WORLD ENERGY COUNCIL

WORLD ENERGY FOCUS

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On 1-2 June in San Francisco, the 7th Clean Energy Ministerial (CEM) will be held. The CEM, whose member countries represent 75% of global greenhouse gas emissions and 90% of clean energy investment, is all about "personally engaging ministers so that they want to push forward clean energy initiative in the world", says Jonathan Elkind, Assistant Secretary for International Affairs at the US Department of Energy (DOE), in an interview with World Energy Focus. In San Francisco an already impressive list of activities will be expanded with several new initiatives, including a Corporate Sourcing of Renewables Campaign and an Advanced Cooling Challenge.

"The emphasis of the Clean Energy Ministerial is on accelerating the deployment of technologies that exist in the marketplace right now." Jonathan Elkind, whose team runs the CEM secretariat, emphasises that the Ministerial, although it involves the most senior energy policymakers in the world, is above all a down-to-earth, results-oriented programme. He cites many examples of what the CEM has achieved in practice.

Take the SEAD (Super-Efficient Equipment and Appliance Deployment) initiative, a project in which the member countries compared standards and testing protocols for super efficient equipment and appliances. "Each country is different, so there are no one-size-fits-all solutions", says Elkind. "But by comparing different approaches countries can learn from each other." In this case, "our colleagues in India picked up on technical work that had been done in the US and used that to develop their own program", explains Elkind. "The result was that India last year became the first to promulgate a comprehensive standard for LED lighting systems. Then the Indian minister, Piyush Goyal, went a step further and personally ensured that the Indian government started making bulk purchases of LED lamps. In the process, they managed to bring the price down from $4.50 per 9 Watt lamp to just over $1.00."

COPENHAGEN

The CEM was started in 2009 by then-US Secretary of Energy Steven Chu after the failure of the Copenhagen climate summit. It was one way for the Obama administration to show its determination to tackle the challenge of climate change despite the lack of a global agreement. The strength of the CEM, says Elkind, is the countries that are involved (most major powers, including China, India, Germany, UK, Australia, Brazil, Canada) as well as "the possibilities this presents to learn from each other". The personal involvement of the energy ministers is also key, says Elkind. "We worked hard to get ministers personally engaged."

The CEM focuses on where "the biggest opportunities" lie, says Elkind. In this way it is different from Mission Innovation, another initiative from the Obama administration to "accelerate clean energy" around the world. This was signed on 30 November last year in Paris by 20 countries (many of the same as in the CEM) which promised to double their funding for clean energy R&D over the next five years. "The CEM focuses on existing technologies, Mission Innovation on technologies that are just beyond the horizon, or don't even exist yet", explains Elkind. The CEM in June in San Francisco will also be host to the first ministerial meeting of Mission Innovation, he adds.

The list of activities that the CEM has undertaken since its inception is long. It includes: the Global Lighting and Energy Acces Partnership (LEAP), the Carbon Capture Use and Storage Action Group, the 21st Century Power Partnership, the Clean Energy Solutions Center, the Electric Vehicles Initiative, the International Smart Grid Action Network, the Multilateral Solar and Wind Working Group, the Bioenergy Working Group, the Sustainable Development of Hydropower Initiative, the Global Sustainable Cities > see page 2

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Network and the Global Superior Energy Performance Partnership.

Many of these initiatives are collaborations with other organisations. For example, the CEM solar and wind programme has teamed up with IRENA (International Renewable Energy Agency) to develop the first Global Atlas for Renewable Energy *[http://irena.masdar.ac.ae]*, which presents an overview per country of its renewable energy resources. At first, it showed only wind and solar power resources, but it has now been extended to include marine energy, geothermal, hydropower

> "The required investments are of such a scale that they will never be met by governments alone"

and bio-energy. "The Atlas provides policymakes with an information base that can help them develop renewable resources by identifying suitable locations", says Elkind. "Anybody can make use of this – you don't have to be a member of the CEM."

Another open access initiative is the Clean Energy Solutions Center, which provides information on policies and programs that governments can use to promote clean energy in their country. It includes an "Ask an Expert" feature that can be freely used by government representatives everywhere. "Countries in the Caribbean region and West-Africa have made use of this facility to develop energy efficiency standards", notes Elkind.

