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With fossil fuels expected to provide the bulk of the world's primary energy needs for the foreseeable future – despite the rapid rise of renewables – carbon capture and storage (CCS) is seen by many as an essential technology if we are to keep global warming within the 2°C limit that scientists recommend. However, though there are signs of progress, the widespread adoption of CCS still appears to be decades away. With the industry facing a critical period in its development, *World Energy Focus* looks at progress to date and the future prospects for CCS.

Few energy issues divide opinion as strongly as carbon capture and storage. The believers see CCS as an essential – and credible – technology for the mitigation of climate change; the sceptics remain unconvinced that it will ever be commercially viable and caution

that the money and effort being devoted to CCS would be better spent elsewhere. What is certain is that progress in deployment of CCS has been much slower than many had hoped.

In its 2008 World Energy Outlook, the

Some of the CO₂ captured by SaskPower's Boundary Dam CCS project will be used to enhance oil recovery – the rest will be stored 3.4 kilometres underground in this Aqstore project.

International Energy Agency described a scenario in which long-term atmospheric greenhouse gas (GHG) concentration was limited to 450 parts per million (ppm) of CO₂ equivalent, consistent with a 2°C increase in global warming. This is the level that scientists have told us would give us a reasonable chance > see page 2

of averting catastrophic impacts from climate change. In that 450 Policy Scenario, the IEA envisaged 350 GW of global CCS capacity by 2030.

More than six years on, the reality is that only one commercial-scale facility has begun operating at a power station – a coal-fired plant in Canada with an output of 110 MW that came on stream last October. At that rate of progress, the trajectory of CCS deployment is much closer to what the IEA projected in its 2008 Reference Scenario – which was “negligible” CCS capacity by 2030.

This slow rate of progress is a big worry, for three reasons. Firstly, despite the rise of renewables, long-term energy outlooks published by the World Energy Council, the IEA, BP and others all agree that humankind will still be relying on fossil fuels – coal, oil and natural gas – for most of its energy supply decades from now. Secondly, these organisations, along with the Intergovernmental Panel on Climate Change (IPCC), agree that limiting GHG emissions will be much more expensive without CCS. Thirdly, some go as far as to argue that, without CCS, limiting global warming to 2°C will be impossible.

NO END IN SIGHT

“Global fossil fuel consumption is continuing to increase – despite massive investment in low carbon-solutions,” says Andrew Purvis, General Manager for Europe, the Middle East and Africa at the Global

CCS Institute (GCCSI). “In 1990 fossil fuels contributed 81% of our primary energy demand, according to the IEA. Between 1990 and 2010 we had 20 years of really strong effort in decarbonisation, strong investment in renewables. Yet in 2010 fossil fuels still contributed 81% of primary energy demand.”

Purvis adds that current projections offer little respite from fossil fuel dependency. In its latest World Energy Outlook, the IEA projects a fossil-fuel share of primary energy of 74% by 2040 in its central scenario. Even in the latest 450 Scenario the share is 59%. He also points to the progress that has been made in getting CCS into the operation and construction phases, as detailed in a GCCSI report published towards the end of last year.

According to the report, as of last October there were 13 large-scale CCS projects in operation around the world and another nine under construction. Of the projects that are operating, most are in sectors where CO₂ is routinely separated from other gases, such as natural gas processing, or is produced in a relatively pure stream, such as in fertiliser or ethanol production.

So far the only large-scale project in sectors where CO₂ capture is more challenging – such as electricity generation and process industries such as iron, steel and cement – is the Boundary Dam Unit 3 coal-fired power plant started up by Canada’s SaskPower last October.

MORE ON THE WAY

In the US another two large-scale power projects are due to start up: the Kemper County Energy Facility in Mississippi in 2015, and the Petra Nova Carbon Capture project in Texas in 2016. Another nine large-scale power projects are close to reaching a final Investment decision. “Given the right conditions,” says the report, “all of these projects could be in operation by around the 2020 timeframe.”

Also under construction is the world’s first iron and steel project with large-scale CCS, the Abu Dhabi CCS project at the Emirates Steel project in the United Arab Emirates. However, it remains the only large-scale project planned for the iron and steel industry and none are yet planned in the cement industry.

