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Policymakers should focus on "energy trilemma"

Pierre Gadonneix, Chairman of the WEC

Looking beyond COP17, tackling global climate change is just one of the issues facing policymakers. **Junior Isles**

As policymakers headed for climate change talks at the 17th Conference of the Parties (COP17) meeting in Durban, South Africa, a report by the World Energy Council (WEC) said that focusing exclusively on greenhouse gas emissions is unsustainable.

The third edition of the *2011 Assessment of Country Energy and Climate Policies* published by the WEC highlights where policymakers can make a difference and outlines how they can create better policies to ensure the world has a chance of limiting global temperature rise to 2ºC.

Speaking at the launch of the report Pierre Gadonneix, Chairman of the WEC said: "As countries struggle to provide for energy security, social equity and the increasingly pressing environmental impact mitigation measures, policymakers must favour resilient systems. I call "resilient" a system that allows us to pursue, year after year, on a continuing process, our long-term objectives and at the same time is flexible enough for us to capitalise on unexpected opportunities, like technological breakthroughs and innovations, and overcome unforeseen obstacles, like price volatility."

Policymakers and negotiators from nearly 200 countries were anticipating difficult talks in Durban. On the eve of the summit no new legally binding deal to follow the first phase of the Kyoto Protocol, due to expire in 2012, was in sight.

The world economic slump and eurozone crisis continues to be a significant factor and threatened the chance of building on what was agreed at previous talks in Copenhagen and Cancun. Just days before the kick-off of COP17 the US, backed by Saudi Arabia, was still refusing to sign-off on the flagship Green Climate Fund (GCF) first mooted at Copenhagen in 2009. The fund is supposed to channel "a significant portion" of the $100 billion a year developed countries have promised to mobilise by 2020 to help developing countries fight climate change.

The US, which has never ratified the Kyoto Protocol, said it wanted more work on issues such as private sector involvement in the GCF and which countries would contribute. Speaking at a conference in Brussels at the end of October, EU climate commissioner Connie Hedegaard said that leveraging private funding is key to moving forward on financing climate change mitigation and adaptation in developing countries.

One leading climate industry specialist noted that the term "climate finance" had to be better defined both in order to reach a global agreement on international climate policy and to facilitate work at a national level.

Kirsty Hamilton, associate fellow at

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World locking into "unsustainable energy future"

The world is at risk of locking itself into an unsustainable energy future, which would have far-reaching consequences the International Energy Agency has warned.

At the launch of the 2011 edition of the *World Energy Outlook (WEO 2011)*, the energy watchdog said that there is still time to act, but the window of opportunity is closing.

It said that investment in low-carbon technologies must be made by 2017 to prevent long term average global temperature rising by more than 2ºC above pre-industrial levels.

Fatih Birol, chief economist at the IEA said: "As each year passes... the 'lock-in' of high carbon infrastructure is making it more difficult to meet our energy security and climate goals. If, as of 2017, there is not the start of major and clean new investments, the door to 2ºC will be closed.

"There is a need for an international legally binding agreement to put a price on carbon, to put in place some new regulations."

In the WEO's central New Policies Scenario, cumulative CO_2 emissions over the next 25 years amount to three-quarters of the total from the past 110 years, leading to a long-term average temperature rise of 3.5°C. It said if the new policies were not implemented, the world would be on track to an increase of 6°C.

In the New Policies Scenario, which assumes that recent government commitments are implemented in a cautious manner, primary energy demand increases by one-third between 2010 and 2035.

The share of fossil fuels in global primary energy consumption falls from around 81 per cent today to 75 per cent in 2035. Renewables increase from 13 per cent of the mix today to 18 per cent in 2035.

The use of coal – which met almost half of the increase in global energy demand over the last decade – rises 65 per cent by 2035. More efficient power plants and carbon capture and storage (CCS) technology could boost prospects for coal, but the latter still faces significant regulatory, policy and technical barriers that make its deployment uncertain.

The IEA's Executive Director Maria van der Hoeven said: "Growth, prosperity and rising population will inevitably push up energy needs over the coming decades. But we cannot continue to rely on insecure and environmentally unsustainable uses of energy."

The World Energy Council (WEC) welcomed the IEA's WEO 2011. WEC Secretary General, Dr. Christoph Frei said: "We share the concerns about the lack of progress towards a global climate framework that provides clear long term signals for energy infrastructure investments."

He added: "We are concerned about the slow take up of the CCS challenge. Coal use is still steadily increasing and failure to deliver in this area has the potential to blow a big hole in the climate mitigation roadmap."

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Durban, South Africa, hosted the latest round of climate change talks

London-based think-tank Chatham House said there is a "lumpy intersection" between the climate finance debate and the renewable energy debate. "This is actually a real issue because it will come down to the metric that unites people in understanding what this phrase means," she said. "Unless we can be sure we're sharing the same conversation, it becomes harder to move forward."

"Is working with renewable energy financiers climate finance or is it not? […] Is climate finance tonnes in a deal or is it systems transformation?" she asked.

In any event, like the WEC other industry experts say it is time for international climate policymakers to broaden their objectives to cover energy efficiency, renewables and environmental health.

Speaking ahead of COP17 analysts at HSBC said in a note from its climate change centre of excellence: "To get a deal that has real positive impact on both economic prosperity and climate security, a global Plan D will need to mirror the packages of measures that governments and business are already putting in place at the national level to deliver 'green growth'."

The bank defines Plan A as the original UN Framework Convention on Climate Change, signed in 1992, Plan B the Kyoto Protocol, and Plan C the "soft consensus in last year's Cancún agreements to holding global warming to 2°C [above pre-industrial levels] this century".

It said such an agreement is some years off and the Durban negotiations should "keep [the] talks alive" with a "full deal postponed until 2015 at the earliest".

The WEC report also said that free market solutions alone cannot deliver sustainability.

Addressing the underlying issues identified in this year's assessment, Joan MacNaughton, the Executive Chair of the report, said: "This report shows that market led solutions are not enough on their own to achieve energy sustainability. Only with coherent and robust policies, led by a clear vision, can countries reach equilibrium in the long term. Countries must adopt stable regulatory regimes if they are to regain investors trust and support the huge volumes of capital investment required to ensure a stable supply of energy."

Joan MacNaughton: market-led solutions are not enough

Nuclear growth still predicted

Taiwan President: Ma Ying-jeou

Despite the accident at Fukushima, the use of nuclear power will still continue to grow, predominantly in Asia. However, it is likely to play a reduced role in the global energy mix.

Junior Isles

In its latest *World Energy Outlook* report, the International Energy Agency said global nuclear power output is expected to rise by over 70 per cent by 2035 as countries including emerging economies have yet to reconsider their nuclear policies even after the accident at Japan's Fukushima Daiichi nuclear power plant.

The forecast was supported by the International Atomic Energy Agency (IAEA), which says demand for nuclear energy around the world is on the rise, although the nuclear crisis in Japan has dented growth.

Yukiya Amano, Director General of the IAEA, said: "Despite the accident, the IAEA's latest projection is that the number of operating nuclear reactors in the world will continue to increase steadily in the coming decades, although less rapidly than was anticipated before the accident."

A newly released report from Global Industry Analysts (GIA) also said escalating demand for electricity, rising crude oil prices, favourable government policies and the need to lower environmental pollution are expected to enhance the significance of nuclear power in the long run.

It said many developing countries still plan to introduce nuclear power due to growing global demand for energy and concerns about climate change as well as about volatile fossil fuel prices and the security of energy supply.

It noted that most of the growth would occur in countries such as India and China that already have operating nuclear power plants.

At the beginning of November, India said it will push forward with expansion of its nuclear energy programme, tripling its nuclear power output from 20 000 MW by 2020 to 60 000 MW by 2030.

Prem Chand Gupta, a member of the Indian Parliament, commented on the IAEA report at an open meeting of the UN General Assembly. "We are committed to taking forward our three-stage nuclear programme based on a closed fuel cycle," he said.

India also remains keen to have nuclear cooperation with Japan. S. A. Bhardwaj, director (technical) of Nuclear Power Corporation of India Ltd recently told a group of visiting journalists from Japan: "Japan is a country which has the technology for nuclear reactor design, construction, equipment and manufacturing."

Like India, Vietnam is still pressing ahead with its nuclear programme, which will employ Japanese technology. Prime Minister Nguyen Tan Dung held talks at the beginning of November with his Japanese Prime Minister Yoshihiko Noda, to resume a process that began in October last year when Vietnam chose Japan as one of its partners for the programme.

If completed on schedule, by 2020, Vietnam would become the first ASEAN nation to have nuclear reactors.

Also at the start of November, a government official said Bangladesh and Russia have signed a cooperation deal to build a nuclear power plant in the country. Under the agreement Rosatom will build two 1000 MW reactors at Ruppur (around 200 km from Dhaka).

While nuclear growth will continue, the accident is likely to see it have a reduced role in the future energy mix. In its *WEO 2011*, the IEA also said the ratio of nuclear power to overall power generation could drastically fall if the accident prompts countries to lower their dependency on nuclear power.

Many ASEAN countries, including Malaysia and Indonesia, are rethinking their nuclear strategy after the accident at Fukushima. Several days after the accident, Thailand indefinitely froze plans to build five nuclear plants by 2025.

Malaysia, which had planned to build its first nuclear plant by 2021, is also having second thoughts. The Indonesian government recently said nuclear energy is the last choice of energy sources, considering the risk and cost.

Taiwan says it will continue with construction of its fourth nuclear plant but remains committed to reducing its reliance on nuclear energy. Taiwan President Ma Ying-jeou promised that the licenses of the existing three nuclear power plants will not be renewed after they expire.

Renewables continue to show strong growth

- Investment in installations to hit $395 billion by 2020
- Offshore wind will see fastest growth

Annual investment in new renewable energy capacity will double over the next 10 years, according to Bloomberg New Energy Finance (BNEF).

In its *Global Renewable Energy Market Outlook* the London-based analysis company says that spending on new installations will double to $395 billion in 2020, then rise to $460 billion in 2030, compared with $195 billion in 2010.

The World Bank also recently said that renewables now account for almost one quarter of its lending.

According to BNEF by 2030, 19 per cent of power generated is expected to come from non-hydro renewables. This compares to 12.9 per cent forecast by the International Energy Agency (IEA) in its recently published *World Energy Outlook 2011*.

Christos Katsileros, energy economics analyst at BNEF, said a clear difference between his company and the IEA's figures was "the much faster penetration of solar technologies".

Investment in biofuels, biomass and waste-to-energy is projected to increase from $14 billion in 2010 to $80 billion in 2020 and then remain level over the next decade.

Offshore wind will undergo the fastest percentage growth of all technologies and, combined with the onshore sector, will attract $140 billion in 2020, compared to $82 billion in 2010, and $206 billion per year by 2030, says the report.

A recently released report by Pike Research, a US-based market research and consulting firm gives even higher numbers. It revealed that by 2017 wind power installations will represent a $153 billion global industry, up from $77 billion in 2011.

The firm's *Global Wind Energy Outlook* forecasts that over that period, cumulative investment in new wind power capacity will reach $820 billion, total wind generation capacity, including both onshore and offshore projects, will increase from 235.8 GW in 2011 to 562.9 GW.

The increasing penetration of wind is leading to a reduction in its cost of generation. According to BNEF, falling costs mean that the average onshore wind farm will be competitive with natural gas-fired power generation by 2016.

US states call time on climate initiative

California now remains the only US state participating in the Western Climate Initiative (WCI) after six states dropped out of the initiative last month.

Along with four Canadian provinces – British Columbia, Manitoba, Ontario and Quebec – on November 10, California announced the formation of a non-profit organisation to administer the WCI greenhouse gas cap-and-trade programme and service its technical needs.

Arizona and the other US states formerly associated with the WCI have now said that they are no longer part of the organisation.

Henry Darwin, Arizona Department of Environmental Quality Director, said: "Arizona believes there are more effective, responsible ways to realise the environmental and health benefits the WCI programme seeks to achieve while avoiding the economic costs to industries that are subject to cap and trade," Darwin said, adding that those costs are ultimately borne by customers.

Arizona has instead now joined 13 other states and four Canadian provinces in a new initiative called North America 2050, which aims to promote energy innovation and create economic opportunities while reducing carbon emissions.

The new organisation aims to collaborate on topics such as exploring carbon capture and sequestration and developing high quality offsets that may be used in emissions trading programmes.

Participating jurisdictions in North America 2050 are free to choose which policies and programmes they want to be involved with based on their own priorities and vision, Darwin said.

In late October the California Air Resources Board (ARB) adopted final regulations for the world's second largest cap-and-trade system, despite unresolved concerns over allowance allocations, buyer liability for offsets and the size of the overall market.

China fights back in solar trade war

The rift in the US solar energy industry deepens as China starts its own investigation into US firms.