The 21st Century Power Partnership is a multilateral platform in which countries look at power system transformation and the new business models utilities will need to adopt to get themselves ready for the clean energy revolution. "No two countries are identically positioned on this, but having these channels creates opportunities for a lot of peer-to-peer learning."

In the Carbon Capture Use and Storage Action Group, the US works closely with China to bring down the cost of CCS, says Elkind. "None of the credible projections that we have seen show us being able to address the climate challenge unless we see significant cost reductions in CCS. So that's what we are aiming to achieve." The US also works with China on energy efficient buildings, Elkind adds.

SUPER-EFFICIENT

As if all this is not enough, the meeting in San Francisco will see a number of new campaigns being launched, if the Ministers agree to them. They include the Corporate Sourcing of Renewables Campaign, which will encourage companies to source their power from renewable energies, the Advanced Cooling Challenge, which will help countries deploy super-efficient, smart and affordable cooling and a new Energy Management Campaign.

> "Each country is different, there are no one-size-fits-all solutions"

Although the CEM is an initiative of the Obama administration, Elkind is convinced that it has sufficient appeal to people from a wide political spectrum to see it maintained under a new Administration. "There are lots of different benefits to clean energy. It provides new opportunities in the building sector, in solar PV and in many other areas. As president Obama has said, it is imperative to respond in a timely way to the massive challenge presented by climate change to our globe, but it is also a great opportunity for new job creation, a better quality of life and a more predictable future for our children and grandchildren. So we are optimistic that the CEM will live on into the future."

Nevertheless, the secretariat of the CEM will soon be moved from the US Department of Energy to "an international energy institution", says Elkind, "to ensure that the foundation of the CEM will remain strong and stable." The ministers will take a decision on this at the San Francisco meeting.

CHIPS

The Office of International Affairs which Elkind heads is not just concerned with clean energy, but also with conventional energy markets. How does Elkind see the clean energy revolution affect geopolitical energy relations? "We see good opportunities for a favourable impact", he says. "There are going to be a wide variety of different energy solutions available, both distributed and centralised. We believe that having these additional, cost-effective competitive energy choices available to people around the world will enhance energy security both in the US and globally."

He adds that "our work is motivated by economic and environmental concerns, not by geopolitical considerations, but if the growth of clean energy has the effect of reducing the ability of parties to exert political influence through energy markets, then that's fine. Let the chips fall where they may."

Elkind finally notes that it is critical for people to realise "the scope of the challenge and the opportunity that climate change brings." Different places, he notes, will find different solutions. "Some US states build new nuclear power, others go for renewables. Countries will also make their own choices."

And the private sector should be closely involved. "The required investments are of such a scale that they will never be met by governments alone. It would be unwise for governments to place themselves in a position of being the solution. The involvement of industry is utterly essential. We focus on pre-commercial activities and policy requirements. That goes for Mission Innovation as well. You can't get anywhere without working hand in hand with industry." ●

Jonathan Elkind serves as the Assistant Secretary for the Office of International Affairs (IA) and previously served as the Principal Deputy Assistant Secretary. Prior to joining the Energy Department, he worked as a senior fellow at the Brookings Institution, focusing on energy security and foreign policy issues. From 1998 to 2001, Elkind served on the staff of the U.S. National Security Council as Director for Russian, Ukrainian, and Eurasian Affairs. Between 1989 and 1998, he served in a variety of other government positions on the National Security Affairs staff of the Vice President of the United States, at the U.S. Department of Energy, and at the Council on Environmental Quality.

WORLD ENERGY TRILEMMA REPORT

What matters most of all: good policy

Focused, well-designed energy policy in a robust regulatory environment is the key for countries to achieve the goals of energy security, sustainability and affordability. That's the most important conclusion from the 2016 World Energy Trilemma report, which will be presented at the Clean Energy Ministerial in San Francisco on 1 June. Overall, countries are on the same track, says Joan MacNaughton, Executive Chair of the study, but "it's still hard for most of them to balance all three aspects." She adds that "policymakers have a grave responsibility to foreswear short-term point scoring."

The 2016 World Energy Trilemma report – based on findings from World Energy Council workshops across the world and extensive interviews with hundreds of top leaders from both the public and private sectors – comes at a crucial time. In 2012, 2013 and 2014, the study was based on in-depth interviews with industry executives, policymakers, and financial experts respectively. Last year, it focused on what energy leaders wanted to see come out of the COP21 climate summit in Paris.