The issue of applying CCS to process industries is a crucial one. “There are many processes for which we don’t have alternatives for mitigation,” says Joan MacNaughton, Executive Chair of the World Energy Council’s World Energy Trilemma work. “So unless we capture the CO₂ we’re still going to be emitting those GHGs.” Industrial applications account for around a quarter of energy-related CO₂ emissions, according to the IEA.

So what about the argument that CCS is an unfortunate distraction?

“People need to look at the evidence,” says MacNaughton. “Over many years we’ve had proponents of one suite of

technologies criticising another as a distraction. Classically, that was what happened with renewables versus nuclear, and now renewables and nuclear both criticise CCS. We need all of them, because they have different roles to play.”

Both Purvis and MacNaughton are adamant that CCS has proved its technical feasibility and that what is now needed is short-term and long-term government support so that engineers can learn-by-doing and bring down costs.

Also vital is the creation of a market for CCS. “Governments could do that in two ways,” says MacNaughton. “One is to have a carbon price that would make CCS competitive, and that price is not as high as people think and not as high as the implied price for a lot of renewables, but it’s a long way from where carbon is priced at the moment. The second thing governments could do is regulate to require CCS.”

It is important to look at CCS in a broad context, adds Karl Rose, the World Energy Council’s senior director for policy and scenarios. “A sustainable energy strategy starts with a coal strategy. Making an energy transition to a sustainable world is not just about building renewable supply. We need to deal with existing fossil supply, mainly coal. That realisation could change the picture for CCS tremendously – because it’s the only technology that can deal with existing coal.” ●

ABOUT WORLD ENERGY FOCUS

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David Walker, CEO of
DNV GL Energy,
on the energy transition

‘It’s all starting
to come together’

“Even old cities are becoming wired these days”, says David Walker, CEO of global consultancy and certification firm DNV GL Energy. “It’s all starting to come together.” In this exclusive interview, Walker – who is in constant touch with companies, regulators and policymakers across the world about the challenges of the energy transition – outlines some of the practical strategies to meet those challenges. Among them: a continuing focus on lowering the costs of renewables, a power “super-grid” for Europe, industrial-scale electricity storage, and encouraging the development of “smart cities”.

What are your views on the energy trilemma and how governments, organisations and individuals should go about addressing the issues it raises?

The trilemma creates a good framework to have a conversation with regulators, with society, and with customers – because they’re all trying to help to solve it.

One of the issues is that our industry has singularly failed to get the public to understand what happens when they flick a switch and what a reliable on-demand electricity supply requires in terms of capital infrastructure, science and so on. So something we

help to do is demonstrate not only the importance of energy but also how it fits into society – how we can make it more sustainable, more affordable and more reliable.

The energy industry is going through a transition and one of the aspects of this is a rapid move towards widespread use of renewables, for example in Germany, Japan and China. What are the advantages of renewables? And what are the challenges of this transition?

Renewables are cleaner and that not only lowers carbon emissions but also improves air quality. In China the air quality issue is as important as climate change, for example. They have also become a new industry that is creating a lot of employment in manufacturing and construction. In certain countries renewables are now mainstream. That means regulators and grid companies have to change how they think about renewables.

The grid companies have to increase capacity and invest in controls and facilitate market mechanisms to meet the rise of renewables while safeguarding grid stability. > see p 4

David Walker has more than three decades of experience in energy. He joined DNV in 2007 to grow the group’s energy business and became Chief Strategy Officer of the DNV Group. He was appointed CEO of DNV KEMA in 2012 and CEO of DNV GL Energy in 2013, following the merger of DNV Group with Germanischer Lloyd to form DNV GL. The group’s energy business is a global provider of advisory and certification services to the electricity industry.



DNV GL has just launched an offshore wind cost reduction manifesto with the aim of reducing the cost of offshore wind by 40-50%.

(Photo courtesy of Siemens.)

some extent. Besides that, the wind resources offshore are generally much higher than onshore. A third reason is that if you look back at our history as a company, starting off with ship classification, then moving into offshore oil and gas, the offshore area is one where we have a lot of expertise; we feel we can make a major scientific and engineering contribution.

