

22nd World Energy Congress, Daegu 2013



Capturing the Moments

20 November 2013



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World Energy Congress – a truly global event



Daegu 2013 Congress Key Statistics

- **7,560** delegates from **123** countries
- **52** government ministers from **38** countries
- **267** speakers from **67** countries
- **62** sessions over **4** days
- **4** WEC Community Roundtables: WEC Insights RT / WELS / Ministerial RT / GEI RT
- **12** Congress Special Events having more than **70** speakers
- **96** Future Energy Leaders' Programme participants from **44** countries
- **107** Developing Countries Programme participants from **46** countries
- **171** papers selected & presented / **10** winners of the award
- **44** sponsors / **263** exhibitors and **20,000** visitors
- **46** media partners and over **450** media representatives

WEC's Statement ahead of the Daegu 2013 Congress

Exposing the myths, defining the future - It's time to get real to secure tomorrow's energy today.

CHALLENGING THE MYTHS

Myth 1: Global energy demand will flatten out.

The Reality: Energy demand will continue to increase and double by 2050, primarily driven by economic growth in non-OECD countries.

Myth 2: Peak Oil - there is an imminent shortage of fossil fuel resources.

The Reality: There is no shortage in sight. The continued discovery of new resources and the emergence of new technologies that both enable the release of unconventional oil and gas and improve the recovery rates from existing fields have already multiplied the available fossil fuel reserves by a factor of four, and this trend will continue.

Myth 3: Demand growth will be fully met by the new clean energy sources.

The Reality: WEC analysis in the World Energy Scenarios shows that despite significant growth in the relative contribution of renewables from 15% today to a figure between 20% and 30% in 2050, in absolute terms the volume of fossil fuels used to meet global energy demand will be 16,000 MTOE in the Jazz (the more consumer-driven scenario) and 10,000 MTOE in Symphony (the more voter-driven scenario), compared to 10,400 MTOE in 2010. This represents a 5% decrease in the absolute amount of fossil fuels in Symphony but a 55% increase in Jazz.

Myth 4: We can reduce global GHG emissions by 50% by 2050.

The Reality: According to the WEC's World Energy Scenarios, even in the best case we will see a near doubling of global greenhouse gas (GHG) emissions by 2050, compared to where we should be in 2050 to meet the 450 parts per million CO₂ reference adopted by many. At worst GHG emissions could increase by over four-fold.

Myth 5: Current business models and markets are delivering.

The Reality: WEC analysis shows that energy markets are becoming increasingly complex, driven by accelerated change in energy policy, technological innovation, and consumer expectations. Current market designs and business models are unable to cope with the increasing renewable shares, decentralized systems, or growing information architecture.

WEC's Statement ahead of the Daegu 2013 Congress (cont'd)

Myth 6: Current programmes will deliver universal access to energy within the next 10 to 15 years.

The Reality: Universal access is far from becoming a reality. While acknowledging recent progress and current programmes to reduce energy poverty, the WEC's analysis shows that on current paths, between 730 million and 880 million people for Jazz and Symphony respectively will still be without access to electricity in 2030 and between 320 million and 530 million people in 2050 globally.

Myth 7: On a global scale capital is cheap and abundant.

The Reality: Capital is extremely sensitive to perceived political and regulatory risks. Moreover, due to the growing pressures on public finances in most countries, public funds will not be available to substitute or augment the private financing of energy initiatives.

DEFINING THE FUTURE

The global energy environment has increased in complexity. The global aspirations on energy security, access and environmental sustainability are destined to fail unless incisive and urgent actions are taken to both develop and transform the energy system.

1. We are looking in the wrong place. The focus of current thinking about the energy system is biased and inadequate:

If we want to get the greatest social and economic benefits out of our energy systems, the focus must shift from the supply mix to demand efficiency. We need more demand-side investments, innovation, incentives and stronger technical standards to reduce energy intensity. Price controls, subsidies, trade barriers and absolute targets for individual technologies distort the market and can have unintended consequences, so policymakers must use them only sparingly.

2. In order to attract the needed investment national policy and regulatory frameworks have to be balanced:

We need robust, predictable and transparent frameworks that allow the market freedom to exercise informed choices in terms of innovation, technology and investment. The "Energy Trilemma" provides a solid framework for every country to assess its own political risk and work towards balanced, predictable and stable policy and institutional frameworks. The WEC's analysis reveals that there is little agreement between investors and governments on nature, price, and value of risks. It is therefore critical to improve the understanding of the nature of risk and the way to price it. In the absence of such understanding, investment will not flow.

3. We need significant investments in RD&D:

We urgently need to realize the potential of breakthrough technologies such as electricity storage and CC(U)S. WEC analysis shows

WEC's Statement ahead of the Daegu 2013 Congress (cont'd)

that the 450 parts per million CO₂ goal cannot be achieved without CC(U)S. It is essential, therefore, that there are clear and unambiguous policy and institutional frameworks to support investment in this technology to justify its inclusion in roadmaps and carbon emission reduction strategies.

4. The energy map is changing and our institutions need to change to keep pace with developments:

The centre of gravity in energy has moved outside OECD countries – and so are interactions between the countries and regions. In addition, consumer groupings and civil society expect to influence our energy future. Existing multilateral and plurilateral energy institutions need to reflect these changes, be more inclusive and responsive, or risk becoming obsolete.

5. To ensure universal access to energy, policy and institutional frameworks and funds are urgently needed to de-risk and support entrepreneurial approaches:

WEC recognizes the need for urgent additional action and supports the objectives of the UN Secretary General's Sustainable Energy for All initiative. WEC further supports the inclusion of universal energy access as a key and distinct element in the post 2015 Millennium Development Goals. Supporting mechanisms and suitable funding are essential in order to achieve this goal.

6. It's no longer just about mitigation:

Risks from the energy-water nexus, extreme weather events, or cyber attacks (to name but a few) expose our energy infrastructure to potential disasters. We need to urgently adapt, re-think, and redefine the resilience for energy infrastructure.

