



European  
Commission


# Going

## CLIMATE-NEUTRAL

### by 2050

A STRATEGIC LONG-TERM VISION FOR  
A PROSPEROUS, MODERN, COMPETITIVE  
AND CLIMATE-NEUTRAL EU ECONOMY





*'As Europeans, we want to leave a healthier planet behind for those that follow. We obviously cannot turn a blind eye to the climate challenge; we must look to the future.'*

**JEAN-CLAUDE JUNCKER**

President of the European Commission, State of the Union address, September 2018.

*'The European Union has already started the modernisation and transformation towards a climate-neutral economy. The European Commission is stepping up the efforts as we propose a strategy for Europe to become the world's first major economy to go climate-neutral by 2050. Going climate-neutral is necessary, possible and in Europe's interest.'*

**MIGUEL ARIAS CAÑETE**

Commissioner for Climate Action and Energy, on the European Commission's strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy by 2050, presented on 28 November 2018.



# Climate change is a reality



## Climate change is a serious concern for Europeans.

According to an EU-wide survey published in September 2017, more than 9 in 10 EU citizens (92 %) consider climate change to be a serious problem\*.

The last two decades have witnessed **18 of the warmest years on record**, and an increase in the frequency and intensity of **extreme weather events**. In Europe, this has resulted for example in:

- extreme heatwaves in four of the last five years;
- temperatures 5 °C higher than usual above the Arctic Circle in the summer of 2018, leading to rapid loss of Arctic sea ice and negative impacts on Nordic biodiversity;
- severe drought in large parts of Europe;
- flood events, with Central and Eastern Europe particularly affected.

Climate-related extremes such as forest fires, flash floods, typhoons and hurricanes are causing mass devastation and loss of lives, as well as economic damage. In 2017, economic damage caused by weather-related disasters amounted to €283 billion globally. For instance, the droughts that occurred in several EU countries in 2018 had an impact on the production of arable crops and animal feed.

The planet is warming by 0.2°C per decade, according to a report by the Intergovernmental Panel on Climate Change (IPCC) published in October 2018. Global temperatures have already increased by 1 °C and if we do not act now, the increase could reach 2 °C by 2060.

**If this happens, the impacts of climate change will worsen worldwide.** For example, 99% of coral reefs could disappear and the loss of the Greenland ice sheet could eventually lead to a seven-metre rise in sea levels, radically affecting coastal areas.

All of this will have severe consequences on both the European and global economy, infrastructure, food production, public health, biodiversity and political stability. It has been predicted, for example, that by 2100 the yearly damage from river floods in Europe could increase from €5 billion to €112 billion and that 16% of the present Mediterranean climate zone may become arid. Moreover, a reduction in food availability is more significant at a global warming of 2 °C than at 1.5 °C.

Only by limiting global temperature increase to 1.5°C could the world avoid some of the worst climate impacts and reduce the likelihood of extreme weather events. Immediate and decisive action on climate change is therefore necessary.

\* Special Eurobarometer on climate change, September 2017

# A vision for a climate-neutral Europe

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In November 2018, the European Commission presented a long-term strategic vision to reduce greenhouse gas (GHG) emissions, showing how **Europe can lead the way to climate neutrality – an economy with net-zero GHG emissions\***.

\* European Commission communication 'A clean planet for all: strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy by 2050' [COM (2018) 773 final]

The strategy explores how this can be achieved by looking at all the key economic sectors, including energy, transport, industry and agriculture. A portfolio of options was explored to underline that it is possible to move to net-zero GHG emissions by 2050, based on existing – though in some cases emerging – technological solutions, empowering citizens and aligning action in key areas such as industrial policy, finance or research, while ensuring social fairness for a just transition.

The European Commission's vision outlines seven main strategic building blocks:

- maximise the benefits of **energy efficiency**, including zero emission buildings;
- maximise the deployment of **renewables** and the use of **electricity** to fully decarbonise Europe's energy supply;
- embrace clean, safe and connected **mobility**;
- a competitive EU industry and the **circular economy** as a key enabler to reduce GHG emissions;
- develop an adequate **smart network infrastructure** and **interconnections**;
- reap the full benefits of **bioeconomy** and create essential **carbon sinks**;
- tackle remaining CO<sub>2</sub> emissions with **Carbon Capture and Storage (CCS)**.

Pursuing these building blocks, starting from the implementation of the 2030 climate and energy framework, will allow the EU to move towards a prosperous climate-neutral economy.

The Commission's strategic vision is a response to the Paris Agreement's invitation to pursue efforts to keep global warming to 1.5°C compared to pre-industrial levels. It is also fully in line with the United Nations' Sustainable Development Goals.

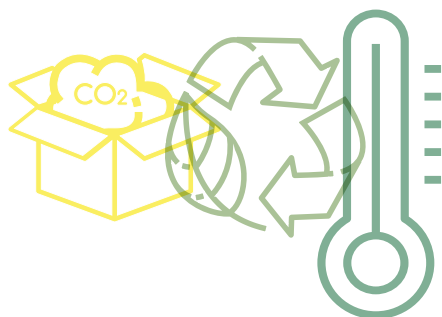
The EU is a global leader in the transition towards a more carbon efficient economy. Citizens and companies across all EU countries have already succeeded in lowering GHG emissions by 22%, while gross domestic product (GDP) increased by 58% between 1990 and 2017. The EU has demonstrated that it is possible to decouple emissions from economic growth and that climate action goes hand in hand with the development of new industries, jobs and technical innovations.