This year, the World Energy Trilemma team looked back on the findings over the last five years and see what lessons could be drawn to help countries going forward. With the Paris Agreement now signed by 175 countries, the time has come for the nations of the world to start delivering on their promises. The World Energy Trilemma report is an invaluable tool for this, because it shows how countries can improve sustainability without losing sight of energy security and energy access.

Joan MacNaughton, who has been Executive Chair of the World Energy Trilemma for five years, notes: "There is going to be a big challenge post-COP21 for countries that have not moved very far to improve on their environmental sustainability performance, while at the same time trying to maintain energy security and affordability. To do that, you need very good policies."

MacNaughton, who has a uniquely broad experience in the energy sector, having held senior posts at Alstom, the UK Department of Energy, the International Energy Agency (IEA) and the London-based Energy Institute, rejects the idea, sometimes pushed by renewable energy enthusiasts, that decarbonisation represents a simple win-win. "To say that all you need to do is expand renewables and the rest will follow, is an oversimplification. If it were as simple as that, it would happen much faster."

There are trade-offs to consider on the road to a low-carbon society, notes MacNaughton. "When you are implementing new systems, you are going to have the costs of the change. You need to make greater investments, which can impact on affordability in the short term. For example, for a country like Germany it's much cheaper to sweat old coal power plants than to operate much cleaner modern gas plant - and several of them have been mothballed."

> "The transitions and growth trajectory of the electricity sector will have a huge impact on the world's economy and environment."

BACKLASH

She notes that "if you pursue decarbonisation without taking into account affordability and security of supply, you run the risk of a backlash against your policies. You may also get results that are not well aligned with the market, for example by making big bets on the wrong technologies, or missing out on second-

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ABOUT
WORLD ENERGY FOCUS

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generation technologies. That's what the Trilemma is about: you have to look at all three elements, but with a strategic sense of direction."

Similarly MacNaughton does not agree with the notion that we know all we need to know about renewable energy technologies, and that all that remains to be done is put the right market design in place. "That's another oversimplification. We do still need progress in renewable energy. There are technologies that have great promise but are not mature yet, such as tidal energy. We also still need to improve solar and wind technologies, and our ability to integrate them into the grid.

That said, MacNaughton is convinced that in the medium to long term, the transition will deliver benefits. "For example, if you see how costs of renewable energy have come down, this will greatly lower import bills for fossil fuels for importing countries." In addition, she notes that "the sooner you start on the transition, the cheaper it will be over the long term."

SILVER BULLET

When it comes to getting policy right, "we found, not surprisingly, that there is no silver bullet", says MacNaughton. "There is no one policy that can deliver all three aims of the trilemma. There are always individual circumstances to take into account."

But what is clear, she adds, is that good policy is key to meeting the three goals of the energy trilemma. "Energy policy choices and their implementation have the biggest impact on performance. Having a high GDP or great fossil fuel resources can help, but good policy, implemented well, is what really matters."

Good policy, says MacNaughton, means a number of things. "It means longevity: policies must be in place for a significant part of the investment period. Predictability. Having clearly defined goals. Transparency. Involving all stakeholders. Taking into account contiguous policy areas, such as transport, environment and industrial policy. And taking into account the specific context of a country. Shooting for something that is high, but achievable."

Industry, she emphasises, must also take its responsibility. "Industry must share their knowledge and take a strong role in change management – investing in solutions and implementing changes."

SAME TRACK

The good news is that most countries are "on the same track now", says MacNaughton, "as the success of Paris has shown. Many countries that are now investing in renewables and energy efficiency would have been a real surprise 5 or 6 years ago. A new consensus has emerged."

Nevertheless, the Trilemma report also concludes that "few countries are as yet fully balanced. Overall progress is usually led in one of the three dimensions".

Foucs areas from the World Energy Trilemma: "increase nuclear, hydro and renewables and price carbon"

- Transform supply by diversifying primary energy supply and electricity generation and drive the transition towards low-carbon energy supply.
- Advance energy access by expanding energy infrastructure and enabling connectivity.
- Consider prices by enabling consumer affordability and industry competitiveness.
- Improve energy efficiency across the whole value-chain by increasing efficiency of energy generation, lowering losses in transmission and distribution networks and ensuring demand response.
- Decarbonize the energy sector by increasing the share of nuclear, hydro and renewables in the electricity generation mix and pricing carbon adequately.