Siân Crampsie

A spat between US and Chinese solar power module manufacturers is deepening with the Chinese government saying that it will carry out its own investigation into trade practices by US firms.

China's Ministry of Commerce says that it will investigate subsidies and supporting policies provided for US renewable energy tech firms exporting to China.

The announcement was made in November just days after the US Commerce Department said that it had decided to take up a complaint by a group of US solar equipment manufacturers over trade practices by Chinese solar firms.

The complaint by US firms has split the US solar energy industry and has led to the creation of another US solar manufacturing coalition that is opposed to the action.

China says that its investigation will cover solar, hydropower and wind energy equipment. Chinese industry groups requested the investigation and allege that US policies violate World Trade Organisation (WTO) rules and hurt the competitiveness of Chinese products in the renewable energy market in the USA.

The China Photovoltaic Industry Alliance, a solar trade group, says that it is concerned about US exports of polysilicon – the raw material for solar panels – to China. It told news agency *Bloomberg* that subsidised imports of polysilicon had prompted Chinese polysilicon companies to halt production.

The USA has initiated anti-dumping (AD) and countervailing duty (CVD) investigations of imports of solar cells from China. It could impose extra taxes on imports of Chinese goods if it finds that Chinese firms have been 'dumping' products on the US markets at less-than-fair value, or if it believes that the production of those goods has been unfairly subsidised by the Chinese government.

The investigation was prompted by a complaint filed by a group of seven US solar firms led by SolarWorld and known as the Coalition for American Solar Manufacturing (CASM).

In November a second coalition of US solar manufacturers opposed to the anti-dumping complaint emerged. The Coalition for Affordable Solar Energy (CASE) says that the US-China solar row is a "distraction" from bigger issues, and that the cheap made-in-China solar products have benefited US consumers.

The scale of the row reflects the double-edged sword of the current US solar power market: falling solar panel prices have helped to drive huge growth in the market but have forced a drastic reduction in revenues for US solar firms, some of which have gone bust.

The drop in prices has been largely the result of a massive oversupply of solar modules as Chinese firms have ramped up production levels.

More Asian companies – including South Korean firms LG and Samsung – are also getting in on the act, says Kurt Zwerko, director of large projects for Conergy, a member of CASE. "I don't see the Chinese or Koreans letting up," says Zwerko. "They've added so much [production] capacity in the last few years, the output has to go somewhere.

"So inevitably it's going to come here [North America] – and actually, it helps to drive the market."

Kinder Morgan buys El Paso

Consolidation in the US energy sector is continuing with a $38 billion deal struck by Kinder Morgan to buy El Paso Corporation.

The deal is one of the largest in the history of the US energy sector and will allow Kinder Morgan to expand its midstream assets during the USA's natural gas boom. The company will become the largest midstream energy company in North America with approximately 67 000 miles of natural gas transportation pipelines.

Kinder Morgan Chairman and CEO Richard D. Kinder described the cash and share deal as a "once in a lifetime transaction" and said that the two companies' natural gas pipeline systems are very complementary. "The El Paso assets are primarily regulated interstate natural gas pipelines that produce substantial, stable cash flow and have access to key supply regions and major consuming markets," said Kinder.

"The transaction is expected to produce immediate shareholder value (upon closing) through strong cash flow accretion and offers significant future growth opportunities."

Kinder Morgan, which has received financing from Barclays Capital to pay for the cash portion of the deal, plans to sell El Paso's exploration and production business to help pay down that debt. El Paso had already announced in May it would spin off those businesses, which account for about 34 per cent of its annual revenue, to its shareholders.

- The closing of a proposed merger between Constellation Energy Group and Exelon Corp could be pushed back until April 2012 after the Federal Energy Regulatory Commission (FERC) delayed a decision on the deal. FERC has restarted the regulatory review period because it considers a settlement reached by the two companies with the PJM electricity grid operator to be an amendment to the initial merger application.

Court rules in favour of Brazil dam project

- Further appeals expected
- Construction work continues

Work on a giant hydropower project in Brazil is set to continue after a court ruled that additional consultation with indigenous communities was not required.

The ruling overturned a court decision made in October 2011 that ruled in favour of a local fisheries group that said that the 11 GW Belo Monte dam on the Xingu river would harm fish stocks and the livelihoods of local populations.

Environmental groups say that the latest court ruling violates Brazil's constitution and international human rights conventions and that an appeal to Brazil's Supreme Court is expected.

The court said that there was no need for consultations with indigenous communities affected by Belo Monte since dam infrastructure and reservoirs would not be physically located on indigenous lands.

The ruling was made in response to a motion filed by federal prosecutors that called for the suspension of construction of Belo Monte in the state of Para until indigenous groups are consulted and given access to environmental impact reports.

"All the studies made arrive at the same conclusion: the dam will provoke drastic changes in the food chain and livelihood of the indigenous communities," said the federal prosecutors' office in a statement after the ruling.

The Belo Monte dam is an important element of Brazil's Accelerated Growth Programme (PAC) and will be the third largest hydropower plant in the world when complete. It is being developed by a consortium led by Brazilian energy group Chesf, which earlier this year awarded major supply contracts to Alstom, Andritz and Voith.

IDB loans boost Caribbean's low carbon credentials

Barbados is hoping to reduce its electricity consumption by 19 per cent by 2029

Jamaica and Barbados' plans to improve energy efficiency and increase their use of low carbon technology look set to benefit from Inter American Development Bank (IDB) loans.

The government of Jamaica says that it is working on a new national energy policy that will help to create a modern, efficient and environmentally friendly energy sector in the country.

Fitzroy Vidal, senior director of energy in Jamaica's Ministry of Energy and Mining told local media that the energy policy would be based on six key pillars and would also result in the update of the "archaic" Electricity Act.

The policy pillars include electricity, renewable energy, energy from waste, energy conservation and efficiency, biofuels, and carbon trading.

Jamaica announced last month that it would benefit from a $90 million loan from the IDB aimed at improving energy efficiency in the public sector.

The loan will cover projects in institutional strengthening, lighting and air conditioning. Energy and Mining Minister Clive Mullings believes that lighting and air conditioning are among the least energy efficient areas in the public sector, and that energy conservation efforts would be backed by a strategy to diversify Jamaica's energy resources.

"We must implement the strategies that will revolutionise our domestic consumption patterns, manufacturing and productive processes," said Mullings. "This includes renewable energy, natural gas, and all the possibilities, because we cannot afford to put all our eggs in one basket, as we have done before."

The IDB also approved a $70 million loan to help Barbados reduce its dependence on fossil fuels by diversifying its energy matrix, promoting sustainable energy sources, and supporting power saving efforts.

Under the plan, the country will aim to have 29 per cent of electricity consumption come from renewable sources such as photovoltaic, solar water heating, wind, biomass cogeneration, and waste-to-energy projects by 2029. The programme will also advance plans to promote the use of biofuels by blending ethanol with gasoline, encourage the use of natural gas as a substitute for other types of fossil fuels, and replace incandescent light bulbs with more efficient alternatives.

As a result, Barbados is expected to reduce its electricity consumption by 19 per cent by 2029. Greater efficiency will also enable Barbados to cut its oil import bill by about 30 per cent over a 20-year period, yielding cumulative savings in the region of around $600 million.

China likely to increase solar targets

- PV solar power could reach 3 GW by 2011
- Plans for 17 per cent reduction in carbon intensity

Bright plans: China's total installed capacity of PV solar power could reach 15 GW by the end of the 2011-2015 Five Year Plan

China's installed capacity of solar power in the renewable energy 12th five-year plan (2011-2015) is likely to be increased to 15 GW, according to the National Energy Administration (NEA).

The 12th five-year plan on renewable energy is still being drafted and the final target number is yet to be determined. However, the Energy Research Institute of the National Development and Reform Commission recently said that China's total installed capacity of PV solar power could reach around 3 GW by the end of 2011, far beyond the expected 1-1.5 GW.

The higher than expected capacity is being attributed to a unified and standard on-grid power tariff introduced for the first time in August, and an almost 50 per cent drop in PV module prices from Yuan12/W to Yuan6.5/W since January 2011.

The price of solar modules exported from China has been a source of dispute between China and the US. Last month the Ministry of Commerce expressed concern over the US' anti-dumping and anti-subsidy probe into Chinese exports of solar panels.

"Chinese people and enterprises are strongly displeased with the United States' attempts to blame Chinese exports for its own sluggish development, said Shen Danyang, a spokesman for the ministry, in a statement.

The US Commerce Department said that it will conduct an investigation to determine whether Chinese companies have been selling solar panels in the US at unfair discounts and receiving illegal government subsidies.

Shen warned that the probe could damage energy cooperation between the two countries and impede the progress of global efforts to deal with climate change.

As part of its plans to address climate change, the State Council recently approved a plan to realise a 17 per cent fall in carbon dioxide emissions per unit of GDP by 2015.

Meanwhile, a report released by Tsinghua University in November said China has become the top emitter of carbon in the world after its emissions of greenhouse gases increased by 33.6 per cent from 2006 to 2010.

The report said that China's carbon intensity dropped by 20.8 per cent but cautioned on coal use.

It said central authorities' goal of controlling coal use in the next five years will be unattainable if local governments remain reluctant to use less energy while they pursue economic growth.

During the past five years, the country has gone from getting 68 per cent of its energy from coal to 70 per cent, despite its heavy investment in renewable energy said Zhang Guobao, former head of the NEA.

"The growing demand for coal will put China under pressure in terms of coal mining, transportation and controlling carbon emissions," he said.

China recently announced plans to invest over $400 billion in the next four years. The country plans to invest over Yuan3 trillion (about $473.1 billion) for environment protection between 2011 and 2015, said Wu Xiaoqing, the vice minister of the Ministry of Environmental Protection (MEP).

S. Korea going big on green growth

South Korea is putting plans in place to be a world leader in green technology, writes **Syed Ali.**

Promising government support: Kim Jung-gwan

South Korea is making substantial investments in an effort to become one of the world's top five green energy economies by 2020.

Plans are already taking shape with the recent signing of a memorandum of understanding between the Ministry of Knowledge Economy and 15 companies, including the state-run Korea Electric Power Corp., and two provincial governments to build a huge offshore wind farm in the Yellow Sea.

The wind farm, which the government says will be third largest in the world, will cost over Won10 trillion ($9 billion).

"This is an important project that requires complete cooperation and support of both the government and private sector as it will lead the country's economic growth and improve its national competitiveness in the future," said Kim Jung-gwan, Vice Minister of Knowledge Economy.

Under the plan initially unveiled in November 2010 the government, along with developers, will first build a "proving area" by 2014 in waters off the coast of southwestern Buan and Yeonggwang counties in North and South Jeolla Provinces to test 20 x 5 MW turbines.

Additional turbines will be added to the site in two stages to bring up total generating capacity to 500 MW by 2016 and 2.5 GW by 2019, according to the ministry.

At the end of October the Presidential Committee on Green Growth briefed President Lee Myung-bak on the preparation process and a range of policy measures on sustainable green growth. The committee said that the government will extend support for export financing in the green industry that covers renewable energy from Won6.6 trillion in 2010 to Won10.5 trillion in 2012.

The country intends to double its budget for energy R&D between now and the end of the decade.

According to the government, technology development and R&D carried out under the plan will deliver a 12 per cent increase in energy efficiency and account for half the reduction in emissions needed for Korea to meet its 2020 target of 30 per cent below the business-as-usual-level.

Joint research projects and bilateral consultations with advanced countries will play an important role in the implementation of this plan, which will require Won35.5 trillion from the government and the private sector combined. It is expected to increase exports and domestic demand to Won202 trillion and Won59 trillion, respectively, and create 917 000 jobs.

Indonesia to replace Singapore gas exports with electricity

Indonesia is planning to export more electricity to Singapore in order to reduce gas exports to the island nation.

The Indonesian government plans to build new power plants in Batam, Riau Islands, with a total capacity of 4000 MW, most which would be exported to Singapore.

Energy and Mineral Resources deputy minister Widjajono Partowidagdo said: "The idea is that we build 4000 MW [of] power plants in Batam. As much as 3000 MW of electricity produced [by the power plants] will be distributed to Singapore, while the remaining 1000 MW can be used for Batam so that we do not need to send more gas to Singapore."

The power plants would most likely utilise coal as the primary energy source because Indonesia has abundant reserves with limited domestic absorption.

The gas that had previously been allocated for generating electricity in Singapore would then be utilised to fulfil soaring demand from industries in Java, he added.

"We hope that the power sales agreement with Singapore can be signed in 2012 or 2013, so before 2014 we can start the construction of the power plants. We will build the power plants gradually with the first to be set up with a total capacity of 1000 MW," Widjajono said.

"Not all gas for Singapore will be stopped. Only the gas that is used for electricity will be shifted to Java, while for industries, we will still deliver, especially if we are already tied by contracts."

