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The EU is aiming to reduce greenhouse gas emissions by at least 40% by 2030 compared to 1990. What key policies and actions will have to be implemented by the Member States in order to reach this goal? And how can the EU ensure a successful transition to a low-carbon economy that is also cost-effective?

The EU's target to reduce greenhouse gas (GHG) emissions by at least 40% by 2030 was agreed by EU leaders in 2014. It is also the basis of our contribution to the global Paris Agreement on climate change of 2015. According to analysis carried out by the European Commission when preparing the EU's 2030 climate and energy framework, the emission target is both cost-efficient and in line with a fair contribution of the EU towards the Paris Agreement objective of limiting the global temperature rise to well below 2 °C.

In order to meet the emissions target and the other key 2030 targets on renewables and energy efficiency, the EU put together a comprehensive package of policies and measures, covering all sectors of the economy. A central tool is our Emissions Trading System (EU ETS), in place since 2005, which ensures cost-effective emission reductions from large power stations, industrial plants and aviation within Europe. Yet climate action is a shared responsibility between the EU and its Member States. For sectors outside the EU ETS sectors, including transport, buildings, agriculture and waste, all Member States have an individual emissions reduction target for 2030, under an "Effort Sharing Regulation" (ESR) adopted in May 2018. Together, these targets will result in an EU-wide emissions reduction of 30% by 2030, compared to 2005.

As with targets in place for 2020, those for 2030 are based on each Member State's relative GDP per capita to ensure fairness: higher income Member States have, higher targets. Italy's goal is to reduce emissions by 33% by 2030 compared to 2005. The ESR allows Member States to decide what policies to implement to achieve their target – and provides several flexibilities so that they can do so in the most cost-efficient way.

A key flexibility concerns land use, land use change and forestry (LULUCF), which will be formally integrated into the EU climate framework from 2021. As this sector generates emissions but also removes CO₂ from the atmosphere as a carbon sink, Member States must ensure that their LULUCF emissions in 2021-2030 are offset by at least an equivalent removal. Consequently, Member States that remove more than they generate will be able to use a limited amount of these LULUCF "credits" to comply with their national ESR target. For Italy, the maximum amount of these credits is 11.5 million tonnes over the period 2021-2030.

On transport, the EU is putting in place a comprehensive strategy to tackle emissions from the sector, which accounts for nearly a quarter of all EU GHG emissions. Based on a low-emission mobility strategy, the Commission has made a series of proposals to put EU transport firmly on a path to sustainability, including new CO₂ emission standards for cars and vans – which will help stimulate uptake of low-emission and zero-emission vehicles – and, recently, the first ever CO₂ emission standards for heavy-duty vehicles.

EU regulatory action on energy is also key for achieving the 2030 emissions target, alongside those on renewables and energy efficiency. The "Clean Energy

for All Europeans” legislative package, proposed by the Commission in November 2016 and currently being negotiated by the European Parliament and Council, aims to provide strong market pull for clean energy technologies, set the right conditions for investors, empower consumers and make energy markets work better, as well as create jobs and growth. The EU has almost finalised its wide-ranging legislative package for implementing the 2030 climate and energy framework. But we are not stopping here: the 2030 framework is part of our long-term strategy for making the EU a truly low-carbon economy by the middle of this century. In March this year, EU leaders asked the Commission to present a new long-term strategy on reducing greenhouse gas emissions – which will be presented ahead of the COP24 climate change conference in Katowice, Poland in December 2018.

What key challenges must the EU overcome in order to achieve the low-carbon, clean energy transition? What are the potential economic and societal impacts and how can they be addressed?

Moving to a low-carbon, sustainable economy will require fundamental shifts in technology, industry, business, finance and, ultimately, society as a whole. This is undoubtedly a significant challenge, but it is also an excellent opportunity for economic transformation, jobs and growth.

The low-carbon transition will stimulate investment and innovation in new technologies and can increase growth in markets for goods and services produced in the EU, for example in the field of energy efficiency. It also offers European businesses and entrepreneurs many opportunities to innovate and remain, or become, highly competitive on global markets.