SOME OF THE REGIONAL IMPLICATIONS OF NON-ACTION ARE:

- In Sub-Saharan Africa 250 to 400 million people could still lack access to energy in 2050.
- Asia will have the highest need for investments in energy infrastructure until 2050, a staggering US\$10 to \$12.5 trillion, compared to US\$3 to \$4 trillion for Europe or North America.
- The Middle East will struggle with increasing demand and energy intensity.
- Europe will struggle with balancing increasing energy prices and GHG objectives.
- North America will struggle with ageing and incremental energy plus issues of transport capacity and infrastructure.
- In Latin America, large hydropower will continue to dominate the energy mix until 2050 and building necessary infrastructure will struggle to meet the expected demand.

We remember ...

Enthusiasm, drive, and a desire to make a difference were the heart of the Daegu 2013 Congress. The Congress was a resounding success and marked a critical milestone in WEC's 90 year history.



22 Key Takeaways from the 22nd World Energy Congress

1. **WEC's Energy Trilemma has become a primary concern for heads of State.**
2. **All sources of energy will be needed to meet the rapid increase in global energy demand.**
3. **Mind the gaps: Climate negotiations are an urgent priority.**
4. **Achieving universal access clearly requires a scale of efforts we have never seen before.**
5. **Even more focus on energy efficiency is critical.**
6. **We are systematically underestimating the power of innovation.**
7. **Political risks must be mitigated to ensure tomorrow's energy investments.**
8. **Shale gas is a revolution, but US shale gas won't change Asian LNG dynamics.**
9. **China is the key to oil market pricing.**
10. **Coal demand will continue to accelerate, but policy uncertainty is killing CC(U)S.**
11. **Without "Symphony," the future of nuclear is uncertain.**
12. **Renewables see a bright future ahead, but regional dynamics are very different.**
13. **The utilities industry needs to adapt to a smart and decentralized system.**
14. **Russia seeks closer energy ties with Asia.**
15. **East Asia weighs up the super-grid plan.**
16. **The outlook for Asian green growth is black.**
17. **The US looks set to achieve net energy self-sufficiency within two decades.**
18. **Latin America is struggling with energy integration.**
19. **A common European energy market is at risk of remaining a pipe dream.**
20. **Untapped resources in Eurasia promise great rewards and challenges.**
21. **MENA: Supply and demand imbalances plague the world's richest energy region.**
22. **Energy access is the golden thread to unleash African development.**

22 Key Takeaways from the 22nd World Energy Congress (cont'd)

1. WEC's Energy Trilemma has become a primary concern for heads of State.

“As the World Energy Council points out, the Energy Trilemma is the most significant challenge.” “Korea will play a leading role in resolving the Energy Trilemma facing the world,” based on the policy of promoting a creative economy.

- **Park Geun-hye**, President of the Republic of Korea

“It is vital that we form a coherent, long-term framework within which to plan and implement future investment. Leadership is needed if we are to address the triple challenge of the Trilemma.”

- **Jung Hong-won**, Prime Minister of the Republic of Korea

“Energy access, energy security, climate change are all very important objectives. The size of this triangle is shaped in a different way from region to region and country to country.” “To find a solution, there are global targets, but there are also regional and national targets that contribute to this global target.”

- **Riccardo Puliti**, Managing Director of EBRD

Countries that live up to the framework of WEC's Energy Sustainability Index will “attract vital investments that will bring jobs and innovations” to their economy.

- **Alistair Buchanan**, Partner & Chairman of the UK Power and Utilities Practice, KPMG

“There is a lot of common ground between industry and government.” “Solving the Energy Trilemma requires a sustainable policy that endures over time, requiring a partnership between industry and government.”

- **John Drzik**, CEO of Oliver Wyman



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

2. All sources of energy will be needed to meet the rapid increase in global energy demand.

The energy market has become more dynamic and confident than ever. But challenges remain. “With the world population projected to increase by 2 billion to 9 billion people by 2050, and the global economy expected to be three or even four times larger, energy consumption is certain to rise significantly.”

The oil and gas resources, “the crown jewels of current and future energy supplies,” should be used efficiently, leveraging them by combining their use with that of nuclear, hydro and renewables.
- **Khalid Al-Falih**, President & CEO of Saudi Aramco

“Natural gas can be the urban fuel of the future. It can help to tackle the pollution crisis in some of Asia’s cities.”

“The Shell scenarios reinforce the scale of Asia’s resource stresses ... also highlight the shift in economic influence from West to East. It’s clear that Asia’s emerging economies have entered a historic phase of industrialization and urbanization.”

- **Peter Voser**, CEO of Royal Dutch Shell

“China’s energy challenges are dire.” Energy demand grew by 5.8% per year when the economy grew by 10% per year.

- **Wang Yumin**, Vice Administrator of China’s National Energy Administration

“It is clear that the main component of the Trilemma is energy security ... Having the largest energy capacity in the world, Russia can submit for international consideration, the issue of establishing transnational energy infrastructure that would guarantee reliable energy supplies to areas with energy production deficit.”

- **Alexander Novak**, Russia’s Minister of Energy

“Seven LNG projects on Canada’s west coast have already entered or cleared the regulatory stage and more applications are being considered, including two on the east coast to service Europe and India.” “Canada will be exporting 60 million tonnes of LNG by end of the decade.”

- **Joe Oliver**, Canada’s Minister of Natural Resources



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

3. Mind the gaps: Climate negotiations are an urgent priority.

“80% of the climate discussion and of the climate solution is energy.”

Governments will draft a Universal Climate Agreement next year with plans to adopt it in 2015. “While there is much mitigation occurring in many different countries and many different sectors, it is very clear that those are not enough.”

- **Christiana Figueres**, Executive Secretary of the UNFCCC

The world should both reduce energy demand and transition to renewable energy sources, warning that harsher climate conditions will perpetuate inequality via food and water insecurity.

