



# THE EUROPEAN FILES

October 2021 - n°67

## ON THE ROAD TO NET ZERO: BUILDING ON EUROPE'S CLIMATE LEADERSHIP





# The European Investment Bank

# SUSTAINABLE INVESTMENT

# FOR CLIMATE AND ENVIRONMENT

Aligned with the **Paris Agreement** by the end of 2020

**50% of our new commitments go to climate and environmental goals** by 2025

**€1 trillion of climate and environmental investment** by 2030



@ Shutterstock

The European Investment Bank is the European Union's bank and the world's biggest multilateral lender. From small businesses to massive infrastructure projects, we back sustainable investments.

[www.eib.org/climate](http://www.eib.org/climate)



European  
Investment  
Bank

*The EU bank* ★ ★ ★ ★ ★

# EDITORIAL

## ON THE ROAD TO NET ZERO: BUILDING ON EUROPE'S CLIMATE LEADERSHIP

This summer's recent climatic episodes (fires across the Mediterranean, floods in Western Europe, Japan and South Africa, hurricanes across North America and the Caribbean) and the IPCC report oblige us to act quickly with regards to the reduction of greenhouse gas emissions. The European Union, for one, has not sat idle by during this time, and is still working diligently on its climate change framework to make Europe climate neutral by 2050. In July, the European Commission presented its 'holistic' policy package called 'Fit for 55' – a political toolkit to reduce carbon emissions to 55% of historic rates. The single largest project ever embarked on by the Commission.

Through various initiatives, the commission has proposed a roadmap to the decarbonisation of all economic sectors: energy, industry, transport, residential and commercial buildings, and agriculture. Centre stage in the package and to the EU's climate ambitions is energy. The large-scale deployment of renewable energy envisioned by the Commission, encapsulates the integration of gas and electricity systems, energy storage and distribution, new technological solutions to network stability, and an increased level of interconnectedness. A complex ballet in which every aspect is crucial in reaching net zero by 2050. The biggest decisive factor? Political will.

The future of a carbon neutral power industry depends on developing a system with that future in mind, and the Renewable Energy Directive (RED) is crucial in keeping fossil fuels at bay. 'Renewables-based-electrification' of our infrastructure as one of the guiding principles of the RED, ought not only be of a scale never before seen; it will need cross-sectoral cooperation of similar scale. 'Fit for 55' also proposes the revision of the Emissions Trading

Scheme (ETS), which is the cornerstone of legislation to incentivize the decarbonization of industry in moving towards cleaner production and stronger innovation.

The decarbonisation of the European gas market is another priority. Hydrogen might be the key in this endeavor: heavy industry, heavy transport, part of energy – all of which so-called 'hard-to-abate sectors' will see measures to roll out initiatives for the promotion of clean hydrogen.

The industrial sector, more than any other, needs a comprehensive European green industrial policy that not only puts a price on carbon pollution but offers policy support along the entire value chain of energy-intensive industries

We must also take into account the need for a just and equitable transition in the transformation of energy supply. This means looking for innovations that are accessible and cheap to deploy or scale. The Commission wants to take important steps to reduce emissions and increase energy efficiency, but this requires even more closely linked environmental and financial legislation to have a real impact; even if solutions may be cheap in the long-run, some initial investment will have to be made. That is why it has chosen to introduce key concepts of green finance into EU legislation; The development of sustainable finance will play a large role in tackling climate change and preserving biodiversity.

With the proposals in the Fit for 55-package, the pricing of carbon and a carbon footprint reflects the truly international nature of climate change. The introduction of the Carbon Border Adjustment Mechanism (CBAM) aims to put a halt to the counterproductive effects of EU CO<sub>2</sub> emission standards in international competition. Although the Commission is adamant

that this 'WTO compatible' mechanism is merely a climate measure and not a tax, it could finally move funds towards necessary infrastructure rather than covering the costs of polluters and an antiquated economic model.

The arrival of CBAM is reflective of the truly global aspect of climate change. More than ever, it has become clear that the EU cannot act alone. COP 26 in Glasgow is therefore an excellent opportunity for nations to confirm their existing commitments and commit to even more ambitious targets. Indeed, critics in the scientific and environmental agencies of the world will deem the Green Deal as insufficient without more ambitious targets—ultimately marking a potential failure in the European vision for society. It is the responsibility of each EU citizen to take up this challenge and open their door to the fight against climate change. With this in mind, Europe must lead the way in the global race to net zero.

This brings us to the last aspect of the planned transition: the Commission has made it more than clear that the tolls on the road to a climate neutral continent should be paid in an equitable manner. Vice President Timmermans has stated on multiple occasions that 'there will be an inclusive transition, or none at all'. The new EU policies must become a driver for innovation, employment, and the decarbonisation of industry rather than the deindustrialization of the EU. In other words: Fit for 55 should be a growth strategy. In order to expect EU citizens to support the transition, the EU must be able to realise opportunities for both citizens and the private sector. Only with all actors on stage, can the EU bring this immense yet intricate play to a successful close.

**Editor-in-Chief**  
**LAURENT ULMANN**

**Management:** The European Files / Les Dossiers Européens - 19 rue Lincoln, 1180 Brussels

**www.europeanfiles.eu** - ISSN 1636-6085 - **email:** [ulmann@europeanfiles.eu](mailto:ulmann@europeanfiles.eu)

**Publication Director and Editor-in-Chief:** Laurent ULMANN

**Layout & printing:** Drifosett Printing - [www.drifosett.com](http://www.drifosett.com)

**Copyright:** Shutterstock

# TABLE OF CONTENTS

## On the way to net zero: the make-or-break decade

**Frans Timmermans**, European Commission Executive Vice-President for the European Green Deal

## How France Puts Climate First

**Barbara Pompili**, *French Minister for the Ecological Transition*

## Making the Most of Slovenia's EU Council Presidency to Accelerate the Green Transition

**Andrej Vizjak**, Slovenija Minister of Environment and Spatial Planning

## Driving Europe's energy transition via policy

**Kadri Simson**, European Commissioner for Energy

## The Outlook for the Global Clean Energy Transition

**Fatih Birol**, Executive Director, International Energy Agency

## Meeting the sustainable energy need of a growing global population

**Patrick Pouyanné**, Chairman and CEO of TotalEnergies

## Accelerating the Energy Transition to Achieve Climate Neutrality

**Cristian Busoi**, MEP (EPP Group, Romania), Chair of the ITRE Committee, European Parliament

## Insurers: A force for sustainable change

**Philippe Donnet**, Group CEO Assicurazioni Generali S.p.A.

## Access to finance facilitating support for the Green Deal

**Ambroise Fayolle**, Vice-President of the European Investment Bank

## From Carbon Markets to Green Industrial Policy

**Bas Eickhout**, MEP (Greens, Netherlands), Member of the ENVI Committee, European Parliament

## A reality check on climate change

**Valerie Masson-Delmotte**, Co-Chair of the Intergovernmental Panel on Climate Change (IPCC) Working Group I, the Physical Science Basis.

## Paving the way towards an affordable and resilient European decarbonization

**Claire Waysand**, Executive Vice President, General Secretary of ENGIE

## 6 The path to 2050 will be defined by how we get to 2030 - Time to move from the age of pledges to the era of results 22

**Jytte Guteland**, MEP (S&D Group - Sweden), coordinator in ENVI and rapporteur for the European Climate Law

## 7 Renewable energy is here... and we are going to need it 23

**Nils Torvalds**, MEP (Renew Europe-Finland), Member of the ENVI Committee

## 8 Mission Zero for healthy living spaces: 3 actions to get buildings on track with climate science 24

**Maximilian Viessmann**, Co-CEO Viessmann Group and CEO Viessmann Climate Solutions

## 9 The EU is on the pathway to a real change of paradigm in its energy & Climate policy 26

**Christophe Grudler**, MEP (Renew Europe-France), Member of the ITRE Committee

## 12 Yes to the revision of the Energy Taxation Directive 27

**Henrike Hahn**, MEP (Greens, Germany), Member of the ITRE Committee, European Parliament

## 14 Hydrogen Fusion: the way to a new energy future 28

**Bernard Bigot**, Director-General, ITER Organization

## 15 Unleashing the power of clean hydrogen for a climate neutral future 30

**Fabienne Lecorvaisier**, Executive Vice President – Air Liquide

## 16 Building climate-neutral economy with hydrogen must start today 32

**Jorgo Chatzimarkakis**, CEO, Hydrogen Europe

## 18 Reducing Methane Emissions - A quick win on tackling climate crisis 34

**Maria Spyrali**, MEP (EPP - ND Greece) - Rapporteur of the EU Strategy to Reduce methane emissions

## 19 Gas is central to the energy transition and decarbonising it will be a cross sector effort 35

**James Watson**, Secretary General, Eurogas

## 20 Two years on the Green Deal, hydrogen is still "the missing piece of the puzzle" 36

**Sébastien Douguet**, Director – Deloitte Economic Advisory



# ON THE ROAD TO NET ZERO:

## BUILDING ON EUROPE'S CLIMATE LEADERSHIP

### How Sustainable Finance Will Support the Climate Transition

38

**Sirpa Pietikäinen**, MEP (EPP Group, Finland), Member of the ECON Committee, European Parliament

### Time Is Not on Our Side - Climate Action is Urgently Needed

39

**Jeremy Wates**, Secretary General, European Environmental Bureau (EEB)

### A lot of work to do until we are 'Fit for 55'

41

**Maria da Graça Carvalho**, MEP (EPP Group, Portuguese), Member of the ITRE Committee, European Parliament

### Developing Clean Mobility for a Climate-Neutral Europe

42

**Henrik Hololei**, Director-General for Mobility and Transport, European Commission

### Carbon2ProductAustria (C2PAT)

43

"Creating a novel circular cross-sectoral carbon value chain for the transformation of industry towards a climate-neutral economy"

43

**Thomas Gangl**, CEO of Borealis

### Promoting an Ambitious Climate Action

### While Protecting Jobs in a Post-Pandemic Europe

45

**Peter Liese**, MEP (EPP Group, Germany), Member of the ENVI Committee, European Parliament

### Why Fit-for-55 needs to drive innovative transformation

46

**Lars Røsæg**, EVP, Corporate Development & Deputy CEO, Yara

### Three steps to tackle the climate emergency

47

**Michael Bloss**, MEP (Greens, Germany) Member of the ITRE Committee

Fit for 55 recognizes that sustainable biomass is key to fighting climate change, but the details must be right for today and tomorrow

48

**Thomas Meth**, Co-founder and Executive Vice President of Enviva.

### Ensuring the Renewable Energy Directive Becomes Fit for 55

49

**Morten Petersen**, MEP (Renew Europe, Denmark), Member of the ITRE Committee, European Parliament

### Circular economy: a concrete solution to climate and biodiversity challenges

50

**Jean Hornain**, CEO of CITEO

### Climate Crisis Shows Need for Bolder National Actions Under EU Green Deal

52

**Linda McAvan**, The European Climate Foundation's executive director for European relations and a former British member of the European Parliament, where she chaired its development committee

### Old Sector – New Role

The European fertilizer industry is standing at the dawn of becoming an essential player in the climate effort

53

**Jacob Hansen**, Director General of Fertilizers Europe

### The green transition only hurts those who do not want to take it seriously

55

**Pernille Weiss**, MEP (EPP Group, Denmark), Chair of the MEP Water Group, Member of the ENVI & ITRE Committees, European Parliament

### How to make the necessary digital transition a sustainable transition?

56

**Patrick Chaize**, French Senator of Ain President of Avicca ([www.avicca.org](http://www.avicca.org))

### Electrifying Europe with wind energy – towards net-zero by 2050

57

**Giles Dickson**, WindEurope CEO

### Electricity leads the race to net zero

58

**Kristian Ruby**, Secretary General of Eurelectric

### Electrification and sustainable fuels: Partners towards carbon neutrality

59

**Pieter Vingerhoets**, EnergyVille/VITO

**Ronnie Belmans**, Advisor to the Board of EnergyVille

### Good Games and Climate Change: Building a better world through video games

61

**Raphael Benros**, Senior Consultant, Games for Good Group





© European Union 2019

**FRANS TIMMERMANS**

*Executive Vice President of the European Commission for the European Green Deal*

# On the way to net zero: the make-or-break decade

**T**his is make-or-break decade to tackle the climate and biodiversity crises. Both crises are already wreaking havoc across the European continent and around the world.

The storms, wildfires, and heatwaves battering our planet show that climate change is not a future threat. It is happening now. If we do nothing and we delay tough decisions, it becomes an existential threat.

The European Climate Law adopted this June has made the EU target of at least -55% reductions by 2030 legally binding. On the way to climate neutrality in 2050, we will need to accelerate our efforts to cut emissions across all economic sectors: energy, industry, transport, buildings, agriculture, forestry and more.

Delivering the Climate Law will require considerable effort in every Member State. It will not be easy, but it is possible.

The European Union is already proving that economic growth and emissions cuts can go hand-in-hand. Since 1990, the EU economy has grown over 60% while emissions have gone down more than 25%.

Europe's existing legal framework thus offers a solid basis for our climate action. It would have brought us to over -40% in 2030, the EU's original target. To get to -55% the Fit for 55 package proposed in July in large part strengthens our current rules.

It runs from scaling up renewable energy and more energy efficiency, to making our buildings, transport and industry more efficient and clean. We will put a price on carbon across the economy to turn the page on fossil fuels and restore our forests to help capture CO<sub>2</sub> and support biodiversity.

Emissions trading takes a prominent position in these proposals. With its cap on emissions, the European Emissions Trading System is a proven and effective tool to bring down emissions. It prompts industry to switch to cleaner production, drives innovation, and generates revenues that become available for redistribution and reinvestment.

The package proposes a separate system for emissions trading in road transport and buildings. Emissions in these sectors have not decreased and our existing tools will not enable us to speed up emissions cuts fast enough.

Under the new system, fuel suppliers – not individual drivers, homeowners or tenants – will buy allowances to put fuel on the market. The cleaner their fuels, the less they pay. A quarter of the revenues from this system will go into a Social Climate Fund to compensate vulnerable groups in Europe for potential higher costs of heating and transport fuels, and help them invest in cleaner solutions. The fund would have € 72 billion available to provide temporary direct income support, and to help citizens finance zero-emission heating or cooling systems, or purchase a cleaner car.

Such action brings financial benefits too: a home that generates its own energy no longer has an energy bill to pay. And already now, driving an electric car costs less than a combustion engine. The problem is the upfront costs of the investment needed. The Social Climate Fund therefore helps citizens overcome the initial financial hurdle to a sustainable future.

All of the changes proposed under the Green Deal have clear long-term benefits: more space for nature, cleaner air, cooler and greener towns, healthier lives, and new economic opportunities. The challenge at the heart of Europe's green transition is how we bring these

long-term benefits to all, as quickly and as fairly as possible. Because we want everyone to make it to the finish line in this race to zero.

The proposals in Fit for 55 bring real changes and provide crucial support to the most vulnerable in our societies. Down the road, their implementation may bring challenges. Overall, however, we must recognize Europe's green transition as a massive opportunity. The Green Deal benefits the wellbeing of all of us, as well as those who come after us.

Our actions and ambition today are necessary to allow future generations – our children and grandchildren – to live happy, healthy lives on this planet. The Fit for 55 proposals, accompanied by equally ambitious global action in the next years, will make this possible. If we get to -55% in 2030, we are on our way to learning to live within planetary boundaries.

Europe can lead the way in the global race to net zero and simultaneously enjoy the advantages of being a first mover. The rest of the world is already watching us and looking how they too could turn around their economy and society.

If we act now and have the courage to tell people honestly what is needed to save humanity and save our planet, and if we show it is done fairly, I'm convinced that can make some very fundamental changes. These will be changes to inspire the whole world and prompt leaders across the globe to come up with a plan of their own. It is what is necessary in this make-or-break decade.

Moving forward, we have to remember that the world is changing rapidly whether we move or not. If we want to be masters of our fate, the Green Deal is our roadmap to a green, clean, and healthy future.





**BARBARA POMPILI**

*French Minister for the Ecological Transition*

# How France Puts Climate First

2020 and 2021 will undoubtedly remain in the history books as the years where Covid-19 dashed through much of the world. But for France, these years will later be looked upon as the time when climate became the cornerstone of much of our policies, both at the national and at the European levels.

## Climate as a French national priority

*An unprecedented investment designed to pave the way for a more sustainable future*

In the fight against climate change, numbers matter. The French recovery plan was carefully designed to secure a wide range of environmental improvements. This plan served as the stepping stone of an unprecedented environmental effort: almost a third of its investments are meant to lay the groundwork for a greener economy.

Overall, we're talking about more than 30 billion euros of investment. This comes on top of the Ministry of Environment's annual budget, which will be of roughly 50 billion euros for the year 2022 alone.

These investments already have a promising - and I believe, enduring - impact. Let me take only one example: for housing, which is the cause of more than 20% of our greenhouse gas emissions and historically difficult to reduce, we have unlocked close to 7 billion euros, which are meant to help the thermal renovation of our homes and buildings.

*A landmark law that emphasizes France's dedication to be at the forefront of the green transition*

Beyond these figures, our ambition can be laid out in simple terms: we want to transform the way environmental policy is perceived and conducted in our country. Our goal? To make ecology part of the daily life of all our citizens. To lay out the groundwork for such a change, France has adopted this summer a landmark law: the Climate and Resilience Bill, which is the signature of our current policies.

This bill was prepared and discussed as part of a new democratic experiment. 150 citizens

were chosen at random in our country; they were entrusted with the task of designing some imaginative measures that once implemented, would be the catalyst for a new form of environmental democracy, where each citizen acts directly as an agent of change. This initiative, which came to be known as the Citizens' Climate Convention, was directly designed by our President Emmanuel Macron - and it is a demonstration his dedication to help solve environmental problems more broadly.

Today, this bill is a major improvement for a more resilient and less wasteful society, on a wide range of themes: travel, housing, consumption, strengthening judicial protection of the environment and improving climate and environmental governance.

## Climate as a European priority

*Climate is a European cause and France will do its best to push it forward*

The battle for climate must be fought jointly with our European partners. From the day of its inception, France has supported the European Green Deal and it will continue to. Our President Emmanuel Macron said in 2017 that "Europe must be at the forefront of the efficient and fair ecological transition". Today, we must make this ambition truer than ever.

In 2019, our President defended a 55% emissions reduction target by 2030, at the opening of the General Assembly of the UN. He played for sure a pioneering role.

Thus, during our presidency of the Council of the European Union, which starts next January, our priority will naturally be to accelerate our common action against climate change. All the texts of the 'Fit for 55' package will be discussed in the year to come. France will do its best to push forward these complex proposals and to create the right momentum for the negotiations.

*Some priority issues to keep in mind*

Like our Climate and Resilience Bill, the 'Fit for 55' package is by design cross-sectoral: we need to negotiate quickly (2030 is not so far) but also with coherence and method.

France will help to strengthen the current EU ETS, in order to consolidate the price signal for carbon. We also have to better integrate the large potential of the forests and lands as carbon sinks.

France will work to accelerate the deployment of low-emission vehicles and to help end gradually the sale of new internal combustion vehicles. This will help develop alternative, non-polluting modes of transport.

As such, France puts at the heart of its priorities the necessity of enabling a low-carbon economy that is both sustainable and fair. In this respect, we will be vigilant to ensure that the efforts required are bearable, that several forms of support will be provided to households, so that the transition to a greener economy will be seen for what it is - an opportunity for our well-being, not a threat.

France will also push forward the long-awaited creation of a border carbon adjustment mechanism. I truly think that this mechanism is one of the keys to limiting the risk of carbon leakage, to consolidating the decarbonization of the industry; moreover, it clearly helps to evaluate the real carbon footprint of the Europeans.

Another important issue we wish to address during the French Presidency is the protection of biodiversity, both terrestrial and marine. I would like us to make clear progress in discussions with our European partners on binding targets for 2030 to restore biodiversity.

Last but not least, I would also like the EU to give strong signals to take concrete measures and actions to fight against imported deforestation, which is a major and long-standing concern for France. On this topic, France has some solid expertise: our "Stratégie nationale de lutte contre la déforestation importée" was adopted in 2018 and was the first of its kind: our experience should facilitate discussions in Brussels.

This is how we will accelerate in the road to Net Zero. And I am really impatient to negotiate, and to act together with my European partners.

**ANDREJ VIZJAK**

*Slovenija Minister of Environment  
and Spatial Planning*

# Making the Most of Slovenia's EU Council Presidency to Accelerate the Green Transition

The beginning of this year's second semester – the semester of Slovenia's EU Council Presidency – was marked by two publications: the package of the European Commission's legislative proposals »Fit for 55« and IPCC's 6<sup>th</sup> Assessment Report by the Working Group I. If dire forecasts in the report are too abstract, the extreme weather events – not in some distant parts of the world, but in the heart of Europe, such as flooding in Germany, Belgium, Romania and elsewhere as well as wildfires in Greece just this summer – should be palpable enough to see that action is needed now.

But what action? On the international scene, virtual June Session made some progress on the road to COP26, but still only modest one as regards to crucial issues of Art. 6 of the Paris Agreement, finance and common timeframes. Much more daringly, building on the European Green Deal, the Commission's Fit for 55 proposals thoroughly revise existing energy and climate framework with an aim of economy-wide domestic greenhouse gas emissions reduction by at least 55% by 2030 (compared to 1990 levels). The 55 % reduction target is enshrined in the European Climate Law and is thus legally binding. The status of 2030 and 2050 targets as a legally binding norm is in itself an important milestone carrying fundamental European environmental principles. This is where the "Fit for 55" comes in with its detailed measures to implement these climate targets and this is where the hard work actually starts.

Slovenia is currently holding the presidency of the Council of the EU in the short second semester, in which the "Fit for 55" was published and in which COP26 will take place in Glasgow. This of course would pose a significant burden for any Member State, not just a smaller one like Slovenia. Having said that, Slovenian Presidency is in a unique position to make use of the new legal landscape provided by European Climate Law, as well

as the momentum of the post-pandemic recovery.

Fit for 55 package is a comprehensive and complex set of proposals encompassing all sectors and all Member States. It's an evolution of the existing climate framework, strengthening of existing policies and the careful addition of new ones. Our discussions in the Council will be framed by the principles agreed by the European Council in December 2020, and reaffirmed in May 2021. The close interlinkages between the individual legislative proposals have to take these principles into account if they are to deliver on the higher greenhouse gas emission reduction ambition.

Environment ministers have already started the discussions on Fit for 55 proposals in considerable detail at the Informal ministerial meeting in Brdo pri Kranju in July. Informally discussing proposals in the competence of ENVI Council, the ministers highlighted that the ETS remains the cornerstone of the EU climate policy. As regards to the proposed expansion of emission trading to buildings and road transport many of them stressed the importance of avoiding energy and mobility poverty. A crucial role here will be played by the new Social Climate Fund. As regards to the proposal for the revision of the Effort Sharing Regulation, the ambitious new national targets were underlined as well as significant efforts needed in order to reach them. It was also stressed that "Fit for 55" is not just environmental but is also an industrial vision for the future.

Within the informal debate on the COP 26 ministers underlined that 2021 is a crucial year to keep 1.5 degrees within reach. Delegations stressed the importance of updated National Determined Contributions (NDCs) and Long-Term Climate Strategies. Unfortunately, several major world economies still have not updated their NDCs in a meaningful way. Another element that needs to

be successfully resolved in Glasgow is the completion of the Paris Rulebook (Article 6) and strengthening transparency.

Reaching climate neutrality is a long-term challenge and it is EU's vision that this must be done together with an economic transformation that is fair and swift. Our goal is to reach a balanced agreement that will lead to the achievement of the agreed climate goals while dividing the burden fairly and cost-efficiently. This means that all Member States and all economic sectors should contribute to the achievement of the goal in a commensurate way. At the same time, we must maintain the competitiveness of our economies and ensure that no household will be left behind in the green transition. Furthermore, we need to reflect on the question of whether and if at all the landscape of EU's climate governance is sufficiently effective for implementing the long-term 2050 objective.

Finally, it cannot be stressed enough that the precondition of green transformation is a lasting recovery in all sectors of the economy and public life. To mitigate the socio-economic consequences of the COVID-19 pandemic, one of the priorities of the Slovenian Presidency is the effective implementation of the Next Generation EU instrument and the Recovery and Resilience Facility. It is our wish to make the most of the implementation of these two instruments to accelerate the green and digital transition, which will create jobs, strengthen the resilience of our societies and ensure the health of our environment.

A complex negotiation process lies ahead of us in the coming months both within the Council and at the COP 26. A process in which we must ensure the groundwork for just, balanced and fair transition for all, both in the EU and in the world.





KADRI SIMSON

*European Commissioner for Energy*

# Driving Europe's energy transition via policy

Ten days after taking office in December 2019, the new Von der Leyen Commission announced the European Green Deal – raising our ambition to become climate neutral by 2050. At that time the initiative was seen as a bold proposal. Now, nearly two years later, this ambition of achieving "net zero" by mid-century – and the step of reducing greenhouse gas emissions by 55% by the end of this decade – is already written into EU Law. The question is no longer **if** we should set such a bold target, but **how** we can achieve it. This summer we presented one of the biggest policy packages in Commission history aimed to deliver the European Green Deal.

The Commission presented more than a dozen concrete legislative proposals to translate our climate goals into action. Getting to net zero is only feasible through a fundamental transformation of our entire society, so we must use all the tools at our disposal and make sure they complement and reinforce each other.

We have put the price on carbon and we propose to extend this proven system to new sectors that are lagging behind: aviation, shipping, road transport and buildings. We will set new and higher targets to push for change – be it in agriculture or industry. We will apply stricter standards, for example for cars and vans. And we will make it easier to be green and less rewarding to use fossil fuels, through taxation and other policy measures.

While this is a multi-faceted package of proposals covering many policy areas, energy remains at the heart of our climate ambition. Three-quarters of EU's emissions come from producing and using energy, so without a green energy transition, there will be no net zero.

On paper, the task can be summarised in one sentence: **we must use less energy and what we do use, should largely be from renewable sources**. This is, of course, much

easier said than done. Energy systems are complex and costly and resistant to change. Infrastructure projects take notoriously long to complete and in some sectors, green solutions are not yet available. Therefore, we need to create the conditions where the changes that we need can happen and happen fast.

The legislative package we published in July contains two dedicated energy instruments: the updated **renewable energy directive** and the **energy efficiency directive**, the core tools of EU energy policy. In the light of our new climate goals, we have to be considerably more ambitious than before. The progress we make in the coming decade will be crucial. We need 40% of renewables in our energy mix by 2030, not 32% as is the current target. And in terms of energy efficiency, we need to save 9% more energy than we would under the existing directive.

When it comes to renewables, the revolution has been in the air for quite some time. In Europe, we are already on course to beat our current 2030 renewables target by a comfortable margin. In many places, renewable energy is now the cheapest option to generate electricity and over the last seven years, more renewable power has been added to the global grid than fossil and nuclear energy combined.

European industry is a global leader in this sector, particularly in offshore wind, thanks to pioneering efforts in the last three decades. So while the necessary roll out will be a huge challenge, it also presents a huge opportunity for our economies to take advantage of our favourable position.

While energy efficiency goals have been more challenging to achieve so far, the pressure on energy prices has made the need to save more relevant than ever. Energy efficiency is the only long-term solution to energy poverty and using less energy will

have a welcome effect on the energy bills of every person and business.

I am fully aware that updating two directives is not enough to transform the European energy system – although the changes we propose go much deeper than just increasing the targets. Much of the necessary work was already done last year with our strategies for energy system integration, hydrogen, the renovation wave and offshore renewable energy. We also proposed new rules for the trans-European energy networks, putting the focus firmly on green energy and grids.

But the work is of course not done, and there are several important initiatives still to come this year, focusing on some key sectors.

Buildings consume around 40% of energy in the EU and we have set ourselves a goal to reduce buildings' energy-related emissions by 60% compared to 2015. To contribute to this, we will, by the end of the year, review the Energy Performance of Buildings Directive.

In the same timeframe, the Commission will present proposals to decarbonise the EU gas market, including measures to boost clean hydrogen. While natural gas has a role to play in the transition to phase out more polluting fuels like coal and lignite, it is clear that by 2050, it has to be largely replaced by clean gases like renewable hydrogen or biomethane.

Finally, we will tackle the emissions of the most potent and second-most important greenhouse gas – methane. This is also an important priority for our global energy policy, as most of the venting and flaring takes place outside Europe. And action here is especially urgent as methane is particularly dangerous in the short term.

**FATIH BIROL**

*Executive Director,  
International Energy Agency*

# The Outlook for the Global Clean Energy Transition

If goodwill and rhetoric were all that counted, we would already be well on our way to reaching net zero emissions by mid-century. Over 120 countries, including many of the world's major economies, have stated intentions to reach this goal. And the COP26 Climate Change Conference in Glasgow provides an excellent opportunity for nations to confirm their existing engagements and commit to even more ambitious targets.

This is all encouraging – but the pledges need to be backed up by strong, credible policies and long-term plans to make them a reality. When we look at current emissions trends, we are still well off track from a path that would enable us to reach the targets that these governments have set.

First, let me map out what a net zero energy world could look like. According to the International Energy Agency's recent Roadmap to Net Zero by 2050 – which sets out a narrow but still possible path to limiting the most catastrophic effects of climate change – global energy demand would be around 8% smaller than today, but would serve an economy more than twice as big and a population with 2 billion more people. Almost 90% of electricity generation would come from renewable sources, and most of the remainder from nuclear power. Solar would be the world's single largest source of total energy supply. Fossil fuels would fall from almost four-fifths of total energy supply today to slightly over one-fifth. After 2035, there would be no more sales of new internal combustion engine passenger cars as electric vehicles would dominate the market. Buildings would be far more energy efficient and rely on electricity rather than gas boilers for heating. Emissions from heavy industries would be slashed by innovative technologies such as hydrogen and carbon capture.

That is where we need to get to – and it's still possible if we dedicate all our efforts to it starting right now. And thankfully, there are plenty of encouraging signs. In 2020, even as economies sank under the weight of Covid-19 lockdowns, renewable sources of energy such as wind and solar grew at their fastest rate in two decades. Even as global car sales plunged, electric vehicles set new records.

But the scale of the challenge means that even with these impressive areas of growth, overall emissions are rebounding along with the global economy. Renewables are expected to be able to satisfy only about half the expected increase in electricity demand this year and next. Electricity generated from fossil fuels is set to account for most of the rest of the growth. Electric vehicles meanwhile still represent just a small sliver of the automobiles on the road worldwide, which are still overwhelmingly powered by fossil fuels. And global improvements in energy efficiency remain much too slow to meet climate goals, despite notable efforts in some economies to channel economic recovery spending into improving the efficiency of buildings, appliances and vehicles.

