



As the new year began, the price of crude oil continued to slide, with the Brent benchmark dipping below \$50/barrel in the first few days of January – more than 50% down from the peak of \$115/b reached in June 2014. Whatever happens next, many commentators regard this shock as the most significant energy and political development of 2014, and a key determinant of what will happen economically and politically in 2015.

Much has changed since *World Energy Focus* last covered the oil price slide a month ago (*see p5 of the December 2014 issue*) – with many of the questions that were then being wondered about now definitively answered – though much uncertainty remains.

Firstly, there is a broad consensus that we are seeing an important change in oil markets, which is likely to persist for some time, caused by a supply glut and demand weakness. Few forecasters expect prices to rally

significantly before the middle of next year; indeed, some see prices sliding even further. How long it will take for markets to stabilise, and at what level, remain highly uncertain questions.

Secondly, the position of the Organisation of Petroleum Exporting Countries (OPEC) is much clearer. OPEC's decision in November to maintain a 30 million barrel/day (b/d) production ceiling caused much speculation at the time about the organisation's motives. Some analysts

took the view that the primary motive was to push high-cost producers out of the market, while others saw political motives, arising from the likely impact of low prices on certain countries, especially Russia and Iran.

Since that meeting, Saudi Arabia's oil minister Ali Al-Naimi has made clear that OPEC is concerned that high-cost producers are eroding the market share of its members, most of whom are low-cost producers. In an interview with *Middle East Economic Survey*, Al-Naimi is quoted as saying: "Is it reasonable for a highly efficient producer to reduce output, while the inefficient producer continues to produce? If I reduce what happens to my market share? The price will go up and the Russians, the Brazilians, and US shale oil producers

will take my share ... We want to tell the world that high-efficiency producing countries are the ones that deserve market share." In the same interview, the minister insists that OPEC is not prepared to cut production, even at prices as low as \$20/barrel.

Thirdly, it has become clear, as a recent publication from the International Monetary Fund (IMF) stresses, that the new oil market realities are "affecting everyone: producers, exporters, governments and consumers".

ENERGY INDUSTRY IMPACTS

There is little doubt that the slide in oil prices will have a big impact on investment in oil and gas exploration and production. Market perceptions of how energy companies will be affected are clear in the huge falls that have taken place in the stock prices of energy producers and service companies.

The major international oil and gas companies generally maintain that their investment plans are formulated over the long term and that there is little impact from short- and medium-term price trends.

However, so severe and prolonged has been the oil price slide that perceptions of long-term prices have shifted, with some companies already having announced capital expenditure (capex) cutbacks and more expected to do so. Some will have little choice but to scale back capex because of cash flow constraints. [> see page 2](#)

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Categories of projects that depend on high oil prices for their economic viability are particularly under threat. These include high-cost oil, such as shale oil plays in North America, oil sands developments in Canada and projects in deep-water and other hostile environments such as the Arctic. They also include non-oil projects, such as LNG, gas-to-liquids (GTL) and high-cost renewables. In areas where gas prices are oil-linked, or low because of shale development, nuclear projects will struggle.

It is in this context that the WEC has begun work on new global energy scenarios that will set out the energy investment landscape to 2060, with the final report being presented at the World Energy Congress in Istanbul on 10 October 2016. This flagship study will enable a full assessment of the impacts of the new oil price paradigm, the views of influential organisations, and the outcome of the climate negotiations in Paris at COP21 (see *news section*).

GLOBAL ECONOMY IMPACTS

The impact of the oil price plunge on the global economy is the subject of a paper published in late December by two senior IMF officials: Chief Economist Olivier Blanchard and the Head of Commodities, Rabah Arezki.