The report includes many case studies of countries that implemented policies in one direction at the expense of others. For example, Argentina's electricity price freeze in 2001 stunted the profitability of the energy sector, with a negative impact on energy security. Germany's renewables drive has had a negative impact on affordability. In the US > see page 5

there is concern about the costs of the Clean Power Plan, which the Obama administration imposed after an attempt to set up a nationwide carbon pricing scheme had failed. “The Clean Power Plan adds a layer of complexity for utility companies which are active across different states”, says MacNaughton. “A cap and trade system would have been more efficient.”

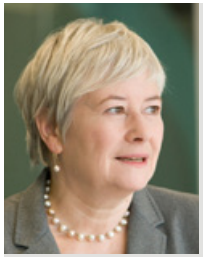
All of this underlines the importance of well-balanced policies, says MacNaughton. She does add that energy policy is not easy to get right for policymakers.

“They face extraordinary challenges. On the one hand, they need to create a market design that encourages innovation in the way energy services are provided and to do this in a way that enables companies to make medium- to long-term bets on their business model. On the other hand, those innovations are going to drive considerable change in the market and in business models, which may make it necessary to adjust the regulations. And at the same time they have to be mindful of the public good of ensuring security of supply. You can’t allow a free for all and let the winners seize the market – you have to ensure that society’s needs for security of supply continue to be met.”

> “A key lesson for countries focused on achieving their COP21 commitments: start now.”

A tall order for policymakers, who, MacNaughton says, “have a grave responsibility to foreswear short term point scoring”. But she is optimistic that it can be done. “We benefit from a sophistication of understanding that is unprecedented. What we must do now is convert that understanding into effective policies”, adding that, “the most successful countries will be those who understand when it is good for the government to set a framework and when it is good to have a hands-off policy.” ●

The 2016 World Energy Trilemma report, produced in partnership with global consultancy Oliver Wyman, and entitled “Defining measures to accelerate the energy transition” can be downloaded from the World Energy Council’s website from Thursday 2 June 2016 [/www.worldenergy.org/publications].



Joan MacNaughton is Chair of the World Energy Trilemma of the World Energy Council.

She is also past President of the London-based Energy Institute. She was Director-General Energy in the UK from 2002 to 2006, Chair of the Governing Board of the International Energy Agency from 2004 to 2006, Senior Vice-President Environmental Policies and Global Advocacy at Alstom from 2007.

She is also a Fellow of the International Emissions Trading Association (IETA)and Distinguished Fellow of the Institute of Energy Economics in Japan, and of the Global Forum of Competitiveness Councils.

Innovations in gas and coal power technology: could they change our energy future?

Two new technologies have been announced in the US in recent weeks that have the potential to revolutionise the electricity sector. Both promise a future in which conventional gas and coal fired power plants emit (virtually) no CO_2 anymore.

A CCS technology that produces instead of consumes energy

US oil company ExxonMobil has announced that it is investing in a new technology, with a partner, FuelCell Energy, which could "substantially improve CCS efficiency, effectiveness and affordability", in particular for natural gas-fired power plants, but also for coal power plants.

It is no secret that CCS, by many regarded as an essential tool to keep global warming limited to 2°C, is struggling. The main problem is that the technology is costly and energy-intensive. The new fuel cell technology has the potential to change: to turn CCS from an energy user into an energy producer. Normally in the CCS process carbon dioxide is extracted from the power plant exhaust with a chemical, after which steam is used to separate the CO_2 from the chemical. As this steam would otherwise be used to move a turbine, the process results in a substantial loss of efficiency.

With ExxonMobil's new technology, the power plant exhaust is directed to the fuel cell, which is then used to generate power. According to the company, a 500 MW power plant using such a carbonate fuel cell would be able to generate an additional 120 MW of power, whereas conventional CCS technology would consume 50 MW of power. Although this sounds promising, there are some caveats. First of all, the technology would still cost money. According to MIT Technology Review, a 500 MW gas-fired power plant would need a 120 MW fuel cell system to capture 90% of the CO_2. This would add about 2 cents per kWh to the cost of electricity. In addition the CO_2 would still need to be transported and stored underground.