To accelerate progress in renewables, EVs and energy efficiency, we need strong policies to mobilise and channel investment into the massive deployment of all available clean and efficient energy technologies. According to the IEA's pathway to net zero by 2050, annual energy investment needs to reach \$5 trillion by 2030, up from a projected \$1.9 trillion this year. Policy makers need to quickly but carefully shift energy demand towards clean technologies and away from fossil fuels, doing so in a way that minimises the risk of supply disruptions and price volatility. And they must give a major push to accelerate clean energy innovation so that the technologies we need to take us all the way to net zero in

the coming decades are ready to be deployed at scale in time.

Of the unprecedented sums that governments have mobilised to offset the impact of the pandemic, we estimate that barely 2% has so far gone to sustainable energy investments. And the destination of this financing remains lopsided. Emerging and developing economies currently account for two-thirds of the world's population but only one-fifth of investment in clean energy. This is a huge missed opportunity, since IEA analysis shows that avoiding one tonne of CO<sub>2</sub> emissions in emerging and developing economies costs on average about half as much as it does in advanced economies. Wealthier countries, which have generally contributed far more to the accumulated greenhouse gas emissions in the atmosphere, also have a moral duty to do their utmost to support efforts by poorer countries to build clean energy systems while still developing their economies and expanding access to energy to those citizens who still lack it.

We have to remember that energy transitions are not just about technology and finance. Above all, they are about people and communities, and they will fail if they don't have public support. In the IEA's Net Zero Roadmap, millions more jobs are created in clean energy and related sectors than are lost in fossil fuel industries. But the changes will nonetheless make the workers and communities who rely on fossil fuel industries extremely vulnerable – and the new jobs won't automatically appear in the same places where the old ones are being lost. That is why it is essential that clean energy transitions put people first – and that governments design policies to maximise the benefits for citizens and to help those who are negatively affected. This requires well-planned cooperation and dialogue among different levels



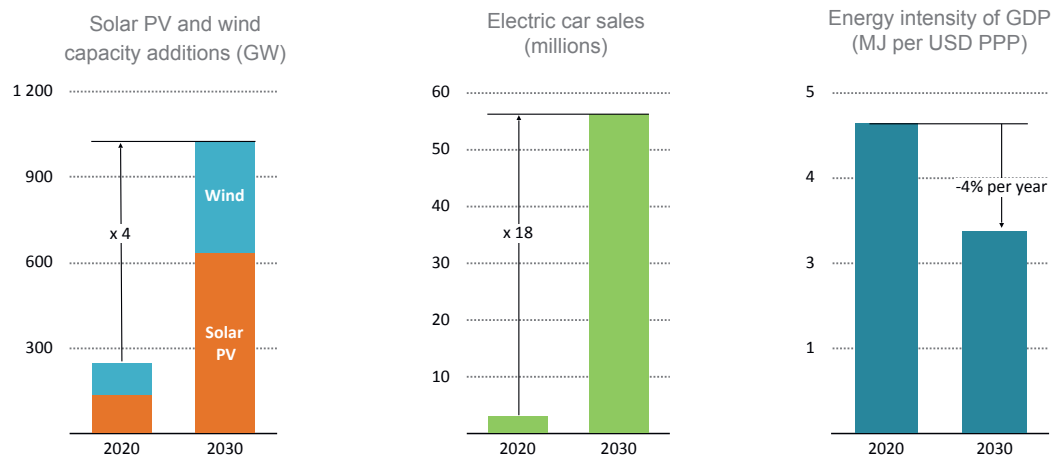
of government, businesses, labour representatives and other stakeholders. The Global Commission on People-Centred Clean Energy Transitions, a group of government leaders and prominent thinkers I convened earlier this year, will provide key recommendations on

these issues in late October, just ahead of the start of COP26.

The participation of all parts of society are essential for a successful energy transition that can build a cleaner, more prosperous

future and prevent the worst effects of climate change. Right now, we are not on track – but it is still within our powers to get there.

## Make the 2020s the decade of massive clean energy expansion

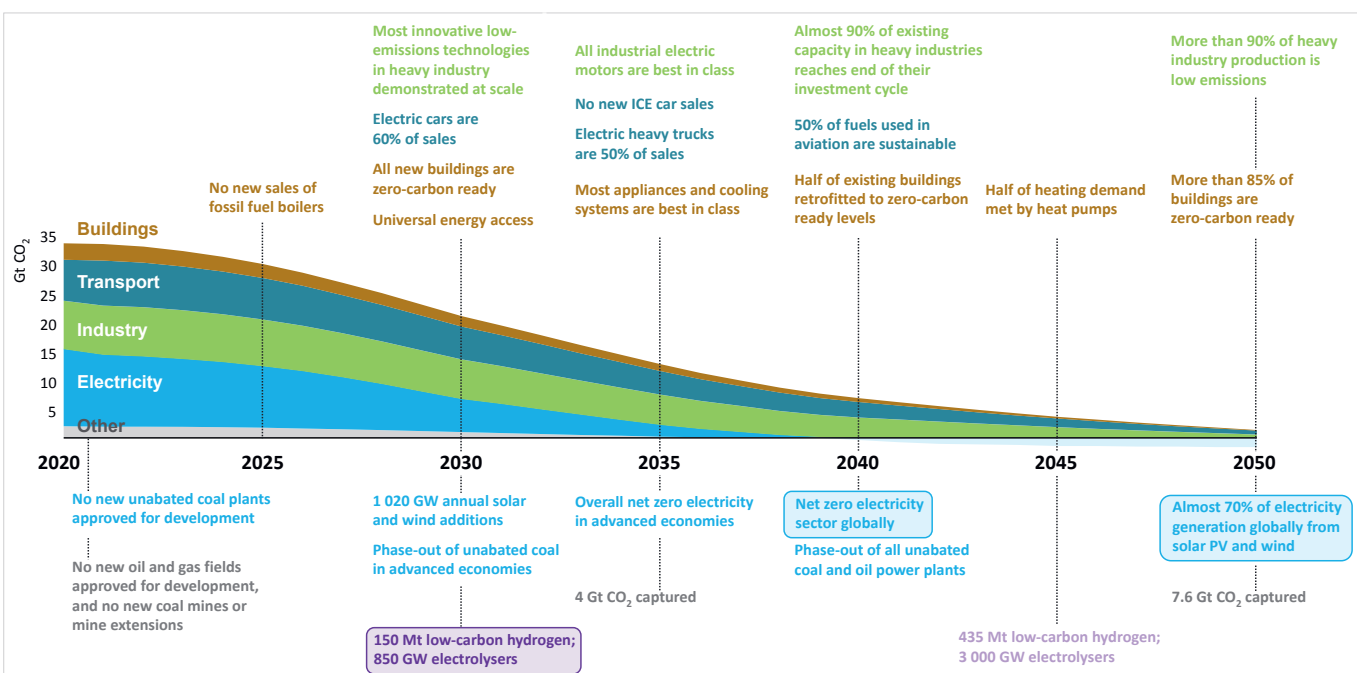


**Technologies for achieving the necessary deep cuts in global emissions by 2030 exist, but staying on the narrow path to net-zero requires their immediate and massive deployment.**

IEA 2021. All rights reserved.

1

## Set near-term milestones to get on track for long-term targets



IEA 2021. All rights reserved.

4



PATRICK POUYANNÉ

Chairman and CEO of TotalEnergies

# Meeting the sustainable energy need of a growing global population

In May 2021, our Company, Total, became TotalEnergies, with a clear commitment to transform itself into a broad energy company during the decade 2020-2030 in order to reach our ambition to get to Net Zero by 2050 together with society by supplying to our customers a new mix of low carbon energies. The change in name reflects a major turning point in the history of the Company and the new ambition and strategy have been overwhelmingly approved by 92% of our stakeholders during our last General Assembly.

A profound desire within our society and a sense of urgency regularly called for by climate experts, as the recent IPCC report again illustrated last summer, triggered this decisive move. Our ambition is to meet the needs of a growing population – nearly 10 billion inhabitants in 2050 – in an increasingly sustainable way. After having ranked among the five major private companies in Oil and Gas, this means we must heavily invest in not two but seven energies including electricity, hydrogen, biomass, wind and solar energies, with the aim of being among the top 5 Renewable energy providers worldwide by 2030.

This strategy, in line with the 2050 Net Zero Emissions goal endorsed by more and more countries around the world, relies on systematic decarbonization of our production and decisive increase of our investments in low carbon and renewable energies. These energies will be the only ones benefiting from an increase in our investments in the decade to come. This year our investments in renewable energies and power alone represent up to 3 billion dollars.

By 2030 massive changes will therefore already be on the way in the sales mix of our

Company: petroleum products, from 55% in 2020, will be down to 30%, gas and green gas will increase and account for 50%, electricity, mostly renewable, for 15%, and other energies – biofuels, biogas, hydrogen – 5%.

As an illustration of this ambition, in electricity our renewable capacity will grow from 8GW in 2021 to 35 GW by 2025 and 100 GW by 2030. This represents the financing of an investment of more than 60 billion dollars in renewable projects within ten years.

Our challenge will be to provide *more energy with less emissions*, when the energy sector is globally responsible for around two thirds of greenhouse gas emissions, in an *always more sustainable* manner. Because energy and climate challenges are not separable from sustainability challenges such as poverty, environmental degradation, biodiversity, water or ethics.

For a Company which has a global footprint like ours, achieving these goals together with society requires to adapt our strategy, while maintaining everywhere our *raison d'être* to supply as many people as possible with a more affordable, increasingly available and cleaner energy.

In the European Union, which is responsible for 8% only of CO<sub>2</sub> emissions on our planet, the focus is and will be on decarbonization. With deep roots in Europe – which accounts today for roughly 60% of our sales –, TotalEnergies is proud to be part of the deep movement of reinvention of energy in which the European Union has decided to play a leading role.

In emerging markets, we must first fulfill the needs for access to energy in a world where close to 1 billion people today have no electricity and where the thirst for economic and social development is enormous and

justified. In these areas which are responsible for an important share of global green gas emissions, substituting coal with gas has started and must be encouraged as an obvious quick win.

Decarbonization is not enough. Across the world, sustainability will be at the core of TotalEnergies strategy as we believe it to be key for success. We must take into account the necessity of a just transition in the transformation of the energy supply. For our Company, supplying energy in this context will therefore go hand in hand with contributing to improving living standards and we believe it is crucial to act particularly in four areas stemming from the UN Sustainability development goals : transforming the energy model; being a leader in the well-being of people through responsible working practices, ensuring people health and safety, and ensuring human rights; being determined to be exemplary in terms of environment management and in the use of the planet's natural resources; and creating value for society and shared prosperity across regions.

To combat climate change, the European Union, through the Green Deal and its law on climate, has decided to position itself at the forefront of Net Zero emissions ambitions. So does TotalEnergies in Europe. For the next decade the Company's target is to decrease its direct and indirect greenhouse gas emissions (Scope 1+2+3) by 30% by 2030 compared to 2015. To that end we must and will reduce the emissions from our own operations. But, as 90% of our emissions are indirect and stem from the activity of our customers (Scope 3), it requires also considerable changes and investments to broaden the choices we offer to our customers.

For that purpose, we invest in new mobility especially by developing and operating



Electric vehicles charge points networks as we will do in Paris, Amsterdam, Antwerp, Brussels, London, Rotterdam, but also Singapore. With the support of the EU Commission and of the various Governments, TotalEnergies has created, together with French and German car manufacturers, the Automotive Cell Company in order to develop and produce Europe's own electric batteries for future EVs; and we are on the way to build charging hubs along highways and around cities, which will be crucial for a credible development of EVs markets across Europe. To achieve our goals in decarbonizing fuels and in the production of biofuel for aviation or of bioplastics, or in the recycling of plastics, we invest heavily (between 300 and 500 M€ for each site), in the conversion of some of our refineries into zero petrol platforms as we do in the south of France or nearby Paris. In the field of green biogas, TotalEnergies recently became the leader in France, through the acquisition of Fonroche. Our ambition is also to become a leader in the mass production of clean hydrogen both through investments in blue hydrogen - stemming from reforming natural gas - and also mainly green hydrogen projects -stemming from splitting water with electrolysis with renewable power capacities. And we do believe Carbon capture and storage will be necessary to achieve our goals for decarbonization and that of our customers; this is why we are part of the Northern light

project, in Norway, alongside other European companies, which is the first large scale commercial project in Europe.

In this context we welcome the Fit for 55 package presented last July by the European Commission. It aims to reduce European emissions by 55% by 2030, versus 1990, on the way to Net Zero in 2050. This package is sending strong signals to all actors in Europe: putting a price of carbon by strengthening and extending the ETS, increasing the level of common goals in the field of renewables, adopting an ambitious goal for vehicles as soon as 2035, introducing a carbon border adjustment mechanism in some particularly vulnerable industrial sectors in order to avoid counterproductive effects of European CO<sub>2</sub> emissions standards in the international competition, in particular for energy intensive industries but also for electricity.

This package offers real opportunities for the European economy to be transformed in a sustainable and inclusive manner. As discussions are starting within the European Union on this basis, it is also important to bear in mind that the implications are global for our industry.

The climate challenge is universal, transition will not happen overnight but needs time to adjust and the challenges are huge for other parts of the world, especially China,

India, and emerging economies without which Net Zero targets necessary to slow down climate change cannot be achieved.

European legislation should keep defining dynamic approaches of the transformation and avoid logics of exclusion as we have to look worldwide for the best technological solutions suited to the variety of situations.

Natural gas can and will play a key role in this transition as it represents a way forward for these economies, with considerable impact on the reduction of emissions through the switch from coal, the development of green gas, and the fight against methane emissions. TotalEnergies ambition in this field is to rank among the top three companies worldwide supplying low-carbon liquid natural gas.

We collectively have a huge and urgent challenge ahead. The key to achieve success in this crucial transition is the collaboration of all, producers, governments, decision-makers, financial and research community, and consumers. TotalEnergies is transforming itself massively and is determined to play its part alongside its peers, and the European Institutions, to fully contribute to the success of the Green Deal and more broadly to a sustainable energy transition.



**CRISTIAN BUSOI**

*MEP (EPP Group, Romania), Chair of the ITRE Committee, European Parliament*

# Accelerating the Energy Transition to Achieve Climate Neutrality

Climate change is the most pressing challenge we are facing, it resulted in a wide range of impacts across the world, it is changing faster our society, and furthermore its impact is expected to grow in the coming decades. In securing our lead in tackling climate change, we need to work towards climate innovation remaining competitive and assuring growth.

The 55% emissions reduction target for 2030 and the climate neutrality target for 2050 have already been fixed. Foremost, the Fit for 55 Package will pave the road to reach this targets. The Commission is very ambitious indeed within the framework of the first part of Fit for 55 Package; but the reality is far from being ready for this transformation, consequently, we, in the European Parliament need to find the proper balance in this debate.

Reaching climate-neutrality by 2050 means undertaking an enormous challenge, which requires a far-reaching transformation of our economies and societies, not only of our energy sector or industrial one.

Moreover, making the necessary changes in the energy sector in order to achieve these targets, it is a challenging task, in particular, for those MS that are still highly dependent on fossil fuels. These structural changes needed in the energy sector will have important social and economic consequences.

We need to ensure consistency across policies, streamline our climate ambitions, with a feasible transition, leaving no region behind, with no industrial sector being barged, ensuring further the resilience both in the energy and industrial sector, and in particular of the energy system, ensuring the security of energy supply, aiming at energy autonomy in the Union, while keeping affordable costs for the end-users. We must understand that in the end, in our fight for ideologies and dogmas the low-income families, middle-class homeowners and car-owners

in rural areas without public transport, or the ones leaving in coal-dependent regions will be the ones paying the highest bill.

In terms of concrete potential for regions that are still dependent on coal, for accelerating the energy transition, gas remains largely accepted as a viable solution to make the transition feasible, and paving the future we need to focus on a more circular energy system with an increased use of renewables and decarbonised fuels including hydrogen. It is also paramount to make the transition possible for all regions!

In the Industry, Research and Energy Committee, that I am leading as a Chair we are of course very much interested in accelerating the energy transition, especially throughout the Fit for 55 Package, as our competences on energy, industrial policies, new technologies and innovation, and the competence on climate policy are very much interlinked.

In securing our lead in tackling climate change and accelerating the energy transition, we need also to work towards climate innovation and digitization, remaining competitive and assuring growth, in all our industrial sectors, and in particular in the heavy ones. The competitiveness of the European industry, especially of the heavy energy consuming one, securing jobs and creating new jobs, is not an option; it needs to be ensured.

We need to back the green transition that we are all expecting to happen with a consistent and horizontal energy policy. It is also imperative that we see environmental policies and the ones in the field of energy reinforcing each other and not as one subservient to the other.

The energy transition comes with its challenges on one hand, but on the other hand we need to also see its benefits. It will create significant investment opportunities, will help Member States restore their economies while

deepening their energy transition, and at the same time creating jobs, it will provide certainty to investors and for sure it will accelerate the much needed economic recovery.

I see that along the process, this acceleration needs to secure our citizens access to affordable clean energy, while ensuring the security of a less dependent supply. For this, we need to accelerate the transition towards a more integrated and decarbonised energy system in EU, by boosting energy efficiency and renewable energy uptake, in order to reduce the total of energy our industries need, their production costs. Meeting the increased production that is expected due to numerous factors (households needs, rising electrification, electric mobility) will require not only enhanced generation of renewable energy, but also consolidated public and private investments in infrastructure, either new one, either in transforming the existing infrastructure across the Member States, building storage capacities, and last, but not least a developed and competitive renewables market. It will also require investing in developing new technologies, investing in building new engineering skills for professionals in the field or reskilling professionals in the field.

As Chair of the ITRE Committee, my long-term commitment is to achieving the ambitious targets on climate policies with a coherent industrial policy, with a just and inclusive transition and maintaining the security of energy supply in the Union.

The challenge of transitioning to a cleaner future ahead of us, was already enormous without the burden of the urgency to react and act. Therefore, accelerating the energy transition is a challenge, but can be realised efficiently and effectively - if we find the right mix of legislative framework combined with an appropriate investment framework under the Fit for 55 Package.



**PHILIPPE DONNET**

*Group CEO Assicurazioni Generali S.p.A.*

# Insurers: A force for sustainable change

The climate crisis is more tangible and urgent than ever. The last decade was the warmest one ever, and 2019 was the second warmest year on record, with greenhouse gases in the atmosphere rising to new highs. This summer, a number of severe natural catastrophes erupted across Europe and beyond, taking heavy tolls on entire cities and regions. In addition, the IPCC report of August 2021 highlighted that global temperatures are seen rising between 1.5°C and 2.0°C during the 21st century if we do not succeed in reducing carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions in the upcoming years.

It is in this context that the European Union adopted one of the most ambitious and all-encompassing policy action plans to reach climate neutrality by 2050, with robust, targeted measures to re-channel investments in a sustainable economy at environmental, social and governance levels.

This calls for all players in the financial system to join forces and act quickly against climate change, and insurers like Generali are perfectly positioned to make a significant contribution. In this respect, in order for us to fully grasp the various environmental, social and governance (ESG) risks we are facing, it is crucial that our industry, both as risk-takers and investors, has access to measurable, assurable, high-quality ESG-related data. We applaud the EU's leadership in taking the initiative in the sustainability reporting discussions, including on the concept of "double-materiality"; we also call upon political leaders to achieve a truly globally harmonized reporting standard, given the true global relevance of sustainability issues. This will allow genuine comparability and prevent market fragmentation.

Both from an investment and risk-management perspective, Generali has been

taking a central role in driving this change, consistently with our will to create sustainable long-term value for our all stakeholders and to improve our society as a whole.

In 2021, as part of our updated strategy for climate protection, we set the target of €8.5-€9.5 billion new green and sustainable investments by 2025, with year-end 2020 as the baseline. This is in line with the previous target of €4.5 billion between 2019 and 2021, which we achieved one year ahead of schedule. Generali will no longer underwrite risks associated with the exploration and production of unconventional fossil fuels from tar sands. We are also accompanying the gradual decarbonization of our direct investment and insurance portfolio to reach carbon neutrality by 2050. This commitment is consistent with the Paris Agreement's goal to limit the global warming to 1.5°C above pre-industrial levels.

As insurers, we know the price of risk, and more specifically the price of climate-change related risks. Recently, we have established a competence center to develop and share the best practices for underwriting the specific risks in the renewable energy sector. We have also taken action in regard to coal to stop coverage while working for a just transition.

Achieving these targets and embracing sustainability at all levels requires time and effort. There are economic and social costs that come with it; there are companies that will no longer exist and specialized workers that will be forced to seek new employment. At Generali, we try to reconcile these objectives with their potential social impact by engaging with our stakeholders and actively supporting their evolution towards more sustainable methods, in the context of a 'Just Transition'. To this end, by 2025 the Group will engage with at least twenty carbon intensive companies in our investment portfolio to drive real change.

We are also joining forces with our peers who share our same drive and commitment. In July 2021 at the G20 Finance Meeting in Venice, a city that is close to Generali's heart and that exemplifies resilience to climate change, I had the honor of launching the UN-convened Net-Zero Insurance Alliance (NZIA)<sup>1</sup>. This initiative, which brings together eight of the world's leading insurers and reinsurers, follows the UN-convened Net-Zero Asset Owner Alliance (NZAOA), launched in 2019. The founding members of the NZIA committed to individually transitioning their underwriting portfolios to net-zero GHG emissions by 2050, consistent with a maximum temperature rise of 1.5°C above pre-industrial levels by 2100. Each company will also individually set science-based intermediate targets every five years and independently report on their progress publicly and annually to contribute to achieving the goals of the Paris Climate Agreement.

The European policy agenda has put sustainability risks at the top of the list of priorities. We are witnessing a tangible push, both from the public and private sectors, to reduce our impact on climate change. Yet we cannot sit back. We must take action now, and by working together we will be able to better understand and consequently overcome, in the words of Mark Carney, the "tragedy of the horizon" for a sustainability-centric economy and society.

<sup>1</sup> <https://www.unepfi.org/psi/wp-content/uploads/2021/07/NZIA-Commitment.pdf>





**AMBROISE FAYOLLE**

*Vice-President of the  
European Investment Bank*

# Access to finance facilitating support for the Green Deal

**T**he [European Green Deal](#) involves nothing less than a radical transformation of the economy and will require fundamental changes in many sectors including energy, transport, building design, and agriculture. Success will also depend heavily on scientific and technical innovation. All this requires huge investment. We estimate that Europe needs about €350 billion of extra investment annually to achieve our 2030 emissions target.

Periods of great change are also periods of great opportunity. Innovators who can devise solutions to our most pressing problems could grow into the great corporate champions of the new economy. The recovery from the COVID-19 pandemic also provides a unique opportunity to transform our economies and place them firmly on a path to low-carbon and climate-resilient development.

Around the world, investment in the energy transition is booming. According to BloombergNEF, global investment in decarbonisation technologies across all sectors reached \$500 billion last year, twice as much as in 2010. Clearly, more and more companies are sensing the opportunity and investing accordingly. But still more investment is needed. Here's how to get the money flowing.

## Tackling barriers to investment

[The EIB Investment Survey](#) shows that, although the proportion of companies investing to address climate change is significantly higher in the European Union than in the United States, EU firms consistently report higher barriers to climate investment than their US counterparts. Why? The reasons most cited by EU firms are uncertainty over regulations and taxation and the lack or unavailability of the appropriate skills and capacity on the labour market.

**The public sector can help to lower these barriers.** This July, the European Commission put forward a new sustainable

finance strategy to make the EU's financial system more sustainable and inclusive. Its principal aim is to help improve the flow of money towards financing the transition to a sustainable economy. By enabling investors to re-orient investments towards more sustainable technologies and businesses, the measures included in the strategy, notably to enhance transparency, accountability, and risk management and disclosure practices, will be instrumental in reaching the EU's climate and environmental targets.

methodology for climate action and environmental sustainability finance with the framework defined by the EU Taxonomy Regulation, as this develops over time. To further integrate climate change, environmental and social considerations into our financing activities, we will enhance and develop additional risk management tools to assess physical, transition and systemic risks at project, portfolio and counterparty levels. The EIB Group will also seek to generate the data necessary to track progress in meeting its



As the EU's climate bank, the European Investment Bank is active in supporting the emergence of a global sustainable finance sector through its active participation as a Member of the EU Sustainable Finance Platform and its involvement as an observer/partner in several forums, including the International Platform on Sustainable Finance and the Network on Greening the Financial System. Notably, we will align our tracking

commitments through further development of climate and environment impact measurement and reporting systems, including to allow for reporting on the climate impact of intermediated financing.

In addition, the European Investment Bank is committed to energising investment in the priorities identified by the European Green Deal. By 2025, 50% of our annual lending volume will be devoted to climate action and

environmental sustainability, up from 40% in 2020. By the end of the decade, we aim to support at least €1 trillion of investment in these priorities.

Our approach is set out in detail in our [Climate Bank Roadmap](#), which we published last year and which aims at mainstreaming climate action and environmental sustainability into everything we do. In broad terms, we aim to maximise our impact by building on our strengths in certain sectors; targeting specific investment gaps that we have identified; reassessing our risk appetite and capacity; and stepping up our advisory services.

The European Investment Bank has a strong track record in supporting large investments in low-carbon transport and in the decarbonisation of power generation. Projects in these areas typically require large volumes of long-term, low-cost capital, things in which the European Investment Bank enjoys a comparative advantage. Target-based financing, where loan repayment terms are linked to the attainment of measurable targets such as a reduction in CO<sub>2</sub> emissions, as in our recent deal with [Enel](#), is a new tool with potential.

To address strategic investment gaps in areas such as battery supply chains, new renewable energy technologies or carbon capture and storage, for example, the European Investment Bank will consider the potential for new financing products, as well as increasing its volume of higher-risk, capital-intensive funding. By doing so, we can support the development of promising early-stage technologies and catalyse additional funding from other sources.

Blended financing structures, in combination with public grants, are another powerful tool to attract private capital with which the European Investment Bank has had great success. The European Fund for Strategic Investments (EFSI), which ran between 2015 and 2020, exceeded its target of mobilizing €500 billion in investment. It also enabled the European Investment Bank to expand its activity to more risky – but also more innovative – portfolios by as much as 30%. EFSI's successor, the [InvestEU Fund](#), will work in much the same way, with the European Investment Bank managing 75% of its €26.2 billion guarantee from the EU budget.

Increasing our investment in equity funds and our use of innovation finance tools and venture debt are other ways in which we can help new companies and early stage technologies to make the leap from demonstration to commercialization.

The EIB Group's **advisory services** also have an important role to play in addressing uncertainty as a barrier to investment. Through JASPERS (Joint Assistance to Support

Projects in European Regions), for example, the European Investment Bank provides independent expert advice and capacity building support to public authorities and final beneficiaries on how to plan, develop and implement high quality large investment projects to be co-financed by European funds, as well as programmes and sector strategies that deliver EU policy objectives. And through URBIS, a dedicated urban investment advisory platform, we provide advisory support to urban authorities to facilitate, accelerate and unlock urban investment projects, programmes and platforms.

Advisory services at the project preparation stage can also help to improve the positive impact of projects on climate and the environment and, along with venture or equity-type financing, promote innovation by helping young, innovative companies to develop. For example, through InnovFin advisory, we help research and innovation projects and innovative companies secure the finance needed to reach their potential. The European Investment Bank's current [advisory portfolio](#) includes nearly 1 000 assignments spanning everything from sustainable transport, energy efficient housing and floating windfarms.

Another key objective of our advisory services that we wish to strengthen is market development. By targeting key sectors and identifying their specific investment needs and gaps, the EIB Group can help to channel financing towards technologies and projects that make a real difference.

### Green bonds

The green bond market has the potential to mobilise and direct significant private capital to investments in climate and environmental sustainability. The European Investment Bank pioneered these instruments in 2007 and has worked to develop the market since, issuing more than €33 billion in [Climate Awareness Bonds to date](#). Adhering to the EU Taxonomy for sustainable activities, our green loans are expanding the range of activities eligible for funding with green bonds beyond the energy sector. We are also developing new green bond products that could be used by clients as a substitute for loans. This would extend our existing bond purchasing initiatives and allow us to help develop the market as a buyer, as well as an issuer.

### More than just a transition—a just transition

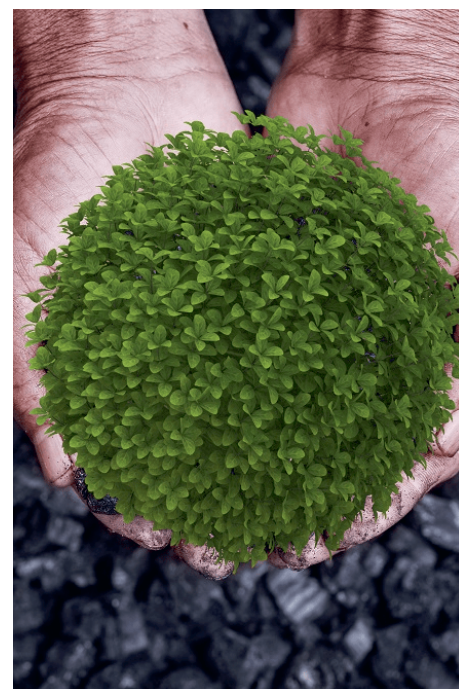
The radical restructuring of our economy to achieve carbon neutrality will create many opportunities and bring many additional benefits, such as lower air pollution and greater energy security. However, businesses, regions and workers reliant

on CO<sub>2</sub>-emitting activities will face hardship, as these are sacrificed in the name of the common good. It is vital and just that we should create new careers and new opportunities for these people, businesses and regions.

It is also important to recognise that a just transition must involve a number of different areas including a shift to new sources of energy; environmental rehabilitation (e.g. the decontamination of mines); a socioeconomic transition (attracting new industries, creating new jobs, training and reskilling); and an infrastructure transition (e.g. boosting physical, network and digital connectivity).

A just transition is a core component of the European Green Deal. Given our historic and statutory mission of fostering cohesion, the European Investment Bank will play an important role here, too, through the Public Sector Loan Facility. Part of the Green Deal's [Just Transition Mechanism](#), the Public Sector Loan Facility targets public entities, enhancing the affordability of projects that support a just transition—but do not generate sufficient revenue. The Facility consists of a combination of grants from the EU budget and loans provided by the European Investment Bank. Overall, the European Commission expects the facility to mobilise between €18 billion and €20 billion of public investment over the next seven years.

By mobilising investment in this manner, we will mobilise society behind the green transition.



**BAS EICKHOUT**

*MEP (Greens, Netherlands), Member of the ENVI Committee, European Parliament*

# From Carbon Markets to Green Industrial Policy

This summer fires, floods and heatwaves raged across the European continent, while the IPCC presented her long awaited climate report. If our emissions stay on the current level, the research concludes, our climate goals are out of sight at the end of this decade. The coming years, therefore, will be decisive in halting the worst effects of the climate emergency and living up to the Paris Agreement. In order to keep the European Union in line with a 1.5°C compatible pathway, the EU must achieve at least 65% overall emission cuts by 2030 and net zero in 2040.