In a recent blog, you argue that Europe should secure its energy future by constructing an electricity “super-grid” to create “a robust, single energy market”. How would that help? What would it look like? And who should fund it?

The idea is to support the European concept of a single energy market, creating a level playing field, a more competitive market that hopefully would drive down prices. But it would also help solve the trilemma, through an increase in renewables within the super grid and an increase in reliability by connecting countries to each other.

The wind resources in north-west Europe are amongst the best in the world. And the Mediterranean has good solar resources. If the wind is not blowing heavily in the north hopefully the sun is shining in the south and vice versa, so those can balance

each other. To do that you need to increase interconnectivity. The story of renewables in Spain being shut behind the Pyrenees and not having access to the rest of Europe is fairly well known.

If you focus more on the grid than purely on generation then you don't need as much generation. That means you may need less conventional standby capacity to back up renewables. So we see the super grid as a way of increasing reliability, reducing emissions and making energy cheaper.

Who should pay for it? The EU has already set a target of 10% of member states' generation being interconnected by 2020, increasing to 15% by 2030. And they've allocated funds to certain countries to encourage the investment that's needed. EU and government funding will be critical because the transmission and distribution companies are run on pretty thin margins. They will need extra government investment or governments will have to allow them to be more creative in how they get their investments.

Much has been said about the impact of variable renewable energy sources on grid stability. How real are these problems and what are the solutions?

The problems are real. One is that when renewables come online they ramp up or down very quickly and generation and load have to be balanced continuously. Another issue is voltage control; how do you make sure that the voltage doesn't wander out of limits. A lot of countries like Japan or in Europe or in North

America have quite old mechanical/ electrical grid control systems, which don't react very quickly. The last issue is that taking large conventional or nuclear generators off the grid – reducing inertia – and replacing them with renewables makes it more difficult to keep the frequency stable.

So you have voltage potentially wandering, you have frequency potentially wandering, and you have sudden ramp-ups. All three of those are important elements the grid has to manage. You can address them in a number of ways.

On the regulatory side encouraging demand response means people use power when it's available and cheaper, smoothing out the load and adapting to the generation. Replacing mechanical-electrical control equipment with new electronic technology can make the grid far more responsive. And we can look at other techniques like storage, which can also help balance the power system more quickly. So there are technical solutions but they require investment.

How close are we to seeing utility-scale electricity storage become a reality?

More than 90% of the world's electricity storage currently is pumped hydro. But that's a form of normal generation, the same as any other hydro that's available. The rest that we're talking about is principally batteries, rather than some of the more esoteric storage forms such as compressed air. The technology for storing enough energy and for batteries to be > see page 5

Public acceptance is becoming an issue because if people want cleaner energy it has to have a footprint.

People want to flick the switch but they don't want to have the power station next door to them, whether it be nuclear, coal, wind or solar. We have to do a better job as an industry of educating people.

DNV GL has just launched an offshore wind cost reduction manifesto.

Offshore wind is still a very small part of the renewable energy mix. Why has DNV GL launched the manifesto?

There are three reasons. One is that society is becoming increasingly intolerant of having power generation close by. Offshore and over-the-horizon generation mitigates that to

cycled quickly enough is getting close. We have a battery-testing facility in New York and we've had encouraging results there.

But the other thing is where does that storage sit and who owns it. Does it sit behind the meter, owned by the user, or does it sit before the meter, owned by the utility? If it's owned by the utility is the storage a service or is it just priced as normal generation? If it sits after the meter, are there going to be aggregators as we see for photovoltaics? We need to understand how to regulate this market as it develops.

The encouraging signs are that California, Germany, Japan and Korea are all putting industrial-scale storage into place and starting to look at these regulatory issues. We could start to see some quite big moves in this area within the coming decade if we can solve those issues.

A recent survey of energy leaders conducted by the World Energy Council identified cyber-security as an issue of growing concern. How real are the threats?

The threats are real and people should be concerned. If you look at some of the data that has been published by the US Department of Homeland Security something like 53% of all cyber attacks in the US are against energy companies.

There are two issues here. One is the macro level for the utilities, where it's the control systems of the grid or of

the generation source that are open to attack by hostile states, terrorists or for extortion. At the micro level, somebody could hack into smart meters in our houses to learn about our living patterns, to learn about when we're away, to get personal information, perhaps financial information. That's a real threat if security isn't adequate.