The EU is now broadly on track to meet its 2020 climate and energy targets and has finalised the regulatory framework to achieve its 2030 targets for further emissions reduction and the clean energy transition. Combined, these policies will enable the EU to deliver on its contribution under the Paris Agreement to reduce emissions by at least 40% by 2030, compared to 1990. Indeed, the new 2030 targets for energy efficiency and renewable energy should enable the EU to reduce its emissions by around 45%, if fully implemented.

However, more needs to be done. The Commission's strategic vision outlines how a transition towards a climate-neutral economy could be realised by 2050.



# How to achieve long-term temperature goals



## The EU's vision is based on a detailed analysis of eight pathways for a possible future EU economy.

These pathways:

- achieve GHG emissions reductions between 80% and 100% compared to 1990, the latter representing a climate-neutral economy by 2050;
- build on 'no regret' policies like strong use of energy efficiency and renewable energy but varying the intensity of the application of electrification, hydrogen and e-fuels, as well as end-user energy efficiency and the role of the circular economy;
- show that a vibrant EU economy can be combined with ambitious climate policy targets, even with existing technologies.

The pathways are not a prediction of what the future holds, but instead show the plausibility of the EU's climate policy ambitions.

## Reducing greenhouse gas emissions

The first five pathways aim to achieve over 80% of GHG reductions by 2050 compared to 1990. The aim is to better understand what the available options to reduce emissions are and how they will transform the sectors in our economy in different ways.

The sixth pathway combines the cost-efficient GHG reduction opportunities from the first five pathways, achieving GHG reductions as high as 90%.

The seventh and eighth pathways assess how net-zero GHG emissions, i.e. climate-neutrality, can be achieved by 2050, thereby also looking at the role of net negative emissions to achieve zero greenhouse gas emissions by 2050.

The seventh pathway pushes zero-carbon energy carriers and relies on CO<sub>2</sub> removal technologies, namely bioenergy combined with CCS, to balance emissions.

The eighth pathway, by contrast, focuses more on the impact of a circular economy in a world in which customer choices become less carbon intensive. It has more scope to strengthen the land use sink and needs to rely less on CO<sub>2</sub> removal technologies to balance out remaining emissions.

Achieving climate neutrality will rely on a combination of drivers in deploying all options to achieve this ambitious vision.

## What's next?

The European Commission's long-term vision invites EU institutions, national parliaments, the business sector, non-governmental organisations, cities, communities and citizens, especially youth, to participate in an EU-wide debate shaping Europe's future and ensuring the EU can continue to lead global efforts to fight climate change.

This EU-wide debate should allow the EU to adopt and submit an ambitious long-term strategy for reducing GHG emissions by early 2020 to the UN's Framework Convention on Climate Change (UNFCCC) as requested under the Paris Agreement.



## Achieving a climate-neutral economy



The road to a net-zero greenhouse gas (GHG) economy could be based upon joint action along a set of seven strategic building blocks.





## ENERGY EFFICIENCY

Improving energy efficiency can help reduce EU energy consumption by as much as half in comparison to 2005 and will therefore play a central role in achieving net-zero GHG emissions by 2050. Considerable progress has already been made, with EU primary energy consumption having peaked in 2006 and the EU having recently agreed a new binding energy efficiency target of 32.5 % by 2030.



Policy measures such as eco-design and energy labelling have already helped to set firm standards, which have been a key driver for innovation within the EU and have also had an impact on energy efficiency beyond the EU. Electronics and appliances are imported or exported, so ambitious EU standards ensure producers abroad also increase efficiency. Other evolving technologies such as digitalisation and home automation will also be crucial to achieve the long-term aims.

While energy efficiency will play a pivotal role in decarbonising industrial processes, significant reductions in overall energy demand will come from energy use in buildings. Residential and service buildings currently account for 40 % of EU energy consumption – with 75 % of these buildings being built before energy performance standards existed.

Most of the housing stock of 2050 already exists and will need to be renovated. Additional efforts include switching to sustainable renewables for heating, efficient products and appliances such as heat pumps, smart building/appliance management systems and better insulation materials.

Renovating Europe's buildings will require financial instruments to overcome existing market failures and a workforce with the right skills to ensure the affordability of climate-friendly housing. An integrated approach across relevant policies, along with consumer engagement, is therefore necessary to modernise the built environment and the building stock.



