

# THE ENERGY INDUSTRY TIMES

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# Energy sector must act quickly on climate change



Morgan says "the challenge is great"

The latest Intergovernmental Panel on Climate Change says it is possible to avoid climate change but the energy sector must take swift and aggressive action. **Junior Isles**

The Intergovernmental Panel on Climate Change (IPCC) believes there is still time to avoid drastic climate change if the energy sector takes swift action in making the transition to low carbon energy production.

Last month the IPCC released the Working Group III (WGIII) portion of its Fifth Assessment Report 'Climate Change 2014: Mitigation of Climate Change', which stated that energy contributed 78 per cent of the total greenhouse gas (GHG) emission increase from 1970 to 2010. It therefore concluded that preventing catastrophic climate change requires an urgent and fundamental transformation of energy

systems around the world.

Commenting on the IPCC's findings, Jennifer Morgan, Climate and Energy Program Director at World Resources Institute and IPCC Review Editor for the WGIII chapter on international co-operation said: "The challenge is great, but we still have time to turn back this global threat. The IPCC offers cost-effective options to change course and avoid locking-in even more dangerous levels of warming.

"The urgency is clear. Global emissions have to peak by the end of this decade. Further delay will not only increase the severity of climate impacts but it will drive up the costs of reduc-

ing emissions."

World leaders also agreed on the need to act quickly. EU commissioner Connie Hedegaard said: "The report is clear: the more you wait, the more it will cost [and] the more difficult it will become." US secretary of state, John Kerry, said: "This report is a wake-up call about global economic opportunity we can seize today as we lead on climate change."

As the world's second highest GHG emitter after China, the US' reaction is noteworthy. In a statement on the report, US Energy Secretary Ernest Moniz said: "The Intergovernmental Panel on Climate Change's latest

report on mitigation makes it clear that the next 10-20 years are critical if we are to avoid the worst consequences of climate change. The IPCC report notes that it will be substantially more difficult to maintain low GHG concentrations in the long term if we do not act aggressively now. The report also points out that there are many low-carbon energy pathways to a prosperous future while mitigating climate change risks to a significant degree."

The report identified renewables and energy efficiency as key technologies in reducing emissions. The IPCC says

Continued on Page 2

## EU state aid rules could hamper small scale renewables

The European Commission's move to reduce renewables subsidies to help lower electricity prices is more suited to large energy players, according to green energy proponents.

According to new Environmental and Energy Aid Guidelines (EEAG), the European Commission recommends removing support mechanisms for renewable technologies that are expected to become "grid competitive" between 2020 and 2030. The term grid competitive, however, is not defined in the guidelines.

The Commission says production costs for renewable energies have significantly fallen over the past years and the generous subsidies for them "caused serious market distortions and increasing costs to consumers".

State aid is defined as an advantage conferred on a selective basis to

undertakings by national public authorities. It is illegal in the EU, with some exceptions. The details of these exceptions are defined in guidelines.

All renewable energy support schemes implemented by member states, which are state aid and do not comply with the guidelines, are therefore illegal. The new guidelines, which come into force on 1 July 2014, are valid for six years until 2020, replacing current existing guidelines. The opening of national support mechanisms is suggested rather than imposed on member states.

The new rules foresee gradually diminishing subsidies to ensure "more cost-effective" renewable energy growth. The reforms will reduce the number of renewable projects eligible for "feed-in tariffs" that guarantee renewable energy producers a selling

price for their power.

These payments will gradually be replaced over the next few years by a more market-based model. In new projects, renewable operators will have to enter into competitive tenders to supply the grid.

The guidelines are supposedly intended to integrate renewable electricity in the market and state owners of existing small scale renewable installations – like solar panels on roofs – will be exempt from the curbs.

Not all, however, are convinced. The European Photovoltaic Industry Association (EPIA) insists that the new rules create new barriers to the integration of small scale renewables into the European power mix.

"A tendering schemes inevitably comes along with risks and transaction costs, making it unfit for rooftop PV

systems and other small scale electricity generators. The 1 MW threshold under which a different support regime is possible, is not enough. Cooperatives and community projects, for instance, will now be forced to place their bids in a scheme much more suited to the largest energy players," stated Alexandre Roesch, EPIA Head of Regulatory Affairs.

Greenpeace has complained that the Commission is acting under pressure from Europe's big utility companies "to stunt the growth of renewables". Joaquin Almunia, the EU's competition commissioner said: "Politically it is the best balance possible. We were obliged to make trade-offs."

The new rules also allow exemptions for particularly energy-intensive manufacturers to keep them internationally competitive.

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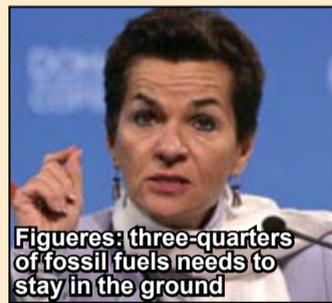
that although global emissions of GHG grew faster between 2000 and 2010 than in previous decades, renewable energy has expanded substantially and its costs have now fallen so dramatically that it is increasingly ready to displace old, polluting forms of energy.

A global roadmap for a transition to a sustainable energy future, "REmap 2030", due to be published this month (May) by the International Renewable Energy Agency (IRENA), shows that quadrupling the share of modern renewable energy sources in the global energy mix by 2030 could reduce emissions by 8.6 Gt to an estimated 32.8 Gt. Based on numbers from the International Energy Agency, energy efficiency could save an additional 7.3 Gt.

The IPCC report includes nuclear power as a mature low-carbon option, but cautions that it has declined globally since 1993 and faces safety, financial and waste-management concerns. Carbon capture and storage is also included, but the report notes it is untested on a large scale and may be expensive.

Talk of reducing fossil fuel dependence has been met with mixed reactions. ExxonMobil said the world's climate policies are "highly unlikely" to stop it from selling fossil fuels far into the future.

Friends of the Earth's executive director, Andy Atkins, however, said: "Rich nations must take the



**Figueres: three-quarters of fossil fuels needs to stay in the ground**

lead by rapidly weaning themselves off coal, gas and oil and funding low-carbon growth in poorer countries."

This was echoed by UN climate chief Christiana Figueres, who told oil and gas officials in London last month that three-quarters of the fossil fuel reserves still in the ground needs to stay there for the world to avoid a 2°C rise in global temperature – the internationally agreed target needed to avoid irreversible climate change.

Others, meanwhile, believe that renewables cannot be deployed fast enough to meet this target.

Geoff Maitland – a professor of energy engineering at Imperial College London and a Fellow of IChemE, Royal Society of Chemistry, Energy Institute and the Royal Academy of Engineering, said: "Waiting for renewable energies to take over will not cut emissions quickly enough to meet the target of restricting the mean global temperature rise to 2°C. There is good evidence to support a greater emphasis towards using natural gas. In the US, the growth in shale gas has reduced the rate of increase in CO<sub>2</sub> emissions to around a third of their previous levels.

"In the meantime, we have to abate greenhouse gases from existing fossil fuel energy sources much more rapidly than we are at present. Carbon capture and storage is a solution, but will again need leadership and resources to help establish an estimated 3200 CCS facilities required worldwide over the next 35 years to remove the necessary levels of CO<sub>2</sub> from the atmosphere."

# Politics could determine Alstom's future

The French government could once again decide the future of engineering giant Alstom, says **Junior Isles**

The French Economy Minister Arnaud Montebourg has made it clear that he would actively seek "other solutions" to a reported \$13 billion bid by US company General Electric for Alstom. He told reporters at the end of April that the government "is expressing its patriotic concern and vigilance".

Alstom's board had been due to hold a meeting at the end of April to discuss the GE proposal before Siemens entered the battle for the company with the announcement that it had written a letter to "signal its willingness to discuss future strategic opportunities" with the French group.

It emerged that Siemens chief executive Joe Kaeser, in a letter to Alstom CEO Patrick Kron, was offering to swap the German group's high-speed trains and locomotives division plus cash – believed to be up to €11 billion – in return for the French group's global power assets.

Alstom is seen as a French national

champion. It employs 18 000 people in France and was rescued in a state-backed bailout in 2004 when Siemens was barred from acquiring it.

French unions are urging the government to step in again to save the company. Former industry minister Jean-Pierre Chevènement wrote to the Prime Minister, Manuel Valls, to seek his "prompt intervention". Chevènement warned that allowing GE to take over Alstom's energy branch would "deal a fatal blow" to France's nuclear energy sector.

Siemens has promised not to cut jobs in France for at least three years or dispose of meaningful parts of the businesses acquired from Alstom. It also proposed talks on Alstom's nuclear power assets, including a possible separation if it is "deemed appropriate to secure the best interests of France".

Alstom has been affected by a weak European power market, which has

also seen a slump in orders for coal and gas fired plants. With shares still down 25 per cent since the start of 2011, the company has been taking steps to improve its balance sheet.

Last November Alstom outlined plans to sell as much as €2 billion in non-core assets, including a minority stake in its rail unit by the end of 2014.

In January this year the company, which supplies equipment for power plants and trains, cut its operating margin and cash flow forecasts for this year, citing weakness in its thermal power division. Last year the group announced that it was cutting 1300 jobs, mainly at its coal-fired boiler business.

At the beginning of April, the company agreed to sell its steam auxiliary components business to private equity firm Triton for €730 million. Alstom said the unit, which manufactures a range of heaters for thermal power

plants, would generate more than €430 million in revenue for the fiscal year ending on March 31. Alstom said that its board of directors had approved the sale on March 31 and expects to finalise the sale in the first half of its 2014-15 fiscal year.

Although a privately owned company, Montebourg's announcement is a stark reminder of the influence the government holds over a company that relies heavily on orders from state rail operator SNCF and partly state-owned utility EDF.

"GE and Alstom have their calendar, which is that of shareholders, but the French government has its own, which is that of economic sovereignty," Montebourg said in a statement.

Montebourg said that an alternative Siemens proposal was "about creating two European and global champions in the energy and transport domains – one around Siemens, the other around Alstom".

## Project awards mark "new stage" in green energy investment

Eight major renewable electricity projects unveiled last month mark the first investments under the UK's electricity market reforms, which are aimed at attracting investment in low carbon generation.

The eight projects with a combined capacity of 4548 MW are: Beatrice (664 MW offshore wind); Burbo Bank extension (258 MW offshore wind); Drax Unit 1 (645 MW biomass conversion); Dudgeon (402 MW offshore wind); Hornsea 1 (1200 MW offshore wind); Lynemouth (420 MW biomass conversion); Teesside (209 MW combined heat and power); Walney Extension (660 MW offshore wind).

The successful projects have been awarded contracts under the Final Investment Decision (FID-ER) Enabling for Renewables process. The

government set up the FID-ER for some projects to ensure that investment in renewable energy projects was not slowed. It allowed developers to reserve a CfD for when they were ready to generate power, thus ensuring that they would definitely receive financial support to pay back the investment they have made in their projects.

The CfD regime, which also provides financial support for carbon capture and storage and nuclear projects, was set up under the 2013 Energy Act. It provides a guaranteed price for power, with the government providing a premium on top of the power price to make low carbon projects economic. It replaces the Renewables Obligation (RO), which will cease in March 2017 when the CfD will be the sole support mechanism.

Commenting on the awards, UK Energy and Climate Change Secretary Edward Davey said: "These contracts for major renewable electricity projects mark a new stage in Britain's green energy investment boom.

By 2020, the projects will provide up to £12 billion of private sector investment, supporting 8500 jobs, and they could add a further 4.5 GW of low-carbon electricity to Britain's energy mix (or around 4 per cent of capacity), generating enough clean electricity to power over three million homes."

Dong Energy, which secured contracts for its Burbo Bank and Walney Extension projects and the first phase of a project in the Hornsea zone, welcomed the news.

"We are delighted that we have been successful with all three of our FID

contract applications we submitted to the UK government," said Henrik Poulsen, Chief Executive Officer of Dong Energy. "It shows that the UK is an attractive place to invest in offshore wind; not only for its great natural resources, but also because of the stable investment environment created by EMR."

Energy UK also welcomed the announcement but urged the government to complete its reforms. "It is excellent news that these major green energy projects have been given the go ahead... However, we encourage government to complete its Electricity Market Reform package to provide certainty for investment in new electricity generation and to build the backup needed when the wind doesn't blow and the sun doesn't shine."

## Temelin cancellation signals shift to coal

The cancellation of the tender process for two new reactors at the Temelin nuclear power plant could signal a shift in the Czech Republic's energy strategy.

Czech power company CEZ decided to cancel the \$10 billion tender for the reactors one year ahead of the planned 2015 deadline to pick the winner, saying that the plant no longer makes economic sense.

Wholesale electricity prices have more than halved since the tender was

launched in 2009, while prices for carbon emission permits in Europe have nearly collapsed, making coal a more attractive fuel for power generators.

Czech Prime Minister Bohuslav Sobotka and the country's President Milos Zeman both described CEZ's decision as logical.

CEZ, which is 70 per cent state-owned, said it still planned to have a new strategy for the expansion and modernisation of its nuclear power facilities by the end of this year. The

new reactors would have doubled the plant's 2000 MW capacity.

Westinghouse, which was in the running with Russia's Rosatom to build the plant, expressed deep disappointment at the news.

Westinghouse Nuclear Power Plants Sr. Vice President Jeff Benjamin said: "The local scope in the Westinghouse proposal represents a significant percentage of the total plant construction and would have resulted in billions of Czech crowns and sustained work for

thousands of workers from the Czech Republic."

Rosatom spokesman Sergey Novikov said: "We do respect the decision of CEZ and we understand why they are unable to continue at this time."

Following the cancellation of the tender, Areva said it was withdrawing the appeal it lodged with the Regional Court of Brno on September 19, 2013. The group was challenging what it believed was its unfair exclusion from the process in 2012.

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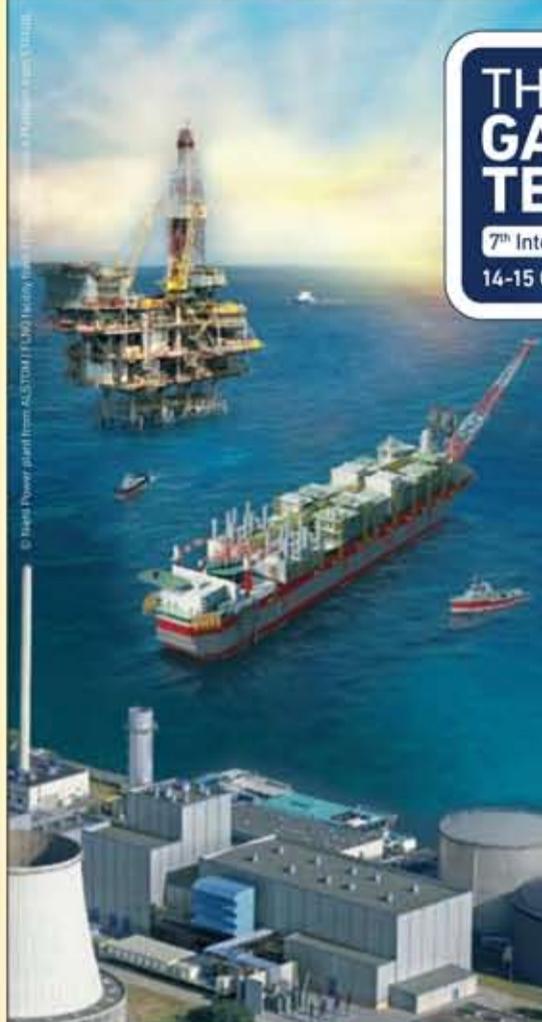
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# Emissions fall thanks to natural gas switch

Greenhouse gas emissions are falling in the USA but uncertain energy policy continues to threaten long-term clean energy investment.