We are taking it very seriously. We have our own cyber-security teams which will blend our knowledge of the grid and control systems with our IT knowledge to address these issues. We're advising ANIS, the cyber-security body that the EU commission has set up. We are also involved in the European network for cyber security which has been formed by grid TSO and DSO companies. Energy companies – because everything depends on that backbone of society – are a very obvious target.

Some commentators paint visions of futuristic smart green cities. How close are we to seeing these utopian visions become reality?

When you're building something brand new like Masdar in Abu Dhabi or Songdo in Korea, you have an opportunity to put in a lot of technology, such as smart meters, micro-grids, distributed generation and plug-in cars. But most of the major cities of the world are old cities. What's encouraging is that even old cities are becoming wired these days.

It is important that we've now got to that stage. Once you do that you can



start to plug in extra devices, such as the smart meters and smart appliances that are critical for demand response. You can start exchanging information between utilities and households. So it's all starting to come together but cities themselves maybe should be doing more to encourage that.

I've talked to mayors of some of the bigger cities. Recently one of them said to me that if you want something done in the US you don't go to Congress you come and talk to the city mayors because they're the ones that can do something locally. Some of those mayors could do a lot more in encouraging smart cities. It is going to require more political will and more engagement of the public. They're quite competitive these cities. I think it'll take one or two of them to do something that's quite dramatic to encourage it and the others will follow quite rapidly.

The problem that we have at the moment is that all the smart grid equipment is expensive. We have this PowerMatching City pilot in the Netherlands of around 40 houses

that we manage on behalf of a set of sponsors. We have wind turbines, heat pumps, solar panels. Every appliance in the houses is chipped. People are very happy with it because everything gets managed and their bills are low. But we and the other sponsors paid for the capital cost of putting all that kit in place. They couldn't afford it unless we did that.

So the question is how do we get to the stage where the white goods manufacturers, say, invest in this and lower the price so that people want to buy these appliances. It will happen. The question is when.

How would you describe the advantages of smart grids to a typical electricity consumer who is not familiar with the concept?

What makes a smart grid smart is that information can be exchanged between the consumer's equipment and the supplier's. It can help consumers use power when it's cheapest, so it can help lower bills. It can help them be more efficient so they use less electricity, which helps to lower emissions.

PowerMatching City is a leading Dutch smart grid project. In this first phase, households were equipped with a mix of decentralised energy sources (photovoltaics and micro-CHP), hybrid heat pumps, smart appliances, smart meters and electric transport.

As for the utilities, it gives them more information about their customers so that they can better meet their needs but also gives them more information about how the grid is performing so that they can improve reliability by intervening faster or even before events happen because they start to see trends.

An interesting story was told to me by a utility CEO in the US. He said that with all the terrible storms they've had, now they have smart meters in people's houses they can tell when houses have been re-connected by interrogating the meter. They used to do that by sending a truck round in the middle of winter to see whose porch lights were on. So the response time for issues is far faster for the utilities – and that's better for the customer. ●

UK and Norway start work on world's longest power interconnector

Construction work has begun on a €2 billion electricity interconnector between the UK and Norway which, when completed, will be the world's longest, stretching 730 kilometres across the North Sea. The 1,400 MW project – dubbed NSN Link – will allow the two countries to exchange power generated from hydroelectricity facilities in Norway or wind farms in the UK, depending on which source happens to be cheapest at the time. The subsea cable will connect the two countries' electricity markets directly for the first time, representing another significant link in Europe's evolving "super-grid".

The ownership agreement was signed by the transmission system operators (TSOs) of the UK and Norway, National Grid and Statnett, towards the end of last month at the British embassy in Oslo, Norway's capital. Costs of the project – due on stream in 2021 – will be shared between the two owners.