The deputy minister believed that as long as the two countries agreed on power sales, many private investors would line up to fund construction of the power plants. He said the government might not contribute because it had very limited budget.

"[The distance between Batam and Singapore] is only 16 km. If we can find the money, the project is absolutely possible," he said.

Newly appointed president director of state electricity utility PLN Nur Pamudji said that his company fully supported the government's plan on the 4000 MW of new capacity.

Asia prefers carbon tax to trading

A report has found that many Asian companies outside Japan prefer a carbon tax to emissions trading as a tool for reducing carbon dioxide emissions.

The Carbon Disclosure Project's 2011 Asia ex-Japan report also found that 65 per cent of the 102 companies that responded are setting themselves emission reduction targets and 79 per cent already disclose some data on their carbon emissions.

The results of the survey add weight to the argument that a carbon tax is a better way of tackling emissions and comes at a time when some are beginning to question the future of the European Union and United Nations' cap-and-trade scheme.

As the price of carbon permits of both the UN-backed certificates of emission reductions (CER) and European allowances (EUA) fell to an all-time low in late November, bankers and traders were losing faith in the trading schemes.

Per Lekander, an analyst at Swiss bank UBS told the *Financial Times*: "The carbon scheme isn't working."

In August JPMorgan sold its ClimateCare carbon permits business, although the bank remains active in the carbon market.

The report also came just ahead of Australia gaining Senate approval of legislation for a carbon tax. This will make Australia one of the first large advanced economies outside of Europe to charge companies for their greenhouse emissions when the law comes into effect in July 2012.

The plan is to replace the tax with a market price for carbon set by an emissions trading scheme that will begin in 2015.

The tax was met by staunch resistance from the coal lobby, who said it will handicap one of the economy's largest export industries.

Cynthia Carroll, Chief Executive at global diversified miner Anglo American PLC said she was worried about the impact of the new carbon tax on the value of its coal mines. At the end of October, the company said it may spend up to $15 billion on expanding its Australian coal operations over the next eight years.

Solar industry fighting FITs cuts

Solar companies are concerned about the impact of proposed subsidy cuts in the UK, but it could pay to look on the bright side.

Siân Crampsie

Solar energy companies are encouraging the UK's industry to look on the bright side in the wake of proposals to cut feed-in tariffs (FITs) supporting the sector.

The UK government has announced plans to halve FITs in response to a boom in the uptake of solar panels since FITs were introduced, and falling prices for solar panels.

The move has led to fears that the cuts will harm the growing solar sector and that they will cause a boom and bust cycle. Environmental group Friends of the Earth, backed by a number of solar firms, has announced plans to take the government to court over its plans.

However, Chris Hopkins, managing director of Ploughcroft – the UK's leading solar installer – is urging people not to panic and to look at the bigger picture, which is vital for creating a sustainable solar economy.

"The rate of the proposed FIT cut did come as a shock. We always knew the rate would be reduced as the solar industry boomed, but we did not expect it to be halved," said Hopkins. "All of the current news seems to be destructive, and this will only destroy consumers' confidence in the solar market.

"We need to look at the positives that come from this announcement – and there are many."

The government said in October that solar incentives for homeowners would be cut from 43 pence/kWh to 21 pence/kWh in mid-December 2011. The change had been due to take place in April 2012.

It follows a decision earlier this year to curtail FITs in the commercial solar sector, and follows in the footsteps of other European countries that have cut FITs in response to rising demand and falling prices.

Spain cut FITs for the photovoltaic sector a year ago and made the policy retroactive to include existing solar plants. The move has left the government in dispute with a group of foreign solar companies who are claiming hundreds of millions of euros in compensation, according to a report published in the *Financial Times*.

"With production and manufacturing costs coming down in price over the last 12 months, and a typical installation now only taking one day instead of two, then it stands to reason that the 41p FIT rate was unsustainable for the long-term," says Hopkins. "If technology and installation costs have halved, then it stands to reason that the government would half the tariff."

But most solar energy companies believe that the cut to FITs will be damaging. Photon Energy has urged the government to reconsider its proposals, which would take effect in mid-December after a consultation period.

Research by law firm Eversheds indicates that over half of British solar companies will cut their workforce by half in response to the changes. John Cridland, Director-General of UK industrial body the Confederation of British Industry (CBI) also criticised the policy.

"Some companies have invested heavily in solar photovoltaic systems, and in the supply chains needed to install them," said Cridland. "That commitment has been undermined by the feed-in tariff decision – and so industry trust and confidence in the government has evaporated. This bodes poorly for investment in future initiatives."

"At Photon Energy, as well as other similar renewable energy companies, we've been able to generate jobs at a time when much of the economy is struggling," explained Jonathan Bates, director at Photon Energy. "To cut jobs in a new, high tech, environmentally sustainable industry at a time of economic instability is hugely irresponsible."

Friends of the Earth has announced its intention to take the government to court over moving forward the date FITs will be cut. It says the policy will be counterproductive.

But Hopkins says that the cuts will be good for the industry in the long-term because it will weed-out profiteers. "Companies that entered the solar industry purely to join in the solar gold rush are unethical and unsustainable," said Hopkins.

He added: "The current FIT makes it too good to be true for them, and the proposed lower FIT rate will mean they cease to exist.

"Long-term, this is good for the industry as we need companies who are committed to the renewable cause."

Smart grids show their skills

Isle of Wight: plans have been announced to turn it into an eco-island

Smart grid demonstration projects are taking off around Europe in a bid to show the ability of intelligent networks to support the operation and development of clean technologies such as renewables and electric vehicles (EVs).

In Italy Enel Distribuzione has begun installing the country's first smart grid, while a project on the Danish island of Bornholm in the Baltic Sea has brought Siemens on board as a partner.

In the UK, a community-led project has announced plans to turn the Isle of Wight into an 'eco-island' by deploying renewable energy technologies, hydrogen energy storage and fuel cell powered vehicles, linked by a smart grid and intelligent 'energy cloud' that can analyse energy usage patterns.

Another UK project will see G4S Utility Services and POD Point, the electric vehicle charging specialists, install smart meters and EV charging points in the northeast of England.

Enel Distribuzione says it is investing €10 million in the Molise pilot project and that the rapid growth of distributed renewable energy resources has spurred the need for a smart grid system that can regulate the bi-directional flow of electricity generated from renewable resources on low and medium-voltage networks.

The Bornholm EcoGrid EU demonstration project is designed to show that intermittent wind- and solar-based power generation can, through smart load control, form the basis for reliable and sustainable power supply.

The Isle of Wight eco-island project has similar objectives, with residents there aiming to be totally energy self-sufficient by 2020.

Key partners in the Isle of Wight project include IBM, Silver Spring Networks and Cable & Wireless, who between them will create the IT infrastructure and smart grid platform that will link renewable energy technologies, the grid and consumers into an integrated system that will be the first of its kind in the UK.

IBM's smart energy cloud will gather and analyse data on the island's energy usage to help understand how energy can be used more efficiently.

Fracking caused earthquakes

A firm exploring for shale gas resources in the UK says that it will implement mitigation measures at its drilling sites after a report showed that its operations were the likely cause of two minor earthquakes.

Cuadrilla Resources believes that the Lancashire field it is exploring in north-west England contains up to 5660 billion m^3 of gas but had to halt its activities after two minor earthquakes hit the area in the spring.

The independent report, which was commissioned by Cuadrilla, found that hydraulic fracturing – or fracking – was the probable cause of the earthquakes and has given environmentalists and other groups opposed to shale gas extraction ammunition for their calls for a moratorium on the industry.

A number of other European countries are planning to explore shale gas reserves in a bid to improve energy security and bridge the gap between coal-fired power plants and renewable energy. Poland is thought to have the largest reserves in Europe and stands to benefit most from the exploitation of a relatively clean domestic fossil fuel.

But environmentalists are concerned that the fracking process can cause considerable damage, including leaks of gases and chemicals into the atmosphere and aquifers.

The report says that the earthquakes had no structural impacts and were due to an "unusual combination of geology at the well site coupled with the pressure exerted by water injection as part of operations" It also says that this combination of geological factors was "extremely rare" and would be "unlikely to occur together again at future well sites".

"We unequivocally accept the findings of this independent report and are pleased that the report concludes that there is no threat to people or property in the local area from our operations," said Mark Miller, Cuadrilla CEO. "We are ready to put in place the early detection system that has been proposed in the report so that we can provide additional confidence and security to the local community.

"Cuadrilla is working with the relevant local and national authorities to implement the report's recommendations so we may safely resume our operations."

Shaky ground: shale gas drilling has caused minor earthquakes

Turkey has a vital role to play in providing secure energy supplies

Turkey boosts regional role

Turkey is using the energy that it exports to Syria as leverage to increase pressure on the regime in Damascus to bring an end to the violence there.

Turkish Prime Minister Recep Tayyip Erdogan has indicated that power supplies to Syria might be cut off if bloodshed continues in the country, where protests against the regime of President Bashar al-Assad began in March.

The protests have resulted in 1100 deaths, according to reports, and also resulted in attacks on Turkish diplomatic missions last month.

Energy sanctions on Syria by Turkey would have little impact because Syria is largely self-sufficient in electricity but they point to growing regional discontent with Syria and Turkey's growing importance as a link between the Middle East and Europe. The White House has welcomed Turkey's stance.

Last month Turkish Energy and Natural Resources Minister Taner Yildiz said at a regional energy conference that Turkey would play a vital role in providing secure energy supplies for Europe because of its proximity to the Caspian Sea, Central Asia and the Middle East.

Its role as an energy 'hub' will also help the country to attract investment to expand and upgrade its own energy sector, including the construction of a nuclear power plant.

In November Turkish energy company MetCap Energy Investments announced plans to build a new 878 MW combined cycle power plant and to expand the output of a planned integrated renewables combined cycle (IRCC) power plant from 570 MW to 1080 MW.

Both projects will be executed with GE Energy. Dr. Celal Metin, chairman of MetCap Energy Investments, said that the alliance with GE would "create growth opportunities to deliver leading technology to Europe, North Africa, the Middle East and elsewhere in the world".

The 878 MW Eurostar project will be based on two GE Frame 9FB gas turbines and will have zero-liquid discharge and a 35-minute start capability. It will be located near Istanbul and will start operations in 2014, says GE.

The Dervish IRCC project will use GE's FlexEfficiency technology, and is designed to integrate natural gas with wind and solar power in a single complex. At MetCap site conditions, this plant is capable of reaching 69 per cent thermal efficiency.

Sun shines on Morocco solar plans

Morocco is set for a significant expansion of its solar energy sector after the World Bank gave the green light to help pay for the development of one of the world's largest concentrated solar power plants.

The country has also been chosen by the Desertec Industrial Initiative (DII) as the site for its first large-scale solar power plant.

The World Bank is to finance the first phase of the Ouarzazate solar complex with a $200 million loan and another $97 million through its Clean Technology Fund. The plant is part of the Moroccan government's $9 billion national solar plan, which aims to develop five large-scale solar power plants with a total output of 2000 MW by 2020.

The first phase of the Ouarzazate plant involves construction of a 160 MW plant by 2014. The second phase will see the expansion of the plant to 500 MW.

Other development banks and the Moroccan government are financing the project, located southeast of Marrakesh. A contractor to build the plant will be chosen in 2012.

DII last month said that it would start construction in 2012 on a 500 MW solar power plant in Morocco. The €2 billion project is the first step in a proposed network of solar and wind power plants in North Africa that the European-led coalition of companies hope will provide 15 per cent of Europe's electricity by 2050.

Other plants could be built in Tunisia and Algeria, says DII, whose members include Siemens, E.On, Deutsche Bank and Munich Re.

The group is proposing that the electricity generated by the €400 billion power plant network would be transmitted to Europe via long distance HVDC power cables.

Morocco's energy plan calls for ten per cent of energy generation to be met from renewable resources by 2012. The country's abundant sunshine and available land space makes it ideal for siting solar power plants, but public utility Office National de l'Electricité (ONE) is also planning the construction of wind and hydropower facilities.

In October the World Bank's Climate Investment Fund (CIF) and CTF approved plans for a 1070 MW hybrid wind-hydropower power plant and a rural electrification project in Morocco.

DRC, South Africa sign Grand Inga pledge

- MOU paves way for project development
- Opponents doubt project benefits

Development of the world's biggest hydropower scheme has moved a step closer to reality

Siân Crampsie

Development of the world's biggest hydropower scheme moved a step closer to reality in November with the signing of an agreement between South Africa and the Democratic Republic of Congo (DRC) to build the plant. DRC President Joseph Kaliba and his South African counterpart Jacob Zuma witnessed the signing of a memorandum of understanding to start the development of the first phase of the proposed 39 000 MW Grand Inga Dam on the Congo River.

The project is touted by proponents as being a project that will spur economic development across Africa, while its opponents say that African communities are unlikely to benefit from the energy generated by the project because the cost of constructing local power grids is not included in Grand Inga's $80 billion price tag.

