



THE EUROPEAN FILES

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CLIMATE
CHANGE:

The
European
Initiatives



BELOW
2°C

a GLOBAL DEAL^{FOR} CLIMATE

To keep global average temperature rise below 2°C to limit dangerous climate change, the world needs a new international climate agreement to be finalised in Paris in December 2015



NEXT STEPS
2015

DECEMBER
Paris Climate Conference
COP21

END OF MARCH
EU submits contribution

BY NOVEMBER
UN compiles all contributions

EDITORIAL



Climate change represents a key challenge today, involving the entire world, at all levels. Europe has reached a point where the scientific, political and business communities, all acknowledge the urgency to find ways to meet the 2°C goal. The European Union has already taken the lead through ambitious commitments to cut its emissions by at least 40% compared to 1990 levels. Indeed, the EU can play a major role in driving the global strategy towards awareness and action against climate change. **The European Files** seizes this opportunity to take a step back and appraise Europe's strategy ahead of the international agreement.

The COP 21 summit is the opportunity, not only to address the climate change issue, but also to review our long-term economic growth and sustainable development policy, as the need to reduce greenhouse gas emissions is faced with the contradiction of rising world energy demand. Fighting global warming requires a global effort made by all countries and citizens.

Certainly, emissions cuts will be the guiding thread of the summit. More than 60 countries, at various stages of development, have put forward contributions to the agreement, including the major emitters (China, the USA and the EU). Nevertheless, those only represent about a quarter of the parties to the UN climate convention. Stepping up energy efficiency is the lowest-cost means of reducing our carbon emissions, and a major stake for the European Union. Sectors such as products, transport and buildings are the largest energy consumer in Europe, and must be tackled.

Scientific reports tell us that reducing GHG emissions can be done, with alternative energy sources, and specific yet ambitious policies, which need to be prioritized. Europe's policymakers are called to redouble incentives and consolidate policies that make investing in the *right* technology, easier. Investments in new technologies such as Carbon Capture and Storage (CCS) are crucial in order to systematize their usage. Complemented by new initiatives such as implementing a global carbon price signal covering all sectors of the economy, internalizing the price as environmental costs, as well as information and awareness campaigns on energy consumption, the EU hopes to empower the entire continent.

Such policies implies investment opportunities in low-carbon technologies. The study "Roadmap 2050" tells us that the change can be realized by further developing and deploying already commercially-available technologies, and by expanding the trans-European transmission grid. More effort can be made in order to integrate renewable energy sources such as biofuels or wind and solar into distribution networks.

Achieving a successful transition requires a strong commitment of all levels of society. For instance, authorities must show full transparency and accountability. Good practices need to be acknowledged and shared. Confidence between private and public organizations is a central feature of the EU's objectives, notably through the creation of a Modernization and Innovation Fund. It is important to keep in mind that the steps toward sustainable development, all lead to improvements in quality of life and jobs creation.

Great changes in the market place will require continuous attention from all members of society. In this case, the EU and its partners hope to promote the Emissions Trading System and other tools to efficiently fight climate change and address the surplus of emission allowances (the Market Stability Reserve) at the international level. These measures demonstrate the political will necessary to achieve ambitious and systemic change.

As our window of opportunity for maintaining global warming below the 2°C temperature limit is closing very fast, all actors need to take steps and acknowledge the necessary high-level of investment required to create a more resilient and efficient energy infrastructure.

This edition probes the various options at hand for the EU and its partners as the campaign against climate change gives way to a new sustainable world system.

Laurent Ulmann

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A global agreement on climate change : a priority for Europe



Laurent FABIOUS

French Minister of Foreign Affairs - President designate of COP21

In December, France hosts the 21st UN Climate Change Conference, COP21. What are we seeking to achieve in Paris? In short, an ambitious, legally binding agreement, limiting global warming to 2°C or 1.5°C by 2100, with financial and technological support for developing countries, in order to ensure solidarity, equity and credibility. The task is of course very complex. As President designate of COP21, my role is, and will be, to help build compromises between the 196 Parties: 195 countries and the EU.

The stakes are of course environmental, but not exclusively. Tackling climate change also contributes to combating poverty, inequalities, food insecurity and uncontrolled migrations. Climate action and development efforts go hand in hand. We therefore need to stop looking at the problems – and solutions – separately. To tackle climate change is also to enhance international peace and security, because climate disruption ultimately means security disruption.

Despite the complexity of the problems and certain prior failures, the chances of an agreement in Paris, which is vital for mankind (vital in the strictest sense), are real, for at least three reasons. Science: nowadays nearly nobody in Europe questions the reality of climate change and its human origin any more. Political will is also going to play a major role, with increasingly strong international mobilization as shown by the European Union's commitment and that of the United States and China, the two largest global emitters. Lastly, the context has changed, particularly in economic terms, as we now have more and more technological solutions that will enable our societies to enter the era of low-carbon

development. We know, as does the private sector, that this vital change of path is technically possible, viable, and will create jobs.

The European Union has placed itself on the front line of the action against climate change. In March 2015, the presentation of the EU's contribution ahead of the Paris Conference was a turning point. The European Union is responsible for almost 10% of the world's total greenhouse gas emissions. In its contribution, the EU committed to reducing its emissions by 40%, compared to 1990 levels, by 2030. It confirmed its long-term goal of reducing emissions by 80-95%, compared to 1990, by 2050.

Beyond these positive commitments, the European Union and all its Member States need to implement the international commitments they have made as soon as possible. That includes ratifying the Doha Amendment to the Kyoto Protocol, which extended the latter through to 2020.

All these actions are in the interests of both Europe and the wider world. Our future depends a great deal on the energy transition begun in recent years. While contributing to achieving the 2°C or 1.5°C goal of COP21, this major change in policy is also an exceptional opportunity for all our countries. The energy efficiency measures that are being and will be implemented will help to address numerous challenges, including cutting greenhouse gas emissions, reducing energy consumption and thus costs for citizens, and creating innovative jobs in Europe. That is the very aim of the "Energy Union" project proposed by the Commission.

In recent years, extreme climate events, including heatwaves, floods and droughts, have led to increasingly severe damage around the world, even in Europe. According to the European Environment Agency (EEA), the last decade was the hottest ever recorded in Europe, with European land area temperatures 1.3°C

above the pre-industrial era average. The effects of climate change on health are also visible and concerning, with the increased spread of the vectors of infectious diseases in Europe. In short, Europe is not spared from the effects of climate change, and action is in Europe's best interests.

The Commission and the Member States need to continue their advocacy work with regard to our international partners. The European Union has an essential role to play in the ongoing negotiations. On the strength of our experience in cooperation and our status as a leading official development assistance donor worldwide, we are responsible for ensuring the voices of the poorest, most vulnerable countries are heard. We need to ensure that the interests and needs of those countries are fully taken into account in the future agreement. We need to foster financial and technological solidarity with them. We need to promote the expertise that has been acquired – particularly through the European Development Fund – through the implementation of projects with climate and development "co-benefits". The challenge is therefore considerable, and it is not an overstatement to say that mankind's very survival is at stake.

The full commitment of the European Union and its Member States is an essential condition for the success of COP21. The dynamic is positive but needs to be intensified. Much remains to be done so that the Paris Conference can be a turning point for the planet. If we succeed, the adjective "historic" will be deserved.

Seven billion reasons why Paris must be a catalyst for change



Miguel ARIAS CAÑETE

European Commissioner for Climate Action and Energy

Every person on the planet will benefit if we can avoid dangerous climate change. For small island nations at the mercy of rising sea levels, urgent climate action is quite simply a matter of survival. In Paris in December, we have a chance to start turning back the tide.

An ambitious, robust and fair global climate deal will not only help us curb climate change and adapt to its impacts; it will also underpin our long-term economic growth and sustainable development.

The Paris Agreement must convince citizens, markets and decision-makers that the low-carbon economy is for real and not just an empty promise. So, how do we achieve this?

Clearly, the level of ambition of emissions targets will be the backbone of the new agreement. So far, more than 60 countries, representing around 62% of current global emissions have put forward contributions to the new deal. As well as some of the biggest emitters – such as China, the US and the EU – the list includes some of the most vulnerable countries. This is real leadership.

The mitigation targets pledged so far already cover more countries and four times the proportion of global emissions than those covered by the current targets of the Kyoto Protocol. This is good news. Still, it is not good enough. What's more, these countries only represent around a quarter of the parties of the UN climate convention.

For the Paris Agreement to be effective, we need all of today's major emitters on board. G20 countries – responsible for 75% of global emissions – need to show leadership, and those that have not done so need to come forward as soon as possible with their intended contributions.

Before Paris, scientists need to give us a clear idea of whether the collective effort puts us within reach of keeping the global temperature rise below 2°C. To this end, together with my Moroccan colleague, Minister-Delegate for the Environment Hakima El Haite, I will convene an informal forum of scientists and policy makers in Rabat, Morocco, in mid-October.

However, we have to face up to the possibility that what will be on the table in Paris may fall short of what is required. That is why it is crucial that the Paris Agreement ensures we carry out a regular global stocktake every five years. This will enable countries to strengthen emissions targets in light of the latest science and progress already made.

In the meantime, we need to look seriously – together with business, regions, cities, communities – for further practical opportunities to reduce emissions, for instance by improving energy efficiency, deploying renewables, and improving air quality.

The Paris Agreement should be guided by a long-term goal. For me, that would mean reaffirming the below 2°C objective and, more specifically, calling on all countries to collectively reduce global emissions by at least 60% by 2050 compared to 2010 and be carbon neutral before the end of this century. This is consistent with the latest findings of the Intergovernmental Panel on Climate Change.

The swift implementation of targets must be backed by multilaterally agreed rules for regularly reporting key data, such as greenhouse gas emissions, and for holding countries accountable for what they have promised. Without transparency and accountability, there will be no trust or confidence that countries will deliver on their commitments. Nor will we be able to track collective progress towards our common goal.

It is no secret that the EU strongly favours targets that will be internationally legally binding. For us, this provides the strongest signals of commitment, as well as predictability and certainty for businesses and citizens. We recognise that

this will be politically difficult for some of our partners and we are working with them to search for a solution that works for everyone.

In the coming weeks and months we need to further build the political momentum we have seen growing at events such as the G7 Summit, the Major Economies Forum and informal ministerial gatherings. The Paris Agreement is already on the agenda of major upcoming meetings – the UN Summit to adopt the 2030 agenda for sustainable development later this month, as well as the World Bank and the IMF annual meeting, and the G20 Summit.

With ten official negotiating days left until we meet in Paris, we are cutting it fine. The window for limiting global warming to less than 2°C is closing fast, and we need solid global action to avoid dangerous climate change now.

Reinforce climate protection, create jobs, and improve competitiveness



Barbara HENDRICKS

German Federal Minister for the Environment, Nature Conservation, Building and Nuclear Safety

A few weeks ahead of the landmark international climate conference in Paris, it is obvious that 2015 marks a turning point in international efforts to combat climate change. For the first time in 25 years of climate diplomacy we see that all major emitting countries are prepared to take concrete action to reduce or limit. There is a growing consensus that the future of this planet is marked by the phase-out of fossil-fuel use in the course of this century. What may look like a far-off aspiration is in fact a very specific action agenda that requires significant changes in investment patterns from today on.

Germany has come a long way in 25 years of climate policy: We reduced emissions by about 27% since 1990. Our share of renewable energies in power supply today is five times higher than in 2000. New buildings consume only half of the energy they needed 20 years ago, to mention a few examples. Nevertheless, our national climate targets are ambitious and require additional action also in Germany. Therefore, in December 2014 the German government adopted the climate action programme 2020 in order to ensure the necessary reductions to achieve our 40 percent reduction target in 2020.

In order to achieve our ambitious emission reduction targets for 2030 and 2050 we need to facilitate changes in production and consumption patterns, for instance in the transport sector, but also in the way cities are organised, energy is managed, and how agriculture meets the need for a healthy nutrition. A number of structural changes are already under way. The car industry is investing serious amounts of capital into electric vehicles. The IT industry is investing massively into smart home solutions. Mobility of

people in cities becomes smarter with advanced communication technology.

All of these examples significantly spur innovation and investment as well as represent major opportunities for economic growth and new jobs. In the field of renewable energy, there are more than 350.000 jobs today. Comparable potentials for new and better jobs are there in energy services, future mobility and smart buildings. What is needed are the right incentives for these investments to become part of the solution to climate change. It is encouraging to see that many new smart technologies are developing even more dynamically outside Germany and Europe, but this also implies that we in Europe need to keep pace with evolving technologies to secure and increase our competitiveness.

If we start a serious debate about how to manage the transition to low carbon alternatives for those industries and regions in Germany that are still heavily depending on the use of fossil fuels, we will be able to avoid further lock-in of investment and human resources in sectors that will inevitably look quite different in only a few decades. In order to kick-start a broad debate in society on how this transition can be successfully managed we have invited civil society to discuss about how to reach our ambitious climate targets for 2030 and 2050. We will draw up a national Climate Action Plan 2050 by summer next year, addressing all relevant sectors and building on that dialogue.

Germany's efforts to decarbonise are closely intertwined with the European context, not least through the Emission Trading System. Europe has clear medium- to long-term climate targets: reducing greenhouse gas emissions by 20% until 2020, at least 40% by 2030 and 80-95% until 2050 (all versus 1990 levels).

The extensive 2030 framework agreed by EU leaders last autumn has clearly defined the level of ambition and the distribution of efforts in the ETS and non-ETS sectors. We will need to further develop this framework with regard to questions such as: How to include emissions and sinks

from land-use and forestry into the climate target while maintaining environmental integrity? How to design a governance system for renewable energies which ensures target achievement?

And: the climate target of minus 40% is a minimum target. We need to actively explore the option of raising ambition beyond this level, including through the use of high-quality international carbon market mechanisms. Experience shows that they can trigger investments and create best practices in developing countries.

The Paris agreement needs to send a clear signal to the world that we need to foster a major transformation, shifting investments from brown to green, literally "shifting the trillions". This should be our collective goal. The aggregate amount required for this global transformation of our energy systems, our economies at large is in the order of the trillions of dollars – coming from domestic and international sources as well as public and private investments, as we again heard i.a. from IPCC and the New Climate Economy.

In order to mobilize the necessary means we need an upward spiral of ambition. Changing economic and environmental realities have to be taken into account. New funding streams, including South-South have to be taken on board. Support provided should reflect increased ambition in mitigation and adaptation actions. This will include creating enabling environments to prepare the ground for investments. We need to implement ambitious climate policies and send thereby the market signals needed for the transformation.

I am convinced that medium- and long-term competitiveness will be redefined by Paris – not only in Germany or Europe, but on a global scale. Companies and investors should carefully position themselves to be part of the solution rather than relying on traditional business models.

Advanced Member States measures towards a low carbon economy



Isabel GARCÍA TEJERINA

Spanish Minister for Agriculture, Food and Environment

The European Union is fully committed to continue pushing for concrete and ambitious proposals at the international level to promote the transition of the global economy towards a low carbon and climate resilient pattern. The European 2030 Climate and Energy Package is a clear example of this determination.

In this context, Spain is aware that this transition is not only necessary but also unavoidable. Hence the willingness of the Spanish Government to create the necessary conditions that would allow the realization of the potential that a low carbon growth brings to the different sectors of the society is strong.

If we want this change to take place, we need to provide an adequate policy and secure regulatory framework to encourage low carbon and carbon resilient investments that avoid locking in carbon intensive investments.

Taking this into account, and in order to ensure that we stay in line with the long term European GHG emission commitments, we have created, at the national level, the appropriate environment to boost new green investments. In this sense, we have put in place new policies to incentivise low emission investments and reduce greenhouse gas emissions.

The latest initiatives that the Ministry for Agriculture, Food and Environment has launched, in coordination with other departments, have a double objective in mind: the transition towards a low carbon and carbon resilient economy, by reducing greenhouse gas emissions in Spain, while creating employment and economic activity in Spain while fulfilling our international

commitments on climate change, both at the UN level and also at the European one.

We have launched a series of plans to promote environmental measures called "Environmental Boosting Plans" (*Planes de Impulso al Medio Ambiente- "PIMAs"*), with different windows targeting various sectors and policy areas.

The "Environmental Boosting Plans" (PIMA) promotes a low-carbon economy in various fields: renovation of commercial vehicles (PIMA Air), rehabilitation of hotels (PIMA Sun), more efficient park of agricultural machinery (PIMA Earth), more efficient of bus and trucks (PIMA Transport) and improvement in waste treatment (PIMA waste). And for the first time in Spain, PIMA Adapta support projects addressing adaptation to the impacts of climate change in a concrete way.

The next initiative is a new Environmental Boosting Plan (PIMA Enterprise). This Plan will be provided with 5 M€ and has been designed to support companies in calculating their carbon footprint and invest in its reduction.

Furthermore, with the **Climate Projects (Proyectos Clima)** we aim to promote development and the reduction of GHG emissions in those sectors not covered by the EU ETS, through the purchase of the emission reductions they generate. We have already launched three calls for proposals, in which we have bought the emission reductions at a price of 7 Euros per ton of CO₂. And we already have more than 100 projects registered. For the forth call, endowed with 15 million Euros and launched in February 2015, we have increased the price for each reduced ton up to 9 Euros. We have found that the response of the Spanish companies has been successful with a relevant number of proposals and projects already underway.

We have also established a **National System of Carbon Footprint** with the creation of a Registry associated with carbon sequestration projects. This project has allowed companies to contribute to the reduction of emissions, with a registry which gives visibility to these companies

and facilitates compensation with sinks in our territory.

It is also interesting to mention the development of the **Non ETS Sectors Roadmap** created with the aim of meeting the Spanish targets for 2020 in those sectors not included in the EU ETS (transport, construction, farming, waste, agriculture) but which will undoubtedly bring emission reductions post 2020. This will be a key tool to achieve our climate goals, while we foster green investments and jobs in our country.

Regarding adaptation, during 2012 and 2013 the Spanish Climate Change Office developed the project "**Initiative - ADAPTA**", with the aim of working together with the private sector towards the integration of adaptation to climate change in their strategic planning and business management, beginning with the development of a vulnerability analysis of key business assets of various organizations.

The project focused on five key sectors for the Spanish economy (food and agriculture; transport; tourism; construction and energy), where a methodology for analysis of vulnerability to climate change impacts was developed. Afterwards, five pilot companies were to perform a detailed analysis, including the identification of main potential impacts in each sector, the identification of the climate risks that companies face, the evaluation of adaptability and, finally, the analysis of current and future vulnerability.

Spain is aware of the importance of changing its development patterns and consolidate this new approach to the way we grow. We are totally convinced that those countries which better integrate the environmental variables in their policies will be those better prepared to compete in a changing world.

We are convinced that the fight against climate change brings great opportunities to modernize our productive model, stimulate growth and create quality jobs and we want to make the most out of this.

The importance of an “ethic” choice. The “human factor” in the climate change debates



Gian LUCA GALLETTI

Italian Minister for the Environment

As COP 21 approaches, discussions and expectations are intensifying. And for good reason. A climate change deal will be, in fact, much more than an agreement on emission cuts and energy production technologies, or an economic commitment to assist poor countries with the financing of climate change adaptation. The Paris conference will represent the boundary between the old and new global economy, between old and new power relations, and between the will to overcome socio-economic tensions triggered by climate change and the failure of experiencing these tensions without a strategy to address them.