Siân Crampsie

Greenhouse gas (GHG) emissions in the USA have fallen in spite of energy sector policy uncertainty and a drop in clean energy investment.

Data from the US Environmental Protection Agency (EPA) shows that GHG emissions fell by ten per cent between 2005 and 2012, and by 3.4 per cent from 2011 to 2012.

In April the Pew Charitable Trusts released a report showing that investment in clean energy in the USA fell by 9 per cent between 2012 and 2013, to \$36.7 billion.

The main causes of the decrease in GHG emissions are the switch from

coal to natural gas in power generation, and a decrease in energy consumption across all sectors of the US economy, says the EPA, which is attempting to limit GHG emissions as part of President Barack Obama's plan to tackle climate change.

The data raises concerns that as the US economy picks up, emissions could once again start rising. An increase in natural gas prices could also lead to a rise in coal-fired power generation.

Pew Charitable Trusts says that the main factor affecting investment in the clean energy sector is policy uncertainty. While solar photovoltaic (PV) deployment in the USA reached record levels in 2013, steep declines were

recorded in the wind sector.

The PV sector has benefited from falling technology prices and the suitability of PV for microgeneration. Pew Charitable Trusts said that "although wind investment was relatively stable at \$14 billion, US wind installations in 2013 were down more than 90 per cent – from more than 13 GW in 2012 to less than 1 GW last year."

This compares with 14 GW of wind capacity deployed in China in 2013. The fall in wind installations in the US last year was mainly due to a slight change in the law when the production tax credit for wind was renewed at the start of 2013.

"Lower technology prices have made

the small-distributed solar market very competitive, and the United States has been a leader in developing innovative financing models that are spurring steadily increasing deployment," said Phyllis Cuttino, director of Pew's clean energy programme. "Wind, however, has been subject to the vagaries of US energy policy. As Congress debates tax extenders, it should aim to level the playing field, accelerate clean energy deployment, and provide long-term certainty to investors."

New legislation is on the horizon to limit carbon dioxide (CO<sub>2</sub>) emissions from new coal-fired plants and the government is also considering whether to limit methane emissions from the oil

and gas sector. Experts are expected to make their recommendations to the EPA on how to proceed with methane regulations by June 16. The EPA will also solicit input from the public.

Industry groups have long resisted the move for regulations on methane, saying oil and gas companies are already taking steps to cut emissions. But environmentalists are concerned about the impact of methane emissions from unconventional oil and gas exploration.

The proposed regulations are part of Obama's Climate Action Plan, which is designed to address carbon pollution from the power and transport sectors, and improve energy efficiency in homes, businesses and factories.



## ■ Kemper costs rise ■ EPA seeks comment on FutureGen

A major coal gasification plant in the USA has been hit by labour issues and construction problems, according to owner Mississippi Power.

The Kemper County coal gasification project remains on track to start operating at the end of 2015 but has experienced productivity problems over the winter "due in large part to adverse weather, unexpected excessive craft labour turnover and unanticipated installation inefficiencies", the utility said in a statement.

The 582 MW plant is needed to replace Mississippi Power's ageing plant fleet and meet future energy needs in the region and will also serve as a bellwether of the economic and environmental performance of coal gasification technology.

Mississippi Power has identified at least \$177 million in likely cost increases at the Kemper project, including \$152 million in construction costs

and \$25 million in start-up costs.

Such added costs would push the estimated price tag for the delayed Kemper plant to \$5.22 billion, well above the \$2.88 billion construction cap approved by the Mississippi Public Service Commission. The cap does not apply to the cost of the lignite mine, the cost of the carbon dioxide pipeline facilities associated with the carbon capture and storage part of the project, and some other costs of the plant.

Another gasification plant – Duke Energy's Edwardsport generating station in Indiana – has been hit by operational problems.

The 618 MW Edwardsport gasification plant began operating in June 2013 but in a regulatory filing the company said that the plant generated less than one per cent of its power capacity during February.

Duke blames February's low power output on an "equipment challenge"

and a decision to move up the plant's spring maintenance.

Power production in March reached 44 per cent of maximum capacity, according to local media.

Edwardsport cost \$3.5 billion to build, far more than the original \$1.9 billion cost estimate.

The US Environmental Protection Agency (EPA) has championed clean coal plants such as Kemper as the future of coal plant in the USA. In April it gave draft approval to the permits needed by the proposed FutureGen project to inject carbon dioxide deep into sandstone formations below the ground.

The EPA is seeking public comments on the proposed carbon sequestration element of the multi-billion dollar clean coal project.

The permits would be the first in the nation for injecting and storing the gas underground.

## Fundy set to host floating tidal turbine

Siemens is continuing its investment in marine energy with an agreement between its subsidiary, Marine Current Turbines (MCT) and Bluewater Energy Services to jointly develop a 2 MW floating tidal current turbine.

The SeaGen F turbine will be installed in Canada's Bay of Fundy and plans are also underway to build a commercial scale multi-megawatt array at the Fundy Ocean Research Centre for Energy (FORCE).

The Bay of Fundy has a tidal range of up to 15 m and current speeds of up to 5.5 m/s. This, combined with Nova Scotia's feed-in tariff make this one of the most attractive and economic sites in the world for marine energy, says Siemens.

MCT has been operating its SeaGen tidal current turbine in Northern Ireland since 2008. The turbine is anchored to the seabed using a monopile structure. It hopes to use Bluewater's expertise in floating platforms and subsea moorings to develop a floating turbine.



## South America draws renewables investors

European energy companies are successfully exploiting opportunities in Latin America's renewable energy markets.

Enel Green Power and GDF Suez are among the firms aiming to ramp up business operations in the region as opportunities in their home markets dry up.

GDF Suez recently announced that it had achieved full commercial operation at the 115 MW Trairi wind farm in Ceara, northeast Brazil. Enel Green

Power announced in March that it had successfully obtained a loan of €153 million from Spanish banking giant Banco Santander to develop wind farms in Mexico.

It has also started construction works at the new Apiaçás hydroelectric complex, in the state of Mato Grosso, Brazil.

Rising electricity demand and favourable energy policies are creating growth opportunities in South America's renewable energy markets, with

Brazil, Mexico and Chile highlighted as target markets.

GDF Suez is already a major player in Brazil, operating around seven per cent of the country's installed generating capacity. The firm is currently also constructing Jirau, a major 3750 MW hydropower plant located on the Madeira river, in the state of Rondonia, Brazil.

Apiaçás will consist of a cascading sequence of three power plants, named Salto Apiaçás, Cabeza de Boi

and Fazenda, comprising seven turbines of around 14.5 MW each, for an overall installed capacity of 102 MW. The project is supported by a 30-year PPA, a contract to purchase the power generated by the complex, which will be delivered to the national grid.

In Brazil, Enel Green Power currently has around 210 MW of installed capacity, of which 93 MW is hydropower and the remainder wind. In Mexico Enel Green Power has wind farms with generating capacity of 144

MW in Mexico and is building two other wind farms.

It also operates renewable energy capacity in Costa Rica, Guatemala, Panama and Chile.

Research from GTM shows that Chile installed 153 MW of utility scale PV capacity in the first quarter of 2014, more than three times the amount that any Latin American country has ever before installed in a single quarter. A further 380 MW of PV capacity is under construction.

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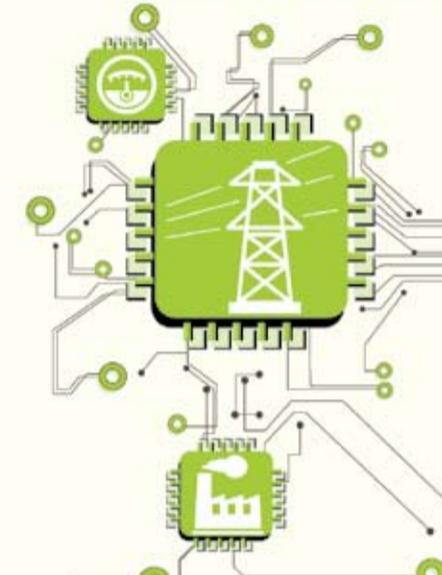


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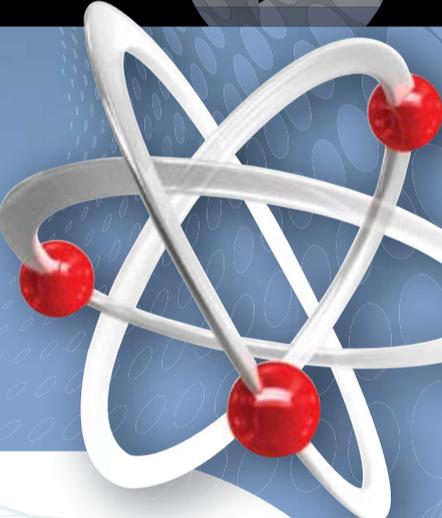
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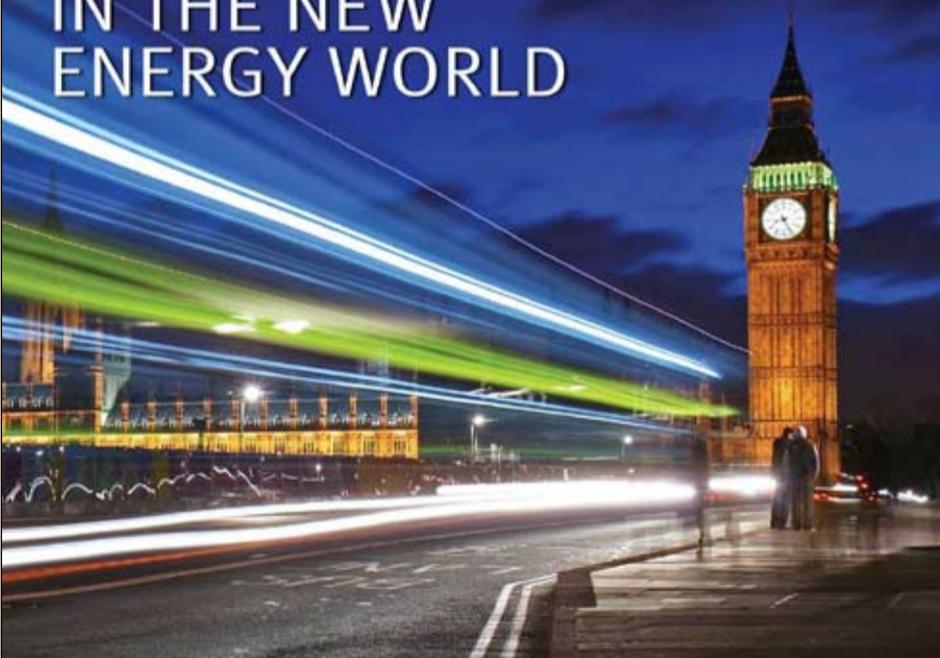
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# Asia maintains strong renewables focus

Generation from renewable sources continues to see strong growth in Asia even as subsidies are gradually reduced, says **Syed Ali**

Governments in Asia are increasing the use of renewable energy, while at the same time working towards achieving grid parity.

Analysis from Frost & Sullivan, Southeast Asia Renewable Energy Market, finds that southeast Asia had an estimated annual capex addition of \$3.15 billion in 2013 and is expected to reach \$3.31 billion in 2018.

However, the high installation cost of some renewable technologies has made it necessary for governments to offer tax benefits, rebates, feed-in tariff (FIT) schemes, and other funding programmes. According to the report, 70 per cent of the renewable energy market growth is dependent on governmental policies. It notes that any withdrawal of such policies therefore significantly limits market expansion.

"Consequently, participants are attempting to achieve grid parity without government subsidies and grants and instead, are sourcing low-cost equipment and having leaner operations," said Frost & Sullivan Energy & Environmental Industry Analyst Vishal Narain. "The timing and methods of phasing out subsidies are critical for creating a vibrant, cost-competitive market."

At the end of March, Japan announced that it was reducing photovoltaic (PV) FITs by 11 per cent. According to a statement by the Ministry of Economy, Trade and Industry (METI), the new FIT will apply to all PV projects that secured approval in Japan's fiscal year 2014.

The introduction of FITs has helped boost solar installations significantly.

Before the introduction of the FIT in July 2012, Japan's PV capacity was 5600 MW. The country has nearly doubled its PV capacity with 6028 MW of new installations in 2013, starting from 6417 MW of cumulative PV power as of December 31, 2012.

The country's thriving solar sector is now attracting large foreign investors. GE Energy Financial Services, the General Electric Co. arm that funds energy infrastructure projects, said last month it was planning to enter the Japanese solar market by investing Yen10-20 billion (\$100-200 million) in a solar power project in Setouchi, Japan. At 230 MW the project would be the largest in the country.

Japan has been taking steps to increase its renewables generation following the Fukushima nuclear disaster

in March 2011.

At the end of March, Chuo Electric Power Co. was set to open Japan's first new geothermal power project in 15 years. The company also said it is planning to open five new plants over the next five years.

Like Japan, Korea is also looking to reduce its dependence on nuclear. In late March Korea Electric Power Corporation (Kepeco) and six other power generation companies said they would set up "new and renewable" energy projects with a gross generating capacity equivalent to "11 and a half nuclear plants".

In its mid-to long-term energy business plan, Kepeco said it aims to invest a Won42.5 trillion (\$409 billion) by 2020 to build new facilities capable of generating 72 per cent (approximately

11.5 GW) of the nation's total new and renewable energy capacity.

"Korea's new and renewable energy generation reached only 64.7 per cent of the government's target in 2012, so we need to concentrate our efforts on making it better," said a Kepeco official.

■ Japan last month approved its 'Basic Energy Plan', the first of its kind since the Fukushima nuclear crisis. The plan aims to boost renewable energy above the level aimed at in the past. It also states that nuclear power is an "important" source of energy and that it will continue to uphold the country's spent fuel recycling policy. The plan also left open the possibility of allowing the construction of new reactors. The news came as the government announced that it will restart its idled nuclear power plants.

## Indonesia attracts energy investment

Sharp increases in electricity demand on the islands of Java and Sumatra is attracting large amounts of capital to Indonesia.

State-Owned Enterprises Minister Dahlan Iskan recently said that industrial bonded zone operator Kawasan Berikat Nusantara (KBN) would be among several state companies that will enter the electricity business.

He said that KBN, which operates an industrial bonded zone in Jakarta, would build a coal-fired power plant with a capacity of 2 x 1000 MW in North Jakarta, while other state firms, including state electricity company PLN, would build a power grid along the eastern part of Sumatra.

The power plant and the transmission network are estimated to cost around Rp20 trillion (\$1.7 billion) and \$896 million, respectively.

"For the power plant project in Jakarta, we will invite private companies to participate in funding and technology," Dahlan said.