- **Samantha Smith**, Leader of Global Climate and Energy Initiative, WWF

“If at the political level, there is real consistent help to invest in new technologies and improve technologies, this would help businesses and customers tremendously.”

- **Philippe Cochet**, Executive Vice President and President of Thermal Power, Alstom

“The developed world needs to share efficient, energy saving technologies with emerging economies in order to offset the effects of crises such as global warming, which some scenarios indicate could rise by 5°C later this century.”

“Water availability is the biggest issue for Africa in terms of climate change. Reuse of water becomes crucially important.”

- **Brian Dames**, CEO of Eskom

“If public opinion is not in favour of new approaches to tackling climate change, governments tend to place less emphasis on developing effective policies to confront the potential scenarios.”

- **Ged Davis**, CEO of Forescene SA

“Adapting human behaviour is fundamental to creating an environment conducive to solving sustainability issues.”

- **Jason Drew**, CEO of AgriProtein



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

4. Achieving universal access clearly requires a scale of efforts we have never seen before.

“Energy is the golden thread that connects economic growth, environmental health, social fairness and opportunity.” “Clean, modern and affordable energy services are essential for sustainable development and achieving the Millennium Development Goals (MDGs).”

- **Ban Ki-moon**, Secretary General of the UN (video message)

“Universal access to electricity should be possible by 2030 but only with international cooperation to increase trading of green energy technology and private capital investment in new projects.”

Energy poor nations to look at policy reforms taking place in Asia and Latin America to attract investment. “Define the right public policies, make them transparent and stable and let private capital flow in the scale that we need.”

- **Kandeh Yumkella**, Special Representative of the UN Secretary General & CEO of SE4ALL, UN

“About 890 million people below the equator use electricity equal to the consumption of New York. There is no equal access to electricity.”

- **Taner Yildiz**, Turkey's Minister of Energy and Natural Resources

“We need to accelerate progress, quintupling the amount of money spent annually to \$45 billion per year if we're going to see MDGs achieved by 2030.”

- **Simon Trace**, CEO of Practical Action

“If it is a centralized system, then we are not likely to involve communities in the decision-making process.” “If it is decentralized, there is scope and potential for involving communities in the implementation and decision-making process.”

- **Sanjit Bunker Roy**, Founder of the Barefoot College

“Developing country governments have a dual responsibility for raising capital to invest in infrastructure and to assist citizens by subsidizing the cost of power supply.”

- **Zola Tsotsi**, Chairperson of Eskom



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

5. Even more focus on energy efficiency is critical.

“Energy efficiency is at the heart of any solution for the Energy Trilemma.”

“Energy efficiency has been called a ‘hidden fuel,’ yet it is hiding in plain sight.” “It’s not just about low hanging fruits, we have to climb the trees of energy efficiency.” We need to “approach energy efficiency as a market, ... All this efficiency can be monetized.”

- **Maria van der Hoeven**, Executive Director of IEA

Calling for the development of an ‘energy epidemiology,’ it is necessary to be more scientific about evaluating how people actually use and respond to energy efficiency tools and initiatives. “Without this we can really risk billions of dollars in this sector without achieving the targets that we are internationally setting ourselves.”

- **Tadj Oreszczyn**, Professor of Energy and Environment, University College London

Whether governments should subsidize energy costs for the poorest consumers emerged as a point of heated debate during the ministerial dialogue.

“Government intervention is necessary so that costly power can reach even the poorest people.” “When you have poverty and import reliance, you have no other choice.”

- **Pradeep Kumar Sinha**, India’s Secretary of Power

Saudi government needs to provide cheap electricity for “air conditioning which needs a lot of energy.”

- **Saleh Alawaji**, Saudi Arabia’s Deputy Minister of Electricity

This drew a comment to the effect that governments should not be spending money to keep inefficient buildings cool with inefficient air conditioners. “High prices inspire innovation.” “In Switzerland you are only allowed to build energy efficient buildings.”

- **Walter Steinmann**, Switzerland’s State Secretary for Energy



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

6. We are systematically underestimating the power of innovation.

Four technical developments which will have a major effect on delivering tomorrow's energy today are: 1) the rise of 'brilliant machines' that can process massive amounts of data and increase productivity; 2) the increased prominence of natural gas as an energy source; 3) the importance of 'distributive power' as the global energy market becomes increasingly decentralized; and 4) the coming age of mainstream renewable energies such as wind power.

- **Steve Bolze**, Senior Vice President and President & CEO of Power and Water, GE

"Due to growing demand, we look at the benefits of a hypothetical ultra-high voltage (UHV) electricity super-grid between Asia and Europe, and one in East Asia, to help deliver clean energy around the world." China has invested \$3.5 billion in the world's longest UHV power line, part of an effort to alleviate the costs of power transmission and to deliver large quantities of power across long distances.

- **Liu Zhenya**, Chairman of SGCC

"There are highly efficient gas turbines, large wind turbines, transmission technology, distribution technology and may more. And the industry continues to work on further innovation."

But "there's practically no country with a market design which fosters an energy triad of economic efficiency. Supply security and sustainability ... there is no transnational energy market ... International cooperation is lacking."

- **Michael Suess**, Member of the Managing Board and CEO of Energy Sector, Siemens

"We should maintain a much broader portfolio of technologies based on a simple fact that we still don't know which will be the one winning, which one the world will be using."

- **Fulvio Conti**, CEO & General Manager of Enel

"It would be wrong to leave energy issues only to the market." "Governments should invest in a wide portfolio" while taking into account their country's strengths.

- **Robert Kleiburg**, COO of ECN



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

7. Political risks must be mitigated to ensure tomorrow's energy investments.

"Annual investment in power generation will have to increase from \$400 billion annually now to \$800 billion by 2030." To ensure the vast amounts of new investment materializes, government will have to strike the right balance between predictability and flexibility.

"Data servers consume 2.5% of the world's energy and that is going to rise." That will give companies such as Google and Microsoft, which have already invested billions of dollars in clean energy projects, a much larger investment role in the future.

