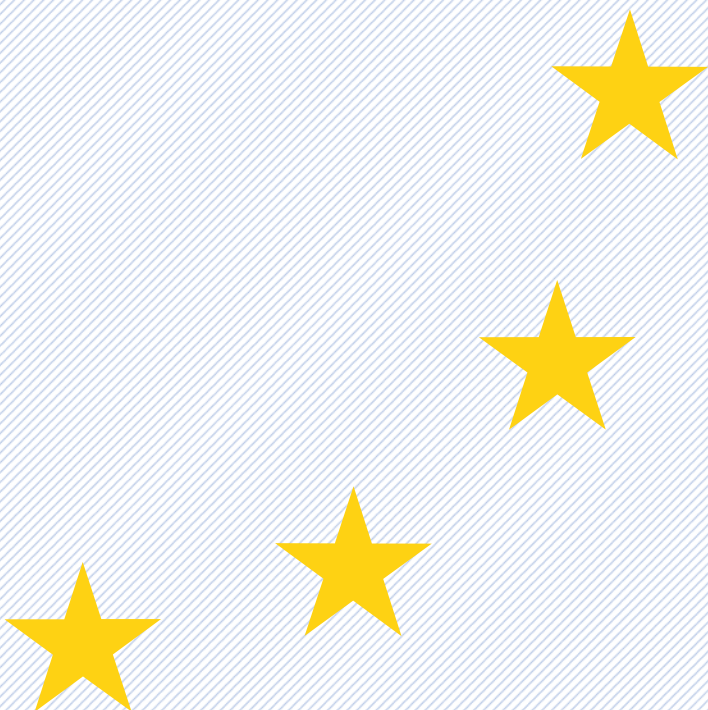




Fit for 55... **and** **what next?**

Proposals for the
2024-2029 mandate

WHITE PAPER



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EDITORIAL

A POWERFUL AND DECARBONISED EUROPE

It was Europe, before any other continent, recognised the danger of climate change and took action to combat it. Over the past 30 years, the Union has steadily increased its efforts. The European Commission, led by Ursula von der Leyen, stayed firmly on track. As soon as she took office, she launched an ambitious project: carbon neutrality for Europe by 2050, with the first set of measures aimed at reducing greenhouse gas emissions by more than 50% by 2030 compared to 1990 levels. “Fit for 55” is the first objective of the European Green Deal, which also aims to protect nature and reduce waste.

A considerable amount of legislative work was done in a very short time. It’s now up to the Member States to incorporate the new provisions into their laws, and to apply them! In the meantime, Europe has faced the Covid pandemic, the war in Ukraine, and the gas shortage: major crises that made it necessary for the EU to adapt its strategy and put energy independence and industrial competitiveness back at the forefront of its priorities. Europe is learning that to remain a consumers’ heaven, its domestic production needs to be ramped up.

A new, more brutal world is emerging, with its tigers. Global trade is fragmenting and its rules are more and more challenged. Europe is at a crossroads. It can either be rocked by any event and end up losing focus and putting aside its climate ambitions, or it can adapt and deploy a climate, energy, and industrial strategy that would ensure the repowering of its economy in its efforts towards carbon neutrality. This is the challenge the next EU mandate will have to face.



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Brice Lalonde

Chairman of Équilibre des Énergies,
former minister

To succeed in this strategy, European institutions will have to be action-oriented and translate objectives into concrete achievements. Several major industrial projects that will play a key role in decarbonisation will have to be implemented: developing new low-carbon energy sources, renovating the EU building stock, phasing out fossil fuels in transport, and supporting the ecological transition of the agri-food industry. It will be necessary to determine what is the best use of biomass and how to effectively manage the carbon resource. With electrification being bound to play a crucial role in the energy transition, the EU will also have to make peace between renewables and nuclear power. Finally, adaptation to climate change will have to become part of Europe’s strategy.

We trust Europe can meet the task. Doubters have often predicted its failure – or even its imminent demise – when struggling with difficult times. But the EU has always been able to walk a fine line and rise to the challenge.

In an uncertain and changing world, it is more important than ever that we Europeans unite, so we can withstand crises, reject violence, and build the powerful, prosperous, sustainable, and secure Europe to which our fellow citizens aspire.

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PREAMBLE



The current European Commission, led by Ursula von der Leyen, has been in place since December 2019, in 2024, a new executive will be elected, once the European Parliament is convened. This Commission's mandate has been marked by the priority placed on energy and climate issues in the form of the European Green Deal put forward by its President.

Several dozen draft texts – directives, regulations and implementing acts – have followed, some of which are still being finalised. For the Commission, it was “the most important climate package ever put forward by any political entity in the world”.

Climate concerns have been compounded by the impact of three major crises in quick succession: the Covid epidemic in 2020, the gas crisis in 2021, and the war in Ukraine starting in 2022. In the light of these events, the European Commission, Parliament, and Council have had to broaden the scope of their work and address the issues of secure energy supplies and energy sovereignty with greater urgency.

There is no doubt that these issues will remain paramount during the next mandate. The European institutions will have to find a way to reconcile the fight against climate change – which will in any case remain a primary concern – with the defence of European interests in the context of a new geostrategic balance and of the war in Ukraine. In this highly sensitive context, the issue of energy will remain central, and it is important that future European leaders have in-depth knowledge and form their own opinions on the subject.

EdEn, which has been working for over 12 years to find ways of reconciling climate action with the need to maintain economic activity and standards of living, puts forward its contribution to the debate with this White Paper. It does so without complacency or political affiliation, by taking stock of the considerable work carried out at European level during the mandate of office that is now coming to an end. On the basis of this assessment, and in view of the challenges Europe faces today, it proposes priorities and policy recommendations to follow over.







SUMMARY

As soon as the EU mandate started in 2019, the European Commission launched *the Green Deal*, a wide-ranging programme aimed at revising EU legislation and putting in place new initiatives to ensure that EU policies are in line with climate target of reducing greenhouse gas emissions by 55% in 2030 compared to 1990 levels, as agreed with the Council and the European Parliament. This target is a step towards the goal of achieving climate neutrality by 2050.

This programme has been at the heart of European energy policy throughout the mandate of office now drawing to a close. Considerable resources have been mobilised at the Commission, Member State, and Parliament levels to put together dozens of draft texts, a task made even more complex by the Covid and gas crises and the war in Ukraine.

At a time when we are beginning to reflect on our priorities for the next European mandate, it is reasonable to ask questions about the results achieved and the merits of the directions taken via this legislative package. Energy will remain a key component of any European policy. It directly affects policies in other sectors of economic life, particularly construction, industry, and transport. European energy policy remains difficult to formulate and implement, as it falls within the shared competences of the European institutions. Regardless, energy is the basis of all economic activity, and the current geopolitical and environmental context makes this issue more sensitive than ever.

WHAT CONCLUSIONS CAN WE DRAW FROM FIT FOR 55?

It is too early to assess the results of the Fit for 55 initiative. However, we can already point to a number of positives.

Europe's greenhouse gas emissions are on a downward trajectory and have reached in 2023 a reduction of over 30% compared to 1990 levels. However, this rate of decline would have to be more or less doubled to bring them into line with the 55% target set for 2030.

The price of CO₂ on the European carbon quota market has become a significant component of economic governance; it now seems to have stabilised at around €80/tCO₂, well above the lows seen in the past, though still far from sufficient to economically justify many of the actions that will be needed to achieve climate neutrality.

The European Commission was aware of the consequences that this rise in carbon prices could have on the competitiveness of European economies and, on its proposal, it was decided to establish the Carbon Border Adjustment Mechanism (CBAM), designed to restore fairness for countries that have not yet decided to set up mechanisms similar to the EU ETS.

In terms of concrete actions, the main success of European policy has been accelerating the transition to electric mobility for light vehicles, supported by measures to stimulate the European battery industry. The ReFuelEU Aviation and FuelEU Maritime regulations have also created a legislative framework for decarbonising air and sea transport.

European institutions also deserve credit for their initiatives in response to the situation created by the war in Ukraine – even if some thought them late or

insufficient, notably the REPowerEU plan, following the outbreak of the conflict, as well as the draft Net-Zero Industry Act (NZIA), a response to the *Inflation Reduction Act* signed into law on 16 August 2023 by the President of the United States.

Despite the positives, Fit for 55 has not been faultless. The initiative's fundamental weakness is that it remains focused on the two traditional areas of European policy set out in Article 194 of the Treaty on the Functioning of the European Union (TFEU): energy saving and development of renewable forms of energy. In the Commission's estimation, these two areas of action were sufficient to achieve the established emissions reduction target. As a result, it proposed very ambitious targets for these two points – targets which will likely be difficult to achieve.

On the other hand, it has not taken sufficient account of the fact that the most effective way to reduce CO₂ emissions is to decarbonise energy systems, from production to consumption. Making energy sources virtually carbon-neutral will also help fight climate change and reduce dependence on imported fossil fuels. However, decarbonisation is taking place very slowly; according to Eurostat, it has taken more than 20 years to reduce the share of fossil fuels in the gross energy available in the EU from 80% (in 2000) to 70% (in 2022).

The priority should have been to promote all carbon-neutral or virtually carbon-neutral energy sources, in particular the production and use of low-carbon electricity, whether from renewable or nuclear sources. European statistics show that the share of electricity in the EU's final energy consumption has stagnated at 22%, the same level as 10 years ago. **Without significant investment in electrification, decarbonisation of end uses will not happen.**

This relative reluctance to come out clearly in favour of promoting electrification seems to reflect the fear of being associated with a revival of nuclear energy, which was never really considered by the outgoing Commission. This mistrust of nuclear power – which was finally allowed into the green taxonomy¹ by the back door, subject to certain reservations – will remain a weak point in the Commission’s action plan, despite the fact that it is increasingly clear that nuclear generation is not only necessary as a baseline to decarbonise the electricity mix and to stabilise the electricity network, but can also help reign in market volatility in the face of intermittent renewable energies and gas supplies whose prices can rise considerably.

By concentrating on energy saving and renewable energies, the Commission has shifted from the objective of reducing emissions to that of developing renewable energies alone, to the detriment of the low-carbon contribution offered by nuclear power, to the point of encroaching on the right of Member States to choose between energy sources and to determine the general structure of their energy supply.

The electricity network itself was another major omission from the *Fit for 55* plan; it only received attention at the end of the mandate, with the organisation of a forum in September 2023 and the subsequent publication of an action plan². However, without modernising, expanding, and digitising the network, it will be difficult to achieve our climate objectives

It was also rather belatedly, and under the pressure of global events, that the European Commission decided to concern itself with Europe’s energy sovereignty and the preservation of its industry. However, the setbacks experienced by the European photovoltaic industry should have reminded us that there can be no energy policy without an industrial policy, and that there is no point in prioritising a given sector if the development of that sector creates dependencies as strong as those we intend to avoid. The Commission’s proposed strategy of importing some 10 Mt of hydrogen by 2030 is susceptible to the same questions.

Clearly, Europe was not prepared for the shock of war in Ukraine. Its energy policy was based on a dogmatic belief in open markets and an assumption that competition alone would bring prosperity. The only place for state intervention was in the development of renewable energies and the search for energy saving based on a single principle: “*Energy efficiency first*”.

➤ **The return of energy security and industrial sovereignty to centre stage marked the beginning of a major shift in the European model.**

1. *I.e.*, in application of Article 10(2) of Regulation (EU) 2020/852 on the European Green Taxonomy.

2. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS – COM(2023) 757 (28.11.2023).

WHAT SHOULD BE THE GUIDELINES FOR EUROPEAN ACTION OVER THE COMING MANDATE?

The most important thing now is to take action.

There is no question of abandoning the *Fit for 55* plan, for which so much effort has been mobilised. Nevertheless, we must consider that the number and complexity of these documents has led to a certain weariness. There is no shortage of reasons for citizens to be annoyed: in addition to *Fit for 55*, there are the measures regarding the circular economy and the protection of biodiversity, as well as all the regulations relating to increased environmental protection. It's a lot to put on the shoulders of less well-off Europeans. Populist protest movements are popping up across the EU. These groups challenge – sometimes violently – what they deem to be a technocratic EU, which they believe cause unnecessary inconvenience to people's daily lives. They must be treated with caution.

It's not just a matter of dreaming up a new *Fit for ___*; we must prioritise building on the achievements of *Fit for 55* by taking concrete actions that make sense for people.

These actions must be built around five main guidelines which should be included in the regulation on the governance of the Energy Union and climate action³.



3. Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action.

➤ **The first guideline must be the unambiguous reaffirmation of the priority assigned to reducing emissions and thus to decarbonising energy systems.** It is the “Emissions reduction first” principle that must guide our actions.

In doing so, it is important that we recognise and accept the diversity of energy sources, particularly nuclear and renewable, and to ensure that the priorities of certain Member States do not stand in the way of those adopted by other Member States. It’s a question of efficiency, but also of understanding, goodwill, and solidarity between the nations that make up the EU.

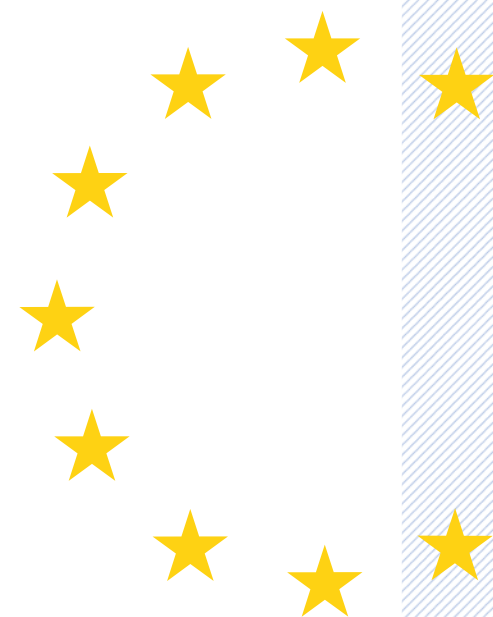
We also need to put the development of electricity networks at the heart of European energy policy. They are the best tool for making the most of renewable energies and exploiting synergies between Member States with a view to decarbonising energy systems.

➤ **The second line of action is to recognise that Europe is not in control of climate change, that it is now almost inevitable, and that we must therefore prepare for it,** with an adaptation programme commensurate with a possible rise in temperature of up to 4°C. Such warming will affect Europe unevenly, and its consequences are likely to bring dramatic changes to the living conditions of a significant proportion of the population. We must anticipate this.

➤ **The third line of action is a direct result of the changing geostrategic context of recent years. Energy independence and industrial sovereignty must once again be treated as serious concerns in the definition of energy policies.** This third line of action is largely in line with the first. It involves withdrawing as quickly as possible from dependence on fossil fuels without – as we have already emphasised – creating new dependencies that we cannot control. More generally, it obliges us to clarify the concept of “open strategic autonomy” such that, without cutting ourselves off from the rest of the world, we Europeans can be more realistic and take measures to protect and support the sectors we consider essential, particularly in the field of energy.

➤ **The fourth concern is preserving economic activity and, more generally, preserving the prosperity of the nations embarking on the energy transition.** This is an essential condition for public acceptance of the considerable effort required to transition away from fossil fuels. We now realise that the energy transition will require significant financial outlays. In its special report of June 2023⁴, the European Court of Auditors adopts McKinsey’s estimate of €1,000 billion of investment per year for 30 years to achieve carbon neutrality by 2050. This unprecedented effort will have to be financed and accepted. The downsizing of economies advocated by some is not a solution, so we need to ensure, particularly in the industrial and transport sectors, that the measures imposed do not result in a loss of competitiveness leading to a decline in activity.

➤ **Finally, we must take much greater account of the very difficult situations in which rising energy prices have placed a growing proportion of the population.** This raises the problem of how to redistribute the sums collected via the mechanisms put in place as part of *Fit for 55*, in particular through the extension of the EU ETS to the construction and transport sectors. Both the next Commission and the Member States must, under Parliament’s supervision, ensure that these mechanisms operate transparently and effectively, particularly those governing the new Social Climate Fund.



4. EUROPEAN COURT OF AUDITORS – Special report 18/2023: EU climate and energy targets – 26 June 2023.

A SECTOR-BASED APPROACH TO AN ACTION-ORIENTED POLICY

This balanced policy, driven by the quest for efficiency, will have to be applied to various sectors of the economy in accordance with the principles set out above.

The building sector

The building sector will remain a priority. Two concerns need to be reconciled:

► the first is the long-term need to improve the quality of buildings, which is relatively poor in most European countries. Such a policy is necessary. It's not just a question of energy efficiency; it's also about providing decent housing for everyone and improving comfort. However, the sums involved are considerable. We cannot devote all available resources to this issue, and we must not systematise the complete renovation of housing stock, which would require enormous resources. It must necessarily be spread over time;

► the second is a direct response to the climate emergency, aimed at accelerating the decarbonisation of heating and hot water production systems. We already have available solutions; these essentially involve using renewable heat and electricity, gradually phasing out the use of fossil fuels. Much is expected of the Commission in terms of promoting heat pumps, which have been recognised as a strategic technology and regarding which the Commission has launched a consultation. It will be up to the next Commission to learn from this and propose concrete actions in an action plan that goes beyond simply listing objectives. In particular, it will be necessary to remove the obstacles that are holding back the choice of electric solutions, including heat pumps. Calculating electricity consumption as primary energy, a mechanism whereby it is increased by a flat-rate factor, has the

effect of lowering the energy performance of the homes concerned. This is a powerful incentive in favour of fossil fuels – one to which we must quickly put an end at European level.

The industrial sector

In the industrial sector, Europe is a much-coveted market. It has very strong assets in terms of skills, expertise, and technical competence; however, in many countries these assets have been neglected. Clearly, Europe was not prepared for the serious events it now faces. Europe has the economic and strategic capacity to meet these challenges, but convergence towards concerted action is too slow and procrastination on pan-European decisions is undermining European integration.

Nature never tolerates a vacuum, and the Member States are stepping into the breach with national policies – sometimes to force Europe to act, sometimes to take matter into their own hands. This is a matter of urgency. Europe's governance must face up to the new industrial challenges and align its fundamental interests within the required timeframe. It has the skill and the strength to do this. **Whatever direction it takes, particularly in terms of industrial and energy policy, Europe needs to adapt its governance to a world shaped by crises and emergencies.**

The transport sector

In the transport sector, it is obvious that we must maintain and build on the momentum assigned to electric vehicles during the current mandate. We need to make electric mobility accessible to all, continue to develop charging infrastructure on a pan-European basis, and ensure technological



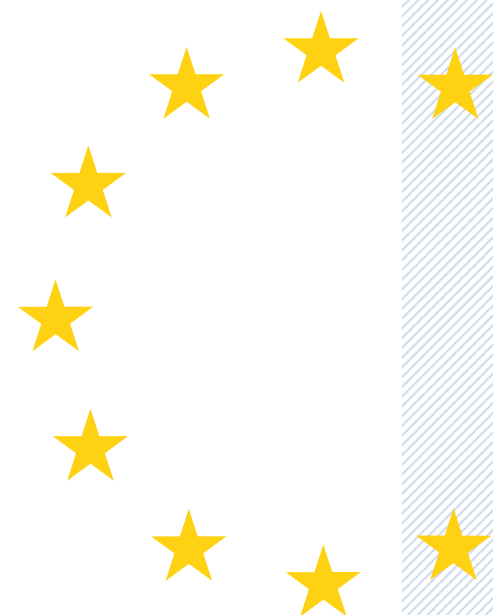
and industrial independence with respect to vehicle and battery manufacturing. Many European citizens still have doubts about the decision to phase out the use of fossil fuels for new vehicles from 2035. This is a major decision, and one that needs to be understood, accepted and, above all, prepared for. Electric mobility must become commonplace and must be easy and convenient for everyone to use.

The next Commission will have to bring the issue of heavy-duty vehicles to a successful conclusion, giving priority, without dogmatism, to the solutions that will make it easiest to phase out fossil fuels. Battery-powered solutions are likely to be the most appropriate, with suitable charging infrastructure and the possibility of installing continuous charging systems (*called* Electric Road Systems or ERS) along major routes, without excluding renewable fuels, which are complementary to the electrification of the sector – in particular for agricultural and construction equipment.