I do not fear that I am exaggerating when I say that the agreement in Paris could represent the paradigm of a new world order, having a decisive influence on the social, economic and political structure of the planet.

Precisely because there are many important implications that arise from a climate agreement, I am among those who do not conceal the current difficulties and the risk of this summit failing. However, I am also among those who have been pleased to take note of the important progress towards an accord made over the past few months.

The encyclical ‘Laudato Si’ (‘Praise Be to You’) by Pope Francis has restored a human and ethical dimension to the problem of climate change. This aspect of the issue often went unseen, to the benefit of predominately economic and technical literature. The Pontiff, with his high spiritual authority, has injected the COP 21 debate with terms such as ‘Integral Ecology’, ecology that is not just environmental but also social and economic, and ‘Ecological Debt’, which indicates the obligation of the wealthiest nations, who exploited and in many cases still exploit the natural resources of poor countries, to intervene in support of the weakest economies.

These arguments were not absent from the climate debate, but were treated with a principally technical and financial inflection. The words of the Holy Father have brought them back to a pre-economic and pre-technical orientation: morality, or in other words the universal values of humanity and justice.

There exists, clearly and undeniably, a dimension of the climate issue that takes precedence over emission reduction targets, over financing adaptation to extreme events and over the transfer of technology; it is the human dimension. I am referring in particular to the ‘climate migration’ and the estimated 250 million people who could be forced to move in the coming decades.

Climate migration might become a phenomenon of huge proportions that overlaps the migratory push of millions of people fleeing war and racial and religious persecution. Today, in order to try to cope with the pressure of migrants at the borders of Europe, countries are attempting to make a distinction between those fleeing war



and persecution, and those fleeing poverty, the so-called 'economic migrants'. But many of the so-called economic migrants are the vanguard of environmental migrants, people and families who leave land that is no longer habitable, that is no longer equipped with the 'environmental infrastructures' which allow, for example, rural communities to sustain themselves. Among these systems, water availability is of chief importance. There is a segment of the planet that is drying up, a phenomenon that also affects Italy, but that, for example in sub-Saharan Africa, affects about 700 million people. It is a social and political powder keg waiting to explode which also sits on North Africa and the Middle East, an area that is already highly instable.

To be effective, a climate agreement must also indicate a credible and feasible development model, in the time span of a few decades, for those areas of the planet that have sustained population growth and that need to be enabled to realize adequate socio-economic development. However, these countries do not have to have the availability of technologies that already exist and that are exported in order to produce energy sustainably. Their growth, if powered by hydrocarbons, would have an unsustainable impact on the climate. The same subject of environmental unsustainability also applies to the hundreds of millions of Indians and Chinese who are about to enter the global 'middle class', in that segment with a quality of life and relative energy consumption similar to our own. If this leap in living conditions, which is certainly desirable and obviously unstoppable, is powered by fossil fuels, the

effects will be devastating for the planet. In addition, no amount of reductions in European emissions could offset it. With our 10% of global emissions, and its continued reduction, we in the old continent must have a strong political role in the awareness that the material impact of Europe in terms of emissions reductions, will become increasingly marginal, even under environmental policies that we have implemented which are the most advanced in the world. From an environmental standpoint, it is evident that the cutting of emissions being carried out by Europe, which is by far the most consistent in the world, will not protect us from climate change. It only means that part of the world that produces 10% of greenhouse gases is reducing its share even further.

But if the effects of global warming continue to grow, Europe will not be protected from the increasingly serious consequences of this phenomenon. In Italy, we are already seeing how destructive the effects are of an increase in violence and the frequency of extreme weather events. If we are not able to build an agreement that stems the greenhouse effect, such developments could only increase, having dramatic consequences both in terms of the loss of human life and the damage to the economy.

Europe has a complex and important mission in Paris. It can and must be the engine of an agreement that encompasses all, that is acceptable for countries large, small, rich and poor.

In order to stay below the 2 degree, the IPCC, has indicated that the global emissions need

to be near zero or below by 2100. It is a high and significant benchmark, a goal to aim for and push the international community towards. But to do so requires political recognition, even more than scientific, of the need for an agreement. An agreement which, as I said at the beginning of this article, could represent the paradigm of a new world order that is capable of

- reducing global emissions of greenhouse gases enough to limit the increase in global temperature to no more than 2 degrees;

- mobilize adequate financial resources for adaptation measures needed by countries that are the poorest and most vulnerable to climate change;

- enhance and promote technology transfer to enable poor countries to realize adequate sustainable socio-economic development without recourse to fossil fuels;

- initiating, within a few decades, a transitional phase of the global energy system away from hydrocarbons and towards renewables, while also promoting and incentivising technological solutions that increase energy efficiency.

Only if the Paris agreement includes these characteristics of inclusivity, development,, only if it is global in adherence and vision, will it be able to be signed and be a victory for everyone. This is what we are working towards and what we will continue to work towards every day until the last hour in Paris.



The European investment bank - mobilising finance for the transition to a low-carbon and climate-resilient economy



Jonathan TAYLOR

Vice-President responsible for climate action at the European Investment Bank

The three dimensions of sustainable development, economic, social and environmental, are fundamentally intertwined. In particular, economic growth and development cannot be sustainable unless the challenge of climate change is addressed. And to tackle climate change, new investment is essential; it is urgently needed to foster growth and jobs, by enabling innovation and addressing the considerable infrastructure and energy gap. But it must do so in a way that encourages a shift to more sustainable power generation and efficient energy use, and ensures that infrastructure can improve lives and support climate action. We know that the financial challenge is huge, with estimates of additional annual investment required to support the transition to a 2°C pathway running into the trillions.

At the EIB, the world's largest international public bank, we believe that multilateral banks have a unique and central role to play in generating this investment.

They possess unique technical and financial experience, they can support a critical mass of projects that promote both development and climate action, and they operate at global level. They can also help mobilise other domestic and international financial flows. It will be crucial to design and implement new ways of attracting private investment and finance on a much larger scale, in support of projects that will truly make a difference for people and planet.

Within that group, EIB has a unique position as it works both within the EU and in partner developing countries, which gives us a unparalleled perspective on financing effective

solutions in vastly different types of markets across the world.

The EIB is also involved in a series of innovative finance initiatives in collaboration with the European Commission, the national promotional banks and other financial institutions within the EU. These initiatives, such as the European Fund for Strategic Investments and the Bank's Advisory Hub, aim to support new or innovative projects and products by providing risk-sharing financial mechanisms and technical assistance to stimulate additional low-carbon project development.

At least a quarter of the EIB's overall lending has a significant impact for Climate Action, most of it in renewable energy, energy efficiency and sustainable transport, while the remaining 75% of our lending are at least climate neutral— The Climate Action portfolio is defined by a positive list of sectors and project types. This has allowed the EU Bank to provide more than EUR 90 billion for climate investment worldwide over the last 5 years.

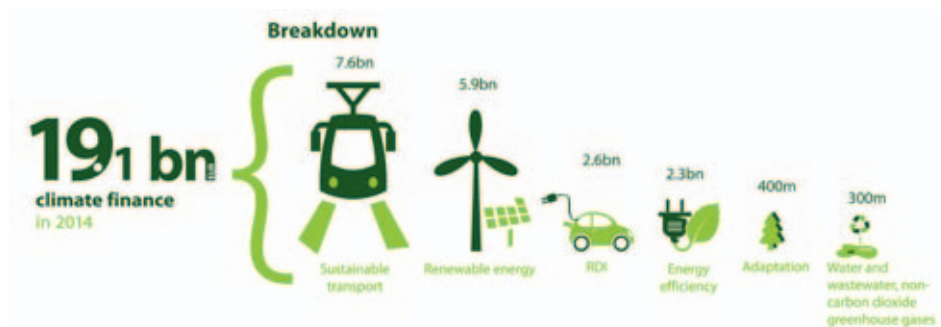
It is no surprise, therefore, that EIB's leadership so far has been recognized due to our major contribution in quantitative terms, year after year. That recognition is also based on qualitative factors, linked to our ability to point the right kind of financial support in the right direction. In order to do that, we have had to develop the tools and processes needed to operate a robust and transparent framework in support of our decisions – and this is precisely the kind of system external

stakeholders, including governments, buyers of climate bonds and investors, are demanding. It is important to understand that, beyond the Climate Action portfolio, climate considerations are already mainstreamed across all of EIB's activities through carbon pricing assumptions and transparent carbon footprinting in particular.

Financial strength matters, but impact matters even more.

To be effective, climate action must be global and climate change must be tackled through effective mitigation and adaptation measures worldwide, and in all sectors of the economy. We must of course ensure that large scale investments are technically feasible and economically sustainable. Our due diligence processes include a full range of environmental and social standards against which project performance is tested. But in addition to that, new investment should also be seen as an opportunity to ensure that infrastructure is better designed to cope with climatic uncertainties and reduce overall carbon emissions.

Last year we supported investment in windfarms on the shores of Lake Turkana in Kenya, and in one of the windiest parts of the North Sea, 85 km north of the Dutch coast. These schemes, one of the largest ever private investments in sub-Saharan Africa and one of the largest wind farms in the North Sea, clearly demonstrated how private investment can overcome challenges that could otherwise hinder



implementation of large scale renewable energy projects.

Energy efficiency is often the cheapest way of cutting emissions, when it can cover investment costs through lower energy bills. The EIB has for example enhanced energy efficiency cutting hospital air-conditioning costs in the Pacific by supporting the use of innovative sea-water cooling technology, and slashed heating bills for residents of social housing in Dublin and Budapest following home improvements. But still, specific barriers prevent energy efficiency investment to reach the levels needed, particularly in the renovation of residential buildings. With support from the European Commission, Directorate General for Climate Action, EIB's recent innovation, PF4EE (Project Finance for Energy Efficiency), addresses those barriers by combining lending, blending and advising activities in cooperation with selected financial intermediaries; the first signature is with Komerční Banka from the Czech Republic to support a variety of smaller scale investments across sectors.

Investment in sustainable transport is essential for cities everywhere, to reduce travel costs, improve health, and cut emissions. The EIB has supported urban transport across Europe and around the world, with recent urban rail infrastructure schemes for example in Paris and London, as well as Istanbul, Quito and Ho Chi Minh City.

Even if global warming is limited to 2°C, there will be a need to adapt to profound changes linked to the evolution of the earth's climate, which are already manifesting themselves. Climate finance and shared expertise is therefore extended to help vulnerable projects improve their resilience in the context of a changing climate. As part of our commitment to climate change adaptation the EIB is supporting, for example, an extensive programme to reduce the economic and health threat posed by water shortages on three islands in the Seychelles and a scheme to transport drinking water more than 300km to the Jordanian capital Amman. Adaptation of new and upgraded infrastructure forms an integral part of both development and climate finance.

Given such diverse engagement, it is essential that the international community not only mobilize finance for catalytic projects, but also work together to build trust in climate finance instruments and flows. **That is why different institutions, including the EIB and the other major multilateral development banks, are working hard to progressively harmonize definitions of climate finance in a transparent manner.** This will help to improve understanding

of finance for both climate and development and to encourage contribution from new partners. Crucially, it will also help project a sense of common effort in pursuit of a genuinely global goal.

EIB's new Climate Strategy

The EIB recently adopted a Climate Strategy following an extensive review and public consultation process. The commitment to large amounts of financing to the Climate Action portfolio remains a feature of the Strategy, and will for instance lead to more than 50 billion Euros of support over the next three years, despite sluggish conditions for investment in general.

But our Strategy is in fact even more ambitious than that large headline number would make it appear. We have stated that our mission is:

“To play a leading role, amongst financial institutions, in mobilising the finance needed to achieve the worldwide commitment to keep global warming below 2°C and to adapt to the impacts of climate change”.

Here as in other areas, our effectiveness depends to a large extent on our capacity to leverage contributions from other actors. So we want to make further progress in fine-tuning our catalytic effect by supporting high-impact investment, for example with innovative technologies, business models and financial

instruments. We want to achieve that by structuring our actions around 3 areas:

- Reinforcing the impact of our climate financing
- Building resilience to climate change
- Further integrating climate change considerations across all of the Bank's standards, methods and processes.

This structure will concern all of the Bank's activities, including those undertaken under the Investment Plan for Europe. In particular, the European Investment Advisory Hub is a joint initiative by the European Commission and the European Investment Bank under the Investment Plan for Europe, which offers a single access point to a 360 degree offer of advisory and technical assistance services with the aim of strengthening Europe's investment and business environment.

By remaining at the forefront of climate finance and the management of climate impact, the EIB intends to play a catalytic role not only for the projects it finances, but more broadly by demonstrating the relevance of innovative financing instruments, business models, technologies and policies in support of the transition to a low-carbon climate-resilient economy. At the heart of our ambitions for the sustainability agenda, our strong reliance on transparency and disclosure ensures accountability to our stakeholders in the interest of the EU and the deployment of its policies.



“Climate finance is the cornerstone of the Paris Summit”



Gilles PARGNEAUX

Member of the European Parliament (S&D), rapporteur of the COP21 report of the European parliament

We have talked a great deal about climate change over the past decade as a prospective issue; something we have to deal with now in order not to let it to the next generation. However, we must say it loudly: climate change is now.

Climate change is now!

In the Sahel region, between 1972 and 1984, droughts and desertification have brought about starvation and caused 100 000 deaths according to the UN. The number of climate refugees is growing consistently. There are 25 million persons every year according to a study of the Internal Displacement Monitoring Center. They might reach 200 million within the next decades.

These realities are the reasons why I believe a failure of the Paris Summit would be unacceptable. In this process, the European Union has to lead the way and to ensure that the agreement encompasses all sectors and all countries in the world: this is why climate finance is such a cornerstone. If we do not include a strong and solid financial package in the COP21, developing countries won't be on board, and half of the world won't commit against climate change.

At the European parliament, I am in charge of the initiative report that gives recommendations in order to reach a universal, binding and effective agreement to stay below the 2 degrees target. The spirit of my report is simple: a strong European commitment against climate change and solid financial aid to support the most vulnerable countries facing this phenomenon.

A leading EU against climate change

First step to be a leader is to behave like it. Thus, I demand ambitious CO2 reduction targets in my report for the European Union. A reduction of at least 40% by 2030 in comparison with 1990 levels and a reduction of 95% by 2050 - which can be seen as a comprehensive phase out. But the European parliament is going further than the European council and its position adopted on 19th September: we call for a binding target for renewable - 30% of our energy consumption by 2030 should be made of renewables - and we call for a 40% energy efficiency by 2030.

These three targets should embody the European commitment against climate change. With lower targets, we will not be able to mitigate CO2 enough in Europe.

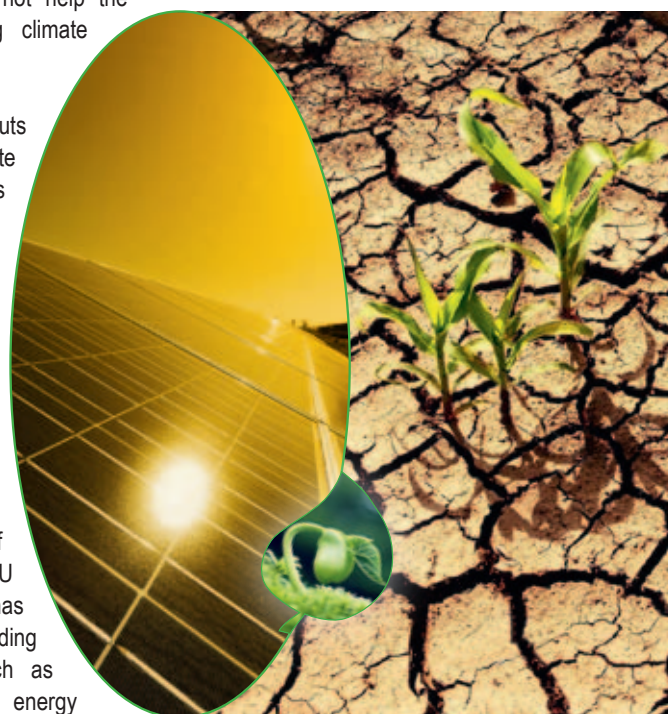
But to be frank, all the targets that developed countries can set will be of no use if an agreement is not reached by all the parties. All the targets without fresh money will not help the countries that are facing climate change right now.

Therefore my report puts forward the need for climate finance. It urges the parties to fund the Green Climate Fund in order to reach 100 billion dollar per year as of 2020. But we also need fresh money from innovative financing opportunities: for instance to define a proper carbon price so that it becomes cheaper to use eco-friendly technologies instead of most pollutant ones. Our EU Emission Trading System has already allowed the funding of innovative project such as “Nemo”: a thermal sea energy

project which was made possible thanks to a 72 million euro funding. If a higher carbon price were to be set, we may find a lot more of other “Nemos”...

Another way to find fresh money is to enforce a Financial Transaction Tax in Europe. The enhanced cooperation by 11 Member States could make 35 million euros available every year. A part of its revenues should be allocated to the fight against climate change. My proposition was rejected by a very light majority, but the idea is making its way. I will keep on promoting it.

These are the ideas I promote and defend in my report that is still to be adopted on October, 14th. The European parliament is strongly committed to find a comprehensive agreement in Paris. The failure in Copenhagen is not an option anymore. The Paris Summit is not a conference to discuss but a conference to decide!



An ambitious climate policy for the EU: a revised EU Emissions Trading System for the next decade



Jos DELBEKE

Director-General for Climate Action, European Commission

The agreement by EU leaders last October on the 2030 climate and energy targets, including a domestic emissions reduction of at least 40% compared to 1990 levels, illustrates the European Union's commitment to securing an ambitious global climate deal in Paris this December.

EU emissions reductions will be an important contribution to the international effort to limit the global average temperature increase to below 2°C.

A well-functioning EU Emissions Trading System (EU ETS) – along with a new measure to address the surplus of emission allowances (the Market Stability Reserve) – will remain our flagship tool for tackling climate change. Today, the EU ETS covers around 11,000 power plants and factories in 31 countries as well as emissions from flights between European airports.

This summer, the European Commission presented the first legislative step in delivering on the EU's 2030 commitments with its proposal to revise the EU ETS from 2021.

The July proposal builds on the lessons learned during the first decade of the EU ETS and benefits from the experience of companies and public authorities across Europe.

There are three key elements: first, an increase in the pace of emissions cuts after 2020; second, more targeted rules for the free allocation of emission allowances to industry; and third, a funding boost for low-carbon innovation and energy-sector modernisation.

Faster declining cap

Reaching our emissions reduction target will mean reducing emissions in the sectors covered by the ETS by 43% compared to 2005. To achieve this, the overall quantity of emissions allowances

within the system will have to decrease faster after 2020.

This will decline at an annual rate of 2.2% from 2021 onwards, compared to 1.74% currently. As a result, there will be a significant additional emissions reduction of some 556 million tonnes over the decade to 2030, equivalent to the annual emissions of the UK.

Better targeted allocation of free allowances

Although a significant share of allowances will continue to be auctioned in the next trading period, around 6.3 billion allowances will be allocated for free between 2021 and 2030.

While in the past, European industry has delivered significant emissions reductions while competing successfully in international markets, the Commission understands that some sectors are concerned about losing international competitiveness.

The rules will be revised to focus on around 50 energy-intensive sectors that are potentially at highest risk of relocating their production outside the EU to countries with less ambitious policies (carbon leakage). The distribution of free allowances will therefore benefit those most in need. Under the proposal, all benchmarks will be updated to take into account technological progress since 2008 and continue to encourage and reward innovation.