- **Guy Turner**, Chief Economist of BNEF

"Funding the development will be a challenge, with roles for both private and state-backed investors ... The increasing amount of investment from international energy developers that have come to Brazil after the country's energy reforms and launching of a new auctioning process."

- **José da Costa Carvalho Neto**, CEO of Eletrobras

Challenges can be met by mixing three sources of funding - public funding through organizations like USAID, charitable contributions, and 'impact investment' or institutional loans.

- **Jim Rogers**, Chairman of Duke Energy

"If the World Bank or development banks would provide some finance as an insurance for other banks to invest in green projects, it would provide a big boost and help capital flow."

- **Prince Michael of Liechtenstein**, Founder & Chairman of GIS

"In Asia, there is plenty of surplus cash available for investment in the energy sector, but "The problem with Asian capital is that people prefer to park it in Europe and the US."

- **S. Chander**, Director General of RSDD, ADB

"90% of the risk in the energy sector is political or market risk," so governments should insure the outcome, so if an investment is made and energy provided, the investor knows they will be paid.

- **Michael Eckhart**, Global Head of Environ. Finance of Citigroup



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

8. Shale gas is a revolution, but US shale gas won't change Asian LNG dynamics.

Despite some uncertainties, shale gas “has been a real revolution for the energy landscape and also for the world economy.” “It’s not a bubble ... The only bubble is in countries which have gas but have no way to export it.”

European energy policies are failures on all three of its objectives, which have resulted in increased CO2 emissions; reduced energy security; high prices and farce competitiveness ... Europe is still hesitating about actively searching for its own unconventional oil and gas resources.”

- **Gérard Mestrallet**, Chairman & CEO of GDF Suez

“The pace and scale of what we see in North America will not and probably cannot be replicated anywhere else.”

- **Martin Houston**, COO & Executive Director of BG Group

While the wave of natural gas expected to be produced from North America’s shale resources is exciting and unpredictable, it is “simply another supply source.”

- **Peter Coleman**, CEO & Managing Director of Woodside Energy

North America can compete for one-third or even half of the estimated 100 million t/y of incremental LNG demand over the next 10 year.

- **Don Wallethe**, Executive Vice President of ConocoPhillips

Long-term US gas will not be the cheapest option, but its competitive advantage is the destination flexibility, which raises the prospect of trading opportunity between the Atlantic and Pacific markets.

- **Shigeru Muraki**, Executive Vice President of Tokyo Gas

“North America is not going to be a price setter.”

- **Russell Girling**, President & CEO of TransCanada



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

9. China is the key to oil market pricing.

“It’s an important demarcation line because we know very little of Chinese demand and inventories.” “Transparency is suffering because of this big black hole of information that’s occurring, not only with China overtaking the US, but as non-OECD markets overtake the position of OECD markets.”

“China needs to take the lead if the world is going to become more transparent.”

- **Edward Morse**, Global Head of Commodities Research of Citigroup

The rise of Asian demand “is being confirmed every day, and that means we need a benchmark for Asia.”

- **Ali Hached**, Senior Adviser to the Algeria’s Minister of Energy and Mining

If change comes, it may be slow. “The oil industry is conservative when it comes to changing practices and adopting new benchmarks.”

- **Gary King**, President & CEO of Tarka Resources

There are widespread concerns that oil prices have been manipulated. But “the truth hurts, but truth is what the price is no matter where you look.”

“If you have two opposite sides of the world, one saying we are not friendly to markets and one saying we are, I wonder what will happen over 5 to 10 years as markets evolve and maybe benchmarks evolve.”

- **Jorge Montepeque**, Global Editorial Director of Platts

The biggest threat to pricing comes from Europe, as policy makers fail to understand the complexity of the oil markets.

- **Peter Caddy**, Director of Global Business Development, Argus



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

10. Coal demand will continue to accelerate, but policy uncertainty is killing CC(U)S.

Global demand for coal will overtake oil consumption by 2018 as China's energy needs to soar. "China can source coal for around \$5 per MMBtu. Pipeline gas is two or three times the cost of coal and LNG is three to four times the cost."

- **William Durbin**, President of Global Markets Research, Wood Mackenzie

"Over the next five years around 600 GW of new power capacity will be built in Asia and over half of this will be coal-fired."

- **Giles Dickson**, Vice President of Alstom

The impact on the environment of coal's continued dominance can be reduced if enough users adopt carbon capture and storage. "This problem is too big for any single nation to solve by itself." "There is no way we can reach the 2050 emission targets unless countries agree to cooperate on carbon capture."

- **Pierre Gadonneix**, Chair of WEC

In some countries, CCUS is the only way they are going to have a low-carbon future. However, "this is not a silver bullet. This is part of the solution."

- **Peter Oosterveer**, Group President of Energy and Chemicals, Fluor

Still views are divided about the merits of CCUS, "Some view CCUS as a way to mitigate CO2 emissions, others view it as an expensive science project."

- **Dave Collyer**, President of CAPP

"Political leaders think in terms of political election cycles of about 5 years and capital investors think in terms of 20 years ... This mismatch in time horizon fundamentally affects the ability to come to an investment decision."

- **Brad Page**, CEO of Global CCS Institute



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

11. Without “Symphony,” the future of nuclear is uncertain.

“Japan’s reactors are shut for political reasons, not for safety reasons.”
“Fukushima questions a certain design at a certain location,” rather than throwing the validity of the whole nuclear industry in doubt.

- **Luis Echavarri**, Director General of OECD Nuclear Energy Agency

“Japan has limited sources of renewable energy such as wind, solar or hydro ... The government has rethought the idea of abandoning nuclear energy.”

- **Zengo Aizawa**, Director Executive Vice President & Chief Nuclear Officer of TEPCO

Poor communication on nuclear safety poses a bigger challenge in the fight against climate change than radiation. “Too often nuclear accidents are treated disproportionately to their actual impact.”

