CONSEIL FRANÇAIS DE L'ÉNERGIE
WORLD ENERGY COUNCIL

4th European Energy Forum

On the Way to COP21

Paris, 12th – 13th March 2015

CONSEIL FRANÇAIS DE L'ÉNERGIE
COMITÉ FRANÇAIS DU CONSEIL MONDIAL DE L'ÉNERGIE

4th European Energy Forum

Directeur de la publication :
Jean Eudes Moncomble, Secrétaire général

Crédit photos © Conseil Français de l'Énergie

Publié en avril 2015 par :

Conseil Français de l'Énergie
12 rue de Saint-Quentin
75010 Paris
France

Contents

Thursday 12th March

- **Opening speech**
- **Introductory session:**

  THE CONTEXT OF CLIMATE NEGOTIATIONS
- **Session I:**

  OBJECTIVES AND EFFECTIVENESS OF CLIMATE POLICIES
- **Workshop on the Global Energy Trilemma**

Welcome address

Olivier Appert, Chair of the Conseil Français de l'Énergie*

It is a great pleasure and honour to welcome you to the opening of this 4th European Energy Forum. Climate change is a major priority for the planet, although it is not the only one. The French Energy Council is part of the framework established in 1982 that defines the global concept of sustainable development. In that context, the World Energy Council (WEC) has established 3 objectives: access to energy, availability of energy, and the acceptability of energy – the so-called 3-As.These 3-As have guided the thinking of the WEC over the past ten years. After establishing a sustainable development indicator, the WEC is encouraging energy policy makers and climate experts to consider the energy trilemma that covers energy security, energy equity, and sustainable environmental aspects.

Energy security covers energy supply for domestic, national and international use. Accessibility to energy is another important factor – both physical and economic accessibility. Finally, we need a sustainable energy supply and demand system, with a large amount generated by renewable energy sources that do not produce greenhouse gas emissions.

Fighting climate change means that the energy sector must limit its greenhouse gas emissions. Two clearly identified levers make it possible to do this.

- First, we have to improve energy efficiency both on the supply side and the demand side. Energy efficiency is a very power lever for reducing CO_2 emissions. It can also help improve energy security and accessibility. It can also help our economies be more competitive. That was the first recommendation put forward by the World Energy Council, after the World Energy Congress held in Daegu in October 2013.

- Second, we have to decarbonise the energy mix as much as possible. We understand there is a great deal of confusion at the European level between the *objective* to reduce CO_2 emissions on the one hand, and the *means* that will make it possible to achieve this objective on the other. That confusion means that our energy and climate policies are not as efficient as we would hope them to be.

With respect to the decarbonisation of the energy mix, there has been a great deal of discussion of the choice of energy. Given the increase in demand, all forms of energy will have to be used in an integrated and appropriate manner across the planet. It must also be acceptable from a cultural and historical point of view.

In order to make progress in this area, some have called for an economic slowdown or even an economic contraction to address this situation. This is clearly unacceptable for developing countries or for countries dealing with high levels of unemployment. It may

* Find Olivier Appert's pronounced speech on page 71

therefore be preferable to better use the levers that have already been identified – energy efficiency and the decarbonisation of the energy mix. We also have to be more rational in the way we make decisions as to how we use energy. The solutions chosen must be those that have the best cost-efficiency ratio. We have to ensure that we are no longer taking decisions based on erroneous information. Public discussion also has to be of a very high quality. This rationality has to include several dimensions: scientific, economic, technical, social, environmental, industrial and policy dimensions. In that way we can create the conditions for a *discussion* and not an *argument*. It is very important for our economies to evolve against the backdrop of climate change and we must be able to better evaluate what we are doing at the municipal level.

Most of these actions will have an additional cost, and it will therefore be necessary to find new sources of funding. We have to mobilise private capital by providing robust and stable policies. We need efficient tools that will allow us to bring together new technologies and private capital. Energy sector leaders will have to make their projects more transparent and more attractive to investors in order to promote confidence. Another rather iconoclastic solution consists of working with economists, and the WEC has provided support to this type of approach: using the limited margins of manoeuvre available to policy makers today to promote more creative decisions. On the one hand, developed countries have the relevant financial resources and, in most cases, are interested in fighting against global warming. However, the cost of reducing CO_2 emissions is very high. On the other hand, developing countries have the resources necessary to fight climate change but they also need to meet the needs of their populations. The solution therefore lies in cooperation – that is bringing these 2 parties together.

We need to bring together developing and developed countries in order to ensure that their work together is as efficient as possible. Developed countries should use their technological expertise to help developing countries. They could use these efforts to develop new technologies that would be exportable to developing countries. These cooperation efforts have already begun, and were discussed in Rio.

These are some of the ideas we will be exploring over the next 2 days, and I am convinced that our discussions will be both rich and productive.

Jean Eudes Moncomble, Secretary General, Conseil Français de l'Énergie

This meeting is concerned with climate change, which is a global issue that cannot be discussed only from a European or national perspective. To that end, we have invited speakers from all over the world to lead our discussions over the next 2 days.

Day 1 will be devoted to climate and energy policies, on a country and regional basis. We will explore the level of coordination that exists (or not) between climate objectives and other policies. The day will close with a valuable session led by Joan MacNaughton, who will present the Energy Trilemma.

Day 2 will be devoted to finance and international cooperation. It will include a Keynote Speech by the Head of the French Negotiating Team, Paul Watkinson. The Forum will close with a session chaired by Olivier Appert and that will notably include a presentation by the Chair of the World Energy Council, Marie-José Nadeau.

Introductory Session: The Context of Climate Negotiations

- Barry Worthington, Executive Director of USEA (United States of America)
- Rabiou Hassane Yari, Former Minister of Mines and Energy (Niger)
- Teruaki Masumoto, Chair of the Japanese Energy Association (Japan)
- John Ashton, Independent Commentator on Energy, Climate and Politics (UK)

US Private Sector Perspectives Post-Kyoto

Barry Worthington, Executive Director of USEA (United States of America)

The US has experienced record low temperatures through much of the country this winter. Clearly, those of us who are involved in climate change at a professional level know that that one unusually cold winter or one unusually hot summer does not indicate a long-term trend. Nevertheless, for those in the political sphere, who work on the basis of a short-term focus, one cold winter can become enormously important.

It is an honour to be here today. You will all be aware of the very great differences of opinion that exist within the United States when it comes to climate change. Even within the energy industry, we are very splintered when it comes to climate change. The oil industry is not of one mind, nor is the electric power industry. To this, we can add the divergent views of the coal industry, the natural gas or renewables sector, the energy efficiency sector, and the environmental NGOs. In summary, we have nothing short of a recipe for policy gridlock.

The only thing that all of these groups do agree on is the theme of this Forum: acting efficiently against climate change. Whatever the outcome of the Paris Conference – be it a treaty, a protocol or an instrument – it must be economically efficient. Given the size of the issue we face, and the magnitude of actions and investments required, let us be efficient. Let us not structure an agreement that calls for our industry – that is, our customers – to pay for a less efficient approach. We cannot afford to spend capital on technologies that will not achieve the multiple goals with which a post-Kyoto Agreement must deal.

We know that everything that is energy-related is also politics-related. We cannot divorce energy from politics. COP21 is sandwiched between the US 2014 and 2016 elections. In 2014, the US Republican Party regained control of both houses of

Congress. The Democrat Party continues to control the administration, and President Obama has made it very clear that he has no intention of being a "lame duck" President. In this context, the outcomes from Paris are certain to become a political football in the United States, both before and after COP21.

The Private Sector Perspective: 10 Expectations

What does the private sector expect to see in the US negotiating approach in Paris? First, and most importantly, we believe and hope that the base year for measuring emissions reductions will be 2005. This is critical to those of us who will be tasked with implementing emissions reductions. In the past 10 years, we have seen sizable CO_2 reductions in the US. By using 2005 as a base year, the United States will receive credit for the reductions already made.

Second, we believe that the US will make a pledge to cut emissions by 26% to 28% by approximately 2025. Many will say that is not sufficient but it is certainly a beginning to the dramatic emissions reductions that the US is expecting to see by 2050.

Third, we are also seeing signals that there will be an earlier rather than later release of the US Intended National Determined Contribution (INDC). If the United States steps forward well before COP21, that will make other countries bolder than they would otherwise have been. In the recent US-China Agreement, China has for the first time made a pledge to have a date for capping its CO_2 emissions.

Fourth, in practical terms, President Obama's Climate Change Plan announced some time ago is based on 3 pillars: reducing emissions, dealing with increased temperatures, and international collaboration. That has been translated into Environmental Protection Agency (EPA) regulations calling for reduced greenhouse gas emissions on coal-fired power plants. Essentially, no new coal-fired plants will be built in the US without carbon capture and storage facilities. The only wild card we are unsure about relates to whether the EPA will also issue regulations for carbon capture and storage on natural gas fired plants. Most agree that this will occur but are unsure of when it will occur, although most believe that it will be sooner rather than later – probably by 2020.

Fifth, we believe that the United States will accept that the Paris Agreement contains different goals for different countries and different pathways forward. In the past, the US negotiating posture was based on everyone doing the same. Going forward, the US will accept that one size does not fit all.

Sixth, we believe that the United States will insist that the outcome of COP21 be a non-binding agreement. That is, under US law any treaty or a protocol, by definition, has to be ratified by the US Senate. It is abundantly clear today that that ratification will be impossible to achieve today. It is therefore quite obvious that the US will find it very difficult to agree to a text that has to be ratified by the Senate. Therefore, negotiators in the US are tending to refer to such a non-binding text as an "instrument". I realise, however, that many are likely to be disappointed by this US negotiating posture.

Seventh, it will be necessary for the US to resolve the debate about the authority of its executive branch versus its legislative branch. President Obama has exercised many powers by regulation or by executive order. That is certainly the case with US greenhouse gas policies as well as its immigration and healthcare policies.

Eighth, an item that we are completely uncertain about is the US approach to the treatment of forestry and land use patterns, which act as a sink for capturing CO_2

emissions and as a source of CO_2 in the atmosphere. We do not know what stance the US will take in this regard.

Ninth, there is growing recognition in Washington that if COP21 fails, the United Nations Framework Convention on Climate Change is broken and unfixable. As such, the world's countries will move to another mechanism to deal with climate change. The US view in December 2015 will be less important than its view in December 2016, after the next elections.

The Private Sector Perspective: 10 Wishes

The following 10 items describe what the private sector would like to see as the outcome of those negotiations.

- First, industry believes that every technology that has zero CO_2 emissions should be treated in the same way, whether it be nuclear, fossil fuels with carbon capture and storage, renewables, efficiency improvements, or improvements to transmission and distribution.
- Second, by doing so, the policies will leave all energy options open.
- Third, we must incentivise the mobilisation of capital, attracting it to energy infrastructure projects.
- Fourth, industry would like to see equal treatment of all energy sectors, including transport, electricity, agriculture, chemicals, manufacturing, and so on. All of these sectors have to be treated equally in addressing climate change.
- Fifth, we would like to see a reasonable and achievable technology deployment timeline. We believe we can meet the 2030 targets but meeting the 2020 targets will be very difficult with hundreds of facilities needing to be modified at the same time.
- Sixth, we would like to see market-based solutions.
- Seventh, we would like to see simplified bureaucracies, both at the national and global level.
- Eighth, we would like to see sufficient global indication that individual country contributions are meaningful. If greenhouse gas emissions are reduced in Australia by 50% that represents a 0.5% global reduction that would soon be counteracted by China or India. We therefore have to agree that different goals and pathways are possible, with everybody participating in a meaningful manner.
- Ninth, the Paris Instrument must support carbon capture and storage with enhanced oil recovery counted as storage. North America uses CO_2 for enhanced oil recovery far more than any other country, and it is critically important that it is treated as a permanent storage mechanism.
- Finally, we believe in our ability to act efficiently against climate change.

Climate Change in Niger

Rabiou Hassane Yari, Former Minister of Mines and Energy (Niger)

My presentation concerns Niger but is also generally applicable to the whole of Africa. Two-thirds of Niger is covered by desert, much of which contains uranium – an important resource for our national economy. The country has a surface area of 1.27 million km², with a population of 17 million that is growing at 3.9% per year. GNP per capita amounts to US$415, and the country has an inflation rate of 3%.

Niger signed the UN Framework Agreement on Climate Change in 1992. This was ratified in 1995 and entered into force in May 2004. In 1996, a National Council for the Environment and Sustainable Development, the body that coordinates all matters related to climate change. In 1998, it set up the National Plan on the Environment and Sustainable Development. The Technical Commission on Climate Change was set up in 1997, and the National Strategic Plan in 2003. Finally, Niger issued its National Policy on Climate Change in 2013.

Niger suffers from a number of extreme climate events, notably droughts, floods, violent winds, sand storms, bush fires and locust plagues. Certain regions, such as the wet zones, are more vulnerable than others, and a number of socio-economic sectors are also particularly vulnerable: farming, livestock, forestry, health, fishing and transport.

Niger's Energy System

Niger has various energy sources at its disposal: uranium, coal, petrol and gas. With respect to hydroelectricity, work on 3 dams (Kandadji, Gambou, Dyondonga) is beginning or planned. However, solar power and wind power have not yet been very well exploited.

In terms of energy consumption, the figures are relatively low compared to the global average. In addition, 95% of domestic consumption is generated by biomass and there is limited access to electricity (as low as 0.6% in rural areas). With respect to emissions, there has been an increase in emission volumes between 1990 and 2008, but the rate of growth is slightly slowing down.

Extreme Climate Events

The manifestations of climate change in Niger include dust storms, droughts, and loss of livestock, which are all directly linked to climate change. Flash flooding is another major problem. All of this has a direct impact on the country's agricultural sector – declining yields, violent conflicts over land use, a drop in fishing resources – and has resulted in increased levels of malnutrition. Climate-sensitive illnesses are also on the rise, such as cholera or malaria.

A number of actions have been taken to address these impacts. These include the use of drought-resistant strains, the use of small-scale irrigation systems, the rehabilitation of deteriorated lands, the implementation of reforestation measures, and the use of solar power.

We have a great deal of hope for COP21, which should lead to the signature of a new agreement on climate. Developed countries must make more of an effort to achieve the

2°C objective that has been recommended by climate experts. Developing countries must deliver on their commitments to various climate funds (Green Climate Funds, Adaptation Funds, for example). Finally, it is necessary for this new Agreement to take into account the question of food security, which is a major concern for the African continent as a whole.

Expectations of COP21 and the Japanese Situation

Teruaki Masumoto, Chair, Japanese Energy Association (Japan)

I am expecting great progress from the COP21 meeting in Paris. The next international framework for tackling climate change must ensure the participation of all major greenhouse gas emitting countries around the world. When designing the new framework, we must take into account the changes that have occurred post-Kyoto. We must also make a fundamental change to our mind sets.

International Agreements

Since the Kyoto Protocol was adopted in 1997, there have been a number of major changes in the world, notably the replacement of major greenhouse gas emitters. Since 1993, global emissions have increased by 12.4 billion tonnes, a 50% increase in the 20-year period between 1993 and 2013. Of this increase, 11.1 billion tonnes were generated by non-OECD countries, which represent 90% of the total increase. OECD countries contributed only 10% to the increase; Asia Pacific contributed 81% to the increase, the Middle East 10%, Central and South America 5%, and North America 5%. Emissions in Europe decreased, helping to curb the overall increase in global emissions. This structural change means that it will be impossible to reduce global emissions unless non-OECD countries make serious efforts to reduce their emissions. I believe that this cannot be done through an arrangement like the Kyoto Protocol under which developed and developing countries are stipulated differently.

At COP15 in Copenhagen in 2009, it became clear that the debate was deadlocked. One newspaper described the situation as a collapse of the United Nations debate. Meanwhile, we know that international trade negotiations are regularly signed, and we can perhaps learn something from their approach. For example, an agreement could be reached among oil producing countries. Alternatively, cross-border industries could work together and all cities across the world could organise activities with respect to these issues. Various initiatives like these will hopefully be implemented simultaneously.

What is important is to ensure that all major emitting countries participate in the international framework. This can only occur if the framework is developed through a bottom-up and not a top-down approach. It is important that besides talking about historical responsibility of developed countries, developing countries realise their responsibility for the future of our planet. At the same time, developed countries must take a stance based on understanding and tolerance. If all of this is taken into account, I believe that the new international framework will be a flexible and pragmatic one in which all countries recognise each other's differences. The framework must also be a fair and effective one.

Eighteen years ago, the common but differentiated responsibility (CBDR) principle was adopted under the Kyoto Protocol. It was stated that individual country national and

regional development priorities, objectives, and circumstances should be taken into account. The joint US-China declaration issued in November 2014 reflects the CBDR principle. Renewed emphasis has therefore been giving to the taking into account of the different circumstances of individual countries.

The Japanese Situation

Japan has been asked to announce its INDC to the UNFCCC as soon as possible. Today, Japan depends heavily on fossil fuels due to a lack of nuclear power. My personal view is that, without nuclear generation, we cannot achieve our ambitions on greenhouse gas emissions for 2030. Eleven March was the 4th anniversary of the earthquake and tsunami that led to more than 18,000 deaths and the Fukushima disaster. In the past 4 years, Japan has been through its worst energy situation ever. Operations at its 48 nuclear reactors were suspended for 18 months, which has had considerably negative impacts on the economy and has increased CO_2 emissions by 81 million tonnes or +6%. Today, Japan depends almost exclusively on oil, gas and coal for its energy supply. Its loss of nuclear power has therefore made the country extremely vulnerable in terms of its energy security.

Japan has therefore started to discuss future energy mix at an Energy Related Advisory Council. The government faces 2 major challenges before coming to a decision on its 2030 goals. These challenges reflect the general Japanese social situation: restarting nuclear generation and the upcoming local elections in April. These 2 challenges are related to public acceptance of nuclear power. According to nation wide opinion polls in 2014 almost 60% of the public is opposed to the restarting of nuclear reactors, and 60% are prepared to accept the increase in electricity rates related to the shut down of nuclear reactors. This reflects the loss of trust and confidence in nuclear power. Nevertheless, in the areas immediately surrounding the nuclear power stations, the population is more in favour of the restart of nuclear reactors.

In 2014, the current government developed the outline of a new Energy Plan. The plan is quite contradictory. On the one hand, it proclaims the goal of minimising Japan's dependency on nuclear power in the long-term. On the other hand, it highlights the important role of nuclear power and calls for the promotion of renewable energies. At the same time, the current government is in favour of nuclear and has adopted a wait and see stance.

The Chairman of the Government Advisory Council on Energy Policy recently noted that the starting point of the discussion is how far we can pursue energy conservation and how far we can promote renewable energy. Regarding nuclear power, Council members have indicated a share of 15-25% nuclear in the energy mix for 2030. These comments appear to indicate what the energy mix goal for 2030 will look like. Once that is finalised, a draft of Japan’s INDC will be submitted to the UN.

Conclusion

I would like to conclude with a remark addressed to Europe. Two former Japanese prime ministers visited Europe recently: Mr Hatoyama (to Ukraine) and Mr Kan (to the United Kingdom). When visiting a construction site of Wylfa of Horizon, Mr Kan expressed his concerns about nuclear safety. For the past 130 years, Japan has had 62 prime ministers. In the past 6 years, we have had the 2 worst prime ministers ever – a point of view that is generally held in Japan by all influential opinion leaders. Mr Kan is simply an anti-nuclear campaigner.

Less Worldly, More Wise

John Ashton, Independent Commentator on Energy, Climate and Politics (UK)

In my 20 years of involvement in the climate change debate, I have never heard the oil and gas industry be accused of being aloof. That industry has an undeniable interest in the choices that society makes on climate change.

Transition not Transformation

It's hard to foresee no longer-term change in the drivers of supply and demand for oil. That is, it will have no structural consequences for the energy system itself. The history of oil and gas has spanned 150 years, and it is now being asked to play its part in the response to climate change – the greatest challenge the industry has ever faced. The decisions taken by the current generation of CEOs will be decisive, not only for their corporations but for the eventual success or failure of our response to climate change.

The argument is that we can have a *transition* but it should not *transform*. The aim should not be to shift to an energy system that is carbon neutral or even low carbon. Instead we must settle for "lower-carbon" that "makes the difference between poverty and prosperity". As such, fossil fuels should not be ruled out; their emissions should simply be lowered. Therefore, many people urge the adoption of carbon capture and storage, but offer nothing to overcome its main obstacle: the extra costs it involves. Similarly, some call for a well-executed carbon pricing system. However, a carbon price will only ever deliver marginal change.

The Emergence of Non-Linear Politics

We have lived in a period when politics has been linear, and therefore predictable. We are now entering a period of non-linear politics, which will be more difficult to predict and which will welcome new voices: cities, communities, young people, women, consumers. Their voices will drive up our climate ambitions. We know that the low carbon economy is starting to take shape and we know that it works.