A key condition for climate neutrality is the decarbonisation of European industry. The energy intensive industry is showing only few signs of the rapid and deep decarbonisation that is needed already before 2030; industrial emissions reductions have stagnated since 2012. Gradual efficiency improvements will not be sufficient; decisions to radically cut emissions need to be taken in the coming years.

Therefore, the European Commission presented a proposal for the revision of the EU Emissions Trading System (ETS) in July. This has been the central piece of legislation that was supposed to establish the 'polluters pays principle' and incentivise the decarbonisation of power generation, industry, and aviation in one carbon market. Emissions from the current EU ETS sectors (and including the maritime sector) are to be reduced by 61% by 2030, compared to 2005, an increase of ambition in 18 percentage points.

This is a big step in the right direction and a clear goal. However, it does not tackle industries' central challenge, which is to stay competitive and at the same time massively invest in new supply chains, abundant renewable energy and completely rebuilding industrial sites to become net-zero. With its small funds and free allocation, ETS only offers compromise solution. ETS can be an enabler, but we need much more.

For this transition to happen we need a comprehensive European green industrial policy that does not only put a price on carbon pollution, but offers policy support throughout the entire value chain of energy intensive industries. Industry will need green investments, massive amounts of sustainable input (energy and materials), stable markets and demand for sustainable products and related R&D and skills. There is an endless amount of studies underpinning the need for this broad package, but let me elaborate on two key elements for the coming years: we need to mobilize green capital and build green lead markets.

All roads to net-zero emissions will require short term investments in which we increase spending with 25–60%<sup>1</sup>. For this, we need to take into account public and private sources such as state aid, the MFF, green bonds and the EU-taxonomy. But, first of all, the ETS can and should also be one of the main enablers. Not only to incentivise these investments with a high and predictable carbon price, but also by being a major source of funding for sustainable innovation and deployment. It is therefore necessary that we stop shielding the industry from carbon pricing and deploy ETS to generate revenues for investment.

We need to abolish ETS' ambivalent structure, end free allocation and use the revenues to massively increase the Innovation and Modernisation Funds. The Commission is taking steps to change the free allocation system, but even the (very slow) phase-in of the Carbon Border Adjustment Mechanism (CBAM) doesn't touch upon more than half of the free allowances currently given to industry<sup>2</sup>. The planned increase of the funds is

also insufficient. During the last funding round, projects have requested more than ten times the available budget. The increased funds should be used to fund Carbon Contracts for Difference (CCfD): project related subsidies based on avoided emissions, which reduce the risk for industry that comes with the volatility of markets, making low-carbon technologies economically viable on the long run.

These investments, however, will make the production processes somewhat more expensive: about 20-30% more for steel and 20-80% for cement and chemicals<sup>3</sup>. Companies, facing international competition, can only bare these costs when there is a demand for sustainable basic materials. Studies<sup>4</sup> offer a wide range of possible instruments: from financial instruments to regulation, which could be deployed in the coming years. From mandatory green public procurement and a carbon price on end products, to changes in construction and product standards, so that sustainable solutions are the preferable option. But also quotas for low-carbon materials, so that producers of consumer goods are obliged to use fixed shares of low-carbon materials.

Together with the push from carbon pricing and investments, a pull will create lead markets for sustainable products. But this is just a small step: industry needs to realise that decarbonisation is inevitable and that free allocation is eventually not in their interest. In turn, policy makers need to be bold and provide certainty to industry and investors that their climate action will pay off. We need much more than a carbon market, we need a strong and comprehensive green industrial policy.

<sup>3</sup> <https://materialeconomics.com/publications/industrial-transformation-2050>

<sup>4</sup> <https://www.agora-energiawende.de/en/publications/climate-neutral-industry-executive-summary/>

<sup>1</sup> <https://materialeconomics.com/publications/industrial-transformation-2050>

<sup>2</sup> <https://www.e3g.org/news/new-study-shows-limited-trade-impacts-of-european-carbon-border-adjustment-mechanism/>





VALERIE MASSON-DELMOTTE

*Co-Chair of the Intergovernmental Panel on Climate Change (IPCC) Working Group I, the Physical Science Basis.*

# A reality check on climate change

## Interview

**Q. In August, the IPCC released its latest report. *Climate Change 2021: The Physical Science Basis*. What does this report tell us?**

This report provides a very clear picture of how human influence drives climate change.

The world is now 1.1 degrees Celsius warmer than in the late 1800's. The report shows that we are now living with widespread, rapid, and intensifying changes in every region in the world—and that the changes that we experience in every region take different forms, and they intensify with any additional fraction of warming. With each fraction of a degree of warming, we will see more loss of Arctic sea ice, more permafrost thaw, faster sea level rise, and more frequent and severe extremes over land.

However, we also show that it's possible to limit global warming. From a geophysical perspective, what this means is that we need to strongly reduce emissions of carbon dioxide (CO<sub>2</sub>). And if we want to maximize the benefits of action for climate and air quality, it's also really important to reduce emissions of methane.

**Q. Didn't we already know much of this? What's new in this report compared to previous reports by the IPCC?**

The new report reflects many advances in climate science. We have a much better understanding of how the climate reacts to emissions of greenhouse gases, and every feedback loop in the climate system. We use this improved understanding of the climate response to provide more accurate estimates of future warming and the associated implications for changes such as sea level rise.

Another new aspect in this report is the link between a changing climate and the water

cycle. Warming leads to an intensification of the water cycle. That means changing precipitation patterns—for instance, a decrease in average precipitation in Mediterranean type climates, and an increase in other places. Precipitation will be increasingly variable, with intensified very wet and very dry events, and very wet and dry seasons. That's extremely important due to the critical role of water for agriculture, cities, ecosystems and industrial activity.

Around a third of the report reflects progress in linking regional climate and global climate change, to better understand how extremes are changing in a warming climate, over both land and the ocean. This regional information is really important for society to look at what is expected in coming decades and to inform decision making.

**Q. Regarding decision making, this report touches on some frightening but very uncertain risks of climate change, including potentially catastrophic sea level rise, or abrupt circulation changes. What does the report say about these types of events?**

We know from the past climate that abrupt events can happen. Examples include a collapse of some sectors of the Antarctic ice sheet, or a collapse of the deeper Atlantic Ocean circulation, or a dieback of specific tropical forests.

We cannot today exclude that these abrupt changes can physically occur, however, we don't know for which level of warming or for which time horizon they will occur. But if they occur, then we know what is physically plausible, for instance, we provide an estimate of the additional sea level rise over this century if a collapse of some sectors on the Antarctic ice sheet is triggered. This is new, and it's reflected in the report.

**Q. The Secretary General of the UN called this report a "code red for humanity." Is it too late? What can be done to limit future climate change?**

In this report we show we expect to reach a level of warming (averaged over 20 years) of around 1.5 degrees in the next 20 years, and it means that, by 2030, every second year would reach a level of global annual temperature above 1.5 degrees Celsius. And we need to be prepared for that. We also show that in every region, every additional fraction of warming matters.

However, if greenhouse gas emissions decline rapidly, starting now, by several percent per year, then we can still limit the level of warming well below 2°C and even close to 1.5°C during this century. In this case, we would see quickly benefits for air quality and atmospheric composition and, within about 20 years, the effects for global temperature trends.

By limiting warming, we can really stop many of the changes in extremes and other aspects directly linked to global warming levels, and we can slow down the unavoidable changes like sea level rise.

**Q. How can decision makers use this report?**

Many decisions made today are still informed by our knowledge about past changes and extremes—what was the record heat, the record amount of rainfall in the past 30 years or the past century. But looking backwards is not relevant anymore, because we expect warming to continue in the next decades, even if emissions decline, due to the cumulative effect of CO<sub>2</sub>. It's really important for society to use that scientific knowledge to look ahead into the coming decades. This report helps us do that.

Read the full report at <https://www.ipcc.ch/report/ar6/wg1/>



CLAIRE WAYSAND

Executive Vice President,  
General Secretary of ENGIE

# Paving the way towards an affordable and resilient European decarbonization

**D**ecarbonizing the European economy and paving the way towards net zero is no longer a choice, but an imperative. The latest IPCC report is very clear, and the UN Secretary General Antonio Guterres even more: it is a code red for humanity.

The European Union has set a clear trajectory with its Climate Law: by 2030, GHG emissions must be reduced by 55% (compared to 1990) and by 2050, emissions must be "net zero". **It is now up to us, European companies, European governments and decision bodies, citizens, to enable this path to become a reality.**

At ENGIE, the trajectory is crystal clear with a commitment to Net Zero Carbon by 2045 on all scopes, supported by an acceleration in our development of renewables and in our contribution to the decarbonation of our customers through investments, such as district heating and cooling networks, and through Ellipse Platform, recently launched. We will invest €15-16 billion by 2023 to reach these objectives. It is just a starting point.

The challenge and the issues at stake are such that we cannot lose time and deviate from the trajectory: **2030 is already tomorrow, in terms of investments and projects deployment.** At ENGIE, we have identified a number of essential drivers drawing the path towards the "55%" target first and, later on, the net zero objective.

## 1. An energy and climate policy that unites rather than divides.

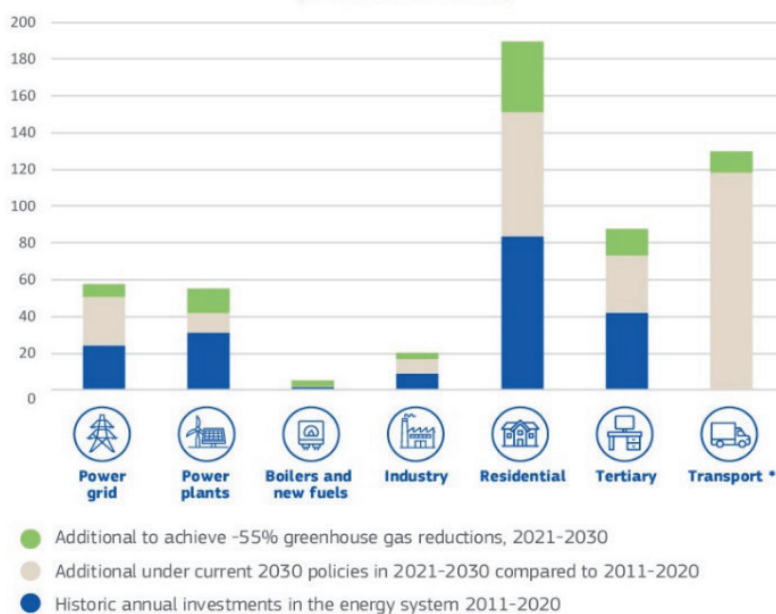
In spite of long debates and difficulties, European policy in this area has always managed, to bring Member States together. The 55% GHG reduction is a shared target. Decarbonizing the EU must be a common

cause, carried out while respecting the rights and obligations of Member States. Raising the ambitions in terms of energy efficiency and renewable energies is absolutely essential. Different European Member States will have different ways to reach their targets – which should be respected, as long as they lead to the agreed decrease in GHG emissions. Affordability of the decarbonation path will be critical – as clearly illustrated by recent tensions due to high energy prices. So will its resilience and Europe needs to make sure that the resulting energy mix from national Member states choices meets the decarbonation target, ensuring the security of supply.

## 2. Rely on a mix of solutions capable of accelerating the decarbonization of the economy.

**Decarbonization will require a mix of options used in synergy with the whole energy system: there is no time for cherry-picking.** The Climate Target Plan published in September 2020 by the European Commission shows that "at least 55% target" by 2030: 1) is feasible, 2) will put us on the right trajectory towards climate neutrality; 3) requires more effort and contribution of all sectors of economy.

**Average annual investment 2011-2020 and additional investment 2021-30 under existing policies and to achieve -55% greenhouse gas emission reductions (in billion EUR 2015)**



\* transport only shows additional investment

Energy efficiency and renewable electricity will be key. To illustrate, let's put the renewable targets into perspective. 40% RES in total consumption by 2030 implies up to 450 GW wind by 2030 (180 GW today). Similarly, solar capacity would have to increase from ~ 140 GW today to up to 375 GW by 2030. **The challenge is so huge that it calls for a mix of solutions.** In particular, **renewable gases (like biomethane or renewable hydrogen) will have a key role to play to exploit synergies and circularity.** Unlike intermittent renewable electricity generation they have **the great advantage of being storable and dispatchable.** Needless to say, renewable heat/cold should also be part of the toolbox, along the development of energy storage and flexibility instruments to cope with a more dynamic energy system.

### 3. Decarbonizing is a must. It is even better in a cost-efficient manner.

**The cost of the energy transition should be kept under scrutiny.** Each € will be precious to deliver additional investment capacity. In a sector where relative prices have dramatically evolved in the last decade, doors must remain open to diversified solutions. Solutions that rely excessively on one type of energy only are likely to be too costly and too risky. **Diversity is the key to an affordable, reliable and sustainable transition.**

Therefore any possibility to exploit synergies and lower costs for consumers (households and industrials) should be leveraged, esp. in a post-crisis context. As mentioned by the Commission in its energy system integration strategy, cost-effectiveness is indeed crucial. The recent rise in energy prices and the emerging fears of continuing issues for the coming winter illustrate that the prices and availability of energies are essential for the competitiveness of European industry as a whole and for individuals.

### 4. Unlocking investment.

The recovery plans seize the opportunity of the economy "restart" to focus on the energy transition, but they will by far not be sufficient. Other measures that will create a funding pipeline for the transition - State aids, Important Project of Common European Interest (IPCEI), Next Generation EU, European Funds - must also contribute to the key goal of reaching 55% GHG reduction by 2030.

However, public money will only contribute to a small proportion of the funding needs. This is why a well-designed taxonomy is important in order to channel private investment. **Natural gas can help decarbonize**

**massively, quickly and efficiently the energy mix in a number of European Member States.** In its 2019 "The Role of Gas in Today's Energy Transitions" report, the IEA estimated that (under some market conditions) existing gas capacity could step in to replace up to half of the European Union's coal-fired power and that this would save around 220 Mt CO<sub>2</sub>, equivalent to 20% of the European Union's power sector emissions. **In this respect natural gas should be regarded as a transitional energy and accepted as such.**

**Regulatory measures** can also contribute to **unleashing investment in nascent sectors.** Indeed, gas will of course need to green itself – thanks notably to **biomethane and renewable hydrogen (H2)** – and well-designed regulation could support the Commission objective to get 40GW of Green H2 by 2030. **For that, conditions have to be gathered, and the decisions that will be taken, especially on additionality, will be crucial to kick-start green H2 production.** We also expect strong support from decision makers regarding renewable energy deployment, especially by facilitating and accelerating permits delivery, and strongly promoting Power Purchase Agreement (PPAs), a powerful instrument, in the frame of the RED II revision process; PPAs already represented a total capacity of 11GW in 2020, and all stakeholders agrees to say that's just the start of a huge growth. We need to encourage them.



### 5. Combining decarbonization with EU reindustrialization and job creation.

**As much as possible, the industrial dimension of the energy transition and the associated value creation should take place in Europe.** The EU Green Deal is also a unique opportunity from this point of view. As stressed by the Commission, vulnerabilities of the European energy value chains have to be managed, and value chains creating jobs

in Europe must be supported. **In this regard, renewable gases (green H2, biomethane) tick all the boxes.** Biomethane for example, respecting high sustainability criteria, can easily achieve 80% greenhouse gas emissions savings compared to fossil fuels, enables circularity, and is a driver for rural development, creating jobs that can hardly be displaced. Given that potential, **biomethane is probably not recognized for its true value, at least for electricity production, in the 55% package.**

### 6. An inclusive transition: leaving no one behind.

**The fight against climate change should also embark both the Member States still lagging behind in terms of decarbonization and the most fragile populations.** That's why a sound coherence between the measures contained in the 55% package is highly necessary. **Transition will have a cost, regardless of whether this cost is apparent through a price mechanism, such as ETS, or whether it derives from regulatory measures. It needs to be minimized, and care should be taken to the most vulnerable parts of society.** As far as possible, the rule of "1 target, 1 instrument" should be applied. This is also one of the conditions for gaining confidence from Member States and populations on new energy solutions, the famous "acceptability".

### 7. Never forget security of energy supply.

Although decarbonization must be our absolute compass, **security of energy supply should be ensured during and after the transition.** This is absolutely essential for all consumers. Today, firm generating capacities (like coal or nuclear) are being decommissioned - ~70 GW of reliable capacity is expected to disappear in Central-Western Europe and UK between now and 2030 - and intermittent renewable capacities are added into the system. This creates challenges for the supply-demand equilibrium in real time and for system adequacy across Europe. However, despite the efforts that will be made in terms of energy efficiency, despite the energy imports that will continue, **massive capacities will be necessary in the future, even more so if Europe wants to maintain or even develop its industrial potential in the future.**

It is the combination of all these factors that will make it possible to achieve the European objective. **The EU must be pragmatic ; what matters is reaching the intermediate target of 55% GHG reduction by 2030, in an affordable and resilient way, and getting onto the final trajectory of zero emissions by 2050.** ENGIE is committed to contribute to these ambitions.





JYTTE GUTELAND

MEP (S&D Group - Sweden),  
coordinator in ENVI and rapporteur for the  
European Climate Law

# The path to 2050 will be defined by how we get to 2030 - Time to move from the age of pledges to the era of results

In the spring of 2020, I took on the biggest and most important responsibility in my political life. As European Parliament lead negotiator on the European Climate Law, I saw my opportunity to push the EU to do what is necessary to curb the climate crisis. It was time for the EU to become the first large emitter to live up to the Paris agreement.

The negotiations started out well. The European Parliament adopted its most progressive position in history. By 2030, we took a stance for a 60 per cent reduction target compared to 1990. The subsequent negotiations with the European Council also resulted in important wins for the structure of the Climate Law. The EU institutions agreed on a carbon budget specifying a reduction pathway, through 2030 and 2040 to 2050 and a strong independent scientific advisory board to evaluate European policies against the latest science.

However, these wins also started to spark a lot of nervousness within the Council. Questions were raised on how far the European Parliament would push for higher ambition on 2030, until a deal would be possible. The Council position was a merely 55 per cent reduction, that also included the contributions from carbon sinks.

Late at night, after 14 hours of intense negotiations, I realised that I had emptied every possibility for a more ambitious deal. All the progress so far was at risk if I did not put my signature on their final offer. Apart from a limitation of the role of carbon sinks, we had to concede and accept the Council's lower 2030 target.

I left the negotiations with a feeling of perplexity. On the one hand, looking back just two years, this outcome would have been almost unimaginably ambitious. On the other,

it was painful to see the discussion at some point shift from what is *necessary* to what is *possible*.

I believe this raises some fundamental issues both for the EU and for the climate.

The climate crisis is by definition a trans-boundary issue, we need common solutions across countries and respect the will of the European citizens. Yet, a consensus-driven culture in the Council allows just a few conservative countries to water down the ambition of an entire union. Rather than policy being shaped by what the many wants, it is decided by what the few wants to avoid.

The other issue is the one of power imbalance. I entered politics in my youth to tackle inequalities. In the world today, the richest one per cent is twice as wealthy as the bottom 90 per cent. The richest one per cent emits twice as much CO<sub>2</sub> as the bottom 50 percent. These same inequalities are just as evident in decision-making. When the big EU leaders united on a level of ambition, the herd of other leaders quickly followed. Nothing, not even a majority of EU citizens, could cause them to move a centimetre.

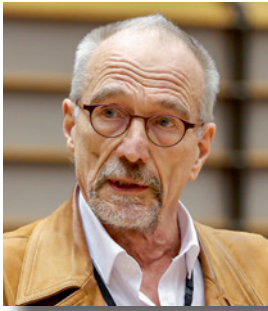
I will keep fighting for higher ambitions as the climate law translates into sectorial legislation and as a delegate to the COP26. But, I want to take this opportunity to call on the leaders of the biggest emitting countries to show true leadership ahead of the Glasgow summit. Unless it is painful, if you are not meeting resistances, you have probably not shown the necessary political leadership.

The Paris agreement was crucial in that it rebooted the conversation on the climate crisis. This paved the way for political structures to be set up, for the youth movement to raise its voice and for investors

re-examine the future. However, it did not have a significant effect on actual reduction of greenhouse gas emissions. At the current pace, global emissions until 2030 will remain the same as today; what we need is at least 45 per cent emissions reduction. COP26 must be the moment when the conversation turns into action, when the age of pledges turns into the era of results.

Eighty countries still have not updated their nationally determined contributions. World leaders must step up and present clear emission reduction pathways combined with concrete policy proposals. One such instrument that more countries should adopt is the EU emissions trading scheme. A recent ground-breaking study showed that to have a chance of staying below 1.5 degrees of heating, we must leave in the ground 90 per cent of the coal reserves and 60 per cent of the world's natural gas and oil reserves. Yet, countries keep exploring new venues to drill for even more fossil fuels. Only a commitment to rapidly phase out fossil fuel subsidies and to start pricing externalities can put an end to this madness.

It is time to honour the work and terrifying conclusions of the IPCC sixth assessment report. It is time to honour all the victims, who lost their lives and livelihoods in the recent extreme weather events. It is time to honour the Paris agreement with a dignified follow-up where the world steers toward safer ground and avoids the worst of the climate catastrophe. It is possible – but we need to turn our pledges into results.



**NILS TORVALDS**

*MEP (Renew Europe-Finland),  
Member of the ENVI Committee*

# Renewable energy is here... and we are going to need it

Priorities on the energy market have made an almost 180-degree turn during my decade as a Member of the European Parliament. I remember how meetings with industry lobbyists used to focus on the macroeconomic risks connected to the necessary change to the global energy landscape, which scientists were demanding. Now, lobbyists from the same organisations are competing about positioning themselves in the forefront of the change. We are still talking about the same disruptive change, but nowadays it is a welcomed change, which is taking place at an accelerating pace.

There are two main reasons for this new behaviour: technological progress and increased awareness among consumers. The challenge is not anymore to make people and organisations engaged in the change. The challenge is to provide them clear enough regulation not to slow down the change.

As the word challenge insinuates, this is not going to be easy on an EU level. We need predictability on the single market to attract the required investments. However, we also need to acknowledge specific Member State circumstances as well as the well-known impossible task of predicting technological progress. This is why the notion of technological neutrality is so important. We need to keep all possible options available and then see which of them will push us in the right direction. In addition, to make it even more complicated - many of those options are for the moment easily outside our imagination. At the same time, naturally, we need to make sure that this does not create loopholes for a laissez-faire attitude in key sectors.

Not an easy task in other words. However, we need to get it as right as possible and quickly, in order to endorse big private investments into solutions, which will take us closer to our common goal of carbon neutrality.

While the proposed new directive on energy efficiency is expected to provide tools for harvesting the low-hanging fruits of emissions reductions in the energy sector, it is crucial that it recognizes the immense amounts of investments renewable energy production is going to need. Although the speed in which technological progress has been reached is fascinating, renewable energy might still in several cases be far from the most efficient option, precisely because we lack investments in innovative solutions and infrastructure in this field.

The key is to enable transitional solutions in order to strengthen the market for renewable energy as quickly as possible, ultimately leading to an energy market consisting of 100% renewable energy. In some cases, this 100 percent might be out of reach because there are no hydropower resources and wind and solar energy have their known shortcomings.

The EU can and should set goals for the Member States to achieve. The implementation of e.g. a union-wide taxonomy to help lead investments into the right type of projects is in theory very nice. Nevertheless, we have to keep in mind the risk that too rigid solutions might shut doors on investments into best practice of Regional and Member State specific solutions.

Interesting examples on projects with the aim to set up affordable and self-sustained energy systems, based on 100% renewables, can already be found locally around the EU. Flexens, an organisation behind such projects on Cyprus and Åland Islands, has calculated that all societies will be largely dependent on solar and wind energy for reaching carbon neutrality. Depending on the society, these forms of energy could in an economically feasible way count for between 70 and 90 percent of all energy demand in the EU. However, fluctuations in the availability will require also other stabilizing sources to

be added to the mix. Geothermal solutions is already a financially feasible option for heating purposes on a large scale and the rest of the energy mix could in a not too distant future be covered by bioenergy and/or hydropower. In other words, solutions for financially feasible and fully renewable sources of energy already exist.

It is also important to understand that the percentages between sources can vary largely from one Member State to another. Therefore, one size does not fit all. It is also important to remember that the large-scale rollout of renewable energy sources will require new technological solutions to guarantee the stability of the grids as well as the storage and availability of electricity. This "intermediary" between the original energy source and the effective utilization, is where transitional solutions will be especially important. For enabling a 100 percent renewable energy market as quickly as possible, we will unfortunately have to accept that hydrogen, batteries and biofuels will be produced in a less than 100 percent renewable fashion for the time being.

Financial feasibility of different technologies can vary largely across the EU depending on the energy sources available and their prerequisites for being a viable solution. Therefore, as mentioned earlier, it is important that the EU does not overstep its competences and impose a feared "one size fits all"-solution for all Member States, which might very well create barriers for societies to turn their energy grid to 100 percent renewable as quickly as needed.

The energy transition is well under way and ambitious goals as well as effective scrutiny to continue tackling climate change is in the EU's and its Member States' interest. Let us not be the ones closing doors on the transition by expecting that we in Brussels know best how every EU citizen should lead a carbon neutral life in the most efficient way.



MAXIMILIAN VIESSMANN

Co-CEO Viessmann Group and CEO Viessmann Climate Solutions

# Mission Zero for healthy living spaces: 3 actions to get **buildings** on track with climate science

**C**OP26 can bring us back into the game for remaining below a temperature increase of 1.5 degrees. It is a matter of urgency that climate talks give special consideration to buildings. The figures are well known:

Almost 40% of global carbon emissions stem from buildings. Count embodied emissions and you add 10% on top. By 2050, the world's building stock will double and 70% of the global population will live in cities. More importantly: We live, we work, we breathe and laugh in buildings. A modern and carbon-free built environment is above all a societal pact, a promise for a better life, for peace of mind and health.

And yet: only 53 out of 186 countries that have submitted Nationally Determined Contributions to the United Nations Framework Convention on Climate Change mention energy efficiency in buildings. The majority do not even specify decarbonisation targets for the sector, or for the greening of heating energy carriers<sup>1</sup>. We have to close this gap: energy efficiency, the greening of energy carriers, and decarbonisation targets for buildings must be included in the next cycle of NDCs with a firm commitment to a net-zero building stock. This is our *mission zero* for healthy living spaces, a clear priority for the COP26 rendezvous.

## 3 actions to get buildings on track with climate science

The EU green deal and the so called "FitFor55" legislation<sup>2</sup> could very well be the recipe for success. The political process at EU level has just started, but it could set the

benchmark for a transformative built environment around (1) people, (2) technologies and (3) financing.

### Action #1 Put people first to improve living spaces for all

Everything starts with people. The corona crisis has shown how important our homes and roofs are, how much the indoor air quality, light and temperature impacts our health and spirits. We are at a historic turning point. The awareness and willingness to invest in better homes has never been higher. People have never been more aware of the impact of climate change. They demand climate solutions.

*Mission zero* for buildings, a giant renovation wave, presents a unique chance to improve the living conditions of millions of households. In France alone, bad indoor air quality costs 18 billion euros per year for the public health system. In 2019, about 34 million Europeans were not able to keep their homes adequately warm, while over 50 million were living in homes with leaking roofs, damp walls or poor foundations.<sup>3</sup> Since 2000, the share of the household budget that low-income families spend on energy has doubled.

We must pay special attention to energy poverty and set adequate safeguards. The Energy Efficiency Directive proposal rightly calls on Member States to prioritize vulnerable households. A new Social Climate Fund will be created with the revenues from the new Emission Trading Scheme (ETS) for buildings and transport. It is also foreseen that this new ETS has a stability reserve, a sort of carbon watch-dog, to avoid skyrocketing carbon

prices. Finally, the revenues arising from ETS must be allocated to the sectors where they arise - in order to balance rising energy bills via energy renovation.

### Action #2 Accelerate emission cuts - scale the uptake of efficient, renewable technologies and sustainable energy carriers

Most people spend 80% of their energy bills on heating and hot water production. Yet the installed stock of heating and cooling systems is aging and only 20% is supplied by renewable energies. Setting a replacement target of 6% per year for heating systems, vs 4% today, is a no-regret starting point at EU level.

Many cities have already proven that it is possible to get buildings on track with climate science. Copenhagen is on the way to achieving climate neutrality by 2025. Over 10,000 mayors have committed to climate neutrality within the Covenant of Mayors.

We have indeed the heating technologies to engineer the net-zero world: heat pumps, renewable-ready combustion technologies, gas/electric hybrid solutions, reduced heating needs by envelope upgrades, district heating and digitalisation. This is the toolbox, combined with innovative business models. We need every option to tackle the heterogeneity of Europe's building stock, the range of incomes and individual needs of households, and national choices of energy carriers. Diverse situations require diverse answers.

The electrification of heating via heat pumps is clearly the backbone of *mission zero*. For me, a successful heat pump wave meets the criteria below: they operate on

<sup>1</sup> World Business Council for Sustainable Development, Transforming the built environment

<sup>2</sup> "Fit for a 55% GHG reduction" by 2030 vs 1990

<sup>3</sup> Right to Energy Coalition, 2021



sustainable refrigerants, with low noise levels and optimized electricity use; they are coupled to on-site PV, storage and self-consumption, and they have the digital functionalities to be fully integrated into the electricity grid, for example, for demand response.

Green gases are another necessary complement. The heating industry is adapting, as we speak, all combustion technologies to make them renewable-energy ready, such as boilers and distributed cogeneration. This is a prerequisite to avoid the lock-in of fossil fuels in buildings and increase the resilience of the energy system.

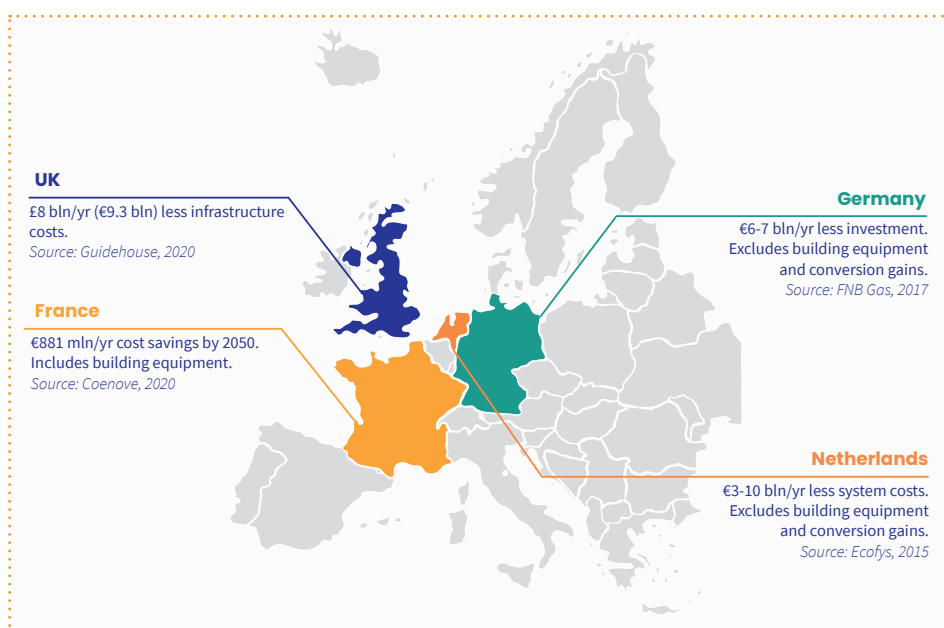
I am conscious that the combination "hydrogen" and "heating" is contested by some, e.g. because a heat pump is more efficient than hydrogen. But this argument is a bit old-school in my view. It fits a world with dispatchable coal and nuclear, but not an energy system built on intermittent renewables. Because well-adjusted volumes of hydrogen or other green gaseous fuels injected into existing, repurposed, gas infrastructure, can complement the electrification mega trend: peak power demand is reduced significantly compared to full electrification of heating. That aids system resilience especially in winter during periods with low wind output, which happens regularly, and during extreme weather situations which occasionally challenge system stability.