- **Agneta Rising**, Director General of WNA

In spite of the absence of international standards on governance on nuclear issues, “There will be a future for nuclear energy. Access should be given to developing countries. As for legally binding international standards, I do not pour my efforts into that because it is elusive. Rather, we should implement action plans that we agree on.”

- **Yukiya Amano**, Director General of IAEA

“If you want energy security, you can’t do it better than nuclear ... Renewables are great, but you cannot use thermal for backstopping. If you do that, you will have a larger carbon footprint than when you had nuclear. That is what happened in Germany. They increased their renewable, but then turned off nuclear power and increased reliance on some very polluting thermal to make up the difference,”

- **Danny Roderick**, President & CEO of Westinghouse Electric



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

12. Renewables see a bright future ahead, but regional dynamics are very different.

After almost a decade of growth, renewable energy is under immense pressure now. "It's not going as well as it should be. We are not very good at marketing, or working together." "We're not going to be totally renewably powering the world any time soon."

- **Jeremy Leggett**, Founder & Chairman of Solarcentury

"If progress continues at the current rate, renewables would account for 21% by 2030." To meet the UN SE4All target, it requires action on all levels with right policies.

- **Dolf Gielen**, Director of Innovation and Technology Centre, IRENA

Drawing on a history of falling costs since the mid-2000's in China and Germany, it is expected a further reduction in both costs and subsidies, making PVs more viable. "Solar energy is still young, but there have been big advances in the past 15 years."

- **Gao Jifan**, Chairman & CEO of Trina Solar

Clear policies and government regulations are basic essentials to implementing a successful renewable energy mix into a nation's power grid, but what works in one region doesn't always mean the same results can be achieved in another.

- **Jose Luis Aburto**, Planning Director of Mexico's CFE

European government subsidies for new renewable technologies must end in order to save the energy industry from going bankrupt. The technologies are well past their 'infant stage' and no longer need protection from the fossil fuel industry. Renewable energy providers "must assume their own risks in a fair market."

- **Hans Schweickardt**, Chairman of Alpiq Holding

In 2011 global subsidies for renewable energy amounted to \$66 billion. That is compared to fossil fuel subsidies of \$520 billion. "If you really want to do something about renewables, do something about subsidies for fossil fuels."

- **Maria van der Hoeven**, Executive Director of IEA



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

13. The utilities industry needs to adapt to a smart and decentralized system.

“In terms of the power system, in generation, delivery and for consumers of electricity, there has been a tremendous amount of change.” It is critical that the various parts of the power system work together.

- **Michael Howard**, President & CEO of EPRI

The utilities business may be moving towards a decentralized energy system, which can put power sources closer to the consumer, foster the more optimal use of renewables, and increase eco-efficiency.

- **William D'haeseleer**, Chair of the Belgian National Member Committee, WEC

Energy companies have a weak understanding of information communication and technology (ICT) and consumer behaviour. “Consumers are being empowered to generate their own power for less money and a fixed cost.”

- **Colin Calder**, CEO of PassivSystems

The smart grid system is “an information platform ... Once major industry players build out the platform backbone, there will be innovation on that platform by new entrants in the industry that will develop business models on top of it.” Key consumer benefits will be service, reliability, comfort, and peace of mind. The data analysed in smart grid systems will also give providers an opportunity to shape highly individualized consumer offers.

- **Michael Valocchi**, Vice President & Energy and Utilities Global Industry Leader of IBM

Five hundred different smart grid pilot projects are being deployed around the world. “We have to show the successes of those 500 projects,” “But we also have to show the failures. Because we can learn a lot more from the failures.”

- **Ronnie Belmans**, Executive Director of Global Smart Grid Federation



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

14. Russia seeks closer energy ties with Asia.

Rosneft is eyeing projects in the Far East and the Arctic. Off-shore projects offer huge potential in increasing the resource base and offsetting declining production in mature fields. This would help supply oil and gas to Europe and the Asia Pacific.

Rosneft and ExxonMobil are partnering to build a joint LNG plant in Russia's Far East. The first section of the plant is set to be completed by 2018 at the latest, and would have a capacity of 5 million tons per year.

- **Igor Sechin**, President of Rosneft

"One point two billion people in the world don't have access to electric power," and half of those live in Asia. "Russia has very good capacity in exporting energy - where it is the world's leading gas exporter and tied with Saudi Arabia when it comes to oil exports. It is also the world's third largest exporter of coal after Australia and Indonesia."

- **Alexander Novak**, Russia's Minister of Energy

"If a connection is established with Chinese companies and Korean companies we could become a state of the art bridge of huge volumes of power across our territory."

- **Oleg Budargin**, Director General of Russian Grids

RusHydro is cooperating with Korea on tidal power and wave power projects, which is "emblematic of international energy cooperation."

- **Evgeny Dod**, Chairman of RusHydro

"There can be no cheap shale gas ... I'm certain that shale gas will not make a major effect on [global] energy markets." Noting that US water protection laws had to be significantly changed to accommodate shale gas drilling there ... hardly anyone looks at the environmental impact of shale gas."

- **Ivan Grachev**, Chairman of the Committee for Energy, Russian State Duma



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

15. East Asia weighs up the super-grid plan.

“The plan will include linking wind and solar farms in Mongolia as well as hydropower in East Siberia in Russia, to markets in China, Korea and Japan via high-voltage transmission line.”

- **Urban Rusnak**, Secretary General of Energy Charter

Because of the complexities involved and the lack of progress to date, a top-down, master planned approach to establishing an East Asian super-grid may not end up being the quickest, or most effective, route to take.

- **Peter Zeng**, Senior Fellow at the China Electric Power Research Institute of SGCC

Nobody thought North Korea would sign on anytime soon, but “I think North Korea will be participating in this project because it could provide them with economic benefits and that benefit is quite big compared to the scale of the North Korean economy.”

- **Stepan Karapetian**, Senior Director of EN+



16. The outlook for Asian green growth is black.

“Green growth is a good model for Asia, but when I look around at what is happening today, I see black growth driven by coal.”