The days of yesterday's business model are numbered, and the challenge now is to manage that decline while building a new business that is fit for today. Only in that way will the world be able to accept the oil and gas industry as part of the solution and no longer as simply part of problem.

I would therefore call on the industry to tell us the inspirational story of that transition, backed its knowledge and experience – a new golden age of energy. It should urge its peers to turn their backs on new fracking around the world. It should stop grumbling about renewables and instead unlock the opportunities they offer. It should hasten the development of CCS. The more it turns towards a 2° C world, the more it will see its opportunities.

We hear nowadays a manifesto for the oil and gas status quo, justified by the unsupported claim that the economic and moral cost of departing from it would exceed the benefit in climate change avoided. This speech is worldly; but will the oil and gas industry be led by a choice that is wise?

Panel Discussion

Javier Jiménez Pérez, Repsol (Spain)

You referred to the importance of COP21 in demonstrating the continued usefulness of the UNFCC. Do you believe that a non-binding instrument will allow governments to show their commitment to climate change?

Barry Worthington

There are 2 different answers to your question. It is clear that many countries will not be pleased with a Paris agreement that is non-binding. It is equally clear that our own domestic politics will not accept a binding agreement. An agreement that is not ratified by the United States Senate would be an even worse outcome – it would be no more effective than the Kyoto Protocol has been. A non-binding agreement – that does not have to be ratified by the US Senate – will not automatically be a failure. For example, the United States has already achieved an 18% reduction in CO_2 emissions in the past 10 years. Some is due to the financial crisis and global recession. Some is due to the switch from coal to natural gas for power generation. Some is due to efficiency standards in buildings, appliances and automobiles. The oil and gas industry has voluntarily reduced methane emissions by over 15% in the past 3 years. None of that is related to the Kyoto Protocol or the UNFCCC.

The notion that globally binding agreements are the only pathway to achieving emissions reductions is not substantiated. Domestic politics will be more powerful forces than global ones, simply because citizens vote for domestic political leaders; they do not vote for global political leaders.

John Ashton

The question we have to ask is what we actually expect from the Paris meeting. The problem with the arcane debate on binding versus non-binding is that it reveals something very important to ordinary people. If we want a process that works, the promises made have to have a hard edge to them. The political problem faced in the US – the tension between the Administration and the Congress – is more widely understood and sympathised with around the world than US officials appear to appreciate. Much of the rest of the world sees the need for a process that can produce hard-edged promises of some kind. It would be willing to go far in order to find a way to accommodate the exceptional circumstances of the US. It is therefore very important for US negotiators not to give the impression that they want to pull everyone else down to their lowest common denominator of a non-binding instrument.

From the floor

We face the problem that energy demand has increased dramatically and there is no real way of stopping that without addressing the issue of population growth. Having 9 billion people in the world in 2050 will clearly create even more problems. This issue is rarely addressed in this type of forum, and not enough is being done in this area.

Barry Worthington

The politics of immigration, healthcare and population control are hugely greater than even the politics of climate change. For religious reasons, this is an issue that no politician will want to touch. That is the reality of politics, at least in the US.

Rabiou Hassane Yari

The population issue is indeed neglected in this type of forum, even though it is a decisive matter when it comes to climate change. Niger has a population of 17 million that is growing at approximately 4%. This is an aspect that touches on climate change, food security, family planning and many other issues.

William d'Haeseleer, University of Leuven (Belgium)

We heard of the lack of new investments in carbon capture and storage. Is the main issue not one of a lack of regulatory certainty and policy direction in this area?
As a result, private investors do not know which direction to take. Similarly, we have all – including Europe – forgotten to do systems thinking.

John Ashton

I am very much in favour of systems thinking. There are four tribes at work inside governments today: food security people, water security people, energy people, and climate people. They speak different languages, have different cultures and peer groups, and are quite prepared to pursue policies that contradict each other. There is also a fifth tribe – the macroeconomists. Economic and Finance ministries tend to be the most powerful ministries, and like nothing better than to see the other tribes fighting against each other, as this reinforces their own power.

With respect to regulatory certainty, that is an absolute need. Why is it that investors hesitate to invest in low carbon infrastructure rather than conventional high carbon infrastructure? Because of the perception of political risk and uncertainty which increases the cost of capital. There is therefore much more that politics could be doing by focusing on this issue.

Marc Daoud, journalist (France)

Imagine for one moment that we were to have access to clean, free and limitless energy. Are our economic and political systems mature enough to deal with such a scenario? What would be the short-term consequences of such a development?

Barry Worthington

Reference has been made to any number of such miracle technologies over the years. In the early 1960s, for example, it was considered that nuclear would make electricity "too cheap to meter". In the early 1980s, the new renewables came with a similar promise. Should another such miracle technology emerge, it is likely that someone would find a reason to oppose it. We have gone from NIMBY (*not in my backyard*) to BANANA (*build absolutely nothing anywhere or anytime*), which subsequently evolved to NOPE (*not on planet earth*). The most recent incarnation is DADA (*design, announce, defend and abandon*).

Rabiou Hassane Yari

This is a very difficult question. The issue is the financial investments that are required, which are still too high. For example, Niger is the world's 4th producer of uranium but is not actually able to exploit that resource without a significant injection of finances.

John Ashton

We all know that nothing is completely free – every action has a reaction and the reactions cascade across society. Nevertheless, my generation has lived through a period of incredibly cheap energy. While making the transition to a different structure in

the energy system, there is no reason why we should not be able to satisfy the demands of a growing number of people. This is not a question of cost but of politics. Energy is at the heart of our economic structure. The industrial revolution built a foundation for the growth model on which the energy system is based. If we change that energy system, we will also change the underlying power relations.
The real costs are therefore political costs. We know that we can afford the transition. However, the politics of politics is what makes this so difficult to achieve.

Teruaki Masumoto

We have so many different issues to address: energy, climate change, security, welfare, healthcare, etc. At the same time, resources are limited and it is necessary to prioritise those issues. In some cases, energy and climate change are simply not a top priority.

Karel Beckman, Energy Post (Netherlands)

What form do you think the agreement at COP21 should take? Will this be another Kyoto Protocol?

Teruaki Masumoto

It is important to ensure that *all* emitting countries are invited to move to a low carbon world.

Calin Vilt, WEC (Romania)

In 2007, the US was pushing the smart grid concept. It now appears to be slowing down in this area. Can we push our politicians to better understand such technological developments?

Barry Worthington

In the US, that should be possible. It is becoming clearer and more acceptable that improvements in transmission and distribution technology can also be used to address climate change. President Obama's Climate Action Plan is based on 4 building blocks, and there is now a strong push to add a 5th dimension – transmission and distribution – which improves overall system efficiency and leads to a reduction in greenhouse gas emissions.

Yousef Alshammari, King Abdullah University (Saudi Arabia)

With respect to the question on clean, renewable and abundant energy for all, this would have a significant impact on trade rules and business models. The emergence of technologies such as fusion, space-based solar stations or hydrogen would work for developed countries as they already have the relevant infrastructure. Developing countries would have to make a quick transition to reach the energy systems enjoyed by developed countries.

John Ashton

That underlies the point I made about the relationship between economics and politics. Economic change has political consequences and this is ultimately a question of power relations. We need to understand the political implications of the changes we are trying to bring about. We tend to talk too much about technology and not enough about the politics needed to bring these changes about. We already know how to achieve much higher levels of energy efficiency, and we know how to drive the cost of renewable energies much faster down the cost curve. We also know how to solve the problem of

electricity storage. These problems are therefore not rooted in the technological obstacles; they are rooted in the politics.

James Marshall, BNL Clean Energy (Switzerland)

Different groups have different time horizons for what they want to achieve. Politicians, for example, look to the next election. Are we avoiding the elephant in the room: how can we deal with any of these issues without dealing with those political timelines?

Jean Eudes Moncomble

In this context, I would quote Jean-Claude Junker's comments on another subject matter: "we all know what we need to do; what we do not know is how to be re-elected afterwards!"

Barry Worthington

I completely agree that this is the elephant in the room.

John Ashton

I agree that we cannot fix climate politics unless we fix politics. Nevertheless, politics is the only way that we have to work together and to take decisions together. If we do not use our voice, we cannot complain that it has not been taken into account. Instead of learning how to use their voices more effectively, people – notably young people – are increasingly turning their backs on politics. We will not see an effective response to climate change unless we learn to make non-linear politics work and bring new voices into the process.

Teruaki Masumoto

I believe that this also comes down to a question of education. We have to let citizens know what climate change and energy are all about.

Marc Darras, MD E&E (France)

The debate so far has been focused on supply but how can we regulate demand?

Barry Worthington

It has to be recognised that the solutions on the demand side have to be very different in different countries. The solution in the US where 100% of the population has access to electricity is very different from the solution in Niger or India. That is why it is not possible to impose a one size fits all solution on all countries through a global treaty.

Jean Eudes Moncomble

I would like to conclude this session by asking our panellists which single condition they consider as necessary to making the COP21 meeting a success.

Barry Worthington

That they agree not be legally binding.

Rabiou Hassane Yari

Do not provide credentials to political decision makers!

John Ashton

I would urge us all to listen to young people: they have more of their futures ahead of them and they will have to live with consequences of the decisions made.

Teruaki Masumoto

It is essential for developed countries to be tolerant, and for developing countries to demonstrate their desire to tackle climate change.

Session I: Objectives and effectiveness of climate policies

- Elina Bardram, DG, Climate Action, European Commission (Belgium)
- Florian Haslauer, Partner, Global Leader Utilities AT Kearney (Germany)
- Krzysztof Bolesta, Political Adviser on Climate and Energy (Poland)
- Yousef Alshammari, Postdoctoral Fellow, King Abdullah University of Science and Technology (Saudi Arabia)
- Dominique Finon, Research Director, CNRS (France)

Jean Eudes Moncomble

This meeting is not focused on all those matters on which we agree, as increasing energy efficiency or decreasing carbon intensity. The aim is rather to consider a number of climate policies being implemented in various countries and regions, and to determine if those policies are in synergy with – or contradiction to – other policies. To that end, we have several formidable experts with us today. Climate change is clearly a global issue and it is not possible to consider it only from a European perspective. We were therefore pleased to hear this morning from speakers from US, Niger and Japan. Nevertheless, there is a European dimension to climate policies and I am therefore pleased to turn to our next speaker, Elina Bardram.

Global Climate Politics and Road to Paris

Elina Bardram, DG, Climate Action, European Commission (Belgium)

The European Commission is the EU's executive body, with certain powers in certain areas, including climate policies. The EU is also seen as a proponent of ambitious international climate policies, and has pursuing the creation of a robust and dynamic agreement in Paris later this year.

My presentations will focus on what the EU expects the Paris meeting to deliver. It will also look at what the EU intends to contribute in the context of that Agreement, and at what is needed in terms of a global undertaking to keep us on track with the below 2°C target.

The Paris Protocol

The EU's recently adopted communication is known as the "Paris Protocol", the blueprint for tackling global climate change beyond 2020. It is a key element in the implementation of the Commission's priority to build a resilient Energy Union with a forward-looking climate change policy. It, first, sets out a vision for a transparent and dynamic legally binding agreement, containing fair and ambitious commitments from all parties. Second, it translates the EU's 2030 emissions target into an Intended Nationally Determined Contribution (INDC), which all parties have agreed to put on the table before the Paris meeting. Third, it highlights the key EU policy areas.

The Communication is complemented by a Climate Diplomacy Action Plan, which has been developed jointly with the EEAS. The Plan is aimed at translating the positive political momentum that is building up with respect to COP21 into the conduct of the negotiators.

The Communication responds to the Lima Call for Action, which was agreed in December 2014. The annexe to the Call for Action was the embryonic form of a negotiating text for the Paris Treaty. That 40-page text looked not only at mitigation but also at adaptation – how to respond to the climate events that are already occurring. It is also about finance – how to provide support to the most vulnerable countries. The Communication includes a Table that provides a simple way of communicating the EU's intentions in the context of a post-2020 world. The Communication reaffirms the Warsaw timetable for INDCs – at the end of March 2015, all parties that are in a position to do so should clearly communicate their INDCs. All countries have pledged to do so well in advance of the Paris meeting. Finally, the Communication builds on a contemporary interpretation and understanding of differentiated responsibilities. Climate change cannot be addressed on the basis of a division of roles and responsibilities that date back to 1992. The economic, political and social landscape has evolved enormously since that time. In order to have a meaningful treaty, it has to be dynamic and it has to mirror today's reality.

I would invite you all to consult the Communication on the EU website http://europa.eu/. The Communication is accompanied by a Staff Working Document (SWD) that outlines the different global mitigation scenarios possible. It also shows how we can design a *dynamic* Protocol that comes under regular review.

The EU's Contribution

The EU wants the Paris Protocol to contain a long-term goal. It must contain fair, ambitious and legally binding mitigation commitments for all parties. The Protocol must be dynamic, with 5 yearly reviews in order to increase ambition. There must be robust common rules for transparency and accountability, and for efficient and effective implementation and cooperation.

The EU's INDC has been adopted by the Council and submitted to the UNFCCC. It has adopted an at least 40% domestic reduction in greenhouse gas emissions by 2030, as compared to 1990. There must be an absolute reduction from base year emissions (1990), and it must be economy wide. The policy should also include land use, land use change, and forestry. What we have put forward is both fair and ambitious. It is built on the economic modelling set out in the IPCC 5th Assessment Report: a 60% reduction in global emissions compared to 2010 level would be consistent with the below 2°C goal. We are therefore in the upper end of the IPCC scale.

EU policies are already delivering. We are currently implementing a legally binding, international framework for the period up to 2020: -20% reduction target, +20% renewable energy target, and a +20% energy efficiency improvement. We have reduced greenhouse gas emissions by 19% since 1990, at a time when the EU economy has grown by 45%. That is clear evidence of the de-coupling of economic growth from a growth in emissions. In terms of CO_2 emissions per unit of GDP, the EU is the most energy efficient economy in the world today.

The 2030 Framework differs from the 2020 Framework with its "stretch" target of -40% reduction in greenhouse gas emissions. We have increased the share of renewable energy to a target of 27%. The energy efficiency target has also been increased to 27%, and we have introduced a new interconnectors target of 15%.

The Global Context

If no new action is taken to tackle climate change, there is a risk that temperatures will rise by 3.7-4.8°C. In addition, any delays in taking global action will add even more to high mitigation and adaptation costs.

With global mitigation action, it should be possible to remain below 2°C. This would require a 60% reduction in global emission levels in 2050 compared to 2010, but that is within reach. We know that differentiated action is required, together with gradual convergence. Today, the EU is a service-based economy and we would not expect China, with its industrial structure, to assume similar targets to ours today. That would be politically impossible and economically unrealistic. We know that economic growth can be maintained, especially with recourse to smart policies. Emissions reductions are required by all sectors, and there must be an investment shift in the power sector towards low emission technologies.

The 3 principal emitters (China, the US and the EU) have already announced their intentions, although only the EU has submitted a formal INDC statement. In 2014, China and the US announced that they would peak their emissions in 2030 and ensure that 20% of their energy mix is generated by non-fossil fuel sources. The US has put forward a stretch target of 26-28%.

To remain below a 2°C temperature increase, a contraction of emissions levels will be required. However, to equalise the cost of marginal abatement, greater efforts are required in the faster growing economies. The additional benefits of the global transition to low emissions can be achieved while at the same time ensuring energy security, air quality, innovation, competitiveness, growth and jobs.

In conclusion, it is important to remember that Paris is not an endpoint. The international community will have to regularly revisit its level of ambition, increasing that level as appropriate.

Global Energy Transitions

Florian Haslauer, Partner, Global Leader Utilities AT Kearney (Germany)

I will focus on the lessons that can be learned from the German *Energiewende*, followed by an overview of the global perspective of the energy transition.

Lessons Learned from the German *Energiewende*

Germany has set ambitious targets with respect to the energy transition that go beyond those defined by the EU. That is the case with respect to energy consumption, the use of renewables, and the reduction in CO_2 emissions. It should, however, be noted that Germany's new government has adapted the Renewable Energy Sources Act (EEG) by reducing the growth targets for renewable energy. Further steps of integration renewables into the market should be set. Finally, auction processes will partially replace compensation for electricity fed into the grid. Further capacity mechanisms should be decided in 2016, and a recent study of the German Economics Ministry takes a rather sceptical view of the capacity market.

Energy consumption in Germany is stagnating or even decreasing, although CO_2 emissions are still rising slightly. Power consumption is experiencing a slight decrease, due also to the increase in self-generation by photovoltaic. There has been an increase in the de-coupling between economic output and energy consumption, and in efficiency gains – particularly in the household sector. Consumption has remained relatively constant in the industrial sector.

Due to the introduction of renewable subsidies, their power generation capacity increased 7-fold between 2000 and 2014. Today, Germany has an installed capacity of 90GW in hydro, solar, biomass, photovoltaic and wind. The high proportion of subsidised renewable energy supplies has had a significant impact on the energy-only market. That market is no longer producing the right price signals. Nor is it producing the right investment signals. All in all, the non-market led expansion of renewables has led to situations of extreme prices.

The German market also has a significant impact on other European markets. Industry has gained certain advantages from this situation but households have experienced a negative impact. Going forward, it is believed that the further development of renewables in Germany will lead to significant excess capacity in that country.

My conclusion on the German *Energiewende* is therefore that Germany will lose its status as a role model in this area. The German model is too costly to serve as a case example for the European or global energy transition, even though the German experience is highly relevant to finding the best solutions. Energy policy should be led by one target and not by several targets. CO_2 reduction is the common denominator in Europe and the rest of the world. For Europe, this means it is necessary to revive the emissions trading scheme by reducing warrants. Energy policy cannot be pursued without taking into account the evolution in global commodities markets. Only market-based systems can secure an economically meaningful restructuring of the system.

Global Energy Transitions

I will now turn to a study undertaken by AT Kearney and the German WEC member (Weltenergierat) on global energy transitions. It was based on a review of the facts and figures of the markets, and on interviews with stakeholders. It focused on South Africa, Germany, Brazil, China, Saudi Arabia and the US.

On the global stage, energy policies are less driven by climate policy than they are in Europe. The key drivers in other countries include security of supply, which is very important for emerging countries such as China or Saudi Arabia. Other drivers include the management of growth in energy demand, the optimisation of the cost of energy supply, and the reduction in CO_2 emissions. Going forward, we can expect that the Ukraine crisis will also change the situation in Europe and increase the importance of security of supply in European energy policy.

Several countries face public controversy on energy costs, and the motives and objectives of the energy transition are different around the world. For example, the US is driven by the need to reduce energy costs and reduce dependency on imports. China is motivated by the coverage of energy demand and industrial policy. South Africa is interested in job creation and increasing the use of renewables. Brazil is driven by the need for greater security of supply. National governments have an important influence on the energy transition in their own countries. While all countries are in favour of renewables, they tend to do so through different types of government support and governance. The need to overcome similar challenges and access new energy sources represents a global opportunity. There is enormous untapped energy potential around the world, but investment decisions are complicated by massive uncertainty. The global energy transition therefore opens up tremendous opportunities for companies that are able to manage the uncertainties related to the energy transition.

Conclusion

I believe that we are not yet where we should be. I would have expected that we would have reached the stage of a much higher reduction in costs of renewable technologies, and a much greater improvement in efficiency. We therefore need a significant step forward on photovoltaic with respect to both cost and efficiency. We still need an effective electricity storage technology, and we need further developments in wind technology, for example. Without that, we will not see the development of these technologies at an optimal pace.

AT Kearney's *Global Energy Transition Report* found that even though different countries are in very different situations, they still have much to learn from each other. From the global perspective, climate protection remains an important rationale for all transitions but is not necessarily the key motivation behind the change as it is in Europe and Germany. In many cases, security of supply and objectives related to industrial policy and economic development are the main drivers for energy transition.

Most importantly, it is necessary to find cost efficient ways of driving the energy transition. That will not occur through a regulatory driven approach – which is not a stable environment – but requires a market based approach.

Effectiveness of Climate Policies in Poland

Krzysztof Bolesta, Political Adviser on Climate and Energy (Poland)

Poland is one of the countries that initiated the road to Paris, a fact of which I am very proud. Paris will not be a success unless we are able to convince people that climate action is not a burden.
This has to be a bottom-up process but people will only participant if we can show them that this is a feasible process that is also economically advantageous.

Poland has many problems in its energy sector, and it is making every effort to overcome those problems. Poland's power mix is 86% is coal-based, and it is therefore difficult to talk about CO_2 reduction in Poland. In the EU only Estonia has a greater reliance on fossil fuels. Nevertheless, Poland has managed to reduce its emissions. Average reductions around Europe are close to the Kyoto objectives whereas Poland's reductions are way below that (-30%). In addition, Poland has managed to combine its climate policies with its growth policies. It is the only European economy to have grown throughout the crisis. It has done this through energy efficiency and renewable programmes.

