be exported to Iraq and beyond.

Iran has the gas potential to eventually make a project like this materialise. But its own economic problems, its internal political machine, its international relations and its relations with its neighbours, as well as the volatile situation in the Middle East make it unlikely that Iran will see this potential realised until major changes take place.

A powerful tool for energy management

The European Commission, CEN/Cenelec and many industries are hoping to harmonise and provide guidance on energy management practices through the implementation of a new European standard.

Inge Pierre

The need for a European standard for energy management systems has been driven by energy and environmental issues, which have become the focus of European politics in the last couple of years. Security of energy supply and global warming together with the impact of increasing energy prices on the economy, have forced politicians in Brussels to act.

This action has taken the form of a new European standard for energy management EN 16001, which is now being implemented across Europe.

The EC has stipulated that by 2020 greenhouse emissions must be cut by 20 per cent, energy efficiency should be improved by 20 per cent and the share of renewables must be 20 per cent of the total energy consumption. However, early on it realised that these targets could not be achieved without a number of actions.

One example of such action is the Directive 2006/32/EC for energy end-use efficiency and energy services; another is the Energy Efficiency Action Plan that was presented in October 2006. A new Action Plan will be presented in spring 2011 at which time the 20 per cent target for energy efficiency improvement could be turned into a binding target.

With energy efficiency becoming a very important pan-European issue, many governments are already implementing programmes according to the various EU Directives to improve all types of energy efficiency. In some countries such as Denmark, Sweden and Ireland a special standard for energy management systems was developed and introduced some years ago.

The positive results from these countries observed in a study performed by an advisory group within CEN/Cenelec, the European standardisation organisations, led to the formation of a project team to develop a European standard for energy management systems.

The team started its work in January 2007 and a standard was published on July 1, 2009, five months ahead of schedule. This new European standard for energy management systems known as EN 16001 will be a powerful tool for companies to review their energy situation and improve their energy efficiency in a systematic way.

Many companies have adopted an energy management system, often as part of their existing management standards (ISO 14001, 9001 etc), and have been certified by independent third parties. The new EN 16001 standard for energy management systems can be used separately, but has been designed to complement ISO 14001. Even if the two standards have different scopes, they have similar designs in order to facilitate their use.

With the focus on issues such as the cost of energy, it is natural for companies looking into this field to start investigating how they can improve energy efficiency. Simple common sense can deliver many improvements and significant energy savings since there is great potential for improved energy efficiency among many European companies, although the situation is much better today than some 20-30 years ago.

To find the maximum potential for energy savings organisations should review their energy situation in a more systematic way. Many companies have therefore introduced different forms of energy management systems.

An energy management system can be described as a tool that helps companies to control, manage and improve their energy use. Through good energy management, a company can ensure that it has knowledge of how the energy is used and create a system that continuously detects and implements measures aimed at reducing energy use and costs.

Many different energy management systems have been introduced and although they all aim to improve energy efficiency, the ways to achieve this can vary.