They see the oil price slump as “a shot in the arm for the global economy”, with a potential gain in world GDP of between 0.3% and 0.7% in 2015, but they caution that “there is much

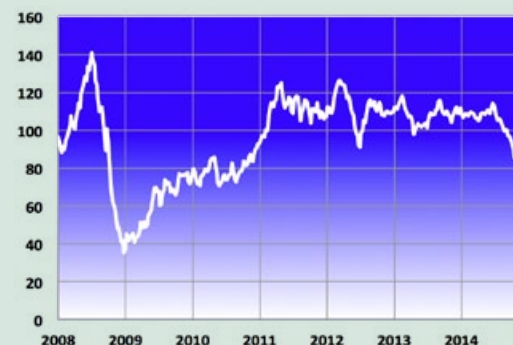
more, however, to this complex and evolving story”. They stress that their simulations – based on all other things being equal – are not forecasts. The IMF will issue forecasts that take into account all relevant factors later this month in its *World Economic Outlook*.

The benefits will accrue mainly to oil-importing countries as lower oil prices increase real incomes, cut the production costs of goods and impact inflation. The effects will vary from country to country. Amongst the advanced economies, Japan, a major importer of oil and gas that is priced on the basis of oil prices, and Europe will benefit more than the US, which produces over half the oil it consumes. Amongst the emerging and developing economies, benefits will depend on energy intensity – so China and India will benefit more than the advanced economies, for example.

Both the IMF and the International Energy Agency (IEA) are urging governments to take advantage of the oil price slump to reduce or eliminate energy subsidies. Speaking in Abu Dhabi last month, the IEA's Executive Director Maria van der Hoeven, quoted in a *MEES* report, said: “There is no time for action like the present in a period of low oil prices ... It's an opportunity to put a price on carbon and slash fossil fuel subsidies.”

The IMF notes that “oil exporters depend much more on oil than oil importers” – so the impacts on some countries will be severe. How severe

Europe Brent Spot Price FOB (US\$/barrel), 2008-2014



Oil prices have fallen to levels not seen since the spring of 2009.

depends on factors including the oil prices assumed in state budgets, the proportion of revenues that goes to the state, and whether countries have established saving funds.

IMPACT ON GEOPOLITICS

For some exporting countries the oil price slump has potential to cause considerable financial upheaval and economic pain, with possible consequences for political stability. Russia, for example, has seen massive depreciation of the rouble and appears to be facing a severe recession over the coming year, given its heavy dependence on energy exports. According to the IMF, energy accounts for 25% of GDP, 70% of exports and 50% of federal revenues. Moreover, it was already facing the impacts of sanctions. Other nations that have seen currencies slump include Nigeria and Venezuela. Iran is another country that will struggle, as it too was already suffering from sanctions that have severely restricted its oil exports.

WHAT NEXT?

It is likely that low prices will persist at least until June, when OPEC is scheduled to hold its next meeting – an extraordinary meeting now looking unlikely – and when Iran is scheduled to reach agreement on its nuclear programme with world powers. If Iran reaches a deal and sanctions are lifted, and OPEC maintains its stance of not cutting production, prices will face further downwards pressures.

Another factor will be the impact of low prices on investment in oil production. According to Rystad Energy, a Norwegian consultancy whose data is used in the IMF analysis, overall capex of major oil companies in the third quarter of 2014 was 7% lower than in 2013. “Available projections from the same source indicate that capital expenditures will fall markedly throughout 2017,” notes the IMF. The picture will become clearer as the oil and gas majors set out their strategies in the first few months of this year. ●

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The big issues

What keeps energy leaders awake at night and busy during the day?

The World Energy Council is just about to publish its *World Energy Issues Monitor* – an annual survey of over 1,000 energy leaders in over 80 countries. With 2015 set to be a pivotal year for energy, as the industry grapples with oil price volatility and with an international climate treaty due to be agreed in December, what are the key issues that are preoccupying the people who lead the energy industries? In this exclusive interview, WEC Secretary General Christoph Frei previews the results of the survey and looks ahead at the future role of the organisation he heads.

What insights can you give us into the results of your survey of global energy leaders?

There are two main themes. On the one hand, what is new, what is different. On the other hand, a number of messages are re-confirmed.