- **Fatih Birol**, Chief Economist of IEA

“Growth looks like it will be black, but if we don’t change it to green then we’re all in trouble.”

- **Howard Bamsey**, Director General of GGGI

Korea adopted an intensive push of ‘black growth’ from the early 1960s to early 1990s. However, the nation implemented a policy of ‘green growth’ in an effort to lessen its greenhouse gas emissions and become more energy efficient.

- **Young, Soogil**, Co-chair & Director of UNSDSN - Korea Forum



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

17. The US looks set to achieve net energy self-sufficiency within two decades.

“None in 2005 could predict with any certainty what was going to happen with natural gas, so what you have to expect is the unexpected,” and we are happy to see America achieve energy self-sufficiency. - **Ken Hughes**, Alberta’s Minister of Energy,

While oil, gas and coal will remain the bread and butter of the energy mix, innovation across differing forms of energy should continue to maximize their potential. “What we shouldn’t do today is say this is the one we want and we don’t want these.” - **Matthew Mead**, Governor of the State of Wyoming

The Keystone KL pipeline “should be approved. It’s a national security issue for the US in my opinion. Why discourage Canada from sending their oil to the US?” - **Osmar Abib**, Global Head of Oil and Gas, Credit Suisse Group

“We expect to have record-level FDI this year.” Reforms and capital will help improve production in conventional oil fields as well as deep water and shale explorations. - **Emilio Lozoya**, Director General of Pemex



18. Latin America is struggling with energy integration.

Latin America is rich in energy as a whole continent rather than country by country. “Integration can bring combined resources of region together in an efficient manner.”

The successful bilateral projects should provide the building blocks to further integration. “We are still very far away, but I think we are advancing.”

- **Luis Enrique Berrizbeitia**, Executive Vice President of CAF - Development Bank of Latin America

However, more recently the political divide that has opened up between resource nationalist governments and more market-oriented governments has complicated integration. “It would be very difficult to integrate these countries that have very different views about the long-term and way to manage energy.”

- **Jorge Ferioli**, Chair of Argentine Nat’l Member Committee, WEC



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

19. A common European energy market is at risk of remaining a pipe dream.

“We won’t have a common market by 2014.” Regional and national differences, including a mixture of public and private sector utilities and varying regulations, means creating a common energy market still needs more work.

- **Klaus-Dieter Barbknecht**, Member of the Executive Board of VNG

Utilities must “raise awareness of the situation to policymakers” about the threats that national fractionalization poses to the whole European energy sector.

- **Jean-Francois Cirelli**, President of Eurogas

Achieving a fully integrated network will first require the EU to reduce its dependence on foreign suppliers. “Europe should do its best to maximize domestic supply.”

- **Bruno Lescoeur**, CEO of Edison



20. Untapped resources in Eurasia promise great rewards and challenges.

“Cooperation and collaboration is of the essence.” A liberalized competitive market should be created. This would attract investment and foster partnerships with firms in the gas and electric sectors.

- **Selahattin Hakman**, Group President of Energy, Sabanci Holding

“Kazakhstan welcomes more foreign investment.” The construction of a trans-regional pipeline that will deliver natural gas to China is an example of the type of cooperation envisioned.

- **Almassadam Satkaliyev**, Chairman of Samruk Energy

Significant obstacles remain in exploiting these resources and delivering them to export markets. As a solution, South Korea proposed to develop these countries’ infrastructure in return for access to their natural resources.

- **Jeong Chang-seok**, Executive Vice President of KNOG



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

21. MENA: Supply and demand imbalances plague the world's richest energy region.

"We need to move to market prices, but with the current social upheavals moving to market prices will be difficult."

- **Hussain Al-Shahristani**, Iraq's Deputy Prime Minister for Energy

"Algeria is facing many challenges as the result of the growth of its population and the continuous enhancement of its standard of living ... At the same time, Algeria intends to remain one of the major international suppliers of hydrocarbons,"

- **Youcef Yousfi**, Algeria's Minister of Energy of Mining

"The supply costs of certain energy forms are reaching unprecedented lows, while others are reaching peaks." The UAE sees "opportunities" and "tensions" in the shifts.

- **Suhail Mohamed Al Mazrouei**, UAE Minister of Energy

"Egypt needs gas and has reserves, but it has no incentives to develop these resources because doing so would entail higher costs than importing gas that is already available."

- **John Barry**, Country Chair Abu Dhabi of Shell Upstream



22. Energy access is the golden thread to unleash African development.

In Africa, 70% of the population has no access to electricity despite recent rapid economic growth. "In some parts of rural Africa, access to energy is limited to 1% or less."

- **Elham Ibrahim**, Commissioner for Energy and Infrastructure of the African Union

Many problems remain. "Africa has all the resources," but infrastructure and quality of life lag.

- **Pedro Egbe**, Managing Director of Weltek

To keep such change going, "we need real political will and commitment of the decision makers" to build the needed infrastructure.

- **Abel Didier Edme Tella**, CEO of APUA

"If you want to come to work in Africa, don't think of it as a date. Think of it as a marriage. The rewards will be very significant if you build those relationships."

- **Brian Statham**, Chairman of SANEA



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

Additional insights

“The need to include new players at the heart of the international system is very clear.” “This is no longer a world where government and energy industries control things - we’re moving into an open source governance world,” adding there would be increasing instances of tension between national sovereignty and the need for international cooperation.

- **Ged Davis**, CEO of Forescene SA

“Energy in its wider context can bring about huge changes on the social side as well as the environmental side.” “A lot of what we need in the developing world has yet to take place - but it requires us to think outside of our comfort zone.”

- **Leena Srivastava**, Honorary Executive Director of TERI

It is not to be expected for “NOCs will compete with IOCs in the technical frontiers. More doors will also be left open for Supermajors as the US Independents increasingly offload overseas investment to return home.”

- **Tony Hayward**, CEO of Genel Energy

Japan has taken significant steps towards the next generation source - methane hydrate. “If proven, it would meet our energy demand for 100 years. It’s our dream and motivation.”