Nor has the technology been proven yet. ExxonMobil has said it will first build a small-scale test pilot on a kilowatt-scale, to be be followed by a 2.5 MW pilot plant, before it can be scaled up further.

A gas-fired power station that does not emit CO_2

Perhaps even more promising is an announcement by US company Net Power, which has started on the construction of a "first-of-a-kind (50 MW) power plant that will… produce low-cost electricity with zero emissions". Net Power is a joint venture of some pretty big names in the industry, including Exelon and Toshiba. Instead of a steam turbine, Net Power's plant, which is based on the so-called Allam Cycle technology, uses a combustion turbine that's run on carbon dioxide. "The system burns natural gas with oxygen, as opposed to air, and uses high-pressure carbon dioxide, as opposed to inefficient steam like most power plants, to drive a turbine", says the company. "Net Power produces only electricity, liquid water and pipeline-ready CO_2, all while operating as efficiently as the best natural gas power plants available today."

What is more, "for a small reduction in efficiency, the technology can operate without water, actually becoming a net water producer. For the first time, cleaner energy does not mean more expensive energy, and, as a result, our global climate goals are within reach." The company is also looking into the possibility to use the technology with coal-fired power plants. The pilot plant should become operational next year.

It is not clear yet how much Net Power's system will cost, nor does it provide a solution for the storage of the CO_2. Nevertheless, the fact that the pilot plant is going to be built is significant. The examples of Net Power's Allam Cycle technology and ExxonMobil's fuel cell technology should serve as reminders that the future of the electricity generation sector may look very different from what most of us think. ●

FOCUS ON ENERGY TRENDS

EIA projection: steeply rising CO_2 emissions

The US Energy Information Administration (EIA) has released the 2016 edition of its annual International Energy Outlook *[http://1.usa.gov/Kskpdh]*. The EIA projects substantial growth in global energy use, and also strong continued growth in use of oil, gas and coal. Gas will grow the most – by 1.9% a year up to 2040, followed by oil (1.1-1.5%) and then coal (0.6%/year). Renewables will grow faster (2.6%/year) as will nuclear power (2.3%/year). This will result in a world in 2040 still heavily dominated by fossil fuels (78%) – and with steeply rising energy-related greenhouse gas emissions: from 32.2 billion tons in 2012 to 43.2 billon tons in 2040, an increase of 34%. The EIA does not take into account climate change policy: it simply assumes business-as-usual.

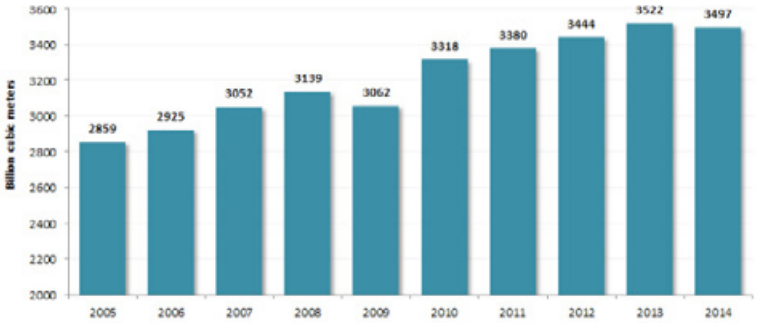
Cedigaz: challenging future for gas

Cedigaz, the International Assocation for Natural Gas, reports *[http://bit.ly/1TRI1W3]* that natural gas demand grew by 1.6% in 2015, after having stagnated in 2014. Cedigaz is not very optimistic about the future: it says that the resumption of growth was mainly due to weather.
It expects "price weakness" to continue in the medium term, and notes that "the future of gas faces many challenges", including competition with cheap coal, the growth of renewables and nuclear, increased efficiency and slower economic growth.