The air transport sector will require particular attention. Whether it is beneficial at all is a matter of debate. Regardless, it is clear that air transport contributes to economic development and to bringing people closer together. This is one of the many ways in which we can gradually build a European identity and sense of belonging among our citizens. The challenge now is to give substance

to the decarbonisation strategy defined by the ReFuelEU Aviation regulation and to ensure that a European ecosystem for the production and distribution of Sustainable Aviation Fuels (SAF) is established. Such an ecosystem should enable the European aviation industry to secure sustainable fuel supplies while limiting the use of imported fuels, without losing competitiveness in relation to airlines and airports operating in third countries. This means drawing up master plans for each Member State, which the European Commission should encourage, as well as increasing support at European and national level for the development of new SAF production and distribution channels.

Along with the manufacture of batteries, heat pumps, and electrolyzers, the production of SAFs is recognised as a strategic area in the NZIA regulation on a net-zero industry. One of the challenges for the next mandate will be to go beyond procedural measures aimed at developing these areas and to provide new projects with tangible financial support, comparable to that provided by the American IRA and calculated simply according to each project's impact on greenhouse gas emissions.





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Carbon management

As we support industries contributing to the reduction of CO₂ emissions, we will have to continue – and even increase – our support for carbon capture and storage (CCS) and carbon capture and utilisation (CCU). These technologies will be essential for decarbonising certain industries (cement, steel, and chemicals). They will also make it possible to recover the carbon resources needed to manufacture synthetic fuels. We must therefore continue to support them and to remove the obstacles to their development.

Networks

Electricity networks will continue to be a key factor in the energy transition. The development of electricity networks and storage facilities is essential to ensure the security and availability of electricity supply, to adapt to new uses for electricity – such as electric mobility, and to enable the successful integration of renewable energies. Networks will also have to respond to people's aspirations for greater energy autonomy, without losing sight of the need to achieve optimum economic efficiency


in energy systems. The stakes are very high, since the European Commission has estimated that the investments needed to adapt Europe's electricity networks between 2020 and 2030 will amount to €584 billion⁵.

This assumes that network operators have the possibility – and the financial resources – necessary to take initiatives to meet their development needs, including by anticipating investments if necessary, and that the regulatory principles allow them to do so. Virtually everywhere in Europe, pricing structures will have to evolve to take better account of the value associated with guaranteed power.


The prerogatives conferred on local authorities, particularly in the form of energy communities, create areas of possible overlap with those of network operators. However, the development of these communities depends on public networks to connect their various members, to guarantee collection and transmission services, and to ensure long-term acceptability. European regulations and their implementation in the Member States will have to ensure that public networks remain the essential infrastructure on which the development of energy communities is based.

5. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, AND THE COMMITTEE OF THE REGIONS – Digital transition of the energy system – COM(2022) 552 (18 October 2022).

CONCLUSION



In conclusion, it is clear that energy will continue to play a central role during the next mandate of the European institutions. The challenge for the new leaders will be to complete the complex legislative framework created under *Fit for 55*. Above all, they will have to design and support concrete actions within the framework and in compliance with the principles set out above, in order to achieve the objectives outlined for 2030 and 2050.



EdEn's recommendations are grouped below into 35 lines of action, some of which are broken down into several items – explaining both the context they are based on and the objective they aim to achieve.







35 AREAS OF ACTION

1

GENERAL POLICY
GUIDING PRINCIPLES

1 > Europe must reaffirm and reinforce the priority assigned to reducing greenhouse gas emissions through concrete measures to implement *Fit for 55*. Wherever reasonably possible, we must favour actions that reduce emissions and free us from fossil fuels. “*Emissions Reduction First*” must be the guiding principle for the new mandate.

2 > Europe must promote, without discrimination, all actions that contribute to reducing greenhouse gas emissions. To this end, paragraph 1(c) of Article 194 of the Treaty on the Functioning of the European Union (TFEU) should be amended to include the priority assigned to combating climate change, to enshrine the principle of neutrality in the development of very low-carbon energy sources, and to bring the European energy policy statement into line with the objective of reducing emissions.

3 > In accordance with Article 194(1)(b) of the TFEU, Europe must recognise that ensuring secure energy supplies is an essential responsibility, define criteria and objectives for energy independence, ensure that these are respected, and refrain from supporting actions which would create new dependencies outside of our control.

4 > Following on from the NZIA initiative, Europe must make resilience and industrial sovereignty a greater priority. It must rebuild Europe’s industrial sovereignty and put in place, through regulatory and financial means – including at its borders – a recovery programme that can be rolled out in all European countries that wish to participate.

5 > The energy transition will require an unprecedented financial investment. When defining actions, Europe must give priority to efficiency and encourage actions that enable the fastest possible progress towards the objectives set, while preserving economic growth.

6 > Climate change adaptation is becoming an increasingly urgent issue, and the plan set out in the Green Paper presented by the Commission to the Council in June 2007 needs to be fully updated, with the goal of developing a *Fit for +4°C* adaptation plan.

7 > Europe must quickly conclude its ongoing work on the development of the wholesale electricity market by adopting provisions that will ensure the financing of the necessary infrastructure, stabilise prices, and provide transparency for stakeholders, while leaving Member States a wide margin to manoeuvre with respect to the organisation of retail markets.

8 > The *Fit for 55* initiative has led to the introduction of new obligations and levies that will weigh heaviest on those consumers who are least well-off. It is essential that the next mandate establish a social climate plan with a scheme for redistributing the amounts collected to those most vulnerable and to those companies whose path to decarbonisation is the most difficult.

2

DECARBONISING AND SECURING ENERGY SECTORS WHILE MAINTAINING THEIR COMPETITIVENESS

9 > In an area where each Member State must remain free to make its own essential choices, Europe must act as an impartial point of reference. **It should allow low-carbon electricity generation, whether renewable or nuclear, to develop without regulatory or financial discrimination.** A return to a climate of peaceful co-existence between the development of nuclear and renewable energies at the level of the European institutions is one of the key challenges for the next mandate.

10 > With the phase-out of fossil fuels, new forms of secondary energy – hydrogen, biogas, biofuels, synthetic fuels – will become increasingly important. **The next Commission will have to rigorously assess the practical feedback from** these new sectors in order to adjust the guidelines adopted during the current mandate, if necessary.

11 > **The question of biomass resources and their optimal use is essential.** The Commission will have to update the resource inventories already conducted and put forward priorities for their allocation.

12 > Research into the economic and technical viability **of technologies based on renewable heat sources, particularly geothermal heat, should be carried out in greater depth.**

13 > **Electricity remains the only form of energy with almost universal application.** The long-expected development of new uses for electricity has never really begun, with the exception of electric vehicles. Following the example of the automotive sector, the next Commission will have to propose a clear, proactive policy to promote electrification.

3

THE BUILDING SECTOR

14 ➤ **Optimise the use of available financial resources:** encourage the rapid transition of heating systems towards low-carbon solutions, renewable heat, and/or electric solutions, accompanied by efficient regulation and control systems, without systematically prioritising deep renovation.

15 ➤ **Accelerate the transition to low-carbon solutions:**

- also take CO₂ emissions into account when determining the energy and environmental performance of buildings;
- calculate the energy performance of buildings on the basis of final energy consumption rather than primary energy consumption, the conventional calculation of which favours fossil fuels;
- launch a plan for the mass deployment of heat pumps, combining the promotion of their use, the development of new technologies for large residential buildings, industrial development, and the training of professionals.

16 ➤ **Continue the fight against energy poverty.**

4

THE LIGHT ROAD TRANSPORT SECTOR

17 ➤ **Continue the roll-out of charging infrastructure:**

- accelerate the development of charging stations accessible to the public, particularly on seasonal corridors, while reinforcing the minimum power capacity provided for in the AFIR regulation;
- facilitate the installation of charging infrastructure in large residential buildings via regulations and the introduction of incentive schemes;
- encourage local authorities to set up charging stations for taxis and other EV users who do not have parking spaces at home or at work;
- at the same time, encourage hypermarkets, supermarkets, and retail outlets to install charging stations.

18 ➤ **Improve the quality of charging services for electric vehicles:**

- require the deployment of devices to control charging in order to encourage the consumption of renewable electricity and limit power demand during peak hours;
- encourage the public availability of open data on charging points.

19 ➤ **Continue investment in research and development:**

- encourage investments in R&D for *vehicle-to-home* (VtoH) or *vehicle-to-grid* (VtoG) technologies, in order to exploit the potential flexibility offered by vehicle storage capacity;
- continue to invest in research and development on new battery chemistries and recycling.



THE HEAVY ROAD TRANSPORT SECTOR

20 ➤ Facilitate the transition of heavy-duty vehicles (HDVs) to electric mobility:

- authorise an increase in the GVW of vehicles to account for the extra weight of batteries;
- develop high-power fast-charging stations along major routes, as studied by the CharIn consortium;
- evaluate continuous vehicle charging systems (known as *Electric Road Systems*, or ERS) through pilot programmes covering shorter distances, and standardise their characteristics at European level.

21 ➤ Maintain the optional use of renewable fuels (BioNGV in particular), provided that their use in HDVs does not compete with essential uses.



THE AIR TRANSPORT SECTOR

22 ➤ Develop a European ecosystem for sustainable aviation fuels (SAF):

- promote the establishment, in each Member State, of a master plan for the development of the production, transport, and distribution of SAF in line with the ReFuelEU Aviation regulation;
- encourage the emergence of new, advanced technologies that are still in the early stages of development;
- coordinate the establishment of master plans with those relating to electricity production, electricity networks, hydrogen production, and industrial CO₂ recovery.

23 ➤ Preserve the competitiveness of European airlines:

- strengthen support measures for decarbonisation of the aviation sector by increasing the reserve allocated to SAF up to 2030 and introducing a new support system after that date;
- establish a system for earmarking the proceeds from the auctioning of aviation carbon allowances to decarbonise the aviation sector;
- schedule the investments needed to achieve the objectives for decarbonising ground operations, in order to give European airports the transparency they need.

24 ➤ Adapt the Single European Sky regulation: reach an agreement on the development of the Single Sky during the next mandate.

7

THE INDUSTRIAL SECTOR

25 ➤ **Provide more support for innovation:**
Make the Innovation Fund the preferred tool for supporting innovation programmes in key technologies, in parallel with the acceleration of procedures made possible by the NZIA regulation.

26 ➤ **Restore the balance of trade:**

- clearly define which markets the EU decides to keep open and which it decides to protect;
- introduce a preferential system in sectors deemed sensitive, to protect them from foreign competition not subject to the same requirements as in Europe;
- ensure that the principle of reciprocity is respected in trade between the EU and third countries in order to re-establish fair market conditions.

27 ➤ **Move towards a low-carbon industry:**

- end the debate between nuclear and renewable electricity (see recommendation 9);
- support the introduction of measures to facilitate the establishment of long-term, predictable electricity contracts for industry, (see recommendation 7);
- plan for the emergence of green energy industries in Europe, in particular by creating a dedicated European fund.

8

DEVELOP THE CCU AND CCS SECTORS

28 ➤ **Facilitate the development of the CCS sector:**

- fully integrate CCS technology into European energy and climate strategies, as a complement to improving energy efficiency and the transition to low-carbon energies;
- continue to support the CCS chain at the European level until the value of CO₂ allowances reaches a sufficient level.

29 ➤ **Facilitate the emergence of the CCU sector:**

- postpone the limit on the utilisation of recycled carbon for the production of synthetic fuels from plants built before 2035 until 2040;
- support pilot Direct Air Recovery (DAR) operations, in Europe or under the control of European players, in order to master the technology.

30 ➤ **Define a European framework for the cross-border transport of CO₂,** in line with the London Protocol on the Prevention of Marine Pollution (1996).

9

FACILITATE THE DEVELOPMENT AND ADAPTATION OF **ELECTRICITY NETWORKS**

31 ➤ Support the promotion of electricity and renewable energies with an action plan for electricity networks, comprising a set of measures aimed at developing an efficient, robust electricity network operated by a skilled workforce:

- rethink the resilience of the electricity system on a European scale to respond to changes in production and consumption and to cope with the intensification of climate change;
- develop storage technologies and capacities at different levels of the energy chain, including for thermal energy storage;
- develop and promote flexibilities, in particular through demand management;
- promote the digitisation of the electricity system, taking advantage of existing tools (smart meters) and defining a harmonised framework to strengthen cyber security;
- develop skills, in particular by helping create training courses that meet the needs of the power distribution industry.

32 ➤ Adapt the criteria used by regulatory bodies to assess the management of network operators, applying a more forward-thinking regulatory approach:

- anticipate investments in the electricity network: physical and digital infrastructure, financing of a skilled workforce, etc.;
- establish a detailed European plan for electricity networks to support an electrification strategy;
- adapt the criteria used by regulators to assess network operators to take better account of the needs of industry and to facilitate innovation.

33 ➤ Under the 2028-2034 Multiannual Financial Framework (MFF), mobilise the financial resources needed to modernise and develop networks:

- following on from the Strategic Technologies for Europe Platform (STEP) initiative of June 2023, create a sovereignty fund designed to support investment in clean technologies, including network technologies;
- encourage the introduction of tariffs based more on the power guaranteed by the network.

34 ➤ Facilitate and accelerate the deployment of electricity networks via expansion or in light of the NZIA regulation, by ensuring the development of a solid industrial base.

35 ➤ Define the areas of responsibility of the new and existing players in the energy transition, in particular to determine who is liable in the event of a supply disruption, and define principles for remuneration and redistribution of revenue





A LOOK BACK AT THE LAST MANDATE

A look back at the last mandate

EdEn White Paper
Fit for 55... and what next?

At the initiative of European Commission President Ursula von der Leyen, the 2019–2024 mandate was structured from the outset around the European Green Deal and the Fit for 55 legislative package, through which the European Commission has set itself the goal of adapting the European Union’s entire legislative framework for energy and climate to a decarbonisation trajectory that will make it possible to achieve carbon neutrality by 2050.

While it is still too early to judge the results of this strategy, it is already clear that it has enabled the EU to make progress in its response to climate change. However, on the other hand, it is clear that the EU is not on track to achieve certain objectives. In addition, new concerns have arisen, in a context that has been severely disrupted by the Covid pandemic, the gas crisis and the war in Ukraine.

MAIN ACHIEVEMENTS

The decline in emissions is well underway but needs to accelerate

After reaching a low point in 2020 as a result of the Covid crisis, greenhouse gas emissions in the EU–27 rose again in 2022, but remained almost 30% below the 1990 baseline (Figure 1).

The year 2023 will see a resumption of the decline in emissions, with Eurostat statistics for the 1st quarter showing a 2.9% decrease compared with the 1st quarter of 2022, which is in line with the trend

observed over the last five years, with the exception of 2020. This result is encouraging; however, 2030 is just around the corner, and the annual rate of reduction in the volume of emissions will have to be increased to around 5.4% from 2023 if we are to meet our target of a 55% reduction by 2030, as compared to 1990 levels.

This is a very difficult challenge that the next mandate will have to face.

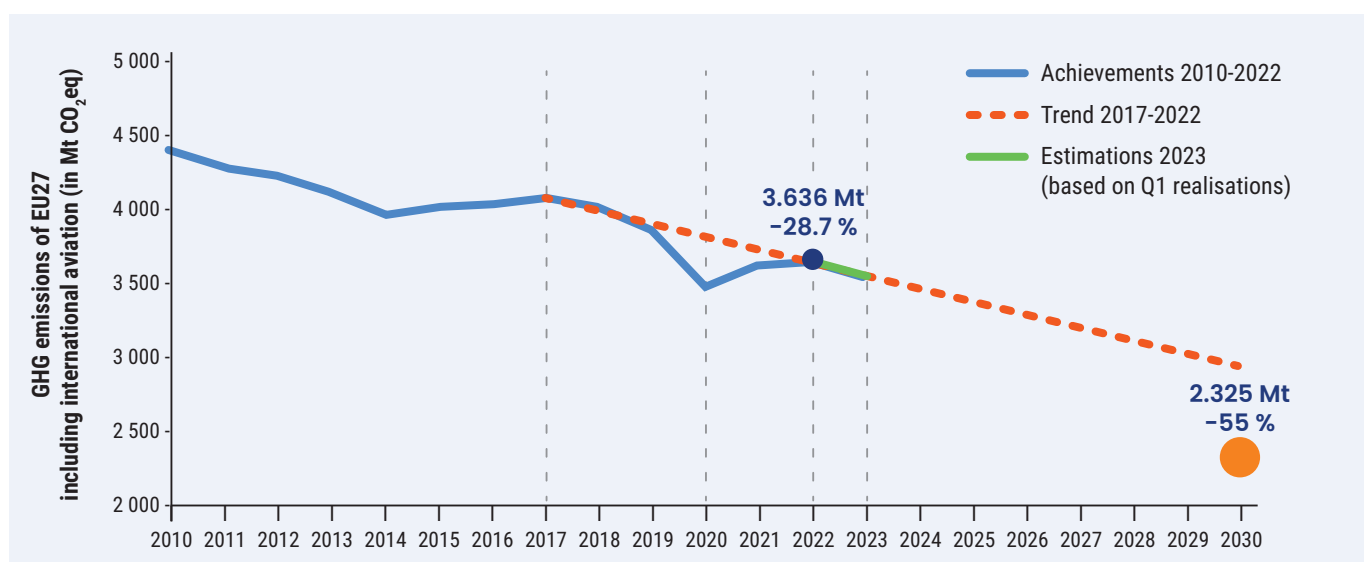


Figure 1: Trends in greenhouse gas emissions in Europe – 2017–2022 trends compared with the Fit for 55 target for 2030.
Source: Eurostat data.

Consolidating and deepening the carbon market

The European carbon market, based on the EU Emissions Trading System (ETS), was set up in 2005. By 2009, it covered more than 10,000 installations in the energy and industrial sectors, which are collectively responsible for almost half of the EU's CO₂ emissions and 40% of total greenhouse gas emissions.

The EU ETS was further strengthened by the *Fit for 55* package, which extended it until 2030 and expanded it to cover the building and road transport sectors, which are responsible for 36% and 20% of the EU's greenhouse gas emissions. This development should be welcomed, as it places a clearer emphasis on the objective of reducing greenhouse gas emissions, in particular in the building sector.

The aviation sector, which was already part of the EU ETS, has been brought into the general regime via the adoption of a reduction trajectory as well as the elimination of the free carbon allowances it was previously granted. In line with the objectives adopted in the ReFuelEU plan, these provisions allow us to plan for the decarbonisation of the sector.

The 2019–2024 European cycle has also seen the price of carbon allowances rise significantly, from €29 per tonne of carbon in July 2019 to €78 at the end of October 2023.

This increase marks the emergence of a price signal to encourage industries subject to the EU ETS to reduce their greenhouse gas emissions.

At the same time, rising carbon prices have increased the revenue generated by the European Union via the EU ETS. This revenue has risen from €14.6 billion in 2019 to €38.8 billion in 2022, of which €29.7 billion was left at the disposal of the Member States; the revenue was also used to support the Innovation Fund (€3.2 billion) and the Modernisation Fund (€5.4 billion)⁶.

The beginnings of a trade rebalance

While strengthening the EU ETS, the *Fit for 55* package also introduced the Carbon Border Adjustment Mechanism (CBAM) – often referred to as the border carbon tax – designed to re-establish a level playing field with countries that have not yet introduced measures to penalise emissions comparable to those in force in the European Union.

The implementation of this mechanism, scheduled for 2027, will enable carbon pricing to be imposed on certain imported products – cement, steel and iron, aluminium, fertilisers, and electricity. Importers will be obliged to purchase emissions certificates, the price of which will be based on the price per tonne of carbon in the EU ETS, corresponding to the carbon content of these products.