KBN president director Sattar Taba said that his firm would form a consortium with PLN and a Chinese company to build and operate the power plant.

State-run electricity firm PT PLN also said it is set to collaborate with 30 investors from Japan to construct power plants that use ultra supercritical (USC) technology in a bid to help reduce coal consumption.

"A plant with USC technology will cost us \$2 million per megawatt," said Nasri Sebayang, PLN's construction director, adding that coal-fired plants cost \$1.5 million per megawatt of electricity produced. Even though the technology was expensive, he said it would reduce coal consumption by up to 20 per cent.

Nasri said the firm expected to put construction of the plants out to tender this year so that building could begin in 2015.

Meanwhile, PT BTN Energy Prima (BEP), a joint venture between Indonesia's PT Biidznillah Tambang

Nusantara (BTN) and Malaysia's BTN Power Sdn Berhad, has joined forces with Chinese state firm China Machinery Engineering Corporation (CMEC) to build \$675 million worth of coal-fired power plants in Dumai in Riau, Sumatra.

The 3 x 150 MW coal-fired power plants in the Pelitung Dumai Industrial Area will start construction in July. Construction is expected to finish by April 2018.

Indonesia has been focusing on coal and geothermal to provide the bulk of its new capacity in the coming years.

At the end of March the Asian Development Bank (ADB) provided a loan of \$350 million for the construction of a 320 MW geothermal power plant in North Sumatra. The project requires a total loan package of \$1.17 billion.

Six commercial banks will also co-finance the loan package. The ADB and the Japan Bank for International Cooperation acted as lead structuring banks.

## Bangladesh's power plans take shape

Bangladesh's plans to increase coal fired generating capacity are moving forward with news that state-owned Power Development Board (PDB) is close to signing a deal with China Huadian Hong Kong Limited to build a new ultra supercritical plant.

The 1320 MW plant is to be constructed on Maheshkhali Island in Cox's Bazar district. "If the planned deal is signed, the number of joint venture coal fired power plants will reach three, raising the total capacity to 3960 MW," said a PDB official.

The plants are an important part of Bangladesh's ongoing efforts to increase generating capacity. State Minister for Power and Energy Nasrul Hamid last month said the government has drawn up a plan to generate 24 000 MW of electricity from coal by 2030.

He also told the UNB news agency the government plans to create a coal fired power plant hub in the south-eastern coast of Maheshkhali and adjoining islands with 9000-12 000 MW

coal fired capacity.

"Of this, about 6000 MW will come within the next five years. To implement the mega plan, we need huge investment and skilled manpower," said Hamid. He noted the power sector needs between \$15-20 billion investment in the next five years to implement the mega projects.

In April, German development bank KfW looked set to emerge as a key partner for the country by providing €60 million (\$82.31 million) worth of assistance for developing the power sector.

Government officials said KfW for the first time was providing a €45 million loan and €15 million grant for the country's development.

Officials said Bangladesh would require \$3.5 billion every year to develop power generation, transmission and related facilities.

■ Last month the government finally approved the 365 MW Ghorasal gas fired power plant, which will be built using Chinese credit.

## China has to reduce reliance on coal

China must reduce its reliance on coal in order to cut air pollution and eliminate the smog that troubled Beijing and other parts of the country last year.

During a keynote speech at the three-day China Development Forum, Zhang Guobao, former chief of the National Energy Administration (NEA) recently said that "coal burning

and vehicle exhaust are both major causes of smog" and noted that China should expand its use of nuclear to help tackle the problem.

He said: "I believe we still should develop nuclear power appropriately because it currently accounts for only 2 per cent of the nation's total electricity generation."

Chinese premier Li Keqiang said

that China will control total energy consumption through higher efficiency, implementing smart grids and switching to clean energy sources such as wind power, nuclear power, hydro-power and photovoltaic.

China wants to raise the share of non-fossil fuels in energy consumption to 11.4 per cent by 2015, a goal that Zhang described as "challenging"

since the figure was only 9.8 per cent in 2013.

There were moves to support the clean-up effort at the start of April when Gerard Mestrallet, Chairman and CEO of GDF Suez, signed a cooperation agreement with Wang Dong, Chairman and CEO of Beijing Enterprise Group to develop natural gas and energy efficiency projects in China.

The agreement extends an existing cooperation between the groups into several new areas, including the development of "utility type services" in the new Technological Business District of Changping near Beijing and the construction of a tri-generation plant. It also covers natural gas storage to help Beijing make the shift from coal to more natural gas.

## Europe News

# Ukraine crisis puts security in the spotlight

Europe is under increasing pressure to diversify its energy sources as the political standoff in Ukraine continues.

| Siân Crampsie

Moscow has warned Europe that disruption to natural gas supplies are likely unless Ukraine settles \$3.5 billion of debts.

Russian gas giant Gazprom gave Kiev a deadline of May 7th to pay for fuel that it has used, heightening tensions in the political standoff and raising concerns about Europe's relationship with Russia.

Around 30 per cent of EU natural gas supplies are sourced from Russia, with half of it transiting through Ukraine. Gazprom says it will cease supplying Ukraine with natural gas if the debt is not paid, making it likely that Ukraine will siphon off gas destined for Europe for its own use.

Gazprom in early April raised the price of natural gas supplied to its Ukrainian counterpart. Moscow's ability to use energy supplies to exert influence over other countries is a major cause for concern, and US Secretary of State John Kerry last month called for Europe to wean itself off Russian gas.

"It really boils down to this: no nation should use energy to stymie a people's aspirations," Kerry said in Brussels, just as Russia's Gazprom raised the price it charges Ukraine for gas.

Concerns about energy security are particularly strong in Germany be-

cause of its pledge to abandon nuclear energy, and in countries such as the UK, where capacity is ageing.

Germany gets around a third of its natural gas and crude oil from Russia, while RWE and E.ON source most of their gas from Gazprom. Natural gas is expected to play a major role in the country's economy as it makes the transition to renewable energy under the Energiewende plan.

Germany is aiming for renewable energy to account for 80 per cent of all power generation by 2050. Continued unrest in Ukraine is likely to boost demand for coal, but even some of that is imported from Russia.

Unlike Germany, the UK is pushing forward with plans to build new nuclear capacity, but it is also relying on natural gas to fill the gap before new capacity is commissioned. It is also looking to natural gas to provide flexible back-up generation to renewable resources.

The concerns over energy security could provide a boost to the renewables sector, which has suffered in recent years because of policy uncertainty in the EU, the economic crisis and the impact of subsidies on consumers' bills.

Last month the European Commission adopted new rules on the use of subsidy mechanisms to support renewable energy.

The Commission wants to gradually move renewables support mechanisms to competitive allocation mechanisms such as auctions in order to reduce the financial burden of renewables and make them more competitive.

Although broadly welcomed, the new rules could have a negative impact on security of supply, according to the UK's renewable Energy Association (REA).

"These new guidelines are based on economic modelling which suggests that competitive mechanisms will deliver equally good results at lower cost to the consumer," said REA Chief Executive Dr Nina Skorupska. "... but putting so much faith in untested theory is a big risk."

In total, Gazprom exported about 155 billion cubic metres (bcm) of gas to Europe in 2013. There is potential to diversify sources with imports of liquefied natural gas (LNG), but increasing demand for the fuel in Asia will mean prices are likely to rise. Current LNG prices in Europe are \$11/million Btu, compared with \$15/million Btu in Asia.

Another alternative is for Europe to exploit shale gas resources, but even countries that are moving forward with exploration, such as the UK, are several years away from producing commercial quantities of gas from such sources.

## UK backs White Rose

The UK is hoping to revive its carbon capture and storage (CCS) development industry after a pioneering project in North Yorkshire was placed in pole position to win European funding.

The White Rose CCS project is a proposed 450 MWe oxyfuel power and CCS demonstration project backed by Alstom, Drax and BOC.

The British government last month told the European Commission that it would provide support for the White Rose project, making it likely that the scheme will be awarded €300 million of funding from the NER300 scheme.

The NER300 scheme will also back a number of renewable energy and interconnection projects across Europe as part of the Commission's plans to increase investment in and boost development of clean energy technologies. Schemes will only win European backing if this funding can be matched by the relevant national government.

The Commission sees CCS as an important technology in the fight against climate change but invest-

ment in demonstration projects has stalled due to low carbon prices and the economic recession.

White Rose would capture around 90 per cent of its carbon emissions and store it beneath the North Sea.

The UK government attempted to kick-start CCS development seven years ago through a £1 billion CCS competition but negotiations with the winner – and only participant in the process – broke down.

White Rose will learn if it has succeeded in winning EU backing in June of this year.

Elsewhere in the UK SSE is proposing to retrofit a 385 MW slipstream at its Peterhead power station in Scotland with post-combustion CCS technology.

The project would capture approximately 1 million t/annum of carbon dioxide and transport it 100 km offshore for storage in a depleted natural gas field under the North Sea.

The UK government is helping to fund FEED studies at both Peterhead and White Rose, and is investing a total of around £100 million in the projects.



## Marine energy plans stream forward

- 300 MW array planned for Channel Islands
- Ocean Energy Forum takes shape

A spate of deals in the marine renewable energy field indicate that efforts to develop Europe's potential for marine energy are being stepped up.

Last month at the Thetis Marine Renewable Energy conference in Cherbourg, France, an agreement was signed between OpenHydro and Alderney Renewable Energy (ARE) to develop a 150-turbine tidal array in the Channel Islands.

The announcement followed the recent completion of more than 1500 hours of testing of OpenHydro's underwater turbine.

The developers of the £500 million (\$800 million) project are aiming to complete the project by 2020 to coincide with the commissioning of a proposed new power interconnector linking Alderney with France and Britain.

OpenHydro, a DCNS company, and ARE have created a joint venture company known as Race Tidal Ltd. to

develop the 300 MW project. The partners will spend the next three years completing the required surveys and environmental impact assessments prior to making an application for full consent.

In April the Channel Islands Marine Renewable Energy Group (CIMREG) signed an agreement with West Normandy Marine Energy (WNME) to cooperate in the development of marine energy. WNME has also inked a deal with the Regional Mission for Innovation and Economic Development Action (MIRIADÉ) to create of Research and Innovation Network in Basse-Normandie, France.

WNME and CIMREG have pledged to address common issues and to encourage business and research collaboration in marine renewable energy. Their agreement will also provide a means to exchange knowledge and best practice to ensure the development of marine energy activities, as



well as foster the promotion of the Basse-Normandie and Channel Islands marine energy industries.

In February France ramped up its efforts to be a major player in the marine energy market when it authorised the extension of the port of Cherbourg. The extension will also enable the port to increase activities in the offshore wind turbine sector.

April also saw the official launch of the Ocean Energy Forum, an initiative announced earlier this year by EU Energy Commissioner Günther Oettinger to help accelerate the development of the ocean energy sector. At the launch

Dr Sian George, CEO of Ocean Energy Europe, said that EU member states and industry should act together to remove barriers and reduce risk.

"This is the kind of coordinated approach which is needed to turn renewable ocean energy into a European industrial success story and make a significant contribution to European energy security – which is precisely what we hope the Ocean Energy Forum will do," said George. "Europe currently has the best ocean energy technologies, research centres and resources in the world and is leading the race to industrialise this exciting new

energy sector."

In the UK, the government said it had completed the Inshore and Offshore East Marine Plans, the first two of 11 marine plans it intends to complete by 2021. The plans designate specific areas of high tidal stream resource off the East Yorkshire, Suffolk, especially Norfolk coastlines, where tidal energy development will be prioritised.

Carnegie Wave Energy also signed a commitment agreement to secure the final berth at Wave Hub, the offshore renewable energy test facility in Cornwall, to demonstrate its next generation wave technology.

# Investors boost Nigerian power capacity

Nigeria's recent efforts to attract investment to its crumbling electricity sector appear to be paying off.

Siân Crampsie

Investors are making plans to build new electricity generating capacity in Nigeria following recent energy sector reforms in the country.

The Nigerian Electricity Regulatory Commission (NERC) has granted an operating license to Mobil Producing Nigeria Unlimited (MPN) to build and operate a 575 MW power plant in Eket, while the Eko Electricity Distribution Company (EKEDC) says it is negotiating with a number of companies on projects to add power to the grid.

Nigeria last year began a widespread power sector restructuring and privatisation programme to attract investors and increase generating capacity as well as improve the transmission and

distribution sector.

The country has one of the lowest per capita national power supplies in the world, with a viable installed capacity of about 3200 MW. President Goodluck Jonathan recently said that \$10 billion would be needed in the power sector in the next five years.

NERC said that the license to MPN represented a "timely boost" to the Nigerian power sector. Chairman and Managing Director of Mobil Producing Nigeria Unlimited, Mark R. Ward, said that the project would provide "a unique opportunity in the sense that there is a ready fuel supply and connection to the grid".

The license makes Mobil the third international oil company to play a major role in Nigeria's electricity sector.

Shell and Agip are already producing 642 MW and 480 MW, respectively to the National Grid, said NERC.

Charles Momoh, chairman of West Gas and Power, the new owner of EKEDC, told a recent summit in Lagos that the firm was already trying to improve power provision in Lagos state through deals on captive power generation and embedded power generation.

"Right now, we are going into the process of pre-qualification and this is just a short-term plan that we want to use so that we can get power to the people. But our long-term project is to bring in about 500 MW into our own local grid," said Momoh, who also highlighted ageing infrastructure and a shortage of gas as major constraints on

the power system.

Nigeria's government has set a target of reaching an installed capacity of 20 000 MW by 2020.

Last year GE signed a memorandum of understanding with the Nigerian government to work with private power generating companies to add 10 000 MW to the grid. According to local media, the firm is already working on the first 3000 MW of capacity.

In the gas sector, Seven Energy recently said it had secured \$255 million of new equity that would enable it to further develop gas supply opportunities in Nigeria. Temasek, the International Finance Corporation and the IFC African, Latin American, and Caribbean Fund (IFC ALAC Fund) all committed equity to Seven Energy, which

is focusing on the development of upstream reserves and resources and gas infrastructure to provide gas to the domestic market for power generation and industrial consumption.

Angus Rollo of Addleshaw Goddard, advisors to Seven, said: "Historically, the relative lack of investment in gas development for the domestic economy has resulted in heavy reliance by local industry on imported diesel and fuel oil, which are much more expensive than locally sourced natural gas."

"The emergence of a domestic gas market in Nigeria, led by indigenous companies like Seven Energy, to provide lower cost energy for electricity generation and industrial users is creating exciting opportunities for global investors."

## Jordan awards solar contracts

Jordan has completed the first phase of a three-stage project to increase installed renewable energy capacity.

The government has signed deals with two companies to build two solar energy plants, each with a 10 MW capacity, in the south of the country.

The agreements bring the number of renewable energy deals sealed by the government to 12. A further two rounds will be held, under which around eight renewable energy projects will be built, according to Energy Minister Mohammad Hamed.

The total cost of the 12 projects under the first round stands at \$560 million. Together they will generate 470 GWh per year and are expected to be completed in 2015.

One of the 10 MW solar projects will be developed by Scatec Solar, which signed a 20-year power purchase agreement with Nepco. Its PV plant will be built close to the city of Ma'an.

