

Offshore connections

EU ministers see the value of investing in offshore links.

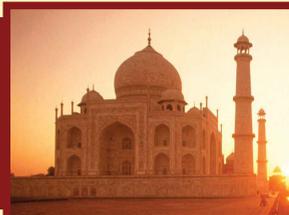
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THE ENERGY INDUSTRY TIMES

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Focus turns to Mexico after Copenhagen failure

Following the failure to sign a legally binding global agreement on climate change in Copenhagen, world leaders are now hoping to reach an agreement in Mexico City this summer.

Junior Isles

World governments are hoping to fill in the missing text in the climate change accord from the COP15 meeting in Copenhagen and turn it into a formally accepted agreement within the next six months.

After failing to reach a consensus in Copenhagen, the UN has its work cut out in order to strike a deal during the 16th session of the Conference of the

Parties to the UN Framework Convention on Climate Change to be held in Mexico City this summer.

The Copenhagen accord was approved after marathon negotiations by the US, China, India, Brazil and South Africa. The accord says greenhouse gases and other emissions by all nations must be reduced enough to prevent average global temperatures – the key index of global warming – from rising more

than two degrees Celsius.

The Copenhagen accord also commits rich nations to contribute \$30 billion to a fund to help developing nations curb their emissions over the next three years (2010-2012). They also set a goal of increasing funding up to \$100 billion by 2020.

However, it does not set specific emissions guidelines for achieving the temperature goal. As published,

the section intended to show commitments to curb emissions by big economies has been left blank. A deadline of January 31st has been set for the submission of these emission targets.

As explained by US President Barack Obama on the last day of the conference, countries will list "concrete commitments" into the document's appendix, and would be subject to

Continued on page 2

Chinese utilities forced to buy power from renewable sources

China's utilities will be required to buy all the power produced by wind farms and other renewable sources under a new law meant to promote the industry and reduce heavy reliance on coal.

At the end of last month, legislators approved the measure as an amendment to China's 2006 renewable energy law, the official *Xinhua News Agency* reported.

Beijing has set ambitious goals for wind, solar and other renewable energy in an effort to clean up its environment and curb surging demand for imported oil and gas.

"The legislation on improving the consumption of clean energy contributes to the global fight on climate change," said Wang

Zhongying, director of the renewable energy development centre of the Cabinet's main planning agency, according to *Xinhua*.

Xinhua gave no details of pricing but said companies that operate China's power grid could be fined if they refuse to buy renewable power. It said grid operators would be required to improve their technology and capacity to absorb power from renewable sources.

China faces the challenge that its windiest areas are far from its major cities, requiring costly transmission lines that in many areas have yet to be built. Wind farm construction has raced ahead so fast that 25 per cent are not connected to the national power grid.

China is one of the biggest users of wind power and the government is

trying to promote the use of solar by promising to pay up to 70 per cent of the cost of new systems.

Government goals issued in 2005 call for at least 15 per cent of China's power to come from wind, solar and hydropower by 2020, up from the current 9 per cent. Officials say that target may be raised to 20 per cent because the industry is developing so fast.

In 2008, China used a total of renewable energy equal to 250 million tons of standard coal, avoiding 600 million tons of carbon emissions, according to statistics of the National Energy Administration. By the end of 2008, its installed capacity of hydro electricity reached 172 GW, the highest in the world. At the same time, installed

capacity of wind power has doubled for three consecutive years.

Coal provides two-thirds of China's power and is expected to remain the dominant energy source in coming years.

China is the world's biggest emitter of greenhouse gases but is not bound by global agreements on curbing emissions because it is a developing economy. However, it has promised to reduce emissions of carbon dioxide for each unit of economic output by 40 per cent to 45 per cent from 2005 levels by 2020.

According to Zou Ji, a professor with the Renmin University of China, reaching the 45 per cent target by 2020 would cost the country \$30 billion per year over the next 10 years.

Barack Obama:
US President



(Continued from page 1)

international consultation and analysis, leading to a hoped-for binding document later.

So far, the US has pledged to cut its emissions by 17 per cent by 2020, compared with 2005 levels. This, however, is under the condition that domestic legislation is passed. The EU has promised a cut of 20 per cent by 2020 compared with 1990 levels. Most developing countries have agreed only to cut the future growth of their emissions.

Rather than committing to a single target, many countries have agreed to a range. For example, the EU has promised a cut of 30 per cent if other countries also agreed to more ambitious targets. Weeks before the conference, China said it would cut 'carbon intensity', a measure of carbon dioxide emissions per unit of production, by 40 to 45 per cent by 2020, compared with levels in 2005.

This will mean some tough negotiations in the coming weeks in order to get countries to agree to go for their upper targets.

A major problem with the accord is that it was not formally accepted by the Copenhagen conference. The accord essentially does not extend beyond the 28 countries represented in the final negotiations and is in effect not a formal UN decision, but a voluntary agreement. Speaking on the Saturday morning of the conference, Su Wei, China's chief negotiator said: "This is not an agreed accord... it is not formally endorsed or adopted. It is prepared or discussed by a group of people who have been specially invited." This means that the accord can be easily sidelined, potentially signalling a further six months of tough negotiations to win unilateral acceptance, to be followed by the task of turning it into a legally binding treaty.

Following the conference Yvo de Boer, head of UN Framework Convention on Climate Change told reporters: "Think of it this way: More than 110 world leaders, an unprecedented number, convened here, with roughly two dozen crafting a weak agreement in less than a day. And yet that deal, the Copenhagen accord, is the basis for next year's effort, which will try again to reach more concrete and dramatic steps."

"We should be conscious of the huge challenge that lies ahead of us," de Boer said.

Commenting on the accord, Anthony Hopley, head of climate change and clean energy at Norton Rose LLP said: "We note that the accord devolves a number of functions to the COP. However, as the COP was unable to marshal the consensus required to adopt the accord as a COP Decision, this could create an interesting dynamic to next year's [2010] negotiations."

Contentious areas that remain to be clarified, according to Norton Rose, include the negotiation of a second commitment period of the Kyoto Protocol (the accord is not specific on this point) and the fact the accord contains no reference to entering into a legally binding instrument.

Europe plans wind power grid

EU plans to generate 20 per cent of its energy from renewables received a boost when a group of energy ministers agreed to develop a grid to link offshore wind turbines.

By Junior Isles

Nine European nations have pledged to build more links between wind power stations in the North and Irish Seas, which could help them boost the output of renewable energy.

Energy ministers from Britain, Germany, France, the Netherlands, Sweden, Denmark, Belgium, Ireland and Luxembourg promised to develop a new offshore power grid to link up electricity produced from offshore wind turbines.

The European Union is aiming to generate a fifth of all its energy needs from renewable sources by 2020 to reduce reliance on imported oil and gas, and to meet climate change goals to reduce greenhouse gas emissions.

Wind power will likely play the major role. The European Wind Energy Association says wind could generate up to 16 per cent of all EU energy – or a third of all electricity – by 2020, if governments help fund more wind farms and power links.

In mid-December, Ofgem, the UK energy regulator short-listed six bidders to own and operate high voltage electricity transmission lines for nine British offshore wind farms.

Ofgem E-Serve – the regulator's delivery arm, which administers its environmental programmes such as the Renewables Obligation and Climate Change Levy – said that the winning bids for the first phase of links are worth more than £1 billion (\$1.6 billion) and would be announced in May this year.

The winners for the nine projects in the first phase of a £15 billion investment programme will connect up to 2000 MW of renewable electricity to the UK power grid. The programme, which could link up to 33 GW of offshore wind farms to the grid by 2020, is aimed at ensuring that transmission links are built in a timely and cost-efficient manner.

"If Britain is to meet its climate change targets and secure energy supplies, Ofgem's Project Discovery

estimates that up to £200 billion may need to be invested," said Ofgem's Chief Executive Alistair Buchanan in a statement.

Wind energy producers complain that there are insufficient links between countries and power stations to allow wind power to be transmitted to where it is needed. The EU's executive also called for more cross-Europe links to secure the power supply and prevent blackouts.

Last month the UK's National Grid Plc and Dutch power network operator TenneT TSO BV received a €300 million loan from the European Investment Bank for the 1000 MW HVDC link being built between the UK and the Netherlands.

The cable, which is already under construction, will connect the Isle of Grain, Kent, with the Maasvlakte area near Rotterdam. It is expected to be completed by the end of this year and will become commercially operational in the first quarter of 2011.

Asian power firms eye international markets

Energy security concerns and business expansion plans are driving Asian power generation companies to turn to international markets for growth opportunities according to a report by industry analysts, Datamonitor.

Indian utility National Thermal Power Corporation (NTPC) is working on a proposal to build a 4000-5000 MW gas-fired power plant in Iran at a cost of around \$5 billion. The company is also looking to develop a 500 MW coal-fired power plant in Sri Lanka. Bharat Heavy Electricals Limited, India's leading power equipment manufacturer, won a contract for setting up a \$100 million, 120 MW cogeneration power plant in Indonesia. In addition, the company has formed a joint venture with National Hydroelectric Power Corporation, which is also looking to develop hydro plants in Bhutan and Myanmar, in order to venture into the central Asian markets.

Other Asian companies are making similar moves. Electricity Generating

Plc (Egco), Thailand's second largest power producer, has been in talks to acquire shares in one or two power plants in neighbouring countries for about \$150-300 million each.

As part of its strategy to expand overseas investment, Egco is also in talks with Italian-Thai Development Plc, Thailand's largest construction company, to buy the latter's 15 per cent stake in the Nam Theun II hydroelectric project in Laos.

Vietnam, Indonesia, the Philippines, and Laos are the prime targets for Egco, which sees diminishing opportunities for building new plants in Thailand as demand growth eases.

Chinese firm Huadian Group Power Operations Limited recently signed a contract with the Sri Lankan government through which it will set up a coal-fired power plant. Also following this trend, Sri Lankan company Hydropower International Limited is helping East African countries like Tanzania, Rwanda and Burundi to set up small hydro power

plants.

However, various technical, commercial and political risks pose significant challenges to these companies' plans to establish an international footprint says Datamonitor.

If the parties involved do not guard against such risks, projects are likely to suffer a fate similar to that of the proposed gas pipeline between India-Pakistan-Iran, which has been derailed due to unstable political relations between the countries involved.

Apart from political risks, power generation companies also face challenges at the execution level. The high cost of laying undersea transmission lines between Sri Lanka and India, or of laying overhead transmission lines on difficult terrain between Iran and India, highlights the technical and commercial difficulties in international energy commerce, especially in a geographically diverse Asia Pacific region, says Datamonitor.

Higher global coal prices may hit power generators

■ Indonesia thermal coal export growth likely to slowdown

■ Benchmark thermal coal could hit \$100/tonne in 4Q

Rising coal prices could hit the profits of power generators that rely on imported coal in the year ahead. Spot prices for the fuel at Australia's Newcastle port, a benchmark for Asia, appreciated almost 10 per cent in November and rates at China's Qinhuangdao port, a standard for the world's largest coal consumer, also recorded a steady increase in October and November of 2009.

Demand for thermal coal from China and India may boost prices to \$80 per metric ton this year amid reduced supplies and lower inventories, JP Morgan Chase & Co. said in a report. Prices of coal burnt at power stations may rise to \$85 a ton in 2011 from \$70 last year, JP Morgan said. It also said that benchmark thermal coal grades might rise to about \$100 a metric ton in the fourth quarter of 2010, led by economic growth in Asia and underinvestment in coal capacity.

Plagued by the supply-demand mismatch in Indian coal production, a number of Indian private sector power companies, for example, have pegged their port-based power projects on overseas coal, with a specific dependence on Indonesian coal.

However, with Indonesia's thermal coal export growth likely to see a marked slowdown, importing the fuel will become more expensive for Indian firms.

Although Indonesian exports account for over 35 per cent of the global sea-borne coal market, the ability of Indonesian producers to ramp up production for sustaining export growth could be constrained by delay and regulatory uncertainties. Also, rising demand from Indonesian power producers and cautious capex programmes by major miners there, due to the global crisis, could see the prices of Indonesian coal rising in the coming months, according to research by Citigroup.

Indonesia together with Australia supplies about 50 per cent of the global thermal coal exports, according to the report.

Supply tightness is also expected to persist globally as export growth in both Australia and South Africa will be restricted due to port and rail infrastructure development. In the latter market, growing domestic demand, too, is likely to have an impact on thermal coal prices, an analysis by AME Mineral Economics suggested.

A study by Barclays Capital says China is likely to remain a major importer this year on the back of mine consolidation, expectation of a strong economic growth and possibility of higher taxes. An increase in heating demand in China, triggered by the harshest winter in almost six decades, has spiked coal prices at Qinhuangdao port.