There are limits to the scope and effectiveness of this mechanism: it only concerns raw materials and therefore risks incentivising increased imports of finished products. Furthermore, in order to remain compliant with WTO rules, European exports will not receive adjustments to compensate for the extra costs associated with the EU ETS. However, the CBAM bears witness to Europe's desire to re-establish a level playing field between European economic players and foreign competitors wishing to market their products within the EU.

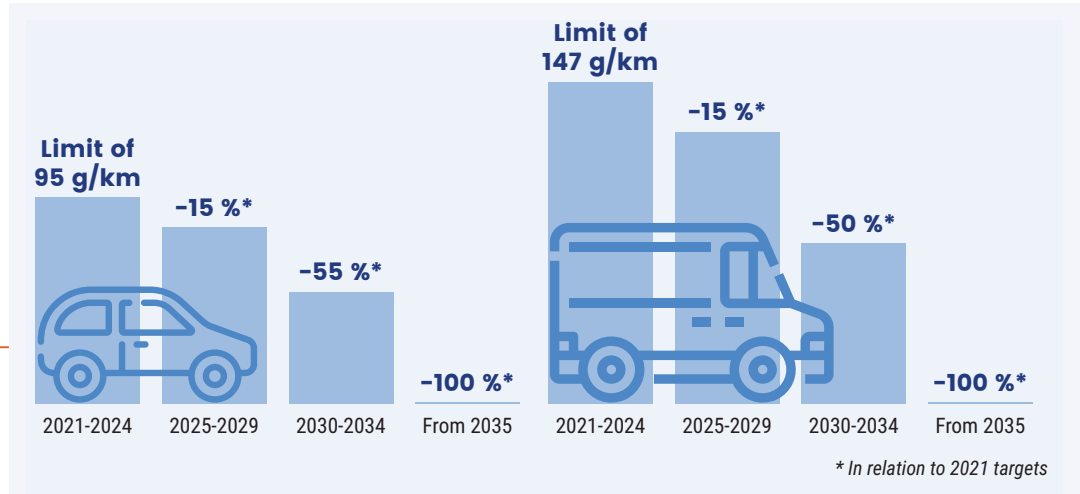
A major and decisive boost for electric mobility

The large-scale launch of electric mobility for passenger cars and light commercial vehicles is one of the biggest successes of the current mandate. European policy has largely been based on regulatory action, through the tightening of CO₂ emissions standards imposed on new vehicles. From 2035, as per the regulation adopted on 25 April 2023⁷, all new cars and vans put on the market must be zero-emission (Figure 2).

6. Source: REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the functioning of the European carbon market in 2022. COM(2023) 654 final (31 October 2023).

7. Regulation (EU) 2023/851 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2019/631 as regards strengthening the CO₂ emission performance standards for new passenger cars and new light commercial vehicles in line with the EU's increased climate ambition.

Figure 2: Reduced CO₂ emissions for new cars and vans.



In support of the regulation of 25 April 2023, the AFIR⁸ regulation adopted on 13 September 2023 requires all EU countries to meet minimum targets for the deployment of publicly accessible charging points for electric passenger vehicles and heavy-duty vehicles. The new Energy Performance of Buildings Directive (EPBD)⁹ will strengthen the requirements regarding charging infrastructure at residential and commercial buildings.

Backed up by national incentives for the purchase of electric vehicles, these measures are bearing fruit: the range of vehicles offered by carmakers has expanded considerably, and by 2022 the proportion of electrified light vehicles among newly registered vehicles will reach 21.5%, including 12.0% for all-electric vehicles and 9.5% for plug-in hybrids¹⁰. However, the first half of 2023 will see a slowdown in the growth of vehicle registrations, with the percentage of electrified vehicles falling to 19.7% and competition from China intensifying.

Integrating the sectors with the most difficult decarbonisation trajectories into Europe's energy transition strategy

The *Fit for 55* package also marks the extension of Europe's energy transition strategy to cover the sectors with the most difficult decarbonisation trajectories. For these sectors – including air transport, maritime transport, heavy road transport, and certain industrial activities – decarbonisation solutions are fewer and more difficult to implement than in other sectors, such as construction and light road transport.

This extension is well warranted, as it is both necessary in order to achieve the carbon neutrality objective that the EU has set for itself and useful in that makes it necessary for public authorities to develop the industry and energy production that will achieve this goal. These sectors, which are difficult to decarbonise, raise the question of the availability of resources and their prioritisation towards those sectors where they are most useful, as well as the question of which industrial sectors may be essential to the deployment of the new fuels and energy carriers needed for the energy transition.

In the aviation sector, the ReFuelEU-Aviation regulation¹¹ of 18 October 2023 imposes a roadmap for the deployment of sustainable aviation fuels – biofuels and renewable fuels of non-biological origin

8. Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure and repealing Directive 2014/94/EU.

9. Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the energy performance of buildings (recast).

10. Source: European Alternative Fuels Observatory.

11. REGULATION 2023/2405 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of October 2023 on ensuring a level playing field for sustainable air transport.

(synthetic fuels) – by 2050. The regulation calls for sustainable fuels to account for 2% of the aviation fuel delivered to airports by 2025. This target will then increase steadily to reach 70% of the fuel delivered in 2050. From 2030, a sub-target has also been set for renewable fuels of non-biological origin: of the 6% of sustainable fuels that must be supplied by this date, synthetic fuels will have to account for at least 1.2%. In 2050, the overall target for the incorporation of synthetic fuels will rise to 35%. By this time, synthetic fuels will account for half of the sustainable fuels delivered to aviation.

While this trajectory is very ambitious, it will allow all stakeholders to work on implementing the energy and industrial models that will be needed to achieve their objectives, while the European Union must take into account the need to preserve the competitiveness of the European aviation sector.

In addition to these provisions, the AFIR and TEN-T¹² regulations also impose decarbonisation roadmaps for ground activities (providing electricity at contact and remote stands, building railway stations to encourage intermodality), requiring massive investment and improving transparency for European airports in the move towards net zero.

In parallel with the introduction of this framework targeting the aviation sector, on 13 September 2023 the European Union adopted the FuelEU-Maritime regulation¹³ which, in the same spirit, provides the **maritime transport** industry with a framework for planning its transition to sustainable fuels. The text stipulates that ships with a gross displacement of over 5,000 tonnes must reduce their greenhouse gas emissions by 2% from 2025 and by at least 80% from 2050. These provisions concern 100% of the energy used on board or on voyages between two EU ports and 50% of the energy used on voyages where only the port of departure or arrival is located in the European Union. As with the aviation sector, this text provides an impetus for planning the production of sustainable fuels for the maritime sector. It also

obliges the EU to take account of the challenges of competing with non-European players – a notable issue in a sector that is international by nature.

The **heavy transport sector** has also been the subject of draft legislation, although the text was proposed after the *Fit for 55*¹⁴ package. This text, like that adopted for light vehicles, provides for a reduction in greenhouse gas emissions from new HDVs 45% by 2030 and up to 90% (European Commission proposal) by 2040. Once approved, this roadmap will give players the transparency they need to develop new solutions for low-carbon heavy mobility and to accelerate the development of the technologies needed to achieve these objectives, including battery and hydrogen technology and Electric Road Systems (ERS). However, certain renewable fuels (biomethane, biofuels) should continue to play a role in this transition phase, particularly in those Member States that will need more time to electrify their road networks. Furthermore, renewable fuels will continue to be suitable for certain markets, such as agricultural and construction equipment.

Awareness of the need for energy sovereignty

The outbreak of war in Ukraine was a wake-up call for Europe. The vulnerability of gas supplies from Russia became brutally obvious. The European Commission had to propose emergency measures to deal with the risk of shortages and to stabilise the gas and electricity markets, which were drifting apart.

It also commissioned an in-depth analysis on how to provide Europe with “affordable, secure, and sustainable energy”. This is the aim of the REPowerEU plan, launched on 18 May 2022 and comprising three chapters:

- saving energy by raising the target for additional energy efficiency in the revised Energy Efficiency Directive (EED) from 9% to 13%¹⁵;

12. Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on EU guidelines for the development of the trans-European transport network (version 09/07/2023).

13. REGULATION 2023/1805 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport and amending Directive 2009/16/EC.

14. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulation (EU) 2019/1242 as regards strengthening the CO₂ emission performance standards for new heavy-duty vehicles and integrating reporting obligations.

15. Finally, the directive approved on 13 September 2023 (DIRECTIVE 2023/1791 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955) sets a target of reducing energy consumption by 11.7% by 2030, compared with previous forecasts.

- stimulating investment in renewable energies by aiming for a 45% renewable energy target in the revision of the Renewable Energy Directive (RED)¹⁶, with:
- a total renewable energy production capacity increasing to 1,236 GW by 2030, including 600 GW of new solar photovoltaic capacity;
- more diverse energy sources, with a target of 20 Mt of green hydrogen by 2030, half of which will be produced in Europe; the development of biomethane, with a target of 35 billion m³ by 2030 (compared with European production of 3.5 billion m³ in 2021); and a plan to accelerate the deployment of heat pumps.

The REPowerEU plan involves a financial outlay of almost €300 billion, including €210 billion in investments over and above those required by *Fit for 55*. The Commission is proposing to mobilise the Recovery and Resilience Facility (RRF) to cover most of the expenditure, primarily in the form of loans.

The REPowerEU plan reflects the European Commission's awareness of the urgent need for energy in the face of a deteriorating international context. However, as we will emphasise below, this plan's objectives remain largely aspirational and are based on the Commission's two traditional areas of action: energy savings and renewable energies, without taking into account at this stage the possible contributions of nuclear energy, including in its advanced forms: small reactors (electric or purely thermal) and generation IV nuclear energy, which will make it possible to overcome some of the shortcomings of current nuclear power stations.

Launch of a European industrial strategy

The 2019–2024 mandate saw a turning point in the approach to the European energy transition strategy in that, in addition to establishing new targets, there was a new concern for identifying and supporting the development of the technologies and industrial apparatus needed for the energy transition.

This new axis in the EU's strategy marks the start of a more pragmatic approach to the energy transition, aimed at making it consistent with the development of new sectors, industrial capacities, and the ambition to maintain the EU's economic prosperity.

The first step in this direction was the adoption of the regulation of 18 June 2020¹⁷ defining the taxonomy of economic activities with a favourable impact on the environment (the Green Taxonomy Regulation). An initial delegated act of 4 June 2021 established a list of economic activities that could be considered sustainable in terms of mitigating and adapting to climate change¹⁸. Subsequently, and subject to certain conditions, a second delegated act introduced certain activities related to nuclear and gas, both considered to be transitional energies¹⁹. The Green Taxonomy Regulation and its delegated acts provide a framework for investors to direct their financing towards activities that have a positive impact on the climate and the environment. The often heated debates that accompanied the inclusion of certain gas- and nuclear-related activities took place before Russia invaded Ukraine, in a context that is now outdated.

The second initiative is the Net-Zero Industry Act (NZIA)²⁰, proposed on 16 March 2023 in response to the US Inflation Reduction Act. With this act, the European Commission aims to develop production capacity in Europe that can cover 40% of the EU's needs net-zero strategic technologies. The Commission's initial proposal sets out a list of net-zero-emission

16. Finally, a target of 42.5% renewable energy by 2030 was set in the directive approved on 18 October 2023 (DIRECTIVE 2023/2413 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL 18 October 2023 amending Directive 2018/2001, Regulation 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive 2015/652).

17. REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2020 on the establishment of a framework to facilitate sustainable investment.

18. Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852.

19. Commission Delegated Regulation (EU) 2022/1214 of 9 March 2022 amending Delegated Regulation (EU) 2021/2139 as regards economic activities in certain energy sectors.

20. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act).



technologies and strategic technologies, each of which will benefit from facilities for the deployment of industrial projects. The text also includes skills provisions aimed at accelerating the training of workers in these sectors.

As with the Green Taxonomy Regulation, this text has given rise to tense debates on which technologies should be included in the defined categories. It does, however, represent an essential first step in establishing a European sectoral industrial strategy.

In the same vein, we should also mention:

- the new “batteries and waste batteries” regulation²¹, which aims to accelerate recycling and make it easier to replace batteries and bans battery models with an excessively high carbon footprint;
- the proposal, published on 16 March 2023, for a regulation establishing a framework to ensure a secure and sustainable supply of critical raw materials²².

Finally, a debate of the utmost importance was launched with the Commission’s 14 March 2023 proposal to reform the organisation of the EU electricity market in order to accelerate the development of renewable energies and the phase-out of gas, to reduce the impact of fossil fuel price volatility on consumers’ bills, to better protect consumers against future price spikes and market manipulation, and to make EU industry cleaner and more competitive.

At the time of writing, the debates have not yet been completed, but the European authorities have reached convergent positions on key points, leading to the prospect of a trilogue agreement before the end of 2023. Under this agreement, Contracts for Difference are likely to be the preferred means of both stabilising prices and enabling investment to be financed. However, the question of the electricity market is likely to remain a major issue for the next mandate and will require adjustments.

21. REGULATION (EU) 2023/1542 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 July 2023 concerning batteries and waste batteries.

22. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a framework for ensuring a secure and sustainable supply of critical raw materials.

THE LIMITS OF THE 2019–2024 EUROPEAN CYCLE

The above analysis shows that, under the impetus of the Commission and in a very short space of time, the European institutions have produced a considerable amount of legislation covering a wide range of sectors, with the central objective of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels, in order to achieve carbon neutrality by 2050.

This approach, taken from the European Green Deal, has been severely disrupted by events beyond the control of the European authorities: the Covid crisis, the gas crisis, the return of inflationary pressures, the war in Ukraine, and the disruption of certain supply chains.

However, it is fair to ask whether this strategy was based on sound principles and whether the actions taken will be sufficient to achieve the desired objectives.

A strategy that remains too dependent on its historical foundations and overlooks nuclear energy

A revolution is underway in the energy sector, with the aim of ending dependence on fossil fuels in just 30 years, whereas it is coal, oil, and gas that have ensured European economic prosperity for 200 years. Not all European authorities immediately realised that this was not just a development, but a revolution that goes far beyond a simple extrapolation of the efforts made under the 2020 climate and energy package adopted on 12 December 2008 – more than 15 years ago.

After twice raising the emissions reduction target from -20% in 2020 to -40% in 2030 and then to -55% in 2030, the European Commission has stuck to the two traditional areas of action for achieving this objective: energy savings and efficiency on the one hand, and the development of renewable energies on the other. It has even made energy efficiency its main priority, establishing a fundamental principle called *Energy Efficiency First*; however, the details of this principle have not yet been defined.

In its defence, the Commission can point out that energy efficiency and renewables are the only tools referred to in Article 194 of the Treaty on the Functioning of the European Union governing the EU's energy policy. However, Article 192 on preserving, protecting and improving the quality of the environment, offers a broader vision.

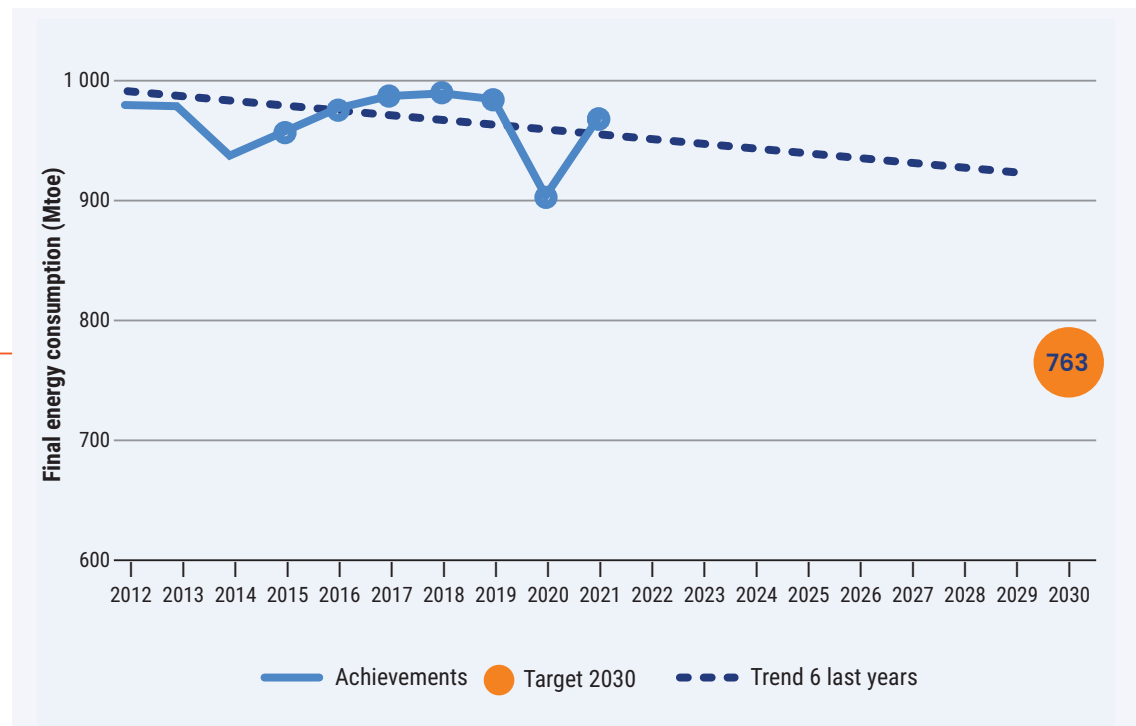
By limiting itself to these two levers to move the European Union towards carbon neutrality, the Commission has been led, through its forecasting models, to propose extremely ambitious targets that are consistent with the objective of decarbonisation, but which it is doubtful will be achieved.

This is particularly true in the area of energy efficiency, where experience has shown that progress has been slow. Even with greater efforts to achieve “energy sobriety”, the target established for 2050 will be difficult to achieve (Figure 3). The difficulty will be compounded by the fact that the transition to new forms of low-carbon energy (hydrogen, synthetic fuels, etc.) will require production processes that are themselves energy-intensive and require equipment such as electrolyzers, heat exchangers, and fuel cells that have to be manufactured (or imported), and whose production has a significant impact on the final energy consumption balance.

The renewable energy target does not escape this tendency towards “activism on paper only”. Achieving a 42.5% share of renewable energies means increasing the rate of development of electricity generation capacity from wind and photovoltaic sources by a factor of 3 to 5, as compared with the rate observed over the last few years. Such acceleration is far from a foregone conclusion, as questions of available space, public acceptability, and industrial sovereignty call for answers that will not be easy to find.

By sticking to its model, in which demand is reduced through energy efficiency and needs are met by renewable energies, the Commission is depriving itself of important means of action.

Figure 3: Trends in final energy consumption in the EU-27 and positioning of the 2030 target.
Source: Eurostat data.



While more and more countries are turning to nuclear energy, the Commission has not yet incorporated it into its policy. The current mandate has even been marked on several occasions by its hostility towards nuclear energy in the texts it put forward. It was only at the end of the mandate, under pressure from a dozen or so Member States, that the Commission opened the door to nuclear energy, though without conviction. Despite this progress, the particularly tense debates over the inclusion of nuclear power in the green taxonomy, low-carbon hydrogen, and the regulation on net-zero-emission industry testify to the EU's difficulties in moving on from the energy transition strategy it has traditionally followed.

Nevertheless, maintaining a base of nuclear energy in Europe is a way of making an effective contribution to decarbonising the economy while ensuring the stability of the electricity system in both technical and economic terms, so as to avoid the return of market price spikes like the one we saw in 2022. It is not a question of imposing the use of nuclear energy on Member States that do not wish to rely on nuclear, but their choice must not be made a Community rule, disregarding Member States' right to choose their energy sources and the general structure of their energy supply.

Neutrality in the choice of low-carbon energy should lead us to reconsider Article 194(1) of the Treaty on the Functioning of the European Union (TFEU), which places the emphasis solely on the development of new and renewable energies. We need to promote all energy sources which produce zero or very low carbon emissions. Rewriting paragraph 1 is one way to affirm this. Failing that, legal means must be sought to bring the European energy policy statement into line with the overriding objective of combating climate change, using for example the flexibility clause in Article 352 of the TFEU.