Energy Efficiency

In terms of energy efficiency, our main target was to de-couple energy consumption from GDP growth, and we have succeeded in doing that. We have used the white certificate scheme, which is a good academic case although its merits are less obvious in practice. The objective of the scheme was to achieve an energy saving of 2.2Mtoe by 2016. Electricity, heat and fuel suppliers were required to hold white certificates or pay a substitution fee. The scheme has not been a great success, and we are now trying to back out of the white certificate scheme.

In contrast, the Polish *Termomodernisation* scheme has been very successful. It provides loans to refurbish houses and buildings with a view to improving their energy performance. A total budget of €400 million was allocated to this scheme, and it is working very well.

Renewables

Poland implemented a green certificates scheme, the goal of which was to achieve a 15% share in final energy consumption for renewable energy sources, with a 10% share of bio-fuels in the fuel market by 2020. The scheme has delivered very successfully – so much so that there are now too many green certificates on the market. Poland is therefore looking to adopt a reversed auction scheme to replace the green certificate scheme.

The Polish case studies show that it is possible to deliver with limited funding. With a budget of €100 million – an infinitesimal amount compared to the German *Energiewende* – we managed to raise public awareness of solar heating. Today, 42,000 solar panel installations have been made, and Poland is now the largest manufacturer of solar panels in Europe. In contrast, the biogas scheme – which aimed to achieve a reduction in CO_2 emissions through the co-financing of biogas plants – has not been very successful and has now been scrapped.

Conclusion

Going forward, Poland's performance will remain solid through the further diversification of supply, greater energy efficiency, increased support for renewables, and the promotion of technology development. With respect to diversification, Poland is pursuing gas, shale gas (where it is again the best performer in Europe), and nuclear. In addition, the country will continue to pursue its energy efficiency efforts, i.e. through its Gazela, Sowa and Gekon schemes. With respect to renewables, the new system to be introduced is based on the reversed auction concept. Finally, a government backed green energy accelerator has been introduced: GreenEvo, which provides support to Polish SMEs that are quite active on international markets.

Poland has implemented policy measures that work. The European renewables targets provide a helpful framework. However, fossil fuelled economies need time to carry out their transition. Not many countries can afford schemes such as the German *Energiewende*. Nevertheless, it is possible to achieve results through small budgets. Finally, climate policy is most effective when the public is kept on side.

The Impact of Climate Negotiations on Saudi Arabia's Energy System

Yousef M. Alshammari, Postdoctoral Fellow, King Abdullah University of Science and Technology (Saudi Arabia)

The way we manage the energy system is crucial to the energy transition. Conversion technologies will pay a key role here, as it is in the conversion stage that CO_2 emissions are generated. Conversion technologies therefore represent the focus of much of today's scientific research.

Saudi Arabia is both a developing nation and a chief exporter of hydrocarbons, primarily crude oil. The Kingdom is not rich in natural gas. Nor are its renewable or nuclear sectors developed. Its high level of oil consumption makes it the 11th largest emitter of CO_2, exceeding industrialised countries such as Britain or France. The recent WEC Trilemma Report shows that the Kingdom is totally dependent on oil for its electricity production; it does not produce any electricity from non-hydrocarbon sources today.

In terms of the energy trilemma, Saudi Arabia scored quite well on energy security and energy equity, having achieved universal access to electricity throughout the country over the past 50 years. However, its scores were low with respect to environmental sustainability. That is due to the fact that the power generation sector has not implemented any carbon capture to date. It will therefore have to make a significant effort to improve its environmental impact score.

The Balance between Climate and Development Goals

Saudi Arabia takes international initiatives very seriously. The IPCC's *Climate Change 2013* report shows that climate change effects and response procedures will slow down economic growth, make the eradication of poverty more difficult, and further erode food security. That is, the climate change negotiations and corresponding actions to reduce CO_2 emissions will have an economic burden.

The Kingdom has joined many international initiatives, including the Global Methane Initiative, the Carbon Sequestration Leadership Forum, and the Initiative on Building Efficiency and Reduction of Associated CO_2 Emissions. It has joined with the UK, Norway and the Netherlands to develop CO_2 capture and storage technologies. It has also established a National Committee for the Clean Development Mechanism, and a National Centre that works to raise awareness among, and improve the behaviour of, end consumers. To that end, a fuel economy standard has recently been implemented in order to improve fuel consumption in the transport sector from 12 km/l to 19 km/l.

Measures Adopted to Fight Climate Change

Saudi Arabia has also taken several practical steps towards economic adaptation and diversification. These steps have been taken in the areas of energy efficiency, the use of wind and solar energy, the development of carbon capture and storage technologies, the use of gasification processes, and the implementation of clean energy R&D programmes. Examples of clean technologies that are being explored include the downhole gasification of hydrocarbons with CCS, fuel cells, generation IV nuclear reactors, and renewables.

The Kingdom is implementing a pilot project to reduce carbon emissions through a "CO_2 Enhanced Oil Recovery" project that will reduce emissions by 800,000 tons per year. In addition, the private sector is pursuing actions to reduce CO_2 emissions by a further 500,000 tons per year. Of course these initiatives face certain challenges. They are high cost solutions that also raise a number of environmental concerns relating to stored CO_2. In addition, they represent an issue for water security in a country where drinking water is already a scarce resource.

With respect to energy supply and demand, Saudi Arabia is looking to diversify its national energy mix so as to include renewables and nuclear. It has recently announced plans to invest US$109 billion in solar energy over the next 20 years. By 2032, the aim is for solar to represent 25GW of the Kingdom's energy mix, solar PV to represent 16GW, nuclear to represent 17GW, and wind to represent 9GW. Most importantly, this will lead to a 60% reduction in CO_2 emissions, a 75% reduction in NOx emissions, and a 70% reduction in SO_2 emissions.

KAUST Research Initiatives

The King Abdullah University of Science and Technology (KAUST) was set up to accompany Saudi Arabia's energy transition. Its primary objective is to achieve breakthroughs in technologies in order to both optimise the Kingdom's energy systems and to meet its low carbon targets. In particular, it focuses on membrane technology, solar engineering, the Red Sea (the impact of climate on marine life), water desalination and reuse, catalysis, clean combustion, and desert agriculture.

The Enabling Conditions for COP21

Saudi Arabia believes that the reduction in greenhouse gases must be achieved without undermining economic growth or adversely affecting social development. That approach will continue in the future. King Salman bin Abdulaziz, who was crowned earlier this year, has announced that the diversification of the economy will be an important focus of his reign.

Integrating Climate Objectives in Energy Policy Agendas: the Gap between the North's Climate Policies and the South's Development Policies

Dominique Finon, Research Director, CNRS (France)

There are a number of intrinsic difficulties in finding agreement on matters of mitigation within the climate change debate. It is extremely difficult to solve the climate change problem due to the unavoidable costs that this entails for energy consumers and due to its restrictive effect on development. As such, the mitigation of CO_2 emissions is not a priority in several developed countries or in the vast majority of developing countries. It is therefore virtually impossible to reach binding commitments to limit greenhouse gas emissions. As a result, we have moved from a concept of "fair burden sharing" to a new concept of "fair access to development".

The idea of voluntary contributions to the reduction in global emissions has emerged in the struggle to meet the 2° stabilisation target for 2050. These voluntary commitments would be annexed to the core agreement in the form of Intended National Determined Commitments. These should ideally include a commitment on absolute emissions at different dates on a trajectory until 2050, complemented by programmes on renewables, energy efficiency and infrastructures. They could also include other commitments such as a reduction in carbon intensity, which is better adapted to developing countries. They could also include specific programmes on renewables, energy efficiency and land use, as well as commitments by individual sectors such as the steel or cement sectors. For the least developed countries (LDCs), the provision of external financing and technological transfer could in fact be conditional on the pursuit of certain objectives.

Climate Policy Packages: The Ideal Type

I am quite sceptical with respect to carbon pricing, which is a key element in the "least cost" response. Carbon pricing involves carbon taxes, quotas and ETS, subsidies for clean technologies, and negative pricing in the form of the suppression of fossil fuel subsidies. However, carbon pricing must be complemented by other measures in energy efficiency, renewables, low carbon technologies (CCS, new nuclear...) and energy infrastructures, if its least cost potential is to be realised. This points to the need to merge energy policies with climate policies.

It is necessary to overcome the known market barriers and imperfections with respect to this mechanism. In particular carbon taxes are difficult to implement and, at the end of day, they send a weak or very uncertain price signal to the market. It is difficult to set up an efficient ETS system which sends a credible long term signal, as the EU-ETS shows, and the carbon price should not play a central role in the system – although it can act as a reference price. Low carbon technologies are capital intensive, and it is difficult to recover those costs in a context of uncertain carbon prices.

Ultimately, *complementary* programmes in energy efficiency and low carbon technologies can play a much more crucial role both with respect to the technologies being developed and with respect to behaviour. There is of course some risk of a difference in the marginal costs of mitigation between, which explains that economists generally do not agree with such a statement. But these eventual differences could be

managed by correcting measures, as European countries have recently done with the promotion of renewables in the power sector.

Differences between Developed and Developing Countries

There is a great range of differences in CO_2 emissions per capita between developed and developing countries. The policy objectives of these countries are also very different. But we want to show that policies could converge by the necessary emphasis put on complementary policies. In Europe and many other OECD countries, priority is given to climate and environmental policy. This is also made easier by the convergence of climate policies with energy security objectives.

Within developed countries, there is a group of what I would call **enthusiastic countries** that include most EU-members, Switzerland, Japan, and New Zealand. These countries have adopted ambitious targets for 2020 and 2030. Climate objectives are a priority in the hierarchy of energy policies, and they confer a central role in the debate to carbon pricing, be it an ETS, a carbon tax, or both. However, in practice, the carbon price does not act as an effective incentive to invest in low carbon infrastructure – that require long-term arrangements based on a fixed price, or financial guarantee offered by the state or public funds.

A second group of developed countries are what I would call **indecisive countries**, which include the US, Australia and Canada. Here, it is not possible to reach long-term binding commitments due to the strong influence of lobbies. So there is no implementation of carbon pricing mechanisms. But voluntary commitments remain possible as shown by the present example of the USA. Here a number of policies and measures deal with the promotion of renewables, low carbon technologies and energy efficiency and with emission on existing equipment at the federal and states levels.

The developing countries include a group of **advanced emerging countries** (China, Brazil, South Africa, and Mexico) that have experienced significant economic growth in the past 20 years. They have given priority to industrial growth and export-oriented development, and their level of development allows them to commit to the adoption of an emissions reduction strategy in the short-term. So they accept to announce voluntary commitments, while some of them are introducing carbon pricing, and develop large programs in renewables and energy efficiency.

A number of **intermediary countries** (India, Indonesia…) face significant constraints on their potential economic growth and are not able to commit to a peak in emissions within a definite time horizon. India, for example, is very protective of its right to economic development and supports the principle of “common but differentiated objectives”. However they can show interest for the development of renewables and efficient fossil fuel power generators, compatible with their economic development.

Finally, we have a number of **very poor developing countries** (in particular LDCs) where priority is given to satisfying basic needs and social redistribution. This requires, in particular, the subsidisation of energy products and electricity. This is an acute problem in oil-rich countries with high demographics, where energy subsidies are seen as a fundamental element of the social compromise. In these countries, energy policy is focused on the development of the power sector, local fossil fuel resources, and the financing of new power plants, grids and distribution networks. Nevertheless, there has been some development of solar and wind power on the basis of specific legal frameworks set up for international investors. There is, however, no political will to make efforts based on their own financial resources.

Conclusion

It is unlikely that the Paris Agreement will be a “Great Treaty”. In particular, not only binding commitments could be waited from, but also it will be difficult to obtain voluntary commitments on emissions from the majority of emerging and developing countries. Nevertheless, there is room for hope as it could create a dynamic on many aspects in the form of concrete complementary programmes, for example. We can therefore be more optimistic if the commitments relate not only to absolute emissions and carbon intensity but also to complementary programmes in the energy sector. Such commitments could potentially go much further in achieving a reduction in emissions than would the implementation of a carbon pricing scheme with weak or uncertain price signal.

Panel Discussion

Calin Vilt, WEC Romania

Who carried out the study you referred to in your presentation, and why was Germany selected for analysis?

Florian Haslauer

This was a joint study carried out by AT Kearney and the World Energy Council in Germany. The first part of my presentation on Germany was not based on that Study but was a review of the situation in that country. Only the second part of my presentation was drawn from the Study.

Philippe Paelinck, Alstom (France)

How do you see the future of CCS in Poland?

Krzysztof Bolesta

Public acceptance is still a major issue for CCS in Poland – it is not possible to use enhanced oil recovery and CO_2 can only be put into saline aquifers. Today, that is still too expensive. Furthermore, pubic acceptance of CO_2 storage is a major issue: people are prepared to accept shale gas extraction as it frees Poland from a dependency on Russian gas; however, they will not accept CO_2 storage. CCS is therefore not possible in Poland at this stage.

Karine Siegwart, OFEV (DETEC) (Switzerland)

Two weeks ago, Switzerland presented its INDC, the first country in the world to do so. It set out a -50% objective by 2030. Switzerland is also about to introduce a carbon tax, and has had an emissions trading scheme in operation for some time. Finally, it has many regulatory measures that apply to buildings and cars. Elina Bardram referred to the creation of a European Energy Union. How will it be possible to bring together the member states in an energy union given the very different energy mixes that exist in each country?

Elina Bardram

Our aim is to set a direction for the journey that is agreed to at the European level. We believe that the transition to a low carbon economy is part of our growth and jobs narrative. We believe that investment in low carbon is an investment in jobs and in competitiveness. It will help reinvent stagnant production structures, and allow Europe

to maintain its central position in the global economy. With respect to sharing the effort among member states, the 40% target is divided between the emissions trading scheme and the so-called effort sharing position, whereby all member states contribute according to their respective capabilities. Together, these efforts will deliver the 40%.

Jean-Michel Trochet, EDF (France)

I was impressed by the Polish success in de-coupling of energy and GDP growth. If you put aside industry, how far has the energy consumption of households been de-coupled from GDP growth?

Krzysztof Bolesta

I have not seen separate data for industry and households. In the past 5 years, the forecasts for energy demand have been erroneous. Energy consumption per capita is still relatively low and forecasts always predict that it will continue to increase. However, that has not been the case, as I believe that people are investing in energy efficiency.

Frank Holtrup, WEC (Germany)

Reaching our targets is very costly: the *Energiewende*, for example, costs approximately €20 billion per year. In order to pay for that, our economies have to be competitive at the global level. What are the EU's plans after 2020: will it continue with carbon leakage or will it sacrifice the competitive position in order to reach the targets?

Elina Bardram

The Juncker Commission is all about reducing red tape and improving European competitiveness. Beyond 2020, free allocation will continue. Carbon leakage will, however, be monitored to ensure that carbon leakage does not penalise the most efficient industries. At the same time, 53% of the energy used in the EU is imported, representing an energy bill for imports of €400 billion per year. If we were able to enhance our indigenous renewable energy base through various incentive schemes, we would have a competitive edge while also reducing the energy bill.

James Marshall, BNL Clean Energy (Switzerland)

We have talked about investment and capital, and a repeated message is that investment needs a stable regulatory and policy framework. In your presentation, you referred to "smart regulation". What exactly does that involve?

Elina Bardram

Agreeing on the direction of travel in important in the international negotiations, as it will allow investors to know that their investments will make sense in the long run. The cost of marginal abatement will increase in Europe but our studies indicate that the proposed targets can be achieved by 2050. By that time, the adverse effects of climate change will have made it necessary to carry out a radical shift at the global level.

James Marshall, BNL Clean Energy (Switzerland)

I assume that when you say "smart" you mean "sensible".

Elina Bardram

That is correct; I am not talking about a smartphone application!

William d'Haeseleer, University of Leuven (Belgium)

I am intrigued that the economist present is so sceptical about carbon pricing. I believe that carbon pricing works exactly as it should because of the economic prices, free allocation, and so on. That is, we know why it is *not* working. The cap will decrease by 1.74% to 2030, and then by 2.2%. The European Commission has stated that that downward slope will never be reversed. That is a sign of stability. Why then are economists still sceptical with respect to carbon pricing?

Dominique Finon

I was being slightly provocative in my comments. Nevertheless, they were based on a real conviction. In power sector, for carbon pricing to work for triggering investment in renewables and low carbon technologies by the market power price, the carbon price would need to be very high approximately €100, because you have to face to two realities: first the price risks and the volume risks to recover the high fixed costs of technologies which are capital intensive, second the decrease of hourly market prices as low carbon technologies equipment which have small variable costs become dominant in the power system and set the market prices at low level. However, that very high carbon price raises issues of acceptability. We therefore cannot rely only on carbon pricing but need to introduce other tools as well, as long term contracts with the state guaranteeing a fixed revenue, or mechanisms as feed in premium which have the same function.

Elina Bardram

When industrial production slows down, there is less demand. At times, it is necessary to make corrective moves, which we have done. A market stability reserve to avoid extreme shocks to price in the coming years.

Jean Eudes Moncomble

If you were to remove climate change from the list of policy objectives, what would be at the top of your list?

Florian Haslauer

Security of supply.

Krzysztof Bolesta

Security of supply.

Elina Bardram

The view that energy efficiency is an energy source.

Yousef Alshammari

Innovation.

Dominique Finon

I do not know.

Workshop on the Global Energy Trilemma

► Moderator: Joan MacNaughton, Executive Chair of the World Energy Trilemma Report, World Energy Council (UK)

Jean Eudes Moncomble

I would like to begin by thanking Joan MacNaughton for organising this Workshop for the Forum, and for opening it up to non-WEC members.

Joan MacNaughton

Introduction

I would like to thank Jean Eudes Moncomble and the WEC for allowing us to meet together today. The presentations we have seen today have been extremely informative and educative. This session will be focused on your contributions. This is an open workshop in 2 senses: anyone is invited to attend and anyone is invited to make any comments they like, within the framework of the discussion agenda. In the interests of frank discussion, our discussions will take place under the Chatham House Rule – people can talk about what has been said here provided that they do not attribute any particular contribution to any particular individual without the prior approval of the person. This is being done in the interests of encouraging people to be very frank in their contributions.

The objective is to hear from you what you would really like to see in the Climate Agreement in Paris later this year? What kinds of messages would you like to send to the negotiators? What are the implications of the elements of such a deal for your business or activity? We have a responsibility not to wait until a deal is crafted and then campaign against it. Rather, our job is to help our democratically appointed representatives to get it right the first time.

I have been asked to facilitate this workshop in my capacity as Executive Chair of the World Energy Trilemma Report. I will first set the scene for this topic, and we will then proceed with our discussion session. We will produce reports on those discussions, which we will present to policymakers in the main capitals, and to the negotiators that the UNFCCC secretariat as food for thought as they work towards a Climate Agreement.

Setting the Scene

The three Trilemma goals are energy security, energy equity, and environmental sustainability. It is extremely difficult to balance these 3 goals, as we find when we review 129 countries each year. Only 3 countries out of 129 get into the Top25 for all 3 goals. It is extremely difficult because it is a complex task that is changing very quickly, and the 3 goals are not entirely compatible with each other.

The challenges include the US$48 trillion in investment that is required in energy infrastructure over the next 20 years. Unless we get the policy framework right, we will not enable those funds to flow. The 3 goals do not all point in the same direction and balancing them will become even more expensive the less effort we put in now. For example, China has performed very well in recent decades on energy security. However, it is now having to catch up on environmental sustainability. This could indeed be the greatest challenge facing the Chinese Communist Party in terms of its future legitimacy. One estimate states that, in 2009, environmental problems have cost 3.3% of GDP. That is the problem with having to play catch up. If greater emphasis is given earlier on in the delivery of policies, much of the future cost can be avoided. In addition, environmental pollution is one dimension of our environmental sustainability goal. That 3.3% could be dwarfed by the costs of tackling climate change if we leave it too late – not just mitigation but also adaptation.

Many speakers have referred to the regulatory and policy changes that are needed, and the fact that there is no clear long-term goal or framework for the climate change agenda. The lack of a global climate framework is one of the greatest uncertainties at the global level. That has been the case ever since the World Issues Monitor has been conducted. In Europe, the lack of a climate framework is a top critical uncertainty, even though there has been a strong EU policy on climate-related issues since 2008.

A spectrum of agreements is possible for the climate framework, from the weak (voluntary non-binding agreements with no international monitoring) to the strong (an international agreement with binding targets and international enforcement mechanisms). I personally do not believe that the latter will be achieved. We are more likely to obtain something in the middle of the range, with the real question being how much international monitoring will be agreed upon. Another crucial matter will be the extent to which it will be possible to upgrade the ambition after 2015.