Of the three biggest changes, the first is an increased awareness around the revival of energy geopolitics and

its importance to energy security. Russia is at the top of the agenda in many places. The second is the understanding that cyber-security may change the way in which we think about infrastructure and resilience. It is something that can black us out and energy leaders are taking it very seriously. The third is that concern around recession, which has been high in the past two years, has

eased – so people are feeling a little more optimistic.

Of the messages that have been reinforced, climate framework uncertainty is a top “keeps me awake at night” issue for energy leaders globally. Another is energy price volatility, particularly oil price volatility. The survey has also re-emphasised the importance of energy efficiency and renewables in the global energy mix. If any trend has grown stronger it is the trend of buying into the logic of more decentralisation, more smart solutions, more storage-based solutions, as a backup to renewables and energy efficiency. Another re-confirmed message is that there is a lack of trust among global energy

leaders in the ability of carbon capture and sequestration (CCS) technology to deliver.

Climate change attracted much attention during 2014. We saw the finalisation of the IPCC's fifth climate assessment; a high-profile climate summit organised by the United Nations in New York; the US and China pledging action to mitigate carbon emissions; and the COP 20 climate talks in Peru. How optimistic are you that we will see a meaningful treaty agreed next year in Paris?

As I've said, climate framework uncertainty is one of the top three issues that keeps energy leaders awake at night – simply because having or not having a carbon price fundamentally changes the system. And we're not talking about €4 a tonne but potentially \$200–300 a tonne.

What do we hope COP 21 in Paris will achieve? Will there be a deal every country will sign and agree to? I find it difficult to see that happening. The real hope for COP 21 could be to see, perhaps not a global carbon market, but a commitment to a carbon market whereby a number of countries, the big players, connect their internal carbon markets and with that create an aspiration for all countries to become part of that. That would be a real achievement.

Much of the WEC's work is structured around a framework that you call the “energy trilemma”. How do you explain what that means to someone

The 2015 World Energy Issues Monitor will be showcased for the first time at the 22nd Handelsblatt Energy Industry Conference in Berlin, Germany (<http://bit.ly/1Km45pw>) on 20 January by Christoph Frei. The report will be published on the World Energy Council's website (http://bit.ly/WEC_org) and presented at the council's events.

who is not an energy expert – say to my 18-year-old son? What is the trilemma? Why is it important?

There are two ways to explain that to somebody. The first one is the concept of sustainability being built on the conciliation of three axes: societal concerns, which we can call equity; environmental concerns; and economic prosperity concerns. According to the Brundtland report – “Our Common Future”, published in 1987 – an equilibrium between those three was the very earliest definition of sustainability. The trilemma is nothing else than that concept being brought to energy.

But there's another way of explaining it. If your son wants to invest money, he will want to put his money somewhere where he has confirmation that tomorrow's rules will be today's rules. If the rules suddenly change he could lose all of his money. That is the exact logic under which energy investors operate.

In energy, if those rules are not in place, we call [> see page 4](#)

that political risk. And political risk is highest in those places where we have a lack of balance in terms of the three dimensions of the trilemma. If you have a country systematically neglecting one of those dimensions – energy equity, the environment, or economic and energy security concerns – sooner or later part of society will become so frustrated that it will overturn the government and elect a new one. That new government could change the rules dramatically such that your investments are at risk. So, as an investor, you want to see that the three dimensions of the trilemma are in reasonable balance.

There has been much discussion as to whether a period of low-ish oil prices would be good or bad for the global economy. What's your view? And where did your survey place energy price volatility in the list of energy leaders' concerns?

Energy price volatility is the number one issue. And this year oil price has been the clear top runner. Previously we have seen volatile gas prices, we have seen solar prices collapse, we have seen CO2 price uncertainty and you can add others. But in 2014 it was about oil price.

Our long-term scenarios are still saying that overall we are moving towards a world in which access to oil becomes more complex, in terms of geology, the political context, and how oil is brought to markets. For those reasons the trend of oil price will not be downwards but upwards. The cost of renewables will

be an upper boundary. If oil becomes much more expensive than renewables there will be a dramatic shift to renewables. And at the downwards end prices will be limited through the cost of production of the most expensive oil producers.