The potential of new pathways needs to be better assessed

The Commission has recently realised the importance and indispensability of CO₂ capture and storage (CCS). The inherent difficulty of decarbonising certain industrial processes, the apparent limitations in the capacity of natural carbon sinks, and the need for a carbon base to manufacture objects, synthetic fuels, and fertilisers have led to a reconsideration of the issue of carbon capture. Though the new impetus given to CCS following the draft NZIA regulation should be welcomed, like nuclear power, it highlights the overly simplistic nature of the "energy efficiency + renewable energies" paradigm.

More generally, the Commission’s traditional model ignores the fundamental changes that will affect the energy world. New energy solutions are emerging: hydrogen – from many different sources – biogas, sustainable aviation fuels, synthetic fuels, e-methanol, and e-ammonia. None of these fuels is as universally useful as electricity, though they can all be useful in a given sector. The debate on the optimal uses of each carbon-neutral energy carrier has not really taken place. However, we will have to define the manner in which the final energy consumption balance should, by 2050, be distributed across the various carbon-neutral energy vectors.

This will probably be an opportunity to reevaluate the role of hydrogen, which had been made one of the focal points of the REPowerEU plan and to refocus its development toward uses for which it is particularly suitable. It will also be an opportunity to define the optimal production and use of these new energy carriers, using life-cycle thinking to ensure technological neutrality and to define, where necessary, principles for prioritising the use of primary energies – as should be the case for biomass, of which resources are increasingly limited.

Too little on electrification in the European strategy

The policy of massively developing solar and wind-generated electricity only makes sense if, at the same time, electricity is promoted as a replacement for hydrocarbons, contributing to the decarbonisation of the final energy balance.

Today, electricity only contributes an average of around 21% of final energy requirements in Europe, and this percentage is changing very slowly (Figure 4).

It is generally accepted that the share of electricity in final energy consumption should increase to at least 50%. This shows how far we have to go to achieve such a goal. However, electrification is little discussed in the texts proposed by the Commission; apart from electric vehicles and certain industrial sectors, there is no specific provision for the development of electricity, while the REPowerEU plan explicitly emphasises hydrogen and biomethane.

What’s more, the continued use of the Primary Energy Factor (PEF) for converting electricity into primary energy to assess the energy performance of buildings strongly penalises buildings equipped with electric heating equipment, even when they emit much less CO₂ than those heated with gas, let alone oil.

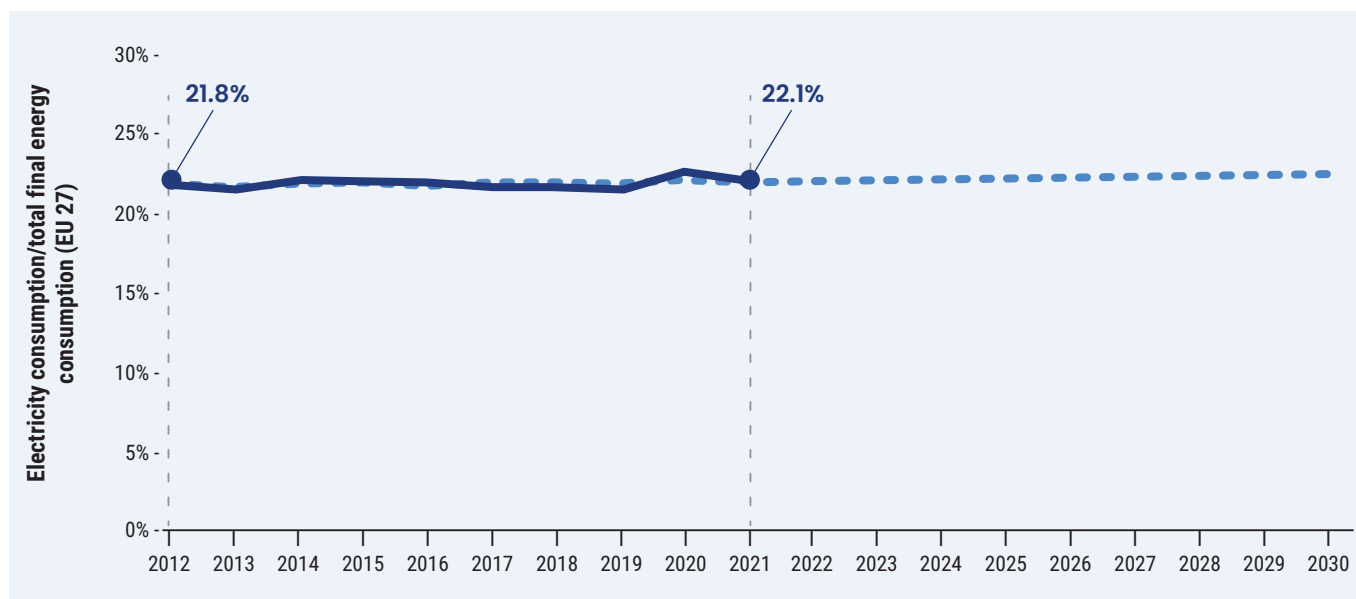


Figure 4: Trends in the share of electricity in final energy consumption in Europe. Source: Eurostat data.



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Insufficient consideration of flexibility

With the integration of intermittent renewable energies into the electricity networks, the development of local energy production, and the emergence of new uses for electricity – such as electric vehicles, we need new ways to adapt electricity demand to supply.

Solutions exist: control and regulation systems, systems for capping power demand, thermal and electrical storage systems, etc. However, it is often difficult for these systems to be economical, as the tariffs levied are not sufficiently differentiated. For some, one kilowatt-hour is the same as another, regardless of when it is produced or consumed. Assessing the technical and economic potential of the various flexibility levers at European level is a key area for development, with the aim of reaching a consensus on a vision for the future.

Though the revised EPBD will impose new requirements to equip buildings with regulation systems, the EED remains focused on the notion of energy consumption, whereas energy efficiency

should include controlling demand for both electricity and gas – in order to limit the need for production, transmission, and distribution infrastructure.

Faced with the costs of the energy transition, the European Union's response remains weak

The financing of the energy transition is a blind spot in the European Green Deal, which does not provide businesses or consumers with a clear vision of how the roll-out of technologies for the energy transition will be supported in economic terms. We now know that the energy transition will entail considerable costs, conservatively estimated at €63 billion for France alone over the period from 2023 to 2030²³.

Whereas the Inflation Reduction Act (IRA) in the United States is an ambitious policy of economic support for the sectors concerned, in particular through tax credits, the draft Net-Zero Industry Act – intended to be the EU's response to the IRA – proposes only administrative facilities and the sharing of best practices.

23. Pisani-Ferry/Mahfouz report (May 2023).

The system of European Alliances set up by the European Commission in the batteries, sustainable fuels, and hydrogen sectors means that state aid in excess of the normally applicable limits can be granted as part of the Important Projects of Common European Interest (IPCEI). However, these IPCEIs are subject to strict rules concerning the nature of the technologies that can be supported and the number of Member States agreeing to support these projects. While battery factory projects only began to emerge several years after the establishment of the Battery Alliance in 2017, other Alliances, such as the Renewable and Low-Carbon Fuels Value Chain Industrial Alliance (RLCF) and the Alliance for Zero Emission Aviation (AZEA), must strive to bring these projects to fruition.

With respect to electricity networks, the Connecting Europe Facility (CEF) has been only marginally beneficial for the distribution networks, as have the Cohesion Fund, the European Regional Development Fund and the European Fund for Strategic Investments. Research and development projects have been funded via Horizon Europe, though the mechanisms are becoming increasingly cumbersome in terms of red tape.

The Emissions Trading System (ETS) is a cornerstone of European action and a source of revenue for the European Union and its Member States through the purchase by companies of emissions allowances, the price of which was €76 per tonne of carbon by the end of November 2023. The specific mechanism for this redistribution, the sectors concerned, and the relative prioritisation of this system, however, have not been sufficiently clarified by the Parliament. This limits the transparency offered to economic entities subject to the EU ETS with respect to the support they may receive for their projects.

As far as consumers are concerned, the European Union has so far given little thought to how new energy transition technologies can be made accessible to them. Although the production of these new technologies – electric vehicles and heat pumps, for example – has already been rolled out, continued growth in demand is uncertain due to the investment required to acquire such equipment: around €15,000 for the installation of a heat pump, and an average of €30,000 to €50,000 for a new electric car.

The Social Climate Fund, set up by the European Union to support households, will not be fully operational until 2027, and the specific mechanism for redistributing the funds has not yet been defined. If the European plan for reindustrialisation and the development of energy transition industries is to become a reality, demand must be allowed to grow at the same rate as production capacity.

Europe's response to the war in Ukraine has been mixed

In the field of energy, European institutions have long taken approaches that have proven difficult to reconcile:

- **an approach based on opening up markets**, supposed to bring prosperity through competition, intending to transpose to the energy sector the model successfully applied to the telecommunications sector;
- **a highly interventionist “environment and climate” approach**, supposed to bring well-being and prosperity through the development of renewable resources and the control of needs, with the aim of positioning Europe as a world leader on the climate issue and encouraging Member States to make the necessary energy transition.

Clearly, Europe was not prepared for the shock of war in Ukraine. Some criticise its leaders for having been slow to take stock of events and put in place the necessary safeguards. In fact, Europe's leaders have risen to the occasion, and the difficulties in changing course have much less to do with their hesitation than with the fact that, over the years, Europe has forgotten the two fundamentals of any energy policy: energy independence and industrial sovereignty. Europe was thinking about the climate and renewable energies, while also preparing to inaugurate Nord Stream 2. The war in Ukraine caught the EU off guard, and lessons will have to be learned.

Nonetheless, Europe remained united. It is a force to be reckoned with in the world, and the current context should serve as a catalyst for the EU to take its destiny back into its own hands.





A NEW VISION FOR EUROPEAN ENERGY POLICY

A NEW CONTEXT CALLS FOR NEW SOLUTIONS



Covid in 2020, the gas crisis in 2021, the war in Ukraine starting in 2022, and the ensuing energy crisis have brutally highlighted the limits of the EU's energy transition strategy.

Covid highlighted the EU's industrial weakness, with the sudden difficulty in procuring basic necessities. The gas crisis of 2021, followed by the war in Ukraine, revealed how vulnerable its energy supply is and how dependent on imported fossil fuels – particularly Russian gas – the EU is.

The ensuing rise in energy prices has highlighted the difficult situation in which many European households find themselves, being encouraged to adopt the new energy transition technologies, while increasingly suffering from energy poverty.

Faced with these difficulties, the next mandate can be neither a replica nor an extrapolation of the current one. For the European Union to pursue its decarbonisation trajectory, maintain its economic balance, and preserve its independence, it must incorporate five essential requirements into its energy and climate strategy, thus returning to the fundamentals of the energy policies of past decades, but without abandoning the fight against the accelerating global warming.

1 > Energy and climate policy must prioritise decarbonisation

Priority to reducing emissions

We have already highlighted the limits of the “Energy Efficiency First” principle promoted by the European Commission, which can be counterproductive when it comes to developing new carbon-neutral energy sources. A model based on efficiency alone would essentially rule out the development of electrolytic hydrogen, non-biological renewable fuels for aviation, and carbon capture and storage (CCS) and carbon capture and utilisation (CCU) technologies.

The EU should promote the principle of “Emissions Reduction First”.

From a climate perspective, there is no other choice. The effects of global warming are more and more palpable; we must act now, and our delays in meeting the targets we set 20 years ago are accumulating dangerously. It is not Europe’s role to lecture the world, but it can lead the way and show that advanced economic development is not incompatible with protecting the environment and managing the climate.

It will not be enough, however, for the coming mandate to simply rehash *Fit for 55* as *Fit for XX*, even if we set targets for 2040. The time for results has come: accountability is imperative and the EU’s energy and climate policy must produce visible results: the quality of housing stock must improve, vehicle fleets must be electrified, the use of fossil fuels must decline, and new industries must emerge and create the expected jobs.

The EU must implement what has already been decided, and resist the temptation to evade its responsibility by setting new targets that are more ambitious yet ever more distant.

It is of course necessary to monitor the implementation of our action plan and assess its relevance and the relevance of our chosen objectives. Since the 3x20 package adopted in 2008, Europe’s energy and climate policy has chronically suffered from multiple and often contradictory objectives, as seen in the

previous chapter. For the next mandate, the relevant overall objective must be to reduce greenhouse gas emissions and translate the *Fit for 55* plan into concrete actions.

Promoting carbon-neutral energy sources

To translate this objective into energy reality, the most effective action is to reduce the share of fossil fuels in gross available energy (GAE), as defined by Eurostat. According to Eurostat, gross available energy is the most important aggregate in energy balances. It represents the quantities of energy required to satisfy all the needs of a particular entity, whether for final or intermediate consumption, including withdrawals from stocks, marine bunkers, and consumption by international aviation.

The share of fossil fuels in GAE represents the level of decarbonisation achieved; it has the advantage of being relevant not only from a climate point of view (being directly related to the quantity of CO₂ emitted), but also from a strategic point of view, in that the vast majority of fossil fuels consumed in the EU are currently imported, representing a cost of more than €40 billion per month for the EU the first quarter of 2023.

The problem is that this ratio is declining very slowly and is still around 70% (Figure 5).

A linear extrapolation to 2050 shows that by then, the percentage of fossil fuels used would still be 56.3%, a far cry from what is needed to achieve carbon neutrality.

The decarbonisation of energy sectors is crucial and a roadmap needs to be adopted in order to set a minimum decarbonisation objective to be achieved by 2050.

It will be difficult to set this target at zero. It should be determined based on the capacities of the carbon sinks that will be available by 2050, in particular those that result from the policy of developing carbon storage sites that the European Commission now intends to promote. For illustrative purposes only, a target of 20% is shown in the graph in Figure 5.

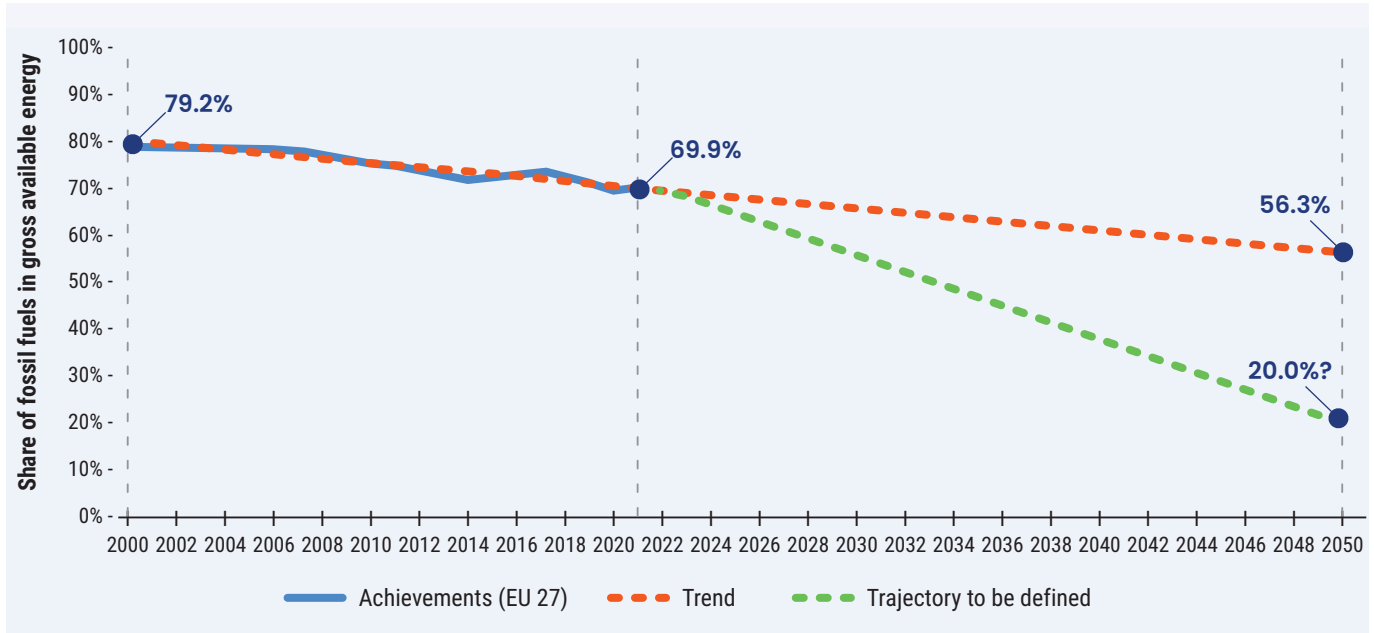


Figure 5: Trends in the share of fossil fuels in the gross energy available in the EU-27. Source: Eurostat data.

Of course, this policy of decarbonising energy sectors is in no way exclusive of energy efficiency and sobriety policies, which must be pursued at all levels where they can be applied. It simply reflects the fact that, without accelerating the withdrawal of fossil fuels from supply chains, we have no chance of achieving carbon neutrality by 2050.

Promoting electrification

As mentioned above, electricity’s extraordinary versatility, as well as the diverse physical phenomena with which it is associated (the Joule effect, induction, electronics, lasers, etc.), means that it is suitable for an almost unlimited number of applications, including transport, heating, lighting, communications, and computing.

Electricity will play a key role in any decarbonisation strategy, and the next mandate will have to make electrification a priority in its energy and climate strategy.

Compared with the approach taken during previous terms, which focused heavily on the production of electricity from renewable sources, the next mandate will have to adopt a much more holistic

approach to the electricity sector and set itself the objective of facilitating its development at all levels, so as to ultimately achieve a 50% share of electricity in the final energy consumption balance. This implies a coordinated approach to:

- **a policy of encouraging the development of low-carbon electricity production**, whether from renewable or nuclear sources, centralised or decentralised, while respecting the Member States’ freedom to decide on the general structure of their energy supply;
- **continued development of electricity networks:** transmission networks, interconnections, and distribution networks to meet the increasingly complex challenge of matching supply to demand. **This policy will have to promote flexibility:** demand management and the development of storage capacities at the various levels of the energy chain. **In particular, the development of electricity storage could be an important area of policy for the next mandate.**
- **promoting the rational use of electricity.** As we saw earlier, electricity now accounts for just 21% of final energy consumption. Getting to 50% represents a major challenge that has only just begun. It will require a strong political message to convince consumers that switching to electricity is the right solution for buildings, transport, and

most industries. This message has been heard with regard to electric vehicles, but its lasting impact is not a given. The Commission is preparing a communication on heat pumps. This will have to take the form of an action plan, which will have to be strong and will need the backing of the Member States if it is to be credible and convincing.

At the same time, there is a need to:

- > remove obstacles to the use of electricity, in particular to put an end to the use of the primary energy factor in assessing the energy performance of electricity used in buildings and industry, which penalises all electrical solutions, including heat pumps;
- > ban subsidies and incentives for the use of fossil fuels. These bans must take account of the solutions that are essential to the realistic management of the energy transition. On the other hand, they should target measures that, although presented as energy efficient, would lock in the use of fossil fuels for years to come, particularly in buildings.

- **Reforming the organisation of the European electricity market.** The development of electrification is currently being held back by the excesses seen on the wholesale electricity markets in 2022, which in some cases led to massive increases in retail prices. Without calling into question the very existence of the wholesale electricity market, it is essential that we rapidly finalise the provisions which would:
 - > finance essential energy infrastructure;
 - > stabilise prices by limiting the influence of marginal factors on price formation;
 - > give stakeholders greater transparency;
 - > ensure attractive prices for consumers.



Promote other carbon-neutral pathways by targeting each at its most appropriate uses

When it comes to energy carriers other than electricity, none should be neglected. However, they must be targeted at those uses for which they are more specifically suited. This is the case for hydrogen, as well as biomass and its derivatives. An idealised view, disconnected from the specific constraints of each form of energy, will necessarily lead to an overestimation of the potential offered by these resources, and thus to a loss of efficiency and even to new dependencies

Hydrogen

Hydrogen has received considerable attention during this mandate. The REPowerEU plan sets a target of 10 Mt of renewable hydrogen production by 2030, supplemented by a similar volume of imports. The Commission saw hydrogen as a way of replacing coal, gas, and oil in industrial sectors that are difficult to decarbonise, as well as in transport.