With respect to the trilemma performance of European countries, the EU-28 countries are reasonably balanced, with strong performance on environment and access in Northern and Western countries, and relatively strong performance on security of supply. Eastern countries and Southern countries are slightly less well-balanced. The stability of the EU framework has been relatively helpful in managing some aspects of the low carbon transition. Nevertheless, there are many lessons to be learned. Although businesses want stability they are also prepared to accept flexibility or changes in policy, but only if those changes are likely to improve the operational context and are not just due to political whim.

The EU has already submitted its INDC, setting out a -40% target on greenhouse gas emissions (compared to 1990 levels). The 2030 targets include a 27% share of renewables, and 27% improvement in energy efficiency, but these are not legally binding. The dominant target is therefore on greenhouse gas emissions. It believes this is a fair and ambitious target that is in line with what the IPCC requires. We have moved away from the position to 2020 where the renewables target has undermined the ETS and possibly also progress on CO_2 reduction.

The Paris Protocol should include binding mitigation commitments that are regularly reviewed and strengthened by all parties. Ideally they would be binding but the question of how that would be enforced is still very open. This package should give regulatory clarity, allowing investors to begin to design their strategies to take their businesses to 2030.

Discussion

Questions for discussion:

- What are the biggest challenges and opportunities for the region in adjusting its energy supply?
- What are the biggest challenges and opportunities for the region in adjusting its energy use?
- What type of climate agreement would best align with the region's energy trilemma goals while at the same time maintaining its competitiveness – especially at a time when jobs and growth are such a crucial issue?

The discussion was based on the Chatham House Rule[1] that is why participants' names have not been mentioned below.

Participant 1

I have a question on the demand side. The EU objectives for 2020 could be reached thanks to the lack of GDP growth, and that would also apply to the 2030 objectives. The energy efforts of each sector are therefore not entirely mandatory.

Joan MacNaughton

What would you like to see in the policy to drive greater performance in the different countries, with a greater focus on energy efficiency rather than simply destroying demand?

Participant 1

We have been working with the WEC to develop benchmarking, sector-by-sector and segment-by-segment. That would encourage the sharing of best practices.

Participant 2

First, I would like to raise the paradox of energy efficiency. How will we define energy efficiency in 10 to 15 years' time, when we have a higher proportion of renewables, significant over-capacity and zero marginal cost electricity? People will start consuming more electricity than in the past, which opens up the need for a new definition of "resource efficiency" that exists as part of a broader framework.

Second, we have to make a distinction between self-consumption and the amount of energy bought from the grid. There is much hidden consumption that no longer appears on the meters.

[1] When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.

Joan MacNaughton

The resources are not only the input commodity but also the resources (capital) consumed in the upfront investment.

Participant 2

Energy efficient is a term that everyone uses but it means many different things to many different people.

Joan MacNaughton

That is an important point for energy security, for competitiveness, and for environmental sustainability.

Participant 3

If we consider the affordability of energy efficiency investments, the fluctuating energy prices could also hinder investments in energy efficiency. How can we create incentives for energy efficiency investments in such a volatile environment?

Participant 4

Energy efficiency is a very complex issue. In the past 25 years, Romania has seen a significant reduction in energy consumption due to a loss of industry leading to a crisis in the system. We are also moving from gas to electricity for cooking and heating, and this will also require significant investments. Romania also faces many issues with its buildings, especially in the East where heating is an issue. We need storage systems for wind power, and we need a new market concept for storage, perhaps borrowing from the Californian example, which has been very successful.

Joan MacNaughton

There are 2 important points with respect to our debate. First, policy makers need to consider the whole system – they cannot simply consider one aspect of the system but need to consider the interactions between individual initiatives. Second, research and capacity building, where understanding must be raised at the political and individual levels. The way in which energy is provided and services are used will fundamentally change in the future. People will need to be capable of dealing with that change.

Participant 5

The question of what energy efficiency could look like in a world of low marginal costs has been raised. I would propose a slightly different perspective. We have quantitative objectives based on averages across very different countries. However, we know that the shape of demand matters enormously. We have to interface that complex geography of demand with the equally complex geography of supply. That is the way we should frame with energy efficiency question.

Participant 6

With respect to the first question, I believe the biggest challenge for Europe is how to frame the energy approach of 28 member states when they each have energy sovereignty. We need a detailed bottom-up study on what is feasible in technical and political terms, and that should be conducted grid by grid. We have the tools to carry out such a study today, and it is worth spending part of the €48 trillion on such a study.

With respect to the second question, we need to properly define this term of energy efficiency. However, that will require a whole new set of regulations and we need to assess what is feasible. We also need to decide on the business model that will drive efficiency.

Finally, I believe the INDC approach is perfect for COP21, and could lead to some favourable outcomes. As soon as an INDC is published, we will be able to identify the missing gaps in order to achieve that goal. That could lead to a future approach based on carbon budgets. This is a sensitive issue but is probably the only real approach we could have: each country would have a contribution that is proportional to what they can do. The carbon budget would take into account historical emissions, and the carbon imports and exports of each country. That would put everyone on a level playing field.

Joan MacNaughton

Assuming that the INDC is the first step on the journey, how can we move beyond that? Can we begin to think in terms of carbon budgets?

Participant 7

I fully endorse the statement made. I would like to raise the issue of power transmission and distribution, where a considerable amount of energy is lost. I believe that super grids and smart grids could play an important role here. In the period from 2004 to 2012, Brazil worked to create one interconnected grid of continental size, in conjunction with regional interconnections. I would expect that concept of regional interconnections, together with decentralised energy production, to form part of the discussions in December.

Participant 8

Regarding energy consumption, the morning presentation showed that Niger has a low rate of energy consumption, and biomass represents a major source of its consumption. What does energy efficiency mean in a context like that? Moreover, what could the contribution be from the African continent in terms of energy efficiency?

Joan MacNaughton

Clearly this comes back to what we mean by energy efficiency. It also comes back to the question of how to provide access to energy. Regarding the contribution of the African continent, I would note that the situation is quite different in individual countries. Some have a rather poor result on the amount of energy used to produce each unit of GDP. That indicator is extremely important for the question of affordability, for resources use, and for competitivity.

Participant 9

The Energy Trilemma truly highlights what makes for a good energy service. With respect to energy efficiency, a large part of the investments occur on the demand side. That is not accounted for in the €43 trillion that has been quoted. With respect to the question of energy efficiency in a context of low prices, this is not only a question of the cost of energy but also a question of climate change.

Regarding the issue of the carbon budget, this comes back to the question of a top-down approach. How can we help less developed countries in their approach to the Climate Change Convention? What type of programmes can they implement? Copenhagen was seen as a major failure. However, it was the first time that heads of

state realised that climate change issues were not only environmental issues but also global economic and social issues. I believe that was a step forward. I therefore believe that the INDCs will also form the basis for a further step forward.

Participant 10

That would be true if we were all playing with the same endgame in mind. However, the environment is very low on the list of priorities for emerging countries. Developed countries are trying to balance and environmental priorities with their economic ones. There is therefore a significant conflict between these different priorities.

Participant 11

The “Better Climate, Better Growth” Report was recently published. The OECD has also published a comprehensive study showing that strong environmental regulation does not hinder competitiveness. Europe and Switzerland should therefore go forward and be a model for the rest of the world, showing that these different priorities can be achieved simultaneously. If we do not invest today, adaptation will be much more costly in the future. This could be a strong signal from developed to developing countries, helping them to grow in a better way than we ourselves did.

Participant 4

In 1996, Directive 92 imposed a certain model for the organisation of energy sector companies. This was then modified but some countries had already begun to act on it. Today, the Task Force on Smart Grids does not have the courage to once again change the European Directive. The smart grid concept is a unique concept requiring the redesigning of all networks. We therefore have to change our priorities for climate change.

Participant 12

Will the new small car technologies help to reduce CO_2 emissions?

Joan MacNaughton

A general thread appears to be emerging here: the importance of R&D and innovation.

Participant 2

I would like to come back to the question of energy efficiency. We have been talking about this for 30 years, but we have not yet found the right business model to promote it. One possibility is to raise electricity prices. Another is to have recourse to regulations. Regarding the question of carbon budgets, I would advocate taking a closer look at the ideas of Dieter Helm from Oxford University, which are based on the concept of coal-based import taxes.

Joan MacNaughton

Indeed, we do not account for the carbon we consume throughout import activities. That is related to WEC’s work on the rules of trade, which will be relevant to a post-COP21 world with a higher level of trading in emissions. We are already seeing much more trading in energy commodities in general due to regional shifts in supply and demand.

Participant 8

The INDCs demonstrate each country’s lines of interest whatever their priorities. I therefore see them as a valuable opening.

With respect to automobiles, we also face the question of systems efficiency and mobility efficiency, which is a more complex issue.

Participant 7

Technology providers in a globalised world are increasingly seeking to reduce costs. They therefore tend to focus on cheaper rather than better technologies. R&D is therefore a crucial element for the December discussions.

Participant 6

As an equipment supplier, we strongly believe in the need to protect intellectual property. That is essential for R&D, and leads to the model to be used for technology transfer. For renewables, we are faced with local content rules in many countries. They will not necessarily have a negative impact if they are not introduced too early or before a genuine market has been established.

Joan MacNaughton

I would like to thank you for a very interesting discussion from which I would draw the following key messages.

- First, **energy efficiency**, which we have failed to deliver on except under the extreme pressure of supply constraints. Delivering energy efficiency will require an investment of €8 trillion as well as the right business models, the right approaches to pricing, and the right use of pricing uplifts. If price is not the only answer, what kind of regulation may we need? I believe that, in this respect, business is a core part of the solution to climate change.

- Second, it is necessary to consider these questions from a **systems viewpoint**. It was suggested that Europe needs a detailed study of the power sector on both the demand and supply side. What is technically feasible, what is affordable, and what does that mean for the contributions that an individual country could make? That kind of study could underpin the delivery of the INDC for 2030.

- Third, we talked about the issue of **R&D** and the need for more partnerships between government and business. That was highlighted in the 2012 Trilemma Report but we have not seen much progress in this area in recent years. That remains an important challenge for policy makers. Capacity constraints in developed and developing economies could be crucial for the future.

- Fourth, in terms of the kind of Agreement we might see emerge from Paris; there is a sense that the **INDC model** represents an opportunity to start the journey with all major emitters involved. This could potentially be a very important tool to take us beyond the top-down approach of Kyoto. Kyoto did not fulfil the expectations that people had, and it has not delivered enough in terms of the size and urgency of the climate change challenge. As recognition grows that we can tackle climate change without damaging our economies, we can strengthen the level of ambition implicit in individual and collective INDCs.

We will try and reflect those themes in the report that we plan to produce by May/June. If anyone would like to contribute further thoughts, I would invite them to do so directly with Jean Eudes Moncomble. I also hope you will be active on these issues in your capitals. Policymakers have suffered from the lack of business input, which could help them take a more pragmatic and focused approach.

Friday 13th March

- **Session II:**

  FINANCE

- **Session III:**

  INTERNATIONAL COOPERATION

- **Keynote Speech**

- **Results and Recommendations**

- **Closing Speech**

Session II: Finance

- Matthew Arndt, Head of Environmental, Climate and Social Policy, European Investment Bank (Luxembourg)
- Jean-Charles Hourcade, Research Director, CNRS (France)
- Christophe de Gouvello, Senior Energy and Climate Specialist, World Bank (Brazil)

Jean Eudes Moncomble

This first session will be devoted to the question of Finance both for mitigation and for adaptation which are the two dimensions of climate investment. By way of illustration, it is estimated that US$51 trillion will have to be invested by 2040 in energy infrastructures, including US$15 trillion for energy efficiency alone. Overall, this represents approximately US$250-300 per inhabitant per year. That provides an idea of the efforts that will have to be made as we go forward.

Scaling Up: Rising to the Investment Challenge

Matthew Arndt, Head of Environmental, Climate and Social Policy, European Investment Bank (Luxembourg)

I will begin by noting that scaling up is the problem we face. However, I am not sure that I have the solution.

The European Investment Bank

The European Investment Bank (EIB) is the EU's long-term lending bank, the shareholders of which are the 28 EU member states. It was set up in 1958 by the Treaty of Rome to carry out long-term lending in support of the EU's objectives. It is a policy driven and not profit driven bank. It raises money on the financial markets, using its AAA rating to on-lend with interesting financial conditions to projects that are in the interests of the EU.

As a public institution and a bank, the EIB works within a reference framework made up of the Treaty of Lisbon (Art 11), the Charter of Fundamental Rights of the EU, and international best practice. The EIB's Statement of Environmental and Social Principles and Standards was issued in 2009, and includes a section on climate.

In terms of climate change mitigation, the EU's 2013 Adaptation Strategy has inspired the EIB to move in a certain direction, working with sub-national and national authorities on adaptation projects. The mitigation framework is perhaps better known, with its 20-20-20 targets for 2020, and its 40-27-27 targets for 2030. EU policy is part of the

Bank's DNA; it is what we are supposed to implement both inside and outside the European Union (10% of our operations are conducted outside the EU).

Climate Action

In 2013, the EIB adopted a Statement on Climate Action. It sets out 4 primary objectives for the bank:

- To integrate or *mainstream* climate considerations into all EIB activities and practices.
- To catalyse private sector financial flows using EIB financial leverage and capacity to innovate.
- To provide a range of climate finance solutions, for both mitigation and adaptation purposes, as part of the EU response to the climate challenge.
- To engage constructively with a wide range of external stakeholders.

Mainstreaming climate action involves a range of activities from low carbon to carbon intensive actions. In the low carbon sphere, we have defined a positive list of sectors that are climate action projects (renewable energy, energy efficiency, sustainable transport, etc.). We have a commitment on what we want to do with those sectors. When working in the carbon intensive sphere, we have developed sector-specific guidelines to help us understand what these sectors should be aiming for in the 2030 package (what is a good cement plant versus a less good plant?). Climate aspects are therefore integrated into all investment projects through environmental due diligence, carbon foot printing, economic assessments, etc.).

We have committed that 25% of our lending (i.e. roughly €20 billion in 2014) should got to the positive list, and we have exceeded that share each year since 2010. We have very large projects in renewable energy and sustainable transport. In the energy sector, renewable energies and energy efficiency represent almost half of our lending. We also lend a significant amount to grid-related projects.

The EIB also lends outside of the EU, with a major focus on EU pre-accession countries.

Mainstreaming climate action at the EIB occurs at 3 levels.

- First, the portfolio level, through the target whereby climate action represents over 25% of all lending in 2014-2016.
- Second, the sector level, through sector lending policies, namely in the energy, water, transport, and solid waste sectors.
- Third, the project level, where the EIB is involved in screening for and management of climate risk. It is also involved in the calculation of carbon footprints, and in the use of an economic price of carbon. We rely heavily on cost-benefit analysis for our own decision making, and extend that approach to our investment decisions by embedding an economic price of carbon in that analysis.

EIB Instruments

In terms of the instruments used by the Bank, it is worth noting several newer products: project finance for energy efficiency (PF4EE), or risk-sharing debt products such as RSFF/Innovfin, or project bonds. We also have tailor-made products such as the NER 300, the new entrants reserve for the EU ETS market. All in all, the EIB has traditional loan products, new financial instruments for projects with different risk

profiles, and technical assistance and advisory services to the Commission, to our clients and to member states.

The EIB is one of the largest issuers of green bonds, if not the largest, with €7.6 billion raised in equity to date. It has played a significant role in "growing" the market with it issuance of climate awareness bonds.

In terms of its activities outside of Europe, the EIB is involved in SE4All (sustainable energy for all) and has developed a number of different products around this programme. Examples of its non-EU activities include the Ouarzazate solar project in Morocco and off-grid energy solutions in Sub-Saharan Africa.

According to Bloomberg New Energy Finance, the EIB is the top lender for new build renewable energy projects. It is estimated that €1 trillion in global investments is needed per year in the renewables sector, and the actual investments being made are clearly far from that figure. Therefore, we are hopefully investing in an intelligent manner that is seeding further investment. We also have to attract private investment into this area at a massive level, for example through climate awareness bonds.

Nevertheless, with respect to renewables alone, we believe that we can play a role in directing private finance towards the market. This is of course a challenge, in particular with respect to the affordability of renewables both for governments and consumers. There is also the question of market integration, which is particularly challenging for Europe and will require massive investment in the grid. In summary, maintaining investments at levels consistent with the 2030 EU climate objectives is a challenge which is met in many different ways by the EIB's activities.

Upgrading Climate Finance in Adverse Economic Conditions

Jean-Charles Hourcade, Research Director, CNRS (France)

I will focus on the perspective of the international negotiations. In terms of the unfinished business post-Kyoto, we can refer to a "mental map" that involves a world cap-and-trade system based on a unique carbon price and compensating transfers. However, this raises a number of problems. First, it does not reflect the fact that, in the short-term, significant carbon prices are harmful to the existing capital stock in developed countries, and to the industrialisation process in emerging economies. At the same time, it does not prevent these countries from locking-in to carbon intensive growth pathways. Second, it ignores the fact that technologies are not selected on the basis of their levelized costs. Third, it leads to an adversarial exercise regarding the sharing of a few remains, with no indication of the benefits of cooperation.

With respect to "finance" and energy prices in an uncertain world, we can see that the best technology will not necessarily attract investors unless we are able to reduce the risk of bankruptcy that this involves.

Funding the Low Carbon Transition in an Adverse Economic Context

The main question is how, under the constraint imposed by the 'common but differentiated responsibility principle' we can increase the funding available in a context

of depression economics, public debt and the rebalancing of the world's economic equilibrium. This context goes to exacerbate donor fatigue and reinforces the resistance to explicit or implicit carbon pricing. There is also the problem of orders of magnitude with respect to incremental investments of below 0.5% of GDP in non-oil and gas countries. We also have the problem of leveraged investment costs, upfront investment costs, and induced investment costs. Finally, we face the issue of redirected investment, which is equivalent to 8-9% of gross capital formation.

We could however consider turning the question upside down in order to mobilise the so called "climate agnostic" policymakers. Rajan Raghuran's work, *Fault Lines*, has pointed out that we have created a regime in which there are considerable savings in the world but no one knows where to invest them – the dilemma of Buridan's Donkey. This is due to the continued risk of depression versus the risk of unleashing speculative bubbles. In addition, the banking system is still fragile and in the process of deleveraging. Finally, we face tensions to a currency Cold War.

Because a massive redirection of investments concerns 40% of all economic sectors, climate policies can stimulate an inclusive growth recovery. As such, climate finance cannot remain on the margins of global finance. Low carbon finance is a good candidate here. It would enable savings to be redirected towards infrastructure and industry. It would revitalise the industrial fabric of OECD countries, and ensure more inward-oriented growth in emerging economies. Finally, it would results in a more resilient financial and monetary order.

Climate Remediation Assets (CRA)

A CRA would help achieve a number of objectives. It would inject liquidity into the system, provided that it was used for low-carbon investments. It would resolve the Buridan's Donkey dilemma by providing a public guarantee to lower risk. It would enhance the solvency of low-carbon entrepreneurs, and attract the banking system due to better compliancy with its prudential constraints. Institutional investors would be interested in carbon-based financial products as a way of attracting savings, and it would trigger a wave of investment in infrastructure.

I would set out the following potential mechanism for the CRA. Such a mechanism would be anchored in an agreement under the UNFCCC on the value of climate remediation per ton of avoided carbon emissions. Voluntary commitments could be made by "clubs" of governments to back a certain quantity of CRAs every 5 years. Central banks could open credit lines and accept carbon certificates as repayment. An independent supervisory body would certify the eligibility of projects and secure the statistical additionality of the system through the allocation rules for the carbon certificates. Finally, asset swaps would occur after project completion was certified, and the CRAs would appear on the balance sheets of central banks.

The mechanism would result in the value to climate remediation asset (VCRA), which is a notional value and not a carbon price. It would act as a signal of the political will to do something about climate change. It would increase over time, acting as a counterbalance to the role of the discount rate against the investment in older capital stocks. It would also act as a surrogate for a global price signal. As such it would not harm existing capital stock and would avoid the fragmentation of climate finance. Finally, it is politically negotiable. The VCRA differs across countries but is conditional upon the content of their development policies. Different countries may therefore accept similar VCRAs for different reasons, including various views of the co-benefits of climate mitigation.

Conclusion

The journey to COP21 will be fruitful only if it lays the foundation for a new global 'social contract', around the protection of our global commons. An upgraded system of climate finance is part of this contract contributing to equitable access to development thanks to long-term infrastructure investments. This contract will be realised only if decision- makers without primary interest in climate protection are convinced that it can contribute to addressing the economic and political challenges they face in a still-unstable world economy.