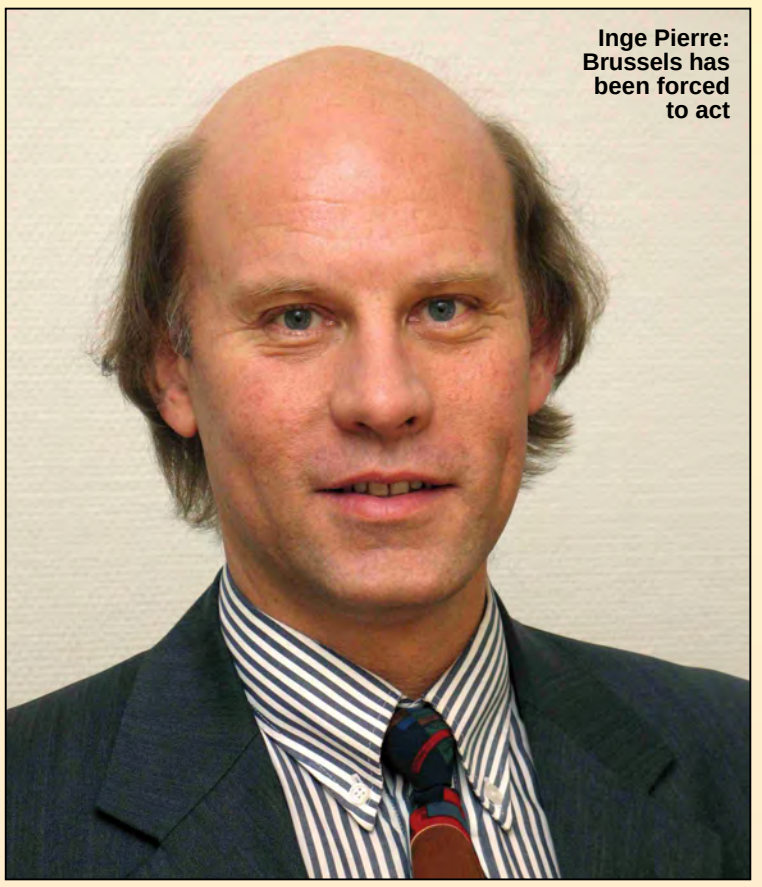
With this in mind, countries such as Denmark, Sweden and Ireland decided some years ago to create a standard for energy management systems to offer companies a single systematic but well proven way of improving energy efficiency.

Many companies demanded a standardised energy management system similar to the existing environmental management system standard ISO 14001 used by more than 50 000 companies worldwide.

Denmark was first with a standard for energy management systems that was published in 2001. Sweden came some years later followed by Ireland. These standards have achieved very good results.

It was therefore no surprise when CEN/Cenelec investigated in 2005 what type of standards could improve energy efficiency actions. The European standard EN 16001 for energy management systems was the first standard to be created and published from a list of planned new standards in the field of energy efficiency.

The basic principle of an energy management system is to have a systematic way of: reviewing an organisation's energy situation; find ways to improve energy efficiency; implement new methods for improving energy use; control the results and compare them with established targets and objectives; perform corrective actions if targets are not reached; document all the actions performed; review the energy management system itself; and find continual improvements.



Inge Pierre: Brussels has been forced to act

Using an energy management system is not a "one time action"; improving energy efficiency is an ongoing process that should be run over and over again. The process included in an energy management system is often called the PDCA-cycle – Plan, Do, Check, Act.

When creating the EN 16001 this process was the main guideline for the structure of the text. Since the global environmental standard ISO 14001 is constructed in a very similar way, many headlines from that standard are used with only minor modifications.

The standard was published on 1 July 2009 and is now in its implementation phase. The new European standard replaces national energy management standards that are already in place in countries such as Denmark, Sweden and Ireland.

The speed of implementation is varying from country to country. In Germany, Spain, UK and Italy, many companies have already implemented the new standard and have achieved improved energy efficiency, cut their costs for energy use and succeeded in becoming "greener". According to some sources, almost 100 companies in Spain have already implemented the new standard.

The EN 16001 standard is also being used outside Europe. For example, some companies in India and Uruguay are implementing it.

In Sweden the national Swedish standard for energy management systems was linked to a five-year programme, run by the Swedish Energy Agency, aimed at improving energy efficiency in energy-intensive industries. This programme has provided the energy-intensive companies with the opportunities to reduce their electricity tax in return for energy efficiency improvements but they had to implement the standard and become certified.

More than 110 industrial companies with around 250 separate production plants participated and 1.4 TWh of electricity per year was saved. In addition, a large amount of fuel was saved and the cost of energy consumption was reduced.

The new European standard EN 16001 for energy management systems is expected to achieve similar results as the Swedish standard. Apart from direct returns in the form of improved energy efficiency and lower costs, companies will also benefit from better trained staff with greater knowledge of energy use.