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New proposal springs hope for Senate

A new framework document designed to diminish the bipartisan split over climate change legislation in the US Senate brings hope for the passage of a bill in 2010, writes Siân Crampsie.

Industrial groups in the US are hoping that federal legislation on climate change will soon be passed to prevent the emergence of a more fractured, regional approach to the control of greenhouse gases.

In December a coalition of Senators released a framework for comprehensive climate change legislation that won praise from a wide range of groups, while the US Environmental Protection Agency (EPA) declared that greenhouse gases (GHGs) are a hazard to human health. The aim of the latest legislative proposal, say the sponsoring Senators John Kerry (D-Mass.), Lindsey Graham (R-S.C.), and Joe Lieberman (I-Conn.), is to broaden the support base for climate change legislation in the Senate, which remains deeply split over the issue.

Their climate framework document recognises the importance of coal in the USA's future energy mix and to the country's economy, and has been welcomed by groups such as the

American Coalition for Clean Coal Energy (ACCCE) and the United States Climate Action Partnership (USCAP).

"These Senators – along with their colleagues who are working hard on this important issue – are to be commended for their tri-partisan leadership and vision," said USCAP in a statement. "They understand that properly designed legislation can spur investments in low-carbon energy technologies that will jumpstart our economy, enhance our energy security, protect American jobs and create new ones."

Praise has not been forthcoming from the industrial and commercial sectors in the US for the EPA's ruling that greenhouse gases "threaten the public health and welfare" of people. EPA Administrator Lisa P. Jackson said that the ruling – which coincided with the COP15 meeting in Copenhagen – was a landmark event that would "cement 2009's place in history as the year when the United States government

began addressing the challenge of greenhouse gas pollution and seizing the opportunity of clean energy reform."

But there is widespread concern among the business community that the ruling will prove costly and could stifle economic growth. While the EPA's decision does not in itself impose any emission reduction requirements, it could lead the way for new emission standards for vehicles and other sources of GHGs.

Industry groups such as the US Chamber of Commerce, the National Association of Manufacturers and the American Petroleum Institute fear that EPA regulations could lead to a command and control-style regime, which would be an administrative burden for most companies. They are also concerned about the emergence of cap-and-trade or other carbon-control regimes at the state level.

Many US industrial groups are therefore now in favour of federal legislation to control GHGs so that

they can plan investments with greater certainty and will not have to adjust to different carbon regimes for different geographic regions where they operate.

However, some remain opposed to the climate bill that was passed by the House of Representatives in 2008 because of the impact that it could have on manufacturing jobs. Other companies support the legislation, most notably Apple and Nike, who withdrew from the US Chamber of Commerce because of its stance on the issue.

The introduction of the tri-partisan framework legislation by senators Kerry, Lieberman and Graham brings renewed hope for the passage of a climate change bill by the Senate. According to the Pew Centre on Climate Change, Majority Leader Reid (D-Nev.) is expected to combine the various elements of the climate bills currently before the Senate and bring it to the floor in early 2010.

If the Senate passes this combined

bill, differences between the Senate and House bills would have to be reconciled, with the final bill passed by both houses, before the bill could be sent to President Obama and signed into law.

The tri-partisan framework document says that due to current regulatory uncertainty, it is increasingly challenging to site new coal facilities. "Coal's future as part of the energy mix is inseparable from the passage of comprehensive climate change and energy legislation," the document said.

"We will commit significant resources to the rapid development and deployment of clean coal technology, and dedicated support for early deployment of carbon capture and sequestration."

The three senators said they hope to propose a near-term greenhouse emissions reduction "in the range" of 17 per cent, equal to that contained in the House bill.

One of the current Senate bills proposes a near-term emissions reduction of 20 per cent by 2020.

Alberta examines nuclear case

- Government open to nuclear applications
- Federal funding for CCS project

Canada's Alberta government has confirmed that nuclear power could play a role in the province's future energy mix.

Nuclear energy is a contentious issue in Alberta but following a public consultation, the government says that proposals for nuclear power plants will be given the same consideration as any other new power plant proposal.

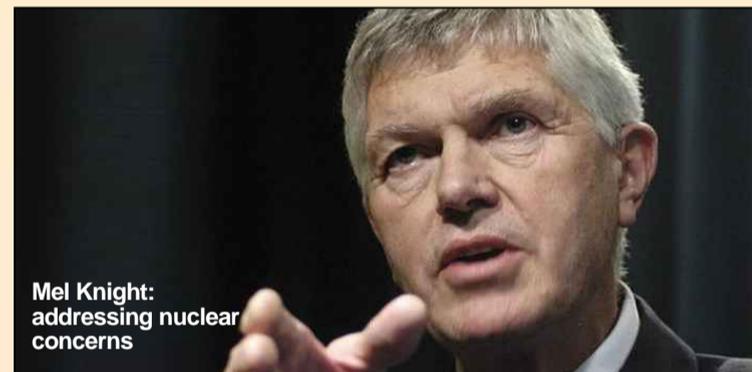
"Albertans have told us that we shouldn't be closed to new generation technologies that could provide clean,

low-emission power," said Energy Minister Mel Knight. "At the same time Albertans have identified concerns with nuclear power that potential future applicants will need to fully address."

The policy decision has been welcomed by Ontario-based Bruce Power, which wants to build a new nuclear plant in Peace River, northwest Alberta. The issue is dividing Albertans, some of whom are concerned about safety risks, while others see nuclear energy as a clean source of power.

"We've said all along we're grateful for the opportunity to make the case for nuclear to the people of Alberta," said Duncan Hawthorne, Bruce Power's President and Chief Executive Officer. "It's encouraging to see the door remains open for us to demonstrate we can bring value to the province and help Alberta meet its future energy needs without contributing to greenhouse gas emissions."

Among the key findings of the Alberta nuclear consultation was that most



Mel Knight: addressing nuclear concerns

Albertans polled (45 per cent) preferred that nuclear power plants be considered on a case-by-case basis. About one-fifth said the province should encourage proposals, while about one-quarter said the province should oppose proposals.

Alberta's policy of promoting clean energy technologies has also received a boost in the form of financial support from the Canadian federal government for a fully integrated, large-scale carbon capture and storage (CCS) project.

The Alberta Carbon Trunk Line project

will gather carbon dioxide (CO₂) from several sources in Alberta's industrial heartland and transport it to oilfields in south-central Alberta for enhanced oil recover (EOR). Led by Enhance Energy and North West Upgrading, the pipeline's design capacity will be 40 000 tonnes/day when fully operational.

The federal government is to provide C\$63 million for the project, which, says Canadian Minister of Natural Resources Lisa Raitt, will demonstrate the country's leadership in CCS technology.

Slowdown hits wind turbine manufacturers

Two wind turbine companies with manufacturing facilities in the USA say that they have been hit by a slowdown in business.

Vestas is temporarily halting production at a blade manufacturing plant in Colorado, while Gamesa USA is reducing employment levels at its Cambria Township fiber plant in Pennsylvania by more than half.

Both European firms attribute their decisions to the economic

slowdown – which has resulted in a fall in electricity prices – and the tight credit situation – which has forced wind farm developers to delay plans for new projects.

Vestas' 500 employees at the Windsor, Colorado facility are remaining in employment and the company says it expects production to start ramping-up again in 2010. Gamesa is laying off around half of its workers at the Cambria Township plant.



Ten wind farms slated for Brazil

Brazil should see the development of ten new wind farms in the south of the country after the country's development bank, BNDES, agreed further funding for the projects.

BNDES has announced additional funds of R838 million (\$479 million) for the wind farms, bringing its total investment in the projects to R1.2 billion.

The wind farms will have a total installed capacity of 222 MW and are expected to be in operation by the end of 2010. They will be sited in Agua Doce and Bom Jardim, Santa Catarina state.

The projects are part of Brazil's economic growth acceleration programme and will be built by Argentina's IMPSA Group.



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Australia maintains climate change strategy despite ETS setback

Australia is continuing its fight against global warming despite the defeat of legislation to set up an Emissions Trading Scheme, writes Junior Isles.

The Australian government will continue with its strategy to combat climate change when it re-submits legislation to set up a greenhouse gas emissions trading system to parliament next month (February).

Last month the Senate again voted against the planned Emissions Trading Scheme (ETS). The ETS bill was first rejected by the Senate in August last year.

The Senate, where Prime Minister Kevin Rudd's government does not hold a majority, rejected his administration's proposal for Australia to become one of the first countries to install a cap-and-trade system designed to cut the amount of greenhouse gases emitted by industries.

The 41-33 vote followed a turbulent debate in which the conservative

main opposition party at first agreed to support a version of the government's bill, then dramatically sacked its leader and switched sides after bitter divisions erupted within the party.

The new leader, Tony Abbott, said Australia should not adopt an emissions trading system before the rest of the world. He said that the argument for climate change was "absolute crap" and that he was unconvinced by the science.

"The right time, if ever, to have an ETS is if and when it becomes part of the international trading system and that is not going to happen prior to its adoption in America," he told reporters after the vote.

Opponents of the legislation say it amounts to a huge new tax on polluting industries such as power



Senator Penny Wong: responding to a global challenge

generators, which will hurt the economy and lead to higher prices for consumers. They say such costs would have no effect on the level of global greenhouse gas emissions.

Climate Change Minister Sen. Penny Wong accused the opposition members who voted the bill down of being climate change deniers out of step with the world.

"This is about doing our bit as part of a global agreement; this is about responding to what is a global challenge," Wong told the Senate.

The government recently called for applications for its A\$1.5 billion Solar Flagships programme designed to accelerate the use of solar power technologies.

Energy Minister Martin Ferguson said the first round of the programme, which closes February 15, will target

400 MW of solar generation from commercially proven technologies.

The call follows an announcement at the end of November by the minister for Resources and Energy, Martin Ferguson, who outlined the government's vision for biomass innovation. Addressing the Biomass Energy Investors Workshop in Canberra, Minister Ferguson emphasised the importance of biomass in the energy mix.

"The significance of sourcing energy from biomass is two-fold: to help in the transition to a low-carbon economy and enhance energy security through a broader range of fuels," he said.

Australian lawmakers last year agreed a mandatory target to source 20 per cent of national power needs from renewable sources by 2020.

International support for Vietnam power sector

- Russia to build first nuclear power plant
- Increased cooperation with Spain

Vietnam's power sector is continuing to attract international interest as the country develops its power sector to meet increasing demand and combat climate change.

Last month Russia inked a deal to build Vietnam's first nuclear power plant. At the same time, the two countries' respective oil and gas giants forged a joint venture, increasing Moscow's reach into southeast Asia.

The nuclear plant deal was signed in Moscow by Sergei Kiriyenko, the head of Russia's nuclear energy agency Rosatom, and Pham Le Thanh, the head of Vietnam's state electricity company EVN.

Respective state energy giants Gazprom and Petrovietnam signed a deal establishing Gazpromviet as a joint venture for developing energy fields in Russia, Vietnam, and other countries –

expanding on a loose agreement from 2008.

Last month, Vietnam and Spain agreed to strengthen their cooperation at international forums and organisations, including the United Nations and the Asia-Europe Meeting (ASEM), to cope with global challenges such as climate change, energy and food security.

The agreement was reached during the talks between Vietnamese State President Nguyen Minh Triet and Spanish Prime Minister Jose Luis Rodriguez Zapatero in Madrid on December 15. President Triet also met with Spain's leading entrepreneurs who are deploying projects in Vietnam in the fields of energy, electricity and infrastructure.

Pham Hung, deputy director of the Ministry of Industry and Trade Energy Department also pointed out that the

Vietnam-Sweden Rural Energy programme (VSRE) has helped Vietnam improve its ability in planning, developing and managing renewable energy sources.

Ludovic Lacrosse, VSRE chief advisor, confirmed that the programme built up a framework of technical standards that are essential for designing and managing renewable energy projects in Vietnam.

In order to increase its use of renewables as well as handle increasing power demand, Vietnam will have to improve its transmission grid.

The Asian Development Bank (ADB) Board of Directors recently approved a proposal to extend a \$325 million guarantee for a 13-year syndicated loan of \$342 million to state-owned Electricity Viet Nam (EVN), which will be used to fund urgent transmission and



Pham Le Thanh: head of Vietnam's state electricity company EVN

distribution improvements. This is the ADB's third guarantee operation in Vietnam.

ADB's guarantee gives EVN the ability to access long-term commercial bank loans on competitive terms and should help spur more private investment in the sector. Given the global economic crisis, foreign commercial banks require additional credit enhancements similar to the type of guarantee that is being provided by ADB.

"This ADB guarantee enables Electricity Viet Nam to reduce its borrowing costs and to increase the tenor of the loan, while it also allows commercial banks to re-engage in lending in Vietnam's infrastructure sector," said Xavier Humbert, senior energy specialist in ADB's Southeast Asia Department.