In addition, around 400 million additional allowances will be made available for new and growing installations through a New Entrant Reserve.

Member States are encouraged to use auctioning revenues from the EU ETS to compensate certain installations in electricity-intensive sectors for their costs related to greenhouse gas emissions passed on in electricity prices. The proposal also calls on Member States to use a share of their revenues to finance climate action in countries outside the EU, including action to adapt to the impacts of climate change.

Innovation and modernisation

Two new funds will be set up to help the industry and power sector meet the important innovation

and investment challenges ahead. The first, an Innovation Fund, will provide co-funding for the demonstration of low-carbon energy technologies in energy-intensive industries. This builds on the successful co-funding programme for innovative renewable energy and carbon capture and storage projects (NER 300).

The second, a Modernisation Fund, will support 10 lower-income Member States in meeting the high investment needs relating to energy efficiency and the modernisation of their energy systems. These countries will continue to receive free allowances to help them modernise their energy sectors.

This support will further stimulate the uptake of renewables and other low-carbon and energy-efficient technologies – which along with decarbonisation are key objectives of the Energy Union – and contribute to efficiency, growth, innovation and new jobs.

Important signal

In the run-up to the Paris climate summit, the Commission's proposal sends an important signal to the international community that political words are followed by legislative action.

We have seen from past experience that setting ambitious targets has paid off. They give industry the necessary predictability it needs for efficient investment and are an important driver for stimulating innovation and reducing the costs of technologies. This same signal and clarity at global level would contribute to an effective and efficient energy transition.

The EU is ready to play its part in a new global climate regime. We hope to inspire others to use carbon pricing for the sustainable decarbonisation of their economies. We are already seeing this happening across the world as others – from California to China – follow Europe's example by creating their own emissions trading systems.

Under the revised rules, the EU ETS will continue to be a cost-effective driver for low-carbon investments.

The Need for a Strong Regulatory Framework for CO₂ Emissions for a successful Energy Transition



Gérard MESTRALLET

Chairman and CEO, ENGIE

Energy Transition: A New Paradigm at European and Global Level

The energy transition is taking place extremely fast, not only in Europe, but worldwide. It is characterized by decarbonisation, decentralization, digitalization, and increased efficiency in both our energy production and consumption. The energy transition is a major challenge but also an opportunity for the energy sector for this century, and a common concern for countries, cities, economic players, local communities and citizens.

As ENGIE, we consider it vital to be part of this revolution. Making ENGIE a key player contributing to a better world, able to reconcile access to energy for everyone with the respect for the environment and climate is our priority. Therefore, we do not only want to be part of the energy transition, but we also wish to further promote it by developing innovative solutions aimed at responding to these new needs. It should, however, be acknowledged that concrete technical solutions, effective business models, new forms of partnerships, are not yet finalized; they will continue to evolve over the coming decade. But being a leader in this revolution remains our main goal. Enabling the energy transition and reducing our emissions requires a European and an overarching global regulatory framework to provide investors with the confidence and predictability they need.

Regulation of CO₂ emissions at EU level: A new beginning?

Ahead of the climate negotiations that will take place in Paris at the end of the year, it is important to recall the crucial role policy makers have already played in promoting a low carbon

energy system at European level. Now, we have to put in place a global CO₂ price signal to ensure further investments in new, low-emitting technologies. We fully support this idea and will remain fully mobilized to make it come true. However, it will be a long and non-linear process. A progressive connection of national and regional trading schemes seems to be the easiest way to reach this objective.

In Europe, we can count on a CO₂ market implemented at European scale, the largest CO₂ market in the world. However, its design has shown in the past years some major deficiencies, which translated into very low, meaningless CO₂ prices down to 3 Euros/tCO₂. How could such prices really influence investment decisions in low carbon technologies? That is why together with ten European energy companies, composing the "Magritte" initiative, we decided to launch a campaign three years ago to promote a structural and profound reform of the European carbon market. This was not only to show Europe but also to the rest of the world that despite its current shape, the European carbon market, could still deliver some positive results, provided that it is appropriately reformed. We called for a regulation mechanism ensuring appropriate price signals for investors. Rebalancing the market was the objective of the adopted "Market Stability

Reserve" and we can only congratulate European Institutions on having agreed on this measure in a relatively short time.

COP 21: A New Impetus for a Global Regulation of CO₂ Emissions

It is essential that the international community agrees on a worldwide climate framework for the long term. What is at stake is to limit the increase of worldwide temperature to maximum 2°C. This is not an idealistic objective. That is why we need a global climate deal, in which all nations contribute with their fair share to limit global warming. It is for the future of our own children, it is the only way to limit the natural disasters that we are experiencing always more frequently. What about the energy sector in this debate? As 2/3 of the emissions are coming from energy combustion, we have a key role to play to accompany these discussions, to develop new technologies, to further contribute to raise the ambition towards emissions reduction. In addition, 1,3 billion people, 1 out of 5 people worldwide, do not have access to energy. So our responsibility in this debate is even more relevant: how to provide the world with energy while limiting global warming. We see it as a unique opportunity to turn the climate challenge risks into an opportunity for human development.



Crédit Photo : ENGIE / MIRO / MEYSSONNIER ANTOINE

Looking ahead to the Paris Agreement: A Challenge and an Opportunity



Seán KELLY

MEP (EPP), ITRE Committee Rapporteur on the Paris Climate Agreement

These past number of weeks and months have seen two issues on the EU agenda that required urgent action to be taken in Brussels.

Resulting from a number of factors, including the abolition of milk quotas earlier in the year, prices for agricultural products were driven down to extremely low levels. Farmers took to the streets in protest to demand that something be done to ensure that they receive a fair return on their produce. Following weeks of work, Commissioner Hogan's announcement of a €500 million package to address some of the issues was a welcome one for those in the agricultural sector.

As this was going on, the tragic scenes in the Mediterranean of migrants being forced to flee their countries in search of refuge has seen ongoing discussions and debates about how to handle the situation and save lives before it is too late. At the time of writing, discussions are still ongoing.

In the background, pushed temporarily out of the news, is another global challenge that is urgently in need of action. It is a challenge that will affect all - farmers, the migrants in the Mediterranean, EU industry, and each and every EU citizen. It is the challenge of combatting Climate Change.

Over the past few months I have led discussions in the European Parliament's Committee on Industry, Research and Energy (ITRE) as we look to put forward the Parliament's position ahead of the upcoming historic Climate Change Conference in Paris - COP21. At the conference we expect to witness the announcement of a legally binding and universal agreement on Climate Change which will aim to

keep global warming below 2°C. I, and I expect most others in attendance in Paris, will be keen to see an ambitious, effective and binding global agreement in December - the ambition must be global, otherwise we put the competitiveness of some of our key growth sectors at risk.

Through our discussions in the ITRE Committee we welcomed the EU's leadership on climate change and adaption, but also noted the importance of EU competitiveness, particularly at this time when European economies, particularly in my own country, begin to feel the effects of the economic recovery. In saying this, the potential for growth and job creation that goes hand-in-hand with meeting this challenge is clear - the European economy has grown by 45% since 1990 while at the same time much progress has been made in increasing the share of renewables in our energy mix, and in lowering energy demand through increased energy efficiency.

In setting out our goal to reduce emissions by 40% by 2030 compared to 1990 levels, the EU has shown a good level of ambition; this ambition will need to be matched globally if we are, firstly, to ensure that the 2°C objective is met, and secondly, to avoid a scenario in which EU jobs and processes are lost due to carbon leakage. I believe we are heading in the right direction.

There are certain aspects of this in which I have an extremely keen interest. The makeup of our energy mix will certainly play an important role in the move towards a low-carbon economy. Making the required cuts to emissions will depend on the increased development and deployment of clean energy technologies. Research and development is certainly needed to further and continuously improve the performance, reliability and efficiency of renewable energy technologies.

Much of this work is ongoing and examples can be found in my own constituency of Ireland South where great strides are being made on ocean energy technologies in particular. The Beaufort Research centre is a world-class test facility that will develop ocean technologies to the level that will see them become a key part of our energy mix in Ireland - a welcome addition no doubt.

In general, I believe it is vital that we strengthen research efforts, particularly improving the flexibility of renewable energy technologies in their electricity production. Additionally, research and development into enhancing the performance of renewable heating and cooling technologies, especially with regards to increasing their temperature levels to make them viable options to cover the high-temperature heat demand in industrial sectors, is something that should be given significant importance. The availability of such technology would be a big step towards a low-carbon economy.

At EU level, another aspect to these discussions that I find to be of utmost importance is the need to ensure a coherent approach to the twin challenges of food security and EU climate ambition. Under the current Effort Sharing Decision, agricultural emissions are treated in much the same way as emissions from transport. This doesn't adequately take into account that there are limited cost-effective mitigation options available in the sector. With emissions targets set in this manner, the only way that the EU agricultural sector can move to compliance would be through reduced production, leading to carbon leakage to other less efficient production systems, thus increasing emission levels globally.

This is where logic must prevail and sustainable EU production and incomes preserved. We should promote the sustainable intensification of food production, contributing greatly to food security, but at the same time encourage sustainable land management and afforestation, recognising the key role of forests and grasslands in Climate Change mitigation.

These are challenges we are faced with and I hope to see a positive and fair outcome for Europe. I look forward to being in Paris for what is set to be a ground-breaking agreement that will put our planet on track towards this hugely important global objective. I am optimistic that a successful global agreement will be reached, and am confident of the potential a strong global commitment has to deliver significant economic, social and environmental benefits to us all.

Charting a course for a low-carbon growth



Jean-Bernard LÉVY

CEO and chairman of EDF

Now is the time for Europe to fully embrace the transition towards low-carbon growth. We must do so to tackle climate change of course, but there is another pressing reason for action: the major competitiveness gap our continent is facing. If Europe remains dependent on imported hydrocarbons, we will not be able to compete with other regions of the world, and with North America in particular. Such regions will benefit more and more from cheap indigenous fossil fuels, while we rely on exporting countries that will inevitably raise prices.

Thus I am glad to see that competitiveness is beginning to be a central concern for the European institutions. The concept of the Energy Union outlined by the Commission is clearly a step forward, as the EU is now promoting the competitive decarbonisation of the energy sector.

Electricity will be key

To achieve such a goal, electricity will be key. Electricity can be decarbonised at affordable cost and can substitute for most fossil uses. In addition, we can increasingly optimise the efficiency of distribution and supply through the development of smart solutions to further leverage the potential of electricity.

This is why EDF Group is part of the solution to the European energy challenge, and why we are preparing to make a major contribution to the changes ahead. I just announced our medium- and long-term strategic perspectives – addressing generation, supply, services and innovation – which are precisely in line with low-carbon growth. We have given them the title, in French, of “Cap 2030”, since it is a strategy that sets a course towards the low-carbon mix for the next decades. One of our main priority will

be at EDF Group level, to double our capacity in Europe in renewables by 2030.

At the EDF Group can be proud of what we have already achieved. We are the European leader in low-carbon generation. We have assets in half of the Member States of the Union, we are the leading power producer and we have the leading renewables fleet in the EU. As a result of our investments, 91% of French generation is carbon free, which is more or less what Europe aims to achieve in 30 years.

We're investing in low carbon technologies

But we want to do more. We are investing in the range of low-carbon technologies, with the objective of further increasing the share of renewables in our fleet – which now account for one third of our investments in new build.

We also know that innovation will be key. The future of electricity requires breakthroughs in nuclear and renewable generation, smart systems, electrical mobility and storage. This is why EDF has long been the European leader in R&D, investing around €600 million a year and running four of the Group's main research centres in five different European member states.

But our focus is not only upstream. The course we are charting towards 2030 also involves providing the services our customers expect. Industrial clients want their consumption to be optimised, local authorities expect more energy efficiency and households are asking for easy-to-use services. So we are delivering new solutions by capitalising on the digital revolution that is impacting our sector as much as any other.

In sum, what we are building for the future is a diversified, low-carbon mix that capitalises on the potential of innovation. It is a strategy that is in line the five pillars of the Energy Union: security of supply from nuclear and renewables, achievement of the internal market to ensure competitiveness, energy efficiency to reduce dependency, decarbonisation of the mix, and leadership in R&D and innovation.

This convergence is a unique opportunity for EDF Group. A few months ago I was elected as Vice Chairman of Eurelectric, the European association of the electricity industry, and I am sure our views and our contribution to the EU energy landscape will be more and more recognised in Brussels.

A competitive decarbonisation

One the main messages I will be putting across is that one aspect of the Energy Union is underpins all the rest: decarbonisation. Competitive decarbonisation is a prerequisite to reconciling competitiveness, security of supply and sustainable development. This is why I strongly support the efforts of the EU to re-establish a solid framework for low-carbon investment. We need a carbon price that really triggers low-carbon investments and creates a sound merit order under which low-emitting facilities are dispatched before highly emitting ones, and we need it as soon as possible.

Several measures have already been taken since the European Council set out the new strategy for 2030. The remainder should be introduced rapidly. We are talking about making investments that will be needed as shortly as soon after 2020, which in our industry is truly short term: it takes around five to 10 years, depending on the technology, to progress from project phase to operations. That is why we need the new ETS directive as soon as possible.

The climate and energy framework is a top priority for the European economy as a whole. Tackling climate change has moved to be the main challenge of our century. Let us not waste the momentum created by the international discussions around the COP 21 Conference. The EU will be a major player in Paris and must set an example with its own energy climate policy. The EDF Group will stand at its shoulder in full support.

COP 21: A strong Europe to propose renewables and efficiency as global climate solutions



Claude TURMES

MEP (Greens/European Free Alliance), Member of the ITRE Committee

At the climate change conference in Paris (COP21), the international community will struggle again to agree on a new climate agreement suitable for all. It is obvious that we need to act now and find a common response in order to make our planet fit for future generations. The UN climate conference in Copenhagen has failed partly because of internal quarrels within the EU and due to the inglorious role of some member states notably Poland. One of the challenges of the European Union is to prevent similar intra-European conflicts in advance of the conference. Unfortunately, this task is complicated by the upcoming parliamentary elections in Poland. It is anticipated that the Polish government will defend its national coal industry even harder in the coming weeks and month, strongly arguing against the development of renewable energy sources. I hope that Europe will meet its special responsibility at the Paris conference and will work in unity to pledge for ambitious and binding climate targets with the aim to limit the global temperature increase to a maximum of 2°C.

Another reason Copenhagen failed is because there was not enough emphasis on climate solutions. Industrialised countries need to promote and share financial, technological and policy related solutions with central and local governments in emerging and developing countries to develop and implement measures to mitigate climate change. These solutions are known: they are called energy efficiency, renewable energy sources, storage and smart grids.

I am convinced that renewable energy sources, notably wind and solar, will be the backbone of

the energy system of the future. When entering office, president Juncker showed great ambition on renewables. He pledged in favour of a European Union becoming *"the world number one in renewable energies"*. To achieve this, we need comprehensive policies supporting the development of renewable energies and using a holistic approach. First we need to continue with ambitious and binding targets set at EU level to give investors the confirmation that Europe wants to stay in the lead of global climate action. Second, we should remove barriers preventing citizens from fully embracing decentralised renewable energy. In fact citizens are taking an increasingly active role in the fight against climate change at the local level, for example by setting up energy cooperatives and thus promoting the expansion of renewable energies. At city level, public buildings identified and transformed to be more energy efficient can make an important contribution. These 'bottom-up' movements generate innovative solutions and impressive dynamics and I see it as our duty to target support towards that direction. What is true in Europe also applies elsewhere in the world. Smart cities have great potential, seizing the opportunity of fostering the evolution of cities becoming smarter throughout the world would ensure the existence of a sizeable market for European companies working with green technologies. Not only urban areas are concerned: rural areas are also in desperate need of electrification and small-scale photovoltaic systems coupled with batteries are part of the solution. The African continent for instance needs renewable energy sources projects not only to supply its growing cities with electricity but also to achieve rural electrification.

I strongly advocate in favour of the creation of a global 'Juncker Plan', possibly under the management of IRENA, to lower the capital costs of investment in efficiency and renewables. These concrete proposals are part of the "Luxembourg

Declaration"¹ I published on 23 September 2015, also recommending the enlargement of the Covenant of Mayors to cities worldwide. Such financial and policy initiatives would allow large and middle size cities throughout the world to invest in renewables and energy efficiency, contracting European companies to implement their projects. In parallel, the European Union could launch a programme in favour of the electrification of rural areas, notably in Africa, and of energy islands, building on the know-how of European leaders in this sector.

Finally, I would like to remind that in 2012, there were 1.2 million direct and indirect jobs in the renewable energy sector, a figure likely to increase to up to 1.7 million jobs in 2030 in Europe and 6.9 million jobs in 2030 worldwide.

Efficiency, renewables, storage and smart grids are the only climate solutions, also delivering on energy security and economic competitiveness. They need to be massively deployed throughout the world, and only a strong and united Europe can make it happen.

¹ Claude Turmes, The Luxembourg Declaration, 23 September 2015. Accessible on <http://bit.ly/LuxDeclaration>

The adaptation of the energy system is key for ensuring the success of the CoP21 in Paris



Dominique RISTORI

Director-General for Energy, European Commission

The EU has long shown leadership in fighting the climate change and stands united and ready to push for an ambitious agreement at the COP21 in Paris. In this regard, the contribution of energy policy, in particular energy efficiency and renewable energy, will be key for decarbonisation. Already today, Europe is one of the most energy and carbon-efficient economies in the world. The EU is currently the only global economic actor that generates more than half of its electricity without producing greenhouse gases. Almost half of the world renewable electricity capacity is in the EU. Energy efficiency in the EU has improved by 15.5% in 2014 and greenhouse gas emissions have decreased by over 19% in 2012 compared to 1990 levels.

This has enabled Europe to lead the global development and large-scale installations of renewable energy and energy efficiency technologies. That is both a direct response to the climate change crisis and the need to kick-start Europe's economy. When facing up to these twin challenges – climate and economy – our approach is simple: the boldest measures will be the safest in the long run. This is why the European Council agreed last year on an ambitious 2030 Framework for energy and climate setting EU-wide targets to reduce emissions by 40% compared to 1990; to be at least 27% more energy efficient and to have at least 27% of renewable energy sources in our energy consumption; all by 2030.

Those twin challenges but also the changing geopolitical context over the last year have stressed the importance of diversifying energy sources and suppliers as well as adapting the energy system. This is crucial for ensuring secure, sustainable, competitive and affordable energy supplies to European citizens and companies.

The European Commission's responses

In this context, the Commission has decided to build on the agreement on the 2030 Framework for climate and energy and the European Energy Security Strategy by imbedding integration and co-operation throughout each area of energy policy.

On 25th of February 2015, the European Commission adopted its Framework Strategy and an Action Plan for the Energy Union. This is one of the most important initiatives this year and a strategic priority for the EU for the next years. The Energy Union strategy is built on the ambition to achieve in a cost-effective way a fundamental transformation of Europe's energy system. It is based on five mutually reinforcing dimensions: (i) energy security, based on solidarity and trust; (ii) a fully integrated internal energy market; (iii) moderation of energy demand; (iv) decarbonisation of the EU energy mix; and (v) research, innovation and competitiveness.

In particular, two key themes will be central for facilitating an agreement in Paris: renewable energy and energy efficiency.

Investing in renewable energy and pushing for greater energy efficiency will help us achieve our objectives and boost jobs and growth in the EU. That is why the EU is committed to become the world number one in renewable energy and to put "energy efficiency first". Energy efficiency truly is the most sustainable energy source and we need to unlock its potential.