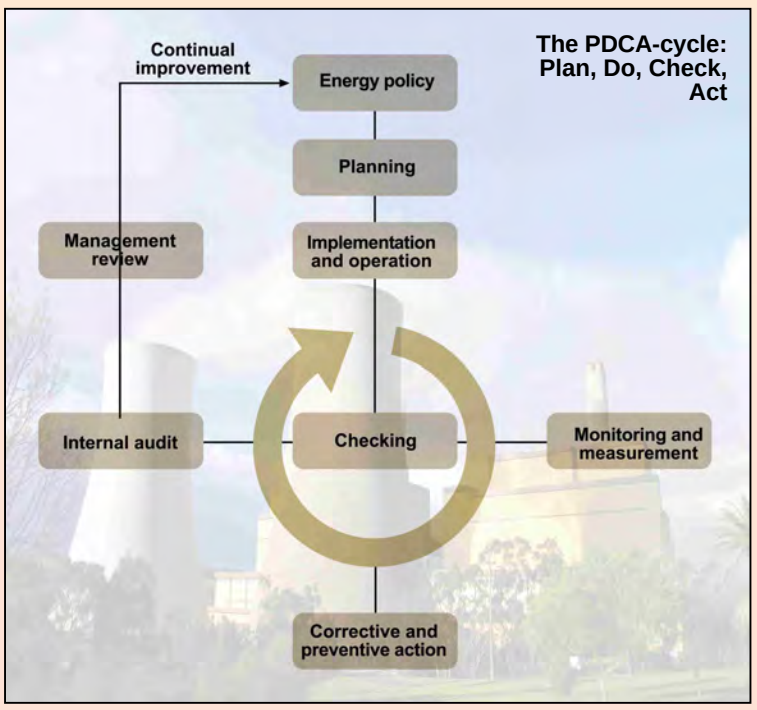
Another added value is that the companies will have an improved method of measuring their energy use, which can help their overall business. Although some resources are necessary for implementing the standard, in the long run it will reduce total costs for most companies.

The issue of improving energy efficiency is not "local" to Europe. At the global level there are strong incentives from governments and environmental organisations to save energy.

Many companies realise that improved energy efficiency goes hand-in-hand with reducing costs. Therefore in 2008 an ISO-project, led by the US, Brazil, China and UK, kicked off with the aim of developing a global standard for energy management systems.

Work has proceeded well and a standard could be ready in late 2011 if all goes according to the current plans. This standard will be called ISO 50001, with content similar to EN 16001. Much of the experience gained from EN 16001 is being used in the development of this new ISO 50001 project.

Inge Pierre is head of European Affairs at Svensk Energi-Swedenergy and is chairman of the project team responsible for EN 16001.



The PDCA-cycle: Plan, Do, Check, Act

Alkaline fuel cells have landed

Following successful trials, a fuel cell has been delivered to generate power at a facility in Australia. The unit, hailed as the first hydrogen fuel cell to be successfully trialled with underground coal gasification, uses a technology that has its roots in space flight. **Junior Isles**

Alkaline fuel cells (AFCs) have been around for decades. Also known as the Bacon fuel cell after its British inventor, AFCs were on board the first manned flight to the Moon and have been used by NASA since the mid-1960s in Apollo-series missions and on the Space Shuttle. Yet despite a long history, their use in the power generation industry has been all but non-existent.

A recent project, however, looks set to put AFCs in the industrial spotlight. Australian company, Linc Energy has installed an AFC at its facility near Chinchilla, a rural community about 300 km west of Brisbane, Queensland. According to Linc Energy, it is the first time that a hydrogen fuel cell has been successfully trialled with syngas produced from underground coal gasification (UCG). The fuel cell is being supplied by UK company, AFC Energy.

Commenting on the application of AFCs for industry, Dr Gene Lewis, Technical Director at AFC Energy said: "AFCs use materials that are available from a number of manufacturers and processes that have been used in the automotive and mobile phone sectors. Essentially, we are looking at 1950s technology through 2010 eyes, a leap no one has made until now."

Dr Lewis has been involved with the development of the unit from the start of 2009. His interest in alkaline fuel cells follows years of focusing on solid oxide fuel cells (SOFCs). Commenting on SOFCs he said: "Operating a SOFC at 1000ºC is a very difficult thing to do. Generally speaking materials don't like to operate at such elevated temperatures. To overcome this calls for engineering solutions that result in a very expensive device. This is arguably why the technology has not really gone anywhere, even after decades of development."