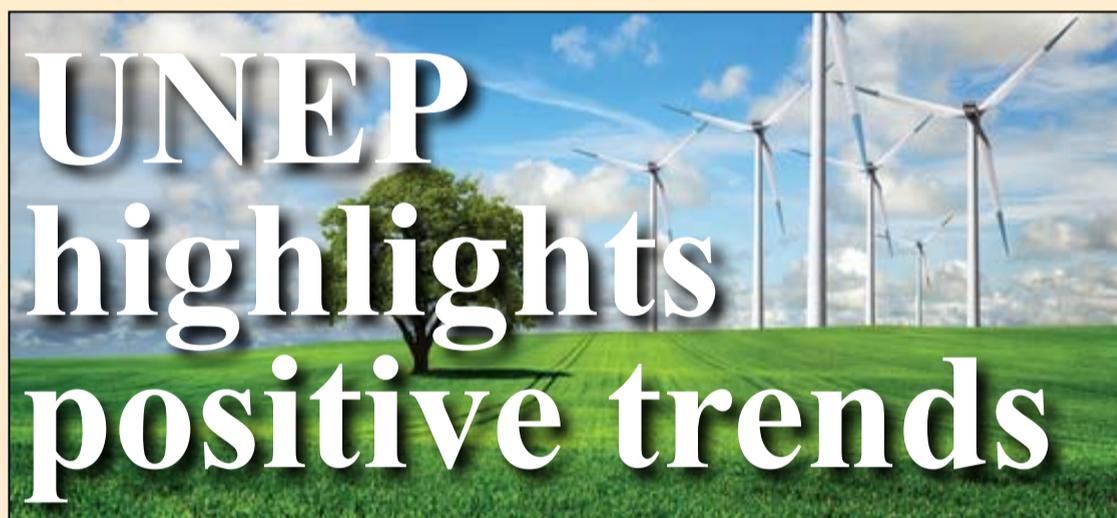
The *Jordan Times* has reported that Jordan would soon sign an agreement with Spain's Elecnor to build a \$150 million wind power plant, also in Ma'an. The 75 MW power plant will be funded by a grant from the Gulf Cooperation Council (GCC) states and is expected to be connected to the grid in the first quarter of 2015.

Jordan is aiming for renewable energy to account for ten per cent of electricity generation by 2020 in order to reduce imports of energy.

In 2011, Saudi Arabia, Qatar, the UAE and Kuwait pledged \$5 billion in assistance to Jordan over a period of five years.

Jordan imports about 96 per cent of its energy needs annually.

The Kingdom's energy bill amounted to JD4.08 billion (\$5.76 billion) in 2013 compared to JD4.63 billion in 2012, according to figures by the Department of Statistics.



- Clean energy stocks gain
- Renewables attract long term investors

The installation of renewable energy capacity continued to rise in 2013 in spite of a fall in investments.

According to a report from Frankfurt School-UNEP Collaborating Centre for Climate & Sustainable Energy Finance, the United Nations Environment Programme (UNEP) and Bloomberg New Energy Finance, renewable energy accounted for nearly half of new capacity additions in spite of a 14 per cent drop in investment.

Globally, renewables – excluding large hydro – accounted for 43.6 per cent of newly installed generating capacity in 2013. The report, 'Global Trends in Renewable Energy Investment' said that the drop in investments was due to a combination of policy uncertainty and the falling cost of solar photovoltaic (PV) systems.

"A long-term shift in investment over the next few decades towards a cleaner energy portfolio is needed to avoid dangerous climate change, with the energy sector accounting for around two thirds of total greenhouse gas emissions," said Achim Steiner, UN Under-Secretary-General and Executive Director of UNEP. "The fact that

renewable energy is gaining a bigger share of overall generation globally is encouraging. To support this further, we must re-evaluate investment priorities, shift incentives, build capacity and improve governance structures."

"While some may point to the fact that overall investment in renewables fell in 2013, the drop masks the many positive signals of a dynamic market that is fast evolving and maturing," he added.

The report points to the end of a four-and-a-half year, 78 per cent decline in clean energy stocks, which bottomed out in July 2012 and then gained 54 per cent in 2013 – an improvement that took place as many companies in the solar and wind manufacturing chains moved back towards profitability after a painful period of overcapacity and corporate restructuring.

The year was also marked by the increasing involvement of long-term investors such as pension funds, insurance companies, wealth managers and private individuals in the equity and debt of wind and solar projects.

Installed PV capacity jumped by 26 per cent in 2013, from 31 GW to

39 GW. Large hydropower was another important area of investment with at least 20 GW of capacity estimated to have come on stream in 2013, equivalent to approximately \$35 billion of investment.

Last year was the first ever that China invested more in renewable energy than Europe. China's total was down by six per cent at \$56 billion, while Europe's dropped 44 per cent to \$48 billion. The US saw a fall of 10 per cent to \$36 billion. India moved 15 per cent down to \$6 billion and Brazil 54 per cent down to \$3 billion, the lowest since 2005.

The Americas, excluding the US and Brazil, increased investment in renewables by 26 per cent to \$12 billion in 2013. Japan's solar boom helped to drive an 80 per cent increase in renewable energy investment to \$29 billion in 2013.

■ The Global Wind Energy Council (GWEC) is expecting wind installations in 2014 to reach at least 47 GW. The growth will be led by China but also by strong recovery in the USA and record installations in Canada and Brazil.

Renewable energy to account for ten per cent of electricity generation in Jordan by 2020



# Renzi signals shake up for Italian energy groups

Lost in reforms: Eni CEO Paolo Scaroni



- Conti, Scaroni ousted in boardroom shake-ups
- Reforms aim to attract investment

Siân Crampsie

Italy's new prime minister is changing the leadership of some of Italy's top state-owned companies – including energy firms Enel and Eni – in a bid to drive through reforms and attract international capital to the country's industry.

Matteo Renzi has proposed Claudio Descalzi, a veteran of the Italian oil sector, to replace Paolo Scaroni as chief executive of oil firm Eni, and Francesco Starace, currently head of Enel Green Power, to replace Enel chief executive Fulvio Conti.

The prime minister, who was elected in February 2014, also named Emma Marcegaglia and Patrizia Grieco, two prominent businesswomen from the private sector, as chairwomen of Eni and Enel, respectively.

Executives at Italy's state-owned companies are selected every three

years and Renzi's selection of established industry insiders as well as candidates from successful private enterprises is being seen as a break from tradition and a means of improving transparency and corporate governance in Italy's key industrial giants.

Renzi has also initiated reforms to Italy's labour market and senate. His policies are designed to overcome the bank lending freeze that has hit Italian businesses hard and to attract overseas investors to the country.

Eni, Enel and defence firm Finmeccanica – which will also see management changes – together make up a third of the value of Italy's stock exchange.

Descalzi, 59, has worked at Eni since 1981 and was appointed chief operating officer of the exploration and production division in 2008. He has been credited with steering Eni through a several lucrative resource discoveries.

Marcegaglia, 49, will be the first

woman to chair Eni, Italy's largest company, and is co-chief executive of family group Marcegaglia steel.

Paolo Scaroni served three terms at the head of the oil company and there have been calls for him to stay on at the firm as a non-executive chairman.

Starace, 58, will replace Enel's long-standing CEO and is a trained nuclear engineer whose career has taken him to GE, ABB and Alstom before joining Enel. Having spent time working in the US, Saudi Arabia, Egypt and Bulgaria, he is one of a new guard of executives who have returned to Italy from abroad.

Grieco is currently president of 105 year-old computer maker Olivetti.

Changes are also being made at defence firm Finmeccanica and postal company Poste Italiane, as well as dozens of other state-owned firms.

All the candidates will have to be confirmed in their roles by shareholders at annual meetings due in May.

# EDF seals exit from US nuclear

- NRC approves Exelon deal
- Cornew calls for updated regulations

EDF has reached agreement with Exelon over the future of their joint venture company, Constellation Energy Nuclear Group (CENG), sealing the French firm's plans to exit the US nuclear sector.

The US Nuclear Regulatory Commission (NRC) has approved the deal, which will see Exelon take over operational management of the five nuclear reactors owned by CENG.

CENG has paid a special dividend of \$400 million to EDF, financed by Exelon. EDF has also been granted an option to sell its holding in CENG to Exelon – at market value – between January 2016 and June 2022.

EDF will continue to hold 49.99 per cent of CENG, while Exelon will hold the remainder.

The Board of Directors will comprise equal numbers of Exelon and EDF board members.

EDF and Constellation created a

joint venture in 2007 aimed at building new nuclear plants in the USA, which at the time was undergoing a "renaissance". EDF later purchased a share in Constellation, but its plans to build new reactors in the country were halted when Constellation pulled out of the consortium in 2010.

US nuclear regulations prohibit foreign companies from obtaining nuclear operating licenses.

Plans by energy firms in the US to build new nuclear reactors have also been scuppered by the shale gas revolution and economic downturn, which have together caused a drop in energy prices and demand.

CENG currently operates five reactors across the states of New York and Maryland: a single PWR unit at RE Ginna, two BWRs at Nine Mile Point and two PWRs at Calvert Cliffs.

At a recent *Platts* global power conference, Exelon President and CEO

Kenneth W. Cornew highlighted the strong performance of the US nuclear fleet and called for regulations to be updated to reflect their reliability.

He said that the US power landscape had changed drastically because of the influx of cheap natural gas and emergence of renewables, and that the current patchwork of market regulations had not kept pace with change.

"Rules that are in place today were designed for a fundamentally different energy market," Cornew said.

"They need to be reformed to reflect our current environment and recent changes in how we produce and use energy."

Cornew believes that policies do not currently compensate nuclear for its unrivalled reliability, and that cheap natural gas and subsidised wind were driving down energy prices, threatening the existence of nuclear power plants

# OPG, Westinghouse partnership eyes global projects

Westinghouse Electric and Ontario Power Generation (OPG) are to join forces to exploit opportunities in the global nuclear power sector.

The two firms say that they have complementary strengths and capabilities and will look at undertaking projects such as refurbishment, maintenance and outage services, decommissioning and remediation.

"We anticipate that OPG's expertise in plant maintenance, upgrades and refurbishments will be well augmented by the service offerings and global ex-

perience of Westinghouse," said Tom Mitchell, OPG President and CEO.

OPG is recognised around the world as the leading operator of Candu reactors and has been encouraged by the Ontario government to explore opportunities outside the province. It has recently collaborated with Westinghouse on key nuclear projects.

Currently, Westinghouse is performing work to design filtered containment vents at OPG's Darlington Nuclear Power Station as part of the site's refurbishment programme.

# MHI Vestas confident of success



MHI and Vestas say that they are confident of success in the growing but challenging offshore wind energy sector through their new joint venture.

The two companies have closed the deal creating their joint venture firm, MHI Vestas Offshore Wind, which will be headquartered in Denmark with 380 employees.

The joint venture will design, develop, manufacture, install and commission the Vestas V164-8.0 MW offshore wind turbine as well as be responsible for marketing, sales and after-sales service in the offshore wind sector.

"The offshore wind power industry is very challenging and it takes just the right combination of reliable and proven technology, experience, knowledge and track record to succeed," said Anders Runevad, CEO of Vestas Wind Systems A/S and Vice Chairman of MHI Vestas Offshore Wind. "I am confident that MHI Vestas Offshore Wind has exactly that right combination and I look forward to closely following the

company towards becoming a global leader in offshore wind power."

The two firms announced the joint venture in late 2013 and say that they will target opportunities in the North Sea region, which has robust growth potential.

Vestas said in 2013 that the joint venture would enable it to become a global leader in the offshore wind turbine sector, which is currently dominated by Siemens.

■ Dong Energy is to sell 50 per cent of the 210 MW Westermost Rough offshore wind project in the UK to Marubeni Corporation and the UK's Green Investment Bank. Marubeni and Green Investment Bank will each acquire a 25 per cent ownership share in the project for a total cash consideration of around £240 million (\$385 million). Westermost Rough is the first large-scale commercial wind farm to deploy the new Siemens 6.0 MW direct drive turbine and is expected to be commissioned in 2015.

# Alpiq acquires decentralised expertise

Alpiq's acquisition of UK demand response firm Flexitricity will give it access to specialist knowledge and markets in the decentralised energy field, says the Swiss firm.

Entering the decentralised energy management market is part of Alpiq's new strategy and the company says that it will continue to develop Flexitricity's innovative solutions as well as expand its client base.

Flexitricity specialises in demand response services, aggregating energy savings made by large commercial and industrial firms and offering these electricity volumes to transmission

system operators as reserves for ancillary services.

In Europe, Great Britain is the most developed market for demand response services. Flexitricity pioneered this market sector and continues to lead it in terms of volume and technical capability, says Alpiq.

Demand management is becoming more important in electricity markets due to fluctuating electricity production from wind farms and photovoltaic systems. Using demand response can help to improve energy security, reduce carbon emissions and stabilise the electricity grid.

## 10 | Tenders, Bids & Contracts

### Americas

#### First Energy deploys smart meters

Accenture has been selected by First Energy to manage the roll-out of around two million smart meters to its customers across its four Pennsylvania-based utilities.

FirstEnergy will install more than two million smart meters over the next several years, meeting all the functional and business requirements outlined in Act 129 passed by the Pennsylvania legislature in 2008.

Under a multi-year contract, Accenture Smart Grid Services will advise FirstEnergy on managing its advanced metering infrastructure (AMI) programme by providing services in areas such as programme management, business process design, change impact and communications, vendor management, solution architecture, testing and smart metering network operations.

The new AMI platform will deliver significant operational efficiencies, support new and existing customer services programmes, and enable FirstEnergy to gain actionable business insights through better visibility into real-time data.

#### Emerson updates Union Power

Union Power Partners, a subsidiary of Entegra Power Group, has awarded Emerson Process Management a contract to replace turbine controls at one of the largest combined cycle power plants in the USA.

Union Power Station has a generating capacity of 2200 MW and comprises four individual 2x1 combined cycle power blocks. Replacing the plant's controls – which are becoming obsolete and will soon no longer be supported by the manufacturer – will help to enhance reliability and operational efficiency.

Emerson will replace legacy controls on the GE Frame 7FA gas turbines and GE D11 steam turbine with Ovation control technology, and the GE EX2000 systems with its Ovation generator excitation technology. The new controls will seamlessly integrate with existing Ovation systems already controlling balance-of-plant equipment, as well as Emerson's Ovation Security Center, which ensures compliance with cyber-security requirements.

#### Acciona signs Mexico wind deal

Acciona Energy has signed a deal to supply wind turbines as well as engineering, procurement and construction services to two wind farms in Mexico.

The Ventika and Ventika II wind farms will be situated in the state of Nuevo Leon and feature a total of eighty-four 3 MW AW 116/3000 MW turbines. Construction is planned to start in the second quarter of this year, and commercial operation is likely by the second quarter of 2016.

Acciona signed the contracts with a company established by Fistera Energy, which is majority owned by funds managed by Blackstone, Cemex and private investors.

#### Alstom, Isolux convert plant

Alstom and Isolux have signed a contract with Mexico's Federal Electricity Commission (CFE) to convert two 158 MW units at the Altamira thermoelectric power station in Mexico from fuel oil to pet coke.

The conversion will substantially reduce the plant's operating costs

given that petroleum coke is significantly cheaper than fuel oil. This is the first project in the country where such a fuel switch is being executed.