ENI: long-term gas demand up

ENI has published a report *[http://bit.ly/1rVK6Jl]* llooking at gas demand over the last ten years, which should give some comfort to the gas sector. It shows a steady rise until a dip in 2014, which may be temporary:
The only region in which gas demand went down was OECD Europe. As China, India and other Asian countries still have very low per capita gas consumption, there are still prospects for growth. ●

A decade of gas demand



Source ENI

Geopolitical energy risks are increasing in the world. That is one of the conclusions of the third edition of "Energy and Geostrategy", a report from the Spanish Institute for Strategic Studies and the Spanish Committee of the World Energy Council which is quickly gaining international recognition. According to Arturo Gonzalo, Chair of the Spanish Committee, there is "a lack of global governance instruments" to address instability in the worldwide energy sector. But Gonzalo sees positive impacts on international energy relations from the growth of LNG trade and the Paris Climate Agreement.

The "Energy and Geostrategy" report *[http://bit.ly/22gR9st]*, whose third edition has just come out, is the result of a special collaboration between the Spanish Institute for Strategic Studies – an agency of the Spanish Ministry of Defence – and the Spanish arm of the World Energy Council. Arturo Gonzalo, who has been Chair of the Spanish Committee since December 2010, and is also Corporate Director of People and Organisation at oil and gas company Repsol, was one of the initiators of the project. "We felt that energy-related factors have a bearing on the global geopolitical and geostrategic scenario in the same way as the general geopolitical framework places conditions on the parameters that define the energy environment. That's why we approached the Spanish Institute for Strategic Studies, who were very interested to work with energy experts. The result was this annual report, which has already a become permanent fixture in Spain and is increasingly attracting international attention."

The latest edition of Energy and Geostrategy addresses five major topics. It looks at how the low oil prices present a risk to the stability of oil exporting nations. It investigates the threat of terrorism and in particular Jihadism on the energy sector. It presents a geostrategic overview of vulnerable energy maritime routes. It assesses a decisive factor in economic development: the water-energy-food-nexus. And it looks at the geostrategic implications of the growth in LNG trade.

"From a geopolitical point of view, what we see is that the trend is towards less rather than more stability", notes Gonzalo. "There are a great many national and regional conflicts that have a negative impact on energy markets, such as Libya, Iraq or the Middle East." According to Gonzalo, there currently is a "lack of global governance instruments" to counter the growing threat of instability in energy markets.

"The World Energy Council and other international organisations could play a part in improving this global governance witch would enhance geopolitical energy security." This is crucial, he adds, since "energy security and geostrategy are two sides of the same coin. They are closely interconnected."

Gonzalo also sees some positive developments in the geopolitical energy space. The growth of renewable energy is a "stabilising factor", he says, since renewables tend to be locally produced. They do not require imports or means of transport. They do have some geopolitical issues, though, such as the scarcity of rare earth materials which are used in solar PV and wind turbines.

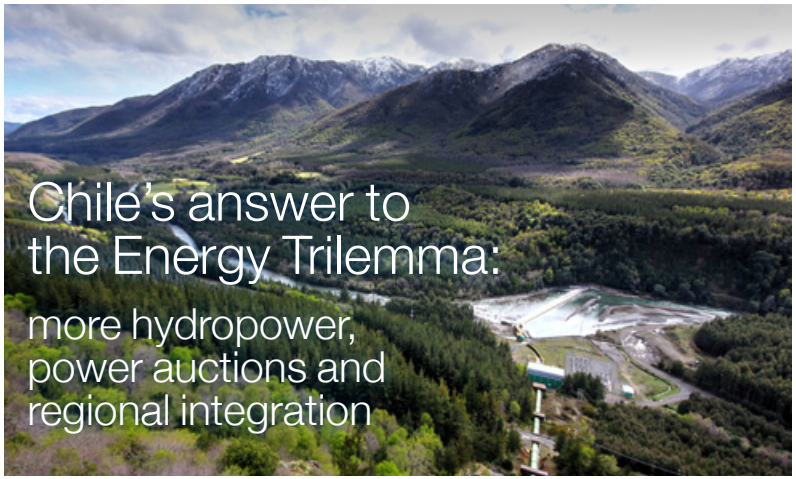
The growth of the global LNG trade will also have largely positive effects, says Gonzalo. "This will reduce dependency of countries on a limited number of sources and on pipeline infrastructure." Spain with its great LNG import cacpacity could play an important role in reducing European dependence on Russian gas, says Gonzalo. "Spain can become a hub for the import of LNG from the US and elsewhere."