To accelerate the transformation of Europe's energy system, we will come forward with concrete legislative proposals at the end of 2016 in order to meet consumers' expectations; deliver real benefits from new technology; facilitate investments, notably in renewables, energy efficiency and low carbon generation; and ensure security of supply at affordable costs.

Market integration and a new electricity market design

The transition to a low-carbon society will require the adaptation of Europe's internal energy market. We have to ensure that it can facilitate our energy efficiency drive and integrate the growing

share of renewables that we will need to get to at least 27% by 2030.

This is why the Commission presented in July proposals to launch a new design of the electricity market and to deliver a new deal for energy consumers.

Our approach focuses on developing a new framework which delivers market arrangements to move towards an interconnected EU electricity market that ensures EU security of supply, provides clear price signals facilitating the investment and continuing penetration of renewables, and promotes regional cooperation on energy policies. Consumers should also have the possibility to benefit from active participation in the EU's energy transition, notably through better information and the use of smart technologies (grids, homes and vehicles).

Research and innovation to accelerate Europe's energy transformation

And while Europe's energy market evolves towards greater integration and more diversified sources, we have to make sure Europe's technologies also keep up with the challenges arising. Research and innovation must be at the heart of the Energy Union especially if Europe is to be the world number one in renewable energies.

In fact, it is about maximising the potential of the great work already happening by better linking it together. That will need more cross-border and cross-sector integration, notably between energy and digital technologies.

The new Integrated SET-Plan Communication adopted this September defines the new European R&I Strategy for the EU for the coming years. It identifies 10 actions for research and innovation to ensure the right policy platform and culture to bring cutting-edge research into the market as part of our energy transformation. It will place the European consumer in centre-stage and support growth and jobs in the EU.

The adaptation of our energy system is essential for ensuring the success of many challenges that our society is facing. The Paris conference is a historic milestone: a unique opportunity to accelerate the shift to a low-carbon, climate-resilient global economy. Let's seize it!

Demand side management: a solution for the climate



François BROTTE

CEO, RTE

Power system operators are players in national and European energy policies, who intervene at the crossroads of three major challenges: competitiveness, energy supply security and sustainable development. To ensure coherence between these three objectives, they design solutions enabling the balance between the supply and demand of electricity to be guaranteed sustainably, in a highly evolving context, i.e. the rapid expansion of intermittent renewable energy, the increasing volatility of the consumption of electricity, and the integration of information and communication technology.

Our responsibility is to provide a sustainable, economic and secure access to very low-carbon electricity: something that is far beyond the meaning of the term electricity transmission. In particular, TSOs' expertise has developed substantially over the last 10 years with regard to market design and mechanisms. Market design, a virtual transposition of the power system, must convey economic messages on the optimization and evolution of the power system in line with public policy objectives. It must provide a visible and stable framework for economic players and reinforce their business model.

We must overcome this challenge as the way we generate and consume electricity changes. For a long while the power system was conditioned by consumption forecasts. Generation means that were perfectly controllable adapted to consumption needs. The transmission system operator adjusted this balance to meet the demand. Today, the development of wind and photovoltaic power mean we have to manage

a share of variable generation that will significantly increase in the future. Simultaneously, the French consumption peak increases twice as quickly as the annual electricity consumption and is the origin of a paradoxical situation. Although French generation means are perfectly capable of providing the 500 TWh of the gross annual consumption of France, it is becoming increasingly hard to satisfy occasional and one-off situations like the cold spell in February 2012. Moreover, with the development of new technology, new electrical equipment has appeared, together with its new usage. Today, it is LCD screens, smart-phones, telecom boxes, and tablets etc. and tomorrow it will be electric vehicles or heat pumps. Electricity consumption is becoming increasingly volatile and the supply – demand balance exercise is becoming progressively complex. From now onwards, the challenge is to move towards a more flexible management of the balance and in particular a more supple consumption of electricity. Demand side management is a resource that, for the same service, is an alternative to generation. From now onwards, all the market mechanisms created in France place demand response and the generation of electricity on the same level, on all timescales where the balance between supply and demand is settled.

Public policy for energy demand-side management are beginning to bear fruit and energy efficiency measures are reducing the growth in the consumption of electricity. The role of TSOs is also to provide the general public with all the necessary data to understand the challenges of energy transition and act accordingly. Energy demand management is everybody's business not just a question of technical solutions: electricity players, industrialists and individuals. Together we have to build tomorrow's power system that will be more efficient, cleaner and more sustainable.



If we act together we can cut 80% of the emissions



Patrizia TOIA

MEP (S&D), Vice-Chair of the ITRE Committee

Winning the energy challenge is vital. The last five years European Union has been struggling with the euro crisis e today the priority on the first pages of European newspapers is the refugees crisis. Nevertheless energy and climate issues remain central if we want to build a future for our children. People's well-being, industrial competitiveness and the overall functioning of society are dependent on safe, secure, sustainable and affordable energy. Power plants, solar panels and energy infrastructure in general cost billions of euro. This is why when we talk about changing the way we produce energy we have to look at the long term and be able to plan ahead. The energy infrastructure which will power citizens' homes, industry and services in 2050, as well as the buildings which people will use, are being designed and built now. The pattern of energy production and use in 2050 is already being set.

Today the Eu has the world's most ambitious commitments on climate change and is pushing for a new international climate agreement to be finalised in Paris. The global transition to low emissions can be achieved without compromising growth and jobs, and can provide significant opportunities to revitalise economies in Europe and globally. The international community has recognised the scientific evidence that global average annual temperature increase needs to be held well below 2°C (3.6°F) compared to the temperature in pre-industrial times in order to prevent climate change from reaching dangerous levels. However, international action taken to date is not sufficient: Global mean surface temperature increase in 2100 is estimated to range from 3.7 to 4.8 degrees Celsius above the average

for 1850-1900, while the current experienced increase amounts to 0.85 degrees Celsius. The most recent assessment of climate science by the Intergovernmental Panel on Climate Change (IPCC) points out that the window of opportunity for staying below the 2°C temperature limit is closing very fast. Limiting the temperature rise will require substantial and sustained reductions in greenhouse gas emissions by all countries. Delaying action will be more costly and technologically challenging and reduce the options for effectively reducing emissions and preparing for the impacts of climate change.

The Eu has to continue to lead by example. The contribution to the 2015 Paris agreement will be a binding, economy-wide domestic reduction target of 'at least 40%' in greenhouse gas emissions by 2030. To achieve the overall target, sectors covered by the Ee emissions trading system (Ee ETS) will have to reduce their emissions by 43% compared to 2005 by 2030. Emissions from sectors outside the Ee ETS will need to be cut by 30% below the 2005 level. The 'at least 40%' target is ambitious and fair and is in line with a cost-efficient pathway to at least 80% domestic reductions by 2050.

Is it feasible? In the "Energy Roadmap 2050" the Eu experts explore the transition of the energy system in ways that would be compatible with this greenhouse gas reductions target while also increasing competitiveness and security of supply. To achieve these goals, significant investments need to be made in new low-carbon technologies, renewable energy, energy efficiency and grid infrastructure. Because investments are made for a period of 20 to 60 years, policies that promote a stable business climate which encourages low-carbon investments must begin to be made today. The European Commission Energy Roadmap set out four main routes to a more sustainable, competitive and secure energy system in 2050: energy efficiency, renewable energy, nuclear energy and carbon capture and storage. It combined these routes in different ways to create and analyse seven possible

scenarios for 2050. Decarbonising the energy system is technically and economically feasible. In the long-run, all scenarios that achieve the emissions reduction target are cheaper than the continuation of current policies. Increasing the share of renewable energy and using energy more efficiently are crucial irrespective of the particular energy mix chosen. Early infrastructure investments cost less and much of the infrastructure in the EU built 30 to 40 years ago needs to be replaced anyway. Immediately replacing it with low-carbon alternatives can avoid more costly changes in the future. According to the International Energy Agency, investments in the power sector made after 2020 would cost 4.3 times as much as those made before 2020. A European approach is expected to result in lower costs and more secure energy supplies when compared to individual national schemes. With a common energy market, energy can be produced where it is cheapest and delivered to where it is needed.

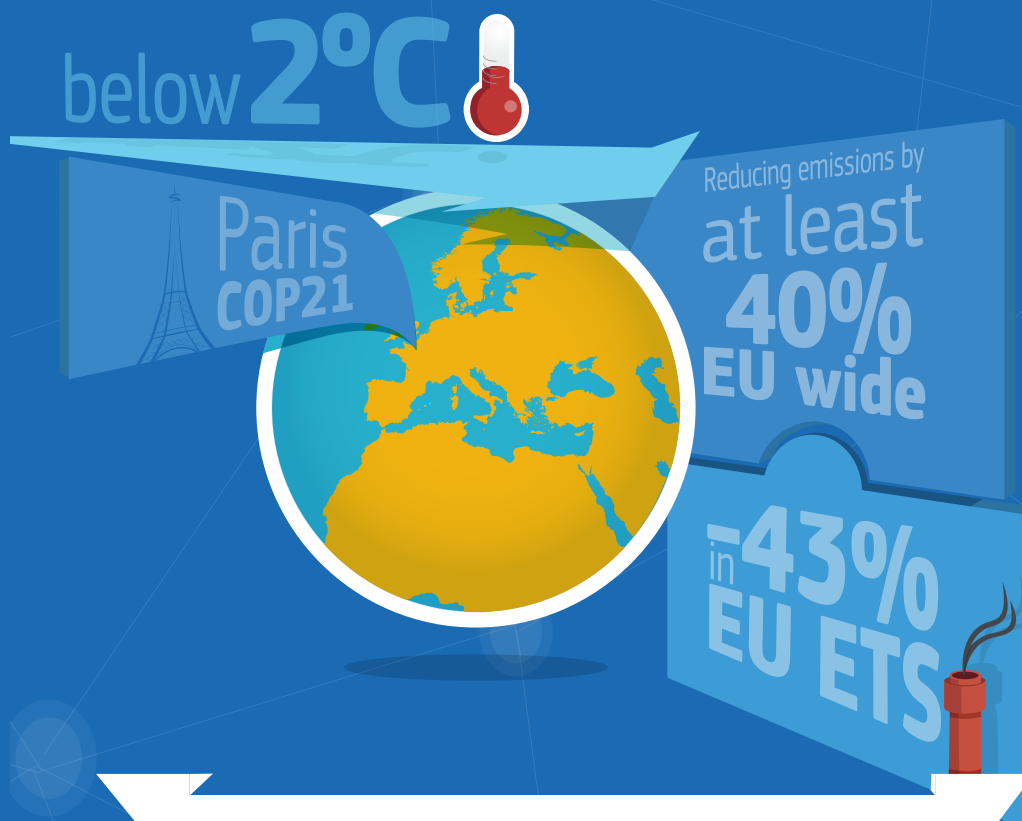
The main finding of the study "Roadmap 2050" is that the change can be realized by further developing and deploying technologies that today are already commercially available or in late stage development, and by expanding the trans-European

transmission grid. Achieving the 80% reduction means nothing less than a transition to a new energy system both in the way energy is used and in the way it is produced. It requires a transformation across all energy related emitting sectors, moving capital into new sectors such as low-carbon energy generation, smart grids, electric vehicles and heat pumps. It requires above all the political will to have the ambition not to shy away from the challenges of our time. If it acts together Europe can do it.



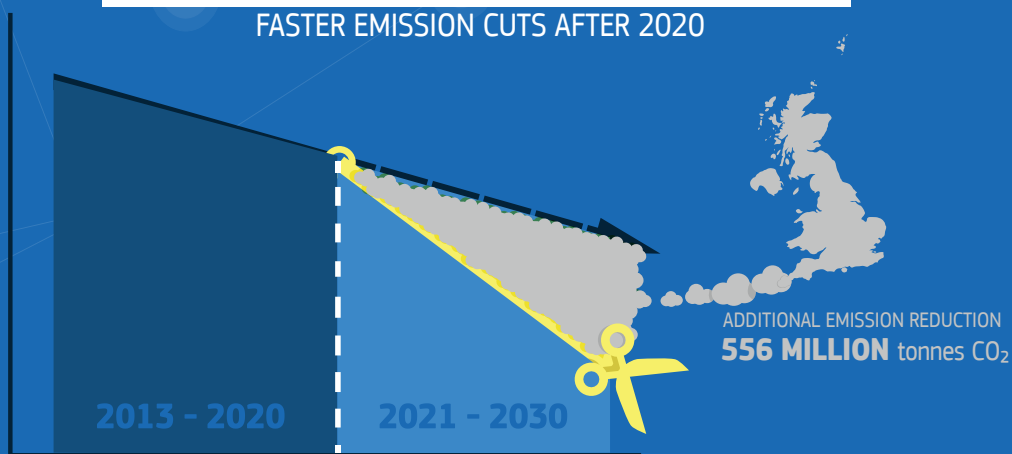
EU EMISSIONS TRADING SYSTEM

FOR CITIZENS, BUSINESS & THE CLIMATE

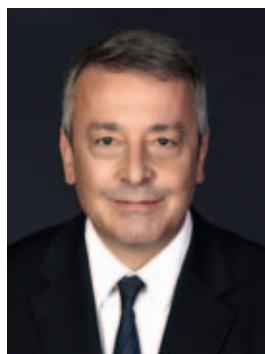


CUTTING EMISSIONS

FASTER EMISSION CUTS AFTER 2020



Becoming friends again with the climate



Antoine FRÉROT

Chairman and Chief Executive Officer of Veolia

Having invented the carbon economy, which adversely affects the climate of the planet, will man be able to “disinvent” it? And will he manage to stabilize the increase in temperatures at 2°C? This is the major challenge of the COP21, in Paris.

If one wants to bring climate disruption under control, it is important to look back at its many original causes. The phenomenon is the result of a mode of development based on fossil fuels, which cause massive emissions of greenhouse gases: we all know this. But in addition, it arises from a linear approach to economics of the *take-make-dispose* variety, which extracts ever more resources from the natural environment. The failure to recover waste, to reuse used products and to recycle increase energy needs considerably. That is something of which we are much less aware! Consequently, the fight against greenhouse gas emissions should not be restricted to electricity or energy producers. On the contrary, it concerns all business sectors. It requires the implementation of a different model of how we use natural resources, one that is more sparing and more efficient, that is fueled by clean energies and that is based on the principles of the circular economy, an economy that transforms waste into resources. **Producing new raw materials by recycling waste emits much less CO₂ than extracting virgin raw materials from the environment.** For example, making a bottle out of recycled plastic releases 70% less greenhouse gas than making a bottle directly from oil products; the potential for reducing carbon emissions is enormous, because 90 billion plastic bottles are produced around the

world each and every year! All too often people are unaware that **the circular economy is one of the main ways to reduce CO₂ emissions.**

When one thinks of greenhouse gases, one first thinks of carbon dioxide. However, **we must not forget the short-lived atmospheric pollutants, and particularly methane.** Over a period of one century, its contribution to greenhouse gas emissions is calculated at 14%, but over 20 years, it reaches 40%! In other words, if we want to obtain rapid results in the reduction of greenhouse gas emissions – and we know that time is of the essence – we must also combat this other atmospheric pollutant. Reducing methane emissions would have a substantial impact in the short term and must be considered with as much determination and ambition as the delicate issue of CO₂.

While the last century saw a record number of extreme climate events, will States agree to abandon the huge deposits of easily accessible and cheap hydrocarbons scattered around the globe, on the grounds that this kind of energy is carbon-based? We have all the more reasons to be skeptical, as the fall in the price of oil has not

encouraged people to save it, and as coal has made a major come-back in the energy mix of many countries. Oil reserves stand at several decades of consumption, while those of coal will last several centuries: it is not very likely that we will do without. Nature will still provide mankind with all the hydrocarbons it needs for a long time. **If we do not abandon these “dirty” energy sources, techniques to artificially make them clean are vital.** Fitting all electric power stations with CO₂ capture and storage systems would reduce worldwide emissions by half.

Yes, there are solutions to greenhouse gas emissions! Veolia is a specialist in the recovery of energy and materials from waste, in the capture of methane from organic waste and its transformation into heat, biofuel or electricity, in energy savings and efficiency, in forestry biomass and in the recovery of energy byproducts; as such our Group has a huge portfolio of technologies to combat CO₂ emissions.

But none of these solutions is sufficient in isolation; no business, local authority or nation can deploy them on a sufficient scale on its own. The change in the scale of the impact of human



Biogas storage at Uruqmi (China) waste water treatment plant

© Uruqmi photothèque Veolia - Ken Choi

activities on the planet means that there has been a change in the scale of our responsibilities. If we want to reduce the economy's carbon footprint and cap the quantities of carbon accumulated in the atmosphere, we must redouble our efforts at cooperation and innovation. We need cooperation to put into widespread use solutions which, for example, turn the energy lost by some into the basic energy of others, or which organize permanent recycling of resources, and reduce energy needs at the same time. We need innovation, because **the low-carbon economy will be an innovation economy or will not exist.**

However, in order for “anti-CO₂” solutions to become generalized, it is essential to fix a robust and predictable carbon price, at a high enough level, around €30 - €40 per ton of CO₂. This means nothing more and nothing less than including the cost of external factors associated with carbon dioxide - as is already the practice for wastewater and solid waste - by applying the dual principle of *the polluter pays* and *the de-polluter receives aid*. **Currently, in the absence of a carbon price that makes people pay to use the atmosphere as a “greenhouse gas dump”, everyone is free to emit unlimited volumes of CO₂ there.**

Putting a price on carbon is the only way of making carbon pollution reduction more economical than emitting CO₂ into the atmosphere. We must not delude ourselves: **how will we decarbonize the economy if polluting the atmosphere continues to be cheaper than preserving it?** However, much remains to be done to apply *the polluter pays* principle to greenhouse gases: today, the pricing of carbon only concerns 12% of worldwide emissions...

Above all, it is this monetary valuation of CO₂ emissions that companies are hoping for from COP 21. Many of them have embarked on the road to a low-carbon society, but in order to reach the end of the journey, they expect States

to define a stable, motivating and fair economic context that provides security for the low-carbon investments that they have planned. **One cannot apply a strong environmental policy with weak regulatory mechanisms! Without either financial incentives or ambitious regulations, we won't win the climate battle.**

The world is caught in a dilemma between the need to satisfy growing demand for energy, raw materials and water, and the need to protect the climate. While the Earth can carry out some of the work of reducing CO₂ pollution, it is up to us to do the rest: from now on, man must “manage”

the climate, jointly with nature. **We cannot, of course, control the climate, but we can decarbonize growth, we can produce differently, we can make the economy circular.**

No matter what the outcome of COP21, we can act. Solutions to greenhouse gas emissions do exist, and every day, each of us can, by taking concrete decisions, vote dozens of times for the climate or against it. If man is the greatest enemy of climate, he is also – if he so wishes and if he deliberately adopts the means to do so – its friend.



Rostock Photothèque Veolia - Alexis Duclos



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Advanced materials recovery facility for source-separated waste in Amiens (France)

Climate Policy: An opportunity to improve competitiveness and create jobs



Ignacio GALÁN

Chairman and CEO IBERDROLA

Climate change is a global challenge we cannot ignore. The scientific, political and business communities, as well as society at large, are now unanimously in agreement about the urgency of creating mechanisms to keep the increase in global temperature below 2°C compared to pre-industrial levels.