By creating a CRA device, developed countries would assume their historical responsibility in both climate change and global financial crisis. Ultimately, all countries are interested in finding pathways that navigate between extreme monetary rigour, which freezes economic growth, and extreme laxity which fuels speculative bubbles and debt risks. They could also envisage carbon assets becoming a recognized reserve currency and one element of SDRs, resulting in less exposure to fluctuations in currency markets and domestic asset prices.

It would be argued that a CRA device is a diplomatic 'non-starter' on the basis that the UNFCCC is not empowered to address monetary issues. But the UNFCCC would not exceed its mandate by providing hooks for advances in other fields in global governance. The CRA mechanism represents a not-to-be-missed opportunity for securing these advances to be aligned with UNFCCC objectives. This will obviously be beneficial for the energy sector by reducing risks due the overall regulatory uncertainty surrounding this sector, uncertainty of which the climate affair is one critical dimension.

Jean Eudes Moncomble

You have very clearly shown that the current system is not optimal. We need a real breakthrough if we are to work better in the future.

Development and Climate: Twin Challenges for Energy Sectors in Developing Countries

Christophe de Gouvello, Senior Energy and Climate Specialist, World Bank (Brazil)

I will be presenting my personal views and not the official views of the World Bank.

I will begin by indicating the order of magnitude of the gap in the reductions that we will need to fill in order to stabilize emissions to an acceptable level: we need to reduce emissions from 60 in the baseline scenario to 30 gigatons of emissions per year by 2030. However, emission reductions in Annex 1 countries are only around 21 $GtCO_2$/ year in 2030. This means that reducing these emissions alone will not be sufficient to meet the greenhouse gas emissions targets. Nor will emission reductions by non-Annex 1 countries if all are converted into carbon emissions offsets. Scaling up the reduction efforts in non-Annex 1 countries beyond zero-sum offsets is therefore necessary if we wish to close the gap.

The Mitigation Potential of Developing Countries

At the same time, the potential to mitigate does exist in developing countries. The example of an inventory of potential low-carbon projects in Sub-Saharan Africa shows that there is huge potential for future energy development at zero additional emissions. We used the CDM as a lens to track potential low carbon energy projects in the region, in the power generation, transport and consumption domains. Overall, for the 44 countries considered, we found that there were over 3,000 potential low carbon energy projects in this region, with a potential to save up to 740 million tons of CO_2 per year. At the same time, they could produce up to 1,244 TWh of additional electricity per year. The investment cost of these projects would be approximately US$157 billion.

A similar study was carried out in Brazil on the use of fossil fuels for industry, in fuel production, transport and consumption. Here, 18,000 potential projects were identified, two-thirds of which were greenfield projects. Despite the energy matrix being already less intensive in carbon in these countries than in Africa, the potential reduction in greenhouse gas emissions would still be up to 450 million tons of CO_2 per year for a corresponding investment of US$1,284 billion.

The Low Carbon Development Facility Concept

However, we clearly need a new financing mechanism to support these investments. One proposal involves the creation of a Low Carbon Development Facility (LCDF) to support investments in clean energy development projects. Today, many clean infrastructure projects cannot obtain financing due to a lack of liquidity, a lack of maturity, and risk aversion. The LCDF would enable the scaling up of financing by tapping into large international capital markets such as pension funds, insurance funds, or sovereign funds. It would make it possible to unlock economically viable low carbon development projects and harvest the considerable mitigation potential that does exist.

The principle of the LCDF is that, using state-or-the art portfolio management techniques, the initial capital would be sized to sustain a AAA rating while raising large volumes of resources from financial markets through AAA rated bonds. This would make it possible to provide inexpensive AAA-conditions for financing low carbon investments that have a lower rating (ranging from C to AA).

Through this mechanism, an initial capital allocation of around US$70billion would allow to leverage US$100 billion in annual international financing of low-carbon projects brought through the LCDF. The whole LCDF portfolio would thus be able to achieve a reduction of 10 gigatons of CO_2 emissions per year in 2030. The LCDF would select local private and public banks, which would bring their loan screening, projects origination and financial analysis capacity to that public-private partnership with the LCDF. This would deliver a major financing advantage compared to non-green projects, which are also struggling to access financing. Available studies show that the potential number of projects is huge.

Creating the Proper Incentives

The limited access to finance is not only a question of the *availability* of funding. It is also a question of the ability to *absorb* the financing available: in some cases, there is no additional room for debt on the industry balance sheet: industries are not short in Opex, but actually are short in Capex. The World Bank has therefore been working with the National Confederation of Industry in Brazil to set up a special purpose vehicle to take on the additional debt, install the energy efficient equipment, retain ownership, and charge the industry for installed capacity. That is the kind of solution we are developing,

which in reality means that we are converting Capex needs into Opex. A number of companies have already indicated their interest in such a system.

Besides unlocking finance for low carbon investments, it is also necessary to create incentives for such investments. This can be done through the introduction of standards or the creation of a price signal using carbon pricing instruments. This involves interfacing carbon pricing with energy policies. In theoretical terms, this looks at first as a "no brainer": prices elasticity is an easy concept for modelling the impact of carbon pricing on demand. However, in reality, what can we expect from investors given that oil prices are so volatile? Oil prices have fallen from US$145 to US$35 to per barrel in the past 7 years. The corresponding carbon price equivalent has gone from US$335 to US$80 to per ton of CO_2. Such variations are far higher than the order of magnitude of any carbon price signal being considered in developing countries, which then would be "lost" and its expected price signal effect thus totally neutralized (Chile is considering a $5/t$CO_2$ carbon tax; South Africa is considering a carbon tax of around $10/t$CO_2$). In addition, investors are adverse to such uncertainty.

Ideally energy prices should be stabilized and a carbon price added. However, is this compatible with the current crusade against fossil fuel subsidies? Indeed, energy price stabilization might mean that local prices might temporarily be higher than international ones…

Moreover, carbon prices do not emerge in a vacuum. In Brazil, for example, 14 different levies and charges already apply to electricity prices. These energy pricing regulations are not all illegitimate. They can reflect – for better or for worse – the objectives pursued by the national energy policy. Nevertheless, ignoring them when designing a carbon pricing instrument can lead to undesirable and unexpected effects. This was the case, for instance, of the windfall profits that were enjoyed by the power companies during the first phase of the EU ETS system when these companies were granted free allowances, the opportunity cost of which they were able to pass through to their captive clients.

Many developing countries still include development objectives in their energy policies and pricing in order to achieve security of supply, reliability, affordability and consumer protection. Those developing countries face different challenges from those faced by OECD countries.

Conclusion

How can we address this complex chain of challenges? It is first of all necessary to distinguish instruments from policy objectives. We have tended to have too much of a dogmatic focus on "good" instruments versus "bad" instruments. However, such a focus means that we are in danger of throwing out the baby with the bathwater, simply discarding some legitimate policy objectives all together with the instruments.

I believe that instruments can be creatively adapted to combine the "new" greenhouse gas mitigation objectives with the "old" but still relevant energy policy objectives. Considering the whole set of instruments - the existing ones related to conventional energy policy objectives, new financing mechanisms and carbon pricing instruments – does offer a wider range of manoeuver to reconcile creatively all legitimate objectives. In California, for example, utilities receive free allowances but are required to auction and re-buy them. They are then allowed to pass-though the corresponding cost in electricity prices, but simultaneously, all auction proceeds have also to be passed on to the end customer through flat climate credits (of approximately US$35 per semester in 2014). These climate credits more than offset the price increase to low income

households, thus reconciling GHG mitigation objectives and the long lasting one of protecting low-income customers.

Panel Discussion

Frank Holtrup, WEC (Germany)

Banks generally lend money and receive something back in return for that, in the form of interest. If the EIB lends €20 billion per year on climate action projects, will it actually receive a return on that money, in particular if it is lent to developing countries?

Matthew Arndt

Even though we are a not for profit institution, we do obtain a return on our money. We carry out a very strict credit due diligence. Nevertheless, it is possible to lose money on a specific operation depending on the level of risk involved.

Birgitta Resvik, Fortum Corporate (Sweden)

You stated that the EIB puts a price on carbon. I would be interested in learning your views on the future of carbon pricing in Europe and elsewhere. Second, the investments in developing countries are based on CDM projects. However, there is some controversy in Europe about the CDM mechanism. How can we change the view in Europe of the future of CDM?

Jean Eudes Moncomble

I would note that a detailed presentation will be made on CDM in the next session.

Matthew Arndt

We use an economic price for carbon that is completely de-linked from the financial price on the market, in particular the ETS market. Hopefully, in a well-functioning market, those prices would converge at some point. In the literature, the economic price of carbon varies in order of magnitude from 1 to 10. We have situated ourselves roughly in the middle of that range. We also use a high and low scenario to stress-test the calculations.

On the financial side, we are all hoping that the recent policy instruments will bolster an increase in the price, which seems absolutely necessary. However, where we end up in the end is anybody's guess.

Christophe de Gouvello

I referred to CDM as a tracking tool only. It makes it possible for us to identify projects through a certain number of methodologies that have been developed in a very bottom-up manner. CDM should not be considered as playing a primary role in global CO_2 reductions if only used to generate offsets, since it is then a zero sum tool. However, it can also be used together with mechanism for financing investment, allowing us to monitor environmental performance. Then it can deliver net emissions reductions. That is only possible if no offsets are issued for the emissions reductions thus generated.

Jean-Charles Hourcade

I do not believe that the EU ETS will reach a significant price for carbon for structural and political reasons – for example, the lobbying of major energy-intensive industries.

The price of carbon is either its real market price or a notional price. I have been involved in the climate negotiations since Kyoto, and we have been hampered by political correctness combined with regulatory uncertainty and the volatility of oil prices. The only way to unlock this situation is to acknowledge this very early on in the process.

Jacques Roger-Machart, EDR (France)

In your presentation on the low carbon projects the EIB is financing, you did not mention "nuclear". Is that because it is politically incorrect from a Brussels point of view or because there are no nuclear projects to finance?

Matthew Arndt

Nuclear is on our eligibility list and, historically, the EIB has provided significant support to French nuclear projects, for example. However, we have not supported any nuclear generation projects in recent years, although we have provided support for projects on nuclear security or safety.

Calin Vilt, WEC (Romania)

Carbon pricing is an important instrument but we should not forget that other instruments are also available for financing secondary projects such as mobility, smart metering, or GIS, etc.

Matthew Arndt

The signalling effect of what we do is probably one of the most significant aspects of our work. We are hopefully moving towards more intelligent, high-value investments that would be difficult to do without the involvement of the MDB/IFI community. From a strictly banking point of view, this is where financial engineering comes into play: how can we de-risk projects when working with players that are perhaps less agile on the financial markets? That is true of all the projects you listed.

Jean-Michel Trochet, EDF (France)

The criticisms that have been made of carbon pricing are quite justified. However, it is necessary to introduce incentives for low carbon technologies. That means that we do need carbon pricing to allow us to assess the projects being financed.

Matthew Arndt

We did not perhaps stress the enormous value of these instruments. Carbon pricing is neutral with respect to the technology selected, and this filters down through the entire economy.

Jean-Charles Hourcade

You should not misinterpret what I said. We clearly do need carbon pricing but it has to fit into an established reality. If we introduce a carbon tax today, it will penalise those actors who are operating under the historically-established system.

Christophe de Gouvello

I would prefer to refer to complete energy "price signals" rather than only additional "carbon pricing". Consumers react to the whole energy price, not only the carbon price top-up.

Christian Deconninck, ATEE (France)

Investing in projects that save energy is a more complex task than investing in projects that produce energy. It is therefore necessary to develop Multi-Purpose Vehicles (MPVs) for such funding that can cover many different areas. That means that we have to standardise operations so that banks are more confident about investing in this area. ATEE is also considering the use of white certificates.

Stuart Neil, WEC (UK)

You referred to the pros and cons of lowering subsidies. In this context, Brazil is a case in point. How important is the reduction in trade and tariff barriers to the unlocking of finance?

Christophe de Gouvello

Brazil has introduced a mechanism to stabilise domestic prices of oil. This has been highly criticised when international oil prices were higher, as it resulted in a drain on the national budget, which is no more the case. However, I believe that these supposedly conflicting objectives can be reconciled if we better understand how they interact and re-design creatively both existing energy pricing and new carbon pricing instruments.

Marc Daoud, Journalist (France)

John Ashton referred to the need to change our mind sets and political dogma. However, the focus appears to be on CO_2 reduction even though methane is 30 times more damaging than CO_2.

Jean-Charles Hourcade

That is a difficult issue. The problem we face is that, historically, our economies have been too energy centric. Cancún resulted in a paradigm shift based on equitable access to development while maintaining the 2°C target. Methane is indeed an issue, but we cannot deal with methane in the same way as we deal with CO_2 – they involve different stakeholders, different players, and they cannot be measured in the same way. We lost considerable time in Kyoto trying to deal with these gases in the same way. In my opinion, we would be making a mistake by treating this as a one size fits all problems.

Matthew Arndt

An international coalition was set up some years ago – the Climate and Clean Air Coalition – which addresses 8 different emissions of Short-Lived Climate Pollutants, including methane, for which the impact on the climate is clearly recognised. However, it is necessary to manage this issue in a completely different manner from the UNFCCC process, at the international level.

Christophe de Gouvello

The projects I referred to in Brazil include those that concern methane, which has been converted into CO_2 equivalents.

Jean Eudes Moncomble

Thank you for that very interesting session that has provided genuine insight into these issues, enabling us to question our often pre-conceived ideas.

Session III: International Cooperation

- Michael Grubb, Professor, International Energy and Climate Change Policy, University College London; Senior Advisor, Sustainable Energy Policy, Ofgem (UK)
- Joan MacNaughton, Vice Chair of the High-Level Panel on the CDM Policy Dialogue (UK)
- Michael Franz, Senior Energy Advisor, EU Energy Initiative-Partnership Dialogue Facility (Belgium)

Jean Eudes Moncomble

To provide some perspective for our discussions, we should note that Europe represents 10% of global CO_2 emissions. In 2012, the *increase* in emissions in China was equal to the volume of emissions for the UK.

Planetary Economics: International Dimensions

Michael Grubb, Professor, International Energy and Climate Change Policy, University College London; Senior Advisor, Sustainable Energy Policy, Ofgem (United-Kingdom)

I have been involved in an in-depth exploration of what we have really learnt about economic and policy dimensions of energy systems, particularly relating to climate change. What are the implications of that work for the question of international operation, credibility and level of ambition – with particular relevance to the energy sector?

Much of my presentation is based on a book I co-wrote, *Planetary Economics* by Grubb, Hourcade and Neuhoff, 2014.

Introduction

I will begin with a few words of pessimism on the international progress made. Climate change is an enormous global problem of risk management under deep uncertainty. It has been referred to as “the biggest market failure in history”, the “perfect moral storm”, and a “super wicked” problem. That is illustrated by the fact that we have not been performing very well at the global level. Current emissions continue to grow, and energy remains an important part of the development challenge. The negotiations have shifted but remain mired in a “blame and burden” mentality.

Six years ago, Laurence Tubiana asked me to give a lecture in Paris on the question of where economics has helped in solving this issue, and where has it not helped. That rather provocative question helped to shape the structure of the book.
In *Planetary Economics*, we show that there are 3 different domains of economic processes.

- The optimising domain in which we assume that all the agents in our societies and markets are rational, calculating and optimising individuals. The theoretical foundation of this domain is neoclassical and welfare economics.
- The satisficing domain that is dominated by personal habits, myopia, and lack of attention, contractual failures, and risk aversion to change or investment. The theoretical foundation of this domain is behavioural and organisational economics.
- Third, the transforming domain, involving structural, technological, institutional and behavioural change typically from innovation and infrastructure investment and institutional development. The theoretical foundation of this domain is evolutionary and institutional economics.

Our core point is that these are not alternative explanations of the energy-economic system; rather they describe different processes that occur at different scales of decision-making and in different timescales. Solutions therefore need to harness the corresponding policy pillars – based on the three domains – in order to transform energy systems.

Why a Technology Lens for International Cooperation

To date, many international efforts have focused on targets or pricing. However, technology has both a theoretical *and* practical appeal in the global context – in principle, innovation can offer gains to all that can be shared to create incentives for a deal. Nevertheless, it has had a mixed record and a surprisingly low profile in the international negotiations. The major focus has been the push by developing countries with respect to technology transfer and cooperation. This tends to make industrialised countries nervous about the intellectual property implications and costs.

We have to recognise that we are seeking radical innovation in some of the least innovative sectors of our economies – sectors that spend less than 1% of their turnover on innovation, compared to IT and pharmaceuticals that spend 10-15%. This is a fundamental question that receives astonishingly little discussion. Part of the reason is that technologies have to traverse a very long, expensive and risky chain of innovation in order to move from idea to the market. In IT and pharmaceutics, for example, product turnover is relatively fast, and product development is relatively cheap. That is, the technology push is not that hard but the market pull is enormous. In the electricity sector, it is extremely expensive to develop ideas to the demonstration scale and this can also take several decades, and the product is basically the same (electrons). The market pull and the technology push are both very weak.

How can we accelerate technologies in these sectors? The history of state-led development programmes is mixed, as is the history of private investments. Governments may not be very adept at picking winners, or at deciding where to cooperate and where to compete. But we have got much better at policies that help to span the innovation chain and thereby accelerate innovation.

When it comes to debates about macroeconomic growth, economic research points to the need to reduce the sub-optimal performance of many economic actors and

structures. In addition, education, infrastructure and innovation are also integral to economic growth. That means that these processes are recognised as important for macroeconomic growth. However, they remain largely absent in global or national modelling, and they are poorly charted in the policy. Energy is a particularly strong candidate for proper attention because of its pervasive input to numerous sectors, and the low rate of private innovation noted.

What is missing from the process is money, at a rising scale that feeds into markets that are credible and strategically growing. That combination of money and markets could help drive the technological push and market pull, and money and markets are both connected to pricing.

The Role(s) of Carbon Pricing

After losing the last general election in Canada, Stephan Dion, former Environment Minister, referred to carbon pricing as "political suicide". The key to credible carbon pricing is to be found in its link to the two other domains. That is the area in which we can develop a more credible and plausible narrative. What can carbon pricing do for innovation processes, and the acceleration of new technologies? That will lead to the transformation of energy systems and new energy services – things that people want and may be willing to pay for. In addition, if we get that package right, we may not necessarily have to pay more for energy overall, because rising carbon prices can be offset against greater efficiency and decarbonisation. That is a more sellable message.

Innovation also offers a positive narrative to carbon pricing: while strategic investments can be costly, their associated returns can also be huge. The question is not how much more costly this will be for the fossil fuel system. Rather the question is how to develop very different kind of energy system. That is the strategic goal.

Effective mitigation policy needs to understand the complementary economic roles of the 3 pillars: pillar 1 is concerned with smarter choices; pillar 2 is concerned with cleaner products and processes; and pillar 3 is concerned with innovation and infrastructure. There is an intimate relationship between the 3 domains. Changing course requires a sustained package that integrates and synergises across all 3 pillars.

The practical answer to Laurence Tubiana's question is thus that economics has helped in those areas where the assumptions match the realities. Neoclassical economic models are very useful for understanding part of the system dominated by neoclassical market behaviour. However, if that is not the case they will be quite misleading and will impose costs on the system leading to political resistance. By understanding the different domains we can begin to build a credible economic narrative that is more appealing and optimistic. If we get this right, we can generate co-benefits. Climate policy can be seen not something that adds costs to the system but as something that can help motivate, stabilise expectations, and coordinate the development of new energy supply chains and infrastructures. Moreover, it can generate the finance with which to undertake those activities. That could be a very attractive package.

An International Club of Credibility

It is possible, at the international level, to build a club that links (a) efficiency, (b) price and (c) innovation? It is unlikely that this would be agreed upon in the United Nations itself. It would involve some element of carbon pricing (shadow pricing, taxes, credits, etc.) and a rising price commitment. A rising carbon reduction value could contribute across the domains. Embedding this in an multinational agreement could enhance stability and credibility. As this is not politically credible as a global deal, it could be

pursued through a growing coalition. Game theory suggests that there are advantages to negotiation on a reduction value rather than a target. I believe that we could plausibly construct a coalition of cooperation around these ideas. Greater industry input in this area would be extremely welcome and valuable.

Jean Eudes Moncomble

CDM has been referred to a number of times in our discussions. We are therefore very fortunate to have Joan MacNaughton with us today, who is a member of the High Level Panel on CDM Policy Dialogue.