After turning away from SOFCs, Dr Lewis decided to look at other fuel cell technologies. "I had heard about AFCs but like everyone in the fuel cell community, I associated them with NASA, Gemini and Apollo space missions. My initial opinion was that it was 'old hat' technology. This is the perceived view but it is changing. It baffles me that no one has considered alkaline fuel cells. But everyone had been missing the trick. It is about using the technology in the right application."

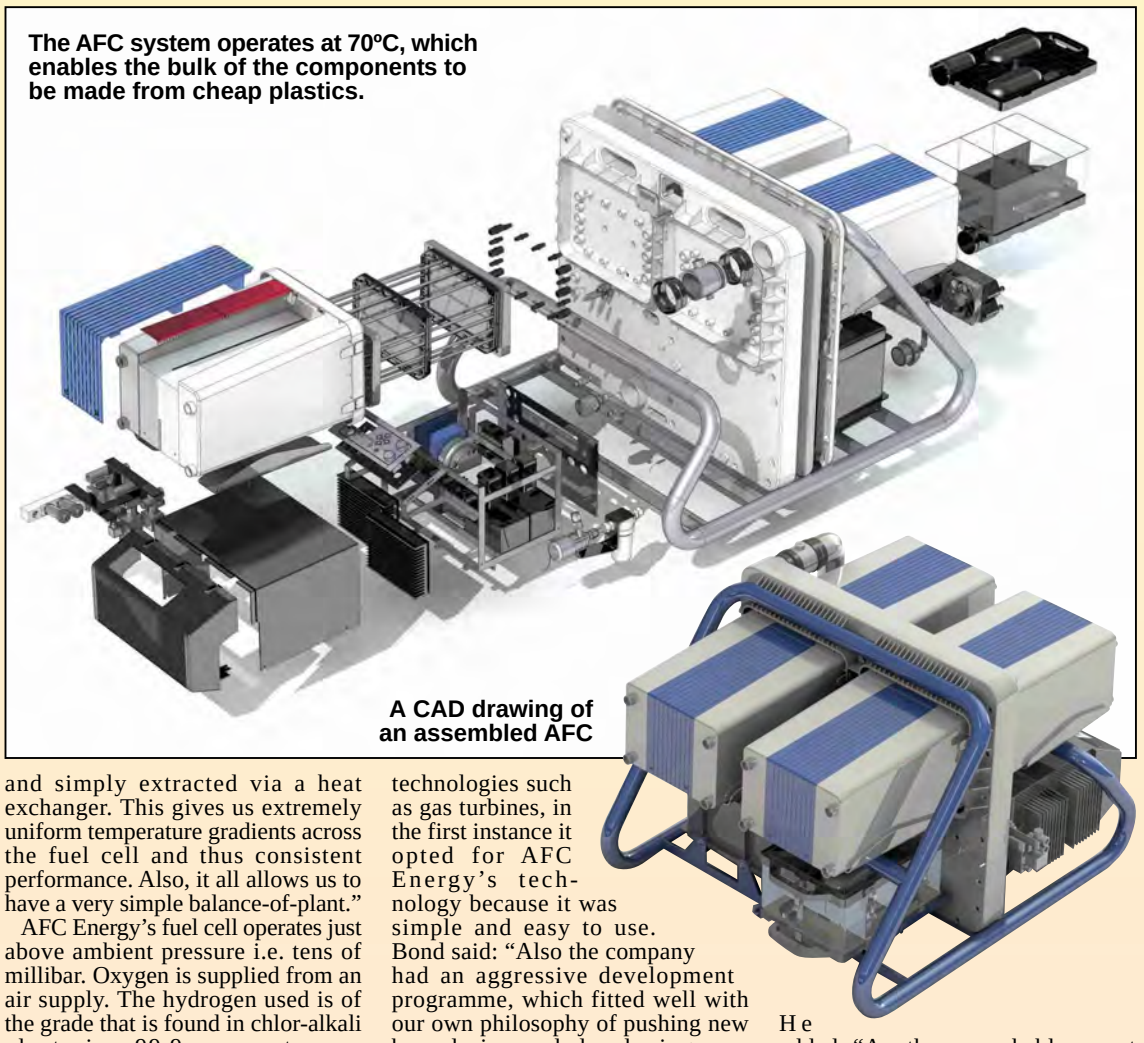
Dr Lewis believes the attraction of the technology lies in its simplicity and low cost. He explained: "In an industrial setting, space is not a premium, such as in the automotive sector and the operating demands are not as rigorous. In an industrial application, which is where AFC Energy is focusing, a fuel cell does not need a high volumetric power density. This allows a simple design that does not need to be operated under high pressure."