India moves to slow carbon dioxide emissions

India will significantly slow the growth of its carbon dioxide emissions over the next decade as its economy keeps expanding.

Environment Minister Jairam Ramesh said that the country plans to reduce by 20 to 25 per cent the ratio of pollution to production compared with 2005 levels.

India's carbon intensity – a measure of carbon dioxide emissions per unit of gross domestic product – fell by 17.6 per cent in the 15-year period 1990 to 2005, Ramesh told parliament, adding that experts within the government agreed that further reduction was possible.

While per capita emissions are low in India – the government says that the average Indian produces one ton of carbon dioxide a year – its 1.2 billion population makes it the world's fifth largest emitter of carbon dioxide emissions, accounting for 4.7 per cent of the world's emissions, according to Ramesh.

To reach its objective, the Indian government will introduce mandatory fuel efficiency standards in 2011, enforce building codes for greater energy efficiency and deploy cleaner technology in coal-fired power plants, Ramesh said.

In late November, India approved the Jawaharlal Nehru National Solar Mission with an aim of setting up 20 000 MW grid solar power and 2000 MW off-grid solar power by 2022.

The mission will be implemented in three phases and the government has approved the target of setting up 1100 MW of grid connected solar plants and 200 MW capacity equivalent off-grid solar applications in the first phase till 2012-13.

India also plans to double wind power generation capacity to over 20 000 MW by 2022. Wind currently accounts for 10 500 MW of the country's 13 300 MW of renewable capacity.

Chinese JV to develop nuclear reactor

Alternate Energy Holdings, Inc. (AEHI) China recently signed an agreement to cooperate in a joint venture with the Nuclear Power Institute of China to design, manufacture and market worldwide a 1000 MWe reactor with the ability to produce electricity as well as potable water from sea water or unsuitable fresh water.

According to AEHI China, the new reactor-desalting unit will be very competitively priced in the world market. International Reactors Inc, an AEHI subsidiary, hopes to be able to start accepting orders this year.

Don Gillispie, AEHI Chairman and CEO, said: "Two of mankind's biggest challenges today are obtaining adequate fresh water and low cost, reliable, clean electricity. The world demand for fresh water will outstrip supply in about 15 years by 50 per cent due to drought, population growth and industrial demand. We believe this reactor-desalting unit can uniquely produce the much needed water and electricity to pump it far inland where it is needed without creating pollution from fossil fuels."

India builds nuke relationships

The signing of two agreements in the civil nuclear sector has enhanced India's relationship with the international nuclear community.

Syed Ali

India's nuclear power expansion plans and its relationship with the international community in the field of nuclear power generation look set to benefit from the signing of two international agreements.

Following meetings in Moscow with Russian President Dmitri Medvedev, Indian Prime Minister Manmohan Singh said Russia will help build four new nuclear power plants.

Speaking after the meeting Singh said: "Today, we have signed an agreement, which broadens the reach of our cooperation beyond the supply of nuclear reactors to areas of research and development and a whole range of areas of nuclear energy."

President Medvedev says the heads of the Russian and Indian atomic energy agencies initialled the agreement to foster nuclear cooperation between the two countries for years to come. He said Russia has experience at India's Kudankulam power station and is thinking about ways to work at another site.

Mr. Singh called the Kudankulam site a symbol of Russian-Indian cooperation in civilian nuclear power, adding that four more reactors will be built after a new site is identified in

West Bengal.

According to the deal, Russia will also provide India with nuclear fuel for its reactors.

India also reached a major nuclear trade deal with Canada that will allow Canadian firms to sell nuclear materials, equipment and technology to India.

The deal was announced by Canadian Prime Minister Stephen Harper and Manmohan Singh during the Commonwealth leaders' summit, has been controversial because Canada ceased nuclear trade in 1974 after India used Canadian materials to manufacture its first nuclear weapon.

The Harper government has been keen to re-establish the relationship because they estimate the energy market in India will be worth as much as C\$50 billion (\$47 billion) over the next 20 years.

The international community has been keen to re-establish ties with India in the civil nuclear sector since the lifting of a three-decade ban on nuclear trade with India in September 2008.

In December, GE Hitachi Nuclear Energy (GEH) helped lead a 50-member, US nuclear industry delegation to the country to support the expansion of its nuclear power

programme.

The trade mission, organized by the US-India Business Council (USIBC) with the Nuclear Energy Institute (NEI), provided a forum for discussions on the next steps in supplying India with next-generation nuclear reactor technology and related services.

India plans to expand its electricity production from nuclear energy more than ten-fold, from 4.1 GW today to 63 GW by 2032. Of that total, an estimated 30-40 GW would come from imported reactor technologies.

According to GEH, India has set aside two sites for potential nuclear power stations of up to 10 000 MW featuring reactor designs from US-based providers. One of the two sites is in the western state of Gujarat and the other is in the southern state of Andhra Pradesh.

Under terms of a preliminary agreement signed earlier this year with Mumbai-based Nuclear Power Corporation of India Limited (NPCIL), GEH could help India's nuclear utility build multiple third-generation nuclear reactors at one of the two sites.

GEH and Westinghouse Electric Co. both recently said they plan to use India as a low-cost supplier of nuclear parts for export to the US and Europe.

PLN and ADB to fund transmission links



The Asian Development Bank (ADB) and Indonesia's state-run power company PT Perusahaan Listrik Negara (PLN) will cooperate in funding three electricity interconnection projects worth 9.8 trillion rupiah (\$980 million), according to *Kompas daily*. Two of the projects are cross-country interconnections that will connect Indonesia and Malaysia.

"The interconnection systems that will be funded by the ADB are the 500 kV Java-Bali islands connection, a 275 kV West Kalimantan-Sarawak regional connection and a 500 kV Sumatra-Malaka connection. We are pleased to work with PLN on the interconnection project the company proposed. This will increase system reliability," said Anthony Jude, ADB's Director of Energy and Water Division for the Southeast Asia in Jakarta.

Two connection options will be studied for the Java-Bali islands line – an overhead transmission line or an under sea cable.

The two regional interconnections between Indonesia and Malaysia will be a key part of the ASEAN (Association of Southeast Asian Nations) power grid, an important element of the region's governments plan to share energy resources efficiently and economically.

"With the interconnection, public service companies of the two countries could take electricity from each other using the most efficient power plant at the time of peak demand, instead of using power from their own plants that may be more expensive during peak time," said PLN's Director of Planning and Technology Bambang Praptono.

The interconnection between Java and Bali is expected to receive \$340 million. The two regional links – West Kalimantan-Sarawak and Sumatra-Malaka will receive around \$150 million and \$490 million, respectively.

The lines will be able to transmit up to 300 MW in the first year and 600 MW in the following years.

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Galán calls for clarity

Iberdrola's Ignacio Galán: decisions must be taken now



The Spanish government must make key energy policy decisions if the investments required in the power sector are to be made, says the head of the country's largest utility.

Ignacio Galán, the Chairman of Iberdrola, has warned that institutional and regulatory stability in Spain is insufficient to encourage investment in the power sector. He has also argued that a clear and definitive energy policy would help to drive the economy out

of recession.

Speaking at a seminar in December, Galán pointed out that "amid global competition to attract investment, greater legal security and institutional and regulatory stability are needed, and not to mention an attractive tax regime".

"Once these factors are in place, they need to be marketed internationally. Unfortunately, we have a long way to go on some of these issues," he added.

Like many European countries, Spain is facing major decisions on energy policy in the face of rising electricity demand and the need to curb greenhouse gas emissions.

The future of nuclear energy and the expansion of electricity interconnections with neighbouring countries are among the key issues for the Spanish government.

According to Galán, Spain needs €50 billion in energy sector investments to

2020, and a further €60-90 billion from 2020-2030. A rise in energy prices will also be needed to meet these goals.

"Energy policy decisions must be taken now, as it takes a long time to carry out investments and it is difficult to raise financing," argued Galán. "We must define how we want our energy supplied and how much we are prepared to pay for it."

Spain is due to phase out the use of nuclear energy but this policy will

impact both energy prices and the country's ability to meet climate goals, says Galán. If the country's existing nuclear plants are kept in service, Spain would need to add 14 GW in new conventional power capacity and 18 GW in renewable power capacity in the decade after 2020.

This will cost around €60 billion, compared with investments of €90 billion needed if nuclear production is phased out.

UK boosts nuclear manufacturing

The UK government is putting plans in place for the development of new nuclear power plants as developers seek partners to share risks and costs, writes Siân Crampsie.

The UK government is examining ways of supporting the development of new nuclear power plants as developers move forward with plans for new capacity.

A package of plans to boost the UK's civil nuclear industry has been announced but the government is under continuing pressure to find ways of providing fiscal support for the planned nuclear new build programme.

The government has announced a £25 million engineering centre in Sheffield, Yorkshire, to coordinate work on new materials and components to boost the UK's nuclear industry. Alongside this, £8 million will be used to upgrade the nuclear laboratories at Manchester University and plans for a Nuclear Low Carbon Economic Area (LCEA) in northwest England were also announced.

Rolls-Royce, which is partnering with EDF to build several new nuclear power plants in the UK, has also

confirmed that it will base its planned new civil nuclear factory in South Yorkshire.

But in spite of calls from industry for the government to help finance the construction of new nuclear power plants, either directly or through fiscal incentive mechanisms, the government is sticking firmly to its policy that calls for new nuclear to be entirely privately financed.

"Nuclear is a low carbon and secure source of energy and must be part of our future energy mix if we're to meet our climate change goals," said Energy Minister Lord Hunt as he announced funding for the Nuclear Advanced Manufacturing Research Centre. "We've already had commitment from industry to build 16GW of new nuclear in the UK. This manufacturing package will ensure we utilise the skills that we have in this country to make sure those power stations get built."

One proposal from nuclear

stakeholders is for the UK's Climate Change Levy (CCL) scheme to be extended to the nuclear sector, but this would be unworkable, according to industry analysts Datamonitor.

Under the CCL scheme, renewable and good quality combined heat and power generators are awarded Levy Exemption Certificates (LECs) for the power they produce. If the scheme were extended to existing nuclear generators, it would not necessarily give rise to additional levels of carbon abatement, argues Datamonitor.

Another issue would be how to link the scheme to new nuclear power market entrants such as Horizon Nuclear Power, the joint venture between RWE and E.ON.

The issue is forcing developers such as EDF and Horizon to seek industry partners willing to share the risk and financial burden of new build. EDF is reported to be in talks with some of the UK's biggest industrial groups



Lord Hunt: committed to nuclear

about forming a consortium to help fund the construction of new plants.

The industrial groups – which include large manufacturers – would invest in new reactors in exchange for long-term electricity supply contracts. The deal would mirror France's Exeltium consortium.

Horizon is currently examining competing offers from Areva of France and Toshiba of Japan for the technology to be used in the 6 GW of capacity it is planning for the UK. It is expected to make a decision in the spring.

GE Hitachi Nuclear Energy, meanwhile, says that it will re-submit its nuclear reactor design to the UK authorities in 2011 after completing the licensing process in the US.

The company withdrew its Economic Simplified Boiling Water Reactor design from the UK regulatory process in September 2008 to concentrate on getting its design licensed in the US.

Price review sparks concerns in UK

■ "Radical reforms" may be needed
■ Smart meter roll-out starts

A regulatory review in the UK has sparked concerns from the country's distribution companies that they may not be able to make vital investments in the grid.

A new pricing framework issued by Ofgem, the country's electricity regulator, says that while the companies will be allowed to invest £7.2 billion in the distribution network over five years starting in 2010, price rises will be restricted to 5.6 per cent per year on average.

The allowed investment level is an increase on the £5.7 billion allowed in the current five-year period, but the seven electricity distribution companies to which the ruling applies, say that they may have to reassess their plans for investment.

Ofgem has also expressed concerns over the rising profit margin levels of the UK energy suppliers and has warned that "radical reforms" may be necessary.

The ruling came as the UK embarked on a massive £8 billion programme to fit smart electricity and gas meters in every home in order to improve levels of efficiency.

The government has also published a Smart Grid policy document and the results of a 2050 Vision document drafted by the Energy Networks Strategy Group. The policy document sets out how energy companies will install and design the new meters and indicates how a smart grid would operate and what impacts it would have.

Steve Holliday, CEO of the UK's National Grid, has warned that rushing into a smart meter programme for homes could cost homeowners billion of pounds if redundant technology was purchased too hastily. Selecting the right technology would, however, allow the emergence of microgeneration systems and boost Britain's renewable energy base, added Holliday.

Russia considers Belene role

Russia could emerge as a strategic investor in the Belene nuclear power plant following the withdrawal of Germany's RWE from the project.