- **Osamu Watanabe**, President & CEO of JAPEX

“There is up to four times more oil locked in oil shale globally than is proven to exist in conventional oil stores today.”

- **Sandor Liive**, CEO & Chairman of Eesti Energia

Water-less fracking technology or technology that enables to operators to use sea water will revolutionize the unconventional sector.”

- **Adil Toubia**, CEO of Oil and Gas Division, Siemens



22 Key Takeaways from the 22nd World Energy Congress (cont'd)

Additional insights (cont'd)

While e-Mobility still seems a long way off, we should not lose hope regarding e-Mobility or any other form of new energy storage. “Technologies take a while to come to fruition, but ultimately there is progress.” - **Sossina Haile**, Professor of Caltech

“The fusion challenge is much bigger than Apollo ... It’s like a mission to Mars or jumping from the Wright brothers airplane to the jet engine.” It is generally agreed that the middle of this century is a realistic timeline for commercial scale fusion energy, though some it can happen faster.

- **Nebojsa Nakicenovic**, Deputy Director & Deputy CEO of IIASA

“Sustainability is about financial issues,” not just environmental concerns. Waste management officials should “get away from the caveman approach and look at waste as a resource.”

- **Gary Shepherd**, Managing Director of Gradsol

“There is no short-term alternative to petroleum based products. Oil products currently represent 95% of total energy demand for the transport sector ... In 15 years from now, all cars sold will somehow be hybrid,” and it could be 35% more efficient than petro-powered cars and 20% more efficient than diesels.

- **Olivier Appert**, Chairman & CEO of IFP Energies Nouvelles

The use of natural gas power road vehicles offers the potential to reduce vehicle emissions, “However developing the necessary structures for CNG is a long process which has to be fostered by granting the car manufactures, fuel distributors, and road users a visible and stable framework.” - **Jerome Ferrier**, President of IGU

“70-75% of delays on major projects are caused by social and environmental issues, not because of technical failures.” “Companies need to build a ‘bank of trust’ with local people.”

- **Keryn James**, CEO of Asia Pacific, ERM



WEC's Community Roundtables

The **WEC Insights Roundtable** on 14 October 2013 provided a platform for high-level dialogue on WEC Insights and it was an opportunity to have brief presentations and discussions of WEC's flagship studies - World Energy Scenarios, World Energy Resources and World Energy Trilemma - and other perspective reports.

WEC Chairs, Secretaries, Global Partners and Patrons, and selected guests had priority access.

The **Ministerial Roundtable** on 16 October 2013 was an opportunity for the Ministerial community of almost 50 Ministers to meet peers. In the middle of roundtable, WEC and Korean government MOTIE has signed the Daegu Declaration.

The theme of the Ministerial Roundtable was "Securing Tomorrow's Energy Today." Session topics included the most pressing challenges facing energy policy makers: "Balancing the Energy Trilemma" and "Delivering Tomorrow's Energy."

Almost 80 WEC's Patron and Global Partner CEOs and selected guests met at the exclusive and invitation only **World Energy Leaders' Summit (WELS) in Daegu** on 15 October 2013.

The theme of the Daegu WELS was "Are we at a tipping point?" Following an introduction to preview the results of the WEC Issues Monitor from over 90 countries, other session topics explored "Global Gas Market Dynamics" and "The Energy Transformation: Where We Stand."

Global Electricity Initiative (GEI) is driven by WEC, WBCSD and GSEP. The objective of GEI is to showcase voluntary actions that utilities are undertaking to increase access globally to affordable and environmentally friendly electricity.

The aim of **GEI Roundtable** was to bring together global utility CEOs to exchange and promote understanding in achieving climate goals and energy access. WEC is taking forward GEI in the context of the UN SE4ALL goals.



Future Energy Leaders' Programme

The **Future Energy Leaders' Programme** identifies, encourages, and inspires the next generation of energy leaders. This year 96 delegates from 44 countries participated in the programme - one-third of whom were women, an underrepresented group in energy.

Over four days of the Congress, the Future Energy Leaders (FELs) participated in a range of exclusive roundtables designed specifically for young leaders. They exchanged views on innovation, new business models, policies, and scenarios with 20 experts including Sanjit Bunker Roy (Founder of Barefoot College), Christiana Figueres (Executive Secretary of the UNFCCC), Fatih Birol (Chief Economist of the IEA), Salvador Namburete (Mozambique Energy Minister), and WEC's Incoming Chair Marie-José Nadeau.

In advance of the Congress, the young leaders came together to establish peer working groups on 10 critical energy topics. During their on site meeting in Daegu, these groups developed a series of initiatives and tools that they will continue to roll out between now and the next World Energy Congress in 2016.

Future Energy Leaders' Vision

1. Embrace the change

Change always comes much faster than we imagine - just look at what is happening with shale gas in North America. We see a future where these possibilities are everywhere. We have made a choice to embrace this change and we are aware of the consequences.

2. Let's add songs to the playlist

We like to listen to jazz and to symphonies, but we also like rock, pop, and some of us like Gangnam Style. ... There are no "one size fits all" solutions. The ability to adapt and effectively recognize appropriate solutions for each region is essential.

3. Make the most out of it

The traditional links between energy security and natural resources must change and the connections with people, food and water cannot be ignored. ... What we need now is to turn our awareness and our enthusiasm into action. It may require changing our government structures, investment strategies or the way we cooperate.