Costs are reduced due to the low operating temperature and the use of widely available materials. "The AFC system operates at 70ºC which enables the bulk of the components to be made from cheap plastics. Also, 50 years ago an AFC used platinum-based catalyst materials that currently cost around £30 per gram. Now there is a new breed of ceramic materials that can be supplied by a number of manufacturers at a fraction of this cost," said Dr Lewis.

An AFC converts oxygen (from the air) and hydrogen (from a supply) into electrical energy and heat. It is chemically comparable to a battery that will provide electric power continuously, as long as it is fed with hydrogen and air. The only by-products are demineralised water and heat. Excluding water, an alkaline fuel cell is a zero emission device.

In AFC Energy's fuel cell, the electrolyte is an alkaline liquid: in this case, potassium hydroxide (KOH). "This is a very cheap electrolyte; basically it's like an industrial bleach. We use it because it has a very high electrical conductivity," noted Dr Lewis. The presence of the hydroxyl ions travelling across the electrolyte allows a circuit to be made and electrical energy produced. The high conductivity of the electrolyte helps an AFC to have the highest electrochemical efficiency of all types of fuel cells – around 60 per cent electrical efficiency.

According to Dr Lewis, a flowing electrolyte makes thermal management much easier. "Heat management limits other fuel cells in terms of performance, size and control. In our system, the heat is captured by the flowing electrolyte and simply extracted via a heat exchanger. This gives us extremely uniform temperature gradients across the fuel cell and thus consistent performance. Also, it all allows us to have a very simple balance-of-plant."



The AFC system operates at 70ºC, which enables the bulk of the components to be made from cheap plastics.

A CAD drawing of an assembled AFC

CAD drawing of a multi-megawatt system

AFC Energy's fuel cell operates just above ambient pressure i.e. tens of millibar. Oxygen is supplied from an air supply. The hydrogen used is of the grade that is found in chlor-alkali plants i.e. 99.9 per cent pure.

The catalysts used are robust, cheap ceramic materials developed for operating in conditions where there may be much higher sulphur and chlorine content in the hydrogen feed. "The use of these ceramics means we can potentially work with dirtier gases in the future" said Dr Lewis.

AFC Energy completed a sixth month testing programme in its laboratories before delivering and completing a successful field trial of an alpha unit at Linc Energy's site in Chinchilla.

Gasification of coal is one of the richest sources of hydrogen in the World. The hydrogen produced at Linc Energy's Chinchilla UGC facility is of the grade on which the AFCs have been previously tested.

Linc Energy first began UCG trial operations near Chinchilla in 1999. Since that time, Linc Energy has further developed the site through the construction of three additional UCG fields, a large demonstration gas-to-liquids (GTL) facility, and a research laboratory.

Peter Bond, CEO of Linc Energy said: "It is the only facility of its kind in the world. It provides us with a unique research and development capability as we prepare for the commercialisation of both UCG-to-GTL and UCG-to-power technologies in locations in Australia, UK, Europe and the US as well as other locations around the globe."

Although Linc Energy plans to use fuel cells in conjunction with other technologies such as gas turbines, in the first instance it opted for AFC Energy's technology because it was simple and easy to use. Bond said: "Also the company had an aggressive development programme, which fitted well with our own philosophy of pushing new boundaries and developing new opportunities in an economical and effective commonsense manner."

Initial testing with the AFC unit at Linc Energy's Chinchilla Demonstration Facility was performed following successful trials in April/May 2010 at AFC Energy's UK facilities using mock syngas of comparative composition to that generated at Linc Energy's Chinchilla facility. The Chinchilla trial successfully demonstrated the ability to generate clean electricity from alkaline hydrogen fuel cell technology from syngas derived from UCG operations.