However, we must ensure the transition is properly managed, firstly by taking into account the differences in energy mixes and socio-economic structures across the EU. This includes anticipating and mitigating societal impacts, particularly in carbon-intensive regions, which must be supported to make the transition.

Moreover, we will not be able to achieve our objectives without largely decarbonising our industrial production structure, something which will require a profound transformation of the sector. The land use and forestry sector, with its dual benefits of removing CO₂ from the atmosphere and providing bioenergy, alongside its anthropogenic emissions, also has an

important role to play and must be managed well.

Along with improving energy efficiency, developing existing and new clean energy sources is of course crucial for achieving deep decarbonisation. While action being taken to meet the EU’s 2020 climate and energy targets is helping to drive renewable energy deployment, there are clearly still barriers to be addressed, as we look to our 2030 objectives and beyond. For example, integrating renewable sources into energy systems still entails many challenges, notably the need to balance the supply and demand of electricity at any time, to ensure grid stability and security of supply. However, I am confident that the development of both technology options for electricity storage (such as batteries, but also hydrogen and synthetic gas) and smart grid applications will be able to keep pace with renewables deployment.

As with all EU regulatory action, the 2030 climate and energy framework began with a rigorous, in-depth assessment of the potential economic, social and environmental impacts and a public consultation process to ensure that the views of all stakeholder groups, citizens and experts have been taken into account.

How is the EU supporting governments, stakeholders and citizens to embrace ambitious climate action, in view of the economic costs and societal changes? And what is the EU doing to help developing countries make the low-carbon transition while also growing their economy and tackling poverty?

A large share of EU spending supports the transition to a low-carbon, climate-resilient economy. For 2014-2020, climate action has been “mainstreamed” into the EU budget: mitigation and adaptation actions are integrated into all major spending programmes, including regional spending, energy, agriculture, transport and research and innovation, aimed at spending at least 20% of all EU funds on climate-related objectives.

For 2021-2027, the European Commission has proposed increasing this share to 25% of the whole EU budget, which would see some €320 billion spent on climate action over these seven years. This would ensure that the EU budget is a real driver for sustainability and helps to steer investments away from “business-as-usual” choices and towards actions supporting the low-carbon transformation.

However, it is clear that current levels of investment

are not sufficient to bring about the global economic shift needed to put us on a path towards the long-term objectives of the Paris Agreement. A worldwide effort to connect finance with climate action and sustainable development is therefore required.

To this end, the Commission put forward an ambitious EU action plan for financing sustainable growth in March this year. The sustainable finance action plan aims to ensure that environmental, social and governance factors become a regular part of private investment decisions. Commission proposals include developing a unified EU taxonomy on climate finance and creating EU labels for green financial products. The EU's climate and energy policies include many incentives to guide business and consumers towards climate-friendly choices. For example, an EU regulation is gradually reducing availability of hydrofluorocarbons (HFCs), giving producers and users an incentive to shift from equipment using these powerful greenhouse gases. In some cases, more climate-friendly types of equipment are already the most competitive solution on the market. The "Clean Energy for All Europeans" package, meanwhile, aims to set a regulatory framework that enables economic operators to play an active role in the low-carbon transition, as well as supporting community initiatives on energy self-generation, particularly from renewable sources.

Civil society groups, meanwhile, are supported to contribute to the EU policy-making process on climate and energy through various EU grant and funding mechanisms, including Horizon 2020, the LIFE programme and the European Innovation Partnership on Smart Cities and Communities.

The EU is a strong supporter of climate action in cities, which have a crucial role for achieving the Paris Agreement goals. While cities generate a large share of EU and global emissions, they often also lead the way in climate and energy innovation. The EU is therefore a strong supporter of the Global Covenant of Mayors of Climate and Energy, which already counts over 7,500 cities and towns in nearly 60 countries. EU Covenant cities had, by 2016, already collectively reduced their GHG emissions by 23% compared to 1990.