CDM and Market Mechanisms for Tackling Climate Change

Joan MacNaughton, Vice Chair of the High-Level Panel on the CDM Policy Dialogue (UK)

I would like to begin by offering a different answer to the question on the value of economics. I spent 5 years as Director General for Energy in the UK. One of our continuing frustrations was that we could never persuade the Treasury that there was a role for government in funding infrastructure or in the major technology transformations that needed to be addressed. That was based on a false antithesis between what markets and governments should be doing. We now face one of the most urgent problems possible and we cannot wait any longer before implementing a concerted push to get this kind of thinking into the dialogue. I would therefore make a personal plea to those of you in business to lobby your governments on these issues in the lead up to COP21.

I believe that the Clean Development Mechanism (CDM) is an important issue that we all need to address. I do not think that we should be throwing it away. However, I also firmly believe in supporting any mechanism that works.

Carbon Markets

Carbon markets have an important role to play. They allow nations to meet their mitigation targets in a flexible and cost-effective manner. They should therefore allow for more ambitious mitigation targets. We are far from meeting the 2 degree target and remember that even achieving it still leaves us with huge challenges in managing the impacts of climate change.

Today, through the CDM, 1.5 billion certified emissions reductions (CER) have been issued, probably saving about 1 billion tonnes of CO_2. In developing countries, CDM has built the capacity to realise the potential for mitigation in ways that are appropriate to their national context. Many countries are undertaking preparations for carbon markets, and China, for example is committed to embarking on a national ETS scheme by 2016. In addition, CDM has mobilised significant private sector investments of at least US$215 billion. This compares to the ambition of the Green Climate Fund, which is to mobilise US$100 billion per year by 2020.

CDM Reform

Nevertheless, there are some major concerns with the Clean Development Mechanism in terms of its environmental integrity, the effectiveness of its processes, and its

governance, which was perceived as slow, opaque and highly politicised. As a result, many have lost interest in it.

The UN established the High Level Panel on the CDM Policy Dialogue in 2012. Its Report was prepared in the run up to Doha and included 51 recommendations across 12 areas to address the crisis in international carbon markets and make the CDM fit for the future. In particular, it was felt necessary to secure market stability, adapt to new conditions, enact operational reforms, and strengthen governance.

With respect to the need to secure market stability, I appealed to the negotiating parties at DOHA to take a number of steps to address this issue by allowing a wider range of entities to purchase CERs, which would help increase prices. Paradoxically, it was the Alliance of Small Island States that vetoed that, which is quite incomprehensible.

With respect to standards, we recommended that significant attention should be given to the development of standards. Those standards should anticipate the needs of any new market-based mechanisms. They should collaborate with other market-based mechanisms around common functions, and establish a common registry function that effectively tracks mitigation outcomes and avoids double counting. Finally, it was necessary to improve regulatory engagement and outreach efforts.

Green Climate Fund

The Panel also called for the rapid implementation of the Green Climate Fund (GCF). The standards and methodologies developed under the CDM could be used to facilitate the implementation of mitigation activities supported by the GCF. We are in a Catch 22 situation here. Negotiating parties are not prepared to commit to significant efforts in relation to stabilising the CER market because they are not confident that the CDM will have a major role to play after 2020. Some countries have engaged in voluntary purchase of CERs but there has not been enough interest to form a fund. Many of the countries that would be most inclined to participate in this are European. However, they have also proposed a new market mechanism to replace the CDM. It is difficult to see in what way this new market mechanism is different from an adapted and improved CDM. Of interest to the business community is that we could see a move to more sector-wide approaches rather than individual project-based approaches. That could be valuable in dealing with the issue of carbon leakage. I would urge business to build up advocacy on the need for globally sectoral approaches to tackle the competitiveness, or leakage, issue.

Regarding the governance issue, the Executive Board has not adopted some our reforms in this area, which is quite regrettable. If all of our recommendations had been tackled, the CDM would be well placed to be an important part of the collective effort post-2015.

Conclusion

With respect to what I would like to see in the Paris deal, minimum standards are required to ensure environmental integrity. The real question is how they are defined, applied and monitored. Reporting and recording via international and national registries is clearly necessary. Common definitions and default or model rules could help encourage linkage in the future among national efforts. The linkage rules should be outside the core agreement – they should not have to be negotiated by all the parties. Finally, provision should be made to allow countries to transfer portions of their INDCs to others for use in compliance. Putting that in the Paris Agreement would have huge symbolic – and practical – significance in getting this started.

Linkage is in everyone's interests, including those of business. We need the flexibility which linkage provides, as some countries will be capable of moving more quickly. We should learn from and build on the CDM experience. Personally, I believe that we should reform the CDM – it is not so basically flawed that it cannot be reformed. And it would offer quicker results than a new mechanism. Major strategic initiatives always take much longer to get up to speed and always have unintended consequences. They therefore always require remedial work as they are executed. By starting again, it is unlikely that we will get this right within a short time frame. The world is littered with examples of why that will not occur. Nevertheless, if a plausible mechanism were to emerge, I would support it.

Finally, I believe that we need to de-politicise implementation. That is perhaps the biggest lesson we have learned from the CDM. I hope that the parties, who all act in the political arena, will recognise that and understand that they need to give themselves the best chance of fulfilling their commitments through an effective and business-like approach to implementation.

Know-How Transfer and Innovation in Renewables in Africa

Michael Franz, Senior Energy Advisor, EU Energy Initiative-Partnership Dialogue Facility (Belgium)

Introduction

The EU Energy Initiative-Partnership Dialogue Facility is an instrument of the EU Energy Initiative founded in 2005 by the EU member states and the European Commission. It provides policy and strategy advice, dialogue, and support for energy market development in developing countries. It is a multi-donor body hosted by a German company (GIZ) and it provides support to over 80 activities in over 20 countries and regions.

There is a nexus of objectives that we are dealing with in international energy cooperation. First and foremost, we need to close the energy access gap – 600 million people do not have access to energy in Africa, a number that is continuing to grow. We want to achieve stable and secure, affordable, socially appropriate, and environmentally sustainable energy supply while, at the same time, addressing climate change primarily from a mitigation angle but also in terms of adaptation. We are dealing with shifting paradigms in the wider global context with a shift from development cooperation to one of future growth markets. The aim is to develop win-win situations.

My presentation will focus on the perspective of developing countries, in particular Sub-Saharan Africa, which reflects my experience. It will also reflect the input from our partners, stakeholders and beneficiaries.
I will address a number of guiding questions, namely:

- Renewable energy markets in the development context: what kind of know-how is involved?
- How to do know-how transfer?
- Which markets and which innovative business models should be pursued?
- How can we stimulate markets and know-how transfer?

Defining Know-How and Know-How Transfer

There is a tendency to reduce know-how to technology. However, our aim is to translate opportunities into successful ventures both at the project development and operational stage. The key barriers arise in the project development stage, in particular *early* stage project development. Know-how also covers a number of different elements: know-how on policies and regulations, know-how on management and technology, knowledge on local markets, and know-how on financing.

The traditional approach to know-how transfer is to provide training, which is usually focused on technology. That can be useful but only if there is a real demand and a potential application for that knowledge. Ideally, know-how transfer should occur through "doing business". That is, it should be a real partnership and real joint development rather than a simple procurement of equipment and services. Know-how transfers can occur in different directions: North-South, South-South or South-North. What are needed are actual opportunities for doing business. This does, however, raise a chicken-and-egg dilemma in that know-how transfer requires the doing of business, but that business can only be in existence if there is already some know-how.

Choice of Markets and Models

To illustrate this, I will refer to the example of energy market segments in developing countries. To this day, 90% of energy consumption in Africa is related to cooking. There is no one renewable energy market but different energy market segments where renewable technologies can be deployed. Those segments are distinguished by the regulations, business models and players that apply to them.

Three options are available in order to electrify rural areas: building a grid, building a mini-grid, or building a standalone system.

When it comes to meso-scale renewables (on-grid), the relevant business model is that of the independent power producer. The key regulations are feed-in tariffs, and the relevant renewable technologies include solar photovoltaic, biogas and small/mini hydro. Market readiness is low with regulations but extremely high without regulations.

When it comes to mini-grids (off-grid); here the relevant business models include private mini-utilities or public-private hybrids (for generation or distribution). The key regulations are permits, licences, grid connections and tariffs. Today, the mini-grids are run by public utilities but they are unlikely to run thousands of such grids. It will therefore be necessary to attract private investment but that requires an extremely stable regulatory and pricing network. Only Senegal and Tanzania have the relevant regulations in place.

When it comes to stand alone systems (off-grid), the main business models are retail or pay as you go systems, and the key regulations are equipment standards. Market readiness is high and this is an area that is taking off extremely quickly.

Stimulating Markets and Know-How Transfer

The success factors for energy market development include financing although, in our experience, this actually comes last. First and foremost, it is necessary to have an appropriate policy and regulatory environment in place. Know-how and skills are also required, together with business models and projects. Unless we have bankable projects, know-how transfer and investment will not occur.

We can support energy market development through advisory support, education and training, network development (matchmaking and B2B formats), grants, equity and loans, and risk mitigation.

Our approach to know-how transfer is based on jump starting market development by providing market reports on specific market segments and opportunities, identifying concrete project opportunities, providing rapid policy support, matchmaking and B2B, and providing advisory support on project preparation and financing.

Conclusion

My key messages include the need to focus support efforts on innovative market segments and business models. In this way we can ensure that the benefits are widely shared. Know-how is made up of many different elements and not only technology. Know-how-transfer can best be achieved by "doing business", and different innovative business models are required in different energy market segments.

Uptake and consequently know-how transfer requires the use of multiple success factors at the same time. Finally, market development needs to be actively stimulated, with a full range of different support mechanisms. All of which is of course work in progress!

Panel Discussion

Javier Jiménez Pérez, Repsol (Spain)

What is your personal view on the future of networked carbon markets? We spoke about the Californian and Quebec schemes yesterday. What potential is there for integrating the EU ETS into such schemes at the global scale?

Michael Grubb

Some years ago, I worked on the potential of linking the European scheme to the US Federal proposal. The expectation was that the value of those 2 markets would be similar but that the European price would be twice as high as the US price, but the latter would be twice the size of Europe. If the 2 schemes were to be linked, the European price would go down while the US price would go up. In political terms, this means that the US would be negotiating a complicated deal in Washington based on a certain assurance about what the price would be. The linking with Europe would then driven up that price. In short, Europe would be paying for the US to cut emissions. Neither of those propositions is politically sellable.

International carbon markets are therefore not impossible but they do involve a paradox: the biggest efficiency gains are achieved when prices are very different; however, the politics are only manageable when prices are very similar. It is therefore necessary to link regions with similar levels of ambitions as a way of reducing uncertainty and volatility.

The situation of the CDM is slightly different, and there is more prospect for indirect linking through common rules on offsets.

Joan MacNaughton

I would draw a parallel with trade rules in general. There has to be sufficient buy-in at the political level for a trade deal to be signed and operated successfully. It is also

necessary to have some international governance processes. The challenge is to accelerate our evolution to more linking (as occurred in trade): as well as the economic benefits, we also have the urgency of dealing with the mitigation challenge.

We are going to have to think about governance, even in a post-2020 world where action is founded on a bottom-up basis. If large volumes of carbon allowances are being traded, it will be necessary to have some architecture in place to avoid a loss of confidence.

Finally, I believe there will be bilateral deals, which will be a driver for some linkage. Overall this will be a rocky road, but I believe we will get there. We will hopefully take the right decisions on the architecture to enable that to occur more rather than less quickly.

Frank Holtrup, WEC (Germany)

The mission of the World Energy Council is to sustainably promote the production of electricity for the benefit of all. By electrifying remote villages in Africa, the EUEI PDF is contributing to that. Yesterday Elina Bardram stated that, after 2020, the EU does not plan to accept CERs to offset emissions. Does that mean that there will no longer be investments in this area in Europe?

Joan MacNaughton

Europe clearly has a major issue with the CDM. The flaws in its operation were a real matter for controversy. There is therefore a huge reluctance in Europe to do anything that could be perceived as providing support to the CDM. I believe Europe would have like to stop accepting CERs although, for reasons of commitment, the decision was made to only accept CERs from the least developed countries to 2020.

It is difficult to imagine what will happen as this will depend on the December Agreement. If there is continued support for the CDM, the dislike of the current machinery and Executive Board could dissipate. However, it is more probable than not that the EU will not accept CERs after 2020. In my “dream scenario” the mitigation ambitions would be so high that they would want some offsets.

Stuart Neil, WEC (United-Kingdom)

What are your views on SE4All? If energy is adopted as a sustainable development goal in September, what impact will that have for your work on the ground?

Michael Franz

SE4All has been instrumental in bringing more money into the system to support energy investments. It has created awareness and mobilised politicians to make decisions that are translated into results. SE4All also played an important role in preventing an uncoordinated approach among many different actors and many different initiatives. Going forward, I hope that SE4All will be able to reshape the current trajectory to achieve more investment from both the public and private sector. That is the only way that we can increase access to modern energy services without recourse to coal. A greater emphasis has to be given to what is needed to get the money flowing.

Keynote speech

Paul Watkinson, Head of the Climate Negotiation Team for COP21 (France)

The Paris conference is scheduled in 9 months' time, from 30 November to 11 December 2015. Our overall intention is to achieve the adoption of a new Paris Agreement – be it an alliance, an agreement, a package, a protocol – by the end of the conference.

The decision was made in Durban in 2011 to adopt, within 4 years' time an international legal agreement that would help us establish a framework that will allow us to remain below the 2°C level. The aim is to have a universal agreement for the 195 parties involved, which represent a wide range of energy users. It must be an ambitious and long-term agreement rather than a short-term agreement that must be renegotiated in a few years' time. It must have legal force but also remain flexible and dynamic.

Conference Organisation

Organising such a major conference that will involve 30,000-40,000 persons is a huge challenge. It should also be noted that many parallel events will be taking place, involving civil society, business, NGOs, trade unions, municipalities etc. As well as the negotiation of the actual text, these parallel actions will also play an important role in finding a solution.

The French Foreign Minister, Laurent Fabius, will preside the conference, as was the practice at the Cancún and Durban conferences. In addition, the entire French government will be mobilised, in particular Ségolène Royal (Minister for the Environment), and Michel Sapin (Finance Minister). President Hollande will also be highly involved and has expressed his hopes that the conference will be a success. During his recent visit to the Philippines, he spoke almost exclusively about climate and related issues. Nicholas Hulot and a number of other highly placed officials are also fully committed to this conference.

Two teams are involved in preparing the conference. First, a logistics team led by Pierre-Henri Guignard, which is responsible for transport, accommodation, security, food and other conditions. France wants to be exemplary in this, notably in environmental terms. Second, an Agreement team, led by Laurence Tubiana, and which includes representatives from the Ecology, Agriculture, and many other ministries.

We are also working with a number of crucial partners that include Peru (which chaired the Lima conference a few months ago), the Secretariat of the Climate Commission, and our 2 co-chairs (from the US and from Algeria). They are responsible for negotiating the actual text of the Agreement. All the other states are also our partners in finding an Agreement that obtains consensus. This is therefore necessarily a collective process from which a consensus will emerge.

Conference Outcomes: The Paris Alliance

The term “Paris Alliance” is increasingly being used to describe the outcome of the conference. The aim is to bring together the entire international community in the battle against climate change and for sustainable development. It will make it possible for us to achieve shared objectives and to achieve a result that will allow us to reduce greenhouse gases. It will make it possible for us to mitigate the existing conditions. This concept is inherently one of joint work with shared goals.

There are 4 components of this Alliance.

- First, the instrument to be adopted in Paris. We do not yet know what form that instrument will take: a protocol, an agreement. However, it will be a legally binding instrument that will be universal and applicable at the international level. It must also be a dynamic instrument that will evolve with time. It will include rules on transparency and accountability. It is also important to be transparent with respect to follow up on the instrument. This has to be a dynamic agreement that will continue to change as the world evolves. As such, it will be necessary to review the text every 5 or 10 years. The text cannot be frozen in time and simply replaced in 5 or 10 years’ time. Finally the text must make it possible for us to respect the 2°C limit. That is a crucial question for me.

- Second, what actions will be included in the Alliance? Here we speak of national “contributions” or “commitments”. Countries will set certain objectives at the national level. To do that, they will carry out consultations and establish partnerships. By June 2015at the latest, all of those commitments should be on the table, showing in concrete terms what they intend to do and what their contributions will be to achieving our very ambitious goals. It is important that all countries – and not only those that represent the bulk of emissions – make a contribution. That is, certain developing countries that have relatively low emissions must also participate in the conference and make a contribution. What is the legal status of these contributions? How will they be anchored in the instrument? Will they form part of the instrument itself, as was the case with the Kyoto Protocol in 1997, or will it annexed to the instrument? The level of ambitions is also an issue: if each country sets its own targets, it is unlikely that, when totalled up, we will reach the 2°C target. We therefore have to look very closely at the link between the contributions and the Agreement.

- Third, finance and investment. How will we mobilise the necessary finance to achieve what the agreement sets forth, and how will we mobilise the investments needed to transform our energy systems? At Copenhagen and Cancún, developed countries agreed to mobilise certain amounts per year for climate change in developing countries. A first priority will therefore be to ensure that that commitment is respected. The French Development Agency will be organising a conference next week with multinational donor banks to explore these questions of finance. A second meeting in May will explore the mobilisation of public-private finance. All of this must be done according to clear and transparent criteria and rules. The Green Climate Fund is now operational, and is also key to the success of the Paris Conference. How can the Paris Agreement send a sufficiently clear signal to investors, encouraging them to invest in the climate?

- Fourth, cooperation. We are very aware that the relevant decisions are taken by companies, municipalities and sub-national bodies, as well as at the national

level. How can we ensure that all of these players are involved in the process? How can restructure the transformation in the key sectors? How can we integrate the role of these actors into the structure of the Agreement? Various initiatives have been launched by the Secretary General of the United Nations with respect to energy, access to energy, and renewable energy, and such initiatives are just as important as the formal agreement. We are also working with Peru on the Lima-Paris Action Plan. Generally speaking, we have to structure the Paris Agreement to allow countries to facilitate their actions through cooperation. That will be a key element of the negotiations.

In conclusion, we have 9 very busy months ahead of us. We have a 90-page document under consideration that forms a solid basis for the negotiations. A clearly defined process has been set up to deal with formal and informal consultations in the lead-up to the conference. The aim is to find a consensus not on the last day of the conference but upstream of that date. Many questions remain open but I hope that we will see an international agreement in Paris in 9 months' time – one that will be legally binding and in which all actors have a role to play.

Discussion

Jacques Roger-Machart, EDR (France)

You expressed the hope for the setting up of a carbon price. What mechanism could be used to achieve that? Are you aiming for a single price or different prices in the different regions?

Yousef Alshammari

Regarding the creation of a legally binding agreement, will the capacity of developing countries be taken into account when committing to such an agreement? What would be the time frame proposed during the negotiations?

Einari Kisel, WEC (United-Kingdom)

How do you reconcile your role as President of the COP with membership of the EU and the constraints that that brings?

Pascal Charriau, ENERDATA (France)

Will each individual Member State the negotiating in Paris or will it be the EU as a whole?

Christophe de Gouvello

We can imagine that the Agreement will also cover adaptation. What might that include?

Rabiou Hassane Yari

The EU has issued its INDC. Was that done on behalf of all its members? Second, what are your views on the situation with respect to Africa?

Paul Watkinson

Regarding the carbon price, we all know that without a carbon price something will be missing from the Agreement. It is highly unlikely that the Agreement will set up global carbon price. This raises an accounting issue, recognising the different schemes that exist in different countries. It also raises the issue of the cooperation involved in setting

up a carbon price in different countries around the world. This is a question of establishing links and cooperation between the countries with a view to having sufficient dynamism over the long-term. Nevertheless we want to encourage the emergence of a price signal around the world. This will be done gradually rather than trying to implement a single system overnight.

As to the question of legally binding instrument vis-à-vis the developing countries, that decision was taken in Durban by the international community. It will, however, depend on the nature of the text and its content. The differentiation arises in the way that each country participates in the system. The dynamism I referred to also includes the reinforcement of capacity at the country level. The Agreement must be of interest and utility for the countries that implement it.

The European Union will negotiate as a block but that will not prevent each country from setting its own framework. With respect to the tension between our presidency and the role of the EU, the fact that the European Union is negotiating as a block makes the situation easier. France will rely on its European partners to defend the credibility of the agreement. We will be both arbiter of the agreement as well as negotiator.

Regarding Africa, the continent is becoming quite well-organised in these negotiations. For example, a meeting of African Environment ministers took place last week in Cairo with a view to identifying a common position. Africa is clearly a key partner for the Paris Agreement, as are Latin America, the Island States, and less-developed countries. These are all key players.

Regarding adaptation, it is easier to measure reduction actions than to measure adaptation actions. The EU has decided to only put mitigation on the table that we know that other countries will want to include adaptation measures in the Agreement. Work will also be necessary in terms of the planning of that adaptation: integrating the impact of climate change into decision-making. An upcoming conference in Sendai will be devoted to Disaster Risk Reduction, and other major conferences will be held this year on that topic. All of that is also relevant to the Paris conference.