The project includes designing, engineering, equipment manufacturing and set-up, electromechanical and civil works, as well as rehabilitation and modernisation of controls that will extend operating life by 30 additional years. Alstom will supply the project's major components, providing two circulating fluidised bed (CFB) boilers, while Isolux will have the role of the lead Engineering Procurement and Construction (EPC) contractor.

### Asia-Pacific

#### KHNP awards stator replacement contract

Areva has been awarded a contract by Korea Hydro & Nuclear Power (KHNP), a subsidiary of Korea Electric Power Corporation (Kepco) for the supply and replacement of six stators at units 3 and 4 of the Kori nuclear power plant.

These components ensure the reliability of the reactor coolant pump, a fundamental element for the safe and efficient operation of the reactor's primary circuit.

Areva will design and manufacture the six stators in the facility located at Jeumont, northern France. The delivery and replacement operations are expected to begin in June 2015 and finish in 2018.

This contract is part of the "Forward Alliance" programme, which offers products and solutions developed by Areva to support utilities in the optimisation of the long term safety of their plants.

#### Siemens wins third Bangladesh order

Siemens Energy received its third order within a year from Bangladesh for the delivery of power plant components and spare parts.

The German firm is to supply an SGT5-4000F gas turbine, an SST-3000 steam turbine, and an SGen5-2000H generator, including the supply of operational spare parts, for the Ashuganj North power plant block in eastern Bangladesh.

The order was placed by a consortium of two Spanish construction companies – UTE TSK and Tecnicas Reunidas – who are building the power plant for the Ashuganj Power Station Company Ltd. The new plant will have an installed capacity of 400 MW and is scheduled for commissioning in mid-2006.

#### PGCIL reinforces grid

ABB has won an order worth around \$18 million from Power Grid Corporation of India Limited (PGCIL), India's central power transmission utility, to construct a 400 kV gas-insulated switchgear (GIS) substation at Kolhapur in the western state of Maharashtra.

The new substation will help strengthen the inter-regional grid between the western and southern regions. The use of GIS technology will reduce the substation's footprint.

ABB's project scope includes design, engineering, supply, installation and commissioning. Key products to be supplied include the 400 kV GIS, shunt reactors, control and relay panels.

#### Vietnam order for FW

Marubeni Corporation has awarded Foster Wheeler a contract for the design and supply of two pulverised coal arch fired steam generators for the Thai Binh thermal power plant.

Foster Wheeler will design and supply two 300 MWe steam generators and auxiliary equipment for the boiler islands. The boilers will be designed to burn local Vietnamese anthracite coal while meeting applicable environmental requirements.

Commercial operation of unit 1 is scheduled for October 2017 and unit 2 is scheduled for April 2018.

### Europe

#### Energos appoints Mott MacDonald

Energos has appointed Mott MacDonald to provide engineering, procurement and construction management services for a 90 000 t/annum waste-to-energy plant in the UK.

The 7 MW plant will process non-recyclable and non-hazardous household waste using gasification technology. The plant will be located in Milton Keynes and is being designed and built by AmeyCespa on behalf of the town's council.

#### EWT orders towers

Dutch wind turbine manufacturer EWT has awarded Mabey Bridge a contract for the supply of 30 onshore wind turbine towers.

The deal, which will also see Mabey Bridge supply 41 wind turbine foundations, will be for EWT's DW52 and DW54 500 kW wind turbines for the community energy generation market. The wind turbines are 35, 40, 50 and 75 m tall and as well as being installed in the UK will also be exported to mainland Europe.

#### Tauron signs project deal

Poland's Tauron has signed a contract with a consortium of engineering firm Rafako and construction firm Mostostal Warszawa for the construction of a 910 MW power unit at the Jaworzno power plant.

Tauron operates nine coal-fired units at the Jaworzno power plant with a total output of 1535 MW. The new power plant will replace some of this capacity and will take 59 months to build.

#### Alstom and Unicorn win TenneT contract

Alstom and Unicorn Systems have been selected to provide a flexible energy market management solution for TenneT, one of the top five Transmission System Operators and the first cross-border operator in Europe.

Alstom's and Unicorn Systems' solution will replace a legacy infrastructure that currently supports all of TenneT's electricity market operations. It will facilitate energy trade while ensuring network stability and security.

The two companies jointly developed the solution to manage the network and meet TenneT's needs. They say that the system is modular and flexible enough to adapt to future technical and regulatory changes.

#### Areva Sellafield success

Sellafield Ltd has selected a joint venture of Areva, Atkins and Mace as the preferred bidder for the construction of a waste treatment facility at Sellafield in the UK.

Sellafield will now enter talks with the joint venture, AMA, to finalise the contract for the construction of a customised waste treatment plant to process legacy material from Magnox fuel presently on site.

#### TenneT awards BorWin3 connection

TenneT has placed an order with Siemens and its partner Petrofac for

the construction and installation of the BorWin3 offshore grid connection in the North Sea.

The 900 MW connection will use HVDC technology and link several offshore wind farms to the mainland. The contract is the fifth awarded by the German-Dutch TSO to Siemens for offshore grid connections in the North Sea.

The scope of supply includes the entire high-voltage equipment of the grid access system as well as the complete on-land station. Petrofac will be responsible for the construction and installation of the offshore platform. Supply and laying of the cables was tendered separately by TenneT and is therefore not part of the consortium's scope of supply.

The connection will be operational in 2019.

### International

#### DEWA tenders solar park

The Dubai Electricity and Water Authority (Dewa) has opened the tender for phase II of the Mohammad Bin Rashid Al Maktoum solar park.

The DH1 billion project will see the construction of a 100 MW installation by a public-private partnership with Solar First. It will be operational by 2017 and there are plans for further expansion projects to increase the capacity to 1000 MW by 2030.

#### Westinghouse extends Ukraine contract

Westinghouse Electric Company and the National Nuclear Energy Generating Company of Ukraine (NNEGC Energoatom) have agreed to extend a contract for fuel deliveries to Ukrainian nuclear plants through 2020.

The contract continues the long-term partnership between the two firms and is instrumental in helping to provide Ukraine with competitive and secure nuclear fuel supplies.

#### Alstom supplies Iraq turbines

A consortium of Metka SA and Metka Overseas has awarded Alstom a contract to provide power generation equipment for the Al-Anbar gas fired combined cycle power plant in Anbar province, Iraq.

Under the €225 million contract, Alstom will supply four GT26 gas turbines, four heat recovery steam generators, two steam turbines and six air-cooled turbogenerators.

The 1642 MW plant, due to be commissioned in 2016, will add much needed electricity to the Iraqi grid.

Alstom is also constructing the Al-Mansuriya (728 MW) gas fired power plant in the Diyala Governorate, northeast of Baghdad, and has recently signed the 740 MW Zubair contract with ENI Iraq B.V.

#### Siemens wins Rabigh 2 order

Siemens Energy has received an order to supply six gas turbines, three steam turbines and nine generators for the Rabigh 2 IPP combined cycle power plant in Saudi Arabia.

Samsung C&T is constructing the 2060 MW power plant for Al-Mourjan Project Company in western Saudi Arabia. It will consist of three power plant units.

For each unit, Siemens will deliver two model SGT6-5000F gas turbines, one model SST6-5000 HI-L steam turbine, and three SGen6-1000A-series electrical generators.

A long-term service agreement was also concluded for maintenance of the gas turbines.



## Oil

# US crude oil sector continues to gain momentum

- Spot prices rise despite Ukraine crisis
- US petroleum product exports increasing

David Gregory

Crude oil prices have seen a near steady daily gain during the last month. In mid-April West Texas Intermediate (WTI) was priced at around \$104/b compared to under \$100/b from a month earlier, and Brent registered in the \$109/b range against \$106/b in mid-March.

The rise in daily spot prices can be seen against the backdrop of the continuing crisis in Ukraine and the future of Europe's energy future with Russia, which is anything but clear. It can also be viewed within the scope of an improving US economy and speculation that demand for fuel there will continue to rise – but so too will production.

According to the US Energy Information Administration (EIA), the spot price for Brent averaged near \$107/b in March – the ninth consecutive month that Brent averaged between \$107/b and \$112/b. It forecast

in its latest monthly report that Brent will average \$105/b in 2014 and \$101/b in 2015.

WTI averaged about \$101/b in March. The EIA expects WTI to average \$96/b in 2014 and \$90/b in 2015.

The discount of WTI to Brent averaged \$13/b from November 2013 to January 2014, but fell to \$7/b in March, the EIA said. The administration forecast that the discount will average \$9/b in 2014 and \$11/b in 2015.

US crude oil production averaged 7.44 million b/d in 2013 and is forecast to reach 8.37 million b/d in 2014 and 9.13 million b/d, according to EIA data.

“Aside from seasonal issues, EIA expects strong crude oil production growth, primarily concentrated in the Bakken, Eagle Ford, and Permian regions, continuing through 2015,” the EIA said in its report, noting that the highest historical annual average for US crude output was 9.6 million b/d

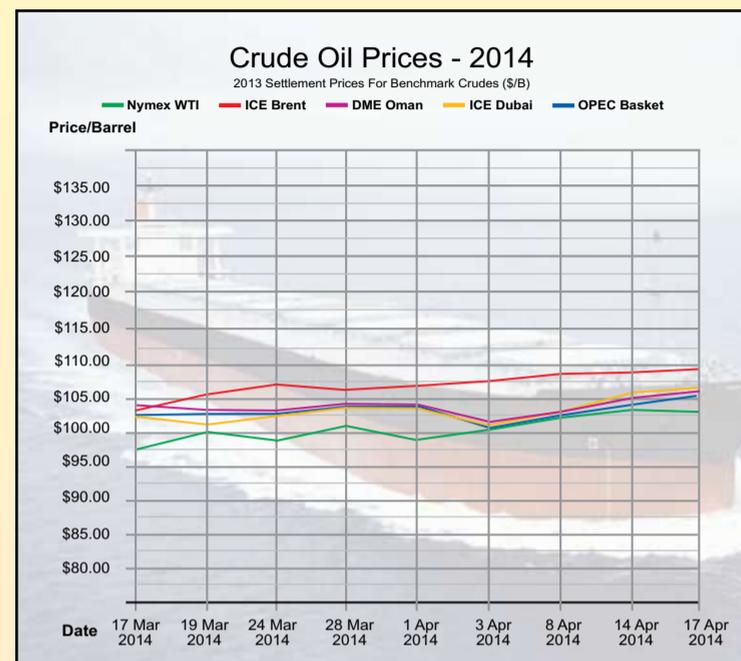
in 1970.

The administration reported that US liquid fuels consumption averaged 18.89 million b/d in 2013 and forecast demand at 18.90 million b/d in 2014 and 18.99 million b/d in 2015. It said consumption grew by 400 000 b/d (2.1 per cent) in 2013.

Total world consumption of liquid fuels averaged 90.38 million b/d in 2013, the EIA monthly report said. It forecast global consumption at 91.61 million b/d in 2014 and at 92.97 million b/d in 2015.

Non-OECD countries account for all of the expected consumption growth in 2014 and nearly all of the growth in 2015, the EIA said, identifying China as the leading global consumption growth market. The report said China's oil consumption will grow by 400 000 b/d in 2014 and by 430,000 b/d in 2015.

Back in the US, the EIA reported on April 17 that crude oil inventories on



the US Gulf Coast (USGC) had reached a record high of 207.2 million barrels as a result of continuing strong production growth, seasonal maintenance at refineries, and the opening of the TransCanada Marketlink Pipeline, which runs from the Cushing, Oklahoma, storage hub, to the Houston area. Shipments through the new pipeline are expected to average 525 000 b/d during 2014, the EIA reported.

Another report released by the EIA in April, *US Crude Oil & Natural Gas Reserves 2012*, said that US proved reserves of crude oil stood at 33.4 billion barrels at the end of 2012, an increase of 15.4 per cent over 2011, or a net increase of 4.5 billion barrels.

“US proved reserves of crude oil and lease condensate have now risen for four consecutive years. Also, proved

reserves of oil exceeded 33.4 billion barrels for the first time since 1976,” the report said.

US petroleum product exports are also on the rise, according to the administration. Product exports averaged 3.5 million b/d in 2013, 10 per cent more than in 2012, the EIA reported on April 22. It said the increase was broad-based, affecting multiple products going to multiple regions. During December of last year, US product exports such as distillate, propane and gasoline averaged 4.3 million, the first time they exceeded 4 million b/d in a single month.

It said the US continues to import significant amounts of products, the average of 2013 was 2.1 million b/d, but the EIA said that in general these imports are declining.

## Gas

# Leviathan partners see Cyprus as potential export option

The partners in Israel's giant offshore Leviathan gas field bid last month to supply natural gas to Cyprus. The bid opens the possibility of a new export destination for Israeli gas and revives speculation that Israeli gas might be included in a planned LNG export facility on the island.

Mark Goetz

Transporting gas from Leviathan to Cyprus by pipeline for the purpose of export in the form of liquefied natural gas (LNG) is an idea that has been envisaged before. In 2011-12, Israel appeared keen on the idea, but the country's domestic politics did not favour a plan to export its gas through a foreign country. Now it appears that the idea may be coming back again.

The Leviathan partners announced on April 16 that they had bid to supply 0.7-0.95 billion m<sup>3</sup> (bcm) of gas annually to Cyprus through a pipeline running from the Leviathan field to Cyprus' main power generation facility at Vassilikos. Regional analysts say this could prove cheaper than deliveries of LNG or CNG (compressed natural gas).

The Leviathan partners are comprised of Noble Energy of the US, Israel's Delek Drilling and Avner Oil

Exploration, both subsidiaries of the Delek Group, and Ratio Oil Exploration. Noble and Delek are partners in Cyprus' offshore Block 12, where gas was discovered in the Aphrodite field in December 2011.

Struggling with the high cost of liquid fuels for domestic power generation (Cyprus has the highest electricity prices in the European Union), the Natural Gas Public Company (DEFA) of Cyprus issued the tender in late January, requesting the delivery of natural gas and the installation of a delivery system at the island's Vassilikos Energy Center on the southern coast.

The cost of building a pipeline from Aphrodite to Vassilikos is considered too expensive to be feasible for the small Cypriot market, but apparently building one from Leviathan, which is a short distance from Aphrodite, has merit.

Since last summer, Noble Energy

and the Cypriot government have been negotiating a framework agreement covering the creation of a LNG export project at Vassilikos, based on the Aphrodite discovery. But appraisal drilling there has shown that the resource is insufficient to supply a LNG train. More drilling – and discovery – is needed offshore Cyprus. Italy's Eni and Noble plan more wells during the second half of this year and France's Total plans two wells beginning mid-2015.

Until more gas discoveries are made offshore Cyprus, the LNG project will be forced to wait – unless sufficient volumes of Israeli natural gas are committed to the Vassilikos project. This can be made possible via a pipeline with enough throughput capacity.

Gas supply to Cyprus is the latest export option that the Leviathan partners have examined. Earlier this year Noble and Delek agreed to supply gas to the Palestinian Authority for a new

power station in the West Bank and to two companies in Jordan. Reports say that further discussions are underway with Amman for more gas supplies. The gas would be sourced from either the Leviathan or Tamar fields.