## DEPLOYMENT OF RENEWABLES

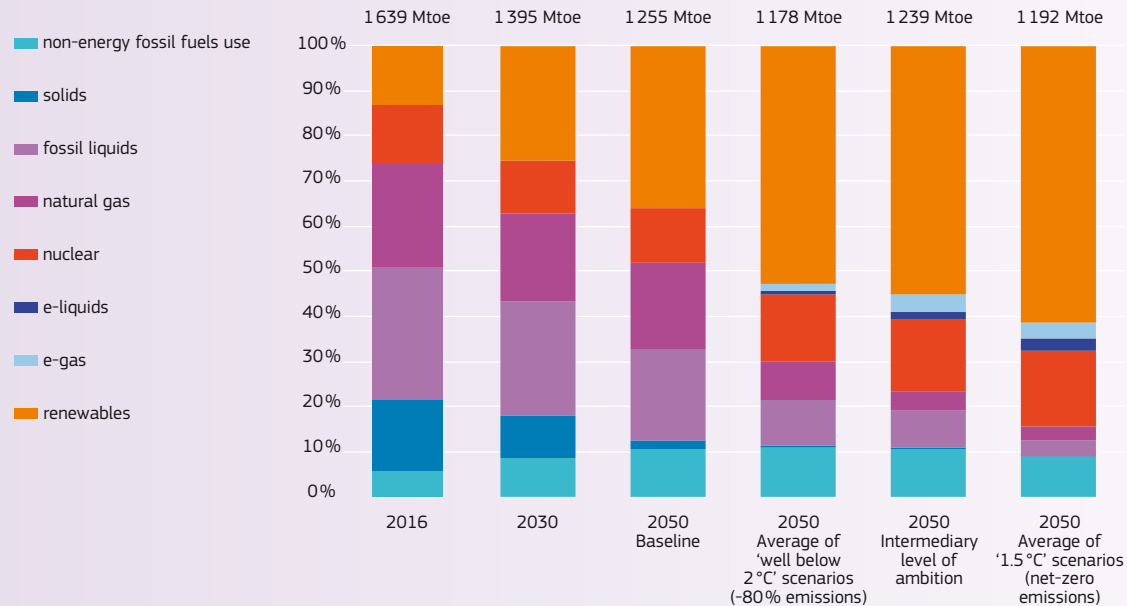
The clean energy transition should result in a system in which the largest share of the EU's primary energy supply comes from renewable energy sources, thereby improving the security of supply and fostering domestic jobs, as well as reducing emissions. The EU has recently agreed a new renewables target of 32 % by 2030.

Europe's energy import dependence currently stands at around 55 % and is forecast to fall to 20 % in 2050 with the transformation to a climate neutral economy. Expenditure on fossil fuel imports will decrease from the current €266 billion, in turn improving the EU's trade and geopolitical position. In some instances, import spending could fall by 70 % and could lead to savings of €2–3 trillion between 2031 and 2050.

The large-scale deployment of renewables will decentralise and increase electricity production. By 2050, more than 80 % of electricity will be coming from renewable energy sources, with electricity providing for half of the final energy demand in the EU. To meet this increasing demand, production will increase by up to 2.5 times above current levels to achieve net-zero GHG emissions.

This transformation will provide huge prospects for clean energy companies. Currently, the EU hosts six of the 25 largest renewable energy businesses and employs around 1.5 million people in this sector, which hints at the enormous potential economic benefits from further

Figure 1. Gross inland consumption of energy



electrification based on increased renewable energy penetration. This will also give customers and local communities important roles in the production of energy.

The deployment of renewable energy will also offer other sectors (heating, transport and industry) decarbonisation possibilities using electricity or e-fuels (hydrogen and power-to-X).

The transition toward a decentralised power system needs a smart, flexible system that builds on customer involvement, interconnectivity, large-scale energy storage, demand-side response and management through digitalisation. However, the transition will not be without its challenges, such as the need for robust and reliable safeguards from increased cyber security risks.

## Hydrogen

- Hydrogen has long been used by the chemical industry as a feedstock in industrial processes and is likely to become more prominent.
- Carbon-free hydrogen will need to be produced by water electrolysis using carbon-free electricity, or from natural gas steam reformed using CCS.
- Hydrogen contributes to decarbonisation when used as a means of energy storage in the power sector, as an energy carrier option in heating, transport and industry, and as a feedstock in steel, chemical and e-fuels sectors.

## Power-to-X

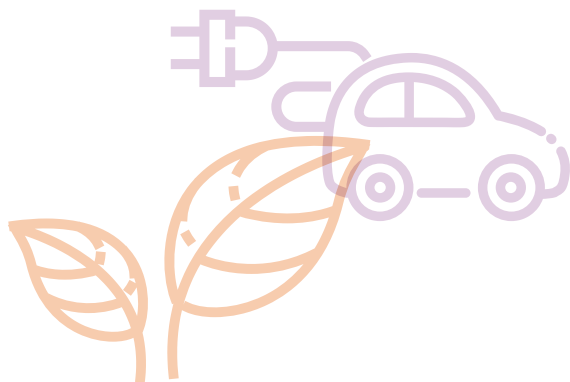
- Hydrogen from carbon-free energy combined with CO<sub>2</sub> from sustainable biomass/direct air capture can create an e-fuel and thus provide a climate-neutral alternative to natural gases or oil.
- It can be distributed through existing systems (transmission/distribution) and used by existing installations and applications.



## CLEAN, SAFE AND CONNECTED MOBILITY

With transport accounting for a quarter of the EU's GHG emissions, all transport modes should contribute to reducing emissions from the mobility system and help reap benefits like clean air, reduced noise and accident-free traffic.

Low or zero-emission vehicles with efficient alternative powertrains are the starting point – the automotive industry already invests heavily in technologies such as electric vehicles.