Bond said: "We obtained encouraging and higher than expected voltages, which then showed that hydrogen fuel cells could be utilised with syngas without separation. What is even more remarkable is that when we do separate the hydrogen from the syngas, even better results will be achievable."

Linc Energy says it plans to have the next generation fuel cell (the Beta cell) operating at Chinchilla early next year. The main goal will be to demonstrate consistent power generation over a period of time.

Bond believes that alkaline fuel cells represent the most effective opportunity and capability to commercialise hydrogen fuel technology. "Other gas turbine technologies, although good, are not as effective as the alkaline fuel cell options," he said.

He added: "Another remarkable aspect of this trial is that the fuel cell configuration was able to produce reliable and efficient clean electricity from a much lower percentage hydrogen content gas than other fuel cells require.

"This effectively demonstrates that combining the AFC fuel cell technology with hydrogen from Linc Energy's syngas produced from the UCG at Chinchilla is a feasible route to achieve the ultimate in clean electricity from stranded, sub-economic coal, of which there is an abundance in the world."

AFC Energy also believes that its technology is the best option in such scenarios. Dr Lewis noted: "Its performance gives the best bang for the buck. We believe we have developed the simplest, cheapest and most efficient way of converting hydrogen to electricity."

Dr Lewis estimates that costs for a 1 MW system would be in the region of £400 000 ($600 000). This, he says, will result in a payback period of a few years.

AFC Energy is currently engaged in economies-of-scale efforts, which Dr Lewis says will further reduce costs.

He summed up: "Other fuel cell companies have either commercial or technical barriers to overcome; we have neither. There have been a lot of false dawns surrounding fuel cells and many negative perceptions. Hopefully we will be the ones to change all of this."

Junior Isles

Keep your friends close...

Many regard the Russian writer Leo Tolstoy as one of the greatest novelists of all time. But it is his later efforts as an ardent pacifist that could be more useful when observing the ongoing saga of uranium enrichment and Iran versus the western World.

Iran's defiance in the face of pressure from the West, largely led by the US, has seen it cast as 'the enemy' in its effort to develop a nuclear power programme that also includes it mastering the technology to produce the fuel needed for its reactors. The West suspects that Iran is using its nuclear programme as a cover to produce weapons and has been attempting to stop the country developing uranium enrichment expertise. Iran denies the accusations, saying the programme is for peaceful purposes.

Enriching uranium creates fuel for nuclear power plants but can also, if taken to higher levels, produce the material for weapons; Iran's growing capacity in this process is at the centre of its dispute with the international community.

With the imminent start-up of the Bushehr nuclear power plant, Iran is already looking to massively increase its quota of nuclear reactors to meet its increasing electricity demand while preserving its fossil fuel resources.

Iranian Foreign Ministry spokesman Ramin Mehman-Parast said: "We have a long-term programme on our agenda and the number of atomic power plants should increase so much that our nuclear power generation capacity grows 20 times more than the existing capacity at Bushehr [nuclear power plant]. Based on parliament's approval we need to build new nuclear power plants to supply the country's electricity needs and the countries which are ready to build and launch the plants can step into this lucrative and important market under an international competitive atmosphere."

The announcement seems to go against the grain of current relations between Iran and the international community but could be an important olive branch in the long running dispute.

At the end of last year, the discovery of a secret enrichment facility near Qom renewed westerns fears that Iran may have other sites where it is enriching or preparing to enrich uranium. This led the UN Security Council to impose a fourth round of sanctions against Iran in June this year.

To add to international concerns, Iran has started drawing up plans for supplying fuel for future nuclear power plants. Last month the country confirmed that it plans to build 10 uranium enrichment facilities that would be located inside mountains. Iran said it needs 20 large-scale sites to meet domestic electricity needs of 20 000 MW in the next 15 years.

Steve Field, spokesman for British Prime Minister David Cameron's, said that the announcement was a cause for concern. "The reports that we have seen certainly do not give us any comfort that Iran is moving in the right direction," he told reporters.