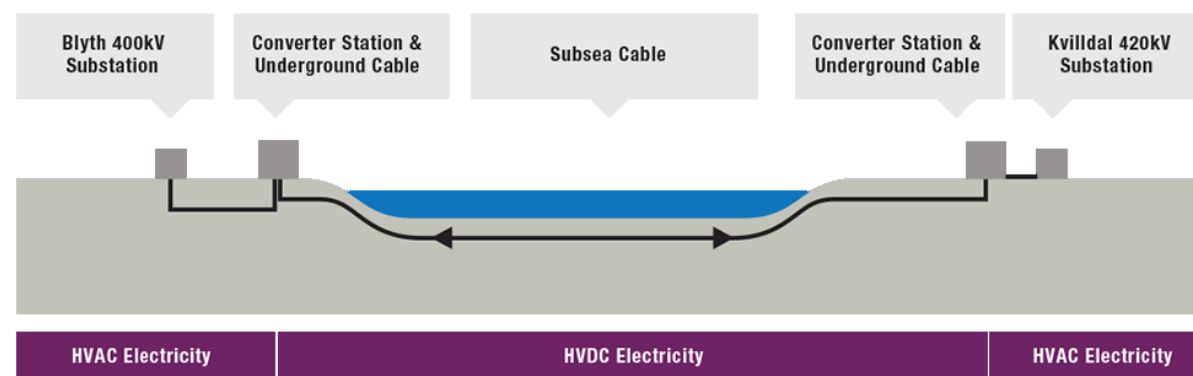
"Access to low-carbon energy from Norway hydro power stations

will help us meet the challenge of greener, affordable energy," said Alan Foster, director of European Business Development for National Grid. "It also adds to the diversity of energy sources for UK and potentially can reduce peak prices with benefits for consumers and businesses. This project not only sets a new world record, it is also an important contribution to the increase of renewable energy production

on both sides, and thereby an essential part of the future electricity system. It will contribute to security of supply and value creation for Norway and the UK."

UK Energy Secretary Ed Davey said: "Coming after the recent confirmation of the Nemo interconnector project with Belgium, I am proud we are now seeing a huge increase in Britain's energy options, and the prospect of a real single energy market and energy super-grid in Europe." A joint venture agreement to move ahead with the Nemo Link was signed in February with Belgian TSO Elia. ●

The interconnector will run from Blyth in the UK county of Northumberland to Kvittdal in the Norwegian county of Rogaland. There will be a converter station on each side where the interconnector is connected to the grid, to convert power from high-voltage alternating current (HVAC) to high-voltage direct current (HVDC) for undersea transmission. The use of DC reduces transmission losses.



Record year for global wind power

Last year saw a record in new worldwide wind power installations. More than 50 Gigawatt (GW) of capacity was added, according to preliminary figures from the World Wind Energy Association (WWEA), 40% more than in 2013 and breaking the 2012 record of 44.6 GW. Overall 370 GW of wind power has been installed worldwide now.

The top-12 countries installed 44.8 GW, with China far ahead of the rest with 23.3 GW. Germany came in second with 5.8 GW, the US third with 4.8 GW. China now has 115 GW of wind power installed.

The "newcomer of the year", says WWEA, is Brazil, which added 2.8 GW. "Especially the new markets in Latin America and Africa are reflecting the importance of wind power as a cheap and reliable power source", commented Stefan Gsänger, Secretary-General of WWEA.

Denmark set a new world record by reaching a wind power share of 39% in its domestic power supply, notes WWEA. Globally wind power now supplies "close to 5%" of electricity supply, with half a dozen countries, including Spain, the UK and Germany, already getting over 10% of their electricity from wind.

There are several other institutions that publish wind power data and they have reached similar conclusions. The Global Wind Energy Council has said that 51.4 GW was added in 2014, bringing the total to 369.5 GW. EurObserv'ER reports 52.1 GW of new capacity.

FTI Consulting, a global business advisory firm, reports 51.5 GW of new installations in its Global Wind Market Update 2014. According to FTI, "Vestas was quick to capitalise on this growth by claiming the crown as the leading turbine OEM supplier for the second year in a row, with a commanding lead over Siemens, which placed second." the top five OEMs. ●



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SAFER, SMARTER, GREENER DNV-GL

China's next five-year plan: absolute or relative cap on emissions?

China is likely to adopt tougher coal and carbon dioxide caps in its next five-year plan, set to run from 2016 to 2020, according to a leading expert on Beijing's climate strategy. "For CO₂ emissions, I do expect there would be a serious cap to be put in place," said Professor Qi Ye, director of the Brookings-Tsinghua Center for Public Policy at a recent event in London, according to a report in Responding to Climate Change (RTCC).