The pressing nature of this task, along with the need to strengthen global economic recovery, must lead us to prioritise policies that enable effective and efficient decarbonisation while boosting economic competitiveness and generating wealth and jobs.

Efforts should be focused on those sectors that have the greatest potential for advancing towards these two goals on a simultaneous basis. In this regard, despite being responsible for just a quarter of global greenhouse gas emissions, electricity has the ability to make a bigger contribution than any other industry to bringing these emissions down, thanks to renewable technologies - hydro-electric, wind and solar photovoltaic - that are capable of sustainable and efficient emission abatement. The International Energy Agency estimates that electricity will need to contribute 40% of the total emission reductions by 2050 if we are to meet the global climate change targets.

This will, in turn, require an expansion of the existing trend towards increased electrification in various areas of the economy, such as transport or heating and cooling.

IMPACT OF CLIMATE CHANGE POLICIES

As long as the policies needed to achieve all this are designed and implemented carefully, this scenario will also accelerate the trend towards sustainable economic growth.

First of all, it will mean a boost to the efficiency and productivity of the economy. Adequate internalisation of environmental costs in prices promotes the adoption of more efficient technologies and a more rational use of energy, which in turn leads to sustained gains in competitiveness. For example, in the European context, extending CO₂ price signals to all sectors of the economy would generate technologically neutral incentives for decarbonisation and would foster the development of the most efficient energy sources. In fact, research conducted by the OECD shows that implementing more demanding environmental policies has boosted productivity in advanced economies, both in the short and medium term.

Setting ambitious climate change targets also implies opportunities for investment in low-carbon technologies, which will promote industrial development and access to new markets. Various sources claim that a scenario in which climate change targets are met (as opposed to business

as usual), would require additional investments worth US\$40 trillion globally by 2050, of which US\$9 trillion would correspond to the electricity sector. Total investment volume would exceed US\$350 trillion, about 1% of the global GDP accumulated over the period.

It is also important to note that climate change policies help reinforce energy security, given that low carbon energy sources (such as renewables) are beneficial in reducing dependency and vulnerability of the economy to disruptive situations in the global energy markets. Governments increasingly see the need to attain the 2°C target as an instrument for enhancing energy security and reducing exposure to price shocks.

From a social perspective, there is an obvious link between policies that promote green growth (if properly designed) and improvements in quality of life, particularly as regards reducing environmental degradation, improving the conservation of natural resources, or limiting exposure to extreme weather and climate events.



West of Duddon Sands offshore windfarm (UK)

Finally, in designing climate change policies, it is important to remember that there are still over 1.1 billion people worldwide without access to electricity. It is perfectly possible to meet both challenges, that is fight climate change and provide access to electricity, simultaneously, as demonstrated by the 2030 Sustainable Development Goals drawn up by the United Nations and the results achieved by the sustainable Energy for All (SE4ALL) initiative.

PARIS CLIMATE SUMMIT

The outcome of the Paris Climate Summit may constitute a true driving force for competitiveness and economic prosperity if an ambitious agreement is reached, covering the following issues:

- A commitment that is sufficient to achieve the 2°C target; a stable and transparent framework to enable the development of the necessary investments; and a governance framework that favours the monitoring and review of the level of ambition every 5 years.
- Progress towards a global carbon price signal covering all sectors of the economy, providing technology-neutral incentives for decarbonisation in order to foster the development of the most efficient energy sources. This signal should be strong enough to drive technological change, and could be extended to all sectors that are not subject to emissions trading schemes via other mechanisms, such as environmental taxation.
- The cost of decarbonisation should be fairly allocated to all energy consumers, on the basis of the “polluter pays” principle.
- R&D incentives should be reinforced so as to progress towards efficient emissions reduction.
- Information and awareness policies should be developed to promote sustainable consumption
- Elimination of subsidies to carbon intensive energy sources, as well as of taxes and charges to emission-free technologies.

Additionally, in order to leverage all the environmental, economic and social opportunities related to fighting climate change, all public policies based on the above principles (on energy, climate and even taxation) must be designed on an orthodox basis and then implemented efficiently. This will lead to the elimination of distortions and inefficiencies such as those that occur in the European context, where electricity consumers often bear almost the full cost of mitigation policies via their final tariffs, including

subsidies for the roll-out of renewable energies and most energy efficiency measures. Together with the inclusion in tariffs of non-energy costs linked to fiscal or social policies, these have been the key reasons behind the rise in the final prices of electricity in Europe, with two negative consequences:

- A loss of competitiveness of European industry compared to other geographical areas, as well as increasing concerns about prices and affordability for residential consumers.
- Negative discrimination against electricity compared to other less efficient energy sources that do not contribute to the financing of environmental and climate change policies.

CONTRIBUTION FROM IBERDROLA

Given the characteristics of its generation portfolio, its investment profile and the commitments undertaken, IBERDROLA provides a global benchmark for fighting climate change.

In this respect, the company's emissions intensity is currently 30% lower than the European electricity sector average. IBERDROLA is also

world leader in renewable energies, smart grid development and electric vehicles, as demonstrated by its position at the forefront of the industry in major sustainability indices.

At IBERDROLA we are determined to contribute to the success of the Paris climate summit. For this reason, we have presented our target of reducing CO₂ emissions intensity by 50% by 2030 compared to 2007 levels, thereby progressing to our goal of achieving a carbon-neutral electricity supply by the year 2050.

This will require a significant investment effort, which will further boost IBERDROLA's contribution to the global economy and job creation, increasing the 350,000 jobs already generated worldwide.

Climate change constitutes a major global concern, but there are different options already available to address it, which will also safeguard security of supply and efficiency. All stakeholders both in the public and private sectors are requested to take the initiative and implement the necessary measures to transform this risk into an opportunity, and enhance competitiveness and economic growth, with the ultimate goal of creating prosperity for the citizens we serve.



Aldeadávila hydro-electric dam (Spain)

Covenant of Mayors: The EU climate success



Eckart WÜRZNER

Mayor of the City of Heidelberg

The observation that cities play a leading role in tackling climate change is no longer breaking news. Take part in any climate-related event in Brussels or elsewhere, and I would be surprised if you do not hear at least one reference to sustainable cities, or the now widely cited statistic that about 75 % of energy is consumed in urban areas. Whatever is understood behind these concepts and calculations, the case has been made: cities ought to be empowered as key players of the energy transition. But since that conclusion has been drawn for quite a number of years now, and considering the urgency for action, it is becoming ever more important to find the right governance model and enabling framework to fully embark local authorities within the processes of climate mitigation and adaptation.

The good news is European institutions seem to be paying attention. European Commission President Jean Claude Juncker recently called on its administration to streamline all city-related programmes and policies, and the Dutch Presidency is betting high on the introduction of an “Urban agenda”, to better integrate the local dimension into EU policy making. But there is an even better news yet: we do not need to start from scratch or set a new course. Indeed, since 2008, with the EU-supported launch of the **Covenant of Mayors** movement, a new, unprecedented collaborative model has been created to directly involve cities and their citizens in the implementation of European energy and climate objectives.

A framework for collective action

Ahead of the COP21, in a climate of confrontation and tense negotiations, it has become

tempting for some parties to pit cities against nation states or present local action as the one and only solution. This reasoning is completely at odds with the imperative for collective change and leadership. I believe it is precisely to that collaborative dimension that the Covenant of Mayors owes its tremendous success.

This rather ‘unorthodox’ initiative marks the first time the Commission decided to consider local authorities as direct allies in the implementation of EU-set targets. The Covenant of Mayors initiative thus created a de facto governance system through which cities were involved along the same lines than Member States, except instead of the national parliaments, it is the 6500+ municipal councils which democratically – and voluntarily – committed to EU climate objectives.

There lies the true peculiarity and strength of the Covenant of Mayors: in that it has evolved into a bottom-up movement yet with institutional scrutiny. Mayors do not simply sign an umpteenth declaration of intent and move on to the next item on the agenda. Their signature marks the start of a long process, from the diagnosis of CO₂ emissions, to the drafting and submission of an action plan with large stakeholders’ involvement and the regular reporting on progress and implementation. The Covenant provides a sound framework for action with shared methodological principles to over 6500 signatory cities, representing one third of the EU population.

Integrated strategy

Common sense tells tackling interrelated problems separately is neither smart nor efficient. Transport experts need to talk to urban planners, municipal services dealing with housing should share a common strategy with those addressing climate, environment and social matters, and the list of illustrations goes on. Energy is a cross-cutting issue which should come with a cross-cutting strategy. This holistic and integrated approach is at the heart of the Covenant of Mayors model, even more so now that the

climate adaptation dimension is to form part of a reinforced Covenant of Mayors movement.

In the same logic of integration within the EU framework and policies, signatories are now expected to upgrade their commitments from 2020 to the now 2030 climate and energy targets adopted by member states. I also count on the European Commission to make it an integral part of an inclusive Energy Union.

A model to scale up

The COP21 summit in Paris should pave the way for hopeful and disruptive change. Humanity stands at a crossroad where a whole new system needs to be built, but not merely from a technological point of view. With the numerous crises that have shaken Europe over the past few years, the rise of populist movements and lack of faith in the European project, the issue of social inclusion resonates more than ever. This is one more crucial reason to call for the mainstreaming and continued reinforcement of a governance model where citizens are not left out, benefits are shared and each party brings a piece to the puzzle.

Through their involvement in the Covenant, thousands of city councils and municipal teams of all sizes and situations have managed to tackle this social dimension, through direct involvement of citizens and by tackling the energy issue in a way that addresses affordable housing, fuel poverty and job creation.

As the EU is trying to reclaim its climate leadership position, the Covenant of Mayors will be one of its key contribution. I look forward to seeing this model travel, with all the promises that it holds for a more balanced distribution of powers, roles and decisions.

SmartGrids for a European smart future



Françoise GROSSETÊTE

MEP, Vice-Chair of EPP Group

The International Energy Agency recently published a study on the environmental impact of smart grids, revealing that some solutions could participate to the reduction of greenhouse gas emissions and positively influence the climate change. I hope that the actions which will be decided during the COP21 could boost these new networks.

Efficient transmission and distribution of electricity is indeed crucial for providing European citizens, societies and economies with essential energy resources. During the last years, especially in the view of creating a European single energy market, it became clear that we urgently need to identify the applications to make renewable energy more competitive, to establish performance of new energy storage technologies, to develop new business models for deploying energy storage solutions and to modernise our energy system in Europe through introducing SmartGrids.

Our resources are not endless, our environment has to be protected and our societies cannot rely only on fossil fuels to cover their electricity needs anymore. Therefore, we need to provide a larger part of our electricity from renewable energies. According to the International Energy Agency, the share of renewables in Europe's electricity generation will double from now 13% to 26% in 2030.

However, the production of renewable energies is dependent mainly on sunlight, wind, rain, tides, waves, and geothermal heat. These weather and time circumstances are not given at all times and consequently supply and prices levels vary strongly; a more flexible energy system is needed.

In order to better integrate and use renewable energies in a smarter and more efficient energy system, we need SmartGrids which respond to environmental, social and political demands on energy supply. They include the newest technologies, products and services while staying flexible to changes and further developments.

SmartGrids enable Europe's electricity grids to meet the challenges and opportunities of the 21st century, it fulfils the expectations of society by creating a user-centric energy approach and it strengthens the European business context for the electricity sector and its international opportunities.

SmartGrids make it possible to collect information about the behaviours of energy suppliers and consumers. With this information the efficiency, reliability, economics, and sustainability of the production and distribution of electricity can be optimized.

When SmartGrids are coupled with smart metering systems, they can reach consumers and suppliers by informing them on real-time consumption. Consequently, consumers can adapt the time and volume of their energy usage to different energy prices throughout the day. This is a response to the wide challenge of energy poverty. The European Commission has recently published a new study on the state of energy poverty across Europe and ways to combat it; nearly 11% of the EU's population is in a situation where their households are not able to adequately heat their homes at an affordable cost. Energy poverty has to be our priority.

In the end the benefits of SmartGrids are various: a more efficient transmission of electricity, a quicker restoration of electricity after power disturbances and reduced operations and management costs for utilities and lower power costs for consumers, a better energy efficiency. Furthermore, an increased integration of large-scale renewable energy systems, a better integration of customer-owner power generation systems and finally an improved energy security

that will make the European Union a smart energy Union.

The EU's climate and energy commissioner, Miguel Arias Cañete, estimates that a demand response energy system through SmartGrids could save the European Union about €100 billion per year which amounts to nearly €200 per citizen.

However, SmartGrids with all its technological implications are a highly complex system. Therefore, the change to this energy system will increase the prices for energy distribution system operators and hence also for the consumers at short term. As a consequence of that and in the light of all its long-term benefits, it is the European Union's but also the national governments' role to encourage investment in the field of SmartGrids in order to promote research and technology to make the energy prices decrease in the long term and to adapt regulation. The EU's Research and Innovation Programme Horizon 2020 which provide €5.931 billion in funding towards energy projects between 2014 and 2020 is a good way but should not be the only source of financing for energy networks projects.

Creating European-wide SmartGrids will lead the European Union into a smart future. A system telling us how much energy we need for what activity at what moment is exactly what the EU needs to create an efficient and sustainable energy system. Pooling knowledge and thinking to improve and adapt the networks is a necessity if we want the energy transition to be a success.

Climate change and the energy sector in the Mediterranean Area: solutions need global approaches



Bruno LESCOEUR

Chairman of OME (Observatoire Méditerranéen de l'Energie) and CEO of Edison

OME is a think tank on energy and a network of key energy players created more than 25 years ago to promote dialogue and cooperation in particular between energy companies in the Mediterranean region. OME has been present since then in every important regional energy event and supported the early development of an energy perspective for the region, including the Barcelona Process and the UfM. OME is acting as secretariat of the UfM Platform on Gas and is actively supporting the three UfM Platform on Energy as Stakeholder and member of their steering committees.

The Mediterranean region is vulnerable to climate change: temperature rises together with water scarcity will affect agriculture, urban life and industry, eventually leading to migration at regional scale. This is not any more the time to debate of the reality of climate change by human activities. It is time to implement mitigation and adaptations options. These options will affect the energy sector notably; transform the energy mix and the modes of energy consumption.

In the Mediterranean region, the energy system is built on a regional interdependency through the trade of oil and gas, and of electricity at the sub-regional level. At present, the region remains largely hydrocarbons dependent despite the important resources of some countries. However, exceptional renewable energy resources exist, especially in the South.

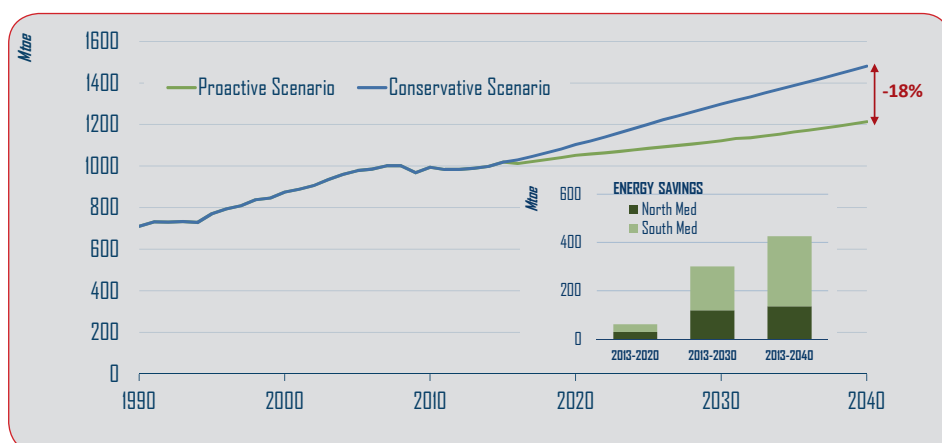
In terms of energy demand, under a business as usual scenario, OME MEP-2015 indicates a more than doubling by 2040 in the South while it will be globally stagnant or decreasing in the European Union. Electricity demand would almost triple over the same period in the South.

This would lead to more than doubling the carbon dioxide emissions in the South and 40% increase for the region. However, a proactive scenario based on increased energy efficiency and renewables would allow substantial energy savings leading CO₂ emissions to decrease by 10% for the region as compared to 2013 level.

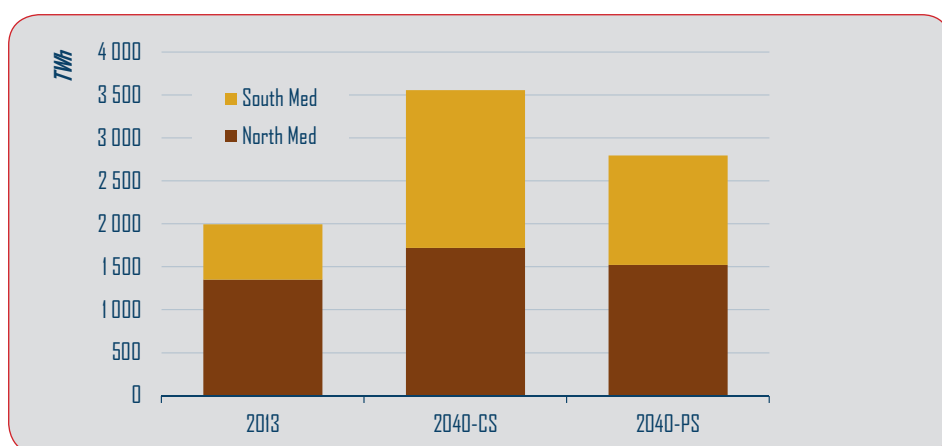
Energy is central for development: the energy system should be designed to give access to basic services and pull for economic development locally, then regionally. Therefore it

needs to be secure, safe, affordable, sustainable, efficient and competitive.

To face such a mandate and address the climate constraints, the energy system should be based on a variety of resources, taking advantage of those available locally, and on a sound economics both for investment and operations. The deployment of energy efficiency and the exploitation of renewable resources are also key elements. At the same time, intermittency of renewable resources and variability of the



Mediterranean Primary Energy Demand by Scenario



Mediterranean Electricity Generation by Scenario

demand should be addressed in the framework of the management of global systems which aim at integrating new and conventional sources, storage and demand side regulation.

Furthermore, in order to take benefit of regional diversity, a framework for a positive regional collaboration is key for a secure energy supply and resilient energy system at local and regional scale. Such regional collaboration may help to answer the challenge of the transformation of the energy system in the north and of the construction of a modern and resilient system in the south, both in coherence with aforementioned mandate.

In this context, energy policies should be based on four priorities.

Energy efficiency is a first crucial tool, keeping in mind that energy efficiency policies should follow a cost reflective approach in order to exploit the huge potential of the Region. These policies could be made attractive through public awareness and education.

The second aspect is **an efficient use of all resources and technologies** at a regional level.

Renewable energies have a significant potential especially in areas where there are regular winds or strong insolation, but technologies should be deployed on environmentally sound and sustainable technologies at a pace which balance global costs and benefits with projects profitability.

New hydrocarbons resources can be developed in the East Mediterranean. If these resources represent an opportunity for the regional development, a clear and shared framework for exploitation drawn in between all parties is needed. The development model should integrate the long term perspective induced by climate change policies. Once again, the regional cooperation and interdependency are essential for it.

The third element is **well-designed public policies**. To attract long-term investments in a sustainable energy sector, these policies should be stable, predictable and transparent. "Stop and go" policies lead to counterproductive "booms and busts" in industries. At the same time, objectives must remain flexible to adapt to technology evolutions and to take into account economic dynamics.