With existing technologies, electrification cannot be the single solution for all transport modes. For instance, batteries currently have low energy density and their weight makes them ill-suited for aviation or long-distance shipping. Similarly, heavy-duty vehicles and coaches may also see hydrogen-based technologies become a carbon free alternative. Rail is still the most efficient solution for carrying freight across medium-long distances and it should therefore become more competitive.

Aviation could shift to biofuels and climate-neutral e-fuels, and shipping and heavy-duty vehicles could also make use of hydrogen and biogas, provided they remain carbon-free throughout the production chain.

Making mobility cleaner also requires an efficient organisation of the mobility system based on digitalisation, data sharing and interoperable standards. This will enable smart traffic management and automated mobility in all modes, reducing congestion and increasing occupancy rates. Regional infrastructure and spatial planning should also be improved.

Smart cities and urban areas will be centres of mobility innovation. Currently, 75 % of the EU's population lives in urban areas, which are characterised by short-distance journeys and often face air quality issues.

Key elements shaping the future of urban mobility include:

- city planning;
- safe cycling and walking paths;
- clean public transport;
- mobility as a service, e.g. car or bike sharing services.

To succeed in this transition, individuals and companies must adapt. For instance, easier access to digital technologies and video conferencing may reduce demand for long distance business travel. If travellers and shippers are well informed on transport options, it is more likely that they will make more sustainable decisions. Internalising the external costs of transport is a prerequisite for making efficient choices relating to technology and transport mode.

Infrastructure is also a vital part of the transition, for example through the completion of the Trans-European Transport Network (TEN-T) by 2030. Investments should focus on the least polluting modes, promote synergies between transport, digital and electricity networks, and include smart features, such as the European Railway Traffic Management System (ERTM). This would enable high-speed train connections to become a real alternative to flying for some journeys within the EU, for example.



## COMPETITIVE INDUSTRY AND CIRCULAR ECONOMY

Maintaining a competitive EU industry – currently one of the most efficient in the world – goes hand in hand with using resources efficiently and developing a circular economy.

With recycling practices on the rise, the production of many industrial goods such as steel, glass and plastics will become more resource-efficient and less emission-intensive as energy needs decrease further. This will improve industry competitiveness, and provide business opportunities and jobs. New materials and ways of using existing materials will play an important role as well. This can range from rediscovering traditional uses, such as wood in construction, to new composites that can replace energy intensive materials.

Raw material recovery and recycling will be particularly important for the sectors and technologies where new dependencies might emerge, such as reliance on materials like cobalt, rare earths or graphite, for which production is concentrated in a few countries outside Europe. A strengthened EU trade policy is also crucial to ensure a sustainable and secure supply of these materials.

For industry, becoming GHG emissions free will often mean significantly modernising existing installations or completely replacing them. This investment will increase the competitiveness of EU industry and its presence in the global economy as it becomes less dependent on carbon. Digitalisation and automation are effective short-term ways of increasing competitiveness, while a combination of electrification, increased use of hydrogen, biomass and renewable synthetic gas can reduce energy related emissions in industrial goods production.

Some industrial emissions will be tough to eliminate, but can still be reduced, for instance CO<sub>2</sub>, which can be captured, stored and used. Renewable hydrogen and sustainable biomass can replace fossil fuels as a feedstock for some industrial processes, such as steel production.

In the next 10 to 15 years, technologies already known in key sectors such as steel, cement and chemicals will need to demonstrate that they can work at scale. Research and development will also reduce costs of breakthrough technologies and help new products, such as carbon fibre or stronger cements, replace today's industrial products.

Product demand will also depend on consumer choices driven by ongoing transformations such as digitalisation or increased demand for environmentally friendly products or services. Information on carbon and environmental footprints of products and services should be more transparent so that consumers may make informed decisions.



## INFRASTRUCTURE AND INTERCONNECTIONS

If we are to achieve a net-zero GHG emissions economy, we need smart, adequate infrastructure that guarantees interconnection and sectoral integration throughout Europe. Increased cross-border and regional cooperation will enable us to reap the benefits of a modernised and transformed European economy.

A focus area should be the completion of the Trans-European Transport and Energy Networks. Sufficient infrastructure is needed to support the development of a more modern system and allow for the digitalisation and further integration of relevant sectors, including smart electricity, data/information grids and hydrogen pipelines where needed.

Transforming Europe's transport sector will require accelerated infrastructure development and greater synergies between transport and energy systems, such as smart charging and refuelling stations allowing for cross-border services.

Retrofitting of existing infrastructure can ensure continuous use, while the replacement of old infrastructure can be compatible with decarbonisation objectives.



## BIOECONOMY AND NATURAL CARBON SINKS

By 2050, the global population will be 30% higher than it is today, estimated by the UN at around 9.8 billion. While facing the impacts of climate change on ecosystems and global land use, the EU's agriculture and forestry sectors will need to provide sustainably-produced food, feed and fibre to the economy. At the same time, they will have an important role to play in preserving biodiversity and moving to a net-zero GHG economy.

Biomass can substitute carbon intensive materials, as well as directly supply heat. It can be transformed into biofuels and biogas that can be transported through the gas grid as a substitute for natural gas. If biomass is used to generate power, technology can be used to capture and store carbon emissions to create negative emissions.