For many EU citizens, climate action is already part of daily life, such as driving a more CO₂-efficient car or better insulating the house. Recent statistics show a growing trend towards climate-friendly choices among the EU population: citizens are becoming increasingly important and empowered actors for climate action.

Meanwhile, EU climate action does not stop at our borders. The EU and its Member States are fully

committed to helping developing countries to take climate change mitigation and adaptation measures, especially those most vulnerable to its impacts.

Together, the EU and its Member States are the biggest provider of financial assistance for climate action in developing countries, a total of €20.2 billion in 2016 alone. Climate action is also being increasingly integrated into the EU's broader development strategy, while the EU and its Member States are collectively the world's biggest aid donor, accounting for over half of all official global development assistance.

What is the scale of the research and development effort required to develop game-changing low-carbon technologies? How will it be financed? And what key infrastructure changes are needed?

Developing low-carbon technologies and bringing them to the market is one of the greatest challenges of our time. If we want to preserve our way of life and avoid dangerous climate change, we cannot rely on existing technologies. Moreover, it is precisely through an innovation-driven low-carbon transition that we will be able to create new jobs and sustained economic growth.

The process of getting low-carbon technology to the market is costly. In most cases, the biggest costs come at the demonstration stage. The risks are high, so the private sector is unlikely to finance projects alone. At the same time, the public sector has limited spending power, so the challenge is to create smart incentives to ensure that projects go ahead and that the ground is prepared for large-scale market deployment.

The EU supports low-carbon technology development at each stage of the process: research and innovation, through the Horizon 2020 programme; demonstration, through the NER300 programme, which will be followed by a new Innovation Fund after 2020; and private finance, through instruments such as EU Finance for Innovators (InnovFin) and the European Fund for Strategic Investments (EFSI). For the EU budget in 2021-2027, the Commission has proposed a new EU research and innovation programme, Horizon Europe, of nearly €100 billion, to support areas including the transition to a low-carbon economy.

In terms of infrastructure, we must push ahead in further developing and diversifying our clean technology portfolio, including large-scale energy storage, which is crucial for ensuring the successful operation of energy systems with a large share of renewable sources. Alongside renewables, other candidates such as hydrogen and synthetic fuels could also play an important role, for example in industrial heating or

air transport. Process innovation in industry is also key: we cannot rely only on carbon capture and storage and new processes must be developed to significantly decarbonise our steel, cement and chemical industries.

The ‘digital revolution’ is transforming society and brings huge opportunities to advance humanity, but emissions from the digital ecosystem could be significant without strategic policy action. How can we ensure that the digital revolution will be environmentally sustainable and a driver of decarbonisation?

We live in a world in which data and digital content are growing exponentially and in which people can be instantly connected and access an endless amount of information, at the click of a smartphone button. Digital solutions can increase output while reducing both operational costs and use of natural resources, leading to lower environmental impact. This “digital efficiency” has huge potential for helping to address global climate, energy and resource challenges. Studies suggest that an “industrial internet” world in 2030 can be cleaner, smarter and more prosperous, with information and communication technologies (ICT) giving the opportunity to substantially reduce global emissions in many sectors, including energy,

transport, health, buildings, agriculture, education and manufacturing.

As with all game-changing technological innovations that imply deep societal change, the digital revolution brings both huge opportunities and significant challenges. This also applies to the digital revolution’s contribution to mitigating climate change and decarbonising the economy.

For example, without ICT it would be extremely difficult to largely decarbonise our electricity system, a key part of the EU’s long-term climate objectives. Digital solutions have allowed us to start building an EU-wide smart grid capable of successfully integrating the growing share of power from intermittent renewable sources. However, digitalisation can also be very energy-intensive. Take cryptocurrencies: by design, they require huge amount of computing capacities and the quantity of electricity needed to run the current bitcoin economy is over 60 terawatt hours a year – equivalent to the electricity demand of Switzerland.

Therefore, it is extremely important for our future digital economy to be powered by clean energy. Implementation of the EU’s 2030 climate and energy framework, which is both ambitious but realistic and enforceable, will help to ensure that the digital revolution becomes an important driver of decarbonisation.