In order to support the needed investment in the energy system, an equitable framework for sharing global risks, costs and benefits could

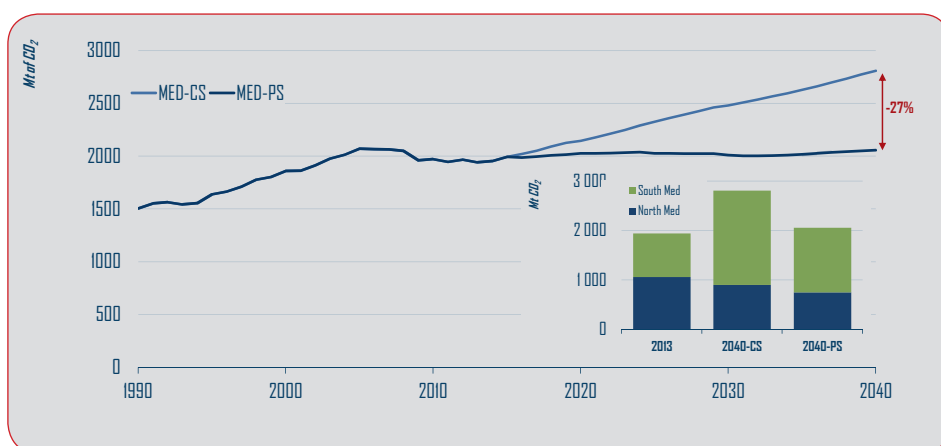
allow the development of efficient business models. A complementary role of the financial instruments developed by multilateral institutions, countries, national development agencies and the private finance is needed. It is a priority to develop a regulatory framework open for investors and operators, taking into account direct and global economic costs and long term risks, with independent authorities to guarantee the implementation of market regulation.

Such a framework is also needed to develop additional investments for climate oriented technologies as foreseen in the development of the Green Fund decided by the Climate Convention in Cancun, 2010. Only in such a framework public and private funds can leverage each others.

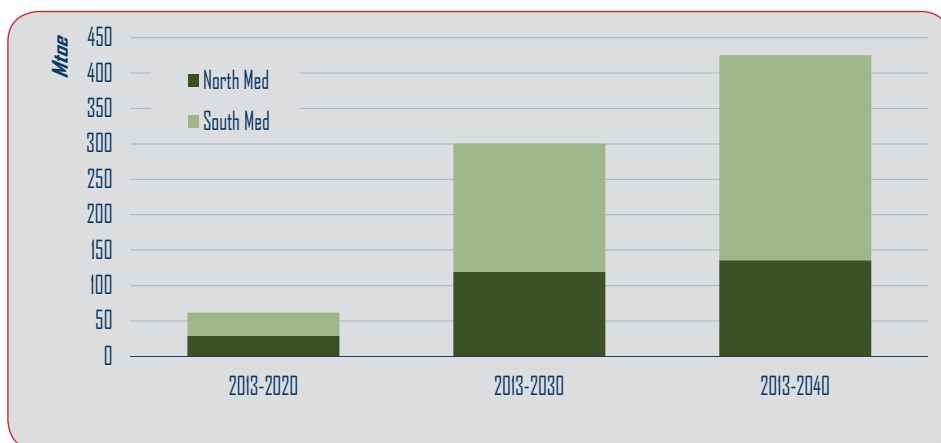
Finally, the realization of an efficient, effective and sustainable energy sector is not only a

political matter, but also depends on people who build it. In that sense, **capacity building** and exchange of information and experience are important. Regional centers of excellence have to be further developed for applied research, to strengthen technical capacities and disseminate information for the implementation of new approaches and technologies, notably for electrical smart grid, energy demand side regulation and heat/electrical renewable resources.

To facilitate a regular exchange of experiences, take stock of achievements and identify further steps, bringing together national and local public sector, private sector, think-tanks and researchers, OME and its partners would like to promote an annual "**Mediterranean sustainable energy week**".



Mediterranean CO₂ emissions by scenario and by region



Energy savings: primary energy demand in the Proactive Scenario compared to the Conservative Scenario

Why we call for a global carbon pricing



Pasquale SALZANO

Executive Vice-President Government Affairs at Eni

Climate change is a pressing challenge. The global temperature is set to rise far beyond the 2°C target identified by the IPCC, with unpredictable consequences for the future of our planet.

The size and the urgency of climate change require governments, businesses, and civil society to act together beyond historical and ideological divides. We are called to square the circle; finding a cost-effective path to the energy transition will not be easy. It requires the engagement of the best financial, technological and human resources we have got because it is not only a question of “how” but also “when”. We have less than 30 years to address global emissions, and we must account for the legitimate aspirations of developing countries.

This is not impossible, the answer lies in the combination of policies and markets to encourage behavioural change, promote sustainable

technologies and support the energy transition. By taking the costs of reducing emissions into account, a price on carbon will drive the right behaviour of consumers and producers.

Policy-makers play a fundamental role in this transition. They are tasked with a tough balancing act in the design of a pricing mechanism for carbon that combines effectiveness, competitiveness and affordability. This is only possible if carbon pricing is adopted consistently on a global scale.

In the energy sector alone, a consistent CO₂ price would be able to support the transition from high-emissions fuels to low-carbon technologies. For instance, it could support the development and deployment of renewables, and can displace high-emitting coal to favour natural gas as a backup for renewable power sources.

Natural gas is the cleanest, most affordable and most flexible option available to support intermittent sources with limited carbon emissions. Natural gas used in the power sector produces half the CO₂ emissions, and around 90% fewer air pollutants compared to coal and lignite. Furthermore, a switch from coal and lignite to gas is also an affordable way to reduce emissions in the power sector.

Last May, Eni, along with BG Group, BP, Royal Dutch Shell, Statoil and Total asked the UNFCCC¹ and the governments around the world to introduce a carbon pricing scheme².

By this point, you might be asking yourself what can an oil and gas company do to tackle climate change, and whether its core business is at all compatible with the idea of energy transition. The answer to this question depends on the reality of global energy demand and on the technological ability of this business to improve operational effectiveness and portfolio sustainability.

Energy demand is bound to rise, as millions of people exit poverty, and gain access to electricity, transport and consumer goods. All scenarios show a rising global energy demand for the decades to come. Despite a substantial rise in the use of renewable sources in the mix, fossil fuels, and in particular natural gas, will still be there and will account for ~60% of global supply in 2040³, even in the most climate-friendly scenarios.

What oil and gas companies can do is extracting, producing and using fossil fuels in

1 United Nations Framework Convention on Climate Change

2 http://www.eni.com/en_IT/media/press-releases/2015/06/Oil_and_Gas_majors_call_for_carbon_pricing.shtml?home_2010_en_tab=editorial

3 IEA 450 scenario (Source, IEA, WEO 2014).



the most efficient and sustainable way, while investing millions in cutting edge zero-carbon technologies for the future.

Eni has already taken action to limit greenhouse gas emissions, both addressing its business model and improving the efficiency of its operations.

As per our business model, we decided to privilege low carbon-intensity resources in our portfolio, such as natural gas. We are also testing 'shadow' carbon prices in our worldwide investments to analyse its impact on our activities.

In our industrial operations, we transformed a substantial share of our traditional downstream in "green refining" and "green chemistry"⁴ and we continue to invest in R&D programmes focussed on breakthrough renewables.

With respect to the improvement of operational efficiency, our efforts enabled us to reduce direct CO₂ emissions by 27% in the last five years. We achieved these results through significant investments in flaring down projects⁵, energy efficiency programs⁶, methane emissions control campaigns and increased use of natural gas in our operations.

We are also taking action in the public debate, promoting synergies with other players and advocating best available technologies to improve efficiency in operations. Eni also decided to join voluntary initiatives and commit publicly to improve the efficiency of our activities. We were among the first signatories of the World Bank-led Global Gas Flaring Reduction commitment to "zero routine gas flaring in 2030" and UNEP's programme for the reduction of methane emissions in the oil and gas sector (The Clean Air & Climate Coalition O&G methane partnership). Last year, we launched the Oil & Gas Climate Initiative, together with a selection of our peers⁷ and the World Economic Forum. This initiative is, once again, aimed at promoting cooperation in the reduction of greenhouse gases.

In the last decade, we learnt from regional carbon market experiences, such as the EU

ETS or the Kazakh emissions' market. These have been mostly positive experiences, despite a limited impact in terms of fuels switch, and a sizeable impact on industrial competitiveness vis-à-vis other international competitors. Linking national schemes and, eventually agreeing on a global price for carbon would address both the effectiveness issues that affected national and regional carbon markets, while also correcting the negative impact on industrial competitiveness.

A global challenge such as climate change requires a global policy tool and all the support we can gather from governments, industry and civil society.

We cannot meet the 2°C target if we remain divided along national, ideological and commercial lines. Climate change is an unprecedented challenge, and we must all be part of the solution. Eni is keen to share our experience with governments and other enterprises to support the negotiations that, starting from the next Paris UN Conference on Climate Change, will hopefully lead to the introduction of carbon pricing systems in many countries and progressively will create the conditions for a global carbon price.



⁴ Producing biofuels and biochemical products.

⁵ -75% flared gas in 2014 vs. 2007.

⁶ 1 Mton/year of CO₂ savings related to fuel consumption in the same period.

⁷ Total, Saudi Aramco, BG Group, BP, Shell, Pemex, Repsol and Statoil.

CoP21: not the solution but part of the problem



Dario TAMBURRANO

MEP (EFDD), Member of the ITRE Committee

A beloved Nobel Prize used to say that one cannot solve a problem with the same mind that created it. Translated into a COP21 language, the problem is the climate and environmental crisis and the mind is the business as usual thinking. If the latter induced the former, it will not solve the problem: will Paris be able to offer a solution or it is part of the very problem it aims to solve?

The headline partner, also one of the main sponsors of the COP21 conference, appears to be a car producer. Cars produced by this company are powered by energy generated by fossil fuels. They strive to limit greenhouse gas emissions, but they are still significantly contributing to boil the planet. It is noticeable that among the sponsors of COP21, those able to promote a sustainable transition to a decarbonised transport model are missing. Beyond a cars manufacturer there is also a tyres maker. In the list we find also well-known legends of energy production which have coal plants and approve fracking methods and an airline company. All the above are net contributors to the greenhouse gas emissions that the COP21 aims to contain.

Also in light of recent global scandals, it is hard to recognise the environmental commitment of these companies. But the decision to cover the costs of the conference by major global emitters is a clear indication on how COP21 will try to negotiate a global agreement to cap GHG emissions, in order that the temperature increase does not exceed the critical threshold of 2 degrees by the end of the century. It will be done under a business as usual rationale.

Einstein and I would have some doubts on the fact that business as usual methods can provide solutions to the same problems they created. Currently, we try to control and lower greenhouse gas emissions using a «cap and trade» mechanism, key concept of the ETS system in place at EU level that until now has been proved ineffective in inducing the desired transformation of the energy system. In view of COP21, the country with the highest GHG emissions, read China, has announced a plan by 2017 that would copy the EU model to limit the emissions and putting a price on them. A similar, but global, plan to reduce overall emissions is among the objectives of COP21. If Europe's example does not really work, why does China intend to follow it? Why should we create a global cap and trade mechanism? On the contrary, why do not we listen to the appeal of an international network, gathering also some of the main sponsors of the conference and representing 6.5 million businesses in 130 countries, calling for a fixed price on carbon emissions?

We only have one planet and we are acting as if we had a second one available! Crisis such as climate and ecological ones can be solved only by abandoning the very schemes that created them. In the current BAU approach, the main problem arises from the fact that energy from fossil fuels has a cost that is not reflecting reality. Last May, the International Monetary Fund estimated that every minute fossil sources receive public subsidies and cause damages (externalities) amounting to 10 million dollars. In one year, this translates into 5.3 trillion dollars. 90% of the total represents health and social costs of pollution and environmental costs linked to global warming.

At the European Union level a similar calculation is provided by an EC study published in autumn 2014 and called «Subsidies and costs of EU energy». It says that coal receives EU's

subsidies up to 10.1 billion euro (2012 data) per year; gas receives 7 billion; nuclear energy 5.2 billion. Furthermore, it calculates that a range of 150-310 million euros per year are spent on damages and externalities, almost entirely attributable to fossil fuels energy production. The same study underlines furthermore that every year, EU grants over 25 billion euros for energy demand, while only a third of it, or even less, to encourage energy efficiency.

Within the EU, the cost of electricity from clean sources - solar and wind power - is now very close to, or even equal to, the cost of energy from conventional sources. But if we were to consider the negative externalities of conventional sources, their cost would be much higher and, as a consequence, clean sources would be the most cost-effective solution.

How to achieve this? Simply by letting the market economy run freely, one of the EU's pillars, thus creating the conditions for an equitable and fair competition between different energy sources. Without subsidies, fossil fuels would immediately be pushed out of the market, thus no need of conferences like COP21.

To me, this is the simplest and more credible solution.

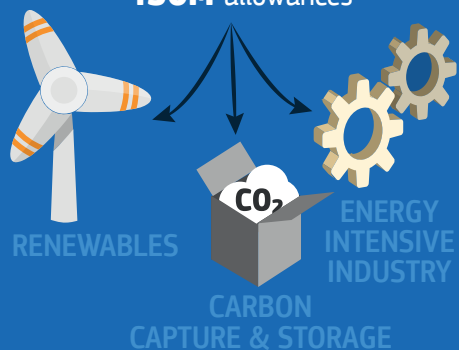
MOVING AHEAD

TOWARDS A COMPETITIVE LOW-CARBON ECONOMY

REAPING BENEFITS



INNOVATION FUND
450M allowances



MANAGING RISKS



6.3BN free allowances
worth up to €160BN

Key industries are to a large part relieved from carbon costs to stay competitive on world markets

WORKING TOGETHER

SUPPORTING LOWER INCOME MEMBER STATES

EXISTING SOLIDARITY MECHANISM
OF AUCTION REVENUES



n€w

MODERNISATION FUND
310 MILLION allowances



#EnergyUnion #ClimateAction

The Carbon Story



Emmanuel HATON

Director European Government Affairs BP

The latest report from the UN's Intergovernmental Panel on Climate Change (IPCC) states that by 2050 the world Greenhouse Gas (GHG) emissions will have to be reduced from 40 to 70% compared with 2010 levels.

For a long time, climate change science - like any other science - was considered to be provisional and uncertain, and as such its conclusions didn't justify important actions. This time is over and there is now recognition that climate change is happening and there is broad agreement that one of its significant causes is the level of man-made GHG emissions.

Within man-made GHGs, burning fossil fuel does play a weighty role. It took nature millions of years to sequester carbon from organic materials to create energy, and we have released this - in the form of CO₂ - within only a few centuries.

Something important to consider - and not always easy to apprehend - is that a lot of the GHG emitted will remain in the atmosphere for a long time and the accumulation of most of those GHGs in the atmosphere is irreversible. We cannot wait for the earth's temperature to rise significantly before acting to offset those emissions and reduce their impact. Therefore, the issue we face in the race against rising temperatures is a question of time, as not acting today places a huge burden on future generations.

The difficulty we have is that while we recognise the need to act, we must also consider the growing global population and continued economic development. These two factors have a direct impact on energy consumption which is directly linked with the emission of GHGs.

The need to reduce GHGs and fulfil the world's appetite for more energy is a difficult paradox that we must resolve.

How can we tackle this apparent paradox and get the world to enter into a much needed virtuous circle?

First, let's look at "*How Greenhouse Gas is Technically Emitted*", then we will see "*How Energy is Used*" and finally "*What We Can Do to Engage the World in a Virtuous, Climate Friendly Circle*".

How Greenhouse Gas is Technically Emitted

Fossil fuel is made of carbon (C) and hydrogen (H). Energy from hydrocarbons (fossil fuels) comes from two sources.

First, we need a combination of fossil fuel carbon and oxygen (O) from the air. This chemical reaction creates CO₂ and energy. This is where 50% of the energy released from fossil fuels comes from.

The second half comes from the combination of hydrogen from the fuel with oxygen from the air, resulting in the formation of water (H₂O).

It is important to note that for the same amount of energy released, a fossil fuel with less carbon and more hydrogen will generate less CO₂. This is why with only one carbon and four hydrogen atoms (CH₄), natural gas emits half the amount of CO₂ compared to coal.

How Energy is Used

Let's take a closer look at the sectors with the highest levels of energy consumption: transport and electricity generation.

Transport uses liquid fuel as its main source of energy due to its inherent qualities of energy content per unit of volume and weight.

In the next 20 years, the share of liquid fuels in total primary energy consumption is likely to decline from 32% to 29%, but the total volume of liquids will still increase by 18% (+785 million tons).

Most of the decline comes from North America -8% (-86 mt) and Europe -7% (-60 mt) while a significant increase will be observed in the Asia Pacific region +37% (+546 mt).

These numbers include biofuels which are set to grow rapidly by 63% but from a low base of 1.60% of total liquid fuels to 2.60%.

Electricity generation is set to account for an ever-increasing share of primary energy consumption, rising from 42% to 47% by 2035. The world's electricity generation comes from coal, natural gas, hydroelectricity, nuclear and other renewables (mostly wind and solar).

Coal accounts for 29% of the world's primary energy consumption today, with the Asia Pacific region representing 71% of global coal consumption. Global coal consumption is set to decrease by 10% in the next 20 years to represent 26% of total consumption in 2035. A huge disparity across regions will be seen as the US and Europe face a 30% decline and Asia Pacific - lead by China - will see its coal consumption increase by 35%.

Natural Gas represents 24% of the world's energy consumption and will increase by more than 40% in the next 20 years to 26% of the world's primary energy consumption. North America (+28%), as well as Europe (+18%), the Middle East (+63%) and Asia Pacific (+70%) will form the bulk of that increase.

Other sources of energy - in descending order - are hydroelectricity, nuclear and other renewables. Today, they account for 14% of primary energy usage, moving to 19% in 2035 which is a 36% increase in 20 years. During that period nuclear growth is flat, hydroelectricity is to grow by 5% and other renewables - mostly composed of wind and solar - will grow by a huge rate of 157%.

“What We Can Do to Engage the World in a Virtuous, Climate Friendly Circle”

Transport

Reducing GHG emissions from liquid fuel can come from several sources. We can make the transformation process from crude oil to refined products more efficient, improve the conversion of the fuel into mechanical power in the engines, blend more GHG efficient biofuels and reduce the overall usage of fuel, especially in optimised transport systems in cities.

The whole process of producing crude oil, transforming it into refined products and getting the product in our car tanks represents 17% of the total GHG emissions. The industry is very keen to reduce the amount of energy used in its systems as much as possible and we hope – thanks to technological improvements – that these processes will further reduce the energy intensity and as a result the GHGs emitted.

The usage of liquid fuels results in 80% of emissions. Improvement of the internal combustion engine has been by far the most effective way to improve fuel economy and therefore lower GHG emissions. The progress achieved over the last 50 years is really impressive as fuel economy of passenger cars has massively improved.

As far as biofuels are concerned, bioethanol from sugar cane is the most efficient bio-liquid as the vast majority of the CO₂ sequestered by the

plant is not emitted back by the transformation process.

In Europe, the level of very high taxation combined with car efficiency regulation - expressed in gCO₂/km – has been very effective in delivering important reductions in fuel bills and reducing GHG emissions. It is important that the EU maintains a good co-operation between auto manufacturers and European policy makers to continue this progress at a pace that is technologically and economically acceptable.