At the moment we are seeing low demand in China and Europe. We are seeing high supply in the US and elsewhere. And those two factors together have pushed the oil price down.

Now, what does that do to the world? On the one hand, people look at lower oil prices as a positive signal in terms of their growth expectations.

But, on the other hand, oil-producing and exporting countries – such as Russia, Nigeria, Mexico, Venezuela and Iran – are obviously suffering from the low oil price in terms of their state budgets. That is also a political risk for those countries.

The IEA recently published its World Energy Outlook with scenarios to 2040. The central scenario projects renewables and nuclear together taking a quarter share of world primary energy demand, with oil, gas and coal taking another quarter each – in other words, a world in which three-quarters of our energy still comes from fossil fuels a quarter of a century from now. How does that compare with the scenarios published by the WEC?

Our scenarios are consistent with that. Today 80% of primary energy supply is fossil-based and by 2050 we see

that between 60% and 75% of primary energy supply will still be fossil-based.

The primary energy contribution today from renewables is about 15% and it will grow to somewhere between 20% and 30% by 2050. Even though we see dramatic growth in solar and wind power, they simply don't match the massive supply chain we have today in oil, coal and gas.

We are absolutely aligned with the perception that by 2050 it will not be possible to come away from a majority dependence on fossil fuels – unless we change policy dramatically or invent breakthrough technologies.

Technology advances continue to play a critical role in energy supply and use. For example, we have seen shale oil and gas technology change the world energy map over the past decade. Which up-and-coming technologies would you identify as the key ones?

The key black-swan technology is electricity storage. A breakthrough in storage technology would have multiple implications – probably beyond what we are capable of describing today. It could catalyse the replacement of liquid fuels by making electric vehicles viable even in parts of the world where expensive battery technology cannot be afforded. It could enable renewables to grow beyond lower system threshold requirements. If there is one technology where we would call for greater collaboration for breakthrough innovation it is electricity storage.

The question of how our future energy needs should be financed was at the centre of the World Energy Trilemma report that the WEC published in November – with \$48–53 trillion required for energy infrastructure and efficiency by 2040. What are the key messages for decision-makers?

The key message is there will be a massive capital requirement globally to replace, to grow and to transform the existing infrastructure and systems. The \$48–53 trillion is more than half the world's GDP spread over two decades. It's massive. The mobilisation of this capital will not come easily. It takes the right policies, it takes trust in the policies being stable and robust, it takes a pipeline of bankable projects, and it takes an understanding of the implications of financial agreements, such as Basel 3, for project finance. We need to balance the trilemma in every country. Money is shy and will go to places where it will feel safe. That may be not only country choices but also sector choices.

How do you see the role of the World Energy Council evolving over the coming decade?

We have been a great platform to host dialogue and make sure that the key leaders in almost 100 countries meet and exchange best practice on a regular basis. That's where we were a couple of years back. Today we have come to a place where we have enabled our constituents to provide real thought leadership, be that through the trilemma, be that through our scenarios, and we are coming to

Christoph Frei has been the World Energy Council's Secretary General since 2009. He has an assignment as Adjunct Professor and acts as Advisor to the President of the Swiss Federal Institute of Technology (EPFL), Lausanne. He is also a member of the World Economic Forum's Global Agenda Council on Energy Security.

a point where we see our community becoming an action community – for instance, in the context of climate change resilience and also the trilemma benefits of regional integration projects. ●

Interview by Alex Forbes

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Lima climate talks – small steps on the road to Paris

The final outcome of the UN climate talks held in Peru last month was less ambitious than many had hoped – given that they had begun in optimistic mood following the historic joint pledges to curb carbon emissions by the presidents of the US and China in November (see p6 of our December 2014 issue). That said, there was considerable relief that after more than two weeks of negotiation on the part of over 190 countries, agreement was finally reached. The Lima Call for Climate Action means that it remains possible, if not easy, to achieve an international climate agreement in Paris at the end of this year.