Grand Inga is a priority project by the Southern Africa Development Community (SADC), the New Partnership for African Development (NEPAD) and the World Energy Council. The World Bank, European Investment Bank and the African Development Bank are also likely to contribute vast sums of financing towards the project.

"It will enhance energy access to clean and efficient energy across the continent and contribute significantly towards a low carbon economy and economic development," declared Zuma in the DRC's second-largest city Lubumbashi, where the signing took place.

Zuma described the event as "a day to prove Afro-optimists right".

Grand Inga will be built on the Inga Falls, one of the largest waterfalls in the world, where the Congo River drops by almost 100 m. Two existing hydropower plants there produce only 1775 MW.

Earlier in 2011 Aecom and EDF were awarded a $13 million contract, financed by the African Development Bank, to conduct feasibility studies of Grand Inga and its associated transmission lines.

Shell signs Iraq gas flare contract

Gas being flared off at oilfields in southern Iraq is to be captured after the Iraqi cabinet approved an agreement with Royal Dutch Shell and Mitsubishi Corporation.

The two companies are part of a venture with Iraq's South Gas Company that will gather the raw gas that is currently flared because of a lack of infrastructure to collect it.

The capture of the gas will provide an important domestic energy source for Iraq and will also offer the country the potential for gas exports.

"Capturing this gas will create a reliable supply of energy for Iraq while at the same time reducing greenhouse gas emissions," said Shell Chief Executive Officer Peter Voser. "This also sends a positive signal about the investment climate in the country."

Under the £10 billion ($16 billion), 25-year deal, the joint venture – known as Basrah Gas Company – will collect and process raw gas from the Rumaila, Zubair and West Qurna 1 fields in the southern part of the country. Some 700 million standard cubic feet of gas is currently burned off each day in southern Iraq.

At current prices, the gas is worth about $1.8 billion per year, says Shell.

The provision of a reliable source of electricity is one of the major challenges for Iraq, says Jason Lovell, partner at international law firm Eversheds.

"Generating electricity from gas in this way is a relatively cheap option in terms of the capital expenditure required to construct the generating station and its reliance on a relatively cheap source of fuel, making use of locally available gas, which would otherwise be wasted in the short term. Using locally sourced gas also removes the expense of putting in place infrastructure for its export.

Alstom broadens Russian ties

- RusHydro venture plans thermal projects
- HVDC JV sealed

Siân Crampsie

Alstom has created a new joint venture aimed at boosting its presence in the Russian power equipment market.

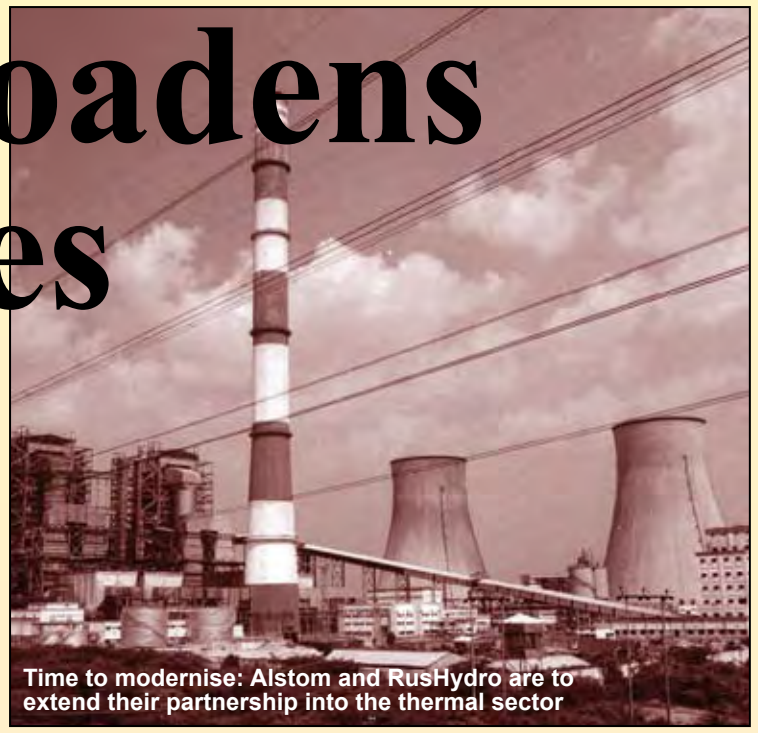
The engineering concern has signed a deal with KER Ltd., a contractor in the field of electrical engineering, to form a joint venture company covering the Russian high voltage direct current (HVDC) market.

It has also extended an existing deal with RusHydro, Russia's largest hydropower generation company, to cover the thermal power generation market in Russia.

The two partnerships are part of plans by Alstom to establish a strong presence in Russia, where energy demand is growing and ageing power infrastructure needs modernising and replacing. It is particularly keen to take advantage of Russia's low cost-base by 'localising' expertise and production.

In their 50-50 joint venture, KER and Alstom hope to take advantage of the need for HVDC technology, which could support the modernisation of Russia's grid with the addition of long distance interconnections. The two companies will also establish a direct current engineering centre in St Petersburg that will start operations in January 2012.

Alstom and RusHydro are to move their partnership into the thermal sector with plans to modernise and repower plants owned and operated by RAO Energy System of East, a holding company owned by RusHydro that manages 9000 MW of capacity in the Russian Far East.



Time to modernise: Alstom and RusHydro are to extend their partnership into the thermal sector

They have also announced plans to build new power generating capacity.

Alstom and RusHydro signed a strategic cooperation agreement in 2010 to take advantage of opportunities in Russia's hydropower sector. Alstom has also created joint ventures with other key Russian firms, including Transmashholding, Rosatom, Rusal and Inter RAO.

In October 2010, Alstom Grid and FSK signed an agreement to establish a framework for implementing Smart Grid technologies in the Russian electrical grid.

Philippe Pegorier, Country President of Alstom Russia, said that the latest deals would help the development of Russian infrastructure with innovative technologies.

GEH, Fluor expand collaboration

GE Hitachi Nuclear Energy (GEH) and Fluor Corporation say that they will work together on a new nuclear power plant in Finland if Teollisuuden Voima Oyj (TVO) selects GEH's reactor technology for the project.

The two companies have signed a memorandum of understanding under which Fluor would serve as GEH's engineering, procurement and construction (EPC) partner on the Olkiluoto 4 project in Finland.

The two companies will submit a joint bid for Olkiluoto 4 based on GEH's generation III+ economic simplified boiling water reactor (ESBWR) design. TVO is evaluating several other different reactor technologies for the project.

"By signing this new project development agreement, GE Hitachi Nuclear Energy and Fluor are demonstrating our shared commitment and global supply chain readiness to TVO to deliver an ESBWR project on time and on budget," said Danny Roderick, senior vice president of new plant projects for GEH. "Our companies offer the technology expertise and project management experience required to help TVO achieve its energy and economic priorities."

Wärtsilä seals Hamworthy deal

Björn Rosengren, CEO, Wärtsilä Corporation

Wärtsilä says that a deal to buy a UK engineering company will allow it to broaden its capabilities in the environmental solutions, offshore and marine gas applications markets.

The Finnish engine firm has reached an agreement with the board of Hamworthy over a cash offer that values Hamworthy at £383 million. It says that its global presence will allow Hamworthy to "accelerate its growth and exploit its full potential, particularly in the early stage environmentally sustainable technologies".

The deal is subject to shareholder approval and regulatory approvals but is expected to close in early 2012. Hamworthy shareholders will receive 825p/share, says Wärtsilä, which is expecting to gain from synergies on costs as well as combined sales opportunities from the transaction.

Hamworthy, which provides specialist equipment and services to the marine, oil and gas and industrial sectors worldwide, employs about 1150 people and achieved revenues of £181.6 million in fiscal 2011. It is seen as a good strategic fit for Wärtsilä.

"We believe strongly in marine gas markets and the opportunities in the rapidly evolving environmental markets," said Björn Rosengren, CEO, Wärtsilä Corporation. "Combining our resources with Hamworthy, we will be able to offer customers a broader portfolio of economically efficient, reliable and environmentally sustainable products and systems."

- Meanwhile, US engine manufacturer Caterpillar announced it has finalised the purchase of MWM Holding GmbH (MWM) from 3i and funds managed by 3i for €580 million ($800 million). This action follows the European Commission's recent clearance of the transaction. MWM is a leading global supplier of sustainable, natural gas and alternative-fuel engines.

"The completion of the MWM acquisition represents the latest step in our strategic plan to aggressively grow our energy and power systems business," said Gerard Vittecoq, Caterpillar group president with responsibility for Energy and Power Systems. "More and more customers want a gas option for their engines. By combining our strengths in diesel and gas power generation with the technology and product strength of MWM, we are well positioned to be a lead provider in gas engine solutions for our customers."

Beacon continues under Chapter 11

Beacon Power Corporation says that it is planning to restructure its overheads and pursue potential new investors after filing in the USA for bankruptcy protection.

The Massachusetts-based energy storage firm is the latest in a series of high-profile bankruptcies in the clean energy sector in the USA. It says that it will continue to operate its New York-based 20 MW flywheel energy storage plant, which was inaugurated in July this year.

Beacon Power believes that its financial difficulties are due, in part, to the uncertain economic and political climate and loan conditions mandated by the US Department of Energy.

It has objected to media reports that have drawn comparisons between Beacon and Solyndra, the solar panel manufacturer that recently went bankrupt.

Beacon received a $43 million federal loan to help fund its flywheel plant in Stephentown, NY.

The company believes that the high capital costs of developing its technology have contributed to its woes. It said in a statement that its business continues to be "a work in progress" that "requires additional investment".

In October it was de-listed from the Nasdaq exchange because its shares fell below $1 in value.

According to CEO of Beacon Power, Bill Capp, the company has been operating at a loss because the revenues generated by its 20 MW facility in Stephentown, NY, could not support its operations.

It says that revenues from the plant, which helps the NY system operator to balance supply and demand on the grid, will rise because the US energy regulator recently ruled that payments to energy storage facilities should rise.

"Despite the need for this restructuring, we believe that our long term prospects are favourable," said Capp. "Our goal in taking this action is to minimise job losses, and to continue to find ways to apply our innovative technology in the frequency regulation and energy storage markets.

"We remain committed to maintaining our business and shareholder relationships and aim to resolve this matter as quickly and efficiently as possible."

Tepco mulls Eurus sale

- Wind company considered for asset sale
- Government orders cost-cutting commitments

Tokyo Electric Power Corporation (Tepco) is prepared to sell shares in a wind power subsidiary in order to raise funds for compensation payments to victims affected by the disaster at its Fukushima Daiichi nuclear power plant.

The Japanese utility has also been told that it will have to commit to cutting costs by at least 2.5 trillion Yen over ten years before it receives help from the government with its compensation obligations.

The Yomiuri Shimbun has reported that Tepco will lower its equity holding in Eurus Energy Holdings Corp. from 60 per cent to 40 per cent by selling stock. It would mark the first time that the utility has sold shares in its energy-related businesses in order to raise funds to cover its Fukushima obligations.

Proceeds from the stock sale could reach 10 billion yen, report the Shimbun.

In October a report submitted to the government in preparation for Tepco's special business plan recommended cost-cutting and other restructuring measures. Tepco President Toshio Nishizawa said that the company would implement the measures.

Tepco has been preparing to sell holdings in non-core assets such as real estate and housing businesses.

The government believes that Tepco could raise 130 billion yen by selling off 46 of the 119 companies that belong to its group.

Eurus Energy is the largest wind power company in Japan and is 40 per cent owned by Toyota Tsusho Corp. Eurus could benefit from plans in Japan to increase renewable generating capacity.

Tenders, Bids & Contracts

Americas

RPM Access orders Nordex turbine

Wind farm developer RPM Access has announced plans to equip two new wind farms in Iowa, USA with Nordex N100/2500 wind turbines.

The 35 wind turbines will be used at the Hawkeye and Rippey wind farms, which will generate energy for the Central Iowa Power Cooperative. The orders will increase Nordex's capacity in the state to 130 MW.

Construction work for both locations has already begun with turbine delivery scheduled for May 2012 for Rippey and June for Hawkeye. Commercial operation for both projects is slated to begin by October 2012.

The turbine nacelles will be produced at Nordex' plant in Jonesboro, Arkansas.

Gamesa sells Pennsylvania wind farm

A subsidiary of EDF Energies Nouvelles has agreed to buy a 38 MW wind farm in Pennsylvania, USA, from Spanish developer Gamesa.

EnXco has signed a purchase agreement for the Chestnut Flats wind farm, which features 18 Gamesa G90-2.0 MW turbines and one Gamesa G87-2.0 MW wind turbine. "This agreement will give enXco, a well-respected owner/operator of renewable energy generation assets, its first project in our own home state of Pennsylvania," said Jiddu Tapia, Gamesa's Chief Development Officer for North America.