As taxation of liquid fuel is maximised in Europe, other forms of pricing carbon in transport may simply lead to rename existing taxation without any significant impact on people's behaviours or improvement of the internal combustion engine.

Electricity generation

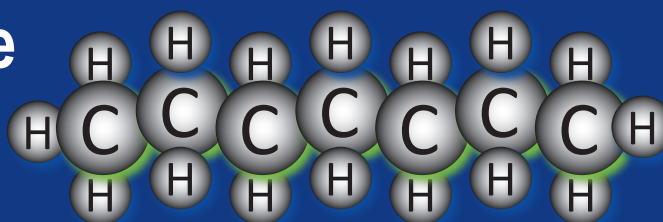
In theory, the best way to tackle CO₂ is to get rid of the CO₂ produced when fossil fuels are used. This can be achieved “pre-combustion” by removing the carbon before the fuel is used, placing it underground and then using the hydrogen in a turbine to produce electricity, or the CO₂ can be separated from the fumes “post-combustion” and sequestered in the same way. This is done through Carbon Capture and Storage (CCS), but these technologies are still to be tested at scale and are still proving expensive.

Another way to address the issue is to produce electricity with renewable energy like photovoltaic solar panels or wind turbines. These technologies have all significantly improved over time whilst costs have been decreasing.

However, their costs are yet to reach the level of conventional fossil fuel production and they still need to be subsidised to be deployed. The need of space for un-concentrated energy like these poses a problem in highly populated regions too. Intermittency and storage of such energies are problematic also as the wind is not always blowing at the same speed and the sun is not shining all the time. Renewables have and will have a role to play but not as an entire substitute for fossil fuels in the foreseeable future.

The keys to solving the issue of CO₂ in electricity generation are the improvement in efficiency of existing fossil fuel plants and the decarbonisation of our existing fossil fuel mix. The first can be provided by giving an incentive via carbon pricing mechanisms. The second will also need the carbon price to play its role but because of the gap between the current coal and gas prices, it may require additional measures in order to speed up the transition from high emitting coal fired power plants to natural gas power plants. **In terms of GHG emissions, converting 1% of the world's coal fired power generation to natural gas would be equivalent to an 11% increase of renewable electricity.** Together with renewable electricity - where it makes sense - and improved efficiency, this should be the world's priority. Natural gas resources are available, technology is available and this should be the next step to address our climate change challenge as well as to meet the world's growing energy demand driven by population growth.

Gasoline



Taking control of energy consumption through energy efficiency



Theresa GRIFFIN

MEP (S&D), Member of the ITRE Committee

Over the last decades, energy consumption has largely increased in Europe. Similarly, gas and electricity prices have also risen on average, both for households and industry.

The increase of energy consumption in the European Union has had very negative consequences in terms of the immediate concerns of energy poverty, energy security, energy dependency and competitiveness. However, this rise is also problematic if we want to achieve our long-term climate objectives.

In this context, stepping up energy efficiency to deliver energy savings and the recognition of energy efficiency as a first fuel are crucial.

Energy efficiency covers a wide range of technologies and materials from insulation and energy saving light bulbs to smart supply-side technologies, including the promotion of district heating and smart grids. Energy efficiency is the key solution that will enable us to address energy security concerns effectively. It is also the lowest-cost means of reducing our carbon emissions and has the potential to create local jobs, boost future markets in the field of technological innovation and contribute to regeneration.

Energy efficiency should be reinforced in different sectors, but in particular for products, transport and buildings. Although action needs to be taken across all of those sectors, the construction sector and the building stock seem to be the lowest-hanging fruit. Indeed building stock is the largest energy consumer in Europe: its share of total final consumption was 40% in 2012, making buildings responsible for 36% of the EU's total CO₂ emissions. Energy renovation of buildings in the EU is a "win-win" for the EU

economy as a whole and will help address the issue of energy poverty.

1. A strong governance system is a prerequisite in order to address energy consumption and promote energy efficiency.

Crucial to unlocking the potential of energy efficiency is an adequate and appropriate governance system. It needs to be transparent, coherent and run from both a bottom-up and top-down perspective. In this way, the major challenge is how to link local and regulatory communities efficiently.

Recognition at European level that energy efficiency is a key solution to our growing energy consumption will enable the development of energy efficiency projects at national, regional and local levels. For this reason the concept of 'Energy efficiency first' (the principal for considering the potential for energy efficiency in all decision-making related to energy) as well as ambitious binding energy efficiency targets, which the UK Conservative government has unfortunately opposed, are crucial. Local energy systems should be guided by the principle of promoting energy efficiency first and combatting energy poverty.

Energy transition will only happen if there is also change from the bottom. Cities, the new combined authorities and local government have to act as catalysts or conductors to accelerate this change. Both challenges and solutions of the energy transition can be found at local level. The governance system should aim to empower local actors by enabling them to have control of energy supply locally for example, something which already exists in several Scandinavian countries.

2. A strong focus on the building sector is necessary to handle our energy consumption and eradicate fuel-poverty

Current statistics clearly show that a major renovation programme for European buildings is key if we truly want to control our energy consumption, stop energy waste and improve our

energy security. As mentioned, buildings currently account for 40% of our energy consumption. In addition, 90% of our buildings in Europe have not been refurbished and the rate of buildings being renovated in the European Union only accounts for 1% per year.

Politically, it is essential to ensure that existing European Energy Efficiency Directives (the Energy Efficiency Directive and the Energy Performance of Buildings Directive) are properly implemented. For example, the Energy Efficiency Directive requires a 3% renovation rate for public buildings, however, a recent report from the Coalition for Energy Savings highlights that most Member States are not on track for this provision. We must meet our targets and ensure that all renovations are comprehensive and that we develop coherent national renovation roadmaps for this purpose.

Retrofit programmes will improve housing conditions and help to protect vulnerable consumers from future increases in energy prices. Around 12% of Europe's households are unable to heat or cool their home properly yet there is considerable scope for increased targeting of energy efficiency towards vulnerable consumers. Priority should be given to retrofitting existing buildings that target low quality accommodation and social housing with public funding being used to reduce the cost of the initial investments, which can often be seen as a barrier for vulnerable consumers.

Funding schemes are crucial to developing renovation roadmaps as financing is an accelerator to drive energy efficiency first. Innovative financing models and public financing should be used to leverage private funding, secure investors' confidence and limit the risk perception.

The COP21 in Paris and the start of the European Commission's Energy Union make it a perfect time to encourage our energy transition. The involvement of public actors at all levels to promote energy efficiency needs to happen now.

It is our responsibility to be part of this change.

Improving energy efficiency in Europe, through the deployment of current technology



Monica FRASSONI

President, European Alliance to Save Energy (EU-ASE)

Never before has the case for greater energy savings been so strong. Greater energy efficiency is the fastest, cheapest, safest, easiest and cleanest way to deliver climate and energy security. It is an area where businesses active in Europe excel and where the right mix of policy and business leadership can improve and protect Europe's competitiveness.

Europe is at a turning point; whether to launch a determined offensive on wasted energy and to tap into the huge energy saving potential and, in doing so, breaking our addiction to fossil fuels, or to fail to take the necessary measures and leave Europe vulnerable to price shocks, political turmoil and risky energy technologies.

The European Alliance to Save Energy (EU-ASE) was established at the United Nations Climate Change Conference in December 2010 in response to the urgent need for stronger action on energy efficiency in Europe. Until then, the voice of energy efficiency was largely unheard. We have joined forces to call for an end to the empty consensus on energy efficiency.

The Alliance creates a platform from which our companies (1E, Danfoss, Ingersoll Rand, Kingspan, Knauf Insulation, Opower, Philips, Schneider Electric and Siemens) can join with politicians and thought leaders to ensure the voice of energy efficiency is heard from across the business and political community. EU-ASE members have operations across the 28 Member States of the European Union, employ over 150.000 people in Europe and have an aggregated annual turnover of €70 billion.

European companies have the technology TODAY to deliver a 20% energy savings target by 2020 through different sectors.

For example, in the area of insulation the technologies already exist to make buildings near zero energy and are already highly cost effective. By combining energy efficiency solutions in existing buildings, the construction industry could save 32% of its total primary energy use in existing buildings (€260 billion a year).

The direct savings that could be reaped through a deep implementation of lighting technologies could reach €28 billion per year.

The ICT sector in energy efficiency could save €20 billion a year.

Smart grid technologies alone can achieve 25-50% of the 20% energy savings target.

The improvement is however possible and it represents a much more important challenge.

The major challenge for both new build and renovation is the building chains ability to take up new technologies and to improve the implementation of these technologies and services.

The biggest challenge is around renovation.

What the industry really needs is not a technology road map, but the belief that Governments are serious about renovation and creating a market. The industry has strong capacity for product innovation for renovation, but this will only be funded when it becomes clear that Governments are serious about renovation.

It is essential to have a long-term EU legislative framework, through the revision of EPBD and EED, that creates a real renovation market.

The EU must maintain its predominant market share in the segment of energy efficiency (which amount to 27% for the EU, while China is 23% and US is 20%) and keep its role as the world's most important market for energy efficiency (accounting for around 40% of global investments in energy efficiency).

The EU cannot risk trillions of euros in outdated investment priorities and lagging behind compared to its global competitors, it must boost clean-energy investments through binding EU target and legislation.

Today billions of euros flow out of Europe to pay for the energy that we waste, a waste made

more shocking by the fact that TODAY all the technology exists to practically eliminate this waste.

The impact of energy efficiency is not solely limited to reduction in energy usage. Energy efficiency generates multiple benefits for various stakeholders in society, with relevant implications for long-term economic development: economic growth & job creation, return on public spending & net savings to support financing for investments in energy infrastructures, consumer surplus & improved asset values, improved health, wellbeing and social development, lower energy prices and energy affordability, increased energy security, decarbonization, energy productivity and competitiveness.

But it is not only a question of technologies and services: consumers need to be empowered. Consumers need better information and personalized insights about their energy consumption, in order to change their behaviour and achieve energy savings in the most cost-effective ways. Deploying behavioural efficiency programmes everywhere are cost-effective and would save European utility customers 12 terawatt-hours (TWh) of energy, 3.3 million tonnes of carbon-dioxide equivalent (CO₂e), and €2.4 billion every year.

Investment in energy efficiency is of strategic importance for the EU since it is a cost effective manner to reduce the EU's reliance, and expenditure, on energy imports over €400 billion a year.

But market barriers, which hinder such investments, exist and need to be overcome. Such barriers have ALREADY been identified and recommendations outlined in the final report by the Energy Efficiency Financial Institution Group (EEFIG) published on 26 February 2015.

Compared to 2010, when the Alliance was established, much has changed and improved for energy efficiency, but the political battle to guide the energy transition through energy efficiency is still far from an end.

Getting Serious with Carbon Pricing Policy¹



David HONE

Chief Climate Change Adviser, Shell International Ltd.

Governments meeting in Paris in December to adopt a new climate agreement have already agreed the ultimate goal: to limit warming to 2°C. This will ultimately require industry, energy and transport systems to transition to near-zero levels of carbon dioxide (CO₂) emissions, ideally within this century and at a pace that is unprecedented in energy system history. Imposing a cost for emitting CO₂ across the economy, is arguably the single most effective public policy that can be implemented to achieve this objective. It is where governments started the climate journey nearly 20 years ago, but not where they find themselves now.

That starting point was the creation of the UNFCCC in 1992, which came on the back of the first Earth Summit, held that year in Rio de Janeiro. By 1997, governments that were party to the UNFCCC had made astounding progress, agreeing on the Kyoto Protocol and its underpinning trading regime, which was designed from the outset to see a cost develop for major emitting economies should CO₂ emissions continue to rise. That cost would act as an economic incentive to reduce emissions. This was the very

beginning of what is now more broadly referred to as a carbon price.

While a government-imposed cost on emissions is regarded as the most efficient means of driving change, that efficiency can also be a drawback. National implementation of carbon pricing policy skews those economics, although this is manageable in the short to medium term as other locations implement similar carbon costs. But, over the long term and without similar implementation in other jurisdictions, the economy efficiently regroups around the change, with no global reduction of emissions. Activities that are penalised by the cost may progressively shift to areas where the penalty doesn't exist, all other factors being equal (which of course they never are). This is instead of responding in the location where the government-imposed price mechanism is present; explaining why partial implementation of carbon costs around the world has yet to have a visible impact on global emissions. Rather, intermittent local implementation leads to a rearrangement of global activities and global emissions continue without interruption, driven by increasing demand for energy.

Although it is unrealistic to expect a cost on emissions to emerge globally without a hitch, over time that cost must embed itself within the global economy. Should this be the single objective of a global approach to managing CO₂ emissions? The current international discussion over an approach that limits warming of the climate system to 2°C is now at a crucial point and arguably without a focus other than on the goal itself. Although the Kyoto Protocol didn't contain the specific objective of a global carbon price, its approach involved price discovery through the trading of emission allowances, which encouraged the emergence of a policy driven global price.

But the deal in Paris is set to finally scrap this system, in spite of its carbon pricing design and structure and the economic efficiency that results. The Kyoto framework was unable to

progressively expand absolute targets and allowance allocation to developing countries, and rather than trying to revise that, the politics have been allowed to defeat the process. Nevertheless, as the Kyoto Protocol departs the scene, it at least leaves us with the legacy of carbon pricing mechanisms such as the EU ETS, the various North American sub-national approaches and project-based systems such as the Clean Development Mechanism, together with a demonstration of their collective effectiveness in shifting funds, triggering project activity and reporting on emissions.

While the implementation of a carbon emissions cost will initially trigger a range of activities throughout the global economy, its eventual purpose is twofold: either to reduce the extraction of fossil fuels which become uneconomic compared to low or zero emission alternatives or to implement carbon capture and storage (CCS), as these are the only two mechanisms available for addressing the accumulation of CO₂ in the atmosphere. This requires a government-imposed cost of carbon that drives such behaviour. For example, in the early days of the EU ETS it was demonstrated that a CO₂ cost of around €25 could encourage fuel switching away from coal and towards natural gas (though it depends entirely on the relative prices of these commodities at any point in time).

In the case of CCS, some sources² have suggested that around €80 per tonne may be needed to drive this technology forward now, but a lower carbon cost in combination with technology funds directed at CCS demonstration could deliver projects in the near term, which underpins the importance of such a technology mechanism to continue within the EU into the 2020s. As the technology matures, the carbon cost needed to trigger CCS activity may settle below €80 – although still recognising that government policy remains the deciding factor

¹ In this article the term «carbon price» refers to a government-imposed carbon pricing mechanism, the two main types being either a tax on the sale of fossil fuels, based on their carbon intensity, or a quota system setting a cap on permissible emissions in the country or region and allowing companies to trade the right to emit carbon (aka as allowances). This should be distinguished from some companies' use of what are sometimes called «internal» or «shadow carbon prices», which are not prices or levies at all but individual project screening values.

² Carbon Capture and Storage Association

for prices to reach such a level. But in all cases, project developers will need to have confidence that the policy mechanism establishing a cost of carbon and its effectiveness in delivery are there to stay.

Scenarios ask “what if?” questions to explore alternative views of the future and create plausible stories around them. They consider long-term trends in economics, energy supply and demand, geopolitical shifts and social change, as well as the motivating factors that drive change. In doing so, they help build visions of the future. As such, scenarios offer useful insight into the development of new policy mechanisms and approaches to manage the climate issue. This has long been at the heart of the Shell scenario efforts, where emissions mitigation has featured in all the outlooks published over the last two decades.

The most recent New Lens Scenarios, published in 2013, are no exception. For the first time, the scenarios extend out far enough to see full resolution of the mitigation challenge with emissions close to net-zero by the end of the century. This is achieved through a major transition of the energy system and the application of CCS on a very large scale. Not surprisingly, the cost of carbon plays a very important role.

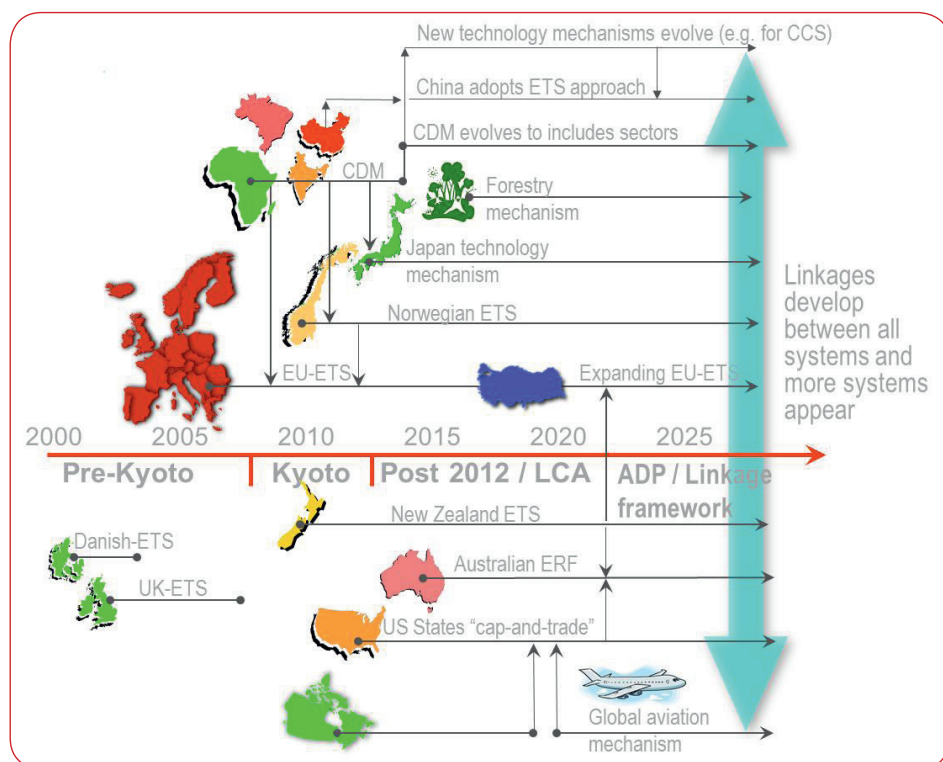
While the New Lens *Mountains* scenario takes a strong regulatory approach to mitigation, effectively requiring the use of CCS, the *Oceans* scenario looks more to the market and a cost on carbon emissions to drive change. But for the scale of change that the *Oceans* scenario envisages, policy-driven carbon prices need to permeate the global economy rapidly and at levels in developed and emerging economies that almost no current systems are delivering today. The scenario is underpinned by global convergence on the cost of carbon in the second half of the century that drives consistent deployment of CCS, with a strong starting point around 2020. That starting point ranges from modest levels in developing economies (e.g., such as the proposed South African government carbon tax of some R150 per tonne CO₂, ~US\$10) through to a level in a system such as the EU ETS that fosters a shift away from coal and encourages natural gas, solar PV and wind. But the reverse is happening in the EU, with tailored policies driving wind and PV, to the detriment of the EU ETS, and coal use consequently rising in some regions. Such a situation results in longer term lock-in of higher carbon energy while at the same time not delivering

CCS. With the Market Stability Reserve (MSR) now in place and the opportunity to simplify the energy policy framework for the 2020s, the EU could see the return of a period where the ETS is the primary delivery mechanism for change. Importantly, this would lower the cost of reducing emissions. Yet, the combined impact of the MSR and the proposed structural reform of the ETS are unlikely to address the existing surplus of allowances in the system until the mid-2020s. As a result, the allowance price will likely remain too low to incentivise low carbon investments or switch away from coal. The ongoing reform of the ETS provides an opportunity to identify ways of accelerating the emergence of a meaningful carbon price, particularly in the power sector where the abatement potential is greater.