Jean Eudes Moncomble

The World Energy Council covers 100 countries that represent a wide range of energy systems. How can the WEC be an effective partner on the way to COP21?

Paul Watkinson

The outcome of the Paris Conference has to be something that is of genuine use to you. You can therefore help us make the Agreement relevant to your decision-making, in your investment choices, and your activities in the coming years. It is therefore important that you deliver that message both to us and to your own governments

Second, the ecosystem that surrounds the Instrument – be it in building, energy efficiency, transport and so on – is just as important as the legal instrument itself. That is where your expertise lies and your participation in identifying solutions could make a real difference. We are preparing for a future that is able to deal with the implications of climate change, and those implications also involve certain business opportunities. It is therefore important that those opportunities are also represented at the Paris conference.

Results and Recommendations

- Jean-Marie Dauger, Executive Vice-President, GDF SUEZ (France)
- Rabiou Hassane Yari, Former Minister of Mines and Energy (Niger)
- Teruaki Masumoto, Chair of the Japanese Energy Association (Japan)
- Marie-José Nadeau, Chair of the World Energy Council and Executive Vice President, Corporate Affairs and Secretary General of Hydro-Québec (Canada)

Moderator: Olivier Appert, Chair of the Conseil Français de l'Énergie

Results and Recommendations

Olivier Appert

I would like to highlight three subjects that have emerged from the discussions.

First, the climate objectives are both in competition, and in synergy, with other objectives. It is possible to create synergies between environmental goals and political or economic ones?

Second, regarding finance and international cooperation, the main question to emerge is whether we can move toward a carbon price or a carbon value? Would a price signal be sufficient as we move forward?

Third, the acceptability of economic policies, in particular the rationality of choices that are made. The WEC firmly believes that greater rationality will increase acceptability among the population at large of measures taken.

Climate versus other Objectives

Rabiou Hassane Yari

We need to have much more diversity in terms of the integration of our climate change policies. Even at the European level there is a certain disparity in this area. Within Africa, which is in a very different situation from the European one, the focus is already on adaptation. Indeed, climate change is a question of survival for Africa, with water and food scarcity already manifest. If we do not tackle the question of climate change, we are in for a very dire future. In addition, for Africa, this is not only a question of greenhouse gas emissions or carbon pricing. Each country has to deal with climate change in its own way on the basis of the conditions it faces and the resources it has at hand. At the same time, all countries have to accept a certain level of responsibility in this process. It is clearly possible to have climate policies working in parallel with other policies.

Teruaki Masumoto

You used the word “competition” between different policies. The popular understanding of international negotiations at the COP conferences is that they are concerned with setting figures. However, going forward, that understanding could change. The INDCs are expected to embody a wider range of practical flexibility. By knowing each country’s INDC, we can learn from each other and this could help participating countries to do even more with respect to emissions reductions. The GCF could also be used more efficiently. That is our expectation.

Jean-Marie Dauger

Policy makers do face the challenge of resolving contradictory objectives. For developed countries, it is necessary to understand the importance of improving energy efficiency, as this will reduce the energy intensity. The relationship between cost and efficiency also depends on the speed with which we want to bring about the transformation of the system.

With respect to innovation, our expectations of the new technologies are not always met, for example with respect to photovoltaic technology for which economic threshold should be reached much quicker than was thought many years ago.

A good policy is one that establishes objectives and also sets out how to best achieve those objectives. But we should therefore not focus only on the instrument itself. We need to take a broader vision. The optimal approach is one in which we are guided by market principles when they are feasible.

Olivier Appert

I understand that the very name of the instrument that emerges from Paris will be crucial for certain countries, notably the US. We should also make every effort to ensure that we do not confuse objectives and means.

I would like to raise a question regarding adaptation versus mitigation. Paul Watkinson stated that COP21 would not deal exclusively with mitigation; adaptation is also a top priority. Would you develop that argument further?

Rabiou Hassane Yari

With respect to adaptation versus mitigation, it would seem that developing countries have to adapt and developed countries have to mitigate. That clearly emerged from the discussions of the past 2 days. The situations are quite different in the countries, and we all have to work on that which is of greatest concern to us.

Teruaki Masumoto

We could envisage a situation where 50% of funds are used for adaptation and 50% for mitigation. Climate change is a multi-dimensional issue that requires a paradigm shift in our current lifestyle that is based on mass production, mass consumption, and mass disposal. Adaptation can take many different forms depending on the conditions in a given country. On the business side, adaptation (like mitigation) represents a new and emerging market.

Jean-Marie Dauger

Some countries are reluctant to talk about actions that they cannot take. European policy will have to deal with both mitigation *and* adaptation if it is to achieve its objectives.

Finance and International Cooperation

Olivier Appert

I would now like to turn to our second question regarding finance and international cooperation. It appears that the cost of CO_2 is lower in developing countries than in developed countries. That should make it possible to reach a certain level of economic rationalisation at the global level by increasing cooperation between developing and developed countries.

The discussions have shown that price of CO_2 is not necessarily an efficient notion in developing countries. Giving a value to CO_2 does not make much sense in those countries.

Jean-Marie Dauger

The situation is not even around the world, and no single solution can be efficient everywhere. Nevertheless, from the European point of view, we believe it is important to attach a price to CO_2. Today, that price is not considered as being at a level that would bring about positive change. However, that does not mean it could not be made to work at another level. Market instruments such as CO_2 pricing can work well, but they require robust rules and regulations.

We also talked about finance. Now we know that oil products are subsidised in many countries. The fact that the price of oil has dropped drastically could make it possible to review our subsidy policies and use that money in other areas.

Olivier Appert

That is a good suggestion, but I believe we have probably missed the window of opportunity to do that. The subsidy question should have been raised when prices were on their way down. Nevertheless, the good news is that certain countries (China, India, Kuwait, etc.) have undergone major evolutions in their approach to this question.

Teruaki Masumoto

CO_2 pricing is the fruit of ideology. It is not possible to find a price for air. When it comes to gas or petrol, regular gasoline is cheaper than high-octane gasoline. And high sulphur content oil is cheaper than low sulphur oil. Make the price visible. That could help people at large understand what the CO_2 price is.

Olivier Appert

Is a price signal of relevance to developing countries?

Rabiou Hassane Yari

We are all sensitive to prices. The drop in international oil prices has not led to a reduction in prices in Niger. However, consumers are calling for such a drop in prices. They do not understand what is going on with respect to oil prices and subsidies. This relates to energy generation, and is quite similar to the situation that applies to transport.

The Role of Technology in the Climate Change Debate

Olivier Appert

Let us now turn to technology. How can we mobilise public and private funding in this area? How can we ensure the transfer of know-how? What kind of business model should be deployed? This is a key aspect of climate change and energy transition discussions, and one in which the World Energy Council has a key role to play. What do you consider as the role of technology in the climate change debate?

Teruaki Masumoto

I agree that technology is clearly crucial to tackling climate change. I would highlight two points. First, we already have very highly efficient technologies at our disposal today. So, deploying such conventional high efficient technology is needed. Second, once technology transfer occurs, how can we ensure that that technology is operated efficiently? This points to the importance of capacity building on operation and maintenance of the technology, which also represents an enormous business opportunity.

Olivier Appert

With respect to business models, as the Chair of a research organisation, much of our funding comes from selling our technology at the international level. We need major investments to develop new technologies, and we also have to be able to obtain a return on that investment. What business model could help us achieve that technology transfer?

Teruaki Masumoto

Improving education in developing countries will increase their thirst for technology. That is also an opportunity for new business.

Rabiou Hassane Yari

Developing countries do not have the relevant skills today, and technology transfer is therefore very relevant to them. For example, Niger has many renewable resources at its disposal but it does not always have the know-how to take advantage of those natural resources.

Olivier Appert

This comes down to a question of funding and international cooperation.

Acceptability of Decisions

Olivier Appert

Before concluding, let us turn to the question of acceptability, which would seem to depend on the rationality of decisions made. It appears to be difficult to bring together social, environmental and economic aspects, and that makes it difficult to improve public acceptability.

Jean-Marie Dauger

Energy questions are increasingly being managed at the local level, with towns and individuals customers becoming involved or even actors. They want to be involved in decision making on matters that affect them, and the new technologies will further

accelerate this movement. As a result, decision-making will become an even more complex process.

Teruaki Masumoto

I believe that “public” is the key element here. The GCF has over US$10 billion in funds, which is ultimately taxpayers’ money. I would therefore hope that governments and international organisations would raise awareness among taxpayers that those funds are being used meaningfully to tackle climate change.

Olivier Appert

If we ask where electricity comes from, we are told “from a switch”. If we ask where petrol comes from, we are told “from a pump”. Clearly it is very difficult to explain what goes on behind the switch or the petrol pump. We now live in a GAFA world (Google, Apple, Facebook, Amazon) made up of social networks and big data. Taking into account the GAFA challenge is therefore essential.

Key Success Factors for Paris

Olivier Appert

What would you consider to be the main prerequisite for the success of the Paris Conference?

Rabiou Hassane Yari

In the light of what we have heard, I believe that things are looking good for the Paris Conference. People are more aware of climate change issues and everyone wants to reach an agreement – it is nothing less than a question of survival. The climate challenges we face are so significant that we absolutely must reach an agreement. What we heard about the preparations for the Conference provides hope that it will be a success. In addition, the many other initiatives that are underway around the world will tie in very well with the meeting. Those initiatives give us hope that Africa will play an important role in this process.

Jean-Marie Dauger

Success will come from what the stakeholders – including business – contribute to the process. We have to be totally convinced that reaching an agreement is better than no agreement at all. The motto should be “Anything but Copenhagen!” We should need also to adapt our expectations to what is possible.

Teruaki Masumoto

What is most important is that all major emitters are involved. To achieve that objective, it is necessary to be more pragmatic and more flexible. Developed countries, in particular, must be more modest and more tolerant. Developing countries must recognise their responsibility for the future of the planet.

Olivier Appert

It is essential that we are realistic and pragmatic. It is also very important that Europe is not seen as giving lessons to other countries, which led to the humiliating failure in Copenhagen with which we are all familiar. We must try and capitalise on this major event, and on the goodwill of China and the United States, which alone represent 50% of all emissions. Let us have confidence in the ability and desire of those countries to act efficiently in the area of climate change.

Closing speech

Marie-José Nadeau, Chair of the World Energy Council and Executive Vice President, Corporate Affairs and Secretary General of Hydro-Québec (Canada)*

It is a great pleasure to be with you today, for this 4th European Energy Forum, and I would like to thank the WEC's French Member Committee for giving me this opportunity to participate in your deliberations.

In this year of COP21, we have many different matters to consider with respect to the consequences of our energy systems on climate change. There is clearly a close correlation between energy and climate change. That is true at two levels. First, producing energy generates a high level of greenhouse gas emissions. Second, natural catastrophes are the result of this climate change, and represent a significant threat against our way of life.

To this, we can add sustainable development, which is the third pillar of the energy trilemma, the first two pillars being energy security and energy equity. It is increasingly weighing on what we will have to do in the future. The more we have to deal with extreme weather events, the more we will have to take significant action and make major investments. To become resistant to climate change, we will have to find new ways to produce and use energy. We are already living with extreme weather events today, and that is likely to accelerate even further as we go further. They are bringing home the extent to which climate change is the most significant challenge that we face, and this is true for both developing and developed country. No one is free of this threat.

The Energy Sector

Energy represents two-thirds of all greenhouse gas emissions. We - the energy sector in general - have to try to reduce greenhouse gas emissions as much as possible. We need to reduce our use of fossil fuels as much as possible, and we need to pursue our efforts to use less polluting sources of energy. We also need to use renewable and nuclear energy more than in the past, and develop carbon capture and storage mechanisms. Finally, we have to reduce the intensity of our energy consumption. All of this will make it possible to make progress. However, they all also require energy.

Clearly, without strong global political action on climate change at COP21 there will be major implications for the energy sector. The stabilisation of emissions at levels that are compatible with the internationally agreed 2°C target will require a fundamental transformation of the global energy industry in the coming decades. That is just one reason why a comprehensive and binding agreement will be so difficult to achieve. The energy sector knows that climate change will alter the landscape in which it operates. The global climate framework is indeed considered as one of the greatest critical uncertainties facing the sector. WEC respondents (approximately 900 energy leaders, captured by our 2014 World Energy Issues Monitor are not so much concerned with climate change itself but with the *political* response to climate change in terms of a new framework agreement. We know that the rules will change, and ending that

* Find Marie-José Nadeau's pronounced speech on page 74

uncertainty is essential as it acts as a potential block to the US$48 trillion of new investment that we estimate will be necessary.

Depending on the outcome of the climate change negotiations, that amount could be significantly higher. Recent evidence suggests that an additional US$900 billion per year could be needed in supply side investments simply to meet the 2°C target to avoid dangerous climate change.

Europe's Aspirations

In the lead up to COP21 in Paris in December 2015, it is natural for Europe aspires to a degree of leadership in a process that has been the victim of competing national and regional interests. History shows that no single country, or group of countries, has the political clout to push the agenda forward. Any leadership that has occurred has been by example. Last year's US-China bilateral agreement to reduce emissions is a case of two of the world's largest trading countries deciding to lead by example with their own commitments. Other countries should welcome that.

The EU has a long history of leadership, with the early adoption of a range of innovative measures, including the EU Emissions Trading System (ETS), and the 20-20-20 targets: The 2020 energy goals are to have a 20% (or even 30%) reduction in CO2 emissions compared to 1990 levels, 20% of the energy, on the basis of consumption, coming from renewables and a 20% increase in energy efficiency.

However, there is a concern that short-term policies threaten to undermine long-term environmental goals. In recent years, we have seen anomalies such as the fact that the successful adoption of clear renewable energies such as wind and solar has been largely offset by the increased emissions from use of coal in European power plants.

The European Commission has recently developed a strategic framework for the creation of an Energy Union. Should this become reality, we will see a profound transformation of Europe's energy sector. This project would bring together Europe's 28 energy markets into a single market. The WEC has been supporting this initiative as far as possible, and I truly believe that this Energy Union will become a reality. We have to take decisions now that will make it possible for us to begin using cleaner forms of energy.

There is increasing evidence that in many countries the political forces that drive energy policies are focused on short-term imperatives. In some countries, the immediate concerns about energy security and energy equity outweigh the longer-term need to protect the environment. This is so even though climate change itself is a growing risk for that security and equity. In this context, it should be noted that average political terms last 4 to 5 years, while typical electricity projects take from 6 to 10 years, and even longer for nuclear or hydropower projects.

The move towards low carbon energy will require significant investments. There is no shortage of capital available. However, there are constraints that arise from policy uncertainty, which create a major risk for investors. COP21 provides an opportunity to eliminate those risks by providing a clear pathway for countries when designing their future energy systems. In this, the energy sector has a special role to play.

In this regard, the 4th European Energy Forum has made an important contribution to the global debate. There is no better way to run a successful negotiation than by

understanding the other party. In these two days, we have heard from countries within the EU and in the rest of the world.

Key Messages from the 4th European Energy Forum

What message has emerged in this forum from those energy leaders? We have heard a call to find market compatible solutions; to factor in the economic dimension of the mechanisms under consideration; and to keep all energy options open. We have heard a plea for less bureaucracy; for the de-politicisation of implementation; and for the adoption of stable and predictable regulatory frameworks.

We were also reminded that a carbon price – or putting a value on carbon – is crucial but is only one element of a portfolio of tools to be implemented. Technology and R&D investments are also absolutely necessary.

Will the framework be a protocol, a treaty or an instrument? Will the reference year be 1990 or 2005? Will the agreement be binding or not? Those questions will not be answered until the very end of the negotiations. However, we do know that it is no longer possible to deny climate change. The Intended Nationally Determined Contributions (INDCs), i.e. climate actions countries intend to take post-2020, could prove to be a major development as they will force nations to reflect on their own context and to publicly commit to targets and domestic measures to reach those targets. In itself, that is a major step forward as nations will be expected to report on the progress made.

I would like to conclude by thanking all the panellists for their contributions and all participants for sharing their expertise and experience. I would also like to thank the WEC's French Member Committee for organising this forum as such an efficient, effective and pleasant event.

Olivier Appert

Thank you for those concluding remarks. I would join in those comments by thanking all participants and speakers for their active participation. I look forward to seeing you all again in just under 9 months' time and at our 5th European Energy Forum next year.

Appendix 1

Olivier Appert's speech, as pronounced

Le changement climatique est un enjeu majeur pour la planète. Mais ce n'est pas le seul. Centrant sa réflexion sur l'énergie le CME s'est inscrit dès l'origine dans le cadre fixé en 1992 par le rapport Bruntland qui a définit précisément le concept plus global du développement durable.

Aussi le CME a donné aux politiques énergétiques trois objectifs :

L'accès à l'énergie, la disponibilité énergétique et l'acceptabilité sociale et environnementale (en anglais : Accessibility, Availability, Acceptability). Ces « 3A » ont guidé la réflexion du CME pendant une dizaine d'années.

Aujourd'hui, à la suite notamment de la création d'un « indicateur de développement durable », le CME encourage des politiques énergétiques et climatiques fondées sur l'équilibre d'un « trilemme énergétique » dont les trois dimensions sont :

- La sécurité énergétique : ce concept recouvre la gestion efficace de l'offre d'énergie primaire issue de sources domestiques et étrangères, la fiabilité des infrastructures énergétiques et la capacité des fournisseurs d'énergie à répondre à la demande actuelle et à venir ;
- L'équité énergétique : c'est-à-dire l'accessibilité - physique et économique – à l'offre d'énergie, pour toute la population ;
- Enfin l'environnement durable basé sur l'efficacité énergétique de l'offre et de la demande, le développement d'une offre d'énergie issue de sources renouvelables ou à faibles émissions de CO_2.

Lutter contre le changement climatique, c'est, pour le secteur de l'énergie, surtout limiter les émissions de CO_2, même s'il existe d'autres gaz à effet de serre. Les deux leviers permettant de le faire sont bien identifiés : d'une part, rechercher une plus grande efficacité énergétique tant au niveau de l'offre que de la demande d'énergie ; d'autre part, décarboner le bouquet énergétique en encourageant les technologies de production émettant peu ou pas de CO_2 (les énergies renouvelables font très souvent partie de ces technologies). On comprend que la confusion faite, au niveau européen, entre l'objectif (la réduction des émissions de CO_2) et certains moyens permettant d'atteindre cet objectif (la promotion de l'efficacité énergétique et le développement des énergies renouvelables) peut mener à des politiques énergétiques et climatiques moins efficaces. En effet, imposer des contraintes en matière d'efficacité énergétique ou de part d'une énergie dans le mix énergétique ne peut que dégrader le résultat en termes d'émissions ou le rendre plus coûteux. Il en est de même pour la répartition de l'effort entre les pays.

L'efficacité énergétique est un premier levier puissant pour limiter les émissions de CO_2. De plus, elle favorise la sécurité énergétique en diminuant les approvisionnements ; elle combat la précarité énergétique et accroît la compétitivité en diminuant les

consommations et donc le montant des factures des consommateurs. C'est d'ailleurs la première recommandation formulée par le CME à l'issue du Congrès Mondial de l'Énergie de Daegu (en République de Corée), en octobre 2013.

Le second levier est la décarbonation du bouquet énergétique. Le point de vue du CME, également exprimé à la fin du Congrès Mondial de l'Énergie, est que les querelles idéologiques sur le choix des énergies n'ont plus leur place dans les débats.

Face à une demande croissante (malgré les efforts déployés en matière d'efficacité énergétique), le bouquet énergétique mondial devra accueillir toutes les énergies en fonction de choix intégrant les dotations naturelles et les capacités industrielles, mais aussi des dimensions historiques, culturelles et politiques.

Que faire pour avancer ?

Certains prônent un ralentissement de la croissance économique, voire même la décroissance. Cette idée est choquante pour les pays en développement qui sont loin d'avoir bénéficié du développement économique et du progrès social auxquels ils aspirent légitimement. Cette idée est certainement aussi choquante dans des pays dont l'économie doit faire face à un niveau de chômage élevé lié en partie à l'insuffisance de la croissance.

La première voie à explorer est certainement celle visant à mieux utiliser les leviers déjà identifiés, à savoir l'efficacité énergétique et la décarbonation des bouquets énergétiques. Introduire plus de rationalité dans les décisions permettra de retenir les solutions ayant les meilleurs rapports coût/efficacité. Il y a là une réflexion importante à mener afin de ne plus risquer de prendre des décisions basées sur des raisonnements partiels ou erronés. Et la qualité des débats publics s'en trouvera également améliorée.