The Paris Climate Agreement will also help to give a clear direction to the global energy market, according to Gonzalo. "Everything has changed – or should change – with the Paris Agreement. To keep warming within 2 degrees Celsius is an absolute must for the global energy sector. In this sense, the Agreement is one of the most relevant steps ever taken towards a global energy governance. It will shape the future energy system."

Gonzalo adds that Paris is "only a beginning. We aren't there yet by any means. We should use all options we can to reach the targets, including carbon capture and storage (CCS) and energy efficiency. Renewable energy alone will not be enough."

"The World Energy Council and other international organisations could play a part in improving geopolitical energy security"

For hydrocarbon companies there is a challenge to adjust to the requirements of a low-carbon energy system. Gonzalo's own company, Repsol, has explored several alternative energies, such as offshore wind and geothermal, but has so far not developed those any further. In addition to reducing its own emissions as much as possible, Repsol's strategy consists of gradually becoming more and more a gas rather than oil company. "Renewable energy and gas will gain in importance. But there will still be growth in oil consumption too for the next 25 years." ●



Chile's answer to the Energy Trilemma: more hydropower, power auctions and regional integration

Chile is looking to reduce its fossil fuel import dependency, lower electricity prices, and reduce emissions by increasing the share of hydropower, organising power auctions and pursuing regional integration, in particular with Argentina. "Regional integration will be slower than in Europe, but more successful", says Francesco Giorgianni, Chairman of the World Energy Council for Chile.

Chile has a strong tradition of hydropower, which provides 34% of the country's electricity needs. Thermoelectric plants supply 63%, and just 3% comes from other renewable energy sources, such as geothermal, solar and wind energy, biomass, and small-scale hydro.

National policy is set out in the National Energy Strategy 2012-2030 (Estrategia Nacional de Energía / ENE). This states that by 2050, 70% of all electricity should be produced from hydro. Francesco Giorgianni, Chairman of the Chilean National Committee of the World Energy Council and Head of Institutional Affairs for Latin America with ENEL, comments: "This is problematic. We are experiencing a lot of local opposition to further large-scale hydro development, and there is also the problem of lower rainfall in recent years. The energy-water nexus problem will have to be solved here."

Chile is predominantly an importer of energy resources and in recent years it has been particularly dependent on fossil fuels, the prices for which have increased the marginal costs of energy generation, leading to some of the highest electricity prices in South America. At present, Chile imports 60% of its primary energy, mostly gas from South East Asia through two LNG

Duqueco hydro-facility in Chile
Photo Duke Energy

terminals at Mejillones and Quintero. "This import dependency provides an incentive for a policy aimed at a fully electric, renewables-powered system," says Giorgianni. "Chile has great potential for developing renewable energy – spurred on by its international obligations to meet emissions reduction targets. There is potential to develop 2 GW of photovoltaic capacity in the north of the country – ten times the installed capacity of all of Latin America. However, this remains theoretical – and we must ask, how will this potential be realised?"

POWER AUCTIONS

In a bid to lower electricity prices and increase power capacity, Chile is holding a series of power auctions, and thereby attracting new private investment. Overseen by the National Energy Commission (CNE), the next tender will auction more than 13 TWh and is designed to allocate 29% of Chile's regulated energy supply for the next decade.

"Already through the auctions, the price of electricity has lowered from $120 to $78 per MWh – a huge achievement. However, people do not yet see the lower prices reflected in their energy bills as the effects of the first auctions will not be felt until 2017-2018", says Giorgianni.

Between 2016 and 2019, 4.7 GW of power capacity will be added in Chile, almost half coming from wind and solar projects. Giorgianni: "In terms of increasing renewable energy capacity, wind and PV are likely to develop faster than hydro. The development timeframe (from 2021) of the auction system favours wind and PV development, and small to medium-sized plants."

REGIONAL INTEGRATION

In May 2016, Chile begins energy exports to Argentina, on the basis of an agreement signed between the two countries on 4 December 2015, shortly after the Argentinian general election. Chile will deliver natural gas to Argentina through the NorAndino and GasAndes pipelines. The country will also be exporting power to its neighbour through a major power line which goes from the Chilean area of Mejillones to the Salta province in Argentina.