The action plan calls on all of the parties to the UN Framework Convention on Climate Change (UNFCCC) to submit their plans for mitigating carbon dioxide emissions, preferably by the end of March, in what are termed “intended nationally determined contributions” (INDCs). These INDCs will form the basis for climate action after 2020 when the new climate agreement is set to come into effect and which will include many elements relating to the energy sector.

Importantly – and for the first time – all countries are expected to submit emissions reduction plans, ending the long-standing assumption that only developed countries should shoulder the burden.

This was an essential development because more than half of anthropogenic carbon dioxide emissions are now generated by developing countries, with China the largest emitter of all. Developing

nations have long argued that climate change should be addressed by the wealthy nations responsible for most of the historical emissions – a concept dubbed the “firewall” because it has made negotiations so intractable.

Nevertheless, negotiations at the 20th Conference of the Parties to the UNFCCC (COP 20) were still complicated by disagreements over how the burden of curbing carbon emissions should be apportioned between developed and developing/emerging countries, with particularly protracted discussions in relation to the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) negotiations. The final text of the action plan talks of “common but differentiated responsibilities and respective capabilities, in light of different national circumstances” – a phrase so vague, some have said, that it leaves plenty to argue about in the run-up to the COP 21 talks in Paris in December.

A common criticism of the action plan is that it does not require sufficient transparency of the details of INDCs. At the insistence of China, which was concerned about sovereignty, “shall” was changed to “may” in the phrase “to facilitate clarity, transparency and understanding [INDCs] may include ... quantifiable information” relating to reference points, time frames for implementation, scope and coverage, planning process, assumptions and methodological approaches.

The action plan sets out a number of milestones that need to be reached before the COP 21 talks begin:

- A final negotiating text for the Paris talks is to be made available to all the parties by May.
- Once countries have submitted their INDC pledges, these will be published online by the UN.
- The UN is to produce a synthesis report by 1 November analysing the aggregate effects of the targets in the pledges to assess their probable impact on the mitigation of climate change. The overall target is to keep global warming to within 2°C of pre-industrial levels, the point beyond which scientists warn of the likelihood of catastrophic impacts.

According to the UN: “Countries also made significant progress in elevating adaptation onto the same level as action to cut and curb emissions.” The final text of the action plan “urges developed country parties to provide and mobilise enhanced financial support to developing country parties



The outcome of the COP 20 climate talks was warmly welcomed by UN Secretary-General Ban Ki-moon: “I cannot overstate the importance of the foundation that is being laid at the UN Climate Conference in Lima.” (Photo: UN/Mark Garten)

for ambitious mitigation and adaptation actions, especially to parties that are particularly vulnerable to the adverse effects of climate change”.

Commenting on the outcome of the talks, Christiana Figueres, Executive Secretary of the UNFCCC, said: “Governments arrived in Lima on a wave of positive news and optimism resulting from the climate action announcements of the European Union, China and the United States to the scaling up of pledges for the Green Climate Fund. They leave Lima on a fresh wave of positivity towards Paris with a range of key decisions agreed and action plans launched, including on how to better scale up and finance adaptation, alongside actions on forests and education.” ●

NEWS IN BRIEF

CHINA TO BUILD COASTAL NUCLEAR POWER PLANTS

China last month announced plans to construct nuclear plants along the eastern coast – ending a suspension of approvals and licensing for new projects imposed after the Fukushima event in Japan in 2011. According to the World Nuclear Association, China has 21 nuclear power reactors in operation with a combined capacity of 19,095 MW. Another 27, with a combined capacity of close to 30,000 MW are under construction.

REGIONAL NETWORK BOOSTS SECURITY IN CENTRAL AMERICA

The nations of Central America can look forward to more secure electricity following completion of the Sistema de Interconexión Eléctrica de los Países de América Central (SIEPAC) regional power transmission network. The 300 MW 230kV transmission line stretches over 1,800 km from Guatemala to Panama via El Salvador, Honduras, Nicaragua and Costa Rica – allowing these countries to trade electricity.