Chestnut Flats is the third wind farm developed by Gamesa in Pennsylvania. The company owns 800 MW of wind farm capacity under construction in three continents.

Acciona sells wind farm output

Costa Rica's Instituto Costarricense de Electricidad (ICE) has signed a deal with Acciona Energia to buy the electricity produced by a 50 MW wind farm in Costa Rica.

Acciona will design, construct and operate the Chiripa wind park in the municipality of Tilaran in northwestern Costa Rica. The wind farm will consist of thirty-three 1.5 MW wind turbines using Acciona Windpower technology.

ICE will buy the output of the wind farm for 20 years under a power purchase agreement. Acciona says that it will start construction of the wind farm in 2012 and will complete it a year later.

GE signs Mexico LTSA

General Electric has signed a $200 million long-term services contract with the Mexican Federal Electricity Commission (CFE).

The 15-year contract covers six GE gas turbines installed for the repowering of Manzanillo Thermoelectric, the largest thermal power generation project undertaken by the Mexican government in the last two decades.

The repowering will add 900 MW of generating capacity to the CFE's grid and bring the site's total generating capacity to 1500 MW in the summer of 2012.

The long term service contract deal marks the first time an entity of the Mexican government has signed an agreement of this scope and type for power plant services, said GE.

Asia-Pacific

Bids invited for Bangladesh dual fuel plant

Bangladesh state-owned joint venture firm BPDB-RPCL Powergen Ltd has invited bids from international companies to build a 150 MW dual fuel power plant on turnkey basis at Kodda near Dhaka.

The proposed power plant should be capable of generating electricity using both natural gas and furnace oil. The winning bidder will be responsible for engineering, design, manufacturing, inspection, supply, installation, erection, testing and commissioning of the plant on a turnkey basis.

The joint venture firm has already started selling tender documents and the documents will be available until January 01, 2012. Last date for bid submission is January 02, 2012.

Doosan Heavy wins Korea order

Heavy Industries & Construction Co. has won a $455 million order to build a 300 MW power plant near the South Korean capital of Seoul.

The coal gasification plant will be built by 2015 in the western coastal city of Taean, 150 km southwest of Seoul. It will be owned and operated by Korea Western Power Corp.

South Korea wants to build a total of 15 coal gasification plants by 2020.

Mongolia plans first wind farm

Mongolia is set to commission its first wind farm in 2012 after GE signed an agreement with Newcom, a leading investment firm in the country.

The $100 million Salkhit wind farm will be located 70 km southeast of Ulaanbaatar, Mongolia's capital, and will generate around five per cent of the country's existing electricity demand. GE will supply 1.6-MW wind turbines that will have an 82.5 m rotor and 80 m hub height for IEC class IIa wind conditions.

GE will also provide technical assistance in the installation and commissioning of the turbines.

GE described its entry to the Mongolian market as "strategic" because the country's electricity demand is set to double in the next 15 years.

Mongolia has one of the world's fastest growing economies.

Alstom Grid reinforces India grid

Power Grid Corporation of India Ltd (PowerGrid) has awarded Alstom Grid contracts worth €30 million to supply, erect and commission a 765 kV extra high voltage substation in the state of Uttar Pradesh.

The work is part of plans by PowerGrid to expand and improve the operation of India's power transmission grid. Alstom Grid, through its subsidiary Areva T&D India Ltd, will deliver the 765 kV transformers for the substation along with other key equipment.

9E destined for Chinese steel mill

GE has won a contract to supply a 9E gas turbine that will use emissions from an iron and steel mill in China to generate electricity.

Handan Iron & Steel Group will install the unit at its mill in Handan City, China, where it will use off-gas from the blast furnace and coke oven to generate electricity. The project will help to reduce Handan's energy costs, carbon footprint and will also improve efficiency at the site.

Recent legislation from the Chinese government is tightening the regulations on steel mill efficiency and industrial activities, with specific goals for the next five years. "We're being challenged to advance our thinking and find new paths to growth," said Mr. Li Fujun, general director, power and equipment of Handan Steel Mills.

"The waste gas used in this solution had been considered too low quality for high efficiency power generation," continued Li. "However, GE engineers devised a way to compress the gas and enable it to power a heavy-duty gas turbine."

Europe

GE toasts French orders

French renewable energy asset management company Eolfi Asset Management has placed an order with GE for wind turbines for two projects in the Champagne-Ardenne region of France.

GE will supply a total of 100 of its 2.5-100 wind turbines for the two projects. The contracts include the wind turbine manufacturing, shipment, installation and a ten-year, full-service agreement (FSA).

The two projects are about 10 km apart, in a region where GE opened a new service centre earlier this year.

Magnox awards contract for 10 nuclear sites

UK nuclear firm Magnox has awarded a framework contract to a group of specialist contractors for de-planting, demolition and bulk asbestos removal across ten nuclear reactor sites in the UK.

The contract is worth £3.4 million and is a major part of the decommissioning plans for the UK's first generation of nuclear plants. The framework contract is described by Magnox as "pioneering" because it will reduce tendering costs and provide it with a supply chain 'toolbox' to meet the needs of various projects in the next few years.

The firms signed to the contract are the Doosan Keltbray Consortium, Celadon, Erith, Squibb/LVI Group, Nuvia, and EDS/Kitsons. Their work will start in the coming months with the de-planting of the boiler houses at Bradwell Site in Essex and the demolition of admin and ancillary buildings at Dungeness A Site in Kent.

JinkoSolar to power UK projects

A partnership between AEE Renewables and EPC Graess Solartechnik has selected Chinese firm JinkoSolar Holding Co. as the preferred module provider for three solar power projects in the UK.

JinkoSolar's solar modules have already been installed on a 4 MW and a 5 MW solar farm in the UK. An additional 5 MW project is to be finalised in early 2012.

Studsvik to treat Berkeley boilers

Studsvik has signed a £8 million contract with LLW Repository Ltd (LLWR) for the transport and treatment of five redundant heat exchangers from the Berkeley nuclear power plant site in the UK.

The five boilers each weigh over 300 tonnes and were an integral part of the UK's first commercial nuclear power station, which ceased generation in 1989. There are 15 heat exchangers remaining at the site, and the project represents an important step in the decommissioning programme at Berkeley.

Studsvik will transport each heat exchanger by road and sea to its processing facility at the Studsvik site, close to Nyköping in Sweden. Studsvik has purpose built engineering facilities for the size reduction, decontamination and recycling of the heat exchangers. Up to 95 per cent of each boiler will be recycled and released for re-use.

International

Ukraine modernises power grid

NPC Ukrenergo, Ukraine's national power grid operator, has placed an order with ABB to supply more than 80 sets of live tank circuit breakers to be installed in seven 750 kV transmission substations.

The circuit breakers – rated at 110, 330, 500 and 750 kV – will replace air blast-type circuit breakers that have been in operation for nearly four decades and will help to improve the reliability and efficiency of the grid.

The circuit breakers will be replaced in three phases, starting in 2011 and to be completed in 2014. ABB will also supply control cabinets with bay control devices for the circuit breakers, along with an online condition monitoring system built on the company's latest substation automation technology.

Emerson upgrades Senegal power plant

Emerson Process Management has been awarded a contract for the retrofit of the Unit 3 turbine at Senelec Cap des Biches power station in Senegal. The upgrade to the new Ovation controls will enable a number of operational benefits, including more precise and reliable combustion.

Located 23 km east of Dakar on the edge of the Atlantic, Cap des Biches is an important power station in Senegal with a rated output of 82 MW. The project is part of a national plan to revamp production capacities in Senegal with EDF CIT (Centre d'Ingenierie Thermique) appointed as technical advisor.

Emerson is appointed main contractor for the project covering the audit and evaluation of the existing control systems, scheduling for the dismantling of equipment to be replaced, design of the Ovation system, engineering drawings, FAT test plan and commissioning procedures. Emerson's scope also includes installation, commissioning and operator training.

Kenya awards geothermal contracts

Japanese trading firm Toyota Tsusho Corp and Hyundai Engineering Co of South Korea have won the bid to build new geothermal plants in Kenya worth Sh40 billion.

The two companies will build a new 140 MW plant and expand the capacity of another to 185 MW from 45 MW. Kenyan Prime Minister Raila Odinga said that the projects would help to put the country on a path to green economic growth.

Kenya's installed power generating capacity stands at around 1100 MW, nearly half of which is hydropower-based. It has the potential to produce 7000 MW from geothermal sources.

Powering a vision

China seems to have found a magic formula that has sustained staggering economic growth over the past 30 years but in many ways is now suffering from the curse of its own success.

Vishvjeet Kanwarpal

What do the Great Wall of China and the Great Leap Forward have in common? They are both monuments to visions that rallied the Chinese people's power and energy. The curious fact about the Great Wall is that it never really succeeded in keeping the invaders out. And the Great Leap according to many was not quite forward. The real Great Leap Forward was yet to come.

In 1961, Deng Xiaoping uttered his famous words: "I don't care if it's a white cat or a black cat. It's a good cat as long as it catches mice". Deng is credited with breaking from the past and engineering the "Socialist Market Economy" which opened China to the global market, foreign investment and private competition.

The combination of a focus on export oriented growth through infrastructure development, as well as leveraging manufacturing technology import with low input costs including energy and labour, has been the magic formula for China's staggering economic growth over the past 30 years. This new China is set to dominate the planet and its future. And it's all about a vision combined with power and energy.

This year saw China set to cross the magic 1 TW (1000 GW) of installed power capacity, heralding its position as the country with the world's largest power capacity – on par with the US. China has also overtaken the USA as the world's largest contributor to global carbon dioxide emissions.

By 2010, of the 962 GW of total Chinese power capacity almost 74 per cent (707 GW) was based on fossil fuel based capacity (mainly coal). Hydro capacity accounted for 213 GW and wind capacity for 31 GW; nuclear stood at about 11 GW. By 2015, China's annual coal consumption is projected to be over 4 billion tonnes. This will account for about half the world's total consumption of coal.

This year also saw Chinese foreign reserves rise to over $3 trillion for the first time. This is the world's largest treasure chest fuelled by historical trade surpluses, Foreign Direct Investment (FDI) and the purchase by China of foreign currency, to keep the Yuan from rising. This in turn keeps Chinese exports extremely competitive, the Chinese growth engine vibrant and many western economies afloat.

With the world on the verge of a global crisis for the second time in the last few years, China has attempted to maintain a careful balance between economic growth and the natural pressures of inflation and interest rates. The challenge is a considerable one.

In many ways China now suffers from the curse of its own success. Having fuelled the demand for energy through high economic growth, it is now facing the consequences of Chinese demand-driven international commodity and energy price increases. It has benefited from low domestic energy prices but is now facing the problems of inability to pass-through high energy costs to both consumers and industry.

China has reached the pinnacle of industrial growth leveraging in efficient heavy industries. However, it now has to examine the energy efficiency of its industrial base and take some tough decisions. Having powered its economic growth with scant regard for the environment, it now has to pay close attention to managing its polluting industries and factor in emissions targets.

The Chinese planners have deftly managed to overcome many of the country's challenges and demonstrated the kind of flexibility and innovation that reflects an impressive long term outlook and vision.

Kanwarpal: despite the tremendous achievements, all is not well in China's power sector

Power and energy planning appears to follow a dialectic process of overbuilding to meet the need of the hour and then corrective shutdown or change of course to match the needs of the day. While it may seem inefficient and wasteful at one level, the above principle has been applied with great effect across myriad power and energy sectors.

The power of the Chinese energy and manufacturing infrastructure lies in the fact that no nation can compete with China across a spectrum of key factors including financing, engineering, procurement and construction (EPC), energy and labour costs.

These in turn fuel the Chinese banking system, economic growth as well as infrastructure in a virtuous cycle. This virtuous cycle has resulted in the world watching Chinese growth in amazement for 30 years. In contrast the European and American systems are experiencing acute debt-driven crisis where the perception of China has shifted dramatically.

> The power of the Chinese energy and manufacturing infrastructure lies in the fact that no nation can compete with China across a spectrum of key factors

Despite the country's tremendous achievements, all is not well in the power sector, which has powered China's growth for the past 30 years. Power generating company losses are increasing and many thermal generators have had cash flow problems due to fundamental and systemic imbalances beyond their control.

Given the inflationary pressures, the government had continued to focus on keeping the general price levels steady, which includes coal supply and prices. Given a relatively balanced Chinese coal market there is little room for power price increases.

Chinese Power sector liberalisation has been postponed repeatedly as the country faces a situation where increased power prices will affect not only the manufacturing and export sectors but also the consumer segments adversely. In a time of inflation and food prices, higher energy costs can result in considerable social discontent.

It is not surprising that China appears to be backtracking on market reforms in both the power sector as well as the coal sectors.