### Action #3 Secure adequate financing and qualifications

The building sector represents over 40% of all investment needs for the green transition in the EU. Over 185 billion euros per year is needed to reach the 40% emission reduction target by 2030 (vs 1990), according to the European Commission. In order to reach 55% emission reduction, this number will have to substantially increase<sup>4</sup>.

To get there, we have to leverage the private sector; aggregation and de-risking are the key words. The taxonomy regulation will be essential to steer climate financing. Staged renovation pathways should also be supported. The 750 billion euro EU recovery fund combined with the EU budget, set the right framework to boost investments in climate action and the building sector specifically - providing a once-in-a-lifetime opportunity to steer finance for a sustainable transition.

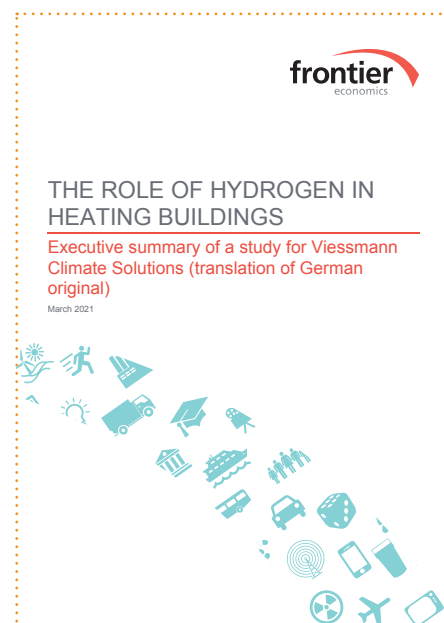
*Significant cost savings associated with lower electricity grid investments*



Source: Unlocking the hybrid heating potential in European buildings, Guidehouse for Hybrid Heating Europe, 2021

Mission zero also requires many skilled jobs. We expect an unparalleled job boost in a sector that already employs about 10% of the global workforce. The EU has estimated that by reducing the carbon emissions of buildings by the necessary 60% (by 2030 vs 2015), more than 160,000 new jobs will be created. For the job market to benefit from this potential, swift action is needed, however. Already today, the sector suffers from severe labour shortages. Targeted information campaigns and recruitment programmes are key to filling the recruitment gap, including with women. Equipment makers can of course alleviate this challenge with innovative solutions: intuitive digital tools will help installers and owners to maintain and optimize energy use in real-life. Plug-and-play modernization solutions will reduce installation time and cost.

With the help of people, technologies and finance, mission zero can become a reality. It is time to unleash a new societal pact along these three actions. Then, the Fit for 55 package can not only be a roadmap for the European transition, but a blueprint for the built environment globally. Let COP26 set a movement at the global scale for healthy living spaces. And the benefits of a net-zero building stock will be felt by all.



For further insights on hydrogen in heating, see study  
<https://www.frontier-economics.com/media/4592/hydrogen-in-the-heat-sector.pdf>

And further information on:  
<https://www.viessmann.family/en/what-we-offer/climate-solutions/hydrogen>

<sup>4</sup> Commission Staff Working Document: Identifying Europe's recovery needs, 2020



CHRISTOPHE GRUDLER

MEP (Renew Europe-France),  
Member of the ITRE Committee

# The EU is on the pathway to a real change of paradigm in its energy & Climate policy

I wish I could for once choose a heart-warming opening about climate. However, the images we saw and the scientific reports we read over the summer leave no space for our imagination: the planet is crying for help. According to the World Meteorological Organisation (WMO), more than 11,000 disasters have been reported in the last five decades worldwide, resulting in just over two million deaths and over \$ 3.64 trillion in property damage<sup>1</sup>. At the same time, the last IPCC report confirmed that the role of human activities cause climate change. The international community needs to speed up the process that started with the Paris Agreement in 2015. The EU, as frontrunner, is showing the way to follow with the launch of the EU Green Deal, which aims at decarbonising its entire economy by 2050.

Electricity is responsible for almost a quarter of all EU greenhouse gas emissions. Fossil fuels still provide today more electricity than renewables, with combustion-based plants dominating the energy mix. The EU has done tremendous efforts to reverse the trend and to scale up renewables in the EU-27 energy mix. Renewable power generation has nearly doubled since 2005, producing 34% of the EU's electricity in 2019, compared with the 38% from fossil fuels. Needless to say that the use of renewable energy has many potentials despite the reduction of greenhouse gas emissions: diversification of energy supplies, a reduced dependency on fossil fuel markets and job creation, among others.

Electrification is needed to achieve our climate goals but we cannot be successful without the use of green molecules such

as biogas and hydrogen, which will help enhancing the flexibility of the electricity network and decarbonising hard-to-abate sectors like the steel industry. The tremendous efforts put in decarbonising the industry will push the EU on the world stage as leader in climate proof technologies, strengthened by a foolproof strategic autonomy. We also need to support other sectors that are hard to electrify such as the heavy-duty transport segment, which is responsible today for about 6% of total EU emissions.

Among the various technologies to be used in a climate-friendly economy, hydrogen needs to be fully decarbonised - it is not the case today as more than 90% hydrogen produced in Europe is fossil-based (coal or natural gas). The two European strategies on Hydrogen and on Energy system integration, alongside the launch of the European Hydrogen Alliance, give the right path to develop a resilient and competitive hydrogen market. In parallel, we now need to gather our effort in developing a strong regulatory framework, which will enable the market to scale up efficiently.

The scale up of green electrons and molecules, alongside the achievement of the Energy Efficiency First principle will lead us to our climate goals by 2050. However, we should choose a pragmatic path to develop a success story. The EU should follow the principle of technology neutrality, notably by allowing the use of decarbonised technologies by Member States in their energy transition plan. Money should also be invested in research and innovation to look for new technologies that may be even more efficient than solar. We need to get away from today's naive approach that renewable power is a panacea.

that needs to comply with our requirements at environmental, economic and social levels. The revolution we are launching with the EU Green Deal and the "Fit-For-55" package cannot be successful if we underestimate the fears of the European citizens. France is an unfortunate example with the Yellow Vest protests. In her speech on the 2021 State of the Union, President Ursula von der Leyen rightly outlined that we need to have a green transition that is also fair. The proposal of a new Social Climate Fund goes along this line. As an elected member of the European Parliament, I will do my best to make the transition as efficient, future proof and conciliatory as possible.

We are at the dawn of a fantastic change of paradigm in the EU Energy & Climate policy

<sup>1</sup> "The Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970-2019)", World Meteorological Organisation, 2021



HENRIKE HAHN

MEP (Greens, Germany), Member of the ITRE Committee, European Parliament

# Yes to the revision of the Energy Taxation Directive

**B**ut we need higher ambitions and Member States who stop to oppose the necessary reforms.

The review of the Energy Taxation Directive is part of the [Fit for 55 package](#) to implement the Green Deal to make Europe the first climate neutral continent by 2050 the latest. We have a once-in-a-generation opportunity to fulfill at least our Paris climate goals and to trigger a fair and green energy tax reform across the EU.

It has to be spelled out: The Commission favors de facto fossil fuel use since the existing 2003 Directive. Additionally, Member States' highly divergent national tax rates are applied in combination with a wide range of tax exemptions and reductions, which can be seen as well as indirect fossil fuel subsidies.

In times of urgently needed action, we have to change that. The present 2003 Directive does not adequately promote greenhouse gas emissions reductions, energy efficiency and the take-up of electricity and alternative fuels such as renewable hydrogen, synthetic fuels, advanced biofuels, etc. This is the case because new, less carbon-intensive fuels are often taxed with the same rate as their fossil equivalent if the new fuel emerged in the years after 2003. And biofuels are disadvantaged by the volume-based taxation as well if the rates are expressed per liter. We have to change that as soon as possible.

Energy taxation is a fiscal instrument that gives us the chance to build up and provide economic incentives for a successful energy transition and that also ensures the proper functioning of the internal market. At the same time, it will drive lower greenhouse gas emissions and energy savings investments and contribute to sustainable growth. In the end, energy taxation can contribute essentially to ending fossil fuel subsidies as an important Green policy demand.

The reform which the Commission proposed recently is overdue. From 2011, attempts to revise the Directive and to introduce a CO<sub>2</sub> tax system based on energy content rather than

volume, to achieve a better coordination with the EU Emission Trading System (ETS) and to remove the special treatment of energy consumers in Member States have long been blocked. It was blocked by the Conservatives in the European Parliament and by some Members States in the Council, including Poland and Germany. This was possible because the revision of the Energy Taxation Directive requires unanimity in the Council, unlike other energy and climate legislation which only requires a qualified majority in the Council and the Parliament.

Finally, we have a first new proposal on the table. And with the EU Green Deal and the EU's raised ambitions in climate and environmental protection, there are no excuses for EU member states to finally adapt the Energy Taxation to the new European climate targets.

The central part of the proposed reform will be to transform the EU-wide taxation system based on volume – or euros per liter – to energy content-based taxation. This is done by eliminating incentives for fossil fuel use and by introducing a ranking of rates according to their environmental performance.

Moreover, it simplifies the current tax structure by grouping energy products and electricity into five categories and by ranking them according to their environmental performance. A specific minimum rate would apply to each energy product within a category. The five categories are:

- Traditional fossil fuels (including e.g. petrol, gasoil, kerosene) and non-sustainable biofuels, bioliquids and certain solid biomass
- Kerosene
- LPG, natural gas and non-renewable hydrogen
- Sustainable but not advanced biofuels, bioliquids and certain solid biomass
- Electricity, advanced biofuels, e-fuels and renewable hydrogen

The highest minimum rate would apply to traditional fossil fuels due to their poorer environmental performance compared to other

energy products. We Greens welcome the higher minimum tax rates for fossil fuels and lower rates for renewable energy products. We need to decrease the relative price advantage of fossil fuels over less polluting alternatives.

Of course, it needs to be worked on tax reductions and exemptions, for gas and oil used in agriculture, gas, oil and coal used by households for heating, or fossil fuels used by energy-intensive industries. These reductions and exemptions significantly lower the effective tax rate for fossil fuels and have to be abolished. Furthermore, the Commission's proposal would finally end the current mandatory exemptions for the aviation and waterborne navigation as well as the fishing sector.

The revision of the Energy Taxation Directive has to envisage the necessary levels of carbon prices as well to effectively cut greenhouse gas emission and set an example globally. It will be very important for us in the European Parliament to address this missed opportunity in the forthcoming negotiations.

We also regret that, in legal terms, the Commission chose article 113 TFEU and not article 116 TFEU for their proposal. For article 113 unanimity is required in the Council, whereas with article 116 a qualified majority would have been sufficient for the revision to pass.

Article 113 TFEU leaves the file almost completely in the hands of Member States, which would again require – as already mentioned above – an unanimous agreement on a revised text. In 2011, the attempt to revise the ETD has failed already because there was no consensus among the EU Member States. It is now on the national governments to demonstrate the necessary leadership in revising the ETD to ensure that the EU delivers the European Green Deal objective of carbon neutrality and fully internalizes the "polluter pays" principle for the sale of energy products. Let's hope that the newly elected German government will play an important role and push with ambition for a revision of the Energy Taxation Directive in the light of the Green Deal.





**BERNARD BIGOT**

*Director-General, ITER Organization*

# Hydrogen Fusion: the way to a new energy future

The potential benefits of a hydrogen economy have recently become popular points of discussion in the "net-zero" strategies of multiple countries. Advocates envision a future in which hydrogen fuel cells are used to power heavy land, sea, and air transport vehicles and other intensive energy loads, with zero emissions at the end point of hydrogen consumption. They also correctly note that compressed hydrogen gas can be an efficient energy storage mechanism.

I, too, am in favour of a future in which hydrogen plays a major role in clean energy production and consumption – particularly as the fuel for hydrogen fusion power: a safe, environmentally friendly, virtually unlimited, and highly concentrated baseload source of carbon-free energy. Even more, we can consider that this technology of hydrogen fusion can produce clean hydrogen to power transport vehicles.

How does hydrogen fusion differ from the use of hydrogen in fuel cells or hydrogen combustion engines? The differences are considerable, and require explanation.

Burning hydrogen in fuel cells or engines is a chemical reaction with oxygen. The hydrogen burns cleanly, with no release of carbon, making it a clean form of energy at the point of consumption, like electricity. But like electricity, hydrogen is not a primary fuel. It must first be produced, normally by splitting water molecules using electrolysis, and no longer from fossil fuels as is mostly the case now. Therefore, to fully account for the environmental effects of hydrogen as a fuel, one must calculate the impacts of the entire hydrogen production and consumption life-cycle.

This understanding has led to characterizations of hydrogen based on the production

method: for example, colour-coded as green hydrogen, grey hydrogen, or pink hydrogen, based on whether it is produced with renewable energy, natural gas, or nuclear fission.

These characterizations seem simplistic. They also do not go far enough regarding their impact on the climate. For example, if photovoltaic solar panels are used to produce electricity, which in turn is used to produce hydrogen via electrolysis, the "green" aspect of this production cycle must be evaluated further. Solar panels are frequently manufactured using coal-fired energy, so these carbon emissions must be included in the calculation. Other factors are also important: the efficiency of the solar panels or steam turbines used to generate electricity, the energy consumed in electrolysis, the energy lost in electricity transmission, the form and amount of energy used to transport hydrogen to its final destination, and the impact of the

eventual disposal or recycling of all the parts and components used.

How does this compare to fusion power? Hydrogen fusion is the most abundant form of energy production in the universe. At the centre of our Sun and the stars, hydrogen is fused using the force of gravitation – at a density more than 70 times the density of steel. Fusion is thus the source of all light and heat on earth. Solar and wind energy are, in fact, powered by hydrogen fusion – but at a distance of 150 million kilometres, and therefore extremely deconcentrated and intermittent. Even fossil fuels are a product of hydrogen fusion: organic matter produced by photosynthesis and compressed over millions of years in the earth's crust.

Hydrogen fusion is not a chemical reaction; it is a nuclear reaction, in which – in keeping with Einstein's famous equation,  $E=mc^2$  – a tiny amount of matter is converted to a large



amount of energy when two hydrogen nuclei fuse. But unlike nuclear fission, in which a heavy element such as uranium is split into two other elements that decay into long-lived, highly radioactive waste, hydrogen fusion occurs, with the highest energy yield, with the collision of two forms (isotopes) of hydrogen – deuterium and tritium – and the products are non-radioactive helium and a powerful neutron that delivers the fusion energy.

Scientists have asked for decades: since humans cannot reproduce the gravitational force in the core of the sun, how would it be possible for humans to re-create hydrogen fusion on earth?

The most promising answer is to use magnetic confinement in a machine called a "tokamak": a large toroidal or doughnut-shaped chamber. A few grams of deuterium and tritium gas are injected into this vacuum chamber. An electrical discharge is used to create an ionized plasma, separating the nuclei from the electrons. The charged particles of the plasma are accelerated and confined using powerful magnets. The magnets are integrated with the tokamak to create an invisible magnetic cage conforming to the shape of the metal walls. Additional heating systems are used to raise the plasma temperature to 150 million degrees (ten times hotter than the core of the sun). At this temperature, the deuterium and tritium particles collide at high speeds and fuse. The powerful neutrons produced by the fusion reaction are not charged, so they escape the magnetic field and collide with the metal tokamak walls, transmitting their energy as heat. Water circulating in the tokamak walls receives this heat and is converted to steam

– which, in a commercial plant, will drive a turbine to generate electricity.

Hundreds of tokamaks have already been built, but a key step remains before commercial fusion plants are feasible. Scientists need to study a controlled "burning" plasma, in which the high-energy helium particles from hydrogen fusion continue to heat the plasma, maintain its 150 million degree temperature necessary for fusion, and thereby generate more fusion reactions. To achieve a burning plasma using the magnets and materials currently available, the tokamak must be large enough to sustain a high number of fusion reactions per unit time. Certainly the impact of the Tokamak construction on the climate needs also to be considered.

At the ITER project in the south of France, 35 countries have come together to construct the largest tokamak ever built, to demonstrate the feasibility of hydrogen fusion power at industrial scale. ITER is designed to produce ten times more fusion power (heat) from the plasma than its heating input. At this power gain, a burning plasma is assured, enabling ITER's scientists and engineers to optimize the design of the commercial machines to follow.

ITER is also a remarkable example of international collaboration and complex project management – another aspect of the project that is highly relevant to global efforts to combat climate change. ITER Members contribute 90% of their financial contribution in the form of components. In many cases, these components involve First-of-a-Kind engineering design and manufacturing, in leading fields from electromagnetics and cryogenics to robotics and materials science. These advances expand each Member's

understanding of fusion engineering; they also lead to spin-offs with beneficial applications in medicine, manufacturing, computer science and many other fields.

For the past six years, ITER has been proceeding at a rapid pace, and in mid-2020 transitioned from construction and manufacturing to Assembly Phase. Despite the constraints of the Covid-19 pandemic, major components have been traveling by sea and land from every ITER Member to the ITER site. The logistics are unprecedented: magnets with dimensions as large as 20 metres and weighing several hundred tonnes each – similar to the weight of a Boeing-747 airliner – must be assembled with a precision in the range of millimetres.

While ITER is the only fusion project of its size and scale, many other fusion projects are also underway, including an increasing number of private enterprises. While some of these projects involve higher risk, less-tested designs and materials, each is very welcome and contributes to global fusion research and development; and the involvement of the private sector signals that, globally, we are closer than ever to making fusion a reality.

In summary, the societal challenge is clear: we need to replace fossil fuels on a massive scale as soon as possible. Hydrogen fuel cells and combustion engines may be an important part of that clean energy future. But to make the hydrogen economy truly green, we will need a clean source of concentrated baseload energy. Hydrogen fusion has all the characteristics to fill that requirement, as a safe, environmentally friendly, and virtually unlimited source of energy for future generations.







**FABIENNE LECORVAISIER**

*Executive Vice President – Air Liquide*

# Unleashing the power of clean hydrogen for a carbon-neutral future

**H**ydrogen molecule, the oldest and simplest molecule in our Universe, is found in great quantities on Earth combined with other elements, such as in water and hydrocarbons, however is barely present in our atmosphere. It has recently reached the top of the political agenda, having a tremendous potential being a major enabler for building a low-carbon society. **As an industrial gas player, Air Liquide has a key role to play fostering innovation and**

**adapting to new sustainability demands.** Air Liquide is addressing two major challenges: the **decarbonation of the industry and the mobility revolution.**

The European Commission has released the first legislative package, supporting its commitment to reduce net greenhouse gas emissions by at least 55 per cent by 2030. **Air Liquide is fully committed to support the objectives of this ambitious package**

that represents a unique opportunity for the industry to innovate, turn Europe's climate targets into a reality and to become the first climate-neutral continent by 2050. In full support of the 2015 Paris agreement, the **Air Liquide commitments** address the urgency of climate change and energy transition, targeting **carbon neutrality by 2050.**

Air Liquide, already contributing through its environmental and societal actions and commitments to achieve some of the Sustainable Development Goals set up by the United Nations, wherever it can make a real difference, is convinced that it is, more than ever, time to act. Our commitments are based on 3 pillars : **Abatement of CO<sub>2</sub> emissions ; Care for patients ; Trust** as the base to engage with our employees and to build a best-in-class governance.

## Renewable Hydrogen at the heart of decarbonization of our society...

Hydrogen is a cornerstone of the energy transition. In order to further decarbonize our society, the development and **scale-up of low-carbon and renewable Hydrogen will be key.** It offers a tremendous growth potential as a competitive climate-friendly solution for a wide range of applications such as industrial usages, space applications and clean mobility.

Air Liquide has 50 years of experience in mastering the entire Hydrogen value chain, and a pioneering role over the last 20 years to shape the role of hydrogen as a key energy transition enabler. The Group has developed **unique expertise** enabling it to master the entire supply chain, from production and storage to distribution, contributing to the widespread use of hydrogen as a clean energy carrier. It is committed to the development of new capacities of both renewable and low-carbon hydrogen production; in this regard, it will invest over €8bn by 2035.

26th January 2021, Air Liquide inaugurated the world's largest electrolyser - 20 MW PEM unit - based on renewable electricity in Becancour, Canada





As such, **Air Liquide currently owns and operates 40 electrolyzers including the largest electrolyser in the world, commissioned early 2021, Proton Exchange Membrane (PEM) low-carbon hydrogen 20MW production unit in Bécancour, Canada. Powered by 99% renewable energy,** this unit can produce over 8.2 metric tons of low-carbon hydrogen daily – enough to fuel more than 2,000 cars, 16,000 forklifts, 275 buses, or 230 large trucks. This enables the Group to supply its North American industrial customers and mobility markets with decarbonized, high-purity hydrogen and help reduce their carbon footprint. It will avoid the emission of around 27,000 tonnes of CO<sub>2</sub> per year (emissions of 10,000 cars per year).

As announced in July 2021, another worldscale PEM electrolyzer will be the first to be built in the framework of the **partnership between Air Liquide and Siemens Energy** in Oberhausen, Germany. With a total capacity to reach 30MW, a first phase of the project is expected to be operational by early 2023 with 20 MW in order to support sectors such as Steel, Chemicals, Refining and Mobility in North Rhine-Westphalia by accelerating the availability of gases produced with renewable electricity for their efforts to reduce their carbon footprint.

Last but not least, Air Liquide and a group of international companies **launched in October 2021 the world's largest clean hydrogen infrastructure fund.** The fund aims to reach 1.5 billion euros and has already secured initial commitments of 800 million euros. With the creation of this fund, Air Liquide is demonstrating its leadership to participate in a **collective dynamic** with the objective to accelerate the growth of the clean hydrogen ecosystem by investing in large strategic projects and leveraging the alliance of industrial and financial players.

### ...from the ground...

Faced with the climate emergency, it is time to switch from awareness raising to action. The importance given to the energy transition in the EU economic recovery plans of several countries underlines this shift.

With this in mind, we have founded several initiatives worldwide, such as the Hydrogen Council which brings together more than 100 executive officers of large international companies. The Group is also forming public-private partnerships, such as in California and South Korea, to **develop hydrogen mobility.** As well as the roll-out of stations for vehicles in Europe, Japan, South Korea and the United States, Air Liquide is also focused on the truck

segment. Large-scale projects are becoming a reality: in Rotterdam in the Netherlands and Fos-sur-Mer in France for example, where the Group is part of key initiatives to develop large-capacity hydrogen stations which will be used to power long-distance trucks.

Alongside hydrogen, biomethane is well placed in the transportation revolution. It decreases travel-related CO<sub>2</sub> emissions by 85%, particles by 90% and noise by a potential 50% compared to diesel engines. The Group is investing across the entire value chain of this green energy source, from the recovery and purification of biogas right through to distribution to the end-customer in Bio-NGV stations (natural gas for vehicles). The major advantage of this energy source: its natural position in a circular economy where biomass, transformed into biomethane, participates in the optimization of natural resources.

### Focus HyTrucks initiative

In May 2021, Air Liquide, DATS 24 and Port of Antwerp joined their forces in the HyTrucks consortium to deploy 300 hydrogen-powered trucks and the related renewable hydrogen production infrastructure and supply chain assets in Belgium by 2025. HyTrucks is one of the largest European projects to deploy zero-emission heavy-duty fleets in Europe's most intense traffic areas. It aims at reducing significantly CO<sub>2</sub> emissions by an estimated amount of more than 100,000 tonnes per year, equivalent to 110 million kilometers driven, thanks to 1,000 trucks, and a first network of 25 high-capacity hydrogen stations connecting Antwerp, Rotterdam, and Duisburg. In Belgium only, the HyTrucks project aims at reducing CO<sub>2</sub> emissions by an estimated amount of more than 30,000 tonnes per year, equivalent to 33 million kilometres driven.

### ...to the air and up to space.

Since the 1970s, and thanks to its extensive experience in the field of extreme cryogenics, Air Liquide has developed expertise in liquid hydrogen, which can therefore be used safely and securely for aeronautical applications. **The Group thus has solid know-how and certifications to work with the aerospace industry** thanks to this in depth expertise also on liquid hydrogen and knowledge of onboard technologies.

Against this background, Air Liquide's ambition is to contribute to build the sustainable aviation ecosystem alongside the

leading players in the sector. Our Group started at the end of the 2000s to promote hydrogen applied to aviation, notably through studies and demonstrators in flight or on land.

In June this year, Air Liquide, Airbus and Groupe ADP signed a Memorandum of Understanding to prepare for the arrival of hydrogen in airports by 2035 as part of the development of hydrogen-powered commercial aircraft.

Very recently, Airbus, Air Liquide and VINCI Airports, three major players in the aviation, hydrogen and airport industries, announced working together to promote the use of hydrogen at airports and build the European airport network to accommodate future hydrogen aircrafts. The airport of Lyon-Saint Exupéry (France) will host the first installations as early as 2023. This partnership reflects the three groups' shared ambition to combine their respective expertise to support the decarbonization of air travel. Lyon-Saint Exupéry Airport has been chosen as the pilot airport by the partners. Starting as of 2023, this **unprecedented project will see the deployment of a hydrogen gas distribution station at Lyon-Saint Exupéry airport.** This station will supply both the airport's ground vehicles (airside buses, trucks, handling equipment, etc.) and those of its partners, as well as the heavy goods vehicles that drive around the airport. This first phase is essential to test the airport's facilities and dynamics as a "hydrogen hub" in its area of reach. Between 2023 and 2030, the **deployment of liquid hydrogen infrastructures will allow hydrogen to be provisioned into the tanks of future aircraft,** preparing the deployment of the hydrogen infrastructure from production to mass distribution of liquid hydrogen at the airport as of 2030.

Finally, Air Liquide also continues to participate in **the space adventure** by developing new technologies for the future Ariane 6 launcher, for electric propulsion for satellites and for projects in connection with space exploration, like the generation and storage of energy and life support in a simulated lunar environment.

A global movement towards a low-carbon society is underway. Accelerating on Hydrogen development is key to mitigate climate change. As a pioneer in hydrogen, Air Liquide commitments address the urgency of climate change, targeting carbon neutrality by 2050, hydrogen being a cornerstone of the energy transition.



JORG CHATZIMARKAKIS

CEO, Hydrogen Europe

# Building climate-neutral economy with hydrogen must start today

The summer of 2021 will be remembered by extreme weather conditions across the world: devastating floods in Belgium and Germany, massive wildfires in Greece, Turkey and Italy, heatwaves on the US Western Coast, and damaging hurricanes on the US East Coast. And while regular citizens are trying to overcome the consequences of these severe events, policymakers feel more pressed than ever to find solutions to tackling the global warming in the most efficient, cost-effective, and socially acceptable way. Hardly anyone will argue that climate change is not real. Almost everyone agrees the time to act is now.

As we embark on transitioning to a carbon-neutral economy by 2050, it is important to

make sure our choices are robust and future-proof. Hydrogen has a strong potential to become an agent of climate mitigation and help decarbonise almost every sector of the economy: heavy industry, transport, buildings, and energy. It can replace coal, oil and also gas by being a renewably produced energy vector, fuel and chemical feedstock.

Hydrogen is integral to achieving the EU's ambitious carbon neutrality target. We are pleased to see that the EU and its Member States are on track to make hydrogen a systemic element of transitioning to a climate-neutral society in 2050.

In 2020 the European Commission published its Hydrogen Strategy, aiming to explore how producing and using renewable

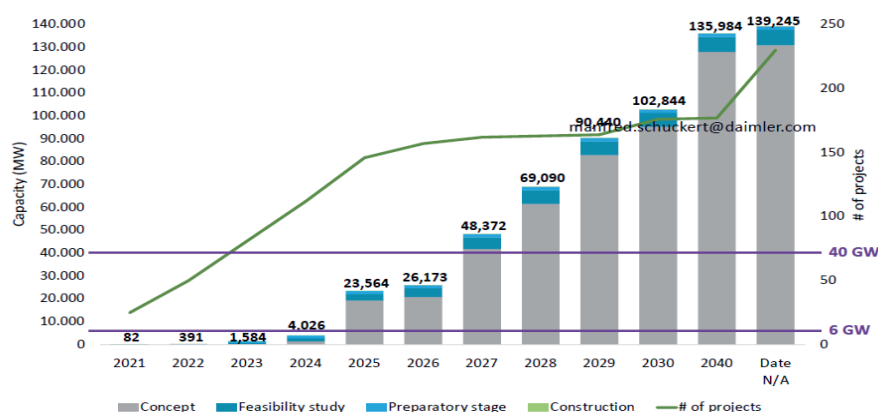
hydrogen can help decarbonise the EU economy.

Earlier this year the European Commission published the Fit for 55 package, aiming to review the fundamentals of its energy policy. It includes such ambitious policy goals as setting higher targets for renewable energy, increasing the share of renewable energy in buildings, putting an end to combustion engine.

At the end of 2021, the Commission will come forward with a set of legislative proposals for a new hydrogen and gas markets decarbonisation package.

## However: Regulation does not help renewable H2 right now!

Cumulative planned PtH projects in EU by year 2021 - 2040 (MW and # of projects)



### Solutions

- 1 Dedicated legislation to govern hydrogen and hydrogen networks
- 2 Remove barriers to hydrogen investment
- 3 Create a level playing field with other net-zero technologies
- 4 Promote a harmonized approach to hydrogen



All these initiatives are a clear indication that the EU is on course to becoming a global leader and a pioneer in hydrogen solutions.

The rapid development of hydrogen is not only important to meeting the EU's climate objectives but also for preserving and enhancing the EU's industrial and economic competitiveness. With projects in France, Germany, Italy, Spain, Portugal, and the Netherlands, the EU is well placed to become the birthplace of a global hydrogen economy denominated in Euro currency.

Much still has to be done though to make sure this ambition comes true. Today, hydrogen represents a modest fraction of the global and EU energy mix, and is still largely produced from fossil fuels. For hydrogen to contribute to climate neutrality, it needs to achieve a far larger scale and its production must become fully decarbonised. With an appropriate hydrogen framework in place, 1 million of clean hydrogen per year can be produced and at least 6GW of electrolyser capacity will have been installed by 2025 already. Significantly higher volumes can be achieved with the development of the hydrogen market, which will include blending with natural gas, building hydrogen valleys and stimulating hydrogen production. By 2050, a mature and deep hydrogen market will be in place ensuring a fully decarbonised economy.