Turkish companies have expressed their interest in purchasing Leviathan gas and earlier this year submitted proposals to the partners for an underwater pipeline project that would run through the East Mediterranean from the Leviathan field, were the resource is estimated at 540 bcm, to mainland Turkey.

While the \$2.7 billion project is technically sound, the political issues between Turkey and Cyprus pose a problem. Cypriot government officials have stated that Nicosia would not be willing to allow a Leviathan-Turkey pipeline to pass through Cypriot waters until the problems are solved.

The Leviathan partners have also been in discussion with BG over the

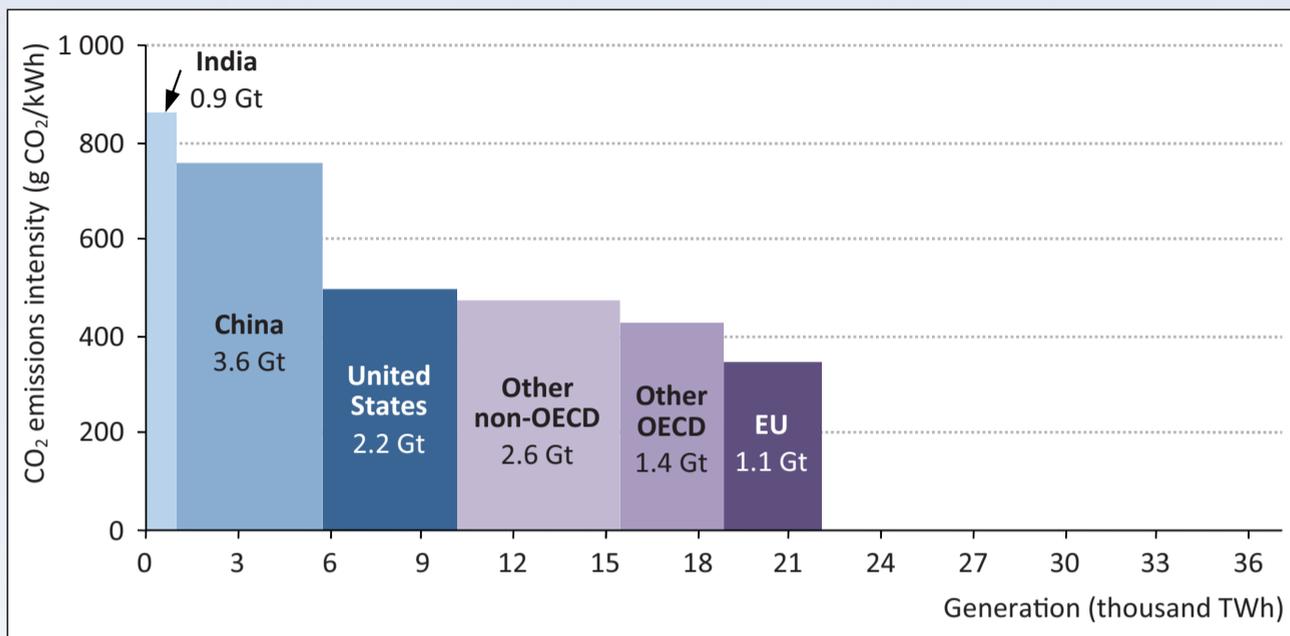
possibility of building a pipeline from the field to northern Egypt, where two existing LNG plants are in need of natural gas supply. As demand for gas in Egypt has grown, its gas production has increasingly been directed towards domestic power generation, leaving the two LNG plants without feedstock.

The partners are also considering floating LNG (FLNG) as another option for Leviathan development. According to the current schedule, Leviathan is due to come on-stream in 2017.

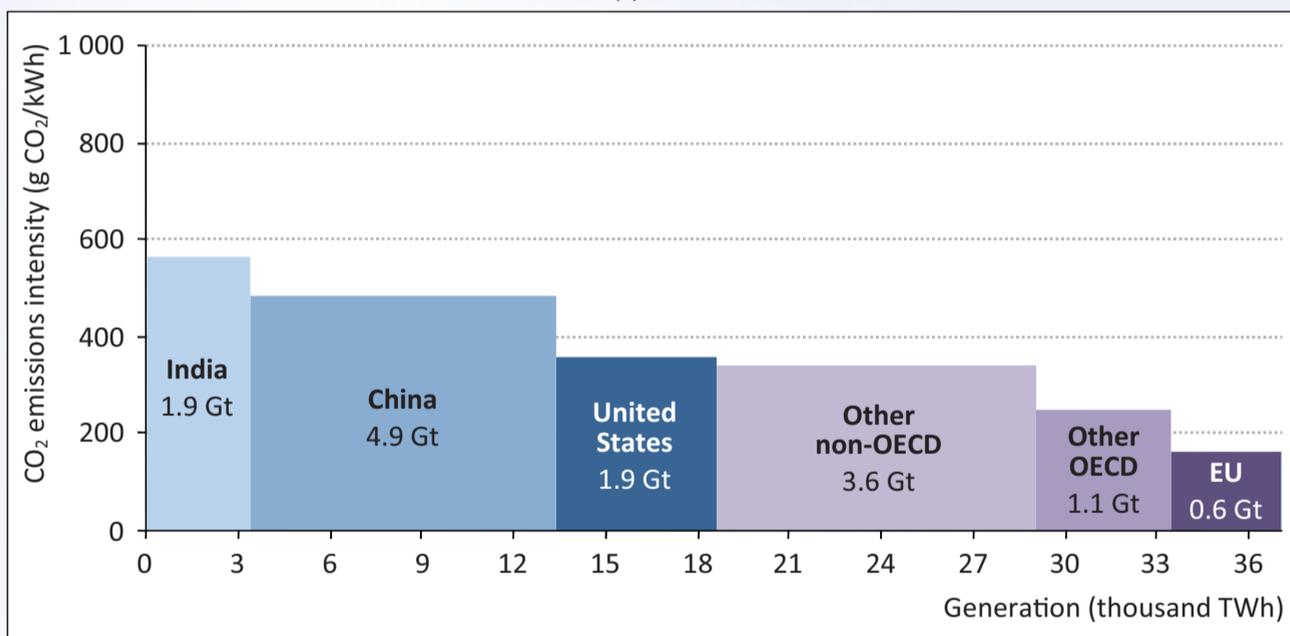
There is also a strong possibility that Australia's Woodside Petroleum will join the Leviathan group if it comes to an agreement with the Israeli authorities over tax regulations governing the project. Earlier this year Woodside and the partners reached an agreement whereby the Perth-based firm would acquire 25 per cent of Leviathan for \$2.7 billion.

### CO<sub>2</sub> emissions intensity in the power sector and electricity generation by region in the New Policies Scenario

(a) 2011

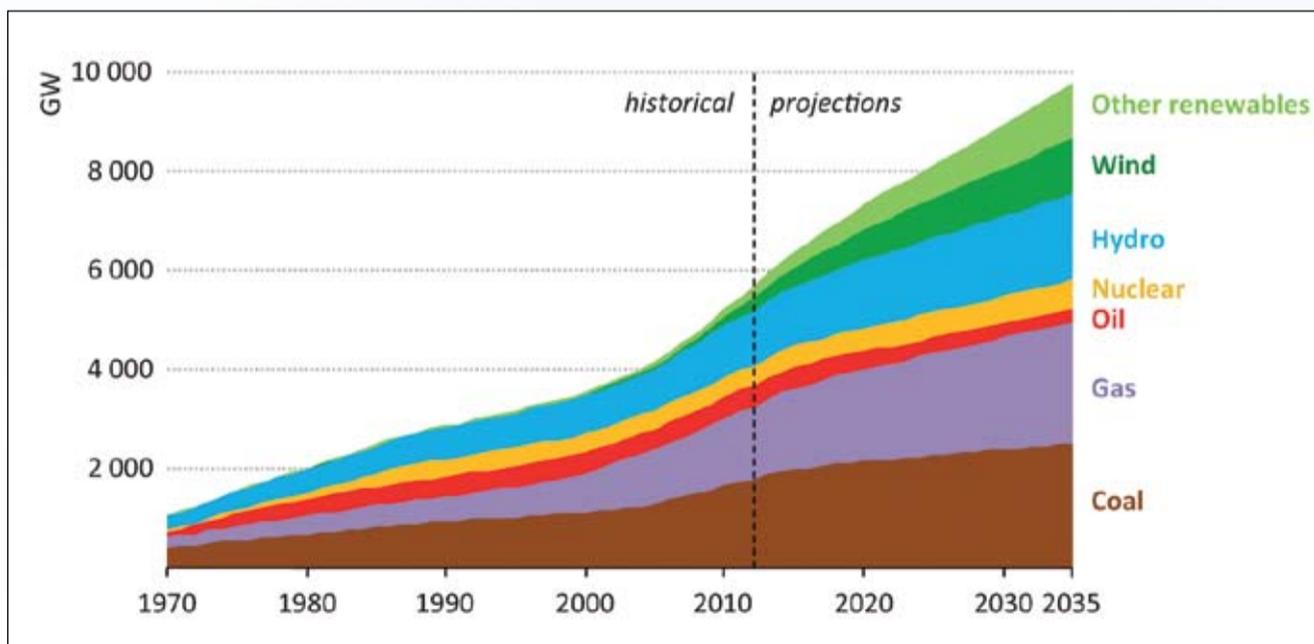


(b) 2035



World Energy Outlook 2013 © IEA/OECD, P 191, Fig 5.15

### Renewables-based power generation and share of total generation by region in the New Policies Scenario



World Energy Outlook 2013 © IEA/OECD, Page 188, Fig 5.13

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# Europe needs a balanced, more efficient energy policy

The energy transition is necessary but should not be done in a way that places an unnecessary financial burden on customers or jeopardises security of supply, argues Eurelectric's **Hans ten Berge**.



Action is needed and it is needed now says Hans ten Berge

The transition to a decarbonised economy requires dramatic changes to Europe's electricity system – from a world of large-scale generation to one in which power generation is becoming more decentralised and greener but also more dependent on the availability of sufficient wind and sun.

This change requires massive investment – €1 trillion by 2020 according to the IEA. Yet the transition is not happening smoothly. While wholesale prices have stabilised, prices for households and for small and medium businesses are skyrocketing. The value of utility companies is deteriorating, political and regulatory uncertainty is high and security of supply is at stake. Action is needed and it is needed now.

The European power sector says yes to an intelligent transformation of the energy system, one that makes it cleaner, smarter and more sustainable. But in the interest of customers and the European economy as a whole, European energy supplies must also remain affordable, competitive and secure.

The new energy system should be implemented at the lowest possible cost. New legislation should demonstrate that it does not unnecessarily increase the financial burden for European customers. It is thus vital that all policy proposals are subject to a rigorous cost-impact analysis, including how any impact flows through to the customer bill.

This is particularly important as the EU prepares its energy and climate policy framework for 2030, which will replace the framework in place until 2020. If there is one lesson we can draw from today's framework, it is that having too many policy instruments in place greatly increases the

risk of unanticipated interactions between them. Renewables growth, which is today often driven by costly and market distortive national support schemes at the expense of the more cost-efficient EU-wide Emissions Trading Scheme (ETS), is a case in point. The result is that targets are met – Europe is broadly on track to meeting both its emissions reduction and its renewables targets – but in a much more costly way than necessary.

Against this background of concern, European electricity industry association, Eurelectric, earlier this year released a 'manifesto' setting out the major political issues on which the electricity industry would like to see progress within the next 12 months.

Adopted by the Eurelectric Board of Directors on behalf of the electricity industry in 31 European countries and presented to EU Energy Commissioner Günther Oettinger in February, the manifesto draws on the lessons learnt from the current policy framework. It calls on national and European policymakers to adopt a more coherent and European approach to energy and climate policies, so as to reduce those policies' costs while increasing their impact.

Titled 'Manifesto for a balanced, more efficient European energy policy', the document lists a series of actions that policymakers should take to deliver "power for a competitive Europe". Crucially, European and national policymakers should take measures that would "re-orient energy policy towards cost-efficiency and competitiveness".

Suggested measures are grouped under three themes: delivering cost-efficient, competitive energy for Europe's businesses and customers; securing supply through competitiveness and innovation; and reducing environmental and climate impact.

In particular, the Manifesto calls on policymakers to:

- Firstly, pursue decarbonisation by opting for a minimum 40 per cent GHG reduction target by 2030 and reforming the ETS by increasing the annual linear reduction factor in the region of 2.3 per cent before 2020. Policymakers should:

- Adopt an economy-wide, binding 2030 greenhouse gas reduction target of at least 40 per cent compared to 1990.

- Strengthen the EU Emissions Trading Scheme: increase the annual linear reduction factor in the region of 2.3 per cent before 2020 and make the EU-ETS auctioning more robust.

- Extend the ETS to other CO<sub>2</sub> emitting sectors of the economy after 2020.

- Promote the use of electricity in transport, heating and cooling, e.g. by reviewing the conversion factor used in the Energy Efficiency Directive, which today penalises the use of low-carbon electricity compared to other energy sources.

- Secondly, revisit the market environment by restricting market intervention to limit uncontrolled costs and threats for security of supply:

- All generators, including low-carbon generators, should sell their production to the market and carry out

the same obligations. Support should be progressively phased out moving towards 2020 and beyond, respecting existing contracts.

- Generation adequacy should be assessed at least at regional level to avoid major market distortions. Capacity remuneration mechanisms, where implemented, need above all meaningful regional/EU coordination and should be market-based, technology neutral and non-discriminatory.

- The process of market integration needs a rebirth. Implementing the existing legislation and all related technical rules is urgently needed.

- Promoting competitive and flexible markets will allow CCGTs to act more flexibly and help ensure the smooth integration of renewable energy into the electricity system.

- Enabling framework conditions and adequate infrastructures need to be put in place to safeguard security of low-carbon supplies. Markets might need some adjustments above all with a focus on the longer term. It is necessary to promote cross-border trade, increasing interconnections where required.

- Thirdly, empower customers and keep bills in check:

- Customers' bills should be kept in check, through effective wholesale competition, efficient and innovative grid tariffs and appropriate taxation rules. Bills should be transparent, with a breakdown of cost components, including those derived from renewables support schemes.

- Customers deserve to reap the rewards that come from taking an active part in the electricity market. To this end, regulatory distortions such as regulated prices should be removed.

- All new legislative initiatives should

Commission in January included a binding 2030 greenhouse gas reduction target of -40 per cent, with a resulting renewables target of 27 per cent. Importantly, both proposed targets were EU-wide rather than national, allowing them to be met through a stronger ETS rather than through a continuation of costly national subsidy schemes.

It would therefore seem that the Commission has a) recognised the interactions between different targets and instruments and b) decided to reduce complexity and ensure greater cost-effectiveness through more European and market-driven approaches, most notably the ETS.

While heads of state and government shied away from confirming any numbers at their European Council meeting in March, the meeting conclusions affirmed that the EU target for greenhouse gas emission reductions would be fully in line with the agreed EU objective for 2050.

Moreover, the target should "confirm the EU's role globally" ahead of the international climate negotiations in Paris next year, and should be agreed "no later than October 2014". This process to agreement will include a stock-taking at the June meeting of the European Council, ahead of the UN Climate Summit in September 2014.