French Foreign Ministry spokeswoman Christine Fages, meanwhile, said the announcement "only intensifies the deep worries of the international community about the Iranian nuclear programme". She added: "We want Iran to respect its international obligations by suspending all its activities of uranium enrichment."

Yet in the event that Iran continues on its current path, perhaps the West could learn from Russia's involvement with Iran.

Russia has argued that the Bushehr project is essential for persuading Iran to cooperate with the International Atomic Energy Association (IAEA), the UN's nuclear watchdog, and fulfill its obligations under international nuclear non-proliferation agreements.

Russia signed a $1 billion contract to build the plant in 1995, and supplied the uranium fuel for it more than two years ago, but the launch has been put off for years.

Now 15 years after contract signing the project is finally coming to fruition. Last month saw the start of the first fuel injection process for the power plant. The process involves inserting 163 fuel assemblies into the reactor. This will be completed in late September when the last of the fuel rods reaches the centre of the reactor at which time the first nuclear plant in Iran, and indeed the Middle East, will begin operation. Commercial electricity production is scheduled for December.

It has been a long time coming but to the good fortune of the West, delaying the project has given Russia continued influence with Iran in international attempts to have it stop uranium enrichment.

The terms of the deal between the countries commit Iran to allow Russia to retrieve all used reactor fuel for reprocessing to avoid the possibility of Iran using plutonium contained in the spent fuel to make nuclear weapons. Iran has said that IAEA experts will be able to verify that none of the fresh fuel or waste is diverted.

> "The countries that are ready to build and launch the plants can step into this lucrative and important market under an international competitive atmosphere"

Commenting on the deal with Russia, Mohammad Ahmadian, Managing Director of Iran's Atomic Energy Generation and Development Company, a company affiliated to the Atomic Energy Organisation of Iran, said: "Russia is contracted to provide fuel for the Bushehr plant for 10 years, and under the terms of the agreement we can acquire the required fuel from different sources. The plant needs 30 tons of fuel annually and we will need more if other units go on stream." Ahmadian added: "We will negotiate from a stronger position if we can produce fuel domestically, even if we want to receive some fuel from abroad."

The US sees the Russian move to launch the Bushehr reactor as a false signal to Tehran as it strives to isolate Iran politically and economically to force it to compromise on enrichment.

Certainly Russia has walked a fine line on Iran for years. As one of six world powers leading international efforts to ensure Iran does not develop a nuclear weapon, it has strongly criticised the US and the European Union for following up with separate sanctions after the latest sanctions by the UN Security Council – which Moscow supported – were passed.

Sergei Kiriyenko, head of Russia's Rosatom, said that the startup of Bushehr will demonstrate that Iran is entitled to peaceful use of nuclear energy under international supervision.

In a meeting with Russia's Prime Minister Vladimir Putin, Kiriyenko said the startup is a "landmark event" that will show that Russia respects its international obligations. "We have proven that Russia always fulfils its obligations," he said, adding that Russia has argued that every country, including Iran, has the right for peaceful use of nuclear energy if it accepts international controls and norms.

As a signatory of the Nuclear non-Proliferation Treaty indeed Iran does have the right, and only time will tell whether it uses that right as it is intended. But Russia's seeming empathy with Iran probably has little to do with following the ideals of its greatest novelist. More likely there is method in what the US sees as madness.

The West seems set on using sanctions as a stick with which to beat Iran into submission. But a stick can be wielded in many ways. It can be used to dangle a carrot from, as a lever in ongoing negotiations as Russia has done.

The international community should seriously consider the political as well as the economic benefits of building nuclear power plants in Iran, and more importantly the role it could play in determining how the sector evolves.

It is always easier to influence a game as a player on the field as opposed to being on the bench. And this is the lesson that the international community can learn from Russia.

If Tolstoy and *War and Peace* is a little too difficult to comprehend, then maybe a few words from Michael Corleone in *The Godfather II* make more sense: "Keep your friends close and your enemies closer." Perhaps the US should keep this in mind when and if it responds to Iran's invitation to the international community to help expand its nuclear generating capacity.

"We have a new addition to our 'special relationship'..."