The 13th Five-Year Plan is expected to be issued after the National People's Congress which will take place in Beijing in March 2016.

China is preparing to launch a nationwide carbon market in 2016. At this moment, the country is experimenting with seven regional carbon emission trading schemes, the biggest one in Guangdong.

According to Qi, an "absolute cap" on coal use could be extended beyond the 30% of provinces currently covered. "For the next plan I expect that will increase to include more provinces for absolute coal consumption caps," he said.

Last November the government released plans to limit annual coal consumption to 4.2 billion tonnes by 2020. In 2014 China for the first time in many years saw its coal consumption fall – by 2.9%.

According to a new report (China: An Emissions Trading Case Study) from the IETA (International Emissions Trading Association) and the French

research institute CDC Climat Research, a subsidiary of the state-owned French bank Caisse des Dépôts, it is not clear yet whether China will choose an absolute cap or an intensity-based cap on emissions.

The report quotes the National Development and Reform Commission (NDRC), which is in charge of China's climate policy, as saying that:

"... each of them has its own pros and cons. But generally, the absolute cap is more favourable ... when an economy is on a climbing trajectory, but it increases the abatement cost. The intensity target helps control the cost when an economy is booming, and addresses some problems like over-allocation and price collapse when the economy is waning."

The NDRC does add that "... the majority of economists prefer an absolute cap. Because if the cap [were] framed in intensity terms, there would be uncertainty in the market about the number of permits available until after the GDP data for that year had been published." ●



Global trade in liquefied natural gas (LNG) is forecast to grow by around 5%/year between now and 2025 to an annual volume of more than 400 million tonnes, according to a market outlook published by BG Group. "After four years of flat supply we are entering a period of growth," said Group Vice President, Andrew Walker. New waves of supply are coming from Australia and the United States. ●

Carbon reduction policies 'creating credit risk and driving innovation'

Carbon reduction policies are having growing impacts across the world, "creating credit risks in carbon-intensive industries but, at the same time, driving significant innovation and change across many industrial sectors". So says a report just published by credit rating agency, Moody's Investors Services.

"An increase in direct carbon liabilities, such as carbon permits and/or carbon taxes, as well as the emergence of disruptive technologies, such as solar power, are already having a tangible impact on rated companies in select carbon-intensive industries," says Brian Cahill, Managing Director for Moody's Fundamental Group in Asia Pacific.

However, the report, "Environmental Risks and Developments: Impact of Carbon Reduction Policies is Rising Globally", goes on to say that policy action is driving innovation and change across many industrial sectors, particularly in electricity generation where renewable energy is well established.

Moreover, even the most affected sectors "enjoy some mitigating factors". For example, in power generation, regulated utilities are likely to get some protection through regulatory adjustments, while thermal coal producers will continue to benefit from growing demand in emerging markets, especially China and India. The report notes that many of the players in sectors that are high carbon emitters "have significant operating and financial flexibility that would mitigate the impact of policies for reducing carbon emissions". However, credit pressures are building for companies that have carbon-intensive products and limited ability to adapt. ●

Historic Nile dam deal agreed

Egypt, Ethiopia and Sudan have signed a "cooperation agreement" over the proposed 6,000 MW Grand Ethiopian Renaissance Dam. At a meeting in Khartoum last month the leaders of the three nations agreed on a "declaration of principles", which includes priority for the downstream countries – Sudan and Egypt – to receive electricity from the dam, a mechanism for resolving conflicts, and compensation for damages. Ethiopia's Prime Minister has reassured Egypt and Sudan that the new dam "will not cause any harm to downstream countries".

The Grand Ethiopian Renaissance Dam, a so-called gravity dam, will be the largest hydroelectric power plant in Africa when completed. It is being built by Italian company Salini Impregilo for the Ethiopian Electric Power Corporation in the Blue Nile River. The project has given rise to concern, particularly in Egypt, which relies heavily on the Nile for farming, industry and drinking water. The Blue Nile joins the White Nile in Khartoum, Sudan.