As important as the timeline, the conclusions also emphasised that the 2030 framework should be based on key principles, including improved coherence between greenhouse gas emissions reduction, energy efficiency and the use of renewables. Moreover, they should deliver the objectives for 2030 in a cost-effective manner, with a reformed ETS playing a central role.

... having too many policy instruments in place greatly increases the risk of unanticipated interactions between them

be accompanied with a clear analysis of the cost impact for each category of electricity customers.

- Modernise Europe's electricity networks. They are the backbone of the electricity system, playing a vital role in delivering electricity to customers. The increasing share of variable renewable energy sources requires tariffs that are cost-reflective, essentially capacity-based and possibly peak-time differentiated, to ensure the system's continued stability, security and reliability.

In all three areas, coordinated Europe-wide effort is key. National regulatory initiatives without consideration for their impact on other EU Member States cannot remain the rule. Only a true European approach can ensure renewed investment in the future – to the benefit of European businesses and households alike.

With this in mind, Eurelectric has been keenly following the debate on the shape of the Europe's future energy and climate policy. Luckily, the proposals on the table today seem to be going in the right direction. First proposals published by the European

Energy is a major EU economic policy. It fuels growth in living standards and is the backbone of a healthy economy. If Europe does not get its energy policy right, ultimately the economy as a whole suffers.

Policymakers must therefore take particular care to avoid policy-induced inefficiencies and market distortions that unnecessarily push up the costs of providing electricity and raise the bills for Europe's customers. In doing so, they will allow customers to regain trust in the energy sector and play their part in tomorrow's new energy world.

How can we shape that world in customers' favour? How can we ensure that the energy transition is a success? Crucially, how do we ensure that it does not cost more than necessary? Eurelectric's Annual Convention & Conference in London on 2-3 June (<http://www.eurelectric.org/london2014>) will address exactly this topic.

*Hans ten Berge is Secretary General of Eurelectric, the association representing Europe's electric utilities.*

# From concept to reality

As the need to balance supply and demand in real-time increases while optimising the use of clean energy sources, smart cities based on smart grid technologies are moving from concept to reality.

## Junior Isles

Increasing electricity demand coupled with the inexorable growth in renewables is placing new challenges on power grids. Innovative solutions are required to ensure a stable, reliable, power supply while enabling a cleaner, more sustainable energy mix at affordable prices. A growing number of utilities and grid operators are therefore looking at smart grids as a way of linking resources and optimising the performance of their networks.

Smart grids enhance transmission and distribution networks through information technology. By coupling power infrastructure with digital solutions, they can optimise the production and distribution of electricity in real-time based on consumption. As electricity demand continues to grow, the resulting savings could be significant.

Speaking at a press event in February, Patrick Plas, Senior Vice President, Alstom Grid, noted that the smart grid market will grow from €30 billion today, to €50 billion in 2020. "Growth in electricity demand by 2023 will require investments of €6 trillion in generation and €6 trillion in grid infrastructure. Smart grids can provide savings of 20 per cent on capex. The overall market will grow significantly – by just over 75 per cent between 2020 and 2030 – but it is the grid part of the market that is at the heart of the smart grid revolution. This will grow by over 90 per cent."

While smart grids offer a pathway to integrating renewables and intelligently balancing supply and demand, they are also paving the way for a fresh approach to urban development, leading to the emergence 'smart cities'.

The smart city model is based on the concept of the digital, connected city. The interconnection between consumers, the city and the power grid underpins new services that allow users to better manage their consumption. This also enables grid operators to manage a full array of energy resources more effectively while helping to reduce CO<sub>2</sub> emissions.

Cities – although occupying just two per cent of the planet's surface – are responsible for 80 per cent of CO<sub>2</sub> emissions. Many therefore see cities as the main battleground in the fight against global warming.

There are many smart city demonstration projects currently under way around the world; Alstom alone, is involved in 30 such projects. One of its more interesting projects is being headed by France's public electricity distribution network management company ERDF (Electricité Réseau Distribution, France).

Known as the Nice Grid Initiative, it is the first smart solar district demonstration project in Europe. This €30 million project is the largest of six demonstration projects under the Grid 4EU programme and aims to test innovative electricity management solutions over a four-year period. According to Alstom, it represents the future shape of a new urban model based on more renewable energy and empowered consumers.

ERDF's project director, Christophe Arnoult, commented: "We have a new chairman who has set new targets for the company. And one of these targets is that ERDF is the model for smart grids in France and internationally."

From a technical standpoint, the project is being driven by the amount of new intermittent, decentralised renewable generation connected to the network. "This will become a constraint," noted Arnoult. "However, we would like to turn this constraint into an opportunity."

The Alpes-Maritimes administrative department in southeast France lies on the periphery of the transmission grid. It is fed by a single 400 kV line, which means it has a potentially vulnerable electricity supply. However, it also has an abundant supply of renewable energy, especially solar. "Between Nice and the Spanish border there are 2000 MW of renewable energy connected to the distribution network," said Arnoult.

The town of Carros, on the outskirts of Nice, was chosen as the project's test hub due to several key reasons: its location at the end of the grid increases the risk of outages; its large number of PV connections at domestic and industrial premises; and its broad range of consumption needs, with a major business park, residential neighbourhoods and co-housing.

The Nice Grid Initiative has four objectives. The first is to optimise the

distribution network to accommodate a large contribution from decentralised, intermittent renewable energy – in this case, PV – into the network.

The second is load shifting. Arnoult said: "We want to model how reactive the average low voltage customer is likely to be in signalling how he consumes energy. We would like to move the customer from a pure consumer attitude to a more prosumer attitude."

The third objective is testing islanding operation. "As we will have pockets of the network fully equipped with solar generation, fantastic IT, and batteries, why not push the system to the limit to see whether it is feasible to operate a small part of the local network for a limited period of time as an independent network, drawing its power solely from renewable sources?" said Arnoult.

The fourth and very important aspect is to study the business model.

Nice Grid has two main features – the smart meter architecture, which is in the process of being rolled out, and the battery storage technology which will be tested at all levels of the network. The project will test several types of lithium-ion cells at three distribution network levels. A 1.1 MW battery supplied by Saft at the Carros primary substation supports load reduction in peak demand periods, while 100 kW batteries at five medium-voltage (MV) and low-voltage (LV) distribution substations help control peak PV generation and manage peak demand periods. A 250 kW battery with an output of 620 kWh is being used for island mode operation.

Around 550 residential and business customers in Carros, representing a load of 3.5 MW, will participate in the ERDF test project. Smart meters are being installed at both residential and business customer sites to control load devices. A customer in Nice Grid could therefore potentially generate electricity from PV panels, store power in batteries and also turn off heating or other electrical devices in order to reduce demand.

With 30 per cent of customers in France being equipped with electric water heaters, this represents quite a significant opportunity for demand reduction or load shifting. Equipped

with solutions enabling voluntary load shedding, these new prosumers can achieve proactive savings during periods of peak demand by following the operator's recommendations.

Coffee production company Malongo was the first industrial customer to sign the Nice Grid agreement. Automatic shutdown of various pieces of equipment at specific times and shifting production to different times of day has helped the company reduce consumption by up to 60 per cent. In addition to cutting the company's energy costs, it also helps the network operator to avoid the risk of blackout.

In addition, the 'islanding' zone – with its own photovoltaic generation capacity and storage facilities – can temporarily be disconnected from the main grid. This microgrid can independently ensure continuity of service for up to 4 hours while maintaining the required voltage and frequency along power lines.

The solar district offers a total installed capacity of 2-3 MWp. According to Alstom, this is the first time that this kind of model has been tested on such a scale anywhere in the world. The system put in place by the Nice Grid consortium partners draws on three key factors to successfully balance supply and demand in the district:

- next-day forecasts to compare solar energy production with demand;
- battery storage at key network nodes to offset any intermittency in the supply of solar energy and absorb consumption peaks;
- incentivising residential and industrial consumers to better manage their consumption.

Alstom Grid will provide a smart network management system that allows the network manager to control and optimise a range of local energy resources available to solar districts in real-time. This will enable the energy manager to monitor information on conditions affecting network operations – such as sun forecasts, consumption patterns, and technical grid constraints – to ensure smooth overall management by efficiently activating these flexible solutions when and where needed. By minimising congestion in the local power network during times of peak power demand, the overall carbon footprint of the district will be significantly reduced while improving energy self-sufficiency.

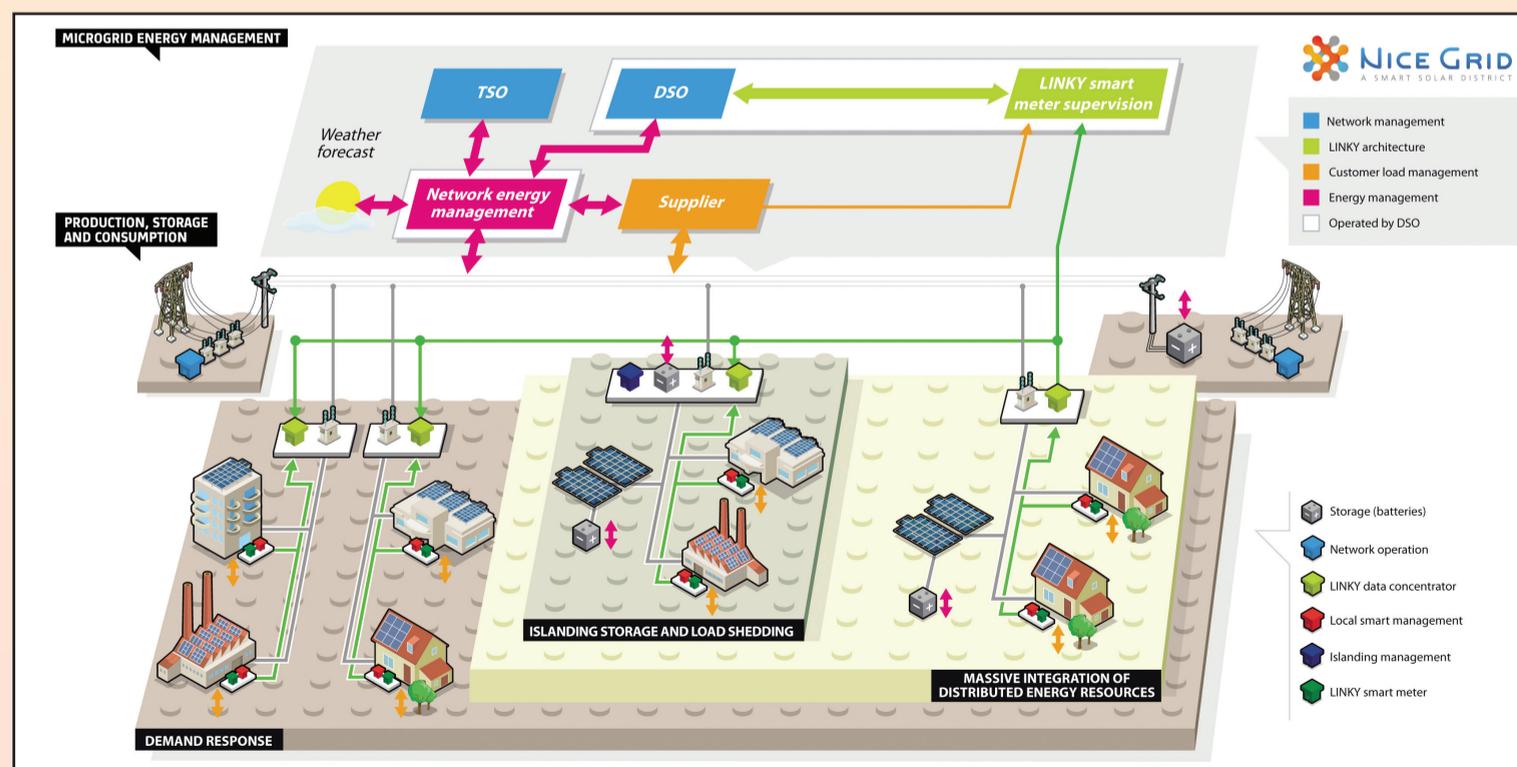
Alstom also supplied its new MaxSine eStorage conversion solution to meet energy storage needs. MaxSine provides the key to connecting batteries to the high/medium voltage network while controlling the amount of energy stored. In conjunction with the smart grid solution, it charges or drains these batteries based on electricity demand across the power grid, thereby reducing the amount of energy required from the operator, RTE.

The project, which was officially opened in November 2011, has just completed a two-year design phase and is now being implemented. It is expected to end around 2016.

"We are currently actively recruiting customers and installing some of the equipment such as the 1 MW battery," said Arnoult.

Completion of the project will provide a number of answers regarding what can be achieved in the field of smart grids and smart cities.

Arnoult concluded: "We will operate the Nice grid during the two coming summers and collect the results so we can do a cost analysis of the benefits and determine the business case for doing all of this."



Nice Grid is an islanding world premiere with a 430 kWc capacity

# New potential for coal gasification

Although developed many years ago, gasification has seen limited deployment in the power sector.

**TEI Times** hears about a new gasification technology that can simultaneously capture multiple pollutants, thus making it more economically attractive for coal fired plants.

Images of smog-filled cities with mask-wearing pedestrians hit the news last year as coal usage in China increased during winter. Yet air pollution is a problem that is not only being faced by China and developing countries. Many Western countries also face issues in controlling the same pollutants as they attempt to comply with upcoming regulations.

The challenge here is that controls for particulate matter (PM), nitrous oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), and mercury are often separate systems, requiring large amounts of capital, and difficulties with simultaneously achieving optimal removal efficiencies with all pollutants.

As worldwide coal usage is projected to increase to record levels, there is therefore a need to find pollution controls that are both effective and economical. One breakthrough technology, currently being developed by US company, ClearStack Power LLC, is a multi-pollutant reduction Ashworth Gasifier-Combustor that reduces the major air pollutants associated with coal combustion and encapsulates these pollutants into saleable byproducts.

The potential for a single system to remove multiple pollutants using a simple gasifier design was identified by Bob Ashworth in 1980. Ashworth was involved with the development of a two-stage gasifier-combustor at Florida Power Corporation (FPC) that reduced both sulphur and nitrogen oxide emissions. FPC demonstrated a two-stage 12 million Btu/h gasifier-combustor in 1984 at the Foster Wheeler Development Center in Livingston, New Jersey.

ClearStack Combustion Corporation (currently ClearStack Power LLC) was formed to develop this technology further. A three-stage gasifier-combustor technology was developed by ClearStack to achieve ultra-low NO<sub>x</sub> emissions and to improve sulphur capture. Both of these goals were achieved and as a bonus mercury and other air metal

toxics were also captured in the slag during testing of the three-stage technique on a 40 million Btu/h gasifier-combustor at the Lincoln Developmental Center in 2003.

One notable feature of this approach to gasification is the ability to eliminate the majority of the equipment that is typically required after a gasifier to cool and clean the syngas.

Mark Becker, Senior Process Engineer at ClearStack explained: "By removing most of the pollutants in the gasifier and directly injecting the syngas into the boiler it is possible to have a much simpler system thus making retrofit projects less expensive and with minimal training for operations."