Russian Energy Minister Sergei Shmatko said that the government is considering the provision of funding for Belene and is also interested in becoming a shareholder.

Russia already has an interest in the project through Atomstroyexport, which is the plant's main contractor. It is also in talks with Bulgaria over other key energy projects, including the South Stream gas pipeline and

the Burgas-Alexandroupolis oil pipeline.

RWE was to have held a 49 per cent stake in Belene under a contract signed in 2008, but withdrew in late 2009, citing spiralling project costs and delays.

The project has also been undermined by weaker electricity demand.

"The Russian Federation was ready to provide a credit for the execution of the Belene NPP project but this is a hard thing to do now in the state of economic crisis," said Shmatko

at a press conference after a Russian-Bulgarian summit in December. He added that Russia is prepared to assume the financial burden of the project for the next one to two years.

Bulgaria has been re-examining its energy policy in the wake of last year's elections. It says that it will soon launch the tender to find a consultant to prepare the tender for a new private investor in Belene.

Bulgaria's Energy Minister Traicho Traikov has said that he expects US companies to express an interest in the project.



Sergei Shmatko: is prepared to assume financial burden



Korean nuke technology for UAE

■ S Korea to build four reactors ■ Interest in Turkey nuke plants

Siân Crampsie

A Korean-led consortium has beaten bids from the US and Europe to win a prized nuclear power plant construction contract in the United Arab Emirates. The Emirates Nuclear Energy Corp.

said in December that the Korea Electric Power Corp.-led consortium is the "best equipped" to fulfil the contract, which involves the construction of four 1400 MW reactors and which has been valued at about \$20 billion.

The Korean consortium includes Samsung, Hyundai, Doosan Heavy Industries, Japan's Toshiba and Westinghouse, and beat proposals from an Areva-led consortium and one from a GE-Hitachi venture.

The reactors will be the first in the Middle East, while the deal marks the first export of South Korean nuclear technology.

South Korea is now also reported to be interested in building nuclear plants in Turkey, after a tender for the

construction of the country's first nuclear facility was cancelled.

The board of the Turkish Electricity Trading and Contracting Company (TETAS) decided to cancel the tender after a court recently ruled against the tender's pricing and the location of the proposed plant, according to reports.

Russia's Atomstroyexport had been the only bidder for the proposed project with an offer to build four VVER-type reactors, and had been in negotiations with TETAS for several months over the contract. Turkish officials had repeatedly indicated that the price of the bid was too high.

It is not clear when the tender will be re-issued, although reports from South Korean newspapers indicate that Korea Electric Power Corp (Kepco) is now in talks with the Turkish government over the project.

Turkey wants to develop a nuclear power industry in order to reduce reliance on foreign energy imports and boost generating capacity to meet rising electricity demand. The country is also now emerging as an important player in negotiations with Iran over its nuclear programme.

US President Barack Obama said in December that he is supportive of Turkey's continued mediation role in Iran and encouraged Ankara to facilitate Iranian compliance in curbing its nuclear ambitions. Iran's relationship with the West has deteriorated significantly since September 2009, when Iran revealed the full extent of

its uranium enrichment programme.

The enrichment programme is heavily censured by the UN because no commercial purpose is evident. Iran's only commercial nuclear power plant at Bushehr is nearing completion and fuel for that facility is being supplied by Russia under international safeguards.

Iran's Fars news agency reported in December that the Bushehr plant will start commercial operation in early 2010 after the completion of final tests at the facility. Pressure tests were carried out at the 1000 MW plant, which is being built by Atomstroyexport, in late November.

The US and its Western allies have taken a tough stance against Iran after suspicions about enrichment in the country were confirmed. While Turkey could serve as a route for negotiation, Iran has also been seeking to strengthen ties with its own allies in recent weeks with a visit by Iranian President Mahmoud Ahmadinejad to Brazil.

Ahmadinejad is reported to have said that he would discuss cooperation in the nuclear field with Brazilian President Luiz Inacio Lula da Silva. He also reiterated that Iran's nuclear programme is for peaceful purposes.

Brazil has the world's seventh-largest uranium reserves and enriches it for its own nuclear energy plants. It says that it would not sell enriched uranium to Iran, although Lula said during Ahmadinejad's visit that the USA's approach to Iran is too punitive.

Major loan boosts Eskom programme

Eskom has received a further boost to its finances with news of a €1.86 billion loan from the African Development Bank (AfDB).

The funds will help the beleaguered utility to construct the Medupi coal fired power project, which will provide a significant boost to the country's generating capacity. The loan will also have a wider impact, according to the Bank.

"South Africa's energy problem has been a major impediment to Africa's leading economy," said AfDB

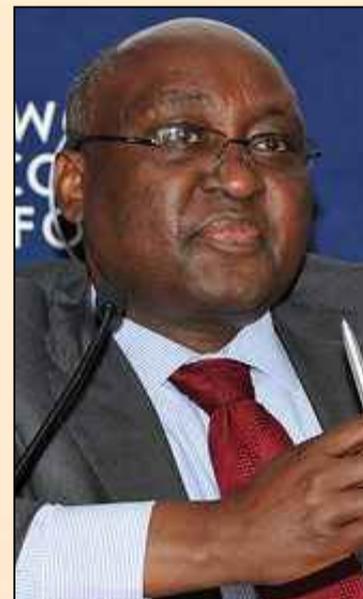
President Donald Kaberuka. "We look forward to working with South Africa towards achieving energy security. This operation should be seen in the context of the Bank's ongoing efforts to help Africa bridge the infrastructure gap."

The Medupi plant located in Lephalale, Limpopo Province, is expected to be commissioned by February 2012. At 4800 MW, it will be the largest dry-cooled power station in the world. It will also be the largest coal-fired power plant in

South Africa and the country's first supercritical power plant.

Eskom is also rumoured to be in talks with the World Bank over a loan of approximately \$3.75 billion. The state-owned utility is facing a funding shortfall for its planned capital expenditure programme.

In late 2009 the utility submitted an application to South Africa's energy regulator for an annual tariff hike of 45 per cent for three years. It expects to hear a decision in February 2010.



Donald Kaberuka: bridging the gap with South Africa

Kenya promotes green technology

Kenya is seeking support from developed nations to implement renewable energy technologies and adapt to climate change.

The African nation has pledged to set up a \$2 billion revolving fund with help from donors to lend to companies investing in green electricity generating projects. It has also established a National Climate Change Response Strategy to help it plan for the effects of global warming.

Kenya's Ministry of Finance says that the World Bank, the French Development Agency, Germany's KfW and the African Development Bank have all agreed to help it establish the fund. The money will be used to bolster investment in commercially viable technologies such as geothermal, solar and wind, and to reduce reliance on large-scale hydropower projects that are vulnerable to drought.

Kenya has experienced serious droughts in the last four years that have had a major impact on food and energy security. Kenya's Prime Minister has also said that the country can expect to lose up to three per cent of GDP per year by 2030 if it does not take steps to adjust to climate change.

The government is also considering awarding sovereign guarantees to independent power producers, and is planning to implement renewable energy projects with a total capacity of 2000 MW by June 2012.

Wind resource assessments for 33 sites are already underway and a survey of 14 small hydropower sites will start in early 2010.

Gulf states inaugurate new grid

The official launch of the GCC electric interconnection grid marks the start of a new era for countries in the Gulf region.

The \$1.4 billion North Grid was inaugurated in December on the sidelines of a conference in Kuwait and marks a major milestone in the grid project, which will allow GCC countries to exchange electricity and reduce the need for new generation capacity.

The inauguration - which

followed testing of the grid - represents the end of Phase 1 of the grid project, which connects Saudi Arabia, Kuwait, Qatar and Bahrain. Phase 2 of the project - the interconnection of Oman and the UAE to form the South Grid - has already been completed and the two 'mega grids' are due to be joined in 2011.

Over the summer, five of the six GCC nations prepared for the operation of the new grid by signing a power exchange and trading

(PETA) agreement governing its operation. The ability to trade is expected to reduce the cost of power generation in the Gulf as well as help the Gulf states meet rapidly rising demand for power.

The power trading agreement sets out the regulations and procedures of electricity exchange and trading during usual periods as well as in the event of emergencies. It also defines the commitments of the GCCIA and the GCC electricity

bodies in power trading and transmission, and lays down the operation standards of the interconnected grid.

The North Grid project involved construction of an 800 km, 400 kV double circuit interconnection line from Al Zour, Kuwait with Doha, Qatar, and a 400 kV submarine line linking Saudi Arabia with Bahrain. The whole system is overseen by a control centre in Ghunan, Saudi Arabia.



Siemens shareholders to vote on settlements

■ Kleinfeld, von Pierer reach deals
■ Action sets precedent

Siân Crampsie

Engineering firm Siemens is hoping to draw a line underneath the multi-billion euro bribery scandal that has dogged it for several years when its shareholders meet at the end of January.

The German company said in December that it had reached settlements with six former Board members from whom it sought damages in connection with past cases of corruption, including its former CEO Heinrich von Pierer. It had already reached settlements with three other managing board members.

The settlement deals must be approved by 90 per cent of Siemens shareholders at the annual shareholders meeting on January 26. Von Pierer has agreed to pay €5 million, according to press reports.

The five other former managers that have agreed to pay damages alongside von Pierer include former Managing Board members Johannes Feldmayer,

Klaus Kleinfeld, Jürgen Radomski, Uriel Sharef, and the former Chairman of the Supervisory Board Karl Hermann Baumann.

Siemens had given the former executives an ultimatum to reach agreements before mid-November or face legal action from the firm. The deadline was extended to the beginning of December.

Kleinfeld, who is now chief executive of Alcoa, has agreed to pay €2 million.

Siemens sought damages from its former managers because it says that they breached their supervisory responsibilities by allowing some €1.3 billion of bribes to be paid in order to win overseas contracts in the late 1990s and early 2000s. It reached settlements with the US and German authorities over the corruption allegation in late 2008, agreeing to pay penalties of around €1 billion.

Siemens has also incurred around €1 billion in legal costs in relation to the scandal, and began seeking damages



Gerhard Cromme: Germany will see more legal action

from its former executives a year ago after shareholders threatened to sue the company if it did not claim damages.

Gerhard Cromme, Siemens' current

Chairman, told the *Financial Times* that Germany would in the future see more legal action by supervisory boards against former managers in cases of wrongdoing.

Exxon gains stake in US shale deposits

Exxon Mobil has secured a foothold in the expanding US market for onshore, unconventional gas deposits by acquiring XTO Energy.

The \$41 billion all-stock deal gives the world's largest publicly listed oil company a large position in US domestic natural gas reserves, particularly in the difficult-to-tap reserves that lie in shale deposits.

The market for unconventional gas reserves such as those owned by XTO has seen a boom in recent years owing to technology advances, rising oil prices and the recognition of a need for a cleaner alternative to coal. Exxon says it will create a new upstream business unit to manage the production of oil and gas from deposits in shale, tightly compressed sands and coal bed methane.

Exxon said in a statement that the deal was good for energy security in the US. "XTO is a leading US unconventional natural gas producer, with an outstanding resource base, strong technical expertise and highly skilled employees," said Rex W. Tillerson, chairman and chief executive officer of Exxon Mobil. "XTO's strengths, together with Exxon Mobil's advanced R&D and operational capabilities, global scale and financial capacity, should enable development of additional supplies of unconventional oil and gas resources, benefiting consumers both here in the United States and around the world."



Alstom CEO, Patrick Kron: made a "good" offer

Despite selling its transmission and distribution business French state-controlled nuclear engineering company Areva SA still needs billions more of funding to realise its substantial expansion programme.

In order to raise the €7 billion or so of additional money for investment, Areva may have to sell more of its business units, possibly as early as this year. Areva has budgeted around €2.6 billion annually for capital expenditures in 2010-2012. SGCIB's analyst Gael de Bray said: "Financing remains an issue, though the €4.1 billion sale of T&D should help."

Areva is also likely to consolidate its power transmission and distribution businesses in China this month, after it is merged with Alstom and Schneider Electric, the two firms that won the bid for Areva T&D at the end of November.

Areva's decision to opt for a joint bid from the two French firms in the sale of its transmission and distribution (T&D) business sparked accusations of protectionism from political and industrial groups.

The winning bidders were forced to defend their bid as credible and economic while the other bidders in

the race – GE and Toshiba – expressed disappointment at the result.

Areva's decision has been criticised because Toshiba submitted a higher offer and because the joint bidders were encouraged by the French government – Areva's majority shareholder – to improve the terms of the bid.

Alstom CEO Patrick Kron said that the two firms' bid was "a good economic offer" and that the price of the offer was never changed. The companies did, however, drop performance conditions attached to the sale in order to clinch a deal.

GE said in a statement that it was "disappointed" by the result and that it had made a "strong, competitive bid ... addressing the financial, industrial and social aspects of the sale".