The African continent is rich in energy resources, both renewable and fossil, but low in energy supply. Africa's technically feasible hydropower potential is estimated at 1750 TWh/year, of which just 5% is produced. ●

World Energy Resources figures on African hydropower are available at: http://bit.ly/WEC_hydro



Egypt's President Abdel Fattah al Sisi in Sharm El Sheikh last month – investments agreed and pledged at the Egypt Economic Development Conference far exceeded expectations.

Investment rush brings fresh hope to energy-hungry Egypt

Last month's Egypt Economic Development Conference in the Red Sea resort of Sharm El Sheikh was a huge boost for a nation that has been going through severe political, economic and social upheavals. During that event the nation received investment deals and pledges totalling over \$170 billion. Crucially – given that Egypt is in the throes of an energy crisis, with power cuts a daily occurrence for many – \$43 billion worth of these were for new electricity projects, with another \$21 billion for oil and gas.

In the four years since the revolution that brought the downfall of former President Hosni Mubarak, at the height of the Arab Spring, Egypt has suffered political turmoil, economic downturn and an array of social problems. Unemployment has risen steeply, the number of people living in poverty has grown to over a quarter of the 88 million population, and the nation has been suffering a chronic energy crisis.

Today, there are signs that the tide is turning. One such sign was the success last month of an investment conference held in Sharm El Sheikh, at which foreign investors rushed to initiate new projects in the Arab world's most populous nation.

MUCH-NEEDED REFORMS

The event's success has been widely interpreted as a vote of confidence in President Abdel Fattah al Sisi's

determination to pursue much-needed economic and fiscal reforms. It remains to be seen how many of the investment pledges will bear fruit, but hopes are running high that the government will persevere with radical new policies aimed at boosting growth, creating jobs, and – not least – making Egypt once again attractive to foreign investors.

Political and economic turmoil has taken a harsh toll on Egypt's energy sector, which was already struggling to meet demand before the revolution. A particular difficulty has been a growing shortage of natural gas, which has left power stations with insufficient supply and increased consumption of costly oil products. Power cuts are frequent and widespread. Moreover, Egypt has gone from being an exporter of gas by pipeline and LNG to becoming a gas importer, with a project under way to import LNG using a floating regasification vessel. The choice of that

technology underlines the severity of the shortage – floating facilities can be brought on stream much faster than onshore regasification.

To make matters worse, the government has struggled to pay foreign firms that operate in the oil and gas sector what it owes them. Part of the reason for that stemmed from energy subsidies, the cost of which rocketed in the wake of the Arab Spring as oil prices soared beyond \$100/barrel, where they stayed until recently.

TURNING POINT

Another encouraging sign was the recent publication by the International Monetary Fund (IMF) of the results of policy discussions held under its so-called "Article IV" consultations. Usually held annually, the latest consultations are the first since 2011, with the final report published in February, helpfully just before the Sharm conference.

Like other commentators, the IMF points to energy subsidy reforms initiated in mid-2014 as a sign that Mr Sisi's government is serious about tackling difficult reforms. The government is also getting to grips with the public sector wage bill, and has introduced higher taxes for high earners and a capital gains tax – helping to curb an "unsustainably high fiscal deficit". The fiscal programme envisages elimination of most fuel subsidies within five years and the introduction of a long-awaited value-added tax – which would boost government revenues.

According to analysis conducted by *Middle East Economic Survey*, the electricity sector deals and pledges made in Sharm last month, if they all went ahead, would amount to new generation capacity of 30 GW, doubling the existing capacity of 31 GW. In the upstream oil and gas sector, three of the biggest foreign investors – Eni, BP and BG – pledged further multi-billion dollar investments, clearly reassured by the progress Egypt has been making in reducing its debts to the sector.

Egypt still faces daunting challenges – but it is no surprise that President Sisi was smiling broadly as he closed the Sharm El Sheikh conference. ●

EVENTS

World Energy Leaders' Summit Manila, Philippines 17–18 June 2015

A high-level, invitation-only event held within the Asia Clean Energy Forum. The summit provides a platform for the global energy leaders' community to facilitate dialogue on energy issues. It will be co-hosted by the President of the ADB.