The debates surrounding these objectives have become heated, particularly over the origin of the hydrogen, with some countries preferring to rely on hypothetical imports from third countries rather than agreeing to treat low-carbon hydrogen produced from nuclear-generated electricity on an equal footing with renewable hydrogen, as envisaged by the Commission.

Some thought that hydrogen could meet a wide range of needs, including domestic heating, and thus provide an alternative to electricity; it could even be used to generate electricity during periods of peak demand.

The enthusiasm generated by hydrogen now seems to be waning, for economic, technical, and strategic reasons. The development of hydrogen in the transport sector in particular seems uncertain, and the decision by the German railway company Landesnahverkehrsgesellschaft to abandon its hydrogen-powered train programme, even though it was a pioneer in the field, is an indication of the uncertainty that hangs over the future of this market.

On the other hand, it became clear during the drafting of the ReFuelEU regulation on sustainable aviation fuels (SAFs) that the production of these fuels, and in particular renewable fuels of non-biological origin (RFNBO), will require very large quantities of electricity and hydrogen. The expected emergence of hydrogen-powered aircraft starting in 2035 should also be considered. It therefore seems that future hydrogen demand will be concentrated in industrial facilities such as steelworks and chemical plants, as well as in facilities producing hydrogen, SAFs, and synthetic fuels for aviation and shipping (e-methanol). As far as resources are concerned, we should support the seemingly promising prospects for natural hydrogen, if they are confirmed.

Before the end of 2025, the new Commission will have to take stock of the conditions necessary for the effective development of the hydrogen sector, in order to affirm or adjust the course taken during the current mandate.

Biomass and its derivatives

Biomass is a renewable primary resource that is perceived favourably by the public. For many, it is the green energy par excellence. It can be used to produce heat in the wood-energy sector, to produce gas in the biogas/biomethane sector, and to produce liquid fuels in the HEFA, Alcohol-to-Jet, and Fisher-Tropsch sectors. It is therefore in increasingly high demand, especially as, unlike electricity, it has the advantage of providing a renewable carbon base that is essential for the manufacture of advanced products such as chemical bases and synthetic fuels.

However, the issue of biomass is complex. Not all uses are equally virtuous: wood energy can only claim to be carbon neutral if the primary resource is reliably replenished. For biogas, on the other hand, there are better applications – in chemicals, heavy transport, and super-peak power generation – than simply burning it in domestic boilers, wasting the precious molecules on a use for which high levels of heat are not required.



In terms of resources, exploiting biomass for energy can damage biodiversity and compete with food crops for human or animal consumption. However, the restrictions imposed by the new ReFuelEU regulation on the choice of biomass resources eligible for the manufacture of SAFs mean that, for Europe, these resources are likely to be insufficient, even if they are partly offset by increased use of hydrogen in conversion processes.

Biomass is central to the decarbonisation of a number of sensitive sectors. A precise inventory of resources will need to be drawn up during the next mandate, with priorities defined for their use.

Renewable heat

Capturing heat from the environment using air-to-water, air-to-air, or water-to-water heat pumps is the most effective way of saving energy and reducing emissions in buildings. In most Member States, programmes for the accelerated deployment of heat pumps have been launched, and the Commission plans to support these programmes as part of measures currently being defined.

However, renewable heat can also come from solar or geothermal sources. Geothermal resources can be used in conjunction with heat pumps to increase temperatures or provide reversible seasonal storage²⁴. In European countries, however, little use is made of these technologies, despite the fact that the potential “deposits” are considerable. Solar thermal energy and geothermal energy represent only 0.31% and 0.46%, respectively, of the gross energy available, and these proportions are not increasing²⁵. Their development would make it possible to preserve biomass and reduce demand for electricity.

We therefore hope that during the next mandate, further research is carried out into the economic and technical suitability of these forms of energy, which avoid the need to burn wood or renewable gas and are well suited to meeting low-temperature heating needs.

24. ATES (Aquifer Thermal Energy Storage) and BTES (Borehole Thermal Energy Storage) systems with inter-seasonal storage.

25. Source: Eurostat (2021).

2 > Adaptation has become as much a priority as mitigation

A deteriorating climate

Despite the commitments made by the parties to the United Nations Framework Convention on Climate Change, greenhouse gas emissions continue to increase and accumulate in the atmosphere, undermining the foundations of the Earth's biosphere. The 1.5°C limit has now been exceeded, and the speed of change is alarming scientists, who see climate change edging towards the most pessimistic forecasts in their models.

The consequences are devastating. Heatwaves are on the increase. Wildfires are increasingly out of control. Droughts are bringing countries to the brink of desertification. Poor crop yields are putting the world's food supply under strain. Increased evaporation transforms rainfall into torrents, causing sudden and violent floods. Paradoxically, the instability of the polar winds allows masses of cold air to reach temperate latitudes. There are fears that ocean currents will shift, with potentially massive consequences for the climate. **Not only are living conditions on Earth deteriorating, but they are also becoming unpredictable.**

Europe is warming faster than the global average.

A moving boundary separates the north of the continent from the Mediterranean zone, considered to be a hotbed of climate change. Sea surface temperatures approaching 30°C are conducive to the occurrence of destructive Cévenol episodes, as was the case in the Vésubie valley in France in 2020. Carefully protected forests are even more vulnerable to fire. Experience shows that heathland, stubble, and dry grass burn no less easily. Towns are rediscovering the virtues of narrow streets and gardens. A new paradigm in urban planning is being developed. Residents will not escape the need for air conditioning.

Adaptation is crucial

The inertia of natural phenomena combined with the procrastination of the international community are exposing Europe to the violent extremes of the new climate reality. However, most of the standards governing existing infrastructure were created based on outdated temperature assumptions.

Wind turbines, for example, are encountering less wind than expected. It is therefore necessary to work simultaneously to reduce emissions and to moderate their harmful effects, seeking synergies and avoiding potential antagonisms. Adaptation works consume energy, refrigerant gases have an impact on the atmosphere, and the distribution of scarce water resources must not ignore nature's own needs.

Climate change is first and foremost the acceleration of the water cycle – after all, water vapour is a greenhouse gas. Warmer temperatures only fuel the feedback loop, further increasing warming. Alternating periods of prolonged drought and torrential rain mean that watershed management needs to be reviewed. When melting snowpack could be relied upon to see us through the summer, it was recommended that foresight now suggests it should be retained on slopes, in the ground, and in old quarries. Trees should be planted along riverbanks to help cool the water; rainwater should be conserved wastewater reused and water management solutions should be developed for individual buildings and properties. Hydroelectricity will also be affected. A new consensus should be established on water policy to recognise the fact that reservoirs are necessary.

Valleys will be prone to now-inevitable inundations, landslides, flooding of underground infrastructure, and overflowing sewers. Leaders will have to prepare emergency plans by involving the population. Towns and cities will have to enter into contracts to create flood control areas upstream. The consequences of rising sea levels are easy to imagine. For any permanent investment and its surrounding area, we will have to account for a two-metre rise. More frequent storms will undoubtedly force us to set strict standards for resistance to high winds. Generally speaking, new buildings will have to take account of the need for adaptation, and materials will have to withstand both drought and standing water, depending on their location. Infrastructure will have to withstand intense heat.

Agriculture and animal husbandry will obviously be affected by climate change. At the same time as it aims to reduce agriculture's contribution to climate change, the Common Agricultural Policy will have to support soil conservation, irrigation efficiency, biodiversity protection, research into

drought-tolerant varieties, weather forecasting, and insurance against crop failure. Forestry is already experiencing a difficult period, with forests decimated by bark beetles or flattened by storms. Wood is increasingly used for construction, energy, and as a non-fossil carbon source. When forests are healthy, they act as CO₂ sinks rather than sources. It is likely that agriculture's role as an energy supplier will come to an end.

Towards a stronger European adaptation policy

The EU outlined an initial adaptation policy in 2013, encouraging Member States and local elected representatives to get to work. In February 2021 it published a four-point strategy:

- learning more about urban adaptation;
- financing nature-based solutions;
- better integrating local policies;

- stepping up action in Africa and on small islands.

A platform called Climate-Adapt was entrusted to the European Environment Agency. Agreements were signed with associations of municipalities. More recently, one of the five missions for the future launched by the EU as part of its Horizon programme addresses adaptation. This initiative brings together 300 local authorities and organises an annual forum for exchanging best practices in the field of adaptation.

Clearly, however, this is not enough. Like most political leaders, the Commission has favoured mitigation over adaptation. Its mistake is that it treats adaptation as a purely local matter, with each locality being fundamentally different from the others. The truth is that adaptation is also a collective issue, with numerous aspects requiring coordinated organisation at the European level – drawing up vulnerability maps in all Member States in collaboration with insurance companies, protecting energy, digital, rail, and road infrastructure, shaping new policies on water and waterways, promoting agricultural adaptation, creating building resilience standards, and providing mutual assistance in the event of natural disasters, to name a few.

Let's imagine power lines battered by a storm, power stations starved of water by a drought, roads rendered impassable by a flood, or telecommunications infrastructure disabled by extreme heat – a society's essential services must continue to function. In this respect, Covid provides a useful example: energy, communications, supplies of essential items, and waste removal were all maintained. On the other hand, there were difficulties in acquiring equipment and medicines that were no longer manufactured in France or Europe. If we are to adapt to climate change, we will undoubtedly need to carefully control the materials and value chains of the future low-carbon industry. Planning is essential. The political will must be there.

That's why the EU should adopt a new package "Fit for +4°C in 2050" to complement its "Fit for 55 in 2030" package.



3 > Energy independence and industrial sovereignty

Reducing Europe's energy dependence

During the first oil crises in 1973-74 and 1980, Western nations found themselves seriously concerned about the security of their oil supplies following the actions of OPEC, which played a decisive role on the market at the time. Security of supply and reducing dependence on energy imports became key concerns for all European countries.

With the advent of gas as an alternative resource, concerns about security gradually faded. No gas supplier had ever failed to deliver, and it was thought that producers had as much interest in ensuring continuity of supply as consumers. In Europe, the question of energy dependence all but disappeared from the radar screen. The emergence of climate concerns may also have diverted the attention of political leaders towards a new issue that appeared to be more important.

In Europe, the energy imports dependency ratio has risen steadily since 1990 (Figure 6). The downturn observed since 2020 is due more to the effects of Covid than to a structural turnaround.

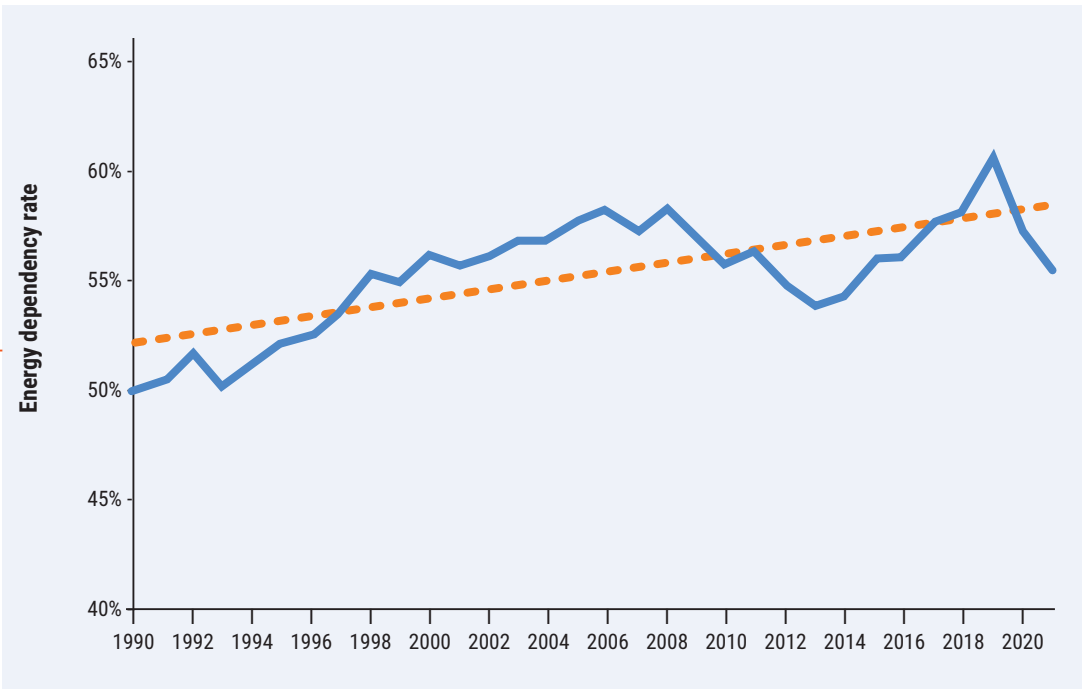
Energy security must regain its full place in European energy policy, as explicitly provided for in Article 194 of the Treaty on the Functioning of the European Union. Europe should set itself targets – at least on an indicative basis – for reducing its dependence on imported energy.

Rebuilding industrial sovereignty

The carbon-neutral energy sectors – nuclear, solar, wind, hydrogen, synthetic fuels, batteries, CCS, and CCU – all require cutting-edge techniques, materials, equipment and, ultimately, significant investment in research and development and industrial deployment.

With the exception of nuclear power, Europe does not have sufficient control over the inputs needed to develop these new sectors. We do not have sufficient control over key technologies, and the supply chains for materials and components present obvious risks of stress or even collapse; some rely on sources

Figure 6: Trends in Europe's energy imports dependency ratio.
Source: Eurostat data.



whose commitment to social responsibility is questionable.

It is crucial that we establish control over these technologies and relocate industrial activities related to our climate objectives to Europe. As long as the European continent does not have control over the industrial developments needed to develop new energy sources, the risks of shortages will remain and much of the financial investment will be lost – to the benefit of other regions. There are two issues at stake: an economic challenge and a strategic challenge. **It is the EU's responsibility to set up a European recovery programme that can be deployed in any European country that wishes to participate.** This technical and industrial relocation is one of the only ways we can meet the challenges of climate change while also preserving European economies and jobs.

In the introduction to this document, the NZIA that was adopted in response to the US Inflation Reduction Act was mentioned as a positive initiative. At the same time, however, there are clear differences in approach: the US government grants tax deductions or subsidies calculated in a simple way on concrete bases:

- \$1.25 per gallon for SAF allowing for a 50% reduction in greenhouse gas emissions + \$0.01 per additional percentage point;
- up to \$8,000 towards the purchase of a heat pump, deducted directly from the sale price;
- \$85 per tonne of CO₂ permanently sequestered, \$180 per tonne if the CO₂ is taken from the air;
- the *Advanced Manufacturing Production Credit* for local manufacturing of all sensitive components;

In total, the IRA allocates up to \$500 billion in additional support to clean technologies²⁶.

In comparison, the European NZIA limits itself to labelling a certain number of technologies with the aim of simplifying procedures and accelerating projects.

The next mandate will have to go further and build a genuine three-pronged industrial renaissance strategy:

- encouraging the development of domestic resources, with due respect for the environment, accompanied by partnerships with a diverse range of reliable potential suppliers;
- support for the development of critical manufacturing, along the lines of the NZIA and *European Solar Photovoltaics Alliance*, but with financial incentives comparable to those of the IRA, subject to minimum domestic content requirements;
- support for training and retraining of workers in all sectors (manufacturers, installers, operators) to ensure that we have the workforce needed for the expected growth in the new energy sectors.

4 > Economic and social acceptability

The fourth concern is preserving economic activity and, more generally, preserving the prosperity of the nations embarking on the energy transition. This is an essential condition for public acceptance of the considerable effort required to transition away from fossil fuels. It is now clear that the energy transition will require significant financial outlays. In its special report of June 2023²⁷, the European Court of Auditors adopts McKinsey's estimate of €1,000 billion of investment per year for 30 years to achieve carbon neutrality by 2050. This unprecedented effort will have to be financed and accepted.

This is the least certain point. Technical progress still needs to be made, though there are no major obstacles in the way. On the other hand, **the ability and willingness of each and every citizen to accept the financial and behavioural constraints are far from guaranteed. Climate scepticism remains rife, and it is still uncertain whether people will be prepared to make even minor sacrifices to their lifestyles over the long mandate. In the EU itself, industrial and political interests regularly oppose**

26. Source: McKinsey (24 October 2022).

27. EUROPEAN COURT OF AUDITORS – Special report 18/2023: EU climate and energy targets – 26 June 2023.

the acceptance of such efforts, and we often see governments – however advanced they may have been in the ecological transition – backtracking in the run-up to difficult elections.

Whether out of conviction or resignation, some advocate economic degrowth as the only way to combat climate change. However, this approach is incompatible with the value creation needed to finance the energy transition. It does not correspond to the aspirations of the vast majority of citizens and could only result in authoritarian measures that are incompatible with the values of democracy and civil involvement for which the EU stands. It will provoke a massive rejection by the middle and working classes, who will not willingly abandon their hopes of improving their standards of living. The economic degrowth advocated by some is not a solution; on the contrary, the EU needs to ensure, particularly in the industrial and transport sectors, that the measures imposed do not result in a loss of competitiveness and a decline in activity.

Of course, the unbridled growth of the post-war period is no longer a realistic aspiration, but it is necessary to continue to ensure the economic prosperity of the Member States, both so that citizens embrace the energy transition and so that the Member States have the means to finance it. Consequently, though

research and development efforts to ensure the necessary technologies are available. The EU also needs to step up investment in communication and training to ensure that everyone buys into these changes.

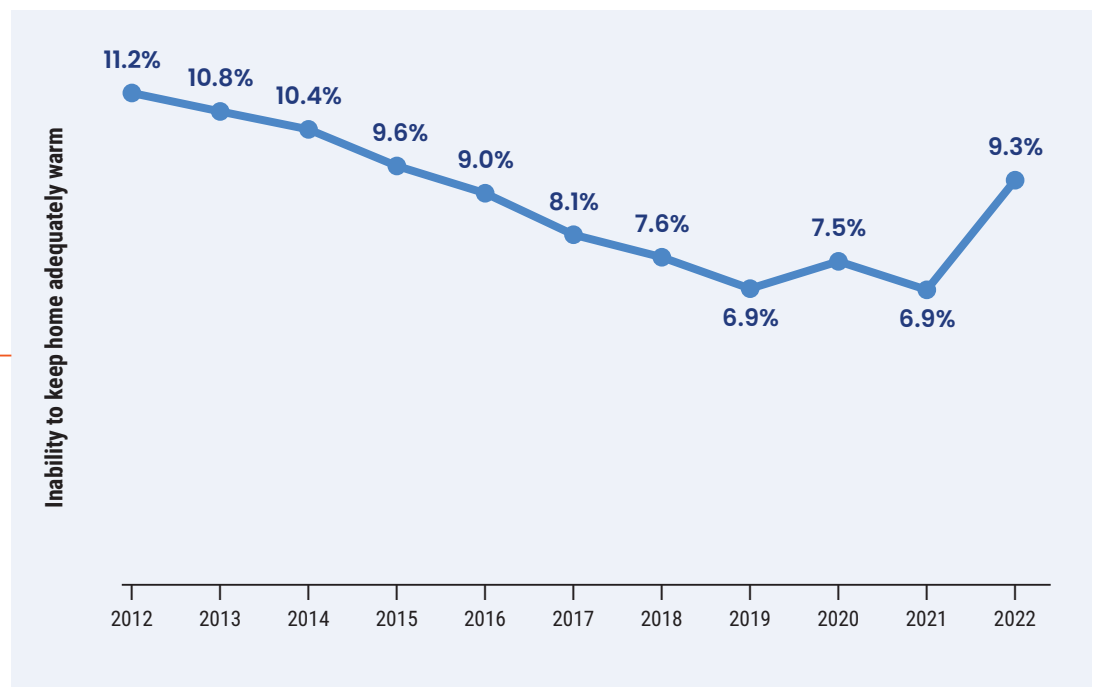
5 > Solidarity

The Covid pandemic and the war in Ukraine have led to higher energy prices in all EU countries, exacerbating the problems of energy poverty. After declining steadily until 2019, the percentage of the European population unable to sufficiently heat their homes has risen to an average of 9.3% in 2022, or around 40 million people (Figure 7). It reaches 20% in the least developed countries and is particularly high among young people and the elderly.