The National Energy Administration's (NEA) of China has observed that China's coal market, which is the world's largest, would be balanced in the fourth quarter of 2011 as supply capacity increases.

As capped power prices impact their margins, power plants have reduced their inventories of coal stock at power plants. This is also a result of transport constraints and the unwillingness of power plants to take exposure to increasingly volatile coal prices, which they cannot pass through to consumers. This attempt to "manage" fuel risk and mitigate the impact on power prices has been a primary factor causing severe power shortages in previous years.

China is also attempting to create a price buffer and reduce the arbitrage between coal and power prices. Policy seeks to eliminate several intermediate private coal miners. The government is encouraging cross-holdings in large power, coal and chemical companies in the hope of achieving greater coordinated power and coal supply and industry consolidation.

However, this may be wishful thinking. The move may result in some degree of price efficiency but will have only an intermediate or no effect on the actual supply of coal to the power sector.

According to the NEA, 23 coal fired power stations equivalent to 7 GW, were forced to shut down due to coal shortages in the summer of 2011. This spells an alarming situation when compared with the shutdown of 10 power stations with an equivalent capacity of a mere 1.9 GW in 2010. This in turn has severely affected power generation and supply.

On March 16, 2011, following Fukushima, the State Council, announced suspension of approvals for new nuclear power stations and initiated comprehensive safety checks of all nuclear projects. A new China National Plan for Nuclear Safety is being formulated. Approval for new plants will remain suspended until the plan is approved. It is expected that the impact on the nuclear industry will only be short term and that nuclear power generation will resume its planned role in the medium term. This will largely be driven by the fact that coal supply and pricing are likely to be unmanageable in addition to the environmental impact of coal based capacity.

In 2010 China was the global leader in wind power, boasting a capacity of about 42 GW. As part of the first centralised industry development plan, another 26 GW of grid-connected wind power generating capacity is planned for completion by the end of 2012.

Meanwhile, dependence on imported oil and product has reached an unprecedented 55 per cent. Taking advantage of even brief spells of oil price reduction in the international market, China has embarked on a policy of developing a strategic oil reserve. Strategic oil reserve was estimated at 178 million barrels post Phase I of the development of the Strategic Oil Reserve Project. This is projected to reach 274 million barrels by the end of 2012 following completion of the Phase II project.

Thanks to the growth engines of the BRIC countries and in particular China and India, the world has run out of cheap sources of energy. The owners of energy assets have also realised that they can charge a premium on energy without it resulting in catastrophic demand destruction – $100 a barrel is now considered "acceptable" by most players: producers and consumers. This is in stark contrast to the situation just a decade ago.

Oil, gas and coal prices are increasingly inter-related and reflect demand-supply dynamics, as well as inter-fuel substitution dynamics. The world is unlikely to see the return of $30 a barrel oil, $40 a ton of coal and $3 MMBtu of gas. With "Peak Oil" a reality and large gas finds becoming rarer, the world is facing a situation where the era of energy shortage is likely to continue until game-changing energy sources such as shale gas, tar sand oil and grid-parity solar power take centre-stage.

In the 'business as usual' scenario China's energy demand and consumption are projected to continue to increase rapidly, and the country will face unprecedented pressures on the energy and environmental sectors. Additionally it will be a challenge to achieve the goal of decreasing carbon dioxide emissions per unit of GDP by 40-45 per cent of 2005 levels by the year 2020.

China's energy policy for the 12th Five-Year Plan has changed significantly. According to *China Economic Net*: "In the past, China saved energy and cut emissions by reducing energy consumption, but now China has made controlling total energy consumption a high priority and placed a great premium on promoting energy conservation and emission reduction by adjusting the industrial structure."

The zillion Yuan question is whether Chinese policy makers are up to the challenges facing them. The answer is a cautious yes.

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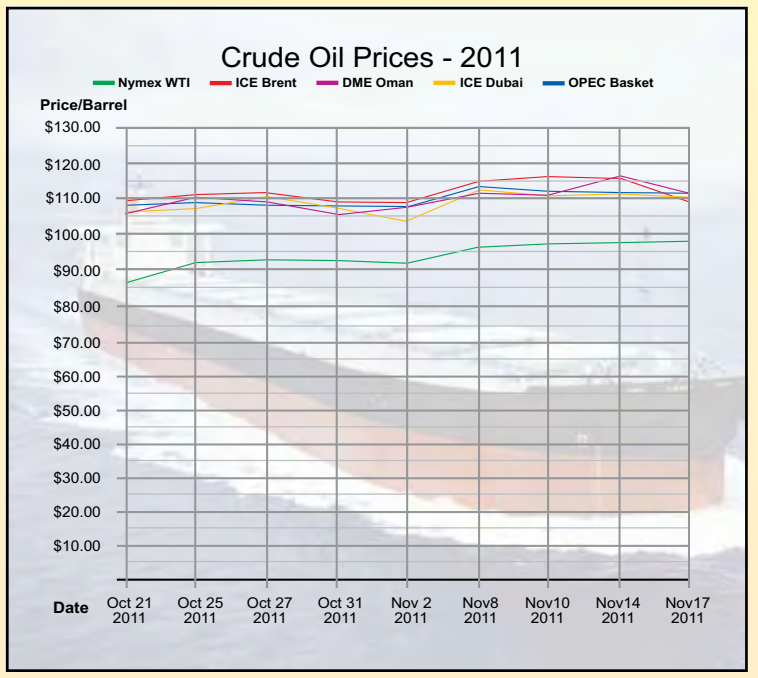
Oil

High crude prices hinder global economic recovery

- Opec urged to increase output
- Consumption to hit record levels



David Gregory

High crude oil prices continue to hamper global economic recovery, according to the head of the International Energy Agency (IEA), but it remains to be seen if Opec is willing to increase crude production in an effort to offer the world some respite from continuing economic problems. Opec is due to meet at its headquarters in Vienna in mid-December amid calls by analysts that more crude needs to be put on the market.

The price of benchmark Brent crude has averaged $111/b over the course of 2011, up by around $20/b from the 2010 average. The price of West Texas Intermediate (WTI) rose to more than $100/b in the midle of November over concerns about the crisis with the eurozone and fears that the global economy may slip back into a recession.

Speaking in Tokyo in November, the Executive Director of the Paris-based IEA, Maria van der Hoeven said the oil market and inventories had been tightening throughout the year and that she hoped Opec would come to a decision to increase output. "Developing countries, especially the poor developing countries, hurt the most because these high oil prices have a very, very negative effect on their economies. In Europe, high oil prices endanger the frail economic recovery."

The IEA has been urging Opec to boost output and relieve the strain on the economy, asking it to match output with a price between $70-80/b as crude at more than $100/b is preventing economic recovery.

By its own calculations, Opec crude supply is shown to have fallen 810 000 b/d short of the projected call of 30.76 million b/d during the third quarter of this year. Opec produced an average of 29.95 million b/y during the period. In the November issue of its *Monthly Oil Market Report* (MOMR), Opec projected that non-Opec supply for the year would decline 140 000 b/d.

Meanwhile, Opec member Libya is moving quickly to restore production, but will not likely return to its pre-civil war production levels before next year and so will not make up the shortfall. Libya's output during November is expected to reach at least 550 000 b/d and Libyan officials are optimistically predicting that the country may reach 800 000 b/d by the end of 2011.

Some Opec producers raised their own production in order to compensate the market when Libyan crude was off the market.

Differences have already appeared within Opec over production targets. At the last meeting in June, Saudi Arabia and other Gulf producers sought to persuade the group's hardliners to boost production by 1.5 million b/d. The meeting ended acrimoniously without an agreement on a production target. Kuwait in November said it supports an increase in production for fear of an oil price spike.

Iran is arguing that with Libyan production coming back on-stream, a production increase should not be necessary.

Opec Secretary General Abdullah al-Badri said in early November that it appeared that Opec members would reduce output as Libyan production came back on-stream. However, Kuwaiti Oil Minister Mohammed al-Busari said later in the month that the market needed more crude regardless of the return of Libyan oil.

Both the IEA and the US Energy Information Administration (EIA) have lowered their forecasts for oil demand growth for this year on the back of lower economic growth.

In its *Oil Market Report* for November, the IEA said: "Global oil demand is expected to rise to 89.2 million b/d in 2011 (+1.0 per cent of 900 000 b/d year-on-year) and reach 90.5 million b/d (+1.5 per cent or +1.3 million b/d) in 2012."

The EIA said in its report that it "expects that world crude oil and liquid fuels consumption will grow from its record level of 87.1 million b/d in 2010 to 88.2 million b/d in 2011 and 89.6 million b/d in 2012."

Meanwhile, in a press statement announcing the release of its *World Energy Outlook 2011*, the IEA said that during 2010 CO_2 emission reached a new high and said that subsidies that encourage wasteful consumption of fossil fuels jumped to over $400 billion.

Under its New Policies Scenario, the Paris agency said that primary energy demand increases by one-third over the next 25 years. It added that the share of fossil fuels in global primary energy consumption falls from around 81 per cent in 2010 to 75 per cent in 2035.

Gas

Gas Exporters Forum looks for better pricing

The Gas Exporting Countries Forum held its first summit in Qatar in November concluding with a call for the price of gas to be more evenly matched with the price of crude oil.

Mark Goetz

Gas exporters have for some time been considering how it might be possible to increase prices, but earlier suggestions that the Gas Exporting Countries Forum (GECF) might attempt to find a common policy and manipulate gas price – as Opec does with crude oil – have fallen by the wayside.

As a commodity, gas is not as fluid as oil and cannot be transported so easily. The gas market is dominated by long-term contracts with deliveries by pipeline or in the form of LNG by ship. The rise of unconventional gas production in the US has also eliminated North America from the LNG market and LNG cargoes on the spot market have contributed to keeping prices down, although demand for LNG is up in the Far East following the closure of Japan's nuclear facilities.

A statement issued on November 15 at the end of the GECF's first summit in Doha, Qatar, said that in order for gas producing countries to receive a fair price for their exports, it is necessary to "achieve convergence between prices of crude oil and natural gas." This would end the "disparities" that exist between the two fuels, the statement said, but it added that members of the GECF recognise the importance of long-term gas contracts that allow for balanced risk sharing between producers and consumers.

Qatar's Emir, Shaikh Hamad bin Khalifa Al Thani, addressing the summit as host, urged GECF members to continue their efforts to see that gas prices match those of crude oil, saying that the group "must act seriously to realise these interests without having a negative impact on the interests of consumers." He added that the challenges facing the group "urge us to look for a variety of innovative solutions which are economically viable in a way that guarantees the interests of consumers and producers together."

GECF members control most of the world's natural gas reserves and include Russia, Qatar, Iran, Algeria, Egypt, Libya, Nigeria, Equatorial Guinea, Trinidad and Tobago, Bolivia and Venezuela. Oman also became a member during the Doha summit, and Norway, Kazakhstan and the Netherlands participated as observers.

While crude oil prices have topped $100/b in most non-US markets for weeks, natural gas prices have remained low by comparison – largely due to the advent of shale gas in the US. *Platts* recently reported that during the first 10 months of 2011, US Henry Hub prices for the month ahead averaged $4.164/million Btu, compared with $9.370/million Btu at Europe's UK NBP and $13.526/million Btu in the Asian spot market. *Platts* estimated that oil-indexed North West Europe gas price, an indicator of long-term contracts, averaged $12.510/million Btu over the same period. It also said that North American natural gas prices would likely remain at $4.00-5.00/million Btu in 2012-13 as shale gas output continues to rise. As demand in the power sector begins to improve in 2014, gas prices could increase to $5.00-6.00/million Btu, it added, citing ICF International.

Despite the GECF's unhappiness with the current state on natural gas prices, the world could be on the verge of a "golden age of gas". In Its latest annual *World Energy Outlook (WEO 2011)*, released at the same time that the GECF was meeting, the Paris-based International Energy Agency (IEA) said that the factors for both supply and demand for natural gas "point to a bright future."

The IEA said its outlook for the gas market remained based on the conclusions contained in a special report issued in June – 'The Golden Age of Gas' – which reported that in three different scenarios outlined in the report that gas consumption will increase, "underlining how gas does well under a wide range of future policy directions."

Projecting on the future growth in gas demand, the *WEO 2011* said: "Policies promoting fuel diversification support a major expansion of gas use in China; this is met through higher domestic production and through an increasing share of LNG trade and Eurasian pipeline imports. Global trade doubles and more than one-third of the increase goes to China. Russia remains the largest gas producer in 2035 and makes the largest contribution to global supply growth, followed by China, Qatar, the US and Australia."

Europe will have to dig deep for the shale gas dream

Shale gas has been called a game changer in the US but Europe will have a tough job emulating the US' success.
Tim Probert

There is no question that shale gas has been a 'game-changer' in the United States. From virtually nothing ten years ago, shale gas now accounts for one-third of domestic natural gas production.