Along with ramping up hydrogen production, the EU should build on existing assets, such as extensive infrastructure. Its

20.000 km of well-developed gas grid can be converted to accommodate hydrogen at a minimal cost. Additionally, offshore pipelines and depleted oil and gas fields can be used on the one hand to transport renewable hydrogen produced directly offshore and on the other hand to store hydrogen.

Hydrogen will also play a crucial role in decarbonising land transport, especially heavy-duty, as well as aviation and maritime. The transport sector is likely to be the biggest user of hydrogen in 2050, with more than 50 million tonnes used either directly in fuel cells, or as part of synthetic fuels.

The hydrogen industry is ready to do its part, but the EU decision-makers must begin putting into place a concrete and fit for purpose framework for the development of a clean hydrogen economy. This includes increased targets for renewable energy which will facilitate and fasten decarbonisation and additional renewable sources. The EU also needs establish a robust carbon reduction system. This should include adding road and maritime transport under the ETS, restructuring energy taxation, reducing fossil fuels subsidies, and granting fiscal rewards to those investing in clean energy technologies.

The EU should also favour the development of hydrogen technologies. No technology solution should be excluded on our way to decarbonization. Policymakers should set clear thresholds and then let inventors and the industry come up with solutions. The EU has a unique opportunity to start developing

a hydrogen economy now and becoming a blueprint for global hydrogen regulation.

2050 may seem years away, but time is a precious moment for the EU to start delivering on its long-term and short-term climate targets. And the hydrogen industry is ready to make this happen!







**MARIA SPYRAKI**

*MEP (EPP - ND Greece) - Rapporteur of the EU Strategy to Reduce methane emissions*

# Reducing Methane Emissions - A quick win on tackling climate crisis

With the catastrophic effects of this summer's unprecedented floods, wildfires still being counted, we need to intensify our efforts to tackle the challenges posed by extreme weather conditions. At no other time has the spectre of climate catastrophe seemed as real as across the Mediterranean region this summer. In recent months, we have experienced the strong impact of climate crisis as we have been forced to deal with forest fires.

We need to act immediately, we need to achieve concrete results on reducing GHG emissions and at the end of the day we have to protect our people and the planet not only in the long but also in the short term.

Methane is a powerful greenhouse gas, warming the planet eighty times as much as carbon dioxide (CO<sub>2</sub>) over a 20-year period, before decaying to CO<sub>2</sub>. While the focus to reduce climate change has rightly been placed on carbon dioxide, methane is the second most important greenhouse gas contributing to the warming experienced to date. Reducing methane emissions is indispensable in the fight against climate change, in line with the Paris Agreement's goals, the European Green Deal and the EU Climate Law.

More than half of global methane emissions stem from human activity in three sectors: energy, waste, and agriculture; In this framework, it is important to proceed with an ambitious revision of our environmental legislation.

In the energy sector, imports account for over four-fifths of the oil and gas consumed in the EU, and most methane emissions associated with oil and gas are occurring outside EU borders. That's why we must explore regulatory tools on fossil energy imports, develop

methods with importing and partner countries to align our efforts, and secure a UN-based pathway on methane in 2021. In the meantime, we could proceed with bilateral agreements with these exporting partner countries.

A strong, independent, and scientifically rigorous Monitoring, Reporting and Verification (MRV) system is central to address methane emissions. It is necessary to provide credible data, identify issues and efficient measures, and assess the progress achieved. A mandatory MRV system would also improve Member States' reporting to the United Nations Framework Convention on Climate Change (UNFCCC). A strong Leak Detection and Repair (LDAR) programme is a critical element of the EU's strategy to reduce methane emissions and achieve the EU climate and environment goals.

We also have to support the establishment of an independent international methane emissions observatory, in partnership with the United Nations Environmental Programme (UNEP), the Climate and Clean Air Coalition (CCAC), and the International Energy Agency (IEA).

In the agricultural sector, we should encourage innovation, and incentivise our industries to adopt the best practices and available technologies, and to reward the frontrunners. We must ensure that proven, cost-efficient innovations are quickly implemented in the EU and integrated into EU agricultural policies. We must be particularly ambitious in the agriculture sector, in parallel with the Common Agricultural Policy.

By the end of 2021, the EU should – in cooperation with sectoral experts and the Member States – develop an inventory of best practices and available technologies to explore and promote the wider uptake of innovative,

mitigating actions. These actions should have a special focus on methane coming from enteric fermentation. In this regard, we have to establish a framework which incentivises and rewards farmers, along with the entire value chain and especially frontrunners, for their efforts.

In the waste sector, the EU should continue to tackle unlawful practices and provide technical assistance to Member States and regions in order to increase the implementation of the existing legislation. We should also help the Member States and regions stabilise biodegradable waste prior to disposal and increase its use to produce climate-neutral, circular, and bio-based materials and chemicals, and divert this waste towards biogas production.

In the review of the Landfill Directive in 2024, the EU should consider further action to improve landfill gas management, minimise its harmful climate effects, and harness any of its potential energy gains. Closure and after-care procedures of landfill cells are key to reducing leakages, taking into account the entire life cycle of landfills. We must provide specific incentives, suited to each Member State's conditions, to ensure separate collection of bio-waste to the maximum possible extent, including by encouraging public-private sector cooperation.

Reducing methane now will avoid nearly 0.3 C of warming by 2045. The immediate implementation of methane reduction measures on human sources of methane could reduce methane emissions by as much as 45% by 2030. That would vastly reduce the formation of and exposure to ground-level ozone.

It is time to act now! By reducing methane emissions we can get a quick win for protecting our people and the environment. Let's do it!

**JAMES WATSON***Secretary General, Eurogas*

# Gas is central to the energy transition and decarbonising it will be a cross sector effort

**W**e need everything. These words are repeated over and over again when we discuss decarbonisation. They ring true. In parallel with electrification, gaseous fuels are essential to fulfilling EU climate objectives. In the short- and medium-term natural, renewable and low-carbon gases offer emissions cuts through coal and oil to gas switching. Low carbon gas is essential to scaling hydrogen markets and will complement green hydrogen production. In the long term, gases will provide a cost-effective and inclusive energy source to complement renewable and low carbon electricity.

In Eurogas' vision for 2050, we foresee a decarbonised electricity system supported by a decarbonised gas sector. It will not be easy getting there. All parts of the energy industry will play a role in delivering on carbon neutrality. Our members are ready to be a driving force in this process, and as an association we need to collaborate with others who share our goals

The Eurogas Pathways study carried out by DNV has shown that the most cost-effective route to carbon neutrality includes delivering volumes of renewable and low carbon gas. This study has resulted in growing understanding among stakeholders that gas – natural, renewable and low-carbon – will have to be part of the energy mix if we are to achieve carbon neutrality. We can even deliver a carbon neutral gas sector well before 2050 if the policy framework enables a swift transition. Therefore, our major goal in the coming years is to continue to work with all willing stakeholders to define the role of gas in decarbonisation and make sure it provides the necessary flexibility, storage and security for the energy systems.

In the transport sector, both in Eurogas and the European Commission's assessments, the

use of gases increases from 2% of energy demand in 2017, to 18% by 2050. It is clear that electricity will dominate commercial and passenger vehicles by 2050, but it will be marginal for maritime and aviation where gases will play a key role. This growing market can be supplied by renewable gases, like biomethane and hydrogen.

Looking to agriculture, the European Commission recognises that demand for biomethane will continue to grow. Its role in decarbonising the buildings sector through blending with natural gas is essential in the short- and medium-term. The readily available infrastructure makes it a cost-efficient option. In the long run, that existing gas infrastructure can carry renewable and low carbon gases. By coupling biomass and biogas with CCS, we can achieve net negative emissions while producing energy. This will require cross-industry cooperation and offer much needed rural job creation for an inclusive energy transition.

To ensure that the share of renewable gases increases, we have launched a call with 15? other associations spanning technology providers, heating providers, certification associations and others, for binding and concrete 2030 targets. These would set the path to reduce the greenhouse gas intensity of gas consumed in Europe by at least 20% compared to 2018 levels and increase the uptake of renewable gases to at least 11% of gas consumed. Thanks to our efforts, the idea of such targets is now growing in strength.

Working with other associations in this way is key to reaching our climate objectives and as such we are also a member of the European Net Zero Alliance (ENZA). There, with like-minded organisations, we advocate for cross-sectoral and cross-vectoral cooperation. ENZA works to promote market access to all low-carbon solutions and identify

synergies that can accelerate the delivery of climate neutrality.

Integrating the gas and electricity systems will be crucial to delivering on net zero before 2050. The use of existing gas infrastructure to transport blended hydrogen and biomethane for power generation to support variable renewables is vital for system security. In consumers homes we see hybrid heat pumps as a way to deliver affordable heat in a carbon neutral world, maximising the efficiency and cost effectiveness of both energy sources. There's undoubtedly potential for much more. We know that optimising the role of gas in the transition can reduce its cost by €4.1 trillion by 2050, more than the GDP of Germany in 2019. It's worth exploring how we can add to that saving through synergies between sectors.

Just like electricity, gases are part of the solution to get us through the transition. The Fit for 55 and Gas Decarbonisation packages are our chance to get the policy framework we need. Our vision for decarbonised electricity and gas sector by 2050 is possible, but we need to work together to achieve it.



SÉBASTIEN DOUQUET

Director – Deloitte Economic Advisory

## Two years on the Green Deal, hydrogen is still “the missing piece of the puzzle”

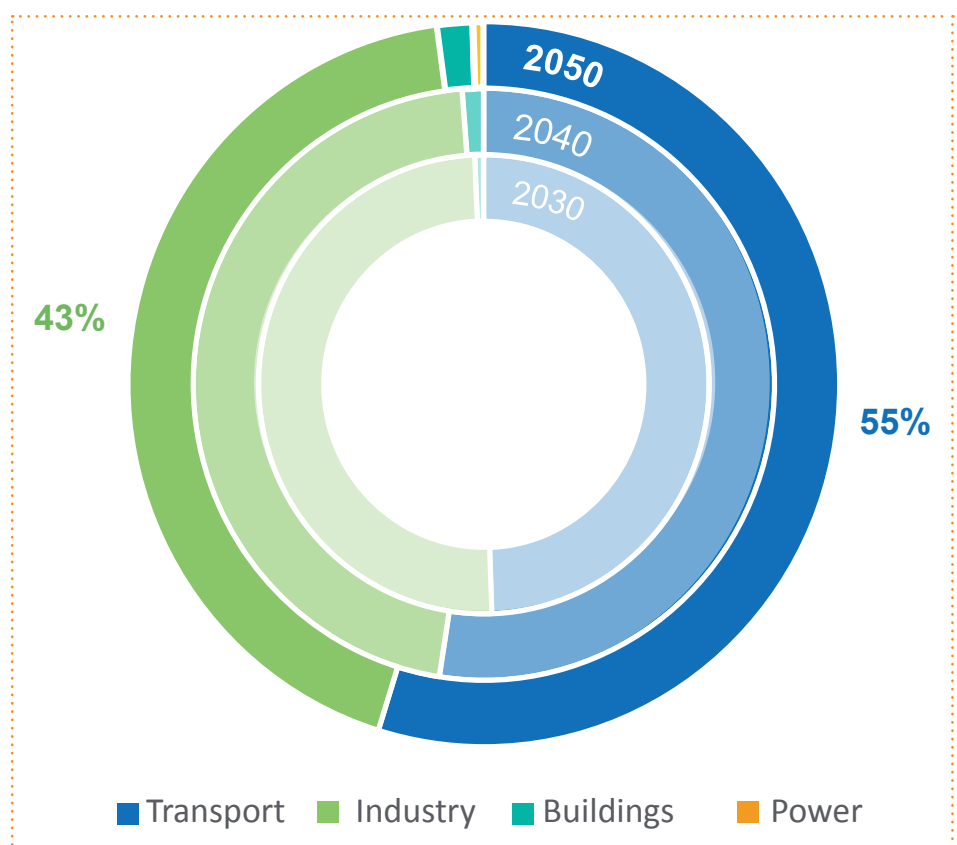
Developments in the past two years have seen policymakers and companies take an increasingly supportive stance on hydrogen. From the European Green Deal to the fit-for-55 package, from the EU hydrogen strategy to the recent UK hydrogen strategy to the first pre-notification waves of the Hydrogen IPCEI, pieces have been set in motion to support the development of hydrogen across the continent. This wave of enthusiasm reflects the stakes at play: as underlined by the latest IPCC report, the EU and other European countries cannot miss their decarbonization objectives, and reaching net-zero CO<sub>2</sub> emissions by 2050 is an indispensable condition to avoid catastrophic climate change. Hydrogen is now clearly recognized as one of the solutions to respond to one of the biggest policy and technological challenges ever, alongside established leads such as electrification, renewable energy and energy efficiency.

While the official objective of the EU is 10 million tonnes of renewable hydrogen by 2030, the current project pipeline<sup>1</sup> and the policy and industrial discussions hint at a far larger potential for hydrogen, that also includes low-carbon technologies such as natural gas reforming with carbon capture and storage (CCS) and pyrolysis and reaches across the entire energy system. To better assess this potential, Hydrogen4EU was launched. This joint industry research project is led by Deloitte and combines the modelling expertise of research centers IFPEN and SINTEF. It aims at assessing the role of hydrogen in the European energy sector transition towards net-zero emissions. Two pathways are explored, both aligned with the key EU climate and energy policy goals. The

“Technology Diversification” pathway provides insights into how an inclusive approach, based on a wide range of decarbonisation technologies, can help minimize the cost of the energy transition. The “Renewable Push” pathway examines the possible impact of a deliberate focus on renewable technologies, a prominent feature of the current policy debate as manifested in the fit-for-55 regulatory proposals.

The Hydrogen4EU study confirms that hydrogen can play an important role in the European energy transition. Propelled by strong policy and industrial momentum, demand for renewable and low-carbon

hydrogen could triple the European Commission's goal of 10 million tonnes of hydrogen in 2030 and exceed 100 million tonnes by 2050. In both pathways, hydrogen is proven to be a versatile and cost-efficient energy carrier that could cover up to 25% of European final energy use by 2050. Transport and industry represent the bulk of the demand. In the transport sector, heavy-duty trucks, aviation, and shipping consume hydrogen directly in fuel cells or as e-fuels in traditional combustion engines. Iron and steel is the largest consumer in industry, followed by the chemical industry and by the production of process steam and heat in other sub-sectors. This is not even accounting for the hydrogen



<sup>1</sup> As of September 2021, 48 GW of hydrogen production projects have been announced in Europe. Source: Deloitte H2-tracker

Figure 1 - Evolution of hydrogen demand by sector in the Technology Diversification and Renewable Push pathways, 2030 to 2050



used as feedstock (for methanol, ammonia...), which could further increase hydrogen demand by around ten million tonnes.

The study's findings suggest that renewable and low-carbon hydrogen are needed together in both pathways. While low-carbon hydrogen plays a critical role in establishing a hydrogen economy between 2020 and 2030, renewable hydrogen develops mainly after 2030 and meets the bulk of the additional demand growth. In the Technology Diversification pathway, the production mix is very balanced in 2050 with renewable and low-carbon sources each providing about half of the European output. In the Renewable Push pathway, renewable hydrogen plays a dominant role, underpinned by more ambitious targets in terms of renewables development in Europe. Renewable hydrogen is mainly produced by off-grid electrolysis, with hydrogen proving to have a clear value proposition for the integration of variable renewable energy into the system. Low-carbon hydrogen shows good potential for natural gas reformers with CCS and, to a lesser extent, for pyrolysis.

Part of the hydrogen needed in the transition to net-zero emissions may be imported from outside Europe, from neighboring regions such as Russia, North Africa and the Middle East. Our results show such imports gradually ramping up over the 2030s. By 2050, between 10% and 15% of

Europe's hydrogen supply come from the international trade market; this correspond to 10 to 15 million tonnes of renewable or low-carbon hydrogen to be imported. Traditional exporters of natural gas are also well placed to become major hydrogen exporters to Europe. This is notably the case for Russia and Algeria. Access to existing cross-border pipeline infrastructure is a significant advantage, as maritime transport is a costly alternative. New players, such as Morocco, Tunisia, and Ukraine, may also have a role to play thanks to their renewable energy potential and proximity to these pipelines.

The transformation of the energy system is underpinned by gigantic levels of investments. In the hydrogen value chain, between 3.1 trillion Euros – in the Technology Diversification pathway – and 5.5 trillion Euros – in Renewable Push pathway – need to be mobilized over the next three decades to finance the necessary investments. In both pathways, the infrastructure needed for renewable hydrogen in Europe is enormous and gives a hint about the seriousness of the challenges ahead: our renewable hydrogen production results require between 1000 GW and 1700 GW of dedicated solar PV capacity, a similar amount of wind capacity and between 680 GW and 1500 GW of electrolyzers. The development of low-carbon hydrogen and other technologies such as biomass with CCS hinges on the availability of CCS technologies. Carbon removal technologies such

as biomass with CCS and direct-air-capture are needed to compensate for some of the hardest-to-abate emissions and to unlock access to new solutions, such as e-fuels for aviation. CO<sub>2</sub> storage demand may reach 1.4 Gt per year by 2050 in our Technology Diversification pathway, making a capacity ramp-up necessary during the present decade. Both cross-border and national infrastructure would need to be developed progressively in the system to connect hydrogen demand to supply, with a heavy reliance on the ability to repurpose existing natural gas infrastructure.

The policy and industrial developments of the past eighteen months are a step in the right direction to address the challenges facing hydrogen. Most recently, the fit-for-55 package has finally proposed some binding targets that will stimulate the uptake of hydrogen and alternative fuels in the energy mix. However, caution is still advised at the current stage, as the hydrogen regulatory and support framework remains a work in progress. The hydrogen and decarbonized gas market package is expected for the end of the year. Likewise, the new CEEAG State aid Guidelines are highly awaited to guide the design of future support schemes for hydrogen technologies. The Hydrogen4EU study points to five critical enablers to an economically optimal development of hydrogen:

- The cost of CO<sub>2</sub> emissions needs to be internalized to shift the economics in favor of clean technologies.
- Clear and transparent accounting rules of CO<sub>2</sub> are needed.
- Innovation and learning-by-doing should be fostered to bring new technologies to commercial viability.
- An increasing capital intensity of infrastructure projects calls for low-cost financing and bankability instruments for low-carbon and renewable solutions.
- Finally, the market and regulatory rules need to be clarified, to ensure system integration and coordinate supply and demand uptake.

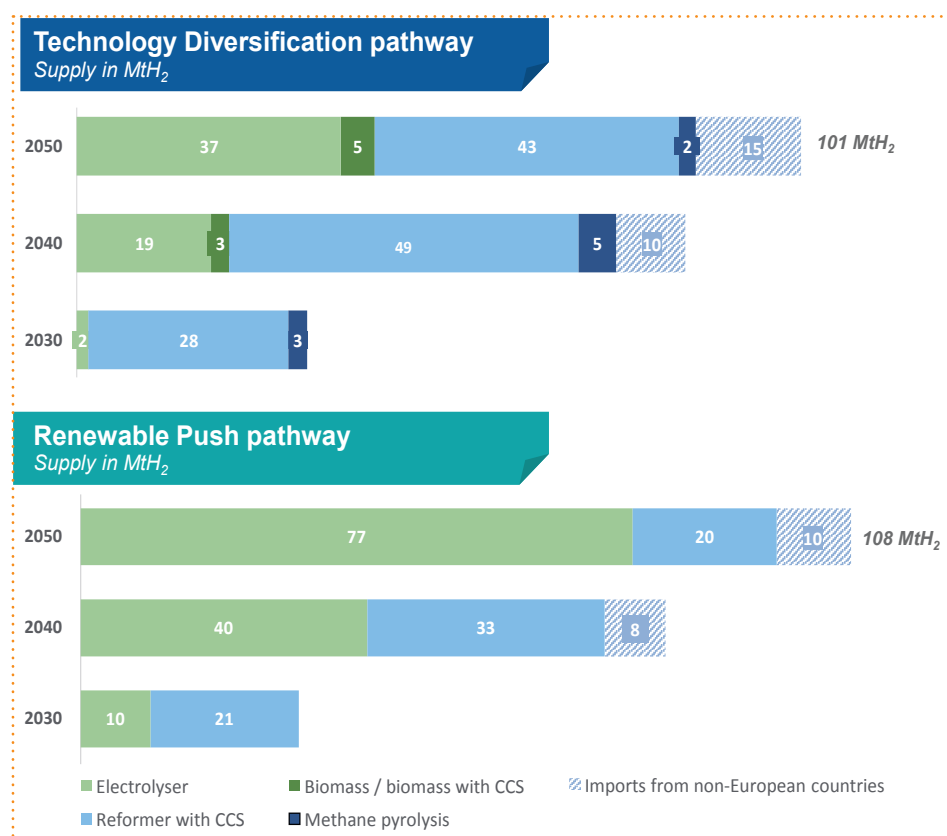


Figure 2 - Evolution of European hydrogen supply in the Technology Diversification and Renewable Push pathways, 2030 to 2050



SIRPA PIETIKÄINEN

MEP (EPP Group, Finland), Member of the ECON Committee, European Parliament

# How Sustainable Finance Will Support the Climate Transition

Today, we are living through a remarkable period of history. The global cash flows are being gradually channelled in a sustainable direction, and green finance is trending in financial markets. In 2020, sustainable funds attracted a total of \$51.1 billion in net flows, which was more than twice the previous record set in 2019. Moreover, the EU launched its very first Sustainable Finance Action Plan in March 2018, during the past years China has committed to carbon neutrality by 2060, and the US has re-joined the Paris Agreement under the Biden administration. The direction is right, but there is still a long way to go.

According to estimates, the climate crisis will cost us \$1 quadrillion over the next 80 years if we fail to meet the terms of the Paris Climate Agreement. Moreover, it makes the yearly sum even more than twice per year of what the COVID-19 crisis is hitting us with now. If we aim to tackle this challenge and want to prepare our political institutions, companies, financial actors, retail investors and industries to cope with global warming, the bar needs to be set high enough to provide ambitious and effective legislation. This requires even more intertwined environmental and financial legislation, and to make it genuinely impactful, the bar needs to be set high enough by using the adequate targets defined by science and impartial researchers.

Heretofore, the EU Taxonomy Regulation is the very first EU financial regulation that sets science-based green finance rules. By re-channelling cash flows from unsustainable to sustainable targets, it aims to halt climate change, conserve biodiversity, foster a circular economy, prevent pollution, and protect biodiversity. For the first time, it introduces very essential concepts of green finance in the EU legislation; the life-cycle analysis, the 'do no significant harm' (DNSH) principle and sustainability indicators. The EU Taxonomy is, therefore, the corner stone of sustainable

finance that complements the EU environmental initiatives, such as the Green Deal and the newly published Fit for 55 package, and additionally, a revolutionary step towards correcting the way financial sector and the real economy price in, or rather do not price in, negative environmental externalities.

In order to reach climate neutrality by 2050, many fixes still need to be done in order to correct the current financial markets. Firstly, sustainability accounting needs to be incorporated in all relevant public and private reporting, and to become globally aligned with the same harmonized methodology. It should be included into consideration of national budgets and European Semester, as well as of banks, credit rating agencies, prudential risk management in solvency concepts, et cetera. Secondly, the concept of sustainability does not only limit to environmental issues, as the whole ESG values (environment, social, governance) needs to be integrated into a company's activities. A top-down approach is needed, and both environmental and social due diligence should be included in the list of responses of corporate management and board, for securing adequate levels of meticulousness and responsibility of the business.

Finally, the examination and implementation of different risk concepts should be in the core of any EU sustainable finance initiatives. Last year, the risk of a global pandemic became reality in the modern world and caused an unprecedented shock to our economies and societies, and even more catastrophic global risk of climate change is looming in the shadows. The future risks are manifold and sometimes even difficult to predict, but I prefer using the concept of 'triple materiality' that introduces the most accurate definitions of different types of risks in financial markets.

Finally, the examination and implementation of different risk concepts should be in the core of any EU sustainable finance

initiatives. Last year, the risk of a global pandemic became reality in the modern world and caused an unprecedented shock to our economies and societies. The future risks are manifold and even difficult to predict, but I prefer using the concept of 'triple materiality' that gives the most accurate definitions of different types of risks. The first level of triple materiality is *financial and technical risks* that might have potential impacts on the credit or liquidity of the company. Secondly, there exists the level of *environmental risks* including the operational risks, such as potential accidents, and new hazards emerging from climate and environmental changes that have a direct impact on the business. Lastly, the third and most invisible, though the most important level is the *biodiversity risk*. It means that if you are increasing and intensifying climate change, biodiversity loss and resource over-consumption yourself, you are both gradually destroying your own business environment and the planet. However, if you are supporting the transition towards climate neutrality, you will also create a sound and successful business environment for yourself.

As a summary, first we need to create a science-based, transparent and harmonized global system for comparable data. Secondly, with this data the sustainability risks need to be assessed thoroughly in system risk analyses, also by credit rating agencies. These assessments, as well as the whole materiality concept should be reflected in banking sector and lending decisions, and capital risk buffers. Thirdly, we need to establish a global sustainable finance framework in both public and private sectors with adequate flexibility, and try to safeguard this framework from political manoeuvring and manipulation. Sustainable finance is the key to tackle climate change and preserve biodiversity, and we have no time to waste.



JEREMY WATES

Secretary General,  
European Environmental Bureau (EEB)

# Time Is Not on Our Side - Climate Action is Urgently Needed

**Wildfires, floods and heatwaves raged all over Europe this summer, reminding us that there is no safe place in the fight against climate change. The pandemic impasse provides a unique window of opportunity for the EU to push forward ambitious reforms and lead by example in the transition to a zero-emission world.**

Europe and the world stood at a shocking turning point this summer.

Devastating flooding in Belgium, Germany, Japan and South Africa, and raging fires in Greece, Turkey, Russia, the US and Canada have shown us the consequences of our unfettered emissions and climate negligence.

Beyond any doubt, these catastrophes are not something we can live with or adapt to. The pace and the intensity of such episodes have unexpectedly increased to a point of irreversibility and are bound to only get worse, as highlighted by world top scientists in the IPCC's 6th Report on Climate, published on 7 August.

Commission President Ursula Von der Leyen also raised this alarm at the launch of the EU 'Fit for 55' package: "The infernos and hurricanes we have seen over the last few weeks are only a very small window into what our future could look like. Only by acting now, when we still have the policy choices, we can do things another way", she said.

But apart from being strong on planet-saving rhetoric, are the EU's policy decisions ambitious enough to tackle this raging climate crisis?

## What is fit for the planet?

Considering the science, the principle of global equity and Europe's historic

responsibility for climate change, the EU should be aiming for at least 65% without removals (CO<sub>2</sub> 'removals' include so-called carbon sinks like forests to account for CO<sub>2</sub> reduction, allowing industry to take credit for work done by nature). The 'Fit for 55' policy toolkit falls short even in its very title.

The most relevant EU green policy dossier of the European Green Deal not only fails to provide climate-neutral roadmaps and sector-specific targets, it also continues to shield EU industry from paying the full cost of their pollution.

The [Court of Auditors](#) unearthed this summer a worrying trend whereby public money is often spent to cover costs that polluters should pay. Industry decarbonisation efforts have lost a decade due to low carbon prices and free allowances, which have helped some industrial sectors make profits of up to €50 billion between 2008-2019.

Introducing an Emissions Trading Scheme (ETS) for the buildings and transport sectors while maintaining free CO<sub>2</sub> allowances for industry and using public funds to finance fossil fuels in Europe will de facto shift the cost of pollution from the actual polluters to the final consumer.

A phase-out of fossil fuels at the latest by 2035 is in fact the minimum required to increase our chances of stopping global warming. It is hard to understand how some national recovery plans got the Commission's approval to channel massive amounts of EU funding into fossil fuel projects, using hydrogen as a lifeline for the gas industry. Simply put, there should not be any room for fossil fuels in the EU budget and taxonomy.

In the energy/climate equation, the EU's 'Fit For 55' figures fall far short of what science is calling for to curb global warming by 1.5 degrees. The targets for renewable energy and energy efficiency must be increased to 50% and 45% respectively and turned into

legally binding policy at national level if we are to avoid further delays in the energy transition.

Another climate-harming sector that is still excluded from meaningfully slashing its emissions under the EU roadmap is agriculture. Despite the fact that up until today the agricultural sector contributes only by 1% to the former 30% reduction target of the Effort Sharing Regulation, the Commission's proposal provides another free pass for non-CO<sub>2</sub> agricultural emissions. It is high time to make agriculture pull its weight in the fight against climate change, setting a transformative agenda for the sector.

## Key global actor

One of the most positive steps forward in the new EU climate blueprint is the proposed Regulation on a Carbon Border Adjustment Mechanism (CBAM) to tackle emissions in imports and increase climate ambition within and outside the EU's borders.

Europe cannot continue ignoring its carbon footprint beyond its own borders and must plug the gap through which our European lifestyles contribute to emissions elsewhere on the planet. We should remember that the figure of 10%, often cited as the EU's contribution to global GHG emissions, only refers to our domestic contribution.

However, the proposed CBAM is very narrow and weak in terms of coverage of products and materials, even if a review clause could extend its coverage in the future. The methodology to calculate embedded emissions is not aligned with a comprehensive carbon footprinting of products and materials placed on the market.



**COP26: what is at stake**

The UN 26<sup>th</sup> Conference of the Parties on Climate (COP26) led by the UK Government will be of historical importance for the 175 signatories to the 2015 Paris Agreement and will set another landmark.

As we count down to COP26, the EU must do its utmost to rebuild a high ambition, high solidarity coalition of the willing.

Today, Governments and in particular the EU have a moral duty and a political responsibility towards future generations to do whatever it takes to slow the current climate trend. Decision-makers will have to review and refocus their efforts to tackle the climate crisis with the aim of stepping up global action to fight climate change and implementing timely and effective adaptation strategies.

The EU and its Member States need to urgently recognise the practical impossibility of living in a +2, +3, +4 °C world; they must rethink what they consider politically possible to make the 'Fit for 55' truly fit for purpose.

Politics, we know, is the art of the possible. But what is possible is not something fixed and immutable, the pandemic has shown us that. We have to recognise that what is seen as politically impossible today will be recognised as absolutely necessary in the future. The question is, how far in the future? How quickly can we get to that realisation? Because time is not on our side.



*Mountains in the smoke of fires in Turkey, on the Turkish coast in Marmaris, 2021 – Vitolda Klein (Unsplash)*



**MARIA DA GRAÇA CARVALHO**

*MEP (EPP Group, Portuguese),  
Member of the ITRE Committee,  
European Parliament*

## A lot of work to do until we are 'Fit for 55'

The Fit for 55 package, released in July by the European Commission under the European Green Deal, is a thorough and complex initiative, pointing in the right direction and with unprecedented levels of ambition. However, it is also a work in progress. One that will require a lot of attention from policymakers, based on strong scientific advice, in order to become the tool we need to address climate change while protecting our European way of life.