IRAN'S PRESIDENT TALKS OF PUBLIC VOTE ON NUCLEAR DEAL

Iran's president, Hassan Rouhani, has raised the possibility of holding a referendum over the issue of reaching a deal with western powers on the nation's nuclear programme, according to a report in the Financial Times. He has warned that Iran needs to end its international isolation if it is to achieve sustainable growth. The economy has come under pressure from sanctions and the recent slide in oil prices (see cover story).

E.ON plans metamorphosis in response to market changes

Germany's E.ON – one of Europe's largest energy utilities – last month surprised observers with plans for a radical demerger that will separate its various businesses into two corporate entities, each of which, it claims, will be better suited to the markets it serves than the current sprawling conglomerate. The announcement is a response to the radical transformation that has taken place in energy markets in Europe, and especially in Germany, that has left valuable generation assets stranded.

CEO Johannes Teyssen – a former Vice-Chair for Europe at the World Energy Council – said: “We are convinced that it's necessary to respond to dramatically altered global energy markets, technical innovation, and more diverse customer expectations with a bold new beginning. E.ON's existing broad business model can no longer properly address these new challenges.”

One of the two companies, to be called E.ON, will retain the renewable generation business and energy distribution networks and continue to supply energy and services to 33 million customers. It will place “particular emphasis” on expanding its wind business and will also strengthen solar. It will upgrade energy distribution networks in Europe and Turkey and “make them smarter so that customers can take advantage of new products and services in areas like energy efficiency and distributed generation”.

The other company, which has not yet been given a name, will take on

conventional electricity generation assets, the global energy trading business, and oil and gas exploration and production.

Commenting on the composition of this new entity, Teyssen said: “The transformation of the energy system will continue to require reliable backup capacity well into the future as well as access to global markets for energy products. The new company will focus precisely on meeting these needs.”

As part of the metamorphosis, E.ON has agreed to sell its entire businesses in Spain and Portugal to Macquarie, an Australian investment firm. It is also considering disposing of its activities in Italy and intends to conduct a strategic review of its exploration and production business in the North Sea.

The company insists that both companies will be “financially robust” and that there are no plans to cut jobs. E.ON expects to carry out the spin-off after approval by the shareholders meeting in 2016. ●



An engineer inspects batteries at Europe's largest battery storage project.

Europe's largest battery storage project goes live in the UK

Electricity storage technology that could help solve issues raised by the intermittency of renewables is being tested in the UK – at what is claimed to be Europe's largest battery storage project. The £18.7 million (US\$ 28.2 million) Smarter Network Storage (SNS) project – with a capacity of 6 MW/10 MWh – was opened last month by Amber Rudd, Minister at the Department of Energy and Climate Change.

The project has been installed at a substation in the town of Leighton Buzzard owned by UK Power Networks as part of a two-year trial. It was awarded funding of £13.2 million (US\$20 million) by the UK energy regulator Ofgem.

“Energy storage can play a major role in balancing the grid . . . by absorbing surplus power and releasing it when needed,” says Andrew Jones, Managing Director of S & C Europe, the lead supplier to the project. Other suppliers include Samsung SDI and

Yunicos. The project is claimed to stabilise the grid more effectively than traditional thermal generation by providing frequency regulation as well as load shifting. Jones claims that energy storage in substations “can decrease the need and cost of traditional reinforcement.”

“We will be testing a wide range of different services that storage can deliver to the network, and the wider electricity system,” said Ben Wilson, UK Power Networks' Director of Strategy and Regulation. ●

IEA forecasts coal growth

Global demand for coal is set to continue rising, breaking the 9 billion tonne level by 2019 – despite concerns over greenhouse gas emissions and slow progress in the development of carbon capture and storage (CCS) technology.

So says the International Energy Agency in its latest medium-term market report for the fuel. The report stresses that the forecast comes with “considerable uncertainties”, particularly regarding the prospect of new policies that would affect demand.