US energy policy has been turned completely upside down by shale gas. Having built a number of LNG terminals in recent years to cope with anticipated demand for natural gas, the US is set to be an exporter. LNG cargoes destined for the US have been redirected to Europe, while LNG terminal operators are considering converting regasification terminals into liquefaction terminals.

With the growing production of shale gas, gas-fired power plants have become the obvious choice to replace aging coal plants, which have been beset by a host of environmental issues. Furthermore, a plunge in the price of natural gas has made coal power even less attractive.

According to the US Energy Industry Administration (EIA) Annual Energy Outlook 2011, the US has a technically recoverable shale gas resource of 862 trillion cubic feet (tcf), enough to meet current consumption for 140 years. Will the same happen in Europe? Possibly, but it will take some time for the industry to get up to speed.

In contrast to 'conventional' gas extracted from porous rock, shale is relatively impermeable, meaning gas cannot easily move through the shale in which the well is drilled.

In order to release the methane, drillers use a method called hydraulic fracturing, also known as fracking. Essentially a large amount of water, sand and chemicals is pumped at high pressure to cause fracturing in the rock. This is combined with a technique called 'pad drilling', with up to ten drill wells radiating horizontally for distances of up to six miles from a single site, or 'pad'.

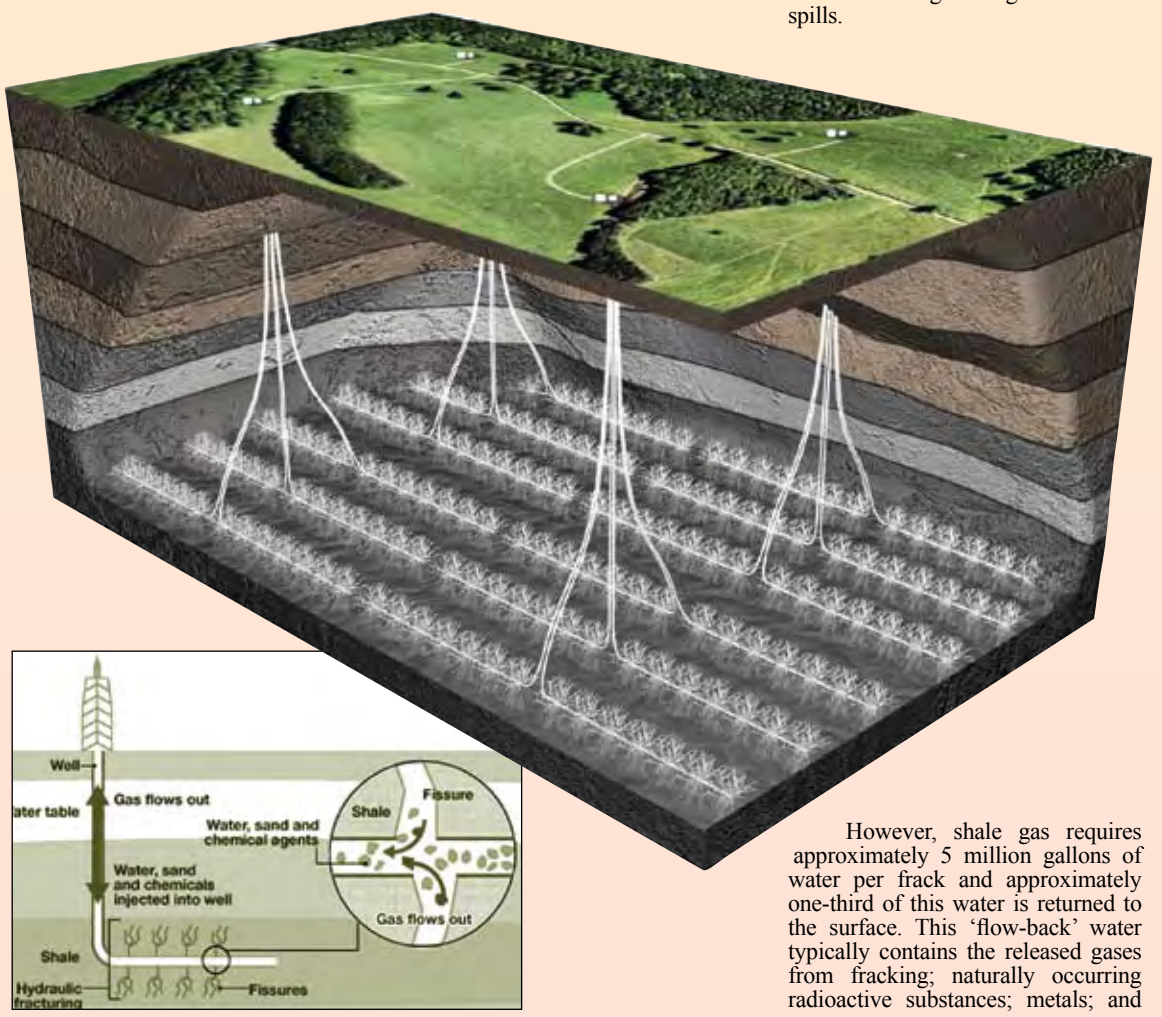
This technique has been used for decades, but the improved ability to steer drill-bits using off-the-shelf technology has made horizontal fracking cost-effective. The facility to perform surface data acquisition to locate gas in the rock, rather than drill right through the shale as previously, has also brought down costs.

However, fracking is not without problems. To some, the US shale gas industry has been reminiscent of the Wild West – a free-for-all where developers frack first and ask questions later. This is partly due to slack regulation – fracking is exempted from federal Clean Water and Safe Drinking Water Acts – and there is evidence that rivers and other water sources have been polluted.

As the fracking process takes place several thousand feet below the layers of aquifers, it is highly unlikely they will be polluted. However, the USA's Environment Protection Agency has found that there is a serious risk of groundwater pollution from badly constructed wells, i.e. where boreholes have not been cased with a steel pipe cemented in place. In Europe, stricter regulations should ensure boreholes are tripled-cased between the drill shaft and the aquifer, while the site will be protected by an impermeable membrane to guard against surface spills.

> "The lack of suitable drilling rigs is the most important issue impairing shale gas production in Europe today"

Hydraulic fracturing process



However, shale gas requires approximately 5 million gallons of water per frack and approximately one-third of this water is returned to the surface. This 'flow-back' water typically contains the released gases from fracking; naturally occurring radioactive substances; metals; and volatile organic compounds like benzene, which easily vaporise into the air.

According to Veolia Water's Karim Essimiani, the costs of treating the flow-back water in the US ranges from up to $6/bbl for reuse or up to $24/bbl for discharge. This would translate to a water treatment cost of up to $3 million per frack, but Essimiani warns that due to deeper European wells up to three times more water may be required.

Tessa Davis, a London-based senior energy attorney at Linklaters LLP, said: "Regulation may affect the ability to economically recover shale gas. Water costs for shale gas fracking in Europe could be ten times higher than in the US, due to greater volumes and higher input costs."

In September Cuadrilla Resources, a UK joint venture between Australian drilling firm AJ Lucas and American private equity firm Riverstone, announced the Bowland sedimentary rock basin in Northwest England, for which it holds shale gas exploration licenses, holds a total potential resource of 200 tcf, or more than ten times existing UK natural gas reserves.

It must be stressed that the estimate by Cuadrilla, which is not a listed company and therefore not subject to usual Stock Exchange reporting criteria, is for 'gas in place' and not proven reserves. It is very much a 'guesstimate', more than 40 times the official estimate for the whole of the UK, calculated by multiplying the area of shale rock by an average figure of how much gas may be extractable from this particular type of shale.

James Elston, CEO of London-based shale gas developer Palladian Energy, says the most that could be realistically extracted from the Bowland shale is 20 per cent. That would be roughly equivalent to the Troll gas field in the North Sea, which holds 60 per cent of Norway's gas reserves alone. "But they've only drilled two wells," noted Elston. "Only when they've done seven or eight fracks over a wider area will we get a true idea of how much shale gas is down there and how much can be got out."

The EIA estimates Poland as having an enormous shale gas resource of 187 tcf. Initial frack results, however, have been mixed. 3Legs Resources, which partners global oil major ConocoPhillips in developing Polish shale gas, has lost two-thirds of its share price since floating in June 2011 due to disappointing flow rates.

The main problem appears to be a lack of suitable drilling equipment. Shale gas wells decline rapidly; Cuadrilla says the typical decline rate is 40 per cent within two years.

To exploit the Bowland basin successfully, Cuadrilla may need to drill six to eight boreholes per square mile and up to 50 wells a year, at a cost of £10.5 million each.

According to Joseph Dutton, an unconventional gas analyst with Douglas-Westwood, the lack of suitable drilling rigs is the most important issue impairing shale gas production in Europe today. The UK-based consultancy forecasts European shale gas production to hit 1.2 tcf a year by 2020. This is based on a figure of 3500 new wells drilled a year by 2020 from a total well stock of 15 000 wells.

Due to the very high decline rates of shale gas wells, however, the industry will need to spend $1 billion on drilling to hit this production rate. Money which, says Douglas-Westwood's unconventional gas analyst Joseph Dutton, is simply not currently available unless investors are "firmly convinced" of the business case.

"Despite the hype, shale gas financing is on a knife-edge," he said. "For it to really take off there needs to be a great deal of capex and opex to invest in drilling and drill rig, but a lot of companies are sitting on their hands. There are big bucks to be made from addressing drilling rig issues.

"Deep, multiple-stage fracking ideally requires a drilling rig with at least 2000 brake horsepower (BHP). We've identified 78 rigs in Western Europe, and only 12 with greater than 2000 BHP."

Palladian Energy's Elston is optimistic the drilling issues will be overcome. "Unlike pressure pumping which is dominated by Halliburton, Schlumberger and Weatherford, shale gas drilling companies can be formed by anyone as long as they can demonstrate competency. Onshore drilling is not all that different from offshore drilling and Europe has a tremendous human resource base of competent drilling engineers working in the North Sea. There will be no capital restraints, as there will be plenty of US private equity and European public market equity available for the right projects."

There is fear among environmentalists that shale gas will derail plans to decarbonise the power sector by choking investment in renewables and nuclear. The argument goes that shale gas, and therefore gas-fired power generation, is 'cheap', so there is no need to build expensive wind farms, solar panels or nuclear reactors.

European shale gas production costs, however, will remain far above conventional natural gas resources. According to the Oxford Institute for Energy Studies, Polish shale gas production costs in 2020 will be four times more than pipeline natural gas from Algeria and twice that of imported LNG from Qatar.

While in the US shale gas recovery has driven gas prices below their traditional oil-linked levels, the complex nature of European gas markets mean that oil indexation in gas contracts will remain for the foreseeable future. Elston said: "Rabid proponents who say shale gas will lead to lower natural gas prices are being disingenuous. What it does is offer a subsidy-free energy source with security of supply, jobs in depressed areas and government revenue, but it won't change the need for zero-carbon sources of energy."

Shale gas is not the environmental catastrophe some NGOs would like us to believe. Equally, it is not quite the "cheap and abundant" source some proponents say. The shale gas 'revolution' appears to be not quite so revolutionary. At least, not yet.

Shedding some Light on Namibia

The Caprivi Link ensures reliable power transfer capability between the east and west of the Southern African Power Pool.

Tim Probert takes a first-hand look at the link, which is ABB's first HVDC Light installation built with overhead lines and is also the highest rated and longest system of its type currently in operation.

Seven out of the world's top ten fastest-growing economies are in sub-Saharan Africa. Much of the economic growth is being driven by mining, which needs power.

The high rate of economic growth means state utilities are constantly playing catch-up. The vast, sparsely populated nation of Namibia, where demand for power is expected to nearly double by 2014 as new mining operations come on stream, is a prime example.

NamPower is a tightly-run ship, which notched up a steady profit of $45 million in 2010 and it does not have to instigate load-shedding, as suffered in so many African nations. Yet the 100 per cent state-owned power generation and distribution monopoly suffers a significant power generation shortfall. NamPower is only 46 per cent self-sufficient in power generation, with imports accounting for the remaining 54 per cent, of which 22 per cent is supplied by South African state utility Eskom.

Maximum demand is 511 MW, but capacity totals just 415.5 MW, including the 249 MW Ruacana hydro plant, the 120 MW Von Eck coal plant and two diesel-powered plants of a combined 66.5 MW. Furthermore, low water flow in the Kunene River at the Angolan border has impaired generation at Ruacana, while outages at Eskom's Koeberg nuclear plant near Cape Town have left Namibia on the brink of blackouts.

NamPower is desperate to build a baseload, fossil fuel power plant, but plans for a 300 MW coal plant in Walvis Bay have been rejected, while an ambitious plan to build the integrated Kudu gas-to-power project, involving a floating gas platform 170 km offshore and an 800 MW combined cycle gas turbine plant in Oranjemund, requires some $2 billion, equivalent to 15 per cent of GDP.