To begin on a positive note, I must stress that this is the first time that the EU is addressing climate change in all areas. If we look back, previous interventions focused mainly on energy production and the industry. Now, the more than 3000 pages of legislative proposals cover several other fields, such as housing and transport. We could argue that they still lack ambition in certain subjects, namely agriculture, but that is a matter for another debate.

We also know that this is a much-needed package. The current *status quo* is not enough for Europe to reach climate neutrality by 2050. If we want to achieve what we pledged ourselves to achieve in the Paris Agreement we need to go further. Fit for 55 is the answer to that need, enlarging the scope of the typical climate proposals.

The new Emissions Trading System (ETS) for buildings is a good example, as are the policy on road transport, the restructure of energy taxation, the increased targets for renewable energy and energy efficiency, the introduction of a Carbon Border Adjustment Mechanism and the revision of the CO<sub>2</sub> emission standards for the automotive industry. This is indeed a very comprehensive package.

However, Fit for 55 will have a deep impact in every sector, in SMEs, in the lives of families and individuals. The main challenge will therefore be to implement these measures in a manner that enables us to achieve our

goals while preventing the more negative consequences.

In the European Parliament, the different political groups are still in the early stages of analysing Fit for 55. Nevertheless, there are already shared concerns. Specifically about the impact that it will have in citizens, especially low-income citizens, and in SMEs. Making sure that this package, not only considers, but also effectively improves the well-being of our societies is a moral imperative – after all, we the policymakers are at the service of the people. Moreover, this is a *sine qua non* condition for the success of the entire climate policy. The changes we are about to implement will only bear fruits if they are understood and well accepted by the public.

To deal with the anticipated side effects of this package, the Commissions' proposal is to create a Social Climate Fund. Financed with 25% of the expected revenues from the auctioning of allowances within the emissions trading system for buildings and road transport, it will receive around 72.2 billion euros for the period 2025-2032. Member States should match this amount, bringing the total budget of the Fund to 144.4 billion euros. I do not believe this will be enough. The number of low-income households affected by the expected rise in the prices of fuel, electricity and heating will be such that the levels of energy poverty will undoubtedly increase and demand a much more comprehensive response.

I would also like to see measures in place aimed at improving the cost-effectiveness of this transition instead of just dealing with its consequences. I am of course referring to technology development, and one of my criticisms of Fit for 55 is precisely the fact that it relies on regulation, standards, taxation and carbon pricing. It never says: "Let us have a technological revolution. Let us have clean, affordable energy, so that we have the means to do this".

The Horizon Europe partnerships are just an example of an initiative that could help us develop the technological resources that we need to achieve our goals.

However, at EU level, we are even witnessing a growing resistance to increase the budget for research and development. Yes, we approved Horizon Europe, which is quite ambitious, but what really counts is the budget we put aside for every year. As we all know, the Council recently proposed to reduce the budget of this framework programme for 2022, which is something that the European Parliament will strongly oppose but that, nevertheless, gives a very concerning image of where the priorities are right now.

In addition, we do not see any decisions being taken based on technology. The technology readiness levels are rarely considered. For example, regarding the automotive industry, the legislation for CO<sub>2</sub> foresees a 55% cut in emissions from vehicles until 2030 and 100% by 2055 but there is no link to the currently existing technology and its affordability or, in the case of electric cars, to the availability of the infrastructure. Also neglected is the need to match these targets with the necessity to ensure mobility across Europe.

We need a package linked to the real world. One that counts on existing and emerging technologies and infrastructures, considers the opinion of specialists, understands that new regulations will have to coexist with current ones, namely regarding the Internal market and that, above all, ensures a fair distribution of the burden we will put on society, contributing to create new jobs instead of destroying existing ones.

**HENRIK HOLOLEI**

*Director-General for Mobility and Transport,  
European Commission*

# Developing Clean Mobility for a Climate-Neutral Europe

**T**ransport has enabled us to explore and learn about the world around us. It has also connected people and businesses, strengthened relationships and generated economic growth.

The European Green Deal sets the ambition of making the EU climate-neutral by 2050. For transport, this means cutting emissions by 90% compared to 1990 levels.

There is no doubt that this will be challenging. But there are also opportunities. I see the target as our growth plan for the years to come. Our Sustainable and Smart Mobility Strategy translates the goals into policy plans, setting out the roadmap to sustainable and smart transport, and we have already presented the first package of regulatory reforms designed to put us on the right track.

They focus on the uptake of sustainable fuels in aviation and in maritime. The proposals create the enabling framework needed to incentivise the market so that it supports sustainable choices. They are also designed to ensure the Single Market continues to function as it should.

We need a technology-neutral framework that supports industry to find the most suitable solutions in terms of the fuels used, while boosting the uptake of zero- and low-emission vehicles, renewable and low-carbon fuels and related infrastructure for all transport modes.

In road transport, there is considerable market momentum for battery-electric vehicles, and yet vehicle uptake remains highly concentrated in a few European markets, as is the deployment of publicly accessible recharging infrastructure. Some 70% of that infrastructure is shared between the Netherlands, France and Germany. If one were to drive across Europe in an electric vehicle, the absence of a Single

European Transport Area would sadly be all too evident. This has to change.

Hydrogen is a valid alternative, but the update is still limited. While some Member States project great ambition for rollout, many have no rollout strategy in place. In 2020, 125 hydrogen stations were in operation, again mainly in just a few countries.

We intend to change that, by ensuring that electric and hydrogen vehicles can move smoothly across Europe, without having to worry about whether a charging point is available, and whether it can be accessed.

Concretely, fleet-based targets will ensure that for each zero-emission car registered in a Member State, 1 KW in charging capacity is installed. Fast recharging points must also be installed every 60 km along the TEN-T core network by 2025, and on the TEN-T comprehensive network by 2030.

For hydrogen refuelling stations, we would like to see at least one station every 150 km along the EU's transport network (TEN-T) by 2030, and in every urban node serving both light and heavy-duty vehicles.

These targets are also essential for the sector, which requires a sufficient amount of recharging and refuelling infrastructure in order to convince consumers to buy zero-emission vehicles.

TEN-T ports – maritime and inland – will be required to install on-shore power supply, while airports must ensure electricity supply for stationary aircraft.

Running planes and vessels on clean fuels is more challenging as options are limited and it is not possible to simply replace today's fleet from one year to the next. The aviation sector is also still recovering from the COVID-19 crisis.

This means that the path towards sustainability for aviation relies upon a basket of measures – market-based measures (like our emissions trading system), innovation, new types of aircraft powered by green liquid hydrogen as well as electricity, more optimal flightpaths and other new innovative solutions. But this will still not be enough. For aviation, the key will be Sustainable Aviation Fuels (SAFs).

SAFs are effective and technologically ready. But uptake is currently very limited: only about 0.05% of the fuels used for European aviation today are sustainable fuels, and they are produced outside of Europe.

We need a strong policy push that does not affect the competitiveness of EU aviation.

FuelEU Maritime in turn aims to stimulate an increase in demand for renewable and low-carbon fuels for vessels. Today the sector relies almost exclusively on fossil fuel and operators have had a 'wait and see' attitude towards cleaner fuels.

Our proposal will introduce a fuel standard, as well as annual limits for the greenhouse gas intensity of the energy used by ships. These targets start with 2% for 2025 and rise to 75% by 2050.

I believe our proposals strike the right balance between delivering the decarbonisation that the sector needs, while keeping the flexibility and predictability needed for a dynamic sustainable fuels market to thrive. They also complement measures on carbon pricing and energy efficiency.

We must act swiftly and give the right incentives and certainty to industry to invest. Our proposals do this, while putting in place long-term solutions.





THOMAS GANGL

CEO of Borealis

# Carbon2ProductAustria (C2PAT)

*“Creating a novel circular, cross-sectoral carbon value chain for the transformation of industry towards a climate-neutral economy”*

Borealis is one of the world's leading providers of advanced and circular polyolefin solutions and a European market leader in base chemicals, fertilizers and the mechanical recycling of plastics. In re-inventing for more sustainable living, we will keep discovering and innovating on our way forward, because progress is what we need to have a better life for everyone. In Borealis views, the 'Fit for 55 package' is a crucial step for European industry and society to lead the global race to climate neutrality by 2050. It needs to secure Europe as a destination for investments in climate-neutral and circular technologies. To accelerate industrial electrification, the package needs to ensure that huge volumes of renewable and low-carbon energy become available as soon as possible.

Borealis agrees with the European Commission that accelerated deployment of a clean hydrogen economy will be essential to make the energy transition succeed. As the Commission's latest data shows, the EU Chemicals Industry is a frontrunner in the use of hydrogen. Borealis therefore welcomes the increase in the size of the Innovation Fund as well as the creation of the Important Project

of Common European Interest (IPCEI) on hydrogen.

Clean hydrogen opens the door to circular and climate-neutral chemistry, which aims to utilise waste streams such as organic waste, used plastics and CO<sub>2</sub> as feedstock instead of virgin raw materials.

## Fundamental changes require all of us to join hands and work together

In 2020, Lafarge Zementwerke, OMV, VERBUND and Borealis co-signed a Memorandum of Understanding (MOU) for the joint planning and construction of a full-scale plant by 2030 to capture CO<sub>2</sub> and process it into synthetic fuels, plastics or other chemicals. Climate neutrality, circularity and innovation in Austria are driven by establishing a cross-sectoral value chain for carbon capture. This innovative project significantly reduces emissions from cement production, establishing the greenhouse gas CO<sub>2</sub> as a valuable raw material.

Carbon2ProductAustria (C2PAT) aims to demonstrate this novel, first-of-its-kind

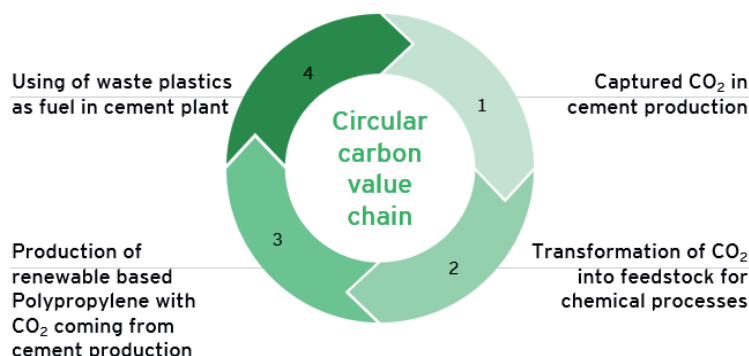
cross-sectoral carbon value chain at industrial scale. Industrial CO<sub>2</sub> released during cement production is captured (10,000 tons per year for the demo plant) and transformed with green hydrogen into feedstock for a variety of renewable-based chemicals and value-add plastics products.

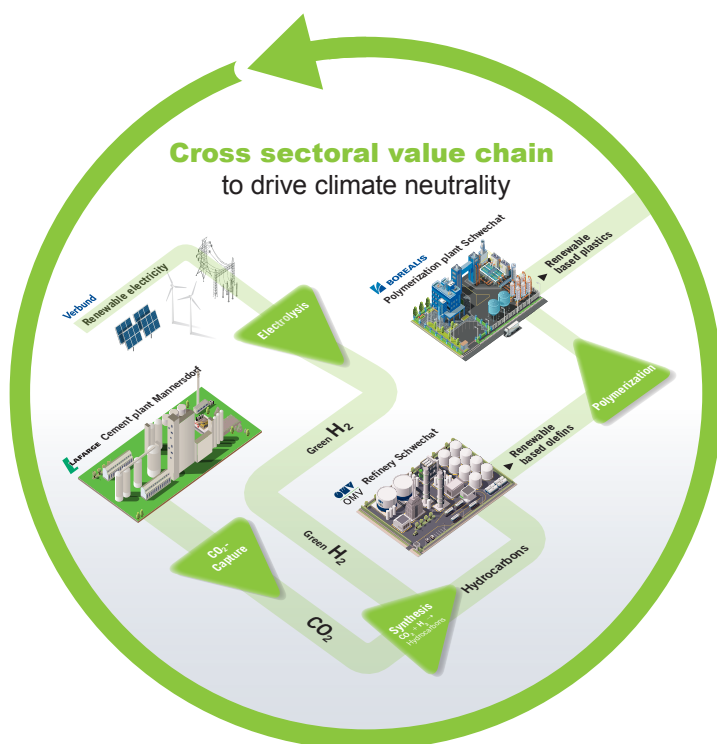
The overall system is based on the integration and joint operation of different technologies that will be combined into one novel, holistic value chain. The facility cluster comprises a carbon capture unit, water electrolysis for the production of green hydrogen, a new synthesis route via the Reverse Water-Gas Shift Reaction and Fischer Tropsch synthesis located at the site of Lafarge's cement plant in Mannersdorf. Intermediates will be processed at OMV and Borealis sites into olefins and, ultimately, renewable-based value-add plastics.

By demonstrating feasibility, C2PAT will elaborate innovative operational and business models to develop a scale-up concept for the carbon value chain. The key innovation is using CO<sub>2</sub> emissions from cement production as feedstock for chemicals – an integrated and cross-sectoral approach that has never been demonstrated before.

C2PAT also demonstrates a circular economy approach in the cement and chemical sector given that renewable-based plastics can be reused and recycled in various recycling streams. C2PAT will explore the market potential for renewable-based products and develop models for control as well as for holistically optimising the overall value chain.

New know-how will be gathered to transfer the demo plant to the next scaling step: a full-scale plant which is capable of converting more than 700,000 tons of CO<sub>2</sub> per year into renewable-based products.





Source: C2PAT Consortium, June 2021

Taking the next steps towards a climate-neutral economy will require the right financial as well as favourable regulatory framework conditions at the EU and Austrian national level.

With this ambitious collaboration, Lafarge, OMV, VERBUND and Borealis are showcasing an innovative and viable solution for the transformation towards a carbon neutral economy in Europe.

The joint project is designed in three phases: In Phase 1, based on a co-signed Memorandum of Understanding, the partners are currently evaluating and developing a joint strategy for project development and funding opportunities, business modelling and process engineering. Based on the results, in Phase 2, a demo plant could be technically developed and realised in the eastern part of Austria, by 2025. Phase 3 entails the full realisation of the presented vision by scaling up to the full size of 700,000 tons of CO<sub>2</sub> per year to be captured and used, and will demonstrate the global scalability of the project.



C2PAT aims to capture industrial CO<sub>2</sub> released during cement production and transform it with green hydrogen into feedstock for a variety of renewable-based chemicals and value-add plastics products. Photo: © Borealis



**PETER LIESE**

*MEP (EPP Group, Germany),  
Member of the ENVI Committee,  
European Parliament*

# Promoting an Ambitious Climate Action While Protecting Jobs in a Post-Pandemic Europe

**F**ighting the climate crisis is for sure the biggest task of our political generation. We must do more to protect the climate now before we reach a point of no return and future generations have to face the terrifying consequences of uncontrollable global warming.

Achieving the increased ambitions (from 25% to 55% net in less than 10 years) is only possible if everyone who invests in climate-friendly technologies is rewarded and there is a clear market signal that every investment in this respect pays off for individuals and companies. This promotes the creativity of each individual and will ensure that good ideas for climate protection are realised. I am sure that the totality of all citizens will produce better ideas for climate protection than if every detail is prescribed by the state or even the European Union. Therefore, command and control measures alone will not be able to deliver the Green Deal.

With the vaccination campaigns well proceeding all over Europe, we must re-concentrate all our energies on climate policies. In July, the European Commission has presented its plans to achieve climate neutrality in 2050 and an emission reduction target of net -55% until 2030. If we actually implement this legislative package known as "Fit for 55," we will not only make an essential step in climate protection but climate protection will finally pay off at every level.

Companies that invest in climate-friendly technologies, will have better economic opportunities and, in particular, every individual who behaves in a climate-friendly way, will save money. Looking at the proposal of the Commission to connect the establishment of a new emissions trading system for heating and transport with a Climate Action Social Fund, it is essential to establish fair compensation

and fair relief, especially for the socially disadvantaged. Supporting farmers and forest owners that store CO<sub>2</sub> through new business models is also an important step towards achieving the European climate targets in the medium and long term.

Market-based measures combined with standards are the right way to go. This policy mix will not only give strong incentives for a climate protective transition of our way of living and producing but also save the pre-pandemic levels of employment and even improve it through innovative, new business models. Only if all dimensions - climate, economy and society but also individual, state and industry - play together, we will not only protect but even create jobs.

Consequently, if we do it in a smart way, the new EU climate policies will also become a driver for innovation and subsequently jobs. After all, the Green Deal also is a growth strategy. We must finally overcome the alleged contradiction between economy and climate protection. Undoubtedly, the industry has to play its significant part in the green transition. Still, it is an immense challenge for many, especially small and medium sized companies. Therefore, we also have to support them and give them the chance to make this green transition. In this context, for example, it is important to maintain the free allocation of certificates in the existing emissions trading system for energy-intensive industry for the time being and create additional incentives to promote environmentally friendly technologies.

Unfortunately, other countries and competitors do not have the same level of ambition as in the EU. For the success of global climate action and the safe future of jobs in Europe, it is essential that we decarbonise the industry and not deindustrialise the EU. Therefore,

we need effective measures to avoid carbon leakage and maintain a level playing field for European companies. Moreover, the proposed Carbon Border Adjustment Mechanism, if compatible with WTO rules, can play an important role to initiate green transition all over the world.

It becomes obvious that the EU cannot act alone. Climate change is a global crisis that needs to be addressed globally. For sure, the EU is one of the biggest polluters and has to do its part. While we have reduced emissions by 25% in recent years, however, emissions in many other parts of the world have continuously increased. If this continues, our ambitions of emitting zero emissions will only have a limited impact on the global greenhouse gas emissions. This holds especially true if states such as the U.S. or China do not live up to or increase their own climate ambition. That is why we need to put massive pressure on other economies now. And this will be what we will need to be working on at the United Nations climate change conference (COP26) in Glasgow in a few months.





LARS RØSÆG

*EVP, Corporate Development &  
Deputy CEO, Yara*

# Why Fit-for-55 needs to drive innovative transformation

As Yara's mission is to responsibly feed the world and protect the planet, we firmly support the EU's climate ambitions. If we are not able to achieve the target of a 55% reduction in net greenhouse gas emissions by 2030 and reach full carbon neutrality by 2050, we could face a climate disaster. This would likely destroy the livelihoods of many of the world's 500 million smallholder farmers, who are already struggling with high costs and a changing climate.

However, we are optimistic and believe that climate neutrality can be achieved. That will require profoundly altering value chains and production systems. Disruptive innovations are needed that successfully reconfigure the entire business ecosystem. The Fit-for-55 package must create space for such an innovation-driven transition, via a logical sequencing of demand creation, investment build-up and infrastructural change. These three elements need to be implemented according to ambitious but realistic timelines, in order to enable the roll-out of innovations, which next would be scaled-up and replicated across Europe and beyond.

## Synergies between the Farm to Fork Strategy and the Fit for 55 package

Yara's core business is delivering nutrients to improve crop growth and soil health. However, to our great concern, too many crop nutrients are still lost into the environment instead of being taken up by crop roots. The **Farm-to-Fork's ambitious objective to halve fertilizer losses is not only necessary but also entirely possible**, according to our own crop nutrition experts, by supporting farmers in their daily tasks via the right products, digital tools and advisory services. Furthermore, it is also the best approach for the climate, since **reducing nutrient losses simultaneously addresses the carbon footprints of production and end-use**. When the soil has become depleted of organic matter, sound nutrient management helps to restore the soils' vast potential to store carbon. Promoting the targeted and

combined use of organic and mineral fertilizers and scaling up precision farming are the major pathways for meeting the F2F ambition and improving European farmers' profitability.

## The climate transition is a business opportunity

Ammonia, today produced from natural gas and oxygen, is the base chemical for manufacturing our nitrogen fertilizers; here Yara International is a global leader in ammonia production and trade. Clean ammonia, tomorrow manufactured with green or blue hydrogen, is an essential part of the solution to drive full decarbonization of the fertilizer industry. And the potential of clean ammonia doesn't stop here. Clean ammonia as a shipping fuel is the optimal solution to decarbonize long-distance shipping. And it can also serve as a hydrogen carrier to transport clean energy. **Clean ammonia is a great option to drive decarbonization of the economy and it opens up entirely new avenues for business growth.**

## Realizing opportunities through a sequence of business innovations

There is broad agreement that Europe's economy needs a profound transformation. Success **will depend on so-called "disruptive innovations" which conquer the market over time by altering value chains and production systems**. Novel solutions must first be made available and commercially tested, which typically makes these solutions initially dependent on niche high-value applications. To scale up, basic infrastructure is to be put in place. Demand will then develop in step with the roll-out of a new business ecosystem and is contingent on how the market values the innovation. Finally, the disruptive innovation can become the new reference after a short or longer transition. To reach the ambitious targets we need speed in this transition.

**For Yara, carbon-neutral ship transport and premium low-carbon food products are**

**expected to be early adopters of clean ammonia in the initial phase of its transformation journey.**

As first movers, Yara will depend on supportive framework conditions to enable scale effects and avoid a first mover disadvantage. Mass-market demand for climate-friendly fertilization practices will develop next, based on consumers' pull up to the end of the food value chain. **The new production installations will subsequently outcompete existing infrastructure depending on their ability to serve local and export markets.**

## Fit-for-55 must enable this innovation sequence or else it will fail

The Fit-for-55 proposals will certainly become subject of intense paragraph-by-paragraph negotiations. For businesses, it is crucial that during this process the package remains coherent and comprehensive. **Yara believes that the different timelines of the new legislation for CBAM, ETS, RED, LULUCF and others need to be reevaluated from the perspective of a demand-driven innovation journey transforming value chains.** Rather than pushing renewables into industry, supply and demand for renewable products have to be developed in conjunction, which will convince investors to finance these investments and complement EU infrastructure funding. The design of a carbon border adjustment should take into account global competitiveness of Europe's low-carbon value chains rather than only regulating the import of a limited set of products. Such an approach will enable businesses to transform rather than only adjust to a new pricing environment. At the same time, businesses must be incentivized by consumers or regulators to collaborate on decarbonizing their value chains. The supporting regulations should develop in step with the roll out of the new economic system. **This can be done without slowing down the Fit-for-55 reform. Instead, it will accelerate the disruptive transformation we depend on.** It is ambitious, but in our view also feasible.



MICHAEL BLOSS

MEP (Greens, Germany)  
Member of the ITRE Committee

# Three steps to tackle the climate emergency

**E**xtrême heat waves, major forest fires, droughts or flood disasters - the climate crisis is an existential threat to our lives and economy. [Almost 40 percent of our economic](#) output is at risk of being lost due to the climate crisis till the end of the century. The "Race to Zero" emissions is on! Three things are important: Firstly, cut emissions as quickly as possible - starting with the biggest polluters like coal. Secondly, strengthen the industrial sectors and guarantee good quality industrial jobs. And thirdly, to guarantee a social transition. The EU's Emissions Trading Scheme (ETS) is responsible for around [40 percent of EU emissions](#). Given the urgency of action, this is where things really need to start.

## Deliver a European coal phase-out and unleash renewables

First, let's have a look at the energy sector. Coal-fired power is still the single biggest source of CO<sub>2</sub> in Europe. But it's also the easiest to shut down. Renewables are already cheaper than coal. With an ETS that has a minimum price of 60 euros per ton, coal wouldn't have a future post-2030. Whilst the current price is already a little more than 60 euros, even the Commission says that this level cannot be maintained. An important reason for this is, that every year, there are still more CO<sub>2</sub> certificates issued on the market than there is demand for those from heavy polluters. In 2019, this oversupply was estimated at around 250 million tonnes of CO<sub>2</sub>, and the corona pandemic has certainly increased this number. The ETS cap must be adjusted to meet realities, not to fuel an already oversupplied market.

To ensure energy safety while exiting coal it is important that we expand renewable energies fast. In addition to the fit for 55, we have to establish a European solar obligation connected to the renovation wave, which

plans to renovate 35 million buildings. As a low hanging fruit, solar should be made the standard for new buildings, in public buildings, commercial buildings and major renovations. Already today, most citizens could install solar power that would be economically competitive. The rest can be provided through the NextGenerationEU-Fund.

## The industry is ready, but a clear set of rules is missing

Secondly, we need a climate neutral industry. The Industry itself is the backbone of our economy, and needs to be able to keep up globally but also take their part in reducing emissions rapidly. To establish themselves as global market leaders, industry needs to transform and fast.

Car- or steel manufacturers already show that a green transformation is technically possible and that they are ready for it. But there need to be clear rules and a transparent path, with which they can plan. Daimler, Volvo and others want to switch to electric engines by 2030. So why does the EU want to wait until 2035? The result would be the loss of our role as pioneers and the waste of precious time.

Industrial sectors are beginning to transform. For example, the first steel manufacturers are producing green steel with green hydrogen. To make this the norm we need two things: Firstly, making green steel competitive. This is achieved through introducing a price signal to industrial sectors by removing free allowances. With the additional revenues and support schemes like climate contracts (Carbon Contracts for Difference) manufacturers will be backed by governments to invest in new, climate-neutral industrial plans and quickly convert their production. Secondly, through the introduction of a carbon border protection mechanism,

governments can protect them from CO<sub>2</sub>-intensive steel imports.

## The Green Deal only works socially

And last but not least, we need a social transition to guarantee a sustainable European Green Deal which works for all. Sadly, Europe has become more unequal and the cost of living has risen sharply, especially since the COVID crisis. Yet, the Commission's Fit for 55 package does not sufficiently consider the social impacts and, which means we run the risk of turning people against crucial climate measures.

The Europe-wide CO<sub>2</sub> price on transport and buildings especially could increase the cost of living and contribute to growing inequalities.

Rather than making life more expensive for the general public, the EU should invest in renovating social housing, schools and hospitals, investing in public transport and by steering the automobile sector to produce affordable electric vehicles by 2030 at the latest.

Without speeding up the transition, we have only ten years left until we cross the 1.5 degree threshold, which will mean more and more powerful climate impacts like floods and fires in Europe and globally. We must therefore seize the opportunity of setting the right incentives, as well as support for sectors including energy, industry and transport to achieve a speedy transition. Crises are not solved by dithering, misplaced support for old technologies or blocking crucial climate measures, but with courage, confidence and a clear plan. As Europe, we have the opportunity to establish ourselves as a leader in the green transition and lead the way towards a more sustainable future.



**THOMAS METH**

Co-founder and Executive Vice President of Enviva.

# Fit for 55 recognizes that sustainable biomass is key to fighting climate change, but the details must be right for today and tomorrow

**Unlocking the full potential of sustainable biomass for 2030 and 2050 is dependent on regulatory decisions made now. If we are to achieve our goals, the framework must enable investment, not create obstacles.**

Years from now, when scholars look back at global efforts to fight climate change, 2021 may well stand out – the United States re-engaging on climate, a renewed scientific consensus on the urgency to act and, hopefully, a pivotal summit in COP26. But even without the benefit of hindsight there is a strong consensus that the time for lofty declarations has passed. As Secretary General Antonio Guterres aptly described recent IPCC findings, this is "code red for humanity." If we are to reach net zero, it is time for concrete action – and sustainable biomass and negative emissions technologies will be essential.

Policy makers such as [Commission Executive Vice President Frans Timmermans](#) acknowledge that the world, and Europe, cannot meet its ambitious climate goals without wood energy. As he simply put it, "...without biomass, we're not going to make it". Just before the summer, Ministers from ten European countries stressed the "crucial role" bioenergy already plays in meeting the EU's climate goals. The European Commission's recent "Fit for 55" package demonstrated the EU's continued commitment to sustainable biomass. In doing so they are reflecting a well-established scientific consensus – that biomass sourced in the correct way is sustainable, renewable, and indispensable.

As the package moves into the next phase, policy makers should be mindful of the need for immediate action. For all the success of recent years approximately 69% of Europe's energy consumption still comes from fossil fuels, including a not insignificant amount of coal. It is a non-negotiable that this must be displaced,

and with 2030 just over 100 months away, it must be displaced quickly. Solar and wind may do the heavy lifting, but on demand heat and power will still be needed. The recent surge in peak power prices has underlined this. Far from being priced out of the market, the need for dispatchable power is keeping fossil fuels in the money.

Alternatives need to be rolled out, so we don't rely on fossil fuels when wind and solar are scarce. This is the role of sustainable biomass which, on a lifecycle basis, reduces carbon emissions from power by more than 85% compared to coal and more than 70% compared to natural gas. It's not just the science, the market is also telling us that we need to scale up **all** renewables – biomass included.

This must be borne in mind when RED III moves to the next phase. While biomass enjoys strong political and academic support, when it comes to policy making the devil is in the detail. This is especially the case when considering the sensitivity of international biomass supply chains to policy changes. It is vital that reforms unlock public and private investment, not constrain it.

Forestry markets are both highly complex and highly local. Policies must be globally applicable and avoid unnecessarily intervening in well-functioning markets. Policy makers should avoid the temptation to define rules in excruciating detail, that do not take account of the reality of on the ground practice. Such actions will deliver no sustainability benefit, but instead would only serve to complicate compliance, undermine confidence, and constrain supply.

The investment in today's biomass supply chains is as important for the long-term goal of climate neutrality, as it is for 2030. The supply chains that support the delivery of renewable power and heat to millions today, are the same

supply chains that will underpin the delivery of another climate mitigation non-negotiable – negative emissions.

When combined with carbon capture and storage technology (BECCS), biomass heat and power pulls carbon from the atmosphere, delivering negative emissions. Scaled up negative emissions solutions will be crucial for correcting temperature overshoots and to compensate for emissions in areas that would be far too expensive, if not impossible, to decarbonize, such as long-distance air travel and agriculture.

According to the latest IPCC scenarios, if we want to keep global temperatures below 1.5 degrees massive amounts of CO<sub>2</sub> will need to be removed. Even in the most optimistic scenario removals of 5 billion tons of CO<sub>2</sub> by mid-century are needed.

EU climate leaders like Denmark and Sweden are already developing BECCS projects to help deliver these removals. However, for them to be fully realized and for BECCS to be scaled up the infrastructure and supply chain must be maintained and invested in. This is a challenge policy makers must rise to today. [Research](#) commissioned by the Coalition for Negative Emissions has found that even when pursuing the most stringent IPCC emissions reductions scenarios, without delivering negative emissions at scale we will exceed the global carbon budget by 2040. Negative emissions from BECCS have the potential to be scaled up to deliver 4 gigatons of negative emissions by 2050.

While the debate may be ongoing about the best way to fund BECCS technology one thing is for sure - you cannot do BECCS without bioenergy. To realize the benefits of sustainable biomass, both immediately and in the longer term I call on EU legislators to ensure that RED III strengthens the investment case for bioenergy for today and tomorrow – because without it, we aren't going to make it.