Energy poverty is not just about people being unable to heat their homes properly. It also exacerbates the problems of transport poverty, when inadequate infrastructure means people have no alternative to private cars.

For all households, switching to low-carbon heating and transport represents a major expense: around €15,000 for a heat pump and twice that for a new mid-range electric car.

Figure 7: Trends in energy poverty in Europe.
Source: Eurostat data (EU-SILC survey).





There is also the question of small businesses. For many tradespeople, their vehicle – often an old one – is their mobile office. Replacing it is an investment beyond their means.

Finally, the growing effects of climate change will make it increasingly necessary to take adaptation measures, in particular with respect to housing, which should be affordable not only for the most affluent populations.

The most disadvantaged citizens must not be condemned to living in poorly insulated homes, driving old, polluting cars, or suffering the effects of heatwaves more than others. Apart from the direct impact on consumption and emissions, this may result in a movement to reject the transition policy, which we know will be costly. In a recent publication²⁸, McKinsey estimated, for example, that sustainable vehicles and heating systems cost on average 7% more than their conventional counterparts.

With its *Fit for 55* package, the European Commission has stepped up the regulatory pressure for energy savings and renewable energies. For those countries that choose to participate, the new energy savings requirements set out in Article 8 of the new Energy

Efficiency Directive will lead to an increase in the price of energy savings certificates, with the costs passed on to consumers. Initial estimates for France suggest a possible impact on retail prices of between 7% and 15%, depending on the type of energy. In addition, from 2027, there will be the impact of extending the emissions allowance system to the building and transport sectors.

During the current mandate, it was decided to set up a Social Climate Fund (SCF) to benefit vulnerable households, small businesses, and transport users particularly affected by energy and transport poverty. Each Member State will be required to draw up a “social climate plan”, part of which will be financed by the SCF. This mechanism should be part of a larger European programme to combat energy poverty, the content and operating rules of which have yet to be defined.

It is essential that the next mandate establish a social climate plan with a master plan for redistributing the amounts collected to the most vulnerable people and companies.

28. *Five key action areas to put Europe's energy transition on a more orderly path* (August 2023).



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BREAKDOWN BY SECTOR

Energy policy lies at the crossroads between the resources we intend to develop and the needs we have to satisfy. Added to this are the imperatives arising from the other considerations we have examined – the climate crisis, energy sovereignty, competitiveness, and social justice. Expressed in terms of objectives, energy policy's most important objective is to transition away from fossil fuels' dependence to fight climate change and enable Europe to regain its energy sovereignty.

However, the conditions under which these policy guidelines are applied vary greatly from one consumer sector to another. Requirements are specific, and replacement times vary widely (in Europe, a house has a lifespan of around one hundred years, while the average age of a car is between 8 and 17 years, depending on the country). Through directives and regulations on the energy performance of buildings, on emissions from passenger cars, on aviation, maritime transport, and soon HDV transport, this mandate has achieved a considerable amount of work.

Although this is positive on the whole, a number of changes are still necessary, particularly in the light of recent developments in the energy sector.

Breakdown by sector

EdEn White Paper

Fit for 55... and what next?



THE BUILDING SECTOR

Somewhat positive results, but still far from the target

Construction is a sector where the energy and environmental transition is difficult to implement at European level for a number of reasons:

- its replacement dynamics are very slow, since it is estimated that only about 0.8% of housing in Europe is replaced each year²⁹;
- historical, demographic, and economic realities vary greatly from one region to another;
- property portfolios vary greatly from one country to another, particularly in relation to climatic conditions, as well as quality (which is generally mediocre).

Such market and geographical differentiation across the Union leads the EU to adopt a policy that expresses constraints and objectives that are binding on all Member States. This policy framework also allows each Member State the benefit of a large degree of subsidiarity in the way in which the objectives are implemented at national level. This search for a balance between results-based objectives and obligations of means is a difficult exercise, but the progress made since 1990 is no less real, as emissions linked to combustion in the household sector were 27.8% lower in 2021 than in 1990 (Figure 8).

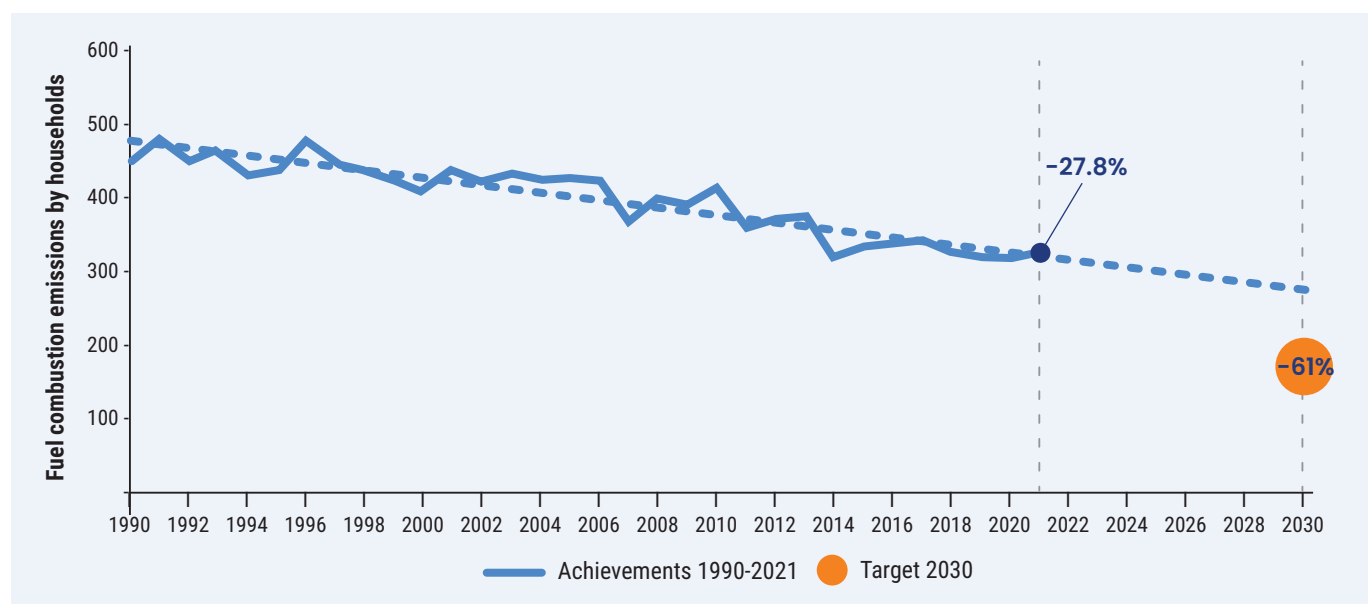


Figure 8: Trends in combustion-related emissions in the household sector. Source: Eurostat data.

29. Source: OECD HOUSING STOCK AND CONSTRUCTION – <http://oe.cd/ahd>



However, these figures do not appear to have improved since 2014 and are still a long way from the general target of a 61% reduction by 2030, which would require us to cut emissions at a rate 3 to 4 times faster than the average for the past 30 years.

Two important texts, although they may not be enough

The mandate that is now coming to an end will have seen the completion of two very important pieces of legislation:

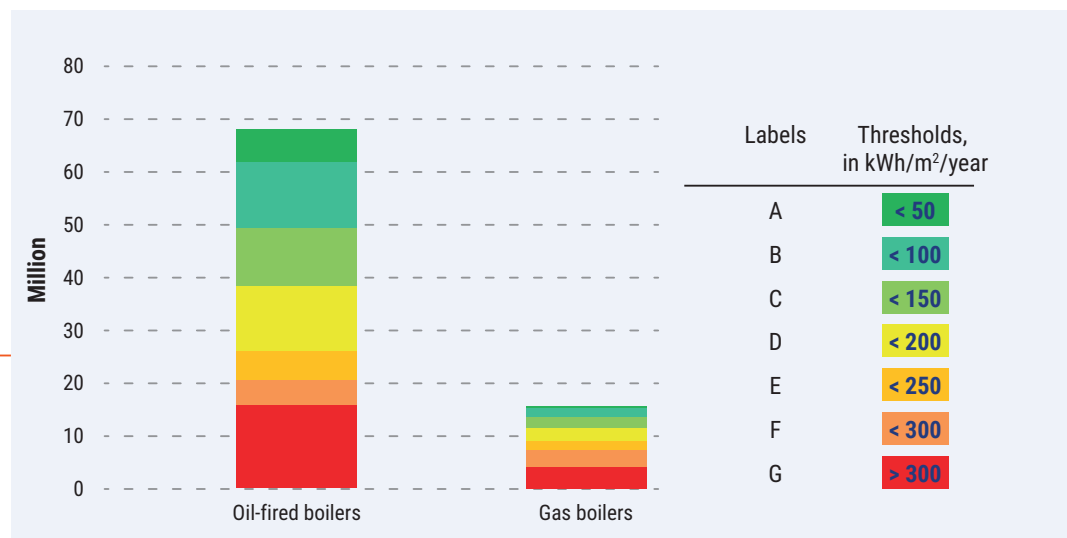
- the extension of the EU ETS mechanism to the building sector;
- the recast of the Energy Performance of Buildings Directive (EPBD).

The first text has the major advantage of putting direct pressure on CO₂ emissions and encouraging investment in reducing these emissions via a price per tonne of carbon emitted. However, it is unlikely that this mechanism will play a significant role between now and 2030. Purchasing allowances will not become compulsory until 2027, and the price of

allowances will be capped at €45 for three years. Changes in this price may pose problems in terms of consumer acceptance of the resulting increases in fuel and gas prices. The main purpose of this mechanism could be to create a financing channel for energy-efficiency improvements to buildings by redistributing the amounts collected when the allowances are auctioned. This redistribution could take place via the Social Climate Fund from 2026 onwards, thereby easing the burden on the most vulnerable populations.

The second text is the recast directive on the energy performance of buildings, a fundamental text in which the Commission tries to strike a balance between the need for momentum at the European level and the responsibilities to be left to the Member States. The objectives of this recast are ambitious: to double the annual rate of energy efficiency improvements to buildings by 2030, to encourage major renovations, to require each Member State to comply with minimum energy performance standards, and to enable a gradual phase-out of fossil fuels.

Figure 9: Number of homes heated with gas or oil in European housing stock and breakdown by energy performance certificate rating.
Source: The Heat Pump Wave: Opportunities and Challenges (JRC 2023).



Unfortunately, the directive remains too evasive on what should have been its priority: reducing CO₂ emissions. The role of these emissions in European regulations remains indicative, as they are not considered in a normative manner when defining the energy performance of buildings. The Commission thus remains within the framework of its traditional bipolar approach to energy policy: “Energy efficiency + renewable energies”. It is betting that the reduction in CO₂ emissions made possible by improving the thermal characteristics of buildings, combined with the development of renewable energies, will be sufficient to meet the established emissions reduction targets. **The results observed in recent years cast doubt on the effectiveness of this strategy – which is disputed by some Member States – and it seems likely that the Commission will have to review its strategy if it wishes to achieve the emission reduction targets it has proposed.**

Choose a strategy that maximises the efficiency of available financial resources

The decarbonisation of buildings will be the result of a series of coordinated actions in several areas: replacing energy installations with systems using low-carbon energies, managing these installations, and renovation works to improve thermal efficiency.

The first two require limited investment and are likely to deliver rapid results in terms of both energy savings and emissions reductions. The installation of advanced energy management equipment and the use of thermodynamic systems – heat pumps for heating and thermodynamic water heaters

for producing domestic hot water – are generally considered to be the most effective measures.

Renovation works are more ambitious and require significant resources. They can improve not only energy performance but also the comfort and heritage value of buildings.

According to the Commission’s estimation, priority should be given to large-scale renovations, combining a wide range of thermal improvement measures. Unfortunately, this requires considerable financial resources. The Commission estimates that 75% of Europe’s current building stock would not meet the current efficiency standards for new builds. The Joint Research Centre (JRC) estimates that 83 million homes currently heated by gas or oil consume more than 150 kWh/m² of final energy per year (Figure 8).

If we conservatively assume an average cost of €35,000 per home for a major renovation to bring these homes up to the minimum level of 150 kWh/m², we can estimate the total investment required at almost €3 trillion – a sum equivalent to 18 times the EU budget. Although individuals are free to make their own choices according to their own objectives and resources, public authorities must direct collective efforts towards the most effective actions and



support households and industries in this direction. The urgency of the climate crisis means that the CO₂ emissions produced by our housing stock must be rapidly reduced, and at minimal cost.

This means that rather than systematically conducting deep renovations, we must prioritise and encourage the rapid migration of heating systems to low-carbon solutions, primarily electric, accompanied by efficient regulation and control systems.

Accelerating the migration to low-carbon solutions

In the building sector, as in the general case, the move towards low-carbon solutions remains at an early stage. The Commission estimates that two-thirds of the energy used to heat and cool buildings still comes from fossil fuels. It is promoting the use

of renewable energies in both new and existing buildings. However, most renewable energies cannot be used directly, and must rely on electricity as a carrier.

It is therefore electrification that should be encouraged as a priority, whether the electricity comes from renewable or nuclear sources. However, current European regulations do not encourage the development of electric solutions and even tend to penalise them. Of course, the Member States must be given considerable freedom to set their own targets at national level. **However, European legislation will have to evolve on two points:**

- on the one hand, the explicit inclusion of CO₂ emissions in defining the energy and environmental performance of buildings;
- secondly, calculating the energy performance of buildings on the basis of final consumption rather than primary consumption, the conventional calculation of which favours fossil fuels.

It is also likely that the migration to low-carbon energies will not take place at the expected rate if it is not accompanied by sufficiently attractive regulatory measures:

- a ban on all financial support for the installation of fossil fuel boilers, which must be reserved for technically challenging cases and meet certain performance criteria;
- the definition of a legal basis enabling Member States to decide to phase out the marketing of fossil-fuelled heating equipment. On this point, the Commission must remain firm on its targets. The forthcoming revision of the Ecodesign Directive for hot water systems³⁰ is crucial to eventually limiting the sale of fossil fuel-based equipment;
- strongly prioritise low-carbon alternatives that are already available, such as heat pumps, minimum low-carbon and renewable energy requirements for heating networks, the use of solar heat, heat recovery, etc.;
- directing limited resources such as biogas and low-carbon hydrogen towards the sectors that are most difficult to decarbonise, where they can be put to best use.

Facilitating easier financing

The energy and environmental transition of buildings is largely a question of financing, and the needs are considerable.

Financing thermal efficiency improvements to buildings will be one of the major challenges of the next mandate. The Commission cannot limit itself to requiring Member States to respond through their own national building renovation plans. The Commission will have to contribute to these efforts, to help those most vulnerable out of energy poverty, but also to stimulate the programmes considered as priorities: accelerated deployment of heat pumps, solar roofs, and storage systems.

30. DIRECTIVE 2009/125 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. This directive will be replaced by a regulation currently being negotiated: Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC.

Breakdown by sector

EdEn White Paper

Fit for 55... and what next?



THE TRANSPORT SECTOR

Considerable effort remains to be made

In 2021, transport was responsible for 24% of the European Union's CO₂ emissions. Emissions from transport were 15% above the 1990 baseline, whereas the goal of carbon neutrality by 2050 requires a 90% reduction in these emissions compared with 1990 levels (Figure 10).

In 2019, 71.7% of emissions came from road transport (Figure 11), including 60.6% from passenger cars and 38.1% from goods transport.

In both areas, there is still a great deal of work to be done, despite the significant progress that can be attributed to the outgoing Commission, especially in the area of light vehicles.

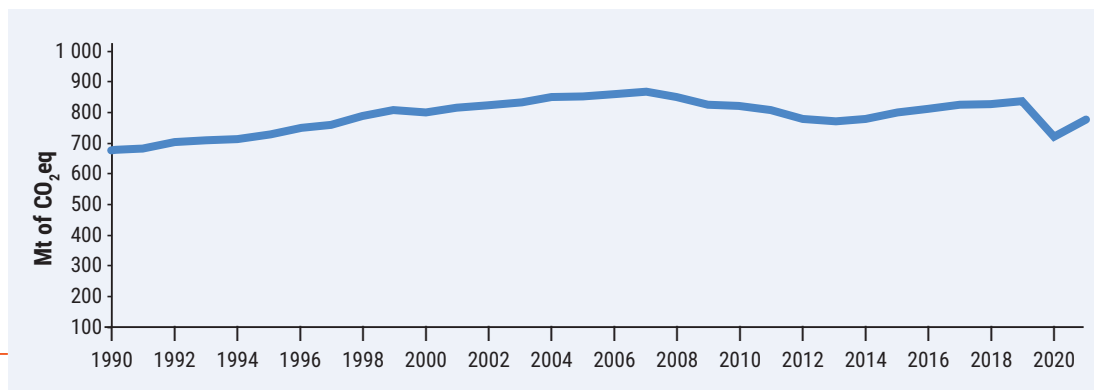


Figure 10: Greenhouse gas emissions in the transport sector since 1990.
Source: EEA data for EU27.

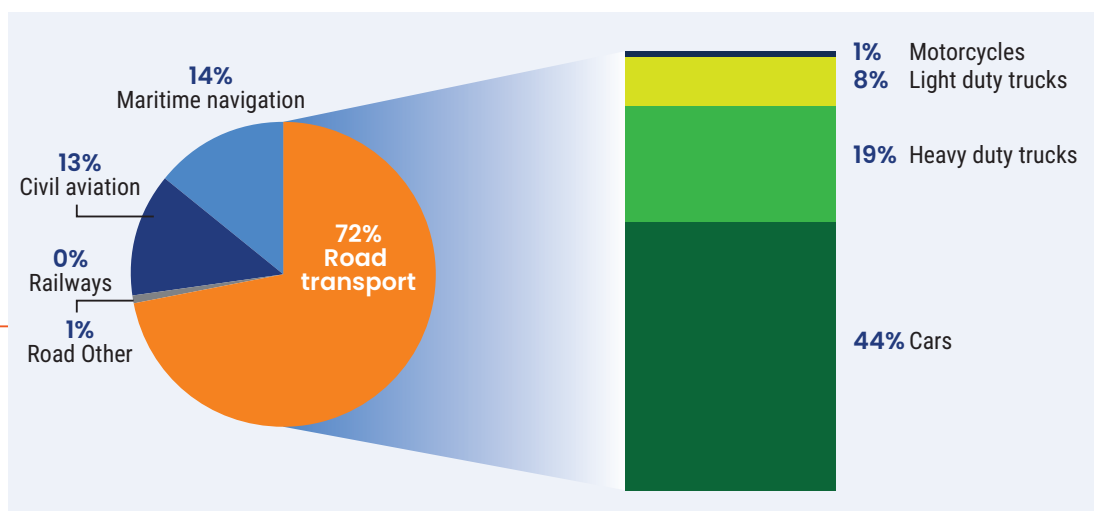


Figure 11: Breakdown of transport sector emissions in Europe.
Source: EEA data (2019).

➤ Light vehicles

In this sector, the Commission has largely relied on obliging carmakers to reduce average CO₂ emissions per vehicle sold each year, which has led to the development of a nearly comprehensive range of electric vehicles. This measure has been supplemented by the obligation to reduce CO₂ emissions from new light vehicles to zero from 2035, which means that petrol and diesel vehicles may no longer be sold after this date.

These decisions have led to massive investment in the manufacture of electric vehicles and the construction of a number of battery “gigafactories” in Europe.