So, in need of a quick fix, NamPower turned to ABB to construct the Caprivi Link, a 950 km overhead high voltage direct current (HVDC) line which runs along the narrow, tropical Caprivi Strip in extreme northeast Namibia.

While technically not an interconnector due to the converter stations being located solely in Namibia, the +300 MW, 350 kV Caprivi Link connects the Zambezi substation near Katima Mulilo, close to the Zambian border, with the Gerus substation near Otjiwarongo, around 300 km north of the Namibian capital Windhoek. The link, for which construction began in March 2007, also connects to the 220 kV HVAC transmission line from the Victoria Falls in Zambia inaugurated in 2008.

Map showing the route of the interconnector between Zambia and Namibia

The aim of the Caprivi Link is to ensure reliable power transfer capability between the east and west of the Southern African Power Pool (SAPP). It is also the first electrical connection between the Caprivi region of Namibia and the rest of the country, and is able to supply power to the region if normal supplies from Zambia are disrupted. Larger islanded parts of the Namibian and Zambian grids can also be supplied by the link, which maintains frequency control and thereby avoids power outages.

The Caprivi Link is somewhat of a curate's egg. Rather than opting for cheaper HVAC or traditional HVDC, NamPower opted to utilise ABB's HDVC Light, the Swiss firm's brand name for HVDC with voltage source correction (VSC). HVDC Light is usually the reserve of underground or subsea links of far shorter distances, and as such it is ABB's first installation built with overhead lines. At 350 kV, it has the highest operating voltage for an HVDC Light system and at 950 km, is also the longest system currently in operation.

Commissioned in June 2010, the Caprivi Link was jointly funded by NamPower, the European Investment Bank, the French Development Bank and the German Development Agency (KwF). Of the total N$3.2bn ($391m) cost, $180 million was booked by ABB.

The decision to use HVDC Light was made because the AC networks connecting with the HVDC Light converter stations are extremely weak at both ends, with short-circuit power levels of around 300 MVA and long AC lines connecting to remote generation stations. As a result, the AC networks are exposed to a risk of 50 Hz resonance.

Manfred Manchen, NamPower's director of power system studies, says these factors made the design of the Caprivi Link extremely challenging. The key to achieving the desired performance under different AC network configurations, says Manchen, was robust voltage and frequency stabilising control for the connected AC network in conjunction with sufficient damping of DC resonance.

Instead of using traditional feedback active power control, frequency control, and power runback systems as installed in other HVDC Light projects such as the Gotland project in Sweden and the Finland-Estonia Estlink project, a determined direct voltage and frequency control is deployed via ABB's turn-on/turn-off insulated gate bipolar transistors (IGBT) power semiconductors.

The basic insulation levels at 350 kV DC compare quite closely with those at 400 kV AC, resulting in the assembly configuration and insulators being identical to those specified for standard 400 kV AC line designs. Without any feedback control loop, the HVDC Light system automatically changes the active power needed to keep power balance within the islanded grid so the frequency is stabilised, automatically changing the reactive power needed to keep the AC voltage at the desired level.

The VSC functionality has proved to be an effective tool in maintaining grid stability. During commissioning of the link, an AC breaker failure occurred in the Zambian grid at a time when 50 MW was being exported from Zambia to Nambia, resulting in a frequency drop in the Zambia grid of 4 Hz.


Bird's-eye view of the Zambezi substation of the Caprivi Link

The HVDC Light system identified the critical situation and quickly changed power flow from exporting 50 MW from the Zambezi substation to importing 60 MW from Gerus. This enabled the Zambian grid frequency to recover immediately to 50 Hz, thus avoiding a blackout.

On an occasion when 80 MW was being exported from Namibia to Zambia, an overload protection tripped a 220 kV line in NamPower's 220 kV bus-zone, which led to a sudden island condition in the Namibian grid. The sudden outage of the line led to a large frequency dip in the Namibian grid.

The Gerus substation immediately reduced the power exporting from 80 MW to almost zero and automatically switched from DC voltage control mode to voltage and frequency stabilisation control. The Zambezi substation then switched from tracking the power order to DC voltage control. About one second after the contingency, says Manchen, the Namibian grid had restored stable AC voltage in both frequency and magnitude.

At present, the Caprivi Link has proved more useful as a grid stabilisation tool than as an interconnector to boost power capacity. As Manchen said: "In the worst case of disturbances when all generators are tripped in the island grid, the link can function as a super UPS (Uninterruptible Power Supply) to feed the passive loads."

The link has not been without problems. It has been plagued by rats, for which dozens of traps have been laid at both the Gerus and Zambezi substations. "They've taken a liking to the fibre-optic cable insulation," explained Manchen. "They ate so much of it that we've had to use a different, less tasty type of cable. There are some things that you just can't plan ahead for!"

Rodent issues aside, the link is not used to its full potential. Power flow is only one-way and the link significantly under-utilised. Due to the weakness of the AC grid in Zambia, only 50 MW is being transmitted, mostly hydropower from the Victoria Falls, representing just one-sixth of the link's 300 MW capacity.

Zambian hydro plants continue to break down and cause the link to fail. However, the link's VSC system means that generators at Zambia's Victoria Falls hydropower plant are able to run through fault conditions for the first time, according to Reiner Jagau, chief officer of NamPower's power system development.

The link is marketed as a key southern African interconnector, but that will only be true once Phase II is commissioned. Phase I, commissioned in 2010, is a +300 MW monopole link operated with parallel DC lines and earth return to reduce line losses.

Phase II would consist of upgrading the converter stations at Zambezi and Gerus substations to a ±600 MW bipole link with zero ground current. NamPower would also have to strengthen its AC grid, as Gerus is currently connected to the Auas substation near Windhoek only indirectly via 220 kV lines to the Omburu substation in western Nambia, from where it spurs southeast to the capital.

This would mean building a 280 km, 400 kV line from Gerus to Auas. NamPower is in negotiations with Eskom and Zambia to build Phase II, but the project has an indefinite timeline, and estimates put the commission date at 2016 at the earliest.

Another key element of Phase II is the need for a 320 kV link between Zambia's Victoria Falls and the Hwange coal plant in Zimbabwe, for which NamPower has invested in a $40 million repowering in return for 150 MW of power capacity for five years. This line is a key part of the regional interconnection programme known as ZIZABONA (ZImbabwe, ZAmbia, BOtswana and NAmibia), but again progress is slow due to a lack of available funds in Zimbabwe.

The Caprivi Link will thus remain a useful tool to maintain grid stability and import some Zambian power but, until Phase II is commissioned, its designated function as a two-way interconnector to facilitate power trading with the rest of southern Africa will remain limited.

Junior Isles

Going in the wrong direction

Climate change negotiators headed for Durban, South Africa for the 17th Conference of the Parties (COP17) meeting were no doubt aware of the stark warning from the International Energy Agency: "If we don't change direction soon, we will end up where we are heading."

It sounds like an admonition a school headmaster might give an errant pupil – one key difference being, however, that the pupil has a lifetime to put things right. If we are to believe climate science, the world does not. And the stakes are far higher.

The caution from Maria van der Hoeven, the IEA's executive director, came at the launch of the *World Energy Outlook 2011* just weeks ahead of the Durban climate change talks. Yet the warning was always likely to fall on either deaf ears or ears preoccupied by seemingly more pressing issues.

While some die-hard optimists still thought it was possible to reach a binding agreement, on the run up to Durban, the general consensus was that COP17 would be yet another cop-out; lots of talk but little action.

In its *WEO 2011*, the IEA stressed that "without a bold change of policy direction, the world will lock itself into an insecure inefficient and high carbon energy system". It said there was still time to act but the "window of opportunity is closing".

Perhaps the IEA does not want to sound defeatist, and while politicians may not openly admit it either, it is probably more accurate to say that the window has already closed. The IEA says that 80 per cent of the total energy-related CO_2 emissions permitted to 2035 in its 450 Scenario (the scenario needed to meet the 2ºC limit) are already locked-in. With the current lack of urgency, there is probably no chance of making a comeback when the world is already so far behind the line.

At Copenhagen in 2009, it was agreed that global temperature rise must be limited to 2ºC but the atmosphere surrounding climate talks seems to have cooled since then. Even the IEA's New Policy Scenario, which it says will lead to a long term average temperature rise of 3.5ºC, seemed to stir little concern among politicians or the general media for that matter.

As the world plunges into a deeper financial crisis, the cost of CO_2 reduction and the perceived high cost of renewables is threatening to derail climate change goals and in particular the deployment of renewables.

> "Given governments' pre-occupation with the current financial crisis, it is difficult to say that the wind is blowing in the right direction."

Speaking at *RenewableUK 2011* at the end of October, prominent environmental campaigner Tony Juniper, Chair of Action for Renewables, described three key challenges facing the renewable energy industry in the near future – and how the new Action for Renewables campaign can help overcome them.

He said: "Action for Renewables has been set up for a very specific reason. Renewable energy faces challenges on several fronts. On the policy level, a new wave of 1980s-style rhetoric on austerity is wrongly condemning renewables and environmental measures as too expensive in the current economic climate. In the media, a misleading narrative about the effectiveness and efficiency of renewables has been allowed to take root.

"To counter these challenges, we need to reaffirm our traditional narratives around the urgent need to expand renewable energy in meeting environmental and energy security goals – but also to build upon them, to emphasise the jobs, investment and economic opportunities available to the countries taking a lead on renewable energy development."

The UK is taking the global lead in offshore wind, which is expected to be a key technology going forward, but there is no denying that the costs are prohibitively high. Even those at RenewableUK concede that costs have to come down.

However, they are confident that the industry will be able to drive down costs by a third by the end of the decade. Maria McCaffery, CEO of RenewableUK says there are quite a few "tools in the kit" to make this happen. "Local manufacture is probably the biggest. It will protect us from exchange risk which saw a 30 per cent increase in the cost of onshore wind turbines in 2008/9. The next biggest will be economies of scale, which drive down the marginal cost of manufacture and deployment. Technology developments such as direct drive machines will make them cheaper to operate and maintain."

Dr Gordon Edge, RenewableUK's Director of Policy added: "Bigger turbines with bigger rotors for higher yield will also give about a 15 per cent reduction [in costs of electricity]. Beyond that, you can make some assumptions around exchange rates, commodity costs, competition and industrialisation that will have an impact during the latter part of the decade."

The cost of capital should also come down as offshore wind gains a track record. The effect of maturity on costs has already been seen in the onshore wind sector, where some argue that wind is already competitive with gas.

At the *Global Clean Energy Forum* in Barcelona, Christian Kjaer, CEO of the European Wind Energy Association noted: "With 1 per cent of the funding that has gone into energy research in the OECD countries since 1974, we have developed onshore technology that can compete with new gas fired power plant, new coal fired power plant and is significantly cheaper than nuclear plant. And that's what we want to do with offshore wind, which is where the big potential is in Europe."

It was a view shared by Antonio Mexia, CEO of Portugal's utility EDP who said: "Wind today is competitive with gas."

It is an important point especially with the debate that the advent of shale gas will stymie growth in renewables. In the US, shale gas production has increased by a factor of 14 since 2000 and, according to Anouk Honoré, Senior Research Fellow on the Natural Gas Research Programme at the Oxford Institute for Energy Studies, will represent 45 per cent of US gas production by 2035.

In Europe, however, unconventional gas is not expected to be the game changer it has been in the US. Also speaking at the Forum, Michael Lewis, Managing Director, Europe, E.On Climate and Renewables said: "We don't see shale gas as a threat to the business. Certainly our gas [power generation] business is growing rapidly – it is very cheap, it's very flexible and is low carbon compared to coal and oil. We don't see it as competition to renewable energy, we see it as a complement to renewable energy. We need something to provide the flexible reserve capacity to fill in when renewables are unable to generate."

While there will be an increase in gas fired plant, whether to complement intermittent renewables or purely economic reasons, it is worth noting that the high gas scenario as modelled by the IEA will lead to a long term temperature rise of over 3.5ºC.

If politicians are listening to the likes of the IEA they will make more of a concerted effort to push climate change back up the political agenda.

In the current economic climate, raising financing is probably more of an issue than actual project costs – a point that was made several times at the *Envirotech and Clean Energy Investor Summit* in London last month. Alejandro Ciruelos part of Santander's project and acquisition finance team in London said: "Sovereign debt crisis has caused a scarcity of capital everywhere. People are prioritising based on country risk. A project has to have good geography and there has to be good regulatory framework."

The fundamentals that underpin renewables may be sound for the long term but since when have politicians been truly concerned beyond their current term? Fatih Birol, Chief Economist at the IEA warned as the Durban conference approached: "Given governments' pre-occupation with the current financial crisis, it is difficult to say that the wind is blowing in the right direction."

Perhaps it is easier to say that the wind will blow us in the direction we are heading.