**MORTEN PETERSEN**

*MEP (Renew Europe, Denmark), Member of the ITRE Committee, European Parliament*

# Ensuring the Renewable Energy Directive Becomes Fit for 55

The European Commission released their highly anticipated Fit for 55 package just before the summer break, and it is of utmost importance that we act fast and get all the details right from the beginning. The proposals did not arrive a moment too soon and perhaps the most fitting reminder of the urgency required was the extreme weather hitting Europe in the weeks following the release of the Fit for 55 package: one side drowning in torrential rain and another burning in scorching heat. Amidst the waves of devastation, the United Nations' Intergovernmental Panel on Climate Change announced that extreme weather events like these are around to stay given that limiting warming below 1.5 °C is no longer a realistic option.

However, the climate battle is not lost yet. Earlier this year, the International Energy Agency released a report showing that net-zero by 2050 is still achievable – but the path to getting there is becoming narrower by the day. Limiting warming to below 2.0 °C and as close as possible to 1.5 °C requires massive reductions in greenhouse gas emissions by 2030, which can only be achieved by accelerating the uptake of renewable energy. There is simply no time for setbacks in the coming decade. Fit for 55, a truly gigantic package, is our opportunity to set in place the legislation to address the many challenges we are facing.

We know that we are on the right track because renewable energy has been growing and showing its potential for the past years. Yet the pace of change is not even close to being fast enough. However great the developments have been for renewable energy, our current methods of rolling out energy projects will not be enough to save us. The only way forward is to drastically increasing the pace. Getting the results we aim for will require increased collaboration between member

states, ensuring real European solutions to our most urgent common problem.

The proposal for the revision of the Renewable Energy Directive seems to take on the need for increased cross-border collaboration by including measures such as requiring every member state to launch a cross-border initiative and a joint planning approach to offshore energy per sea basin. These are both great steps in the right direction but we should be doing much more to incentivise and facilitate cross-border projects. As renewable energy projects become bigger and more complex, our energy systems will grow more interconnected. We need to make sure that member states are ready to exploit the synergies between the different systems at every possible point. Supporting resources should be available so that all member states are able to keep up and that no member state is postponing developments due to lack of experience.

Another area lacking behind in the proposal is permitting. Permitting procedures are the biggest hurdle standing in the way of an appropriate rollout of renewable energy. As it stands, projects take unnecessarily long time to be granted permits, and the procedures are different from one country to the next. This is not only a problem on its own due to it pushing the lead time far forward into the future, but the problem is likely to be aggravated over time, as we expect increasingly more complex projects, some of which will also span across multiple countries. The difficulty and excruciating length of the processes are keeping us from reaching our goals in time. The bottom line is that if we do not address permitting differently, we will not be able to succeed. The proposal acknowledges the shortcomings of the current permitting processes but lacks concrete initiatives which can improve the status of permitting. A different approach

will include streamlining of the process and removal of unnecessary red tape, while also involving more regional cooperation and moving towards a homogenous approach.

In terms of targets the proposal features a new higher target of 40% renewable energy by 2030. Although the Commission is making the effort to be ambitious, it falls short of what is needed. The numbers and several experts point towards a 45% target not only being needed, but being feasible with current technologies. Given that the technology is available, we need to ensure we have the political will to follow through.

The RED revision will play a central role in the Fit for 55 package by ensuring that the proper uptake of renewable energy will be at the core of the green transition. In order to succeed, the focus should remain solely on renewable energy. Despite the potential interest for it, fossil fuels and low-carbon gasses need to be kept out of directive at all costs. Keeping the high level of ambitions means a lot of hard work and many arduous fights with MEPs and Member States but it is a fight worth fighting for.



JEAN HORNAIN

CEO of CITEO

# Circular economy: a concrete solution to climate and biodiversity challenges

**A** pioneer in sustainable development since the early 1990s in France, Citeo has built its expertise by imagining a new life for household packaging and graphic paper. Citeo has developed eco-design, collection, sorting and recycling services within the framework of Extended Producer Responsibility (EPR), thanks to a mutualised action of its client companies who are at the initiative of its creation, and in partnership with local authorities and sorting and recycling professionals. In order to bring an answer to the ecological emergency and accelerate the necessary transformations, Citeo is committed to work with all stakeholders to ensure that production, distribution and consumption at national and European levels are adapted to the preservation of our planet, its resources, biodiversity and the climate through the circular economy model.

The Covid-19 pandemic and the latest extreme weather events remind us once again of the threats posed to humanity by the erosion of biodiversity, and the urgent need to mobilise all stakeholders to answer to the ecological crisis. In this context of awareness of the climate crisis, the latest report of the Intergovernmental Panel on Climate Change (IPCC) published on 9 August 2021, deplores that even if the commitments made during the Paris Agreement were respected, they would lead us to a global warming of 3°C. It confirms the anthropogenic origin of global warming and its magnitude, due in particular to our linear consumption and production patterns. The

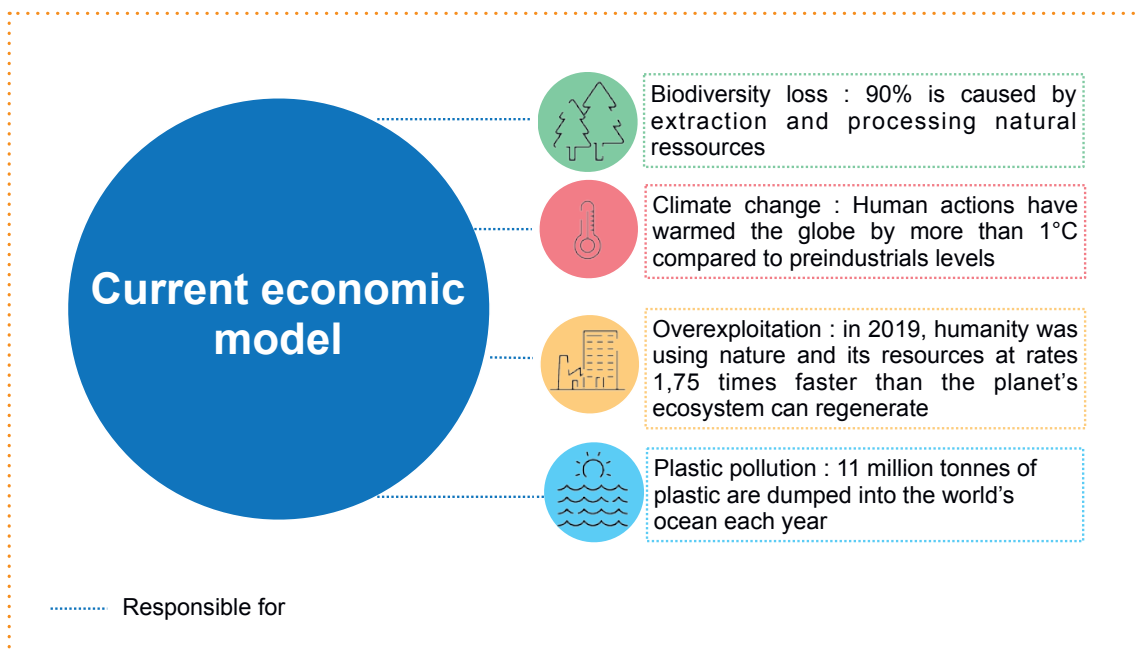
latest report by the IPCC and the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) also stresses the importance of protecting biodiversity in the fight against climate change.

Such systemic change can be catalysed by the circular economy. This includes reducing, reusing and recycling packaging and paper, as well as making better use of materials at different stages of their life cycle, notably through eco-design.

The next coming months will be important for the fight against the climate crisis with the hope that it be followed by a clear political vision and translated into impactful actions by public authorities and industries, in the light of IUCN, COP 26, COP 15 at international level, and the French Presidency of the Council of the European Union in the first semester of 2022.

Because biodiversity and climate change are not two separate crises but two aspects of the same global crisis, Citeo, by virtue of its "raison d'être" and its status as a "purpose company", wishes to share its recommendations concerning:

- The promotion of the EPR scheme as a concrete tool to fight plastic pollution within the negotiation of the international treaty on plastics pollution;
- The implementation of a Carbon Border Adjustment Mechanism that is up to the challenges of ecodesign;
- The deployment of an incentive fiscal system to accelerate the deployment of the circular economy;
- The generalisation of the sustainable corporate governance model and the extra-financial accounting in line with the challenges of the circular economy.



## For a treaty to expand EPR Systems internationally in order to fight plastic pollution

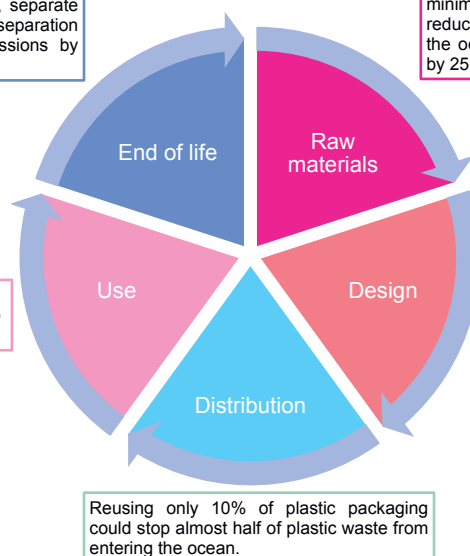
In order to fight against the pollution of natural spaces generated by plastic waste, a draft resolution on an internationally legally binding instrument will be examined at the United Nations General Assembly in 2022. Convinced of the need to provide a global and coordinated answer to this challenge, Citeo supports, alongside numerous companies and environmental associations, the draft resolution for the adoption of a legally binding global agreement. This treaty must therefore promote a circular economy encompassing the entire life cycle of plastic products and EPR systems to best fight against litter and integrate them into the circular economy loop. France and the European Union - as precursors of public policies in terms of reduction, reuse, recyclability, integration of recycled materials, and implementation of EPR systems - must be at the forefront of an international response to this 21st century challenge.

## For a Carbon Border Adjustment Mechanism that is up to the challenges of ecodesign

The EU has managed to decouple its greenhouse gas emissions (-24%) from its economic growth (+60%) between 1990 and 2019. However, these figures do not take into account emissions from international trade. At the heart of the legislative proposals of the "Fit For 55" package presented by the European Commission on 14 July 2021, the Carbon Border Adjustment Mechanism (CBAM), which is inspired by the emissions trading system, would enable the EU to extend its rules on emissions to companies operating on its territory and thus combat carbon leakage. Citeo supports this mechanism as an efficient tool to avoid producers of virgin material to relocate their activities to regions of the world subject to less coercive environmental rules. The CBAM should enable efficient management of resources within the internal market while contributing to the objective of carbon neutrality. It will be necessary to support complementarity between the CBAM, the European taxonomy and the Sustainable Products Initiative.

An holistic approach to waste, including a deposit system for liquid containers, separate collection of household waste and separation of mixed waste could reduce emissions by 2.76 billion tonnes of CO2 per year.

Deposit return schemes for recycling like in Sweden succeeds to recycle up to 90% of its household waste.



Reusable and recycled materials can minimise its demand for virgin materials, reduce global annual volume of plastics in the oceans by 80% and the sector's GES by 25%, all by 2040.

With over 80% of a product's environmental footprint determined during its design phase, circular design provides an approach and mindset to start redesigning products, services, and systems for a nature positive Future.

Reusing only 10% of plastic packaging could stop almost half of plastic waste from entering the ocean.

Therefore, Citeo recommends that this mechanism be applied to all raw materials in order to:

- Strengthen the European recycling market;
- Support measures aimed at integrating recycled materials;
- Contribute to closing the price gap between virgin and recycled materials;
- Support an equivalent level of competitiveness between products incorporating recycled materials and those made from virgin materials.

## For an incentive fiscal system to accelerate circular economy

Finance is a key lever for achieving the ambitious goals of economic prosperity, social inclusion and environmental regeneration. The World Conservation Congress, held in Marseille last September, made a strong call to large companies and other investors to analyse the potential impact of new investments on nature at an early stage, favouring those that benefit nature. In this perspective, the classification system of sustainable economic activities, as foreseen by the European taxonomy, should recognise the complementarity between circular economy activities and climate change actions.

In this perspective, Citeo supports the implementation of a taxonomy accelerating the deployment of the circular economy, that would take into account:

- The waste hierarchy;
- The reduction of overpackaging and the reflection on the right balance between the reduction of packaging and the fight against food waste;

- The development of new complementary recycling technologies, including chemical recycling;
- Selective collection, by promoting new collection systems;
- Disruptors to the recycling process;
- The fight against substances of concern.

Furthermore, the new own resources correlated to non-recycled plastic packaging, which is included in the European recovery plan, must be a real lever to accelerate the circular economy and the preservation of natural resources. Consequently, the transposition of this measure at national level must provide an incentive for all the plastic value chain players while meeting a common environmental ambition, and without compromising the functioning of the internal market. Thus, according to Citeo, this measure must, at the Member States level, concern virgin materials only, to discourage the purchase of virgin materials outside the EU, while favouring the purchase of recycled materials to so it combine environmental preservation and industrial resilience.

## For moving the environmental impact from "extra financial" to "financial" reporting in accounting rules

In line with the European Commission's initiative for sustainable corporate governance, there is a need to improve the European regulatory framework to prioritise long-term sustainable value creation over short-term profits, while aligning the interests of companies - their shareholders and managers - and society by including the environmental impact of industries within the accounting process, moving from the "extra financial" to the "financial" reporting.





LINDA MCAVAN

*The European Climate Foundation's executive director for European relations and a former British member of the European Parliament, where she chaired its development committee*

# Climate Crisis Shows Need for Bolder National Actions Under EU Green Deal

From devastating wildfires in Greece to deadly floods in Germany and Belgium this summer, the impact of climate change in Europe is being felt with increasing frequency and force. So too is the political fallout.

In Greece, the government reacted to the heatwave-fueled blazes by creating a ministry for the climate crisis and civil protection -- and by appointing a former European commissioner for humanitarian aid (and a Cypriot national) to lead the new organisation.

In Germany, the ruling party's candidate to succeed Chancellor Angela Merkel suffered a gaffe-induced election-campaign setback -- and questions about his climate credentials -- in the wake of the flooding disaster in two western German states.

For the 27-nation European Union, all this underscores the need for clarity and honesty about policy responsibilities as the bloc seeks to deepen cuts in greenhouse-gas emissions and become climate-neutral by mid-century.

At stake is the EU's ability to avoid another knee-jerk populist backlash and show the long-term rewards of multilateral cooperation to counter global warming, mankind's most pressing threat.

The distinction between EU and national policy tools is central to the bloc's new "Fit for 55" package of draft climate legislation, which the European Commission unveiled on 14 July. While EU instruments will deliver some of the emission cuts needed, parallel national action is essential.

The Commission proposals aim to reduce EU emissions by 55% -- rather than by just 40% as previously agreed -- in 2030 versus 1990 levels and hasten the development of clean energy. The measures need the approval of EU governments and the European Parliament in a process due to last at least a year.

A central feature of the package would ensure that EU countries retain the freedom to fashion policies for domestic industries -- agriculture, waste, buildings and surface transport are among them -- that together account for 60% of the bloc's emissions.

Under this proposed revision of European "effort-sharing" legislation, EU countries would face stricter 2030 targets for curbing these sectors' discharges. But those goals would continue to vary based on national wealth, with the steepest reductions falling on the richest member states.

This key facet would be hard -- or even impossible -- to pick up from media coverage. News reports have largely made the package look like a top-down, one-size-fits-all, EU plan, with particular focus on two other draft European laws.

One would phase out the sale across the EU of cars with a combustion engine. The other would create a European system for slashing emissions from buildings and road transport (mirroring Europe's cap-and-trade market for power plants, factories and intra-EU flights).

With the public spotlight on proposed European measures rather than on needed national ones, voters and politicians alike risk failing to see in whose court the ball lies for the EU to make good on its more ambitious climate promise.

Climate change may be global, but its politics and policies are largely national.

This is fitting. The EU legislative package -- and indeed the bloc's broader "Green Deal" -- stem from grass-roots climate activism in the run-up to European Parliament elections in 2019.

The EU assembly's newly elected members threatened to wield their veto power over Commission President-designate Ursula von

der Leyen, whom member-state leaders had proposed as a compromise choice, to get her to commit to a more ambitious green agenda. Since then, opinion polls in Europe have shown continued, solid support for climate action.

Awareness of the bottom-up nature of climate forces and of policy requirements across the EU is a prerequisite for understanding a key related challenge: ensuring a socially just transition to an economy based on renewable energy rather than on fossil fuels.

While such a revamp promises benefits for societies as a whole, it requires careful policy designs to avoid exacerbating social injustices. The current energy-price rises in Europe highlight the political risks.

Von der Leyen's Commission has accompanied the proposal for a European emissions-trading system for buildings and road transport with a planned "Social Climate Fund" to help tackle "energy poverty". But such a centralized European aid programme could struggle to find its way into people's pockets.

In any case, proposed European measures like this are meant to act as a helping hand for member states. If EU legislators end up rejecting more European tools to cut emissions, the onus would only grow on member countries to come up with home-grown policies.

National resolve is anyway more urgent than ever. This summer's horrifying fires and floods show clearly that climate action is a necessity rather than a choice -- and that inaction is too costly not just economically but also in terms of human lives and misery.



JACOB HANSEN

Director General of Fertilizers Europe

# Old Sector – New Role

The European fertilizer industry is standing at the dawn of becoming an essential player in the climate effort

**T**he fertilizer industry is well known as the ammonia industry since ammonia is the main building block for all nitrogen fertilizers. Ammonia is produced by combining hydrogen with nitrogen from the air, and the industry is currently producing and using about 40 % of the total amount of hydrogen.

*If the hydrogen is based on renewable energy, then the ammonia is also green.*

With the share of hydrogen in Europe's energy mix projected to grow from less than 2% today to 13-14% by 2050, the open question quickly becomes how best to store and transport this hydrogen. Unlike hydrogen, ammonia doesn't have to be stored in high-pressure tanks and it has 10 times the energy density of a lithium-ion battery, making it an obvious future energy carrier. Ammonia will become the workhorse of the hydrogen economy.

Precision farming, including decision making support tools, has created new perspectives for fertilizers use in agriculture. Such technologies will drastically reduce losses to the environment while maintaining the necessary productivity to feed the global population. Green fertilizers based on green ammonia will in themselves help decarbonise the agricultural sector.

## Green ammonia as the workhorse of the EU Hydrogen Economy

Although it might seem a paradox, ammonia is a better hydrogen carrier than hydrogen itself. Hydrogen liquifies only at the extremely low temperature of -253 degrees, whereas ammonia liquifies at -33°C and can be handled easily, similarly to liquified natural gas. Storing hydrogen under pressure is also possible but again, for the same volume,

ammonia has a 50% more hydrogen than hydrogen itself. Therefore, when hydrogen is needed, it makes more economical sense to transform, transport and use it as ammonia, unless the hydrogen is produced and used on site.

The ammonia molecule is also one of the best alternatives for the mid/long-term storage of electricity as a chemical energy. As such, it can be used in buffering a renewables-based electricity system by transforming electricity into hydrogen/ammonia when renewable energy is abundant and cheap. It then can be used to produce electricity when needed.

The role as energy carrier can start by attaching itself to the existing ammonia storage and transport network that serves the industrial market, which will greatly enhance the value in the transition. In the

longer perspective new storage facilities and an extended transport network will have to be built.

## Step by step transition

Rome was not built in a day, and neither will a decarbonized industry.

'Green ammonia' production is based on green electricity where hydrogen is produced via electrolysis. This process is very energy intensive. If fully covered by renewable electricity, the energy demand of the fertilizer industry would be similar to the annual electricity demand of Poland.

It is no surprise that the transition will be done in smaller steps building on the present production capacity and adding more and more green ammonia to the present grey ammonia.

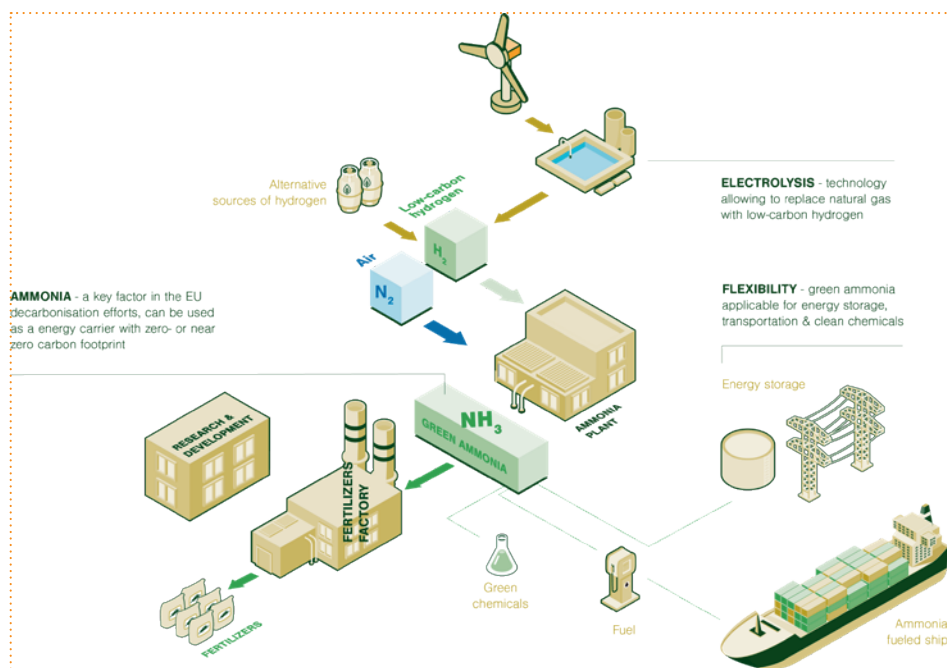


Figure 1: Green ammonia's role in hydrogen economy

'Blue ammonia' is not carbon free, but the CO<sub>2</sub> produced is captured and stored underground. It will therefore be climate neutral production and it certainly has its role in the transition of the fertilizer industry. Especially in areas of Europe where there is less wind and solar power.

### Decarbonising international shipping

Several alternative fuels are emerging to break shipping industry's reliance on fossil fuels. A recent survey of shipping sector stakeholders by Lloyd's List – the maritime publication – identified ammonia as one of the top three alternative fuels. In practice, ammonia is the only carbon free fuel. As such, it brings the promise to decarbonise the maritime shipping sector reducing its emissions by 95% by 2035 when demand could reach about 1 million tonnes of ammonia per day. Indeed, with limited modifications and technology improvements, ammonia could be directly used in combustion engines of deep-sea vessels.

### Reducing the carbon footprint in agriculture

Fertilizers are an important part of the carbon footprint of arable farming. This footprint can be reduced by much more precise and variable application of fertilizers. The improvement depends on availability of machinery that can use GPS and mapping technologies for precise application. Decision making support tools helping farmers make the right fertilizing decision based on the plant's nutrient needs are also becoming commonplace. The last element is improvement in the fertilizer products themselves as they

need to become more targeted. In all areas, major progress has been made over the last few years.

On top of this comes the fact that fertilizers produced from green ammonia have no carbon footprint and that in itself will be a major contribution towards making agriculture climate neutral.

### What needs to be done to unlock huge potential of green ammonia and advance the transition?

Production of green ammonia and low-carbon fertilizers is very energy intensive. Additionally, green energy is still considerably more expensive than natural gas making the production of green hydrogen uneconomic. The pre-condition for moving ahead is abundant amounts of competitively priced renewable energy.

As renewable energy and hydrogen are to play an increasingly important role in powering the EU economy, ammonia should be recognised as an important way to store and transport hydrogen in energy systems. Policies must include ammonia in decarbonisation efforts, through support for research and pilot projects.

Another major obstacle faced by front-runners who invest in green ammonia is the cost of production, which is currently estimated to be two to four times as expensive as that of conventional ammonia. Financial support, especially for early movers investing in capital-intensive green ammonia production, will be vital.

Part of the challenge is to develop a market for low-carbon ammonia. Certification schemes for green and low-carbon ammonia, and for the fertilizers they are used to produce, would help these products command a premium price in the market. Without support from the market, the transition towards decarbonisation cannot take place.

Fertilizer industry as producer of ammonia will become part of the solution to the decarbonisation challenge and our industry is committed to play its part. Through investments, public funding, and coherent legislative framework, the industry can cut its own emissions, support the decarbonisation of agriculture and act as the workhorse for the green hydrogen economy.

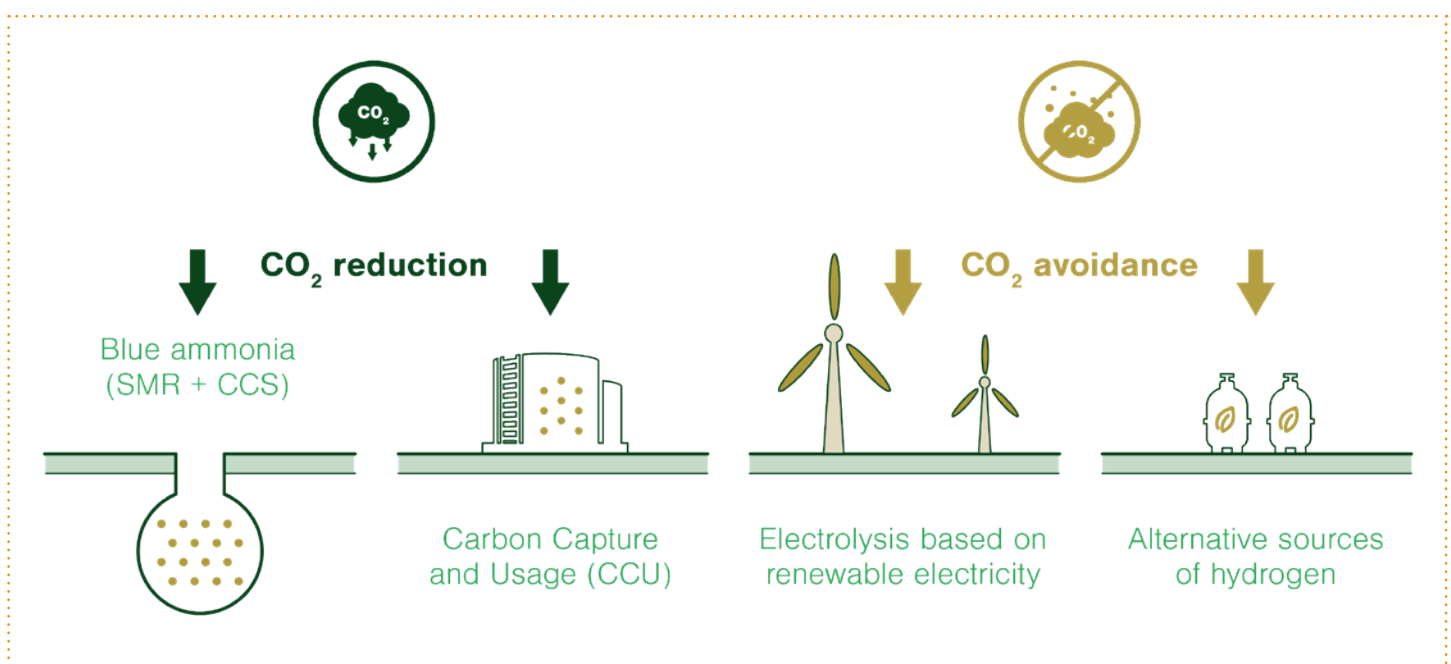


Figure 2: Emerging low carbon technologies





**PERNILLE WEISS**

*MEP (EPP Group, Denmark), Chair of the MEP Water Group, Member of the ENVI & ITRE Committees, European Parliament*

# The green transition only hurts those who do not want to take it seriously

I have noticed that several of my colleagues are advocating the view that the green transition is going to hurt if we are to succeed in achieving the climate goals.

I think that is a strange premise. How do they know that? Should there be any pain involved before anything can go well? Or does the pain metaphor sound more action-ready and consistent and thus more politically correct?

In contrast, there are others - including me - who, conversely, believe that we actually already are very adaptable, and that only relatively few are vulnerable to the ongoing and upcoming changes in everyday life - in our shopping, in many companies' production equipment and so on.

It should not be denied that there will be steps on the ladder towards the fulfillment of climate goals, which will be connoted with a certain form and degree of pain. Of course. There will be anxiety from the hassle of adjustment and headaches from hearing how many - no one mentioned, no one forgotten - complain that the transition is either too slow, wrong, too fast, or not at all. But I would strongly warn against us as politicians promising in advance that it will hurt regardless and for sure.

Simply, I think that statement is a cheap shot.

With that mindset we allow ourselves to be sloppy when we rattle off with initiatives in all directions and in asynchronous heartbeats. It's also cheap - and too easy - because the chorus of doomsday prophets, especially our political opponents on the left, use the echo chamber of the climate struggle to revive old 70's revolutionary sentiments, in order to

steal time for political craftsmanship, it is to find sustainable solutions.

That life hurts, the human race has always had to experience. Through pain, new and often deeper insights are gained into life and into the resources available to the individual or the environment. That the climate change is thus something particularly 'evil' is therefore nonsense, although it is typical of how our time is occupied with avoiding any kind of pain, waiting time, disadvantage, differences, etc. At the same time as we consciously seek out the pain and competition in everything from the gym, in the pursuit of love, and the statement that all change for the better only happens through firewalking.

That's weird.

What if it is possible to achieve the climate goals with enthusiasm, desire, voluntary cooperation and mutual recognition? What if the green transition is actually possible to carry out without hurting anyone for a particularly long time? What if the way we plan and carry out the changeover happens with logical, meaningful and encouraging information along the way, with appropriate funding and an ongoing re-design of incentives and instruments that support the experience and confidence that it all happens as smooth and fast as possible? What if facts and technology neutrality, as well as the will to make the EU truly self-sufficient in green and clean energy in abundant and secure quantities, fill most of the media picture? Preferably in ways where my old parents can be assured that everything will probably be all right and that their great-grandchildren will not need to protest with stomach ache and anger in the mouth.

I think we should strive for that.

After all, we politicians could start by taking seriously the growing frustrations about greenwashing that have long come from an increasing number of companies. Companies, that for many years have worked according to the UN World Goals. Companies that have adhered to the life cycle logic and circular economy long before the EU green investment taxonomy was finally adopted. Let us now create the framework and foundation for the EU to show the rest of the world that concrete CO<sub>2</sub> measurements from cradle-to-grave of everything from toys to tuna can actually be calculated and used as a guide so that we can get as painless as possible through the transition. Based on real facts - not numbers that sound good on paper.

That might hurt. On someone. Namely, the potent vanity of us politicians when we cannot just state that 'it is going to hurt' but have to roll up our sleeves and go to war with making the climate fight less evil than it hopefully needs to be.



**PATRICK CHAIZE**

*French Senator of Ain  
President of Avicca ([www.avicca.org](http://www.avicca.org))*

# How to make the necessary digital transition a sustainable transition?

**H**ow to reduce the environmental footprint of a sector today responsible for 2% of greenhouse gas emissions in France, and maybe more than triple by 2040 if our public policies do nothing?