The Alstom-Schneider bid was controversial as the two companies will carve up Areva T&D into two businesses. French labour unions were unusually in favour of the foreign bids that would have kept Areva T&D in tact as one unit.

The French government, however, was reportedly concerned about plans by GE and Toshiba to sell small stakes in the T&D business to sovereign

wealth funds.

Alstom and Schneider say that their plans for Areva T&D will create two global specialists in the upstream and downstream sectors of the electricity market. Two-thirds of the Areva T&D business will go to Alstom and about one-third to Schneider.

"Alstom and Schneider Electric will preserve and develop the links between transmission and distribution in all areas: commercial, through cross-purchasing agreements, technological, via the adoption of identical standards (hardware and software) and on innovation through an ambitious common R&D programme on the "Smart Grid" concept," said Alstom in a statement.

The two companies say that they do not "foresee any restructuring linked to the acquisition" and that there will be "no site closures... no mass redundancy ... unless there is a significant downturn in general economic conditions".

Alstom says that Areva Transmission employees will form a third sector in its business alongside Power and Transport, while Schneider will create a new business unit known as Energy, with sales of €4.6 billion.

Consortium to develop future combustion engine technology

Finland's Wärtsilä says that its participation in a major three-year combustion technology research programme will help it to maintain a leading position in competitive global markets.

The engine manufacturer is one of several leading companies participating in the Future Combustion Engine Power Plant (FCEP) programme, the main aim of which is to develop reciprocating engine and related power plant technologies that will enable Finnish industries to remain competitive in global markets where environmental regulations are tightening.

The initiative has been set up by a wide and cross-functional consortium of Finnish technology companies and research institutes and will cost a total of €38 million. Key areas of research will include improvements in the combustion process, energy efficiency, emissions reduction methods, heat recovery systems, and power conversion technologies.

Fuel flexibility and the use of biofuels in combustion engines are also to be amongst the central areas of research. The programme will be led and coordinated by CLEEN Oy, the Strategic Centre for Science, Technology and Innovation of Finland (CSTI) for Energy and the Environment.

"The FCEP programme addresses the critical areas for success in the changing energy markets," said Juha Kytölä, President of Wärtsilä Finland.

Other organizations participating in the programme include ABB Oy, Metso Power Oy, Metso Automation Oy, Wapice Oy, Ecocat Oy, Gasum Oy, VTT and the Helsinki University of Technology.

SSE and Dong to develop 1000 MW offshore

Scottish and Southern Energy (SSE) and Dong Energy are to boost their offshore wind portfolios through the development of three new projects in the North Sea.

The two companies have signed an agreement to form an equal stake joint venture to take forward the development of the wind farms, which are in the Dutch sector of the North Sea and have a combined capacity of 1000 MW.

The projects already have consent and SSE says that the timing of the projects' development and investment decisions will be dependent upon the extent of the financial support for offshore wind farms available from the Dutch government through its renewables support mechanism.

Ian Marchant, CEO of SSE, said: "SSE is aiming to develop a substantial portfolio of offshore wind farm assets in northern Europe and we believe that there is real value in working with experienced and skilled partners like Dong Energy to make sure that the full potential of projects is realized and the risks associated with them kept to the minimum possible."

"Offshore wind projects continue to be dependent upon appropriate support regimes being in place and the successful development of these Dutch assets will be no different."

Tenders, Bids & Contracts

Americas

Wärtsilä plant will stabilize grid

Golden Spread Electric Cooperative, Inc. (GSEC) has placed an order with Finland's Wärtsilä for a 170 MW gas-fired power plant to be installed at Antelope Station in Texas, USA.

The power plant is to be located close to significant wind farm generation, and will serve to stabilise the grid when the output from the wind farms change unexpectedly because of weather changes. GSEC is a consumer-owned public utility providing power to 16 member distribution cooperatives that serve 208 000 retail consumers.

The new power plant will incorporate 18 Wärtsilä 20V34SG generating sets along with mechanical, electrical and control auxiliaries, switchgear and exhaust emission controls. Wärtsilä will also provide installation and commissioning support, as well as factory training.

The power plant, which is expected to achieve commercial operation in early 2011, will generate approximately 170 MW, enough to meet the peak load requirements of 55 000 homes. The engines are designed to achieve full operation in less than 10 minutes, whereas traditional gas-fired generation can take from one to four hours to start.

"The growing summer electricity demand and the large amount of wind generation that is located in the region, were the main drivers in GSEC's choice of quick-start generation technology," says Mark W. Schwirtz, President and General Manager of the generation cooperative.

MHI wins Oakville contracts

Japan's Mitsubishi Heavy Industries (MHI) has received an order for two sets of gas turbines and generators from North American energy infrastructure company TransCanada.

The gas turbine-generator sets on order will be the core components of TransCanada's 900 MW Oakville gas turbine combined cycle power generation plant that is to be built in Ontario.

The generating sets are slated for delivery in mid-2011. Oakville is planned to be in service by the end of 2013 and will supply electricity to the Ontario Power Authority (OPA) under a 20-year energy supply contract.

Asia Pacific

Kyocera to supply solar modules

Japanese firm Kyocera has announced that it is to provide the solar modules for a new power plant being built in Japan by Tokyo Electric Power Company.

Kyocera will provide around 13 MW of modules for the Ohgishima power plant, which is scheduled for completion in 2011 and which will provide electricity for around 3800 homes. Hitachi is the main contractor for the plant.

To promote land-use efficiency, the Kyocera solar modules, covering about 57 acres, will be installed on an artificial island just outside of Tokyo Bay.

Siemens wind turbines head for NZ

Meridian Energy has placed an order with Siemens for the supply of 28 wind turbines for the Te Uku project near Hamilton, New Zealand.

Under the contract, Siemens will

supply its SWT-2.3-101 units for the project, which is scheduled to come on line in 2011 with a capacity of 64 MW. With a diameter of 101 m, the rotor of the new SWT-2.3-101 has a swept area of 8000 m².

The new turbine is based on the design of the widely deployed 2.3-MW family and the project represents the first installation of these wind turbines in the Asia-Pacific region, says Siemens.

"New Zealand's abundance of natural wind resources is ideal for wind power generation," said Andreas Nauen, CEO of the Siemens Wind Power Business Unit. "Siemens and Meridian Energy initially worked together on the West Wind project which was recently commissioned ahead of schedule. We are confident that the follow-up project at Te Uku will also be a great success."

Europe

London Array signs six supply contracts

The consortium building the 1000 MW London Array offshore wind farm in the UK has announced the signing of six major supply and installation contracts.

Dong Energy, E.On and Masdar – the three partners in the consortium – have agreed contracts totalling almost €2 billion with seven European suppliers for components and services needed for the project's first 630 MW phase. Offshore work is scheduled to start early in 2011 and construction completed by the end of 2012.

Siemens, which has already been contracted to supply the turbines for the project, is to provide the grid access, while Nexans Norway AS has been awarded the contract to supply the 220 km of 150 kV subsea export cable connecting the offshore substations to the shore.

JDR Cable Systems will supply the 210 km of 33 kV array cables that will link the turbines to each other and to the offshore substations. Visser & Smit Marine Contracting and Global Marine Systems Limited have been selected to carry out the installation of the export and array cables.

In addition, a joint venture of Per Aarsleff A/S and Bilfinger Berger Ingenieurbeau GmbH has been awarded the foundations contract. As well as supplying and installing the 177 monopiles – including one for each of the two offshore substations – the joint venture will install the wind turbines.

The contract to design, fabricate and install the two offshore substations required for phase one of the project has gone to Future Energy, a joint venture between Fabricom, Iemants and Geosea.

The London Array wind farm will be the largest offshore project in the world when complete. It will be built in the Thames Estuary approximately 20 km off the Kent and Essex coasts.

ABB to refurbish Swiss nuclear plant

ABB has won orders worth some \$73 million from Kernkraftwerk Leibstadt (KKL) to refurbish and upgrade the non-safety related operational control and automation system at the 1220 MW Leibstadt nuclear power station in Switzerland.

Under the contract, ABB will replace the existing multiple control systems with a single solution based on its Extended Automation System 800xA. ABB will design, engineer, install, commission and test the installation, and is also responsible for upgrading

the KKL simulator used for operator training.

To avoid any disruption in electricity supplies, the project will be carried out in phases that coincide with planned annual outages, starting in 2011 and running until 2018. Prior to installation, each stage of implementation will be extensively tested on a full-size test bed and on the KKL training simulator.

The initial scope of the new control system will include the ventilation systems, the demineralization plant and the cooling tower make-up water system, which makes up for losses due to evaporation. It will later be extended to incorporate the water steam cycle, the turbine controls, operational reactor support systems and other elements, under a frame agreement between ABB and KKL.

REpower wins UK contracts

REpower UK has won two major contracts from E.On Climate and Renewables to build two new wind farms in the northeast of England.

The company, a wholly-owned subsidiary of REpower Systems, will install a total of 15 turbines at two sites in County Durham. Together the two projects will produce 30.75 MW of energy, enough to supply 17 000 homes.

The first of five MM82-type turbines will be installed at a site in Haswell in July 2010. The remaining ten units will be installed at Butterwick Moor. The two projects will be operational by the end of 2010.

Siemens supplies EnBW smart grid

German utility EnBW Ostwürttemberg Donau Ries AG (EnBW ODR) is expanding and upgrading its electricity supply network and has contracted Siemens Energy to provide smart metering solutions.

Under the contract, Siemens will supply metering infrastructure based on the AMIS metering and distribution network automation system, which will be supplemented by a modern meter data management system. The solution will provide EnBW with a basis for future smart grid applications such as an increase in renewable energy.

In total, Siemens will supply approximately 135 000 meters and load-switching devices, and around 3500 AMIS data concentrators. The special features of the solution include an Ethernet module for linkup to a TCP/IP network, the integration of around 17 000 gas and water meters, and the telecontrol equipment of the AMIS data concentrators for approximately 1700 transformer stations, and integration into the existing Scada system.

International

Emerson wins CEZ contract

Czech utility CEZ has placed an order with Emerson Process Management for an instrumentation and control (I&C) system for a new supercritical coal-fired unit being constructed at Ledvice power station in the Czech Republic.

As the main automation contractor, Emerson will carry out engineering design, instrument and equipment procurement, control system supply, site installation, commissioning and start-up. The USA-based firm will apply its PlantWeb digital plant architecture and Ovation expert control system at the new unit, which

is being built to replace units 2 and 3 at Ledvice.

As part of a coal power plant modernization programme, CEZ is investing in Ledvice and other selected power plants located near the Czech lignite mines. As well as delivering high-efficiency electrical power, the new unit at Ledvice will use the latest technology for flue gas desulphurisation (FGD) and ash handling to meet new European environmental standards.

Operation of the new plant is scheduled for December 2012.

Alstom secures Slovenia contract

Engineering firm Alstom Power has won a contract worth around €700 million to build a 600 MW coal-fired power plant at Sostanj in northeast Slovenia.

Under the contract, which was awarded by state-owned utility Termoelektrarna Sostanj, Alstom Power will supply the complete power island for unit 6 at the Sostanj site. The new unit will be operational by the end of 2014 and will double the utility's generation portfolio.

The plant, which will account for one-third of Slovenia's power production, will help Slovenia to reduce its dependence on energy imports and will also enable production at the nearby coal mine to remain at full capacity. Alstom will supply the steam turbine generator set, the water-steam cycle, the boiler and the distributed control system.

Tognum to supply emergency gensets

Tognum has won an order valued at €6 million to provide emergency generating sets for a nuclear power plant in Russia.

Under the order, Tognum will provide MTU Onsite Energy emergency gensets to Russian energy solutions specialist Zvezda Energetika for installation at a nuclear power plant owned and operated by Energoatom Concern OJSC. The plant, near the city of Nowoworonesch in central Russia, is currently under construction and will be connected to the grid in 2012.

The gensets will be equipped with MTU 20V 956 TB33 engines and will generate a total of 36 MW. They can reach their nominal speed within 15 seconds and full load within 50 seconds.