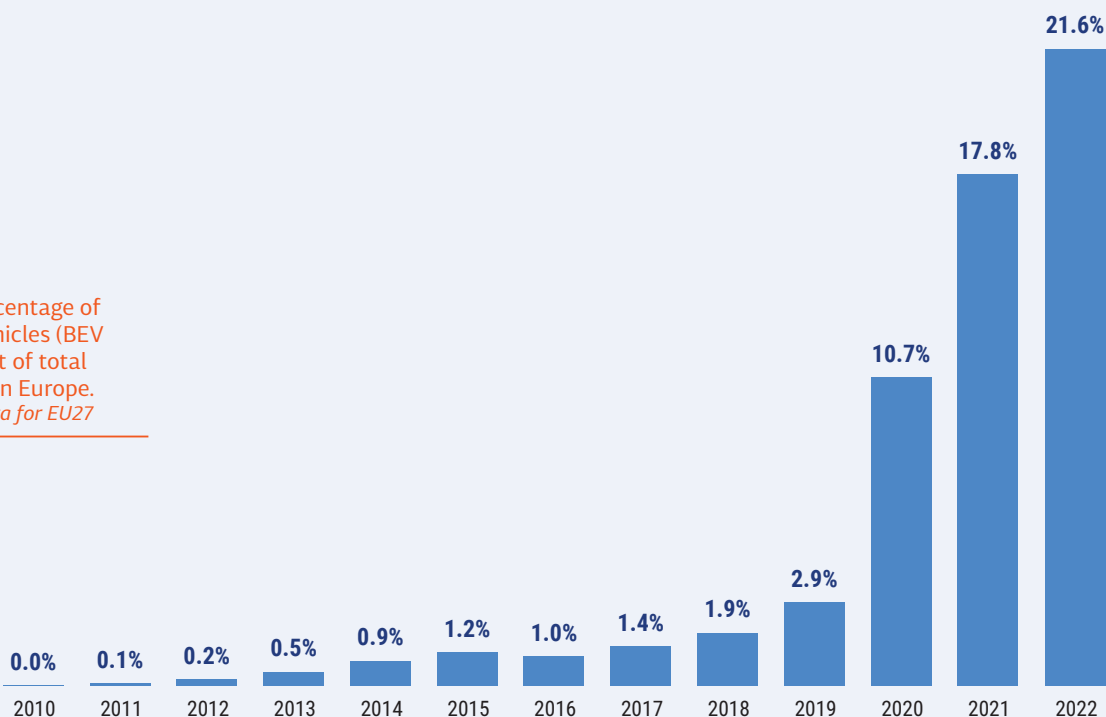
These investments have been made possible by technical advances in batteries, a high level of competition between players, major subsidies for the purchase of new vehicles, and investment by various governments in the development of charging infrastructure for electric cars and light commercial vehicles.

As a result, there are now vehicles which claim a range in excess of 600 km, as well as entry-level vehicles suitable for everyday journeys.

The alternatives offered by hydrogen- and alternative fuel-powered vehicles have not kept pace with the development of electric vehicles, both because hydrogen is expensive and difficult to handle and because biofuel production capacity remains limited, and their use is subject to competition between sectors. Although hydrogen and alternative fuels may be seen as long-term alternatives, most resources should be focused on developing electric vehicles, as this is the only solution that will enable us to achieve our decarbonisation targets within the timeframe envisaged, and with greater energy efficiency than competing technologies.

However, the success of electric vehicles should not be taken for granted, as electric vehicles remain largely in the hands of those who have the means to invest in new vehicles, who can afford the high costs, and who have no difficulty installing a charging station at their home or place of work. These are either those with a company car, or people from higher social classes with a second or third car.

Figure 12: Percentage of electrified vehicles (BEV and BHEV) out of total registrations in Europe.
Source: EEA data for EU27



Thus, there are a few key points to bear in mind:

- relatively few people buy new electric vehicles, as the prices – especially for those with a long range – remain prohibitive for the middle classes;
- the second-hand market is still underdeveloped; for the time being, it offers first-generation vehicles with limited range. Furthermore, for households with one car, this vehicle needs to be suitable not only for daily journeys, but also for occasional long journeys, such as holidays. Thus, many people are waiting for the availability of second-hand electric vehicles offering sufficient range, or of fast-charging infrastructure;
- tradespeople also rarely buy new electric vehicles, both for range- and price-related reasons;
- while some companies have begun to convert their fleets of passenger cars, they may find it difficult to do the same for commercial vehicles due to insufficient range, which further reduces the availability of these vehicles for tradespeople;
- large residential buildings are still poorly equipped with respect to charging infrastructure, and many people do not have an individual parking space where they can install a charging point;
- on this last point, the initiatives of local and regional authorities are most welcome. However, they come up against complex procedures and trade-offs with other priorities. To overcome these difficulties, the installation of charging stations at supermarkets and shopping centres – that is, where car users often go – should also be encouraged.

The new version of the Energy Performance of Buildings Directive (EPBD) will bring progress in terms of equipping buildings with charging infrastructure. The AFIR regulation will strengthen minimum infrastructure standards along motorways.

These requirements are not sufficiently stringent and will probably prove insufficient.

To ensure that the roll-out of electric vehicles is not a simple case of “*picking the low-hanging fruit*”, it is essential that Europe continues to take action on the following points:

- continue to promote the development of publicly accessible charging stations, in particular on corridors used during peak summer holiday periods. It is not necessarily a question of installing ever-more-powerful charging points, which would create difficulties for the power network, but of ensuring that a large number of charging points are available to provide an extra 350 to 400 km of range within 30 minutes, i.e. charging points with a power rating of around 175 kW;
- promote the open availability of data on charging infrastructure: station availability, quality of service, maximum charging power, cost basis (kWh delivered vs. time spent at the charging station), as well as information for users. This will make it possible to respond to users’ main concern, which is the ability to charge during long journeys, by developing applications that aggregate data from multiple operators;
- promote the deployment of intelligent charging systems to control slow charging (which remains the most common) at home and at the workplace, in order to encourage low-carbon electricity consumption and limit power demand during peak hours;
- accelerate the installation of charging infrastructure in large residential buildings via regulations and incentives;
- encourage local authorities to set up charging stations for taxis and other EV users who do not have parking spaces at home or at work;
- encourage supermarkets and shopping centres to install charging stations;
- invest in R&D for vehicle-to-home (VtoH) and vehicle-to-grid (VtoG) technologies, which will exploit the potential flexibility offered by vehicle storage capacity. There may be technical, regulatory, and fiscal obstacles to be overcome, but the benefits can be significant for network management and for the renewable energy production/consumption chain;

- continue to invest in research and development for new battery technologies. NMC (nickel, manganese, cobalt) battery technology currently offers the best mass capacity for medium and top-of-the-range vehicles. However, entry-level vehicles are starting to use batteries with iron phosphate electrodes, which are less expensive, less prone to thermal runaway, and less dependent on scarce resources. The use of silicon anodes offers similar benefits. There are other avenues for progress that will allow us to improve mass capacity and/or safety, as well as cost price. Solid-state batteries will bring further advancements, but they still require investments in research and development – investments we must support.

There could still be a breakthrough in new electrode and/or electrolyte technology. Such a breakthrough would definitively remove the last remaining obstacles to electric vehicles. The benefits would be twofold: the batteries would be lighter, safer, and less expensive, and the vehicle's overall structure would be correspondingly lighter;

- Battery recycling will also become increasingly important as the batteries currently in circulation reach the end of their life. The quantities involved will gradually become considerable, and recycling gigafactories will have to be built using techniques that enable all materials to be recovered.

➤ Heavy transport

General overview

The goods transport sector is a diverse field that includes last-kilometre delivery, transport of heavy loads (sand, scrap metal, concrete, etc.), refrigerated and international transport, and even the transport of heavy construction machinery. The vehicles used range from 3.5-tonne rigid trucks to 44-tonne articulated lorries. Unlike private vehicles, there can be no single solution for decarbonising this sector; instead, we need a range of solutions tailored to each of these categories.

Long considered the solution of the future, the use of hydrogen appears more difficult than anticipated: the cost of hydrogen solutions is directly impacted by the rise in the price of electricity and amplified by the poor efficiency of the production chain,

including electrolysis, pressurised storage, and fuel cells. In addition, there are other sectors – such as industry and synthetic fuels – where hydrogen can be developed more effectively, as some concentrated industrial applications have no other alternative. In the transport sector, long-distance goods transport remains a possible niche, though one where hydrogen competes with other solutions.

Local and regional goods transport

This type of transport seems to be well suited to battery-powered electric solutions. These solutions are now operational and commercially available, particularly for the last-kilometre market. There is still progress to be made in regional transport, but this market segment will benefit from the progress made on batteries and prices driven down by the large-scale production of electric vehicles.

However, the gross vehicle weight (GVW) limits for vehicles should be increased to take account of the extra weight of batteries.

Domestic and international long-distance transport

This type of transport is more difficult to decarbonise due to the limitations of existing battery technologies. 100% battery-based solutions would mean several tonnes of extra weight and a significant cost premium in a sector where profit margins are low.

The emerging solutions involve developing and installing very high-power (between 500 kW and 1 MW) fast-charging stations along major routes, as studied by the Char'In consortium. Infrastructure of this kind would make it possible to limit the number of batteries needed and to adapt hauliers' practices to ensure that compulsory breaks and charging coincide.

In addition, we should take a close look at continuous vehicle charging systems, known as Electric Road Systems (ERS), which would make it possible both to reduce the volume of batteries needed and to switch to less expensive technologies such as lithium iron phosphate.



A number of players are proposing to develop the use of biogas (BioNGV). This solution has the advantage of benefiting from existing technologies for adapting natural gas vehicles (NGVs), particularly for public transport and heavy-duty vehicles. Considering the identified potential for biomethane production and its gradual shift towards the uses that are most difficult to decarbonise, BioNGV could complement the other fuels envisaged for this sector, in line with European legislation (in particular the RED and HDV CO₂ standards).

As previously noted, long-distance transport remains a possible niche for hydrogen, and the AFIR regulation will lead to the installation of charging infrastructure along major routes. It will therefore be important to monitor developments in the hydrogen ecosystem over the next mandate and adapt policy accordingly.

Non-road vehicles (diggers, dumpers, tractors, etc.)

This category of vehicles is not well suited to battery-based solutions: they do not have sufficient range to cover a day's work and the vehicles are not mobile enough to recharge at a fast charging point with a sufficient connection to the electricity network. Battery-based solutions will only be suitable for small machines such as mini-excavators or small lifts used indoors.

In the short mandate, it is possible to use biofuels similar to diesel as well as biogas, which can be easily refilled without significant additional costs.

In the medium mandate, the use of hydrogen with internal combustion engines could be considered, as could synthetic fuels, although the issues of availability, supply, and cost will probably make this a more difficult solution to implement than BioNGV.

Scattered all across the EU, agricultural equipment will be a prime target for biofuels and biogas, which could be produced locally or could use existing distribution networks.

➤ Air transport

Many studies show that decarbonisation of aviation is possible, with an ambition, as endorsed by the International Civil Aviation Organisation (ICAO), of decarbonised civil aviation worldwide by 2050. However, the very nature of air transport makes the process difficult (a "hard-to-abate sector"), and it will therefore require more time than other sectors for which technical solutions are currently available.

In many ways, decarbonisation is preferable to the more or less voluntary restrictions on air travel that some people are advocating. Aviation plays an essential role in our economy, and it would be

inconceivable for Europe to be penalised in relation to its major competitors around the world. And let's not forget that a system that does not maintain a fair level of competition between geographical areas will inevitably lead to "carbon leakage", with no global climate benefits.

In line with the priorities set out by Ursula von der Leyen in her State of the EU address on 13 September 2023, aviation plays a key role in the continent's strategic connectivity. Aviation plays a social role, contributing to the development of each individual and bringing people together. A dynamic and prosperous European aviation industry is one of the prerequisites for developing a sense of belonging to Europe and, consequently, to its unity.

The legislative developments that have been adopted as part of the *Fit for 55* package are a very positive sign that the aviation sector is now finally fully part of the EU's energy transition strategy. In particular, the plan for the deployment of sustainable aviation fuels, the move towards the decarbonisation of European airports and the strengthening of the carbon allowance mechanism to make it more incentive-based are all very welcomed steps.

Though this first step is to be welcomed, as with the other sectors covered by the *Fit for 55* package, the question now arises as to how the established roadmap will be followed.

The development of SAF is currently very limited, accounting for just 0.05% of the fuel delivered to aircraft in Europe. Achieving the targets set by the new ReFuelEU Aviation regulation, which calls for 70% SAF by 2050, including 35% renewable fuels of non-biological origin, will require the establishment of a solid European SAF production/distribution ecosystem and support for their production or consumption.

Development of a European SAF ecosystem

In the coming years, the availability of the resources needed to produce SAF will pose a challenge to the development of this ecosystem. Projections carried out by EdEn with the help of ONERA (the French Aerospace Lab) indicate that the quantities of SAF required by ReFuelEU Aviation will require between 56

and 90 Mt of biomass and between 570 and 711 TWh of low-carbon electricity in Europe, depending on whether preference is given to technologies based essentially on biomass or those making greater use of hydrogen.

These volumes of electricity represent the equivalent of 16% to 20% of current electricity production in the EU27.

Assessing the availability of biomass is difficult because of the diversity of sources, but the volumes required would correspond to approximately 15% of the potential available in the European Union, taking into account the sustainability requirements imposed by ReFuelEU Aviation on the choice of resources. Added to this is the difficulty of collecting these resources, which are decentralised by nature.

These are complex issues. EdEn suggests that each Member State draws up a master plan for the development of its own SAF ecosystem with a view to limiting imports while remaining within acceptable economic limits.

Such a master plan presupposes an inventory of available biomass resources in each Member State as well as the definition of a strategy for developing them, including the identification of the most efficient means of collecting them and a plan for prioritising their use in sectors which, like aviation, cannot ensure their energy transition via direct electrification.

With respect to the electricity needed to produce synthetic fuels, the appropriate means of production need to be planned well in advance, whether they be renewable sources or nuclear generation.

More generally, the SAF master plan should be coordinated with plans for electricity production, electricity networks, hydrogen production, and industrial CO₂ recovery.

On this last point, industrial firms feel that the 2040 deadline for the use of CO₂ recovered from industrial installations is too soon. Direct air recovery processes will probably not be operational by then, and the timeframe between 2023 and 2041 is too

short to allow for the construction and amortisation of capital-intensive industrial facilities.

In addition, at European level, there are a number of levers that can be used to accelerate the deployment of a European SAF industry. However, these levers need to be strengthened. For example, the European Commission's initial proposal for the Net Zero Industry Act (NZIA), presented as the EU's counterplay to the US Inflation Reduction Act (IRA), did not include SAF technologies in the list of "strategic" technologies. These technologies are crucial to the decarbonisation of the aviation sector and should benefit from the support of the NZIA. What's more, while the NZIA will primarily accelerate the procedures for granting permits, it should be coupled with real financial support, as initially announced by the Commission, via the European Sovereignty Fund. The establishment of the Strategic Technologies for Europe Platform (STEP) – a mechanism for reallocating European funds to decarbonisation-critical technologies, such as SAF, and adding a further €10 billion³¹ – is a first step. Nevertheless, the sums invested are still too small to really offset the subsidies allocated to SAF via the IRA, as already mentioned.

Maintaining the competitiveness of European airlines

A second difficulty is the price of sustainable fuels, which are currently between two and eight times more expensive than conventional kerosene. This additional cost, which we hope will decrease, cannot be entirely absorbed by the airlines. This would be reflected in European airlines' ticket prices, which could make them less competitive than airlines not subject to the same regulations. This increase in price would also reduce the attractiveness of European airports, as foreign airlines would be encouraged to refuel at non-EU airports in order to avoid the obligation to incorporate sustainable fuels, leading to carbon leakage.

While the Inflation Reduction Act in the United States has introduced a tax credit strategy to support the production and use of SAF, European measures to

limit the additional cost of incorporating SAF are still inadequate. The redirection of revenues from EU ETS Aviation to the aviation sector is currently uncertain. The ETS Directive, amended in 2023, provides for the establishment of a reserve of 20 million free allowances for the development of SAF, but industry estimates indicate that this reserve could be exhausted in one or two years, even though it is supposed to support the consumption of SAF over the entire 2024-2030 period. Furthermore, while some of these revenues will be channelled into the Innovation Fund, the allocation of these resources to projects of interest to aviation cannot be taken for granted. This lack of clear allocation could mean that aviation credits are used to support the energy transition in other sectors rather than in aviation.

To minimise the loss of competitiveness for all European players in the industry, support measures must be strengthened by increasing the reserve of free allowances to support SAF and by directly redirecting aviation carbon allowances towards decarbonising the industry.

The Single European Sky

Alongside the development of SAF, optimising the organisation of air traffic is another way to reduce greenhouse gas emissions from aviation. The European Commission's 2020 proposal to review the Single European Sky initiative would, in its view, make it possible to reduce the sector's CO₂ emissions by 7% thanks to more direct routes.

However, several years after the start of negotiations, this revision has still not been adopted due to the reluctance of certain Member States.

Given the significant reductions in emissions that the reform would make possible, the European Union cannot do without it if it wants to make a success of the energy transition in the aviation sector.

For this reason, EdEn calls on the EU and the Member States to reach an agreement on the development of the Single Sky within the next mandate.

31. At the time of publication of this White Paper, the Member States seemed to want to limit the funding made available to STEP to €1.5 billion.

Breakdown by sector

EdEn White Paper

Fit for 55... and what next?



INDUSTRY

Europe on the road to a new model

Europe is currently undergoing a change in its economic model: it is transitioning from a consumer society, characterised by mass consumption, to another socio-economic model that has yet to be named.

Values related to the environment and sovereignty will be omnipresent.

This change of model requires a profound transformation of our productive capacity in order to serve this new project, making it possible by putting its skills and know-how at its service.

Developing our productive capacity is first and foremost about responding to a demand and a market. The European market is rich and continues to attract envy, because Europe wanted it to be largely open. This openness is beneficial in the context of free competition, but it also has detrimental consequences in terms of sovereignty, as we can see in the case of solar panels, batteries, electric vehicles, medicines, and many other products.

The concept of “**open strategic autonomy**” has gradually found its way into the discourse of European political leaders, to the point of becoming a leitmotif in the European Commission’s communication, reflecting this societal and geopolitical shift. This open strategic autonomy aims to improve Europe’s independence in critical areas while maintaining openness to cooperation and world trade. However, it is still a protean concept, reflecting an ambivalence between liberalism and control of our

own productive destiny, and for the moment it only concerns a few industries, or even a few sub-sectors.

Giving substance to this concept and translating it into economic reality will therefore be one of the major challenges of the coming mandate.

Non-convergent industrial issues

While the above context applies to all European countries, the industrial reality is that trajectories vary from one Member State to another. Let’s take a simple indicator, manufacturing as a share of GDP (source: OECD). In 1975, the maximum-minimum range for this indicator among European countries was eight points: between 17% and 25% (excluding Luxembourg and Greece). By 2022, this range had widened to 10% and 25% (and, excluding Luxembourg, Greece and Ireland, to 35%). The widening of this gap illustrates the diversity of economic paths and policies followed by the Member States.

This diversity is well illustrated by the EU’s three G7 members: Germany (25%) has maintained a strong industry, Italy (17%) remains at the European average and is strengthening its export capacity, while France (10%) has for decades neglected its industrial ambitions.

This diversity leads to distinct challenges. Germany, which has not experienced an intense wave of de-industrialisation, has a positive trade balance. The challenges facing its production base are linked to digitisation (Industry 4.0), greening (decarbonisation, circular economy), pivoting its export markets by

distancing itself from the Chinese market, and securing supply chains. In contrast, the primary objective of the EU's "post-industrial" economies today is to regain control of their production chains, reduce their dependence, and correct their trade balances.

A minimum set of European measures to protect our industries

These divergent trajectories and distinct challenges explain the difficulties encountered by Member States in coming together to define a coordinated industrial strategy. However, there are a number of measures on which we could find consensus with regard to the new model we have entered.