Congress Special Events

Monday, 14 October 2013

- **The Offshore Wind Energy Forum**
Organized by Korea Wind Energy Industry Association
- **The 4th Future Strategy Forum on Energy and Resources Development**
Organized by Association of Future Strategy Forum on Energy and Resources Development

Tuesday, 15 October 2013

- **Joint Special Event of WEC-Republic of Korea-UNESCAP**
Organized by Ministry of Foreign Affairs, Republic of Korea and UNESCAP
- **The 2nd Meeting of Energy Ministers from la Francophonie**
Organized by International Organization of La Francophonie (OIF)
- **atomic Energy Specialists Outlook Panel (aESOP)**
Organized by Seoul National University, Korea Atomic Industrial Forum, Gyeongsangbuk-do Provincial Government, Gyeongju City, Korea Hydro Nuclear Corp.
- **KETEP Seminar on Energy Technologies (15-16 October)**
Organized by Korea Inst. of Energy Tech. Evaluation and Planning

Wednesday, 16 October 2013

- **Day of Russia: “Green” Energy - Renewable Sources of Energy and Energy Efficiency Technologies**
Organized by Ministry of Energy of the Russian Federation
- **Canadian Day**
Organized by Ministry of Natural Resources of Canada
- **IHA Workshop : Briefing on Hydropower**
Organized by International Hydropower Association

Thursday, 17 October 2013

- **Atlantic Council Workshop**
Organized by the Atlantic Council, KEPCO, Global America Business Institute
- **The 4th UNECE Gas Centre Industry Forum 2013**
Organized by UNECE Gas Center
- **The 2nd Resources Circulation Policy Forum of Korea**
Organized by Resources Circulation Industry Promotion Association



Call for Papers

Experts Forum

A total of about 350 papers from 49 countries were submitted on topics related to the Congress theme of “Securing Tomorrow’s Energy Today.” 171 selected paper authors have been invited to attend the Congress and present their papers at the Expert Forum session.

Tomorrow’s Energy Award

The four category prize winners are:

- **Tatiana Mitrova**, Head of the Oil and Gas Department, Energy Research Center of the Russian Academy of Science, Russia
“The Global Outlook until 2040: The Potential Impact of the Shale Oil and Gas Technological Breakthrough on the Liquid Fuel and Gas Markets”
- **Supanida Wongsomboon**, Senior Accountant, Electricity Generating Authority, Thailand
“The Impact of Renewable Energy on Electricity Tariffs”
- **Omar Ramirez**, Head of Business Development, Artech, Mexico
“New Single Phase Substations as a Real Option for Rural Electrification”
- **Rui Zhang**, Chief Engineer, Shanghai Solar Energy Research Center, China
“Study on Thermal Performance of Photovoltaic Glass Curtain Walls”

In addition, six papers were deemed to have special merit:

- **Andreas Wiese**, Executive Director, Lahmeyer International, Germany
“The German Energiewende: A Model for Other Countries?”
- **Nicolas Vortmeyer**, Head of the Technology Development Lab, Siemens, Germany
“Post-combustion Carbon Capture - Leading Mature Technology for Decarbonization of Fossil Power Generation”
- **Noelia Chimale**, Professor, Instituto Tecnológico de Buenos Aires, Argentina
“Shale Gas Development in Argentina: A Change to the Traditional ENP Business Strategy”
- **Jair Maues**, Consultant, Petrobras, Brazil
“Harvesting Bioelectricity Production in Brazil”
- **Seo In-yong**, General Manager, KEPCO, Korea
“Financial Impacts of Energy Efficiency Resource Standards on the Korean National Electricity Market”
- **Yusuf Mohammad Ganda**, Assistant Chief Technical Officer, Sokoto Energy Research Centre, Nigeria
“The Role of Renewable Energy for Energy Access in Nigeria”



Daegu Declaration of the 22nd World Energy Congress

Proposal to Secure Tomorrow's Energy Today

The World Energy Council and the Ministry of Trade, Industry and Energy of the Republic of Korea have agreed to build on the proceedings of the 22nd World Energy Congress, Daegu and the topics discussed in the World Energy Leaders' Summit and the Ministerial Roundtable to push forward with the following items in their respective areas of activity.

1. The Ministry of Trade, Industry and Energy recognizes that the World Energy Council and the 22nd World Energy Congress have set out meaningful vision for the future direction for the global energy system. **In line with the objectives of the Clean Energy Ministerial (CEM), which will be hosted in Korea in 2014, we agree to inform the CEM of the recommendations of the congress.** The World Energy Council has agreed to support the Ministry of Trade, Industry and Energy in the staging of this event in seeking ways, with the agreement of the CEM secretariat, to develop joint working activities, particularly in relation to the CEM's stated goal of enhancing Public Private Partnership.
2. Building on the 2013 APEC Economic Leaders' Declaration, the World Energy Council has agreed to continue to support the work of APEC in the area of environmental goods and services. **The Government of Korea has already recognized the importance of this issue and has welcomed the World Energy Council's contribution on Rules of Trade and Investment** which has already helped to inform the APEC agreement on tariff caps for 54 types of environmental goods by 2015. We will continue to build on the outcomes of the 22nd World Energy Congress to further this agenda.
3. **We agree to support the objectives of United Nation Secretary General's Sustainable Energy for All (SE4All) initiative and the inclusion of energy in the post-2015 Millennium Development Goals.** A key part of this support has been the dedication of an entire day for deliberations at the 22nd World Energy Congress focused on Securing a Sustainable Energy Future. The World Energy Council also reiterated its commitment to the SE4All Global Tracking Framework process.

Signed, on 16 October 2013, by:

Yoon, Sang-jick, Minister of Trade, Industry and Energy, Republic of Korea

Pierre Gadonneix, Chair of the World Energy Council

Marie-José Nadeau, Incoming Chair of the World Energy Council



***Thank you to everybody
who made the 22nd World Energy
Congress, Daegu 2013
a success.***

For further information, please contact
Ms. Heidi Morgan at morgan@worldenergy.org
Ms. Charlotte Kidd at kidd@worldenergy.org

www.worldenergy.org
[@WECouncil](https://twitter.com/WECouncil)

Next Events

World Energy Leaders' Summit

Astana, Kazakhstan; 20–21 May 2014

World Energy Leaders' Summit

Cartagena, Colombia; 23 October 2014

23rd World Energy Congress

Istanbul, Turkey, 2016

Publications

All WEC studies can be downloaded on
www.worldenergy.org/publications