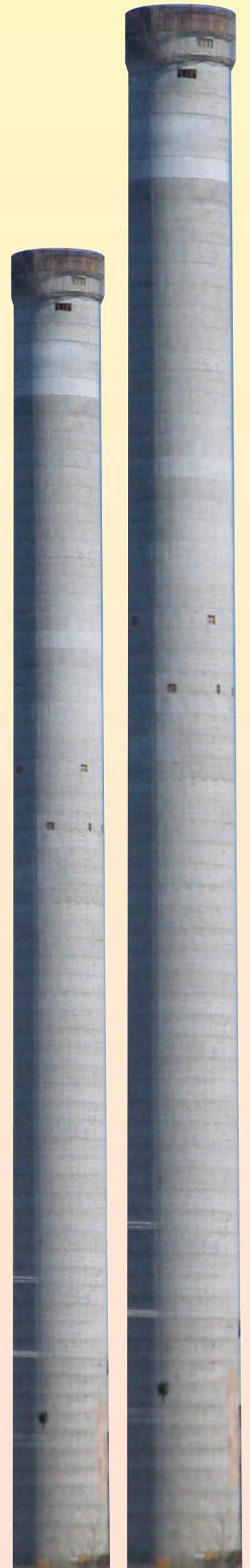
"This order represents a breakthrough on the Russian market for emergency power in nuclear power plants," said Christof von Branconi, member of the Tognum executive board and responsible for the business unit Onsite Energy & Components. Previously, only gensets from local manufacturers were used in Russian nuclear power plants.

Alstom in €100 million Eskom deal

French power group Alstom has signed a €100 million contract to supply the instrumentation and control system for the 4800 MW Medupi power plant in South Africa.

The new coal-fired plant is an integral part of South African utility Eskom's R385 billion capital expansion programme and is due to be commissioned in 2012. Alstom will engineer, supply and install a distributed control system and the Alspa series 6, an open information technology platform that reduces running costs.

The control system will allow for monitoring of the plant's critical equipment.



Reflections and predictions

The power plant construction industry is expected to rebound in 2010.

Alstom Power's **Andreas Lusch** gave *TEI Times* his perspective on what is on the cards for Alstom and the industry in general.

With the deepening of the global economic downturn, last year was characterised by a reduction in electricity demand in many markets around the world. The situation resulted in a fall in orders for many of the power industry's original equipment manufacturers (OEMs).

Outlining last year's situation, Andreas Lusch, Senior Vice President of Alstom Power and head of Thermal Systems said: "The economic crisis made customers more hesitant in taking the decision to go ahead with projects. IPP (independent power producer) projects were put on hold since these are fully financed using project financing. This was most noticeable in the Middle East where there is a big IPP market. There has also been some consolidation in the utilities which affected utility projects but to a lesser extent."

Lusch points out however, that the downturn is compared to the very high volume of orders in recent years. "Now we are more or less back to the pre-boom level of 2006," he explains.

The tough economic climate and market requirements are prompting a general trend towards EPC/turnkey projects, says Lusch. "Most of our clients are increasingly focussing on their core business and do not have the capabilities to integrate separate components into a plant. They are looking for companies with the integration capability needed to deliver efficient, flexible plants. The drive towards carbon capture-ready plants also calls for knowledge of integration."

Globally the power generation market will grow by 220-240 GW annually over the next five years

This trend could also be attributed to the challenging project schedules, which Lusch says are only possible through a turnkey approach. He believes that with the move towards turnkey projects, OEMs will need the whole portfolio of power generating products as well as EPC capabilities.

The OEMs, says Lusch, have not been hit by the downturn as hard as other industries due to the large backlog of projects carried over from the boom. Although down 8 per cent from a year earlier, Alstom Power's order backlog as of September 30, 2009 stood at €24 631 million.

The long-cycle nature of projects is also helping OEMs to ride out the economic turbulence. "Car manufacturers, for example, saw an immediate impact from the crisis; but we have a large backlog [of orders] that will be executed over the mid- to long-term. We are talking about projects of 2-4 years, depending on the technology. The financial crisis, therefore did not show a huge impact on our balance sheets."

However, whether the fall in orders does eventually catch up with the OEMs or not depends on how quickly the market rebounds. "There were a lot of projects in the pipeline that didn't happen but the projects are still in the pipeline. For us, it depends on whether the projects happen this fiscal year. But there will be a strong rebound; we are seeing it in the tendering activity and renewed negotiations with customers, including the IPP projects," says Lusch.

Certain markets are already

returning, he notes. "Latin America has not been affected too badly by the crisis. There is still increasing demand in Saudi Arabia, Southeast Asia and countries in North Africa. China is generally recovering very well. It is clear there is still a shortage of power in a number of countries."

Lusch points out that the market fundamentals are still intact. According to the company's forecasts, globally the power generation market will grow by 220-240 GW annually over the next five years.

Most importantly, there is a strong mid- and long-term energy demand. "In the mid-term the US market will be strong. They had stopped a lot of investment in recent years and now need to invest. The Middle East and Europe will also be coming up," notes Lusch.

He used the UK as an example, where there is an investment backlog. "It is just a question of which technologies they will invest in. They are investing in wind but this can only deliver a small part of what is needed. They will probably invest in a number of gas plants in the short term; already a number of plants are under construction. Then the big question is: will they invest in coal with carbon capture or nuclear or both?"

With discussions about energy security high on Europe's agenda, the likelihood is that the UK like other countries in Europe will invest in a range of technologies.

As energy demand continues to increase, CO₂-neutral technologies will grow with it. However, Lusch is

convinced that in the long term fossil fuels will dominate the global generation mix. "More than 50 per cent of the power generation base will be fossil fuels. We are at 70 per cent today globally but all studies show that by 2030, it will still be above 50 per cent. This means we have no choice except to make fossil fuels clean."

Alstom is active in all areas of power generation including renewables and environmental control systems but with a large installed base of fossil fuel-based power plants, five years ago it took the decision to start investing in technologies to capture CO₂ from fossil fuelled power plants.

The company is investing in post-combustion and oxy-firing combustion technologies for carbon capture. It already has two oxy-combustion pilot plants running. In post-combustion it has demonstrated chilled ammonia and amine technology at several pilot plants.

Lusch comments: "These pilot plants are all in the 30 MW range, about 100 000 t/year of CO₂ recovery. The task is now to scale these plants up and optimise the technology." The plan to scale up plants to the 250 MW range is being incentivised by the European Union.

The recent acquisition of Lummus Global in Germany will help Alstom in its scale-up efforts, while the recent agreement with Schlumberger will help to demonstrate the technology across the entire chain i.e. capture and storage. "The capture of the CO₂ has been demonstrated, at least at pilot



Andreas Lusch: OEMs in the power industry have not been hit as hard as others by the crisis

scale, in both pre- and post-combustion; the transportation and storage issue is now a big focus."

The reason for Alstom's focus on post-combustion technology rests in its belief in the need to address the existing fleet of fossil fuelled power plants. "There is a solid global market for old plants that are in need of upgrade," said Lusch. This was one of the key reasons for a reorganisation at Alstom Power last year to bring its generation and services business units together.

Lusch explains: "The reason for this was obvious. Whether in generation or services, we based our offer on the same technology. In order to present one face to the customer, it made sense to combine these sectors. It will help us to use our technology properly, from the start of the project, to operation and maintenance and potential retrofit. Customers can now talk to people who can talk across the

whole chain. Bringing two sectors together saves on administration costs. We can combine our network of workshops and use them more effectively. These have an immediate effect on the cost structure."

Notably, Alstom Power's, September figures showed, the operating margin reached 9.8 per cent as compared to 9.2 per cent last year.

Looking forward, in terms of general challenges Lusch says there will be a move towards Asia in terms of sourcing and customers. Accordingly, Alstom has invested in Asia in terms of sourcing, having opened two additional factories in China last year for the manufacture of turbines, generators and boilers.

However, it is the CO₂ debate and associated future regulations that will continue to bring challenges, concludes Lusch. "The environmental aspect [of the industry] is dominating everything. Everyone is talking about CO₂."

Oil

Opec says oil price "perfect"

■ Supply is still abundant as global economy yet to improve

■ Last year "one of the worst for world oil demand"

David Gregory

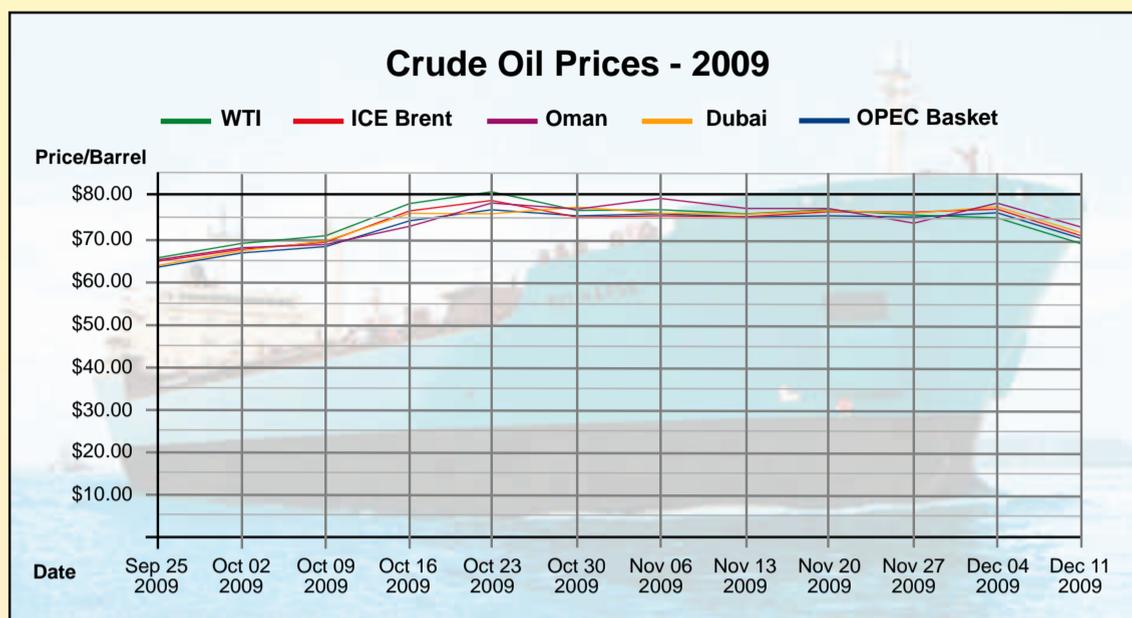
Opec is satisfied with the recent price of crude oil. Throughout November, the price of West Texas Intermediate (WTI) stayed within the \$76-80/b range, more than double compared to a year ago. During the Organization of Arab Petroleum Exporting Countries (OAPEC) meeting in Cairo in early December, Saudi Arabia's Minister of Petroleum and Mineral Resources, Ali al-Naimi, went so far as to describe the price of crude at that time as "perfect."

However, over the first two weeks of December, the price of WTI declined by nearly 10 per cent, from \$78.37/b at the start of the month to \$69.51/b on December 14. While that

range remains decidedly good for oil exporters, it shows that supply is still abundant and that the global economy has yet to improve to the point that demand is growing and oil prices along with it.

In early December, concern about the pace of economic recovery and the rising supply of non-Opec crude had an impact on the price of oil, which continues to behave like a commodity, largely unaffected by the fundamentals. The weak dollar is also seen as having attributed to the recovery of crude oil prices.

Opec's position was expected to remain unchanged during its meeting in Luanda, Angola, on December 22. While the Opec-11 (excluding Iraq) production target is 24.845 million



b/d, output during November averaged 26.48 million b/d, 1.64 million b/d over quota. That target was set a year ago during a crisis meeting in Oran, Algeria. At that meeting, Opec ministers agreed to cut production by 4.2 million b/d from the group's output in September.

Any move by ministers to influence the oil market, was expected to be an effort to enforce compliance among members to adhere to their quotas. As crude prices have increased, over-quota production by Opec members has become a norm, as most are missing their target.

In the latest issue of its *Monthly Oil Market Report (MOMR)*, Opec commented that 2009 "was one of the worst years for world oil demand." It said that while consumption recovered in the fourth quarter as a result of improved economic activities worldwide, demand for the year is seen as falling 1.4 million b/d to

average 84.3 million b/d.

The Opec report said demand is set to improve during 2010, but non-OECD countries will account for all the increase in demand. It added that pressure on oil demand in 2010 could depend on the pace of economic recovery in the OECD, especially the US. The report forecast global demand to average 85.1 million b/d next year, up by 800 000 b/d.

Opec predicted that demand for its crude would average 28.6 million b/d in 2009 and remain at that figure for 2010. It added that "the supply/demand balance indicates that fundamentals will continue to be weak in the first half of the year before improving in the second half," and that demand for Opec crude would pick up during the second half of next year.

Meanwhile, the monthly report issued by the Paris-based International Energy Agency (IEA) estimated that

global demand during 2009 would average 84.9 million b/d and rise by 130 000 b/d to 86.3 million b/d in 2010. It put the call on Opec crude at 29.1 million b/d in 2009 and at 29.6 million b/d in 2010.

The December issue of the IEA's *Oil Market Report* included a medium-term forecast that said global demand for crude would grow by an average of 1.4 per cent or 1.2 million b/d per year between 2009 and 2014, from 84.9 million b/d to 90.9 million b/d. It said that non-OECD demand would account for more than half of global demand for the first time ever by mid-decade. It also forecast at price of \$76/b in real terms for crude oil by 2014.