A key challenge facing the development of gasification technology has been the complexity of many system designs, resulting in high capital and operating costs, along with long start-up times. The use of air provides a low cost source of oxygen both from the capital and operating perspective, and provides a much higher overall efficiency due to the lower power demand of the auxiliary equipment.

ClearStack says its technology has a number of benefits. These include major reductions in traditional pollutants (mercury, NO<sub>x</sub>, SO<sub>2</sub>, heavy metals, and PM), co-firing with biomass, along with reductions in landfill requirements of ash due to acceptable quality of ash for cement and slag for asphalt use.

Having successfully demonstrated the technology at the Lincoln Development Center in Lincoln, Illinois, ClearStack is now looking to conduct a rebuild on a 12.65 MWe coal stoker boiler owned by the Sterling Energy Group in Crawfordsville, Indiana. Other than the gasifier and corresponding slag quench tank the main equipment to be installed is a limestone storage and feed system,

The intent of the project is to not only to enable it to comply with upcoming air emission regulations for this boiler

built in 1965, but also to allow the use of lower cost local coals that have a higher sulphur content. This flexibility in fuel source will allow the use of lower cost fuels and enable the evaluation of other coals for other potential installations. The intent is to conduct trials to document the thermal and pollutant removal efficiencies along with any adjustments needed for optimal operating conditions.

The retrofit project is expected to be complete in 2015. Testing will start in 2016 and continue long term.

"A smaller boiler is well suited for fuel evaluations because it is less expensive to conduct 4-8 hour trials on a boiler that uses 12 tons/hour instead of 150 tons/hour," noted Becker.

The emissions expected for the No. 6 boiler after the retrofit are:

- NO<sub>x</sub> emissions down to 0.095 lb/10<sup>6</sup> Btu and less (~60 ppmv)
- SO<sub>2</sub> reduction of near 100 per cent (with a Ca/S ratio = 1 with fine limestone)
- CO emissions 7-8 ppmvd (@ 3 per cent O<sub>2</sub>)
- Mercury capture and other air metal toxics in slag/fly ash near 100 (wt) per cent
- Particulate matter capture of 80 per cent in the gasifier and over 98 per cent removal efficiency in the electrostatic precipitator (ESP).

Based on guidelines from the European Commission, the technology development has completed the 7th Technology Readiness Level (TRL 7, demonstration) and is ready for TRL 8 (first commercial system).

The next step of development will be for a larger boiler, likely to be in the 50-200 MWe range. Construction of these boilers is expected to start in 2017. This size range will not only document the operation of a larger boiler, but also multiple gasifiers and another boiler type. The boiler types are likely to be wall-fired, vertical-fired, or tangentially fired designs at sub-critical pressures. As the confidence grows in this range of boiler, larger and higher pressure boilers will

begin to be considered for a gasification retrofit. ClearStack says this gasifier system can be used to upgrade any size or type of boiler at a fraction of the cost of other alternatives.

"The installed cost of a gasifier upgrade is approximately €200/kWe (\$145/kWe) for a 200 MWe installation. Additional costs will occur for some systems if coal pulverisers or over-fire air are not already in place," said Becker.

The final development stage will be to include gasifiers in the original design and installation of new boilers. ClearStack believes the installation on new boilers is likely due to the lower overall capital cost and higher overall efficiency when compared to post-combustion emissions controls.

"Many of the boilers that are less than 200 MWe lack any sulphur emissions control, which provides an opportunity for a retrofit of existing boilers. Most of the newer and larger boilers were installed with advanced emission controls so retrofits may not be as likely. The expected opportunity for the largest boilers will come as the mid-sized boilers are adequately demonstrated leading to including gasifiers in the original design of future installations of new boilers," Becker commented.

According to ClearStack, the technology could have several applications. "The applications that have been identified have led to a focused effort to commercialise the technology," said Becker. "This includes conversations with key individuals in the various coal using industries including the electric utilities and the paper industry."

The largest overall opportunity for implementing the gasifier technology, however, is in the electrical utility industry. The large quantity of coal usage and the wide range of boiler sizes present a major opportunity. The utility industry also has additional opportunities for innovative technologies beyond air emissions. One of these is addressing the high cost and risk of boiler ash disposal.

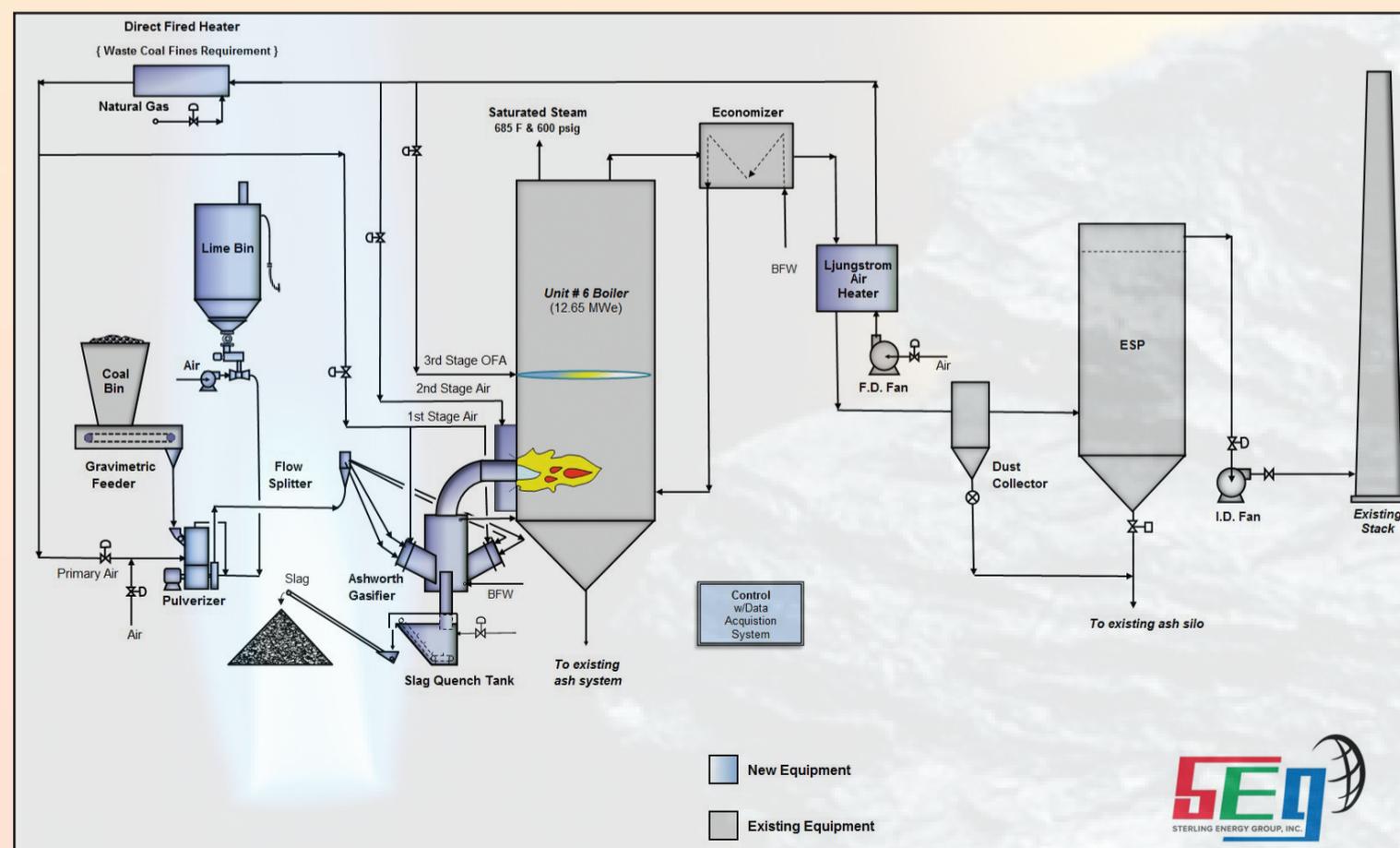
Another application of the technology crosses various industries and focuses on reducing mercury emissions from coal. The Minamata treaty was signed in January 2013 by 140 countries to a set of newly established laws as part of an attempt to prevent the spread of mercury pollution. This treaty has been coordinated by the United Nations Environmental Programme (UNEP) and has said that one of the major sources of this pollution is the burning of coal. The International Energy Association's (IEA) is conducting a technology review to recommend the best available technology to reduce mercury emissions from coal.

"The IEA is searching for technologies to recommend to the United Nations Environmental Programme (UNEP) for reaching the goals of the Minamata Convention and this could provide excellent worldwide exposure and funding," noted Becker.

With the worldwide plans to increase coal usage, and the potential impact on emissions, ClearStack is convinced there will be many opportunities for this technology.

Becker concluded: "We have documented that the ClearStack technology allows major reductions in a wide range of pollutants at a much lower capital and operating cost, which provides compliance with existing requirements and compliance with tighter restrictions that are likely to be implemented in the future."

For pulverised coal-fired units, other than the gasifier and corresponding slag quench tank the main equipment to be installed is a limestone storage and feed system





Junior Isles

# Don't jump the gun

If the scientists are right, the race against climate change is more of a sprint than a marathon. There's no time for lengthy solutions, drawn out by long political process.

Last month the Intergovernmental Panel on Climate Change (IPCC) released the Working Group III portion of its 5th Assessment Report 'Climate Change 2014: Mitigation of Climate Change'.

This latest IPCC report warns that carbon emissions have soared in the last decade and are now growing at almost double the previous rate. But its analysis found rapid action can still limit global warming to 2°C – the internationally agreed safe limit – if low-carbon energy triples or quadruples by 2050.

According to the IPCC WG3 report, CO<sub>2</sub> emissions from fossil fuel combustion and industrial processes contributed about 78 per cent of the total greenhouse gas (GHG) emission increase from 1970 to 2010, with a similar percentage contribution for the period 2000-2010.

It therefore comes as no surprise that the report calls for a major shift towards renewable energy and an increase in the use of natural gas to help bridge the transition away from fossil fuels. Along with measures that cut energy waste, renewable energy – such as wind, hydropower and solar – is viewed most favourably as a result of falling costs and large-scale deployment in recent years.

With the current economic climate, however, there is considerable doubt as to whether these measures can be deployed in time.

Energy expert and deputy president of the Institution of Chemical Engineers (IChemE), professor Geoff Maitland recently estimated that – taking a realistic view of the rate at which renewable energies can be developed and implemented at large-scale – fossil fuels will continue to provide around

half of the world's energy supply by 2050. He adds that it will take a further 25 years before fossil fuels are fully replaced by low carbon, renewable energies.

Maitland said: "Many governments do have plans stretching decades ahead for the reduction of carbon emissions. These address both increases in the contribution of renewable sources of energy and reductions in carbon emissions from the continued use of fossil fuels.

"However, it is the speed of imple-

annual global energy-related CO<sub>2</sub> emissions will rise from 30 Gt in 2010 to 41.4 Gt in 2030, according to IRENA. The IPCC report said this figure would reach 55-70 Gt by 2050 in the absence of climate change mitigation policies. It also said that with a long term concentration goal of 480 ppm, emissions need to fall by 50-70 by 2050 compared to the year 2010.

A leaked draft of the report sent to governments in December suggested that in order to keep global tempera-

angered solar supporters.

Leonie Green, Head of External Affairs at the UK's Solar Trade Association (STA) commented: "The Commission advocates technology-neutral auctioning and clearer moves towards open competition so it makes no sense at all that they themselves have discriminated against on-site solar power by limiting feed-in tariffs for solar to 1 MW while wind can secure 6 MW.

"This is an illogical decision by the Commission which shows unjustified technology bias, serves a big utility agenda and risks damaging one of the most cost-effective and biggest markets for solar across Europe. It could leave a total policy void for 1-5 MW projects from 2017."

With the dramatic fall in the levelised cost of solar power, subsidy removal measures in Europe and elsewhere are gaining widespread support in all quarters. Yet for some, the question of timing remains – and not just because of the urgent need to combat global warming.

Commenting on the Commission's decision, Dr Nina Skorupska Chief Executive of the UK's Renewable Energy Association said: "This is a huge leap into the unknown. Policies, which pay developers a fixed price for their power, have been shown to work and deliver a major increase in renewable electricity – up to 15 per cent last year. These new guidelines are based on economic modelling which suggests that competitive mechanisms will deliver equally good results at lower cost to the consumer.

"We support measures to reduce policy costs as renewables continue their journey towards price parity with fossil fuels. But putting so much faith in untested theory is a big risk, especially when the UK is in such desperate need of new capacity."

Joaquín Almunia, the EU's competition commissioner, said renewable energy projects had now reached a "scale and maturity" that meant they no longer needed such generous help from states. "Support mechanisms have led to significant cost increases for electricity users, both consumers and businesses. They have sheltered renewable producers from risk," he said.

This may or may not be true but what of the bigger risk? The IPCC report found that current emission cutting pledges by the world's nations make it more likely than not that the 2°C limit will be broken. Although understandable, Europe's decision is unlikely to help the situation.

Some also believe that the transition proposed by the IPCC can be achieved without breaking the bank.

Professor Jim Skea, an energy expert at Imperial College London and co-chair of the IPCC report team was reported as saying: "It is actually affordable to do it and people are not going to have to sacrifice their aspirations about improved standards of living."

While the affordability argument will continue to rage, one thing is clear: if global emissions have to peak by the end of this decade, now is the time for action.

Reducing renewables subsidies is necessary but perhaps there needs to be more discussion between governments and organisations like the IPCC on the global impact, timing and method of phasing out those subsidies.

After all, essentially everyone is in the same race and jumping the gun may get you nowhere fast.

**This is a huge leap into the unknown. Policies, which pay developers a fixed price for their power... deliver a major increase in renewables**

mentation of these measures that is a major cause for concern. The IPCC is saying that it is essential for governments to accelerate these processes if we are to combat effectively the hidden enemy of climate change.

"Renewable energy currently provides around 14 per cent of our needs. To move to 100 per cent by 2075 is not going to be achieved without sustained political will and resources."

This sentiment is echoed by UN Secretary-General Ban Ki-moon, who in response to the report urged all countries to "act swiftly and boldly at every level", to bring ambitious announcements and actions to the Climate Summit in September this year. He added that countries should "make every effort needed" to reach a global legal climate agreement by 2015.

Average concentration of CO<sub>2</sub> in the atmosphere reached 398 ppm at the beginning of 2014; 450 ppm is the widely accepted threshold to keep global temperature rise to 2°C above pre-industrial levels by 2100.

Based on the world's current path,

emissions need to fall by 40-70 per cent by 2050.

Armed with this knowledge, one has to question the European Commission's recent decision to introduce new rules on curbing renewable subsidies. Perhaps the Commission has jumped the gun in its own race to have renewables compete on an even footing with fossil fuel generation.

If the timing is questionable, so too is the way in which subsidies are being curbed. The IPCC calculates that renewables can meet world primary energy demand nearly three times over. Notably, it says that of all the technologies, solar energy has the largest technical potential – the "largest by a large magnitude" – exceeding world energy demand on its own.

It says that global solar power capacity grew 25 fold from 2005-2012, and that levelised costs had fallen by 57 per cent since 2009.

The Commission's new guidelines, limit feed-in-tariffs for solar to 1 MW, a decision that could be detrimental to small scale PV solar. The move has