The largest source of this uncertainty will be China, which is expected to account for three-fifths of global demand growth, but which “has embarked on a campaign to diversify its energy supply and reduce its energy intensity” (see cover story in September 2014 issue).

Global demand is expected to grow at an average rate of 2.1%/year through to 2019. The “main engines of growth” will be China, India, Southeast Asian nations and other Asian countries. ●

How much electricity will be produced by coal in 2050? Two scenarios, each with and without CCS, in our World Energy Scenarios report:
<http://bit.ly/1dfc9et>



Photo courtesy of Eskom

South Africa's energy system is a textbook illustration of the challenges outlined in the World Energy Council's energy trilemma model, writes Brian Statham, Chairman of the nation's WEC member committee. Finding a balance between energy equity, energy security and environmental sustainability is at the heart of the policy debate in both government and business today.

Despite its lack of oil and natural gas resources, South Africa – categorised along with Brazil, Russia, India and China as one of the emerging economies in the BRICS grouping – is one of the wealthiest economies in sub-Saharan Africa. In terms of GDP it is Africa's largest economy. It nevertheless faces a tough time in meeting its energy needs, partly because it lacks its own resources – except for carbon-intensive coal – but partly also because of its rapid rate of social and economic development over the past

two decades. Indeed, energy availability is currently a significant constraint on growth and therefore looms large on the policy agenda, with efforts under way to boost supplies of natural gas, nuclear electricity, hydroelectricity and wind and solar power.

A report published in December by the International Monetary Fund concluded that: "South Africa has made substantial progress in its first 20 years of democracy, achieving much improved living standards

for its citizens. But growth has slowed in recent years, specifically relative to other emerging markets. Although weak trading partners' growth contributed to the slowdown, increasingly binding structural constraints, such as protracted strikes and electricity constraints, have been important factors."

ENERGY EQUITY

Looking first at the energy equity aspect of the trilemma, even in one of the most developed countries on the African continent, some 20% of the population still lacks direct access to commercial forms of energy. Without energy there can be no prospect of modern healthcare, sanitation, education or economic activity. So these citizens are excluded from social and economic development.

The prospect of connecting these people to the mainstream energy grid in the near future is low because of the disperse nature of the communities and the long distances involved. Off-grid solutions need to be developed on a scale that makes economic sense and of a standard acceptable to the people they will serve. Currently there is a strong perception – rightly or wrongly – that off-grid solutions are of a much lower standard than on-grid supply and they are therefore rejected by many communities.

For the 80% of the population that does have access to commercial energy, a significant proportion are finding energy costs increasingly

With some 40 years of experience in the energy sector, Brian Statham is an Officer of the World Energy Council and Chair of its Studies Committee, Chairman of the South African National Energy Association, Chairman of the Africa Energy Indaba and past-Chairman of the Energy Access Partnership.



difficult to accommodate within household and small business budgets. To support the development of new capacity, electricity prices are rising faster than inflation. Many of the lowest-paid workers have to travel long distances to get to and from work and the cost of liquid fuels makes this commute a significant part of their personal budgets.

ENERGY SECURITY

Looking next at energy security, the second trilemma dimension, electricity supply is severely constrained with scheduled load shedding needed to maintain the integrity of the national supply network. This constraint is having a major impact on the performance of businesses – both large and small – and consequently has a knock-on effect on the nation's economic performance.

New generating capacity is being built but it will be some years before reserve margins will be adequate. Moreover, it is not only electricity supply that is of concern. The liquid fuels industry is also under severe pressure. There has not been any investment in new refining or import facilities for decades and there is uncertainty over whether it will be government or the private

sector that will make the necessary investments to support cleaner liquid fuel standards.

About 10% of the diesel supply is being allocated for electricity generation. This increases the risk of diesel shortages, with knock-on effects on transport, mining, agriculture and industry.