More biomass will be required in a zero-emissions economy. Increased biomass production needs to come from a combination of sustainable sources to ensure that the EU's forest sink and other ecosystem services do not decline.

EU agricultural production results in non-CO<sub>2</sub> GHG emissions, such as nitrous oxide and methane that cannot currently be fully eliminated. However, efficient and sustainable production methods can reduce emissions. This will increase productivity, reduce input needs and other environmental pressures such as air pollution and eutrophication, i.e. excessive nutrients in water bodies.

Examples include:

- precision farming technologies and digitalisation to optimise the application of fertiliser and plant protection products,
- increased use of manure treatment in anaerobic digesters not only reducing non-CO<sub>2</sub> emissions but also producing biogas,
- improving farming systems by agroforestry techniques that use nutrient resources efficiently to enhance soil carbon, biodiversity and resilience of farming to climate change,
- adapting certain agriculture activities on organic soils and
- restoring wetlands and peatlands, which are hotspots for carbon soil emissions.

The transformation towards a more circular bioeconomy will also open new business opportunities for farmers and foresters. New demand for biomass can diversify farming.

Furthermore, there is a role for afforestation and restoration of degraded forest lands and similar ecosystems to further increase CO<sub>2</sub> absorption of our natural sink, creating negative emissions and benefitting biodiversity, soils and water resources.

The biomass-based transition is limited due to restricted land availability. Generally, the EU should be careful of how to make the best use of scarce land and other natural resources to ensure that biomass is utilised in the most efficient, sustainable way.



## TACKLING REMAINING EMISSIONS WITH CARBON CAPTURE AND STORAGE

Carbon Capture and Storage (CCS) was originally viewed as a major decarbonisation option for electricity production. Today the potential need for it seems lower, due to the fall in the costs of renewables other options to reduce emissions in industrial sectors combined with the low social acceptability of CCS.

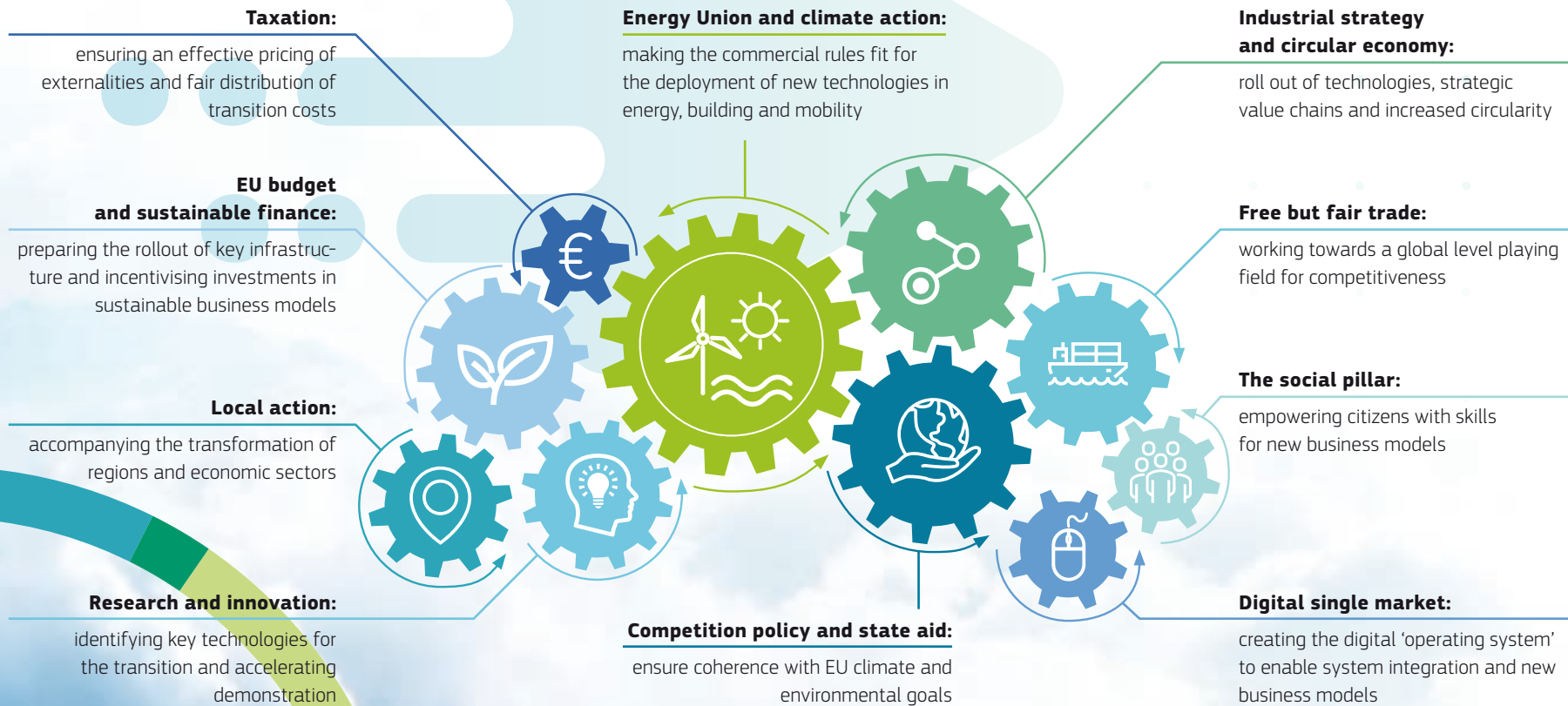
Nevertheless, it remains necessary as a potential avenue to produce hydrogen, as a mechanism for eliminating certain difficult-to-reduce emissions from industry and, combined with sustainable biomass, to create CO<sub>2</sub> removal technologies.