Giorgianni is enthusiastic about the prospects for further regional integration. "This could be the first region in the world to meet the terms of the Paris Agreement. Much can be achieved with the existing infrastructure – and improved interconnection can help avoid building overcapacity. However, apart from the agreement with Argentina, there are no other formal cooperation mechanisms. There are many organisations active in this space, but up until a few years ago this region experienced significant political instability which precluded formal cooperation between countries".

Chile, Colombia, Ecuador, Peru (and Bolivia as observer) are seeking to integrate their power systems through the Andean Electrical Interconnection System (SINEA) project. Within Chile, last year the government approved the 2014-2015 expansion plan, which provides for the interconnection of the two main electricity grids of the country, the SING (Sistema Interconectado del Norte Grande) and the SIC (Sistema Interconectado Central).

The interconnection is expected to reduce electricity system costs by about US$1.1bn. Electricity bills are expected to fall by $13/MWh for households in Norte Grande (US$3/MWh for the South Central region) and by up to US$17/MWh for industries in Norte Grande (US$9/MWh for the South Central region). The interconnection of the two systems is also expected to boost the development of renewable energies and to reduce uncertainty for operators while increasing competition.

"This is a really big region, and connecting the large power corridors will provide the infrastructure for regional integration. Many countries have yet to complete their own national infrastructure, and it's important not to over-invest in transmission within one country only," says Giorgianni. Referencing the World Energy Council's world map for regional integration in Latin America, he adds, "My guess is that regional integration in Latin America will be slower than in Europe but more successful." ●

MEMBER COMMITTEE EVENTS

Energy Dynamics in a Changing World

Tehran, Iran
30 - 31 May 2016

The 11th International Energy Conference (IEC2016) organised by World Energy Council Iran focuses on energy practice and policies. Sessions and workshops during the forum highlight dynamics in energy finance, structures and institutions, energy technologies as well as in energy and environment and economy.

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FOREN 2016 - Safe and Sustainable Energy

Costinesti, Romania
12-16 June 2016

The 13th Central & Eastern Europe Energy Forum (FOREN 2016) will focus on the main challenges, developments and opportunities of the Central and Eastern European (CEE) power industry for a sustainable development. World Energy Council Romania, the organisers of the conference, expect up to 1,000 energy experts at the event. It offers a deep dive analysis of the CEE region, meant to further on contribute to the development of the "all-round education" in the energy field, and increase awareness for the role energy plays in our lives.

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Market Operations and Climate Change

16-18 June 2016
Acapulco, Mexico

The two major challenges of the Mexican energy sector, market operations and climate change, will be discussed at the 8th Annual Joint Congress of the Mexican energy associations, co-organised by World Energy Council Mexico. Confirmed speakers include Pedro Joaquín Coldwell, Energy Secretary, José Antonio González Anaya, CEO PEMEX and Enrique Ochoa Reza, CEO CFE. The event language is Spanish.

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Energy Scenarios Latin America

Rio de Janeiro, Brazil
12-13 July 2016

This seminar will focus on the main challenges, developments and opportunities described by the World Energy Scenarios 2035 for Latin America and the Caribbean (LAC), which will be launched on the first day. Beyond scenarios experts will discuss the low oil price, regional integration and raise questions such as "What are the impacts of the low oil price on energy industry as a whole?", "How can the hydroelectric capacity facilitate the integration of renewable energy?" and "What actions should the energy sector take to meet the agreements of Paris and at the same time achieve a balanced Energy Trilemma?" World Energy Council Brazil organises this conference free of charge, the event will be held in English and Spanish.

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With only 5 months remaining until the 23rd World Energy Congress kicks off in Istanbul under the theme "Embracing New Frontiers", to date 207 speakers have confirmed their attendance. Confirmed speakers come from 72 countries and include 31 Ministers so far.

The triennial World Energy Congress has gained recognition since the first event in 1923 as the premier global forum for leaders and thinkers to debate solutions to energy issues. In addition to the discussions, the event provides an opportunity for executives to display their technologies and explore business opportunities.

Companies interested in sponsoring the Congress are welcome to contact the appointed marketing consultants from ITE Group plc, *vivian.linecar@ite-events.com*.

For more information not only on sponsorship, but also on the Congress, the call for papers (submission possible until 31 May 2016), and registration visit **the official congress website** *http://www.wec2016istanbul.org.tr/*
Follow the Congress on **Twitter**: *https://twitter.com/WECongress*

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

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- 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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