Despite numerous governments now seriously considering or implementing policies that deliver a cost on emissions, few contemplate carbon levies that would drive the rapid change required. A rising cost on emissions in leading developed countries seems to be out of reach today as concerns about competitiveness abound. However, such an outcome could be envisaged if emitters and policy-makers in those countries had confidence that carbon pricing policies

implemented by many more governments would become well established and show some sign of convergence. In the interim, the continuation of strong carbon leakage provisions can limit ongoing concerns as that convergence gets underway.

The key to such confidence is a global framework that encourages the national implementation of allowance based systems for managing emissions and then offers the tools to link these systems. Linkage fosters convergence and therefore diminishing resistance to implementation on the back of competition concerns. But such a linkage framework needs a starting point, which is why there are business led proposals to this effect in front of the national negotiators for consideration in Paris and subsequent COP discussions. The details can be filled in later and by others, such as through the Networked Carbon Markets initiative under the World Bank or similar institutions, but even these ideas may not gain traction if a bolthole isn't created in the new agreement. The Paris summit could open the door to the possibility of a global approach to putting a price on carbon and accelerating the low-carbon transition.



“Challenges of integrating renewable energy sources into distribution networks”



Ana AGUADO CORNAGO

Secretary General EDSO

The European Union's energy policy objectives have triggered the rapid growth of distributed renewable energy sources (DRES) across Member States. By end-2013, the installed capacity of photovoltaic (PV) systems and wind turbines across the EU reached 81 GW and 117 GW respectively¹. With these market developments, distribution system operators (DSOs) are facing both technical and commercial challenges to integrate an ever increasing installed capacity of DRES – on industrial and 'prosumer' levels – into their networks in a cost-efficient way. This article provides some views on how to address these challenges.

Technical challenges

To inform this DRES integration, an EU-funded R&D project² conducted case studies to investigate the potential benefits of using ancillary services provided by wind and PV systems at distribution level. The six case studies, conducted in four Member States (Germany, Italy, Portugal and Spain), focussed on a simulation of the behaviour of low, medium and/or high-voltage grids.

The case studies demonstrated³ the usefulness of giving DSOs the possibility of using ancillary services to actively manage their networks. They further showed that the proposed voltage control solutions can bring a number of benefits for DSOs, traditional generators and society in general:

- reduced operational and maintenance costs;
- increased hosting capacity of the networks for variable generation;
- deferred distribution capacity investments;
- reduced electrical grid losses;
- reduced outage times;
- reduced curtailment of variable generation.

Commercial challenges

The project also provided some insights in the commercial domain. The case studies showed that DRES integration would lead eventually to a shift from capital expenditure to operational expenditure for DSOs. They also showed that smart grid deployment can be cost-effective and cheaper than traditional grid reinforcement.

In the first instance, though, capital expenditure by DSOs is expected to be substantial in

the coming years: an estimated €215 billion EU-wide by 2030⁴. To incentivise the necessary investments in DRES-integrating infrastructure, the regulatory framework and network tariffs must be adapted.

DSO network costs largely are driven by the scale and scope of the network required to be ready for all supply and demand situation and for maintenance. DSO revenues, however, are most commonly based on the volume of energy flowing through the network and delivered to final consumers. The integration of DRES will result in an increased variability of generation and of consumption in the distribution networks. Uncertainty regarding DSO costs and revenues thus is rising. And this is impacting the ability of DSO to perform their duties in the predictable scenarios required by the tariff-setting models of national regulatory authorities (NRAs).

A specific example of this is self-generation, also known as self-consumption, which offers many advantages for both consumers/prosumers and DSOs. For DSOs, for example, it can offer the advantage of more predictable consumption patterns. With the deployment of local storage units such as batteries, the peak load could be shaved, relieving the network from a high stress. Batteries, however, do not allow the storage of

1 SolarPower Europe, "Global Market Outlook 2015-2019" (June 2015) and EWEA, "Wind in power: 2014 European statistics" (February 2015).

2 The REServiceS (Economic grid support from variable renewables) project [April 2012 – September 2014]. For more information, see <http://www.reservices-project.eu/>

3 "Report on the evaluation and conclusion of the DSO case studies: Fraunhofer IWES, ENEL Distribuzione, 3E, Union Fenosa Distribucion, EDP Distribuição, ACCIONA" (March 2014), REServiceS project deliverable. See <http://www.reservices-project.eu/wp-content/uploads/REServiceS-D6.2-Final.pdf>.

4 Imperial College London, NERA Consulting and DNV-GL for the European Commission, "Integration of Renewable Energy in Europe," (June 2014).

excess summer output (e.g., from PV panels) until winter, and the excess output often needs to be absorbed by the DSO network. There is thus major uncertainty about whether a prosumer or microgrid could ever rely fully on self-generation and go truly 'off grid.' Given its universal service obligation (USO), though, a DSO cannot operate as if residential or small business consumers are 'off grid' and rationalise its network accordingly. In this context, a DSO's USO costs should continue to be paid by all benefitting end users (including those using it as backup) – and not only by those who remain 'on grid' because they are unable to afford or to avail of a (currently complex and costly) self-generation system.

Reviewing and revising the setting distribution network tariffs will ease the transition towards a more decentralised energy system. NRAs should consider the following high-level recommendations⁵ when designing distribution network tariffs:

Grid users (industrial and consumer/prosumer) should be able to:

- Self-generate and self-consume energy, as long as the costs incurred by their use of network access and network services, including USO access costs and 'insurance' against periods when it is not possible to consume one's own generated electricity, is reflected in their bill;
- Receive compensation from DSOs when adapting their energy consumption/generation in response to signals (e.g., at peak times);

⁵ For more detail, see EDSO policy paper on network tariffs (*forthcoming autumn 2015*) [<http://www.edsoforsmartgrids.eu/category/position-papers/>]



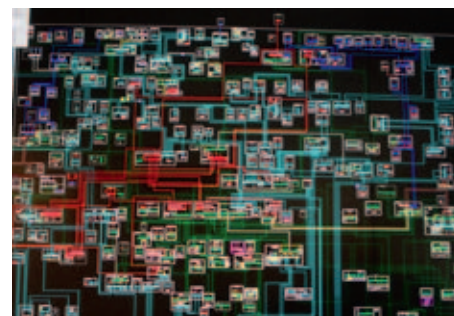
- Sign up for 'smart contracts' with DSOs, granting them a scaled connection quicker, in exchange for occasional and limited curtailment/grid disconnection/activation of storage at peak times.

Operators of (industrial) DRES should:

- Be offered reduced locational connection charges to incentivise them to connect in areas requiring less grid reinforcement and thus costing less to society;

NRAs are invited to:

- Make distribution network tariffs more capacity-based and less volume-based to limit revenue uncertainty for DSOs;
- Ensure that DSOs remain compensated for the cost of USO (including sunk investments) – especially, if and when prosumers and microgrids are able to go 'off grid';
- Set the application period for network tariffs for a short period, ideally one year, to match closely costs and revenues. The regulatory period in tariff-setting cost modelling, however, should not be shortened;



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- Introduce transparency requirements to ensure that network users receive clear and appropriate information as new network tariffs are implemented.

Conclusions

DSOs are working to embrace the technical and commercial challenges of integrating an ever increasing installed capacity of DRES, including self-generation, into their networks. This DRES integration, though, demands the adoption of new commercial practices and regulatory measures which will ensure it is done in a socially and economically fair manner.

Ocean Energy – building a new industry for Europe



Rémi GRUET

CEO Ocean Energy Europe

A local, renewable resource. Ocean energy is abundant, geographically diverse and renewable. For communities leaving close to the sea, it seems only natural to want to exploit it. For the rest of us, it requires maybe to consider the many reasons to generate power with ocean energy: energy security, local durable jobs, export opportunities, climate change, etc...

The main one is maybe the most trivial: the world is moving fast on renewables, which have become the cornerstone of any new energy system today. The IEA medium term report states that renewables already represent most of the new added power plants in the world and that this trend will not abide any time soon. So if we do not

develop our own technologies, and industry, we will have to import everybody else's! Not a great economic plan...

The size of the prize. In 2050 the global market for ocean energy could see 337GW¹ in installed capacity, of which 100GW are expected in Europe according to the Ocean Energy Europe Vision Paper².

By 2050, Ocean energy has the potential to generate 350TWh of electricity meeting up to 10% of Europe's demand³.

To stay ahead of the game and ensure that European companies are in a prime position to

1 IEA-Ocean Energy Systems: Annual Report 2013

2 Ocean Energy Europe Vision Paper, 2013.

3 Ocean Energy Europe has calculated that 100GW of ocean energy capacity could be deployed in Europe by 2050, producing around 350TWh of electricity. The European Commission's Energy, transport and greenhouse gas emissions trends to 2050 reference scenario (2013) estimates total EU power generation in 2050 at 3.844 TWh.

capture the lion's share of the market, Europe needs to invest in ocean energy now.

To date, 5 technologies have been tested and are at various stages of development. Wave energy, Tidal Stream, Tidal Range, Ocean Thermal Energy conversion and Salinity Gradient.

Wave energy converters derive energy from the movement of waves. Energy output is determined by size, speed and length of the waves.

Tidal stream turbines harness the flow of the currents to produce electricity. Energy output is determined by the speed of the currents.

Tidal range uses the difference in sea level between high and low tides in a lagoon to create power - the higher the wall, the more energy is produced

Ocean Thermal Energy Conversion (OTEC) exploits the temperature difference between deep cold ocean water and warm surface waters to produce electricity via heat-exchangers.

Salinity gradient power generation utilises the difference in salt content between freshwater and saltwater to provide a steady flow of electricity via osmosis

Technology leadership and industrial success

Europe has the opportunity to develop a new industrial sector, create a supply chain, local jobs and wealth, and capitalise on its first mover status to cultivate significant export opportunities.

Today 45% of wave energy companies and 50% of tidal energy companies are from the EU⁴. With the right support over the coming decade, Europe will maintain leadership in a global



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4 JRC. 2014 Ocean Energy Status Report. 2015

market, worth an estimated €53bn annually in 2050⁵.

The EU is in need of industrial success stories, and ocean energy can be one of those. Europe's manufacturing base has eroded significantly with most of the manufacturing done outside of the EU. The country that best withstood the European crisis – Germany – remains, on the contrary, strongly industrialised. And more so than his neighbours.

The ocean energy supply chain is also truly pan-European, with both leading companies and supply chain SMEs spread across the EU's Member States. It even includes landlocked countries like Austria, due to a long experience in hydro equipment manufacturing.

5 Carbon Trust Green Growth Paper 2011

Moreover, ocean energy is deployed in coastal areas, some of which have been hit by economic restructuring in recent decades. Putting ocean energy farms in the water will complement Europe's regional growth agenda by creating high-skilled jobs and sustainable economic development. Ocean energy also provides under-used ports and harbours with an opportunity to innovate and specialise as hubs for blue growth.

A solution for Europe's overreliance on fossil fuel imports. The EU is in a precarious energy position. The bloc continues to rely on imports for 53% of its energy needs. This bill totals €400bn a year and dependence on a handful of exporting countries is becoming increasingly problematic.

An important cog in the fight against climate change. Policy in Europe has been very successful in taking the first generation of renewable energy technologies, such as solar and

wind, to commercially competitive levels. The EU will however need other technologies to further diversify its low-carbon generation capacity, if it is to meet its objective of reducing greenhouse gas emissions to 80% – 95% below 1990 levels by 2050⁶. By 2050 power generated by the ocean energy sector could avoid the equivalent of 276m tonnes of CO₂ emissions annually⁷.

Extra value by exploiting synergies and knowledge transfer across the blue economy

Other marine sectors have both a lot to offer and a lot to gain from the development of the ocean renewable energy sector. Today, companies from sectors such as naval construction, offshore oil & gas, offshore wind and dredging are amongst the leading players in the ocean energy sector. These companies are creating extra value from their existing knowledge by using it to exploit new growth opportunities in the emerging ocean energy industry.

How to?... Is now the key question. How do we continue the development of ocean energy?

Technologies need to improve, evolve, prove themselves and in the end get down the energy cost curve. In the current cash strapped investing climate, and as for the first steps of all other energy sectors this requires public support. But in a rational and structured way, getting maximum value and leverage out of investments.

An EU Commission initiative, the Ocean Energy Forum, aims to identify a path forwards on technology, consenting and financing ocean energy. It's first Roadmap and conclusions are due to be released in October and are looking at ways to maximise return on investments, leveraging private capital and packaging public support in a way that makes it usable.

Four ideas provide solutions for all phases of technology development, from the lab testing to industrial roll-out. Only by putting those into application will we succeed where others have so far failed – developing a new energy source and a new industrial sector for Europe.

6 European Commission: Energy Roadmap 2050

7 Calculations based on Ocean Energy Europe and European Commission's Energy, transport and greenhouse gas emissions trends to 2050 reference scenario (2013).

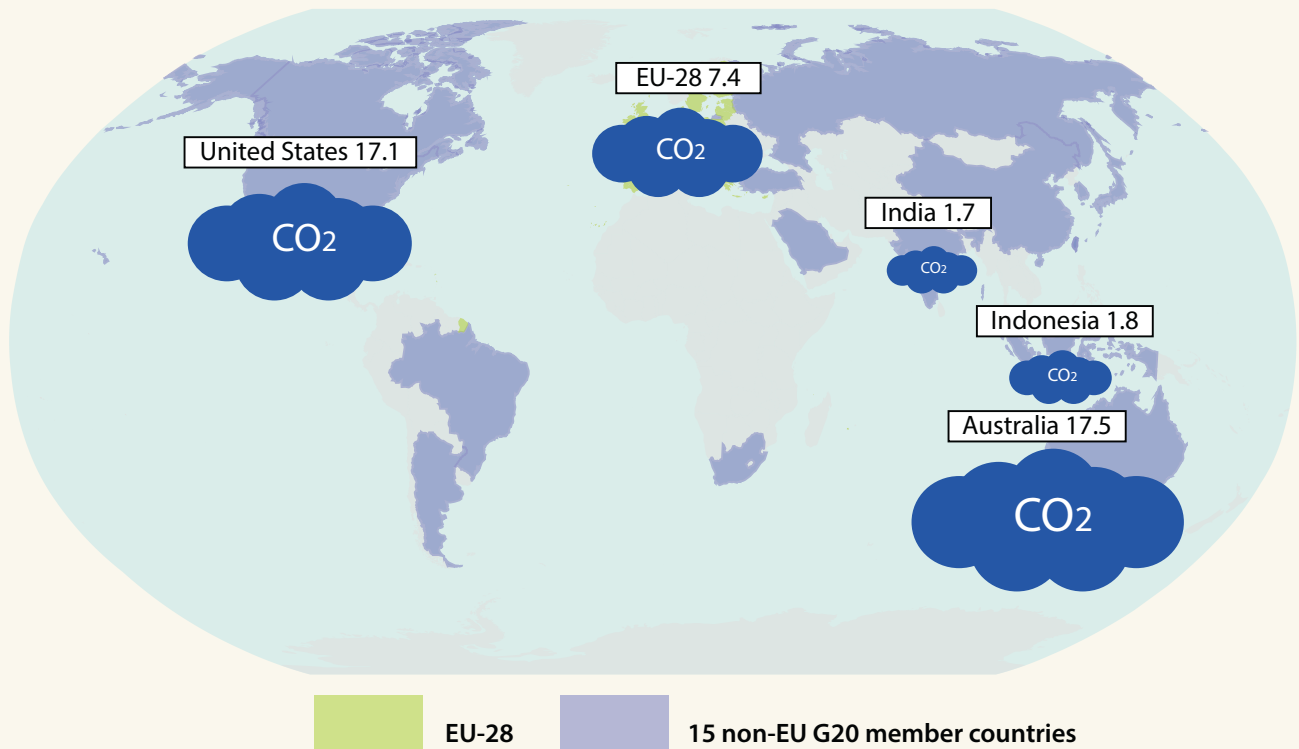


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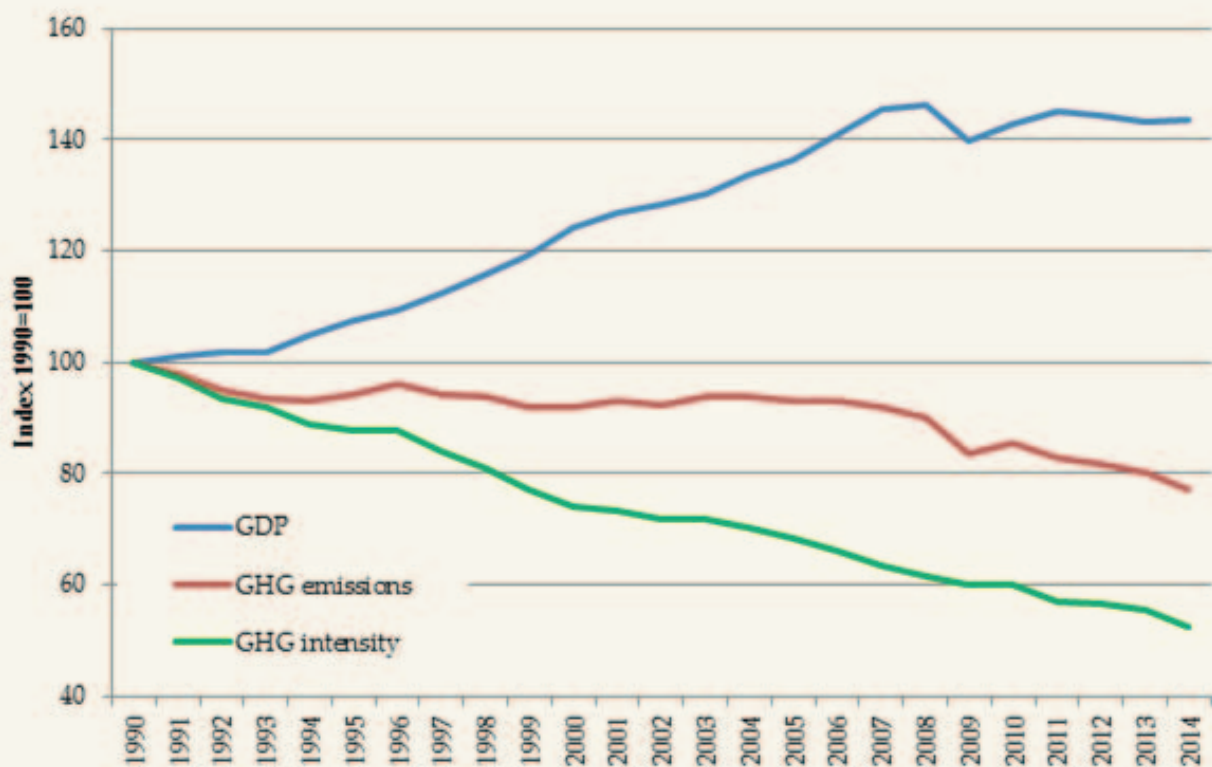


© DCNS

Carbon dioxide emissions (tonnes per inhabitant)



© Eurostat



© European Commission (DG Climate)

Changes in GDP (in real terms), GHG emissions and emissions intensity (ratio between emissions and GDP) of the economy. Index (1990 = 100)





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