More research, innovation and demonstration efforts are needed to ensure the successful deployment of CCS. It requires a new infrastructure and, for it to achieve its potential, coordinated action is necessary to secure the building of demonstrators and commercial facilities within the EU, while addressing public concerns in some Member States.

**These seven strategic building blocks will ensure that the EU can work successfully towards making its vision a reality. Nevertheless, to do so, policy efforts will have to be increased. A framework is required to:**

- spur research and innovation;
- scale up private investments;
- provide the right signals to markets;
- ensure social cohesion so no one is left behind.

Figure 2. Enabling framework



Source: European Political and Strategy Centre (EPSC)



# The European framework: shaping a sustainable society



Building on the Energy Union, the enabling framework for a climate-neutral society will include a policy mix to foster change (see figure 2), while ensuring public acceptance and remaining socially just. It will embrace major trends shaping the EU society and economy, such as climate change, digitalisation, ageing and resource efficiency.

## Investment and finance

Today, around 2% of the EU's GDP is invested in the energy system and its related infrastructure. To achieve a net-zero GHG economy, investment should increase to 2.8% annually, rising to around €520-575 billion. Compared to the baseline, this means additional investments of between €175 and 290 billion a year. This is in line with the IPCC special report on 1.5°C temperature change, which estimates that investments in the energy system of around 2.5% of global GDP are necessary between 2016 and 2035.

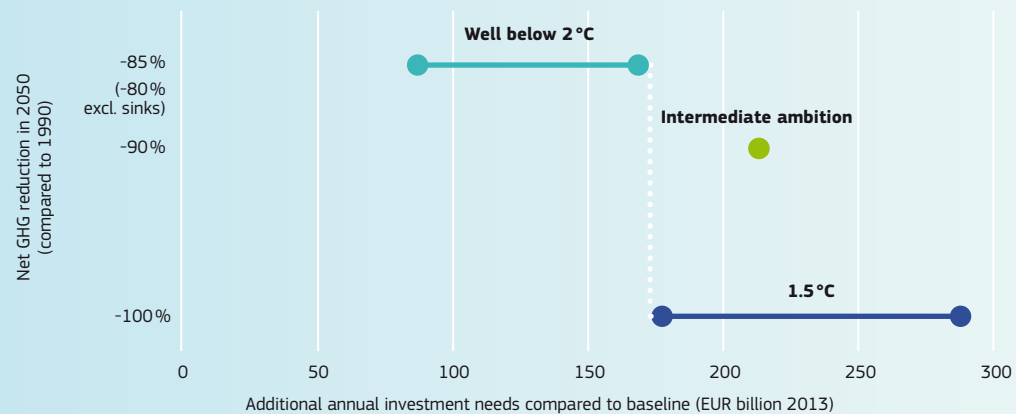
The additional investment needs depend on a range of factors. For example, rapid transformation to a circular economy or behavioural changes can reduce investment needs (see figure 3).

The EU and national governments already provide considerable public investment. Moving forward, most of this additional investment will have to come from private businesses and households. Therefore, the EU and its Member States should offer long term signals to guide investors.

In policy terms, the recent 'Clean Energy for All Europeans' package provides a modern, stable legal framework aimed at facilitating this additional investment. For example, the stricter rules on capacity mechanisms are aimed at enabling investors to plan based on market signals, rather than subsidy signals.

The EU is also doing more to stimulate the necessary investment, with 20% of EU budget currently required to be climate-related. The Investment Plan for Europe names the

Figure 3. Annual investment



environment, resource and energy efficiency as key areas of focus, stimulating much greater volumes of private and corporate investment. In the current 2014-2020 budget period, the European Fund for Strategic Investment (EFSI) and EU cohesion policy funds will provide €70 billion to implement the Energy Union Strategy.

- The European Commission has proposed an increase in climate mainstreaming by 25% for the future EU budget for 2021-27, underlining that EU spending remains a catalyst to leverage private and public investment and channel EU support for the clean energy transition. This will ensure that EU spending in different programmes such as Horizon Europe, the European Structural and Investment Funds, the Common Agricultural Policy and InvestEU will bring about investments in line with its climate objectives. In addition to these, the Innovation Fund, which pools resources from the EU Emissions Trading System, will support low-carbon technologies in several sectors such as energy intensive industries, renewables, carbon capture, use and storage, as well as energy storage.

The financial sector will play a vital role in reorienting capital flows and investments. The European Commission's Action Plan on Sustainable Finance connects finance and the EU's agenda for sustainable development. For example, the Commission's proposal for a unified classification system aims to help define 'green' economic activities, enhancing transparency for investors.