Cette rationalité doit intégrer plusieurs dimensions : scientifique ou technique, économique, sociale, environnementale, industrielle, politique… On créera ainsi les conditions d'un débat non polémique qui permettra aux décideurs politiques, de s'appuyer sur une synthèse des connaissances des experts. Alors que la nécessaire évolution de nos économies pour lutter contre le changement climatique va exiger de tous un effort très important, s'assurer d'une meilleure évaluation des choix faits par la collectivité est une exigence incontournable. C'est certainement aussi une condition de l'adhésion des citoyens à ces politiques.

La plupart des actions envisagées impliquent un coût supplémentaire et, dans un contexte de finances publiques exsangues et de pouvoir d'achat en berne, la question du financement des investissements colossaux auxquels nous devrons faire face dans les prochaines années est clairement posée. L'éluder, c'est aller à l'échec.

Pour ce faire il convient de mobiliser les capitaux privés. Pour ce faire il reviendra aux décideurs politiques de mettre en place des cadres réglementaires et politiques efficaces, cohérents et stables. Les financiers devront mettre en œuvre des mécanismes efficaces pour orienter les capitaux vers les technologies adaptées aux pays qui en ont besoin. Les dirigeants du secteur énergétique devront rendre leurs projets plus clairs et attractifs pour renforcer la confiance des investisseurs.

Une autre solution, considérée iconoclaste il y a encore quelques années, fait aujourd'hui des progrès dans les esprits. Des économistes reconnus y travaillent, des organisations respectables la proposent dans leurs rapports et le CME l'a suggérée dans la position sur la politique énergétique et climatique européenne qu'il a publiée

début 2014 : il s'agit d'utiliser des marges de manœuvre aujourd'hui limitées par une politique monétaire trop contraignante.

La coopération internationale est une option bien connue puisqu'elle a été mise en œuvre avec malheureusement un succès limité.

Le problème peut être simplement posé : d'un côté, des pays développés qui ont des ressources financières et souhaitent pour la plupart s'engager dans la lutte contre le réchauffement climatique avec, en revanche, un coût souvent élevé de la tonne de CO_2 évitée ; de l'autre, des pays en développement disposant de peu de ressources, pour lesquels la lutte contre le changement climatique passe après des objectifs de satisfaction des besoins vitaux, avec des coûts de la tonne de CO_2 évitée souvent moindres que ceux des pays développés. La solution à ce problème s'appelle la coopération internationale.

Il y a là une possible réorientation de l'effort des pays développés à laquelle il faut réfléchir. Plutôt que de poursuivre des objectifs très ambitieux de réduction de leurs émissions à des coûts marginaux très élevés – une réduction qui restera insuffisante si les pays émergents et en développement ne font pas d'effort -, une partie des ressources consacrées à la lutte contre le changement climatique pourrait être utilisée plus efficacement dans les pays en développement. Les pays développés, en utilisant leurs compétences technologiques, pourraient consacrer par ailleurs une partie de leurs efforts domestiques, d'une part, au développement de technologies favorables au climat qui seraient largement diffusées et donc source de croissance et d'emploi et, d'autre part, à la mise en œuvre de politiques d'adaptation.

Voici un certain nombre de pistes qu'il convient d'approfondir aujourd'hui.

Je suis convaincu que les débats pendant ces deux jours seront riches et productifs. Je passe maintenant la parole à Jean Eudes Moncomble, Secrétaire général du Conseil Français de l'Énergie qui va vous présenter le déroulement de nos travaux.

Appendix 2

Marie-José Nadeau's speech, as pronounced

Chers collègues et amis,

C'est avec empressement que j'ai accepté l'invitation d'Olivier Appert et de Jean Eudes Moncomble de vous rejoindre pour le quatrième Forum européen de l'énergie et je remercie le Conseil français de l'énergie de me donner cette occasion de participer à vos délibérations.

En cette année de la 21e Conférence des Parties, ici même à Paris, le thème «Objectif COP 21 — Agir efficacement contre le changement climatique» s'est imposé comme une évidence. Derrière ce titre se cache une question cruciale, celle de la contribution de notre secteur économique — l'énergie —au succès des prochaines négociations.

En effet, s'il est un **premier constat** qui apparaît très clair, c'est la corrélation étroite entre changements climatiques et énergie. Et cela joue à deux niveaux : d'une part l'énergie produite et consommée est la source la plus importante des gaz à effet de serre et, d'autre part, les excès climatiques qui s'ensuivent menacent l'intégrité de nos infrastructures de production et de transport.

Avec l'équité et la sécurité énergétique, le développement durable représente le troisième sommet du Trilemme énergétique.

Mais avec le temps et l'impact grandissant des changements climatiques sur notre environnement, ce troisième axe du Trilemme pèse de plus en plus lourd dans la recherche de l'équilibre.

En effet, plus les manifestations climatiques extrêmes se produisent, plus le risque de dommage à nos infrastructures critiques s'accentue. Pour mitiger ce risque, et maintenir la fiabilité des systèmes, les opérateurs de réseaux doivent réaliser des investissements majeurs. Plus on investit pour augmenter la résilience de nos parcs, moins on investit pour accélérer l'accès à l'énergie, à des prix abordables.

Les manifestations climatiques extrêmes font déjà partie de notre réalité. Les grands désastres naturels des dernières années sont venus donner un sens très concret aux dommages que peuvent causer les changements climatiques. Aucune région n'est à l'abri des phénomènes climatiques extrêmes : pays industrialisés et pays en émergence sont sur le même pied. Inondations, sécheresses, déchainements du climat sont observés dans tous les continents.

L'énergie, qui compte pour les 2/3 des émissions globales de GES, est à l'avant-scène des responsables et par conséquent des solutions. Des réductions importantes de GES peuvent être réalisées par un portefeuille de mesures ; qu'on pense :

- À la réduction des émissions dues à l'exploitation des énergies fossiles avec des technologies plus performantes ;
- À des choix énergétiques moins polluants : plus de gaz moins de charbon ;
- À la diminution des pertes électriques en transport et en distribution ;
- À l'augmentation de la contribution des filières non émettrices de dioxine de carbone, telles les énergies renouvelables et nucléaire ;

- Au déploiement des technologies permettant la capture et le stockage des GES (CCS) ;
- À la réduction de l'intensité énergétique.

Toutes ces mesures ont un coût et presque toutes requièrent de l'innovation technologique. Toutes dépendent de politiques publiques qui encouragent les initiatives de production moins polluantes et qui soutiennent la R&D et les projets de démonstration.

It is clear that strong global political action on climate change at COP 21 will have major implications for the energy sector. Stabilization of emissions at levels compatible with the internationally agreed 2°C temperature target will mean a fundamental transformation of the energy industry worldwide in the coming decades. Which is, of course, just one reason why a comprehensive and binding agreement will be so difficult to achieve.

The energy sector knows that climate change will change the landscape in which it operates. Year after year, WEC's World Energy Issues places the global climate framework as one of the biggest critical uncertainties facing the sector. Note that WEC's respondents — close to one thousand energy leaders - are expressing concern not so much about climate change itself, serious as it is, but about the political response to climate change in the form of a new framework agreement.

We know that the rules will change and ending that uncertainty is critical because it is acting as a potential block to the $48 trillion of new investment that the WEC World Energy Trilemma Report estimates is required if the global energy system is to supply the growing demand for power.

Depending on the outcome of climate change negotiations, that amount could be significantly higher. Indeed, recent evidence presented by the Intergovernmental Panel on Climate Change suggests that an additional $900 billion a year could be needed in additional supply-side investments simply to meet the 2°C targets.

As we approach COP 21 in Paris in December, it is natural for Europe to aspire to a degree of leadership in a process that for so long has become the victim of competing national and regional interests. History shows that this is a process in which no single country or group of countries have the political clout to push the agenda forward. Instead, where there has been leadership, it has been by example. Last year's, US-China bi-lateral agreement to reduce emissions is a typical case of two of the world's largest trading countries deciding to lead by example with their own commitments. Other countries should welcome that.

For its part, the European Union has a long history of leadership with the early adoption of a range of innovative measures such as:

- The development of the EU Emissions Trading System;
- Adopting legislation to raise the share of energy consumption produced by renewable energy sources, such as wind, solar and biomass, to 20% by 2020;
- Setting a target to increase Europe's energy efficiency by 20% by 2020 by improving the energy efficiency of buildings and of a wide array of equipment and household appliances;
- Binding targets to reduce CO_2 emissions from new cars and vans.

However, returning to the energy sector, there is a concern that short-term policies threaten to undermine long-term environmental policy goals. Recent years have seen the emergence of anomalies such as the fact that the successful adoption of clean renewable energies such as wind and solar has been largely offset by the increase in emissions from the use of coal in European power plants.

Comme vous le savez, la Commission européenne a annoncé tout récemment l'adoption d'un cadre stratégique pour bâtir une « Union de l'énergie ». Si ce projet

devient réalité, nous assisterons à une transformation en profondeur du secteur énergétique en Europe.

D'après le vice-président de la Commission européenne chargé de l'union de l'énergie, M. Maros Sefcovic, il s'agit du projet européen le plus ambitieux dans le domaine énergétique depuis la création de la Communauté du charbon et de l'acier en 1951.

Ce projet vise à intégrer les 28 marchés européens de l'énergie pour former une grande Union de l'énergie, et entamer une transition fondamentale vers une économie à faibles émissions de dioxyde de carbone.

L'encre n'est pas encore sèche et nous assisterons sûrement à de nombreuses itérations de ce projet. Mais je ne doute pas qu'il fera avancer le débat.

Les orientations qui sous-tendent l'Union de l'énergie sont nobles.

Un marché de l'électricité plus interconnecté, davantage ouvert aux énergies à faibles émissions de carbone, des tarifs abordables et compétitifs, une sécurité d'approvisionnement. Voilà le Trilemme énergétique exprimé autrement.

Dans le contexte où l'énergie compte pour les 2/3 des émissions globales de GES, il faut faire la transition vers des énergies à faibles émissions; il faudra inévitablement prendre des décisions qui engagent l'avenir à long terme.

As Chair of a global organization that promotes sustainable energy for all, my concern is that there is increasing evidence that in many countries, not just in Europe, the political forces that drive energy policies are focused on short-term concerns rather than long-term imperatives.

In the current context of the climate change debate and using the language of the Energy Trilemma, it appears that in some countries, the immediate concerns about the pillars of energy security and energy equity are outweighing the longer-term need to protect the environment. And yet, as I mentioned earlier, climate change is itself a major threat to energy security and energy equity.
Increasingly, energy policies are being introduced with the aim of a political quick-win at the expense of long-term policies aimed at delivering reliable, affordable and sustainable energy supplies.

It is no coincidence that an average political term is four to five years while the typical energy project from conception to commissioning ranges from six to ten years and sometimes longer in the case of large nuclear and hydro power projects or other large energy infrastructures.

As I mentioned earlier, the move towards a low-carbon future energy will require significant investments. As the latest edition of the World Energy Trilemma Report points out, there is no shortage of capital. There are, however, constraints in the form of policy uncertainties that create a major risk for investors.

COP 21 in Paris provides a major opportunity to eliminate these risks by providing a clear pathway for nations when designing their future energy systems. In this, we in the energy sector have a special role to play.

In this regard, a meeting such as this European Energy Forum is an important contribution to the global debate. For there is no better way to run a successful negociation than to understand where the other parties come from.

Yesterday and today, we have heard the views of countries within the EU — Germany, Poland, France, United Kingdom, Belgium - but not only from the EU. We have learned more about the North American perspective — more specifically the US. The views from

Japan, Saudi Arabia, and Niger were also very instructive in terms of their own specificities.

Now what is the message from the energy leaders out of this Forum:

- We have heard a call to find market-compatible solutions; to factor in the economic dimension of the mechanisms considered and to keep all energy options open.
- We have heard a plea for less bureaucracy and a very consistent plea to depoliticize implementation and to adopt stable and predictable regulatory frameworks;
- We were also reminded that carbon price — as much as it is crucial —is only one element of a portfolio of tools to be implemented and that technology and investments in R&D are absolutely necessary.

Thank you very much.

Context of Climate Negotiations

T. Masumoto, J. Ashton, R. Hassane Yari, B. Worthington

Objectives and Effectiveness of Climate Policies

F. Haslauer, K. Bolesta, E. Bardram, Y. Alshammari, D. Finon

Workshop on Global Energy Trilemma

J. MacNaughton

Finance

M. Arndt, JC. Hourcade, C. de Gouvello

International Cooperation

M. Grubb, J. MacNaughton, M. Franz

Keynote speech

P. Watkinson

Results and Recommendations

JM. Dauger, R. Hassane Yari, O. Appert, MJ. Nadeau, T. Masumoto




















WORLD ENERGY COUNCIL


Le Conseil Mondial de l'Énergie

Fondé en 1923, le Conseil Mondial de l'Énergie (World Energy Council, WEC) est la principale organisation multi-énergétique mondiale. Organisation à but non-lucratif et non gouvernementale, agréée par l'Organisation des Nations Unies, le Conseil Mondial de l'Énergie est doté d'un statut de bienfaisance au Royaume-Uni et est partenaire stratégique d'autres organisations clés dans le domaine de l'énergie. Il est constitué de comités nationaux, représentant près de 100 pays dans le monde et composé de dirigeants du secteur énergétique. Il est régi démocratiquement par une Assemblée Exécutive, composée de représentants de tous les comités membres. Son siège est à Londres, il comprend parmi son personnel des coordinateurs régionaux qui exercent leurs activités en Asie, en Europe centrale et orientale, en Afrique et en Amérique latine/Caraïbes. Il est financé essentiellement par les cotisations des comités nationaux.

Le Conseil Mondial de l'Énergie couvre une gamme complète de questions liées à l'énergie. Il s'intéresse à toutes les énergies (le charbon, le pétrole, le gaz naturel, l'énergie nucléaire, l'hydraulique et les nouvelles énergies renouvelables). Il réalise des projections à moyen terme et long terme et travaille sur un grand nombre de thèmes liés à l'énergie (efficacité énergétique, environnement et énergie, financement des systèmes énergétiques, prix de l'énergie et subventions, pauvreté et énergie, éthique, normes, nouvelles technologies,...). Le Conseil Mondial de l'Énergie réalise des analyses, des recherches, des études de cas et des orientations stratégiques publiées sous forme de rapport et utilisées par les principaux décideurs. Des cycles de travail de trois ans aboutissent au Congrès Mondial de l'Énergie, événement majeur de l'industrie énergétique attirant plus de 5 000 délégués, incluant un programme technique, des réunions, des séances de travail en réseau et une importante exposition sur l'énergie.

Plus d'informations sur **www.worldenergy.org** et **@WECouncil (twitter)**

Comités membres du Conseil Mondial de l'Énergie

Afrique du Sud
Albanie
Algérie
Allemagne
Arabie Saoudite
Argentine
Autriche
Bahreïn
Belgique
Bolivie
Botswana
Brésil
Bulgarie
Cameroun
Canada
Chili
Chine
Chypre
Colombie
Congo
Corée
Côte d'Ivoire
Croatie
Danemark
Egypte
Espagne
Émirats Arabes Unis
Équateur
Estonie
États-Unis
Éthiopie
Finlande
France
Gabon
Ghana
Grèce
Hong Kong, Chine
Hongrie
Inde
Indonésie
Irak
Iran
Irlande
Islande
Israël
Italie
Japon
Jordanie
Kazakhstan
Kenya
Koweït
Liban
Lettonie
Libye
Lituanie
Luxembourg
Macédoine
Maroc
Mexique
Monaco
Namibie
Népal
Niger
Nigéria
Nouvelle-Zélande
Pakistan
Paraguay
Pays-Bas
Pérou
Philippines
Pologne
Portugal
Qatar
République tchèque
Roumanie
Royaume-Uni
Russie
Sénégal
Serbie
Slovaquie
Slovénie
Sri Lanka
Suède
Suisse
Swaziland
Syrie
Taiwan, Chine
Tanzanie
Tchad
Thaïlande
Trinidad-et-Tobago
Tunisie
Turquie
Ukraine
Uruguay
Zimbabwe

Le Conseil Français de l'Énergie

Fondé en 1923, le Conseil Français de l'Énergie (CFE) est le comité national français du Conseil Mondial de l'Énergie. Ce dernier rassemble plus de 3 000 organisations et représente une centaine de pays dont les deux tiers de pays en développement. Il représente ses membres dans toutes les activités internationales du Conseil Mondial de l'Énergie.

Le Conseil Français de l'Énergie est une association qui a pour objectif de promouvoir la fourniture et l'utilisation durables de l'énergie pour le plus grand bien de tous. Le Conseil Français de l'Énergie regroupe des acteurs français (entreprises, administrations, organisations professionnelles ou universités) impliqués dans des réflexions qui privilégient les dimensions d'accessibilité, de disponibilité et d'acceptabilité de l'énergie dans une perspective mondiale ; toutes les ressources et les technologies de l'énergie sont représentées.
Le Conseil Français de l'Énergie soutient les recherches en économie de l'énergie et participe aux débats énergétiques, notamment par l'intermédiaire de publications et de conférences.

Le Conseil Français de l'Énergie assure la diffusion des résultats des recherches qu'il a financées. De plus, le français étant l'une des deux langues officielles du Conseil Mondial de l'Énergie, le Conseil Français de l'Énergie contribue à la promotion de la francophonie en traduisant en français et en diffusant les travaux les plus importants du Conseil Mondial de l'Énergie.

Plus d'informations sur **www.wec-france.org** et **@CFE_WEC_France (twitter)**

Membres du Conseil Français de l'Énergie

▸ Membres partenaires

ADEME - Alstom - Areva - CEA - EDF - FIM Energétique - GDF SUEZ - IFPEN - PricewaterhouseCoopers - Total - UFIP

▸ Membres scientifiques et professionnels

ANAH - AFG - ASTEE - ATEE - CGEMP - CIRED - CPDP - CNISF - Enerdata SA - FEDENE - FNCCR - FAF - OIE - UNIDEN

▸ Membres associés

Pascal Faure, Directeur Général de la Compétitivité, de l'Industrie et des Services (DGCIS)
Laurent Michel, Directeur Général de l'Énergie et du Climat (DGEC)
Pierre-Marie Abadie, Directeur de l'Énergie (DGEC)
Pascal Dupuis, Chef du Service Climat et Efficacité énergétique (DGEC)

François Ailleret - Jean Bergougnoux - Marcel Boiteux - Claude Destival - Jacques Maire – Pierre Gadonneix - Bruno Weymuller

Publications

- « Trilemme Énergétique Mondial - Financement : mythes et réalités » Conseil Français de l'Énergie, 2014
- « 3rd European Energy Forum – What Policy Measures for Energy Transition in Europe? » Conseil Français de l'Énergie, 2014
- « 22ème Congrès Mondial de l'Énergie – Incertitudes et résiliences » Conseil Français de l'Énergie, 2013
- « Scénarios Mondiaux de l'Énergie à l'horizon 2050 – Mises en musique du futur de l'énergie », Conseil Français de l'Énergie, 2013
- « Les politiques d'efficacité énergétique dans le monde – ce qui marche et ce qui ne marche pas », Conseil Français de l'Énergie, 2013
- « Trilemme Énergétique Mondial – Investir dans l'énergie durable », Conseil Français de l'Énergie, 2013
- « Trilemme Énergétique Mondial – Le programme du changement », Conseil Français de l'Énergie, 2013
- « Les enjeux énergétiques mondiaux vus par les acteurs français », Conseil Français de l'Énergie, 2013
- « 60ème Congrès AFSE Économie des Énergies : prix et incertitudes », Conseil Français de l'Énergie, 2011
- « Politiques pour demain », Conseil Français de l'Énergie, 2011
- « Le gaz de schiste : résumé et commentaires », Conseil Français de l'Énergie, 2010
- « Montréal 2010 : parole aux jeunes », Conseil Français de l'Énergie, 2010
- « Objectif : développement durable », Conseil Français de l'Énergie, 2010
- « Énergie et innovation urbaine », Conseil Français de l'Énergie, 2010
- « Efficacité énergétique : la recette pour réussir », Conseil Français de l'Énergie, 2010
- « Conséquences de la crise sur le secteur de l'énergie », Conseil Français de l'Énergie, 2009
- « Cahiers de l'Énergie n°1 », Conseil Français de l'Énergie, 2009
- « Choisir notre futur : scénarios de politiques énergétiques en 2050 », Conseil Français de l'Énergie, 2007
- « Une seule planète pour tous », Conseil Français de l'Énergie, 2003.

Conseil Français de l'Énergie
12 rue de Saint-Quentin
75010 Paris - France
T (+33) 1 40 37 69 01
F (+33) 1 40 38 17 38
E cfe@wec-france.org
www.wec-france.org

Promouvoir la fourniture et l'utilisation durables de l'énergie pour le plus grand bien de tous