The medium-term forecast Opec crude oil production capacity to rise from 34.15 million b/d in 2008 to 36.90 million b/d in 2014. Total non-Opec supply will grow to 51.4 million b/d by 2014, according to the IEA.

Gas

Turkmen-China pipeline brings shift in Central Asia gas scene

The Trans Asian Gas Pipeline will not only ship gas to China but could also provide Turkmenistan with a route to European markets without having to cross Russian territory.

Mark Goetz

The inauguration last month of the new gas pipeline connecting Turkmenistan's eastern gas fields to China has brought a shift in the energy supply situation and political circumstances in Central Asia. With the exception of small gas shipments to Iran, the completion of the 1800 km gas pipeline enables Turkmenistan to export its natural gas to a buyer without having to go through Russia.

The Trans Asian Gas Pipeline (TAGP), built by the China National Petroleum Corporation (CNPC), crosses Uzbekistan and Kazakhstan. Both countries are expected to contribute gas shipments to China through the pipeline in future. From the Kazakh-China border, CNPC will ship the gas further eastward to its increasingly energy-hungry cities on the Pacific coast. In total, the gas pipeline network will cover some 7000 km.

Initial shipments from a processing

station near Samandepa have begun at a rate of 5 billion cubic metres/year (bcm/y) and are to reach 30-40 bcm/y by 2013-14. China has already signed agreements with Kazakhstan for the supply of 10 bcm/y of gas, and a pipeline designed to carry that gas from western Kazakhstan to a connection point with the Trans Asian in southern Kazakhstan is under construction and will be complete in 2010.

The pipeline politics of Central Asia has seen Russian gas monopoly Gazprom negotiate deals with Turkmenistan that would have most of the country's gas production being exported through the Soviet era gas pipeline system for some time to come. In an effort to monopolize Turkmen gas exports, Gazprom has sought to secure gas deals at Turkmenistan's maximum production level.

Turkmenistan currently has the capacity to produce around 70 bcm, but Ashgabat claims that the country's total reserves are around 24 trillion m³.

Turkmen gas sales to Russia in 2008 amounted to around 45-50 bcm. As of 2010, gas purchase agreements have Russia receiving 70-80 bcm/y of Turkmen gas.

However, since an explosion on one of the main export pipelines last April, there have been no exports of Turkmen gas to Russia. The damage to the pipeline was quickly repaired, but shipments have failed to resume because the two sides cannot agree on a new price. The decline in international gas prices has prompted Gazprom to seek a reduced price, but Ashgabat is unwilling to agree, although it is reported to have lost \$1 billion a month since the exports to Russia stopped.

The TAGP enables Turkmenistan to loosen Russia's control over hydrocarbon resources in the region. By building this pipeline China has tapped a region where gas resources are plentiful and the countries are keen to expand their market options.

Gas for the TAGP will come from

Turkmenistan's gas fields in the Bagtyarlyk area on the right bank of the Amu Darya River. CNPC is expected to produce around 13 bcm/y from these fields, while Turkmen gas will supply 27 bcm/y from other fields in the area. China is also reported to be keen to gain access to the South Iolotan/Osman gas fields, where an audit conducted by the UK's Gaffney Cline and Associates estimates reserves at 4-14 trillion m³. As incentive to Turkmenistan, China has provided Ashgabat with a \$4 billion loan allocated for exploration and development of the area.

It remains to be seen how much of an impact TAGP will have on the flow of gas from Central Asia. China is a potentially large market and as it shifts away from coal to cleaner natural gas, eastern demand will grow.

It is assumed that Russia has been planning to ship Turkmen gas through its proposed 63 bcm/y-capacity South Stream gas pipeline across the Black Sea to Europe, but the opening of the

TAGP could mark the start of a new approach to world markets by Ashgabat.

The EU- and US-backed Nabucco gas pipeline project is also anxious to have access to Turkmen gas. It would provide Turkmenistan with a route to European markets without having to cross Russian territory. Political and territorial differences with Azerbaijan over Caspian Sea sectors would first need to be resolved and a pipeline to carry Turkmen gas across the sea would need to be built, but the European market could be reached through a Trans Caspian Gas Pipeline that would connect in Azerbaijan with the South Caucasus Pipeline, which will feed the proposed 3300 km, 31 bcm/y-capacity Nabucco project.

Turkmenistan is clearly entering new territory, as is the rest of Central Asia. Chinese and Western companies are keen to gain entry into the country's hydrocarbon sector, but it is likely that Ashgabat will continue to hold its cards close to its chest.

Looking to Montreal

With the conclusion of COP15, the industry is already looking forward to the crucial energy meetings scheduled for this year.

Junior Isles speaks to Stéphane Bertrand, about the importance of this year's World Energy Congress in Montreal.

The World Energy Congress (WEC) comes around just once every three years. This year, according to Stéphane Bertrand, executive director of WEC-Montreal 2010, it has particular significance. "It will be [happening] at a strategic moment. It will be nine months after COP15 and six weeks after the G8-G20 meeting, which will be held in Canada. So it will be the first meeting to gather the entire energy sector in one place."

Energy will be a key point on the agenda at the G8-G20 summit due to the type of agreement signed in Copenhagen, which Bertrand says "puts down a path" for the coming months and the longer future. "COP15 was not a perfect agreement but at least they have signed something which shows that the world recognises there is a problem. Everyone recognises there has to be some effort and energy is at the forefront of this global challenge. So everyone across the energy sector is making an effort to improve efficiency in production, transmission and consumption. There will be many meetings before Mexico, and Montreal will be one of the key points [on the path]," he believes.

The theme of the conference: 'Responding *Now* to global challenges' emphasises the need for immediate action. Notably, the third day of the conference will focus entirely on energy efficiency, climate change and the environmental issues the world is facing.

"We have to find ways of coping with the rising demand in the BRIC countries. If you look at Brazil, Russia, India and China, energy demand will grow substantially over the next 10 years," notes Bertrand.

It is a belief that is supported by the International Energy Agency. According to its *World Energy Outlook 2009*, published in November last year, global primary energy demand in the Reference Scenario is projected to increase by 1.5 per cent per year between 2007 and 2030. The Reference Scenario describes a future where governments are assumed to make no changes to existing energy policies.

Due to the financial crisis, on average, demand falls by 0.2 per cent per year between 2007 and 2010 as a result of a pronounced drop in 2009. However, demand rebounds after 2010, averaging 2.5 per cent per year in 2010-2015. It says that China and India are the main drivers for growth, followed closely by the Middle East.

The rising price of energy will also be a major challenge says Bertrand. "At the same time [as rising demand], in countries like the US for example, energy prices will rise significantly between now and 2020."

According to the *WEO 2009*, in nominal terms oil prices roughly triple between 2009 and 2030, going from \$60 per barrel in mid-2009 to almost \$190 per barrel in 2030. Nominal prices

assume inflation of 2.3 per cent per year from 2008. Gas prices, will move according to the degree of contractual linkage to oil prices and of government price controls. International steam coal prices have generally followed oil and gas prices in recent years. In the *WEO 2009 Reference Scenario*, coal prices are assumed to bottom-out at less than \$65 per tonne on average in 2009, before recovering gradually to \$100 per tonne by 2020 and almost \$110 per tonne by 2030.

Meanwhile the price of CO₂ under the EU Emissions Trading Scheme is projected to reach \$43 per tonne in 2020 and \$54 per tonne in 2030.

These challenges will be addressed during the four days of WEC-Montreal. According to Bertrand, the opening keynote will set the tone for the week stating that there needs to be a global declaration at the close of the congress on September 16th to state the plan in response to the challenges for the following three years.

The WEC's work is carried out by its 93 National Member Committees, who represent policy making bodies, leading energy companies, energy organisations, regulatory authorities, government bodies, academia and research institutes, public and private sector organisations, national energy agencies.

"The WEC has taken a strong commitment to creating a sustainable future analysing energy issues according to the four 'A's' – accessibility, availability, acceptability and accountability. A challenge will be addressed on each of the four days of the Congress," says Bertrand. Its

...concerns about climate change and forecasted peaking in the production of conventional oil in the next 10-20 are challenging traditional thinking

various global studies, technical programmes and task forces, along with regional action plans designed to address the four issues will be published and discussed at the Congress.

Bertrand is hoping there will be what is being called the 'Montreal Declaration' at the end of the congress. "The Montreal congress will be the first time we measure the four 'A's' and be accountable in 2013 for our decisions."

The first day will focus on 'accessibility' and the need to manage the growing energy demand while addressing the problem of the two billion people that have no access to adequate supplies of energy. The demographic and economic growth in the emerging economies will require most of the additional capacity needed for the global energy system. Responding adequately to that growing demand will pose major challenges.

'Availability', i.e. determining the



Stéphane Bertrand: we have to find ways of coping with the rising demand in the BRIC countries

right energy mix for long term stability will be the focus of the second day. Although fossil fuels still account for most of the global energy supply, concerns about climate change and forecasted peaking in the production of conventional oil in the next 10-20 are challenging traditional thinking. The WEC says this will require a re-assessment of supply potential of the

easy, it says, and will require unprecedented levels of public-private cooperation and new forms of government partnership.

Energy ministers from 11 countries will meet in a closing session to discuss the main challenges regarding energy policy.

Indeed Montreal will be an important meeting place on the road to addressing the issues of meeting energy demand and tackling climate change. Ministers and high-level industry CEOs together with an expected 3500+ conference delegates and 200-300 reporters will gather to exchange ideas on how to respond to the challenges.

However, unlike Copenhagen, where delegates were reportedly often left standing outside in freezing conditions, Montreal in September should be a much more pleasant and fruitful experience. "This is the second time the Congress has come to Canada and the weather in September will be fantastic," laughs Bertrand. He also notes that Canada is a significant location, not only because of the G8 summit that will be held in August but because Canada is a net exporter of energy. "We are involved in all aspects of energy and it will be interesting to showcase our expertise. We will organise technical tours all over the country to show these expertise. We are one of the leaders in hydropower and have more than 5000 MW of wind power. Montreal will be an interesting destination for energy people," Bertrand comments.

It sounds as if WEC-Montreal will certainly be warmer and better organised than Copenhagen.



Using CO₂ to extract geothermal energy

Carbon dioxide captured from power plants could make geothermal energy more practical. The US government is using stimulus funds to advance projects in this field. David Flin explains.

Enhanced Geothermal Systems (EGS) are a new type of geothermal power technologies that do not require natural convective hydrothermal resources. Until recently, geothermal power systems have only exploited resources where naturally occurring water and rock porosity is sufficient to carry heat to the surface. However, the vast majority of geothermal energy within drilling reach is in dry and non-porous rock. EGS technologies enhance and/or create geothermal resources in this hot dry rock through hydraulic stimulation.

When natural cracks and pores will not allow for economic flow rates, the permeability can be enhanced by pumping high pressure cold water down an injection well into the rock. The injection increases the fluid pressure in the naturally fractured granite which mobilizes shear events, enhancing the permeability of the fracture system. Water travels through fractures in the rock, capturing the heat of the rock until it is forced out of a second borehole as very hot water, which is converted into electricity. All of the water, now cooled, is injected back into the ground to heat up again in a closed loop.

In a further development to this, carbon dioxide generated by power plants may be used cost-effectively as a working fluid in place of water to help recover geothermal heat from deep underground. Such a system is similar in principle to enhanced oil recovery (EOR), in which carbon dioxide is used to improve the extraction of oil from marginal wells, making wells that were formerly not viable into cost-effective producing wells. At the same time, the carbon dioxide used in the recovery remains within the wells, sequestered away from the atmosphere.

In a similar way, the concept of this system would capture carbon dioxide and keep it out of the atmosphere, and it would also be a cost-effective way to use the greenhouse gas to generate new power.

Using supercritical carbon dioxide instead of water in a closed-loop system offers two significant advantages.

Firstly, the very significant well-bore density difference between the cold supercritical carbon dioxide in the injection well and the hot supercritical carbon dioxide in the production well will generate a very large buoyant drive, giving thermal siphoning, markedly reducing the circulating pumping requirements over those of a comparable water-based system.

Secondly, the inability of supercritical carbon dioxide to dissolve and transport mineral species from the geothermal reservoir to the surface would eliminate scaling in the surface piping, heat exchangers, and other surface equipment.

Supercritical carbon dioxide would be used for both the fracturing fluid and the heat transport fluid for deep-earth heat-mining systems. A three-well system – two production wells and one injection well – would be used to best access the fractured reservoir region. The heat contained in the hot geo-fluid would be transferred to a secondary working fluid in a high-pressure heat exchanger included as part of the surface power plant.