## Research, innovation and deployment

To reduce the cost of advanced low-carbon energy carriers and technologies, a huge research and innovation effort is needed over the next two decades. A well-coordinated strategic research, innovation and investment agenda will make zero-carbon solutions economically workable while bringing about new ones.

Under Horizon Europe, the EU's research and innovation programme for 2021-27, the Commission has proposed **to invest 35% of the €100 billion budget in climate-related objectives** through the development of innovative and cost-effective solutions.

A key challenge is financing high-risk disruptive innovation. This is the aim of the European Innovation Council, which focuses on radically new breakthrough products, services and processes. The European Institute of Innovation and Technology will also continue its support of young innovators and start-ups.

The **focus** of EU research should be on **transformational GHG-neutral solutions** in areas such as:

- electrification, e.g. renewables, smart networks and batteries;
- hydrogen and fuel cells;
- energy storage;
- carbon-neutral transformation of energy intensive industries;
- the circular economy;
- the bioeconomy;
- sustainable practices in agriculture and forestry.

The EU should also build strong value chains supported by enabling technologies such as new materials, digitalisation, artificial intelligence, high performance computing and biotechnology.

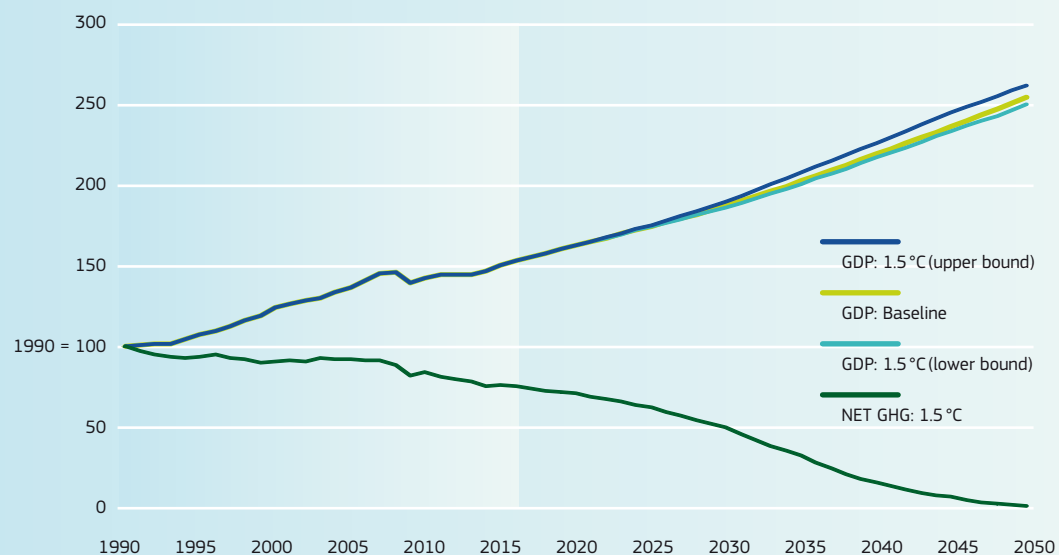
## Economic and social impacts

Europe's economy and society will look very different in 2050. Current demographics point toward an ageing society, which could have implications for the sustainability of public finances. At the same time, the population will be better equipped for working with information and communication technologies, which will help facilitate the transition.

In the dynamic world with which we interact and do business, our economy needs serious modernisation and decisive action to maintain competitiveness, to re-industrialise and regain technology leadership. Massive investments are needed to make Europe succeed in the 21st century, to renovate cities and improve citizens' quality of life. With this vision, the Commission proposes to guide these investments in a sustainable direction.

This transition can be beneficial. Overall, delivering on a climate-neutral economy will not negatively impact our economic prospects. The EU's economy is expected to more than double by 2050, relative to 1990, while it fully decarbonises. The transition to climate neutrality is expected to have a moderate or positive impact on GDP, with estimated benefits of up to 2% of GDP by 2050. These estimates do not even include avoided damages from climate change, nor co-benefits such as improved air quality.

Figure 4. European climate policy decouples GHG emissions and GDP growth



Green jobs represent around four million EU jobs. Policies implementing the EU's 2020 energy goals have already added 1-1.5% to the EU's labour force and moving to a climate-neutral economy will further spur job growth. The EU's Energy Union policies, including the new 2030 targets, are expected to create more new and high quality jobs, given the investment needs that have been highlighted for industrial modernisation, energy transformation, the circular economy, clean mobility, green and blue infrastructure.

While there will be an increase in job opportunities for some sectors, for example construction or renewable energy, some regions could be affected if they depend on activities that will decline or transform, such as coal mining, oil and/or gas exploration. Other jobs will need to be transformed and adapted to this new economy. The transition will also be shaped by a shrinking and ageing labour force, as well as increasing substitution of labour due to technological changes.

This modernisation process needs to be well managed to ensure a fair and socially acceptable transition for all, in the spirit of inclusiveness and solidarity. The EU and its Member States should account for social implications and deploy relevant policies to mitigate the challenge.

The EU budget, employment, social and cohesion policies, for example, exist to reduce economic, social and territorial disparities across the EU. The Commission has already initiated a platform for coal regions in transition and an observatory for tracking energy poverty to support those that need it most, share experiences and to help spread best practices.