This issue is at the core of the reflections of institutional players in the digital sector : Avicca, an association of elected officials who work on all digital issues, the State and its regulator, Arcep, and of course parliamentarians. It was in the Senate roadmap and a bill was drawn up to reduce the digital environmental footprint. Approved by the parliamentary assemblies, the text is built around four priorities :

## 1) Make digital users aware of its environmental impact.

Schools have a role to play in training in the responsible use of digital tools, young people being particularly digital consumers. At the other end of the training chain, the training of future engineers must include skills in software eco-design.

It is also important to develop tools of measuring by creating a research observatory of the environmental impacts of digital technology within ADEME (French ecological transition agency) or by including the environmental impact of digital technology in the Corporate Social Responsibility report.

The Senate is also putting forward the idea of a tax credit for the sustainable digitization of small and medium-sized enterprises, in particular to push to get refurbished terminals.

## 2) Limit the replacement of digital terminals, the manufacture of which represents 70% of the digital carbon footprint in France.

This aspect of the environmental impact of digital technology affects user behaviors, so it is often overlooked or intentionally ignored.

It must become the subject of increasing attention.

The first attention is to strengthen the fight against planned obsolescence and improve the fight against software obsolescence by integrating in the French Consumer Code the definition of programmed obsolescence.

On the supplier side, the aim is to force the seller of products with digital elements to separate security updates from other updates. The intention is also to increase from two to five years the length of time during which consumers can receive the updates to maintain the conformity of their goods. The user who has installed an update should always be able to revert to previous versions of the software provided when purchasing the product. Finally, the warranty period of conformity for digital equipment should be increased from two to five years.

Senate also aims to take into account product sustainability criteria in the public purchases of certain digital products. This would be based first on the reparability index, compulsory since January 1, 2021, then on the Sustainability Index from January 1, 2024.

Finally, even if some resistance has recently been expressed against tax reductions (exemption from double taxation that can affect recycled terminals, reduction of the VAT rate on the repair of terminals and the acquisition of reconditioned electronic objects), tax incentives that will limit new purchases should be found.

## 3) Promote ecologically virtuous digital uses.

This involves thinking about the eco-design of websites and public online services and those of companies whose turnover exceeds

a threshold to be defined by decree of the Council of State.

This can be the obligation for on-demand audiovisual media services to adapt the quality of the downloaded video to the maximum resolution of the terminal, the prohibition of the automatic launch of videos or the practice of infinite scroll.

## 4) Require network and data center operators to subscribe to legally binding commitments in order to prevent the increase in consumption and emissions, particularly with the roll-out of 5G:

This criticism we have heard a lot with the arrival of 5G, must find a first solution by forcing data centers to reduce their environmental impact through a multiannual commitment.

The tax advantage for data centers on final electricity consumption (TICFE) could also be conditional on performance criteria.

Binding multiannual commitments are also expected from network operators to reduce their greenhouse gas emissions and energy consumption.

Arcep is a key player in raising awareness in the digital sector regarding the environmental issues associated with it.

Arcep's authority needs to be increased with environmental regulatory powers. As example, the Authority could add the preservation of the environment among the conditions for radio frequency allocation.



GILES DICKSON

*WindEurope CEO*

# Electrifying Europe with wind energy – towards net-zero by 2050

**W**ith the presentation of the European Commission's "Fit-for-55" package, the EU has set a new pace for the transformation of Europe's energy system. The goal is to be climate-neutral by 2050, and the method set out in "Fit-for-55" is electrification of the energy system. And whether it's direct or indirect electrification, the source will be renewables. "Fit-for-55" is a blueprint for accelerating the expansion of renewables across Europe.

The EU envisages that Europe's electricity will be almost completely zero carbon by 2050. They estimate that electricity will be 57% of the EU's energy mix and that a further 18% will be electrified indirectly via renewable hydrogen and its derivatives. Large-scale electrification of mobility, heating and industry will lead to an almost threefold increase in the demand for electricity across the EU: from 2,700 terrawatt hours (TWh) today to close to 7,000 TWh by 2050. Take the German chemicals sector: its electricity demand alone will grow from 60 TWh to 628 TWh by 2050, more than Germany's entire electricity demand in 2018.

At the same time the EU is determined to clean up the power sector. By 2050 most electricity will come from renewable and low-carbon sources. And wind energy will lead this decarbonisation. Wind provides 16% of Europe's electricity today. Already by 2027 it will be the number one source of electricity in the EU; and by 2050 its share in total electricity generation is set to increase to 50%. Onshore wind will remain the dominant technology. New wind farms, and the repowering of existing wind farms, will boost the EU's installed onshore wind capacity from 165 gigawatts (GW) today to 1,000 GW by 2050. The EU Commission wants offshore wind to grow by the factor of 20: from 15 GW today to 300 GW by 2050. Bigger turbines and the

commercialisation of floating offshore wind will play a key role in this expansion.

The perception of renewable energies has changed fundamentally over the past decade. For a long time energy-intensive industries, such as steel, cement, aluminium, chemicals or fertilisers did not like renewables. They thought wind energy was expensive and that it would mess up the energy system with its "intermittency". But wind energy has delivered a remarkable cost reduction over the years. It is now among the cheapest sources of electricity in Europe – certainly cheaper than new coal, nuclear or gas. And by reducing taxes and levies on electricity governments can further reduce the costs for consumers. As can the uptake of intelligent, digital battery storage solutions.

Now energy-intensive industries are knocking at our door. They want our cheap electricity to decarbonise their CO<sub>2</sub>-intensive processes. Take again the chemical sector: chemical giant BASF recently bought shares in Europe's largest offshore wind farm. They are very clear about the large amounts of renewable energies they need to electrify. And just as importantly, the financial markets gave a vote of confidence: despite the pandemic Europe raised €43bn to finance 20 GW of new wind farms in 2020.

A home run for renewables? Not yet. Europe needs to build 30 GW of new wind per year to reach the 2030 targets set out in the "Fit-for-55" package. As it stands, Europe will only build 15 GW over the years 2021-2025. We need to overcome several challenges to deliver the EU's climate promises. And the most ambitious decarbonisation and electrification targets remain purely academic if we don't solve those. The main bottleneck for new wind energy in the EU is permitting. Across Europe permitting procedures for

new wind energy projects are too long and complex today. The EU must help Member States to digitalise, streamline and accelerate their permitting of both onshore and offshore wind farms. And for offshore wind farms, cross-border collaboration on permitting and maritime spatial planning will also be crucial.

And then there is the missing infrastructure. To electrify mobility, heating and industry we need to strengthen and expand electricity grids. Annual investments across all voltage levels of the European power grid need to double over the next thirty years to €80bn a year. Infrastructure is also key to ensuring the buildout of new wind farms. We need to strengthen road infrastructure to facilitate the transports and logistics. And we need to reinforce Europe's port infrastructure, a key enabler of offshore wind development. Over the next ten years alone we need to invest €6.5bn in heavy-loading quaysides, deep berths – and in that crucial commodity: space for the large offshore wind components.

Streamlining the permitting processes and reinforcing our grids, roads and port infrastructure are no quick fixes and will cost us some money. But the benefits of renewables-based electrification clearly outweigh those costs. Electrification is the cheapest and most efficient solution to decarbonise our economies. Electrification will reduce the total energy demand of our energy system from 17,400 TWh today to only 7,200 TWh. And it will reduce the EU's dependence from fossil-fuel imports and make Europe a greener and healthier continent.



**KRISTIAN RUBY***Secretary General of Eurelectric*

# Electricity leads the race to net zero

**T**he new era of clean energy is initiated with a roaring electric decade. Electricity is the cleanest energy carrier in Europe, and it is set to reach full carbon-neutrality well before 2050. Looking ahead, electrification offers the most cost-effective solution to decarbonise major parts of energy intensive sectors like transport, heating and cooling and industrial applications.

The steep decarbonisation curve set by the Fit for 55% package can lead to a fully carbon neutral power sector within the next 15-20 years, five to ten years earlier than previous projections.

This is no doubt a major challenge, but if any energy carrier can do it, it's electricity. The sector is decarbonising fast. The Power Barometer, Eurelectric's annual analysis of the sector, reveals that almost two thirds of the EU's electricity already come from clean and renewable sources. Solar, wind, hydro, biomass and nuclear generation now cover 65% of the EU's electricity the mix.

As electricity demand recovers to pre-pandemic levels, clean power sources continue to dominate the electricity mix. We therefore have solid proof that the 2020 figures were not an exception. Clean is on the rise, although still not at a rate we need.

Around 500 GW of additional renewable capacities must be installed by 2030 to meet the Green Deal objectives. This is equivalent to half of the entire European electricity capacity today. Breaking it down by generation type, both wind and solar installations need to double, while other renewables, like hydro and biomass, must significantly up their share as well.

The electricity industry persists in its efforts to replace the most polluting power plants. The investment needed, both in generation and distribution, is not to be ignored, though. Neither is the need to combine the phase-out of fossil fuels and the installation of renewables with developments in storage and

flexibility solutions. Another critical factor is the lengthy permit-granting procedures, that often delay the deployment of renewables by as much as six to eight years.

Across the Fit for 55% package, several provisions and incentives strive to remove some of the roadblocks and boost electrification, but more must be done, especially to tackle the permitting lead-times.

## Electrification unfastens transport decarbonisation

The race to electrify is on in road transport. Responsible for about a quarter of the EU's GHG emissions, the Fit for 55% heralded a plan to end the sales of new combustion engine cars by 2035. Automakers are taking serious steps to improve their offerings. And their efforts are bearing fruit, as electric vehicle sales break record after record.

Numerous models of electric vehicles are now available, and improvements on the battery side seem to be curbing range anxiety. Nevertheless, the deployment of charging infrastructure across Europe must mirror this upward trend to reach some 3.5 million points in 2030 - up from 224,000 today.

Vehicle fleets are key to speeding up the electrification of transport. As public authorities and private companies replace their fleets with EVs, benefits on several fronts will follow. First, significant carbon cuts - as fleets emit 50% of road transport's CO<sub>2</sub> emissions. Second, a rapid deployment of charging points along frequently travelled routes, increasing their availability for private users. Third, an affordable second-hand EV market, as fleets refresh on average every five years.

## Electrified buildings: decarbonised and energy efficient

An electrified building sector will also be crucial when constructing the path to net zero. Relying heavily on fossil fuels today,

buildings consume 40% of the energy used in the EU, emitting over one-third of the overall CO<sub>2</sub>. With three-quarters of the EU's building stock being energy inefficient, the need for space heating and cooling is higher. This has a direct impact on consumers' energy bills.

That needs to change. With the Renovation Wave, as well as the Fit for 55 % package, the Commission is taking significant steps toward cutting emissions and increasing energy efficiency. More than 35 million buildings, including hospitals, schools and houses, have to renovate to a nearly-zero energy standard between now and 2030.

Electrifying buildings means energy savings and CO<sub>2</sub> cuts. Electric heat pumps offer a solid solution. They are five to six times more energy efficient than conventional gas boilers and have a considerably lower CO<sub>2</sub> intensity. In 2020, the EU had a total of 15 million installed heat pumps. That figure must triple to achieve the Green Deal ambitions.

## The clock is ticking: time to electrify

With the latest IPCC report, scientists issued a clear warning: every tonne of CO<sub>2</sub> we send into the atmosphere will increase extreme weather events: wildfires, heatwaves, drought and heavy rainfall. But they have also said that fast action can dampen the worst.

Every EV replacing a fossil-fuelled car, every heat pump installed, every renewable power plant built, can help us stay within the limits of the Paris Agreement. The 2020s must be a decade of doing, a decade where we drive the necessary change. So let's do it. Let's electrify now!



RONNIE BELMANS

Advisor to the Board of  
EnergyVille



PIETER VINGERHOETS

EnergyVille/VITO

# Electrification and sustainable fuels: Partners towards carbon neutrality

There is an enormous push of hydrogen in the world. Given sufficient policy support, there will be low-carbon<sup>1</sup> hydrogen available. The discussion on the availability and cost of different options is found in a contribution by Jean-Michel Glachant and Piero Carlo Dos Reis.

Here, we attempt to estimate an order of magnitude on how much sustainable fuels including hydrogen will be needed in the future energy system. We follow the communication<sup>2</sup> of the EU on system integration:

1. Energy efficiency first, including use of waste heat,
2. Then electrification of those applications that can be technologically and cost-efficiently electrified,
3. If the first and the second approach are not feasible, sustainable fuels have to be used (amongst them hydrogen)

For 2018 an overall figure of 10.929 TWh (electricity 2512 TWh, solid fuels 268 TWh, oil and petroleum products 4013 TWh, gas 2397 TWh, renewable energies 1150 TWh, heat 537 TWh) of final energy supplied in EU-27 is mentioned.<sup>3</sup>

**Transport** overall requires 3.335 TWh<sup>4</sup>. By far the largest energy demand in this sector is the **road transport** (3114 TWh). Individual transport of persons is transitioning to electricity. An overview of electric cars shows an average of 20-25 kWh/100 km<sup>5</sup>. For smaller cars, the electric energy demand is lower than 20 kWh/100 km. We assume an average fuel consumption of 5,1 (Europe) – 7,2 (global) l/100 km<sup>6</sup>. With a weighted average of 46% petrol and 54 % diesel passenger cars<sup>7</sup>, this leads to 73,2 kWh/100 km with a minimum of 52 kWh/l for the lowest European figure: overall, electric cars consume 2.5 to 3 times less energy than ICE cars.

Heavy-duty vehicles, lorries, buses and coaches are responsible for about a quarter of CO<sub>2</sub> emissions from road transport in the EU<sup>8</sup>. Local buses can be cost-effectively electrified, given the fact that the trajectory and charging times can be planned. The electrification of trucks is more difficult but seems to be taking off<sup>9</sup>. Given full electrification of road transport, the energy use could be reduced to circa 1050-1250 TWh assuming constant mobility demand. Electrification of road

transport implies an enormous gain in energy efficiency.

The overall demand for liquid oil and petroleum products for **aviation and shipping** is 1053 TWh. In Eurostat, the fuel for international navigation and aviation is not included in the energy for transport. With the exception of a small share of domestic navigation, the potential for electrification is limited and hydrogen or synthetic/biofuels will be required.

The energy consumption in **residential and commercial buildings** in 2018 in EU-27 was 4405 TWh. The non-electrical part (75 %) of the energy supply is dedicated to heating. Assuming that, in line with EU ambitions<sup>10</sup>, three quarters of the energy demand can be saved through renovation, the decarbonization of 1846 TWh (natural gas and petroleum) remains. Electrification implies great gains in energy efficiency. A coefficient of performance of 4 for heat pumps would mean that around 462 TWh of carbon neutral heat and electricity has to be supplied as input to heat pumps. This leads to an extra electricity demand of 121 TWh.

The decarbonization of the **industry carbon-based energy supply** is a patchwork, with many approaches for the different products. A mixture of CCS/CCU, biofuels, circularity of materials and hydrogen/sustainable fuels from green electricity is to be considered. When studying literature, most technologies are still in a premature status, and often 2035 is mentioned as a starting date of full industrialization. Eurostat distinguishes 13 industrial sectors consuming 2816 TWh not including the 1032 TWh of carbon-based fuels

1 Taxonomy of "renewable & low-carbon" vs "fossil H<sub>2</sub>" introduced Ilaria Conti "Which future gas markets?" <https://fsr.eu.europa.eu/publications/2-handle=1814/66356>

2 [https://knowledge4policy.ec.europa.eu/publication/communication-com2020299-powering-climate-neutral-economy-eu-strategy-energy-system\\_en?language\\_content\\_entity=en](https://knowledge4policy.ec.europa.eu/publication/communication-com2020299-powering-climate-neutral-economy-eu-strategy-energy-system_en?language_content_entity=en)

3 [https://ec.europa.eu/eurostat/cache/sankey/energy/sankey.html?geos=EU27\\_2020&year=2018&unit=GWh&fuels=TOTAL&highlight=&n odeDisagg=010111111000&flowDisagg=true&translateX=-3806.753595830847&translateY=-617.7487735928504&scale=2.512716829970907&language=EN](https://ec.europa.eu/eurostat/cache/sankey/energy/sankey.html?geos=EU27_2020&year=2018&unit=GWh&fuels=TOTAL&highlight=&n odeDisagg=010111111000&flowDisagg=true&translateX=-3806.753595830847&translateY=-617.7487735928504&scale=2.512716829970907&language=EN)

4 [https://ec.europa.eu/eurostat/cache/sankey/energy/sankey.html?geos=EU27\\_2020&year=2018&unit=GWh&fuels=TOTAL&highlight=&n odeDisagg=010111111000&flowDisagg=true&translateX=-3806.753595830847&translateY=-617.7487735928504&scale=2.512716829970907&language=EN](https://ec.europa.eu/eurostat/cache/sankey/energy/sankey.html?geos=EU27_2020&year=2018&unit=GWh&fuels=TOTAL&highlight=&n odeDisagg=010111111000&flowDisagg=true&translateX=-3806.753595830847&translateY=-617.7487735928504&scale=2.512716829970907&language=EN)

5 [https://en.wikipedia.org/wiki/Electric\\_car\\_EPA\\_fuel\\_economy](https://en.wikipedia.org/wiki/Electric_car_EPA_fuel_economy)

6 <https://www.iea.org/reports/fuel-consumption-of-cars-and-vans>

7 <https://www.sciencedirect.com/science/article/pii/S0360128516300442?via%3Dihub>

8 [https://ec.europa.eu/clima/policies/transport/vehicles/heavy\\_en](https://ec.europa.eu/clima/policies/transport/vehicles/heavy_en)

9 <https://www.vox.com/energy-and-environment/2020/11/19/21571042/tesla-electric-cars-trucks-buses-daimler-volvo-vw-charging>

10 [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_20\\_1835](https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1835)

for non-energy use. Two examples illustrate the challenges faced in aiming at a carbon neutral industry.

For the steel industry, a number of new manufacturing options are present. One of them, Hydrogen Direct Reduction, uses electricity and hydrogen as inputs. First installations are designed in Sweden<sup>11</sup>. The approach requires 3200 kWh/ton steel extra electricity input, of which 2600 kWh/ton for hydrogen production.<sup>12</sup> Given an overall production of steel in Europe of 169 Mt/year in 2018, a full decarbonization via the H<sub>2</sub>-DRI leads to 540 TWh extra renewable electricity demand, to be compared with the present energy carbon based energy supply of 198 TWh. The example shows that the opposition electrification versus hydrogen is artificial: the technique is "hydrogen based", but from the outside, the energy flow is purely electric.

At this moment 293 TWh (264 TWh in chemical industry) of hydrogen is already used, mostly produced by Steam Methane Reforming of Natural Gas<sup>13</sup>. A lot of it is used for the production of ammonia. The production via electrolysis of the hydrogen for the ammonia as such would require 161 TWh.

This approach is extreme: it assumes that everything that can be electrified is. Transport and buildings will need an additional 1200 to 1400 TWh of electricity. In parallel 1050 TWh

of sustainable fuel will be used for aviation and navigation. Industry is a patchwork. The separation between sustainable fuels, hydrogen and electricity sometimes becomes artificial, making future energy flow diagrams as used by Eurostat challenging.

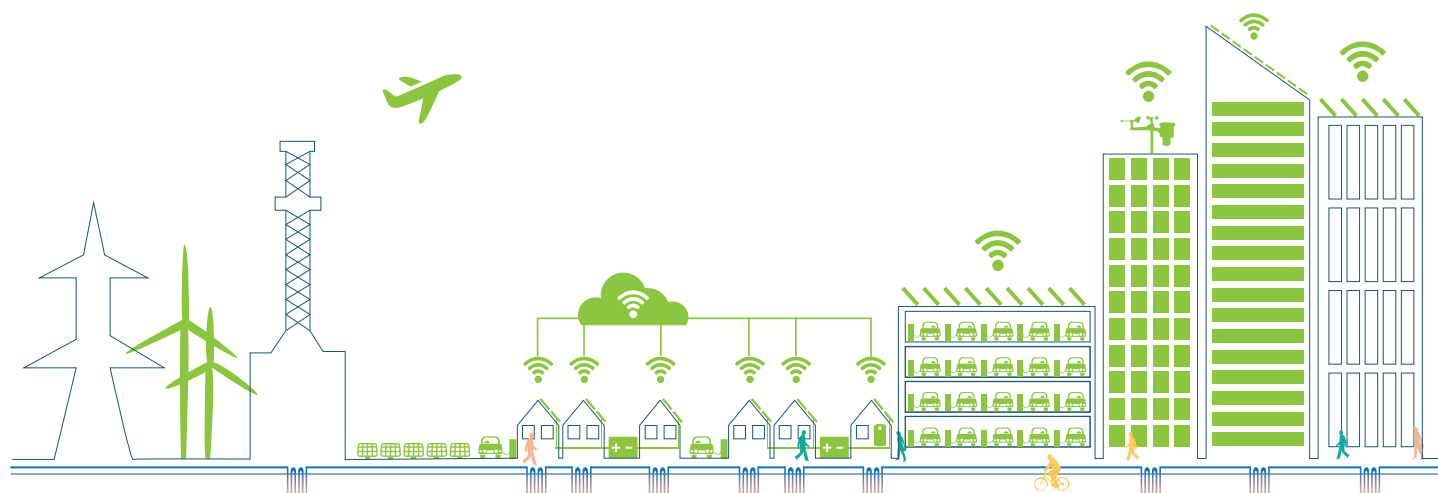
It is evident that a much more detailed modelling is needed and a lot of parameters are neglected here. Future studies will give far more insight.



<sup>11</sup> <https://www.powermag.com/swedish-companies-jointly-explore-hydrogen-based-production-of-steel/>

<sup>12</sup> <https://www.sciencedirect.com.kuleuven.ezproxy.kuleuven.be/science/article/pii/S0959652619330550>

<sup>13</sup> <https://www.sciencedirect.com.kuleuven.ezproxy.kuleuven.be/science/article/pii/S0196890420311766>







RAPHAEL BENROS

Senior Consultant,  
Games for Good Group

# Good Games and Climate Change: Building a better world through video games

In 2020, the video games industry reached €150 billion in revenue making it larger than the film and music industry combined.<sup>1</sup> Thanks to the widespread propagation of high-speed cellular data and smartphones, the global "player base" has reached 2.7 billion individuals. The video games industry has entered its golden age whichever way you look at it— and that means we should look at it more closely.

Indeed, close attention is demanded of us if we are to achieve a low-carbon industry. The video games industry poses a unique challenge because it is *always* on. Today, multiplayer gaming via online servers allow players to play in real-time, anytime and anywhere. Video games have benefited hugely from the optimization of networks, streamlined program development and the leaps in graphical capacity in gaming platforms or devices. But this is a double-edged sword. The high-end PC gamer can use up to 1,400 kWh per year—magnitudes above any other household appliance. Though this number represents only a small fraction of the total devices market, the market for most energy-intensive devices (PC, home consoles) continues to grow 5% yearly. Furthermore, the global pandemic has only accelerated the demand for games.

## Developing the role of the video games industry in the fight against climate change

On one hand, achieving a low-carbon video games industry requires further optimization and transparency at each stage of the value chain. It must deal with the scale

of development of "AAA" flagship games, reliance on online downloads and servers, rate of graphics innovation and the shift to Live Dev (continual development and delivery of new game content and features for existing games).

In the last decade, there has been a drive by games studios to make production more environmental. For example, the **International Game Developers Association (IGDA)**, the trade association, has its own **Climate Special Interest Group (SIG)** led by senior game directors. With a task force of 90 members across the industry, the SIG is currently working on a variety of initiatives focused on environmental actions found in-game, successful environmental games and what to learn from them, and game development's contribution to the United Nations (UN) Sustainable Development Goals. Key individuals are actively sharing their knowledge such as Mr Arnaud Fayolle, Art Director at Ubisoft, who is pioneering a game development toolkit for green technological and narrative impact.

These game changers come together thanks to conferences like the **UN Environment Programme's Playing for the Planet Alliance** where each year, studios compete by "hacking" their own games in a **Green Game Jam** to include "green activations" that inform and encourage their players to support a yearly environmental cause. This past year saw 11 major studios participate engaging 110 million players around reforestation and decarbonization. Additionally, more than two-thirds of the studios committed to reduce their carbon footprint with a new calculator for the industry to be created in 2021.<sup>2</sup>

Year to year, more studios are leveraging their resources to develop better games with a higher capacity to do good, optimizing all parts of their studio and supporting their player community proactively around climate change and environmental issues.

## Beyond the technology, video games have a strong culture potential

The video games industry has a unique toolkit at its disposal when it comes to fighting climate change: *cultural impact*. Thankfully, the video games industry is responsive to its younger demographics and is often led by young, ambitious individuals. Gaming studios know that they represent the future and share a responsibility in telling complex and emotive stories that capture the uncertainty of our times. Examples of mature story-driven games include [Life is Strange](#), [Kentucky Route Zero](#), and [What Remains of Edith Finch](#). With so much storytelling power in hand, it's up to the industry to share ideas and habits that reinforce positive environmental behaviour.

## The objective requires industry level collaboration and a world-building vision.

At a time where pessimism rules the climate change narrative, the future of video games is brighter than ever. Studios around the world look to support NGOs through donation campaigns and long-term partnerships that reflect a mature and action-oriented agenda. The diversity of issues involving climate change is an opportunity to "green-light" projects across tech, conservation, energy and consumers themselves— truly embodying the European model for society. However, this holistic model has yet to permeate throughout the entire industry. To take the video games industry to the next level means nurturing a stronger sense of responsibility in developers and consumers, as well as everyone in between.

<sup>1</sup> Witkowski, Wallace. "Videogames Are a Bigger Industry than Movies and North American Sports Combined, Thanks to the Pandemic." MarketWatch, December 22, 2020. <https://www.marketwatch.com/story/videogames-are-a-bigger-industry-than-sports-and-movies-combined-thanks-to-the-pandemic-11608654990>.

<sup>2</sup> "Playing for the Planet Alliance Releases 2020 Annual Impact Report." Playing4theplanet, June 4, 2021. <https://playing4theplanet.org/news/playing-for-the-planet-alliance-releases-2020-annual-impact-report/>.





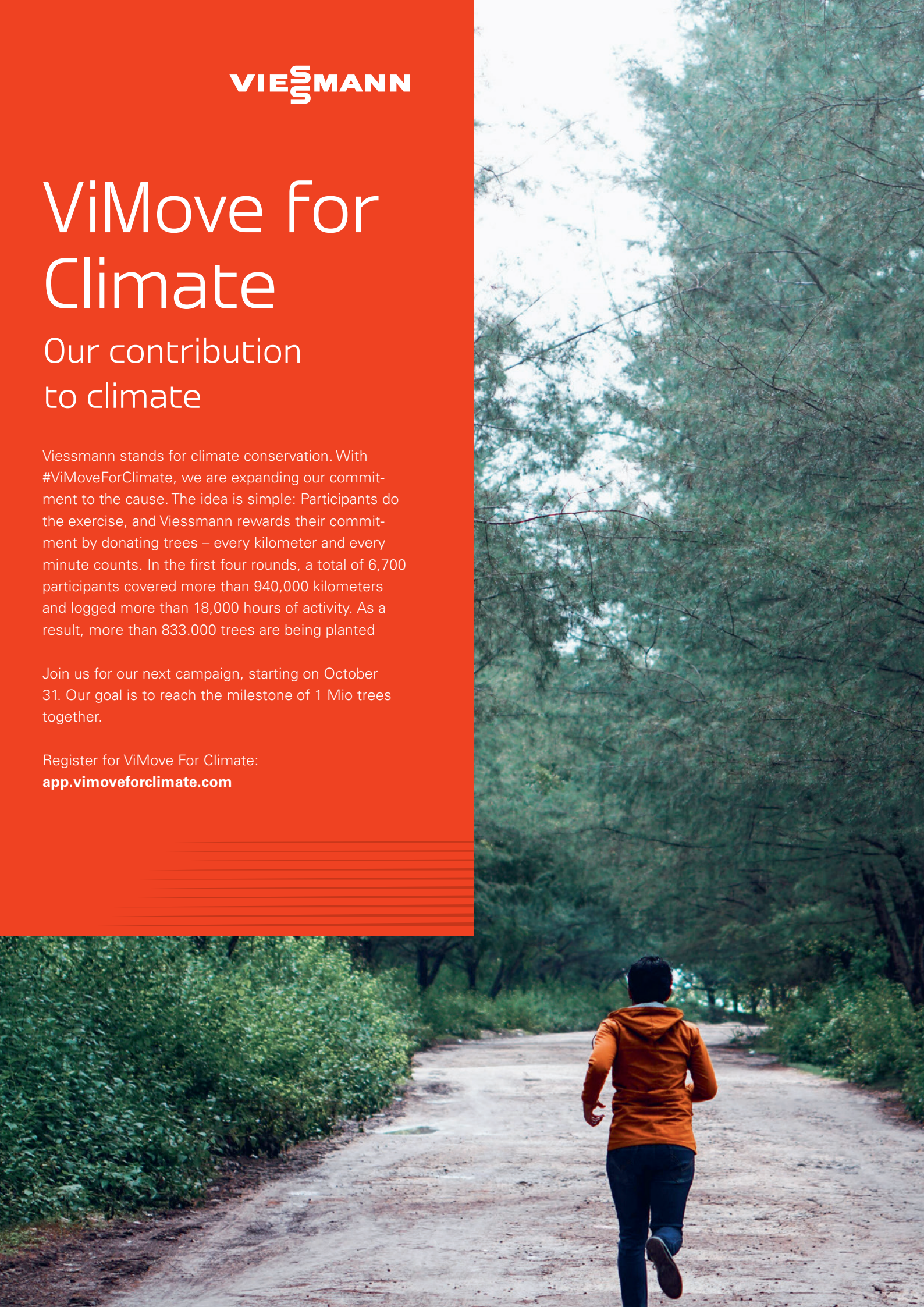
# ViMove for Climate

Our contribution  
to climate

Viessmann stands for climate conservation. With #ViMoveForClimate, we are expanding our commitment to the cause. The idea is simple: Participants do the exercise, and Viessmann rewards their commitment by donating trees – every kilometer and every minute counts. In the first four rounds, a total of 6,700 participants covered more than 940,000 kilometers and logged more than 18,000 hours of activity. As a result, more than 833.000 trees are being planted

Join us for our next campaign, starting on October 31. Our goal is to reach the milestone of 1 Mio trees together.

Register for ViMove For Climate:  
**[app.vimoveforclimate.com](https://app.vimoveforclimate.com)**





The background is a vibrant orange-red color. It is decorated with several stylized elements: green leaves and branches in various shades of green and teal; four open hands in a light pinkish-orange color, positioned around the central text; and several circular icons in a darker red shade, including a house, a percentage sign, and a globe. There are also speech bubble shapes with three dots inside. The central text is in a bold, white, sans-serif font.

ENABLE  
PEOPLE  
TO SHAPE  
A SAFER  
FUTURE  
BY CARING  
FOR THEIR  
LIVES AND  
DREAMS.