There is much talk of introducing natural gas into the energy mix to increase diversity and help with energy security – with the Department of Energy working to formulate a gas utilisation master plan. But South Africa does not have any significant indigenous natural gas reserves and consequently has never developed an extensive natural gas supply network. Currently natural gas is imported from Mozambique and supplied mainly into the Gauteng region. However, if additional volumes of natural gas are to be imported from the newly identified fields in northern Mozambique, or as LNG, there will need to be considerable further development of physical gas infrastructure and supporting legislation and regulation.

South Africa is thought to have large amounts of shale gas but the controversy over [see page 8](#)

the desirability of fracking as a means of extraction has led to delays in the formulation of national policy and the granting of exploration licences. If shale gas is found to be a viable primary energy resource, it will be subject to the same challenges as other gases in respect of the need to develop gas networks and supporting infrastructure before it can get to market.

The above developments in new capacity for both the electricity and liquid fuels sectors will need to be funded. Regardless of whether the funding comes through the Fiscus or from institutional or private investors, the impact will be increased energy prices which will negatively impact the energy equity dimension.

SUSTAINABILITY

South Africa is also struggling with the third trilemma dimension of environmental sustainability. Electricity supply is around 85% based on fossil fuel-fired generation plant, mostly coal with a very small proportion of diesel. The cost of retrofitting flue gas desulphurisation and carbon-capture technologies to fossil-fired generation facilities will be significant, assuming viable technologies become available, adding further strain to the energy equity dimension.

South Africa has run a very successful independent power producer programme based on renewables – primarily wind and solar – with its Renewable Energy Independent Power Producer Programme (REIPPP).

However this represents less than 10% of the capacity needed to meet electricity demand. The government has also declared its intention to construct more nuclear power plants. Currently, South Africa generates 5% of its electricity from nuclear power, from the Koeberg facility near Cape Town. The government has said that, in line with its Integrated Resource Plan 2010–30, it plans to add 9.6 GW of nuclear electricity generation capacity. Intergovernmental agreements have been signed with potential vendors, including France, Russia and China. However, the policy remains very controversial from economic and safety points of view.

Environmental sustainability is not simply a matter of carbon management. Water resources are stretched to meet the needs of the growing population and the energy-water-food nexus debate is a matter of concern to the nation's policymakers. Also, those citizens who do not have access to commercial energy are forced to forage for biomass to meet their basic energy needs. This leads to destruction of forests and grasslands, with the consequent risk of soil erosion and the destruction of arable land.

If you really want to understand the difficulty of balancing the WEC's Energy Trilemma, imagine yourself in the role of a South African policymaker. There is much to be done on all three dimensions – and the counter-acting forces between dimensions are very powerful. ●

WEC EVENTS

Africa Energy Indaba Johannesburg, South Africa

17–18 February 2015

Africa Energy Indaba (AEI) is the foremost African energy event for energy professionals from across the globe. The event gathers international and African experts to share insights and solutions to Africa's energy crisis, while exploring Africa's vast energy development opportunities. It includes a conference and an exhibition. Designated the WEC's African regional event, the AEI is presented by the South African National Energy Association

(SANEA), the WEC national committee. It is supported by the African Union Commission and the NEPAD Planning and Coordinating Agency.
<http://www.africaenergyindaba.com>

Executive Assembly Addis Ababa, Ethiopia

26–30 October 2015

The WEC's annual meeting. The full week of events will welcome the WEC community and representatives from the African and global energy sectors for open and private discussions. It will also host the WEC's governance meetings.

WEC MEMBER COMMITTEE EVENTS

India Energy Congress New Delhi, India

28–29 January 2015



Held under the theme "Securing India's energy future: integration and action", the congress will discuss issues of integrated energy governance and

planning and the actions needed to secure energy to foster inclusive growth, while balancing the energy trilemma. Ministers, policymakers, industry leaders and other stakeholders will lead discussions while international experts will provide global perspectives.

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SEE MORE WEC EVENTS ON
www.worldenergy.org/events/future

ABOUT THE WEC

The World Energy Council (WEC) 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 WEC'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 WEC 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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