The European Pillar of Social Rights will support this transition, focusing on adequate social protection systems, inclusive education and training. Skill development is crucial; people need professional skills but also key competencies in science, technology, engineering and mathematics.

## The EU's global role

International cooperation will be key for the EU's success in leading the low-carbon transition. The EU should promote the worldwide uptake of policies and actions to reverse the current emissions trajectory and manage the transition to a low carbon future.

The EU will use its external action, trade policy and international cooperation to support the global transformation to low-carbon sustainable development pathways, in line with the European Consensus for Development.

Fair and rules-based trade can contribute to the global uptake of climate-friendly technologies, facilitate the energy transition and help secure supplies of the necessary raw materials, including those used in low-carbon technologies.

As the world's largest single market, the EU's environmental standards for products also have an impact beyond its borders. Just as the EU remains open for climate-friendly investment and trade, it should also defend its right to fair access to partner countries' markets, infrastructure and critical raw materials.

This will require enhancement of the EU's energy and climate diplomacy and further mainstreaming of climate change objectives and considerations in political dialogues, including in the areas of migration, security and development cooperation.

## The role of citizens and local authorities

The transition towards a net-zero GHG economy is not only about technology and jobs, but also people and their lives – how they use transport, live and work together.

Consumers have a powerful role to play in driving the transformation forward. An individual's choice impacts their carbon footprint, whether it be buying a house, choosing a diet or purchasing a car. Lifestyle choices can make a real difference in the transition to climate neutrality while improving quality of life.

Cities are laboratories for transformative and sustainable solutions. City refurbishment and spatial planning can be drivers to renovate houses and attract more people to live closer to work, improve living conditions, reduce travel time and associated stresses. Public infrastructure will also need to be built to withstand the effects of climate change.

The EU should capitalise on and expand the role of regions, cities and towns. The Covenant of Mayors for Climate and Energy represents 200 million Europeans and is an example of a collaborative platform allowing local authorities to learn from one another.

# A clean planet for all, the EU's action plan



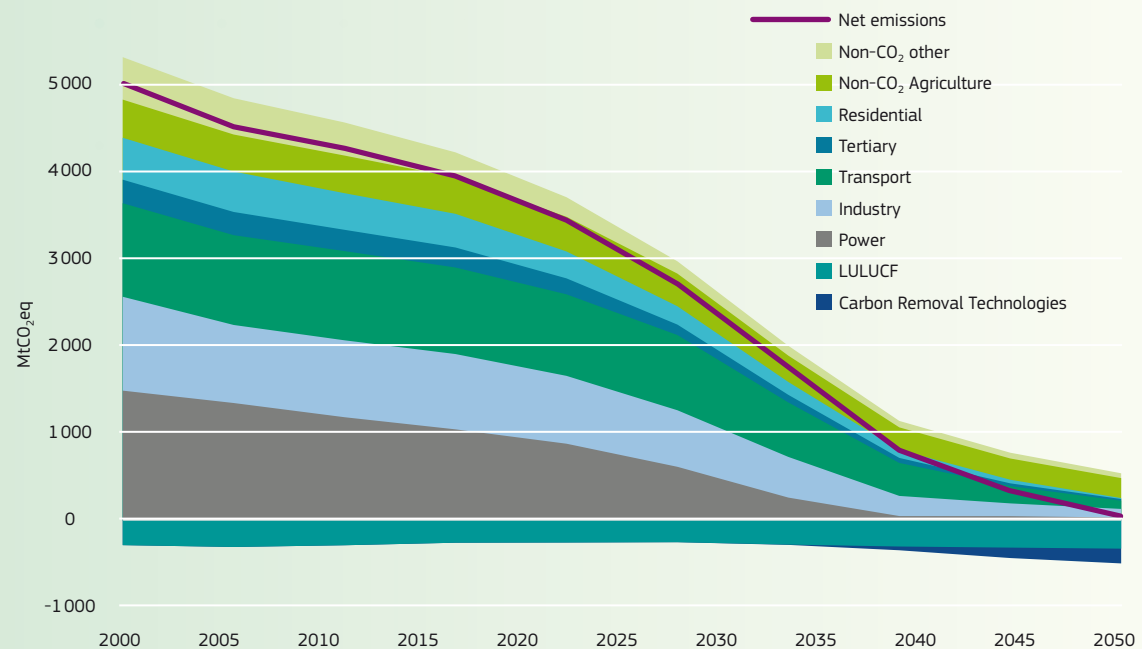
Climate change is a global threat and Europe cannot combat it alone. Cooperation with partner countries will therefore be essential. However, the EU also has a firm interest in working towards a net-zero GHG economy by 2050 and demonstrating that this can go hand in hand with prosperity, which will encourage other economies to follow.



This represents a tremendous opportunity to channel the response to the challenges of the 21st century in a strategic manner. The purpose of this strategic vision is not to set targets, but to create a clear sense of direction.

The European Commission, by presenting this climate-neutral vision, has invited an EU-wide informed debate that should allow the EU to adopt and submit an ambitious strategy by early 2020 to the UNFCCC as requested under the Paris Agreement.

Figure 5. GHG emissions trajectory in a 1.5 °C scenario



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