Backers of this new concept, which has yet to be proven, managed to secure a big endorsement and much needed cash with the announcement by the US Department of Energy that it was awarding \$338 million in federal stimulus funds for geothermal energy research. Some \$16 million of this award will be shared among nine carbon dioxide-related projects led by Lawrence Berkeley National Laboratory and other national labs, the California-based combinatorial chemistry firm Symyx Technologies, and several US universities.

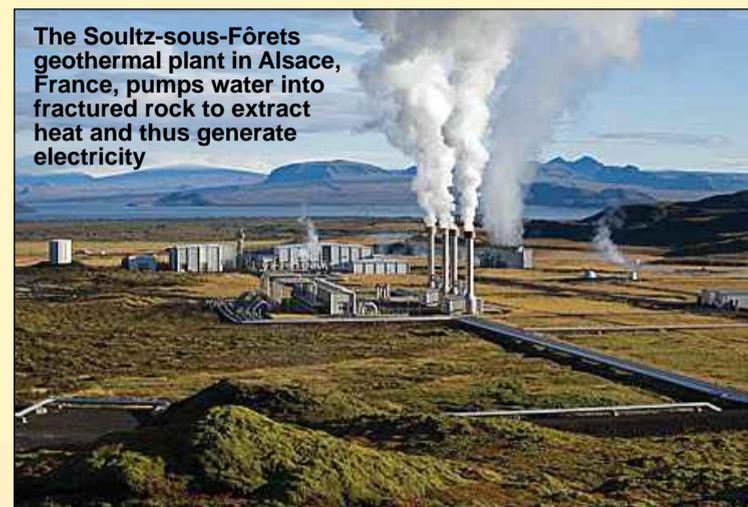
The concept behind these projects is based on using carbon dioxide that has been cycled through hot regions deep underground to efficiently bring heat to the surface, where it can be used to generate electricity. As a result of the process, a large amount of carbon

The system would capture carbon dioxide and keep it out of the atmosphere, and would also be a cost-effective way to use the greenhouse gas to generate new power

dioxide would be left underground, and thus taken out of the atmosphere. Miroslav Petro, Project Leader and Materials Scientist with Symyx, said: "You are sequestering carbon dioxide, and at the same time generating power from it."

The concept was first proposed as a way to improve systems that pump water deep underground to fracture hot rocks, then bring the heated water up via a second well to generate power, and then cycle the water back down. The technology has been little used to date because of the difficulties involved in fracturing rock to get at the geothermal heat and sustain the flow. The European Union's Soultz-sous-Fôrets project in Alsace, France, the most advanced such project worldwide, has taken 20 years to reach just 1.5 MW. In addition, the process has antagonised nearby communities because of the small earthquakes sparked by the aggressive fracturing required.

Donald Brown, a physicist at Los Alamos National Laboratory, proposed replacing water with supercritical carbon dioxide, a pressurised form that is part gas, part liquid. Supercritical carbon dioxide is less viscous than



The Soultz-sous-Fôrets geothermal plant in Alsace, France, pumps water into fractured rock to extract heat and thus generate electricity

water, and thus should flow more freely through rock. Brown noted that a siphoning effect should help cycle the carbon dioxide, thanks to the density difference between supercritical carbon dioxide pumped down, and hotter gas coming up, slashing power losses from pumping the fluid. In addition, Brown argued, instead of using precious fresh water resources, a carbon dioxide-based project could sequester the equivalent of 70 years worth of carbon dioxide emissions from a 500 MW coal power plant.

Karsten Pruess, a hydrogeologist at Lawrence Berkeley, then performed the first detailed modelling of the technology. Pruess projected that a project such as Soultz-sous-Fôrets

could produce approximately 50 per cent more heat with carbon dioxide than with water. Most of the DOE-funded projects seek to test Pruess's optimism.

The most important question, according to Petro, is how supercritical carbon dioxide will interact with rock and minerals. Supercritical carbon dioxide also has a particularly complex relationship with water. On its own, supercritical carbon dioxide is not expected to dissolve minerals from rocks – a major problem encountered in the water-based approach. However, according to Petro, adding a fraction of water to supercritical carbon dioxide could form a super-dissolving "acidic soda water."

Meanwhile, at least one developer is seeking financing for a field demonstration of carbon dioxide-based geothermal. In September 2009, Salt Lake City-based geothermal developer GreenFire Energy announced a joint venture with a small oil developer, Enhanced Oil Resources, to build a 2 MW carbon dioxide-based demonstration plant near the Arizona-New Mexico border. The companies propose to commence drilling wells in 2010 to access hot rock underlying

a natural underground carbon dioxide reservoir. They project that the location could yield enough heat to generate up to 800 MW and, in the process, could absorb much of the carbon dioxide generated by the six large coal-fired power plants in the region.

Instead of adding carbon dioxide to geothermal energy plans, the University of Minnesota's geofluids research group, one of the DOE's awardees, proposes to add geothermal energy extraction to existing plans for carbon capture and storage. Martin Saar, the University of Minnesota geophysicist who leads the geofluids group, says that this scheme will yield additional value out of operations that already pump supercritical carbon dioxide into deep saline aquifers for storage, or into oil and gas formations to accelerate production. "That carbon dioxide will pick up heat from surrounding rocks," says Saar, "so why not circulate some of it to generate power?" This will eliminate the need to fracture rocks, and it takes advantage of existing equipment and drilled wells, thus reducing the cost of the geothermal plant.

Saar is researching how supercritical carbon dioxide interacts with rock, minerals and water. Understanding the latter is critical to the Minnesota scheme, since carbon dioxide injected into a saline aquifer will mix with water. However, Saar says that may be less of a problem than it appears, because large volumes of carbon dioxide injected into a saline aquifer should separate to form a distinct layer. He said: "Supercritical carbon dioxide is actually less dense than brine, so in an aquifer, it will rise and pool underneath the cap rock."

If the lab work confirms that and other predictions, Saar believes that they could be testing carbon dioxide geothermal in the field in as few as three years.

Meanwhile, at the Hellisheidi Power Plant in Iceland, a project is being undertaken to determine how quickly carbon dioxide will react with basalt once it is injected into the ground. The goal is to have the power plant start trapping a portion of its carbon dioxide emissions, with injections of carbon dioxide to begin by the end of 2010.

Until recently, geothermal power systems have only exploited resources where naturally occurring water and rock porosity is sufficient to carry heat to the surface





Junior Isles

Is the glass half-full or half-empty?

The year ended with a dilemma. Attending a family wedding in Barbados would mean not being able to attend the biggest event on the 2009 conference calendar – the COP15 meeting on climate change in Copenhagen. You cannot have it all. Life is about making decisions, with success or failure being merely a matter of perspective.

Countries have long agreed on the need to act on scientific advice to reduce greenhouse gas emissions but nearly 20 years later, the same stumbling blocks still remain. Now after nearly two weeks of political wrangling, the end result of COP15 last month was a three-page declaration that makes tentative commitments to curb greenhouse gas emissions. It also proposes financing from the rich countries to poor countries to help them deal with drought and other impacts of climate change, and to develop clean energy.

Most industry commentators view the outcome of COP15 as a dismal failure. Not just a failure by ministers and heads of government to reach a legally binding agreement but also a failure of the whole decision-making process and the UN's ability to broker such a deal.

At the end of the conference, four countries still opposed the accord – Venezuela, Bolivia, Cuba and Nicaragua. This meant that it could not be formally adopted as a decision of the UN meeting and so the conference had to take a much weaker “decision to note” the accord's existence. This leaves countries free to sign up voluntarily but requires consensus at a fresh general meeting to make the accord the basis of a new UN treaty on climate change.

One point of general consensus, however, is the UN's shortcomings in facilitating negotiations at the highest level, which some blamed for the failure to reach an agreement.

A few days after the close of the conference the UN bowed to pressure to start sweeping reforms of its process for reaching an agreement. According to UN rules, countries must reach a consensus before any binding decision is made. This meant hundreds of negotiators had to meet in dozens of groups during the conference to work on pages of highly detailed drafts.

Calling for a reform of the process, Britain's prime minister Gordon Brown said: “What happened at

Copenhagen was a flawed decision-making process.” He attacked a small group of countries, without naming them, which prevented the formal adoption of the accord. Ed Miliband, the British climate secretary went further in blaming China for the outcome, saying that China had vetoed two key commitments on emission cuts that would have made a stronger accord.

China responded by accusing Mr Miliband of trying to stir discord among developing countries. Wen Jiabao, China's premier said the agreement was “a result that came from hard work on all sides, was accepted by all, didn't come easy and should be treasured”.

European leaders called the non-binding accord “disappointing” while environmental organizations said it was a “failure”.

South Africa's negotiator Alf Wills said the resulting agreement was limited not only in terms of what it did to save the planet, but in the number of nations that accepted it,

any difference. In 1992 a UN Conference on Environment and Development was held in Rio de Janeiro. The United Nations Framework Convention on Climate Change (UNFCCC) was opened for signatures during the meeting and entered into force in 1994.

It was the first international treaty to call for controls on greenhouse gases and served as a basic framework for the international community to cooperate on climate change. However, it failed to reach concrete agreements on funds and technology transfer the developed countries should provide.

The Kyoto Protocol in 1997 was the first and only attempt at a globally binding agreement but was never ratified by the US and placed no obligations on developing countries. Due to expire in 2012, the protocol has done little to reduce greenhouse gas emissions. Some form of carbon tax may be a more effective tool.

So where do we go from here? In the coming weeks, the UN will attempt

Under the accord, developed countries will finance a \$10 billion/year, three-year programme starting in 2010

saying it did not extend beyond the 28 represented at the late-night negotiations.

The energy business community has also largely been left disappointed by the accord. The view of the business sector is especially important since its role will be crucial in fighting climate change, with the private sector expected to provide about 90 per cent of the \$500 billion a year needed in investment.

Speaking to the *Financial Times*, Peter Voser, chief executive of Royal Dutch Shell said: “We recognise that the accord reflects true political willingness to combat climate change. However, it remains unclear how this political willingness will translate into concrete steps.”

E.On, meanwhile, had pledged to cut its emissions faster if there was a strong deal in Copenhagen. But Wulf Bernotat, E.On's chief executive warned such cuts would “depend on further progress”, in the UN talks, and from China and the US in particular.

It is arguable, however, whether any type of global agreement will make

to persuade countries to strengthen their targets on reducing emissions. A space was left blank in the accord, pending submissions of formal targets by January 31st.

South Africa's Mr Wills said the political agreement that emerged from Copenhagen did have positive elements that can be built upon at the next round of talks, scheduled for Mexico City this summer. Wills pointed to agreements on how the US and other developed countries would record emission reduction targets, and on how emission reduction action by advanced developing countries like South Africa would be accounted for.

Others were also able to see rays of light from the conference. As expected most of those hailing the outcome as some form of success are politicians who invariably are known for positive spin. They say that while the accord is not perfect, it is a significant step.

German Chancellor Angela Merkel told the *Bild am Sonntag* newspaper the outcome is the first step toward a new world climate order, nothing more but also nothing less. Chinese Foreign

Minister Yang Jiechi said the accord is a positive step forward in recognizing different responsibilities between emerging and rich nations. Indonesian President Susilo Bambang Yudhoyono said the leaders took a “wholehearted stance” to save the earth and protect its children. US president Barack Obama said it is the first time in history that leading economies have come together to take action on global warming.

Making the right political noises is necessary to keep alive hopes of a binding deal. The finger-pointing that has followed Copenhagen will only serve to damage the chances of drafting a binding treaty in coming negotiations. Yvo de Boer, the UN's climate change chief urged governments to “...stop the recriminations, and to pick up the pieces to get the process to go on”.

Copenhagen may not have lived up to expectations but it did mark progress. Under the accord, developed countries will finance a \$10 billion/year, three-year programme starting in 2010 to fund developing nations' projects to deal with drought, floods and other impacts of climate change, and to develop clean energy. It also set a “goal” of mobilizing \$100 billion a year by 2020 for the same purpose. Equally importantly, the big developing nations have come closer to acknowledging that climate change cannot be tackled without action from them.

James Cameron, vice-chairman of Climate Change Capital also noted: “In the detail there are small encouragements in the reform of the Clean Development Mechanism which should make the process better – quicker, fairer and more effective at taking tonnes of carbon out of the atmosphere.”

Your view on COP15 depends on whether you see the glass as half-full or half empty. The majority of those who attended the conference – during which some were unfortunate enough to be left outside in freezing conditions due to insufficient space in the venue – only to witness a weak declaration at the end, must be seeing the glass as half-empty.

Gazing at a sun-drenched beach in Barbados, while sipping on a cold glass of coconut water, I thought of the conference in Copenhagen with the freezing weather and chaotic conditions. I decided my glass at least, was half-full.