Executive Assembly Addis Ababa, Ethiopia 26–30 October 2015

The World Energy Council's annual meeting, welcoming the Council's community and representatives from the African and global energy sectors. It will also host the Council's governance meetings.

2016 World Energy Congress Istanbul, Turkey 10–13 October 2016



The World Energy Congress is the triennial flagship event of the World

3rd Seminar on the Ecuadorian Electric Sector Riobamba, Ecuador 15–17 April 2015

This event will gather representatives from Ecuador's energy sector to discuss the country's energy development.

For the first time, to celebrate Ecuador joining as a member of the WEC, the seminar will have sessions looking at the sector from the lens of the Council's studies. Co-hosted by ECUACIER, Ecuador's committee for the region's energy integration commission.

<http://ecuacier.org/seminario/>
Contact: Marisol Álvarez
aalvarez@ecuacier.org

Energy Council. It has gained recognition since the first event in 1924 as the premier global forum for leaders and thinkers to debate solutions to energy issues. The event also provides an opportunity for executives to display their technologies and explore business opportunities. With the upcoming Congress in Istanbul – to be held under the theme “Embracing new frontiers” – the event will have taken place in 21 cities around the world.

Catch up on the 2013 Congress at:
<http://bit.ly/1n1IWWV>

MEMBER COMMITTEE EVENTS

Energy and Geostrategy Madrid, Spain 13 May 2015

WEC Spain will present its latest publication Energy and Geostrategy 2015 at this event, co-organised with the Spanish Ministry of Defence. Speakers will discuss current energy issues from a global geopolitical perspective. Topics will include Russia and Europe's energy security, the effects of conflicts in the Middle East on the energy industry, the prospects for nuclear energy, energy poverty, and the energy industry of the Arctic.

Download last year's edition at:
<http://bit.ly/1zaZOzi>
Contact: Javier Jiménez Pérez
jjimenezp@repsol.com

2015 Energy Summit Toronto, Canada 26–28 May 2015

There is an important, but typically untold, story about the role that energy plays in the economic, social, environmental and regional fabric of Canada. The Energy Council's conference will address this knowledge gap. Sessions will include: external influences; energy economics; infrastructure; social impacts; First Nations' projects and partnerships; and energy and the financial sector.

<http://www.energy.ca>
Contact: Brigitte Svarich
brigitte.svarich@energy.ca

3rd International LNG Conference (ConferenzaGNL) Rome, Italy 11–12 June 2015

Focusing on LNG-as-fuel applications in marine and road transport in the Mediterranean region, the conference will gather national and international experts from business, research, and civil society. Organised by WEC Italy in partnership with Symposia.

<http://www.conferenzagnl.com/>
Contact: Agata Carone
agata.carone@wec-italia.org

Bolivia Gas and Energy International Congress 2015 Santa Cruz, Bolivia 19–20 August 2015

The 8th annual Congress of the Bolivian Chamber of Hydrocarbons and Energy (CBHE) will analyse the realities of the energy and hydrocarbons sector in national and international contexts. This year's event is expected to attract more than 500 participants.

Catch up on last year's event at:
<http://bit.ly/1C46UIt>
<http://boliviagasenergia.com/2015/>
Contact: Ronald Fessy Málaga
dircom@cbhe.org.bo

SEE MORE COUNCIL EVENTS AT
www.worldenergy.org/events/future

ABOUT THE COUNCIL

The World Energy Council has been at the forefront of the energy debate for nearly a century, guiding thinking and driving action around the world to achieve sustainable and affordable energy for all. It is the UN-accredited energy body and principal impartial network, representing more than 3,000 organisations – public and private – in almost 100 countries.

Independent and inclusive, the Council's work covers all nations and the complete energy spectrum – from fossil fuels to renewable energy sources.

JOIN OUR NETWORK

Join the debate and help influence the energy agenda to promote affordable, stable and environmentally sensitive energy for all. As the world's most influential energy network, the World Energy Council offers you and your organisation the opportunity to participate in the global energy leaders' dialogue.

Find out how you can:

- join a Member Committee;
 - become a Project Partner, Patron or Global Partner;
 - take part in annual industry surveys, study groups and knowledge networks;
- by visiting our website and contacting our team on: <http://www.worldenergy.org/wec-network>

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