More support for innovation

Overcoming our dependence on fossil fuels within three decades is a challenge on an unprecedented scale. Europe does not have large areas where dispersed forms of energy – such as wind, solar, or biomass – are easily harvested. It has to do three things:

- Improve energy efficiency;
- Develop low-carbon energy carriers: electricity, as well as hydrogen (including, perhaps, natural hydrogen), SAF, biogas, synthetic fuels, e-methanol, e-ammonia, etc.;
- recover, transport, sequester, and reuse CO₂.

Many of the technologies that will be needed are not yet industrially available. In a recent study, McKinsey listed 10 areas that are critical to achieving carbon neutrality, and where greater innovation is needed³².

In Europe, the Innovation Fund is the appropriate tool to support this effort. This vehicle will benefit from increased resources from the EU ETS. It is essential that the next mandate rapidly propose an action plan for this fund, broadening its scope of intervention. Energy storage technologies, low-carbon fuels, hydrogen-powered aircraft, new industrial processes (steel, cement, chemicals), low-carbon buildings and heat pumps, and small nuclear reactors are just some of the areas that should be

eligible for funding, in parallel with the acceleration of procedures made more practical by the NZIA.

Protecting emerging markets

By way of illustration, let's take the case of the entry-level electric vehicle market. China has several years' lead in technological terms, as well as mature production capacity. Only by protecting European production capacity for as long as it takes to develop a competitive industrial base will Europe be able to stay in the game – unless it decides to withdraw from this sector entirely, even though it is essential to both decarbonisation and individual mobility.

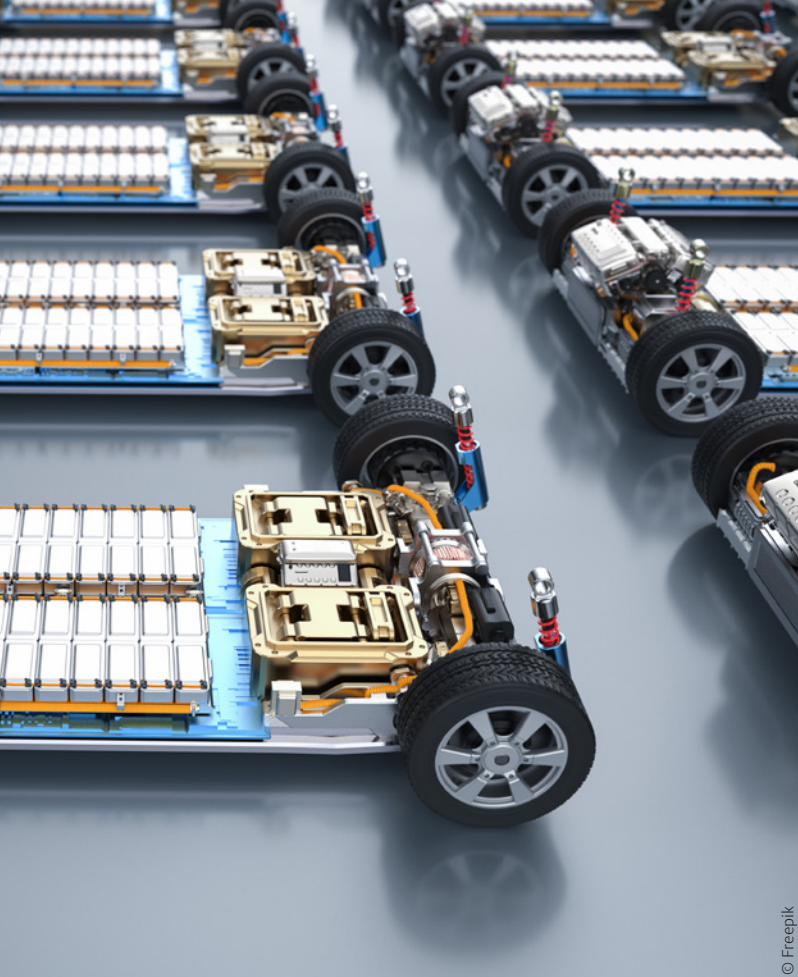
Europe will therefore have to accept the fundamental contradictions between an open market and sovereignty, and make clear choices. It would be futile to maintain the illusion that these two concepts are compatible. **We must choose what we want to protect and what we want to leave open.**

Essential goods and services

This leads to the simple question: which products or services are essential? Which links in the value chain need to be secured? It may be an easy question, but the answer is not easy, and it applies to every sector of the economy. For the moment, only certain sectors have begun to consider these issues: equipment supporting the ecological transition and strategic metals, for example. Partial, yet incomplete approaches are emerging in the pharmaceuticals and microchip sectors. They are virtually absent from other sectors.

Secondly, the solutions which will allow us to secure supplies of goods and services essential to Europe can only be defined by experience, on a case-by-case basis. No overarching policy can embrace the diversity of situations or value chains. No option can be ruled out *a priori*. And in this respect, it is regrettable that the latest regulations on medicinal products avoid mention of relocating production as a means to secure supplies, as if it were an offensive concept even though it meets the expectations of many of our fellow citizens.

³². *Delivering the climate technologies needed for net zero – McKinsey (April 18, 2022).*



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European preference will have a cost but that is inevitable

Let's remember the obvious: we don't produce to produce, we produce to sell. Re-industrialisation, near-shoring, or relocation policies to address the serious dependencies we saw during the Covid-19 crisis and the war in Ukraine are futile if buyers are not encouraged to adopt these solutions.

For decades, price optimisation remained the main objective, stimulated by competition – a concept we wanted to be perfect. The environment and secure supply chains have now been added. They will have a cost. As such, the notion of European preference is inescapable. It clashes with decades of belief in a global free market and will not be implemented without upheaval. Once again, there is no point in hoping to make up for our dependence on industries whose production costs would be higher, with our European social model and acute concern for the environment, if our market were to remain fully open.

The first step in this direction would be to review our positions on opening up European public procurement markets, as agreed when the WTO was established.

A level playing field

The holy grail of our economic policies, the level playing field, has been profoundly affected by the Inflation Reduction Act. It has also raised awareness of the reality of China's state support for industry. While aid to Chinese industries is sometimes opaque, aid to American industries through the IRA is quite transparent. And even if the levels of aid in Europe were similar – which has not generally been demonstrated – the means and speed of such allocations are extremely different and work to Europe's disadvantage.

The mechanisms for regulating world trade have failed, at least for the time being. Re-establishing a level playing field will require reciprocity, not only in market access but also in protecting our companies, compared to the conditions enjoyed by American or Chinese companies. The introduction of the CBAM is a step in this direction, but it is not likely to be enough.

Key considerations for energy policy

Decarbonising European industry

Though the decarbonisation of industry is underway, one of the key issues remains the availability of decarbonised energy and, first and foremost, decarbonised electricity. Biomass resources are too limited to meet most of industry's needs, and give rise to conflicts of use. Thus, industry needs to electrify: this is already happening and is a factor in decarbonisation, but also in modernisation.

But the availability of electricity, and especially of decarbonised electricity, remains an open question, even though it should in no way limit the decarbonisation of industry, especially when manufacturers have the will or the choice to invest. This has major implications: the debate between nuclear and renewable electricity must be closed. Europe will need both in the near future, on a massive scale and on the most competitive terms possible.

Planning for the emergence of green energy industries

The green energy industries (photovoltaics, electrolysers, batteries, etc.) are currently dominated by China, whose capacity projections far exceed its own needs. So what role will European industry play in the future? The huge subsidies that photovoltaic, electrolyser and battery mega-factories currently receive will not be enough to ensure their long-term competitiveness. What's more, the sum total of the projects sometimes covers or far exceeds Europe's 2030 needs (by a factor of three for electrolysers): some projects will not be completed, and hydrogen is probably the most uncertain sector.

It is difficult not to anticipate project cancellations, which will once again call citizens' attention to the management capacity of their elected representatives and their governments, as these projects will take with them the public subsidies which they received. By not creating a European fund for these industries, Europe has shown that it did not want to take on the role of a planner.

Taking back control in the form of planning for the emergence of the green energy industry would represent a change of direction for European policy and an essential step if we intend to make a success of this transition.

The environment and sovereignty will come with a cost

While some consider that the 50-year-old model of optimising costs through competition to have largely been a success, we must accept that the world has changed. The European market has its virtues, but this is not the only solution that can invoke European solidarity. In troubled periods, it has the disadvantage of being open to highly speculative phenomena, for example when the internalisation of risk leads to price levels that are out of all proportion with economic reality, as was the case at the start of the war in Ukraine.

Our industrial transition will take place in a shifting and unstable world. The stability of a few fundamental elements, such as the price of electricity, will limit the risk to investors in this transformation and thus make it easier. All ideas that move towards long-term contracts with predictable electricity prices, particularly for industry, deserve to be supported.

European governance must adapt to the new world

Faced with upheaval in the landscape of our industrial and energy policies, Europe is not ready. The EU's successes on delivering masks and vaccines during the Covid period are not enough to overlook the inadequate governance, postponed decisions and clear differences between Member States as regards the energy policy and defence policy. The victories of European cohesion remain limited in the face of the competition between Member States over gas purchases or attracting investments in mega-factories – sometimes with the help of enormous subsidies.

The EU is the relevant economic dimension for addressing these issues, but convergence is too slow and procrastination on pan-European decisions is undermining European integration.

When the EU fails to provide a common framework, Member States step into the breach with national policies – sometimes to force Europe to act, sometimes to go it alone. The situation is urgent. Europe's governance must face up to the new industrial challenges and align its fundamental interests within the required timeframe. It has the skill and the strength to do this. **Whatever direction it takes, particularly in terms of industrial and energy policy, Europe must above all adapt its governance to a world shaped by crises and emergencies.**





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A EUROPEAN STRATEGY FOR CARBON MANAGEMENT

Although already deployed at a number of sites in Europe, carbon capture, utilisation, and storage (CCU and CCS) have long been seen as technologies of last resort that do not deserve the same priority as energy efficiency or the migration to low-carbon energy sources.

With the realisation that it is impossible to completely decarbonise certain industrial sectors and the expected development of synthetic fuels, views on CCS and CCU are evolving and the European Commission is now considering the framework for their deployment.

CCS: a solution for eliminating residual emissions

The perception of CCS technologies is changing with the realisation that a certain volume of residual CO₂ emissions will remain due to the very nature of activities such as the production of concrete, chemicals, and steel.

These sectors can improve their carbon footprint by various means, but the balance of emissions, which can sometimes be significant, can only be eliminated by capturing the CO₂ leaving industrial facilities.

The carbon management strategy to be adopted by the European Commission should enable this development to be continued and further developed so that by 2050 the 330 to 550 Mt of CO₂ captured each year that will be needed to meet the target of a 1.5°C rise in average temperatures can be achieved.

To provide a solution to the issue of residual CO₂ emissions, the development of CCS technology should be pursued at both the Member State and EU levels.

To this end, it will be necessary to:

- fully integrate CCS technology into the European energy and climate strategies, as a complement to improving energy efficiency and the transition to low-carbon energies;
- continue to support the CCS chain at the European level until the value of CO₂ allowances reaches a sufficient level.

The development of CCU: turning carbon into a resource

Although CO₂ is currently a substance of which we are trying to rid ourselves, its usefulness in the production of chemical bases and synthetic fuels – which are needed in particular to decarbonise the aviation and maritime sectors – should not be overlooked.

The Commission intends to facilitate these uses of carbon in the most sustainable possible conditions, though CO₂ recycling remains marginal today. One of the reasons for this is that CCU only allows partial recycling of carbon, rather than eliminating emissions, as is the case with CCS.

Direct Air Capture (DAC) technology allows us to obtain climate-neutral carbon, though it is still in its infancy and poses major problems for large-scale extrapolation.

Given the expected increase in carbon requirements for the production of synthetic fuels as a result of the obligations arising from the ReFuelEU Aviation and FuelEU Maritime regulations, the recovery and reuse of CO₂ emitted by industrial facilities is, in the short and medium mandate, the most effective solution for sourcing CO₂. **A framework needs to be defined at European level for the development and deployment of these technologies.**

But the limit set by the Commission at the end of 2040 for the recognition of the sector risks discouraging investment. It must be postponed in order to justify the investment needed to develop the sector.

The common core: capturing and transporting CO₂

In the breakdown of investment across the entire CCS chain, storage accounts for around 30%, while capture accounts for over 50%. It is thus essential that we support both carbon capture and storage activities.

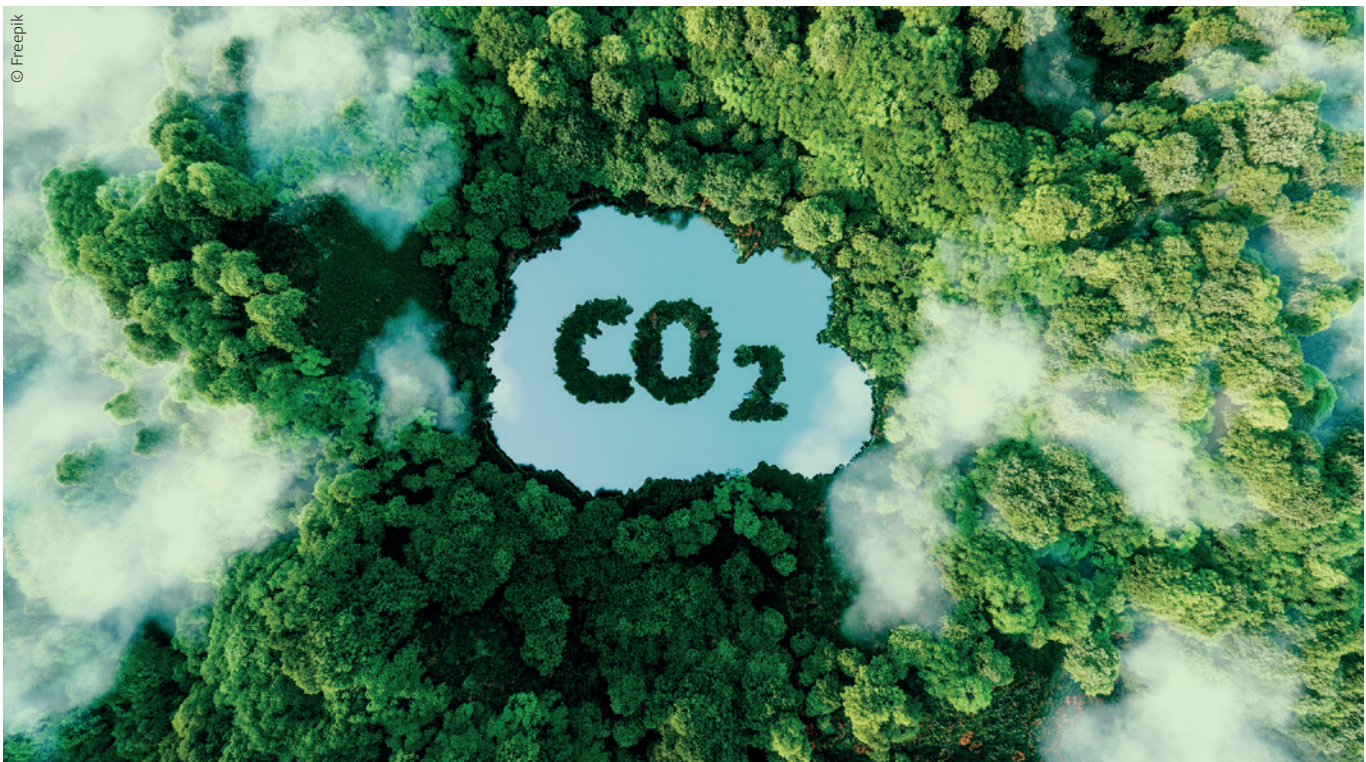
The price of carbon allowances on the European market (at around €76/tCO₂ at the end of November 2023) is still insufficient to ensure the economic

equilibrium of the entire sector. We must therefore provide additional support and ensure that the compensation provided by the carbon value is distributed fairly to enable the development of all the links in the chain.

From this perspective, it is desirable that a monitoring framework be adopted in order to track the progress of the quantities of carbon captured and to ensure that they correspond with storage capacities and industrial demand for carbon resources.

Transporting carbon from where it is captured to where it is stored or processed is also a key stage in the value chain. However, the cross-border transport of CO₂ for underwater storage is regulated by the London Protocol (LP), which only allows the export of CO₂ for geological storage under an agreement between two or more states.

Signing agreements on a case-by-case basis is likely to slow down project development. **The adoption of a European framework in line with the London Protocol would make it easier to set up projects by defining the conditions for transporting CO₂ between Member States in a standardised manner.**





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ELECTRICITY NETWORKS



Electrical systems are undergoing a profound transformation

Electricity is an essential – not to say vital – commodity for our economies, when you consider that it powers all new communications technologies. For several decades, consumers have been accustomed to the comfort of a stable electricity system, and the extent of the consequences of any destabilisation of this system is often underestimated.

In most developed countries, electricity systems are currently undergoing a profound transformation, with the integration of intermittent renewable energies, the development of decentralised production and storage resources, smart metering, and the arrival of smart grids, as well as increased interest in energy autonomy and self-consumption. The traditional model of a centralised network and conventional power stations is increasingly being called into question in the face of the rise of renewable energies and smart grids, while the need to decarbonise the economy is driving further calls for electrification.

Furthermore, with climate change set to intensify, all elements in the electricity system are exposed to the effects of the growing number of extreme weather events (storms, extreme heat, floods, fires, etc.).

In the EU's economic development strategy, and with the prospect of significantly increased demand for electricity, electricity networks are on the front line and deserve greater attention at the European level. However, decision-makers tend to overlook their importance, perhaps because their management is rather inconspicuous and quite technical; nevertheless, the financial stakes are enormous. The European Commission has estimated that €584 billion will have to be spent between 2020 and 2030 to adapt electricity networks to the energy transition. The first high-level forum on electricity networks organised on 7 September 2023 in Brussels by the European Network of Transmission System Operators for Electricity (ENTSO-E), under the patronage of the European Commission³³, demonstrated the importance of electricity networks to the EU's net-zero strategy and made

recommendations which the European Commission will have to consider in its recently proposed action plan on electricity networks³⁴. **It is essential that a European action plan for networks be drawn up in order to define and quantify the investments needed to achieve the EU's general energy and climate action objectives and to propose measures to facilitate their achievement.**

Integrating renewable energies

Renewable energies (RE) have grown rapidly, driven by proactive policies. As a result, the cost of these products has fallen sharply, although these trends have recently reversed with the rise in the cost of components and interest rates. By the end of 2021, 90% of renewable electricity generation facilities will be connected to distribution networks, which will be much more strained than before, with bi-directional energy flows in areas where renewable energies are installed. In fact, intermittent renewable energies tend to be produced where there is space and where equipment can be installed, that is, generally in sparsely populated areas. Thus, they are far from areas where demand is most concentrated, and have no reason to be in sync with it. As a result, the cost of integrating intermittent RE is rising much faster than its share of the electricity mix.

Photovoltaic (PV) solar power has seen a clear resurgence in interest since the war in Ukraine, but poses a particular problem in terms of modulation and guaranteed power, as it leads to very large injections of electricity in the middle of the day, when demand is low. Electricity systems designed to accommodate it must be sufficiently flexible, particularly in terms of storage and demand management. If self-consumption seems profitable to those with access to such solutions, it is often because of favourable tax and tariff arrangements.

It is essential that we better coordinate the development of renewable means of production as well as the reinforcement of network capacity. The European Commission should promote investment frameworks to ensure that network resources are planned and deployed in advance of renewable energy projects, thereby reducing the risks associated with them.

33. <https://www.entsoe.eu/eugridforum/>

34. See reference 2.

Storage is evolving with the arrival of batteries

Until now, storage has been the preserve of large hydroelectric facilities. However, driven by electric mobility, advances in lithium-ion batteries are a potential game-changer for network management. We can expect the cost price of electrochemical storage to fall as existing technologies mature and new batteries with less expensive components emerge. Behind this development lie major industrial challenges for Europe, both in terms of technology and controlling the supply of the resources needed to manufacture them.

Today, storage is “on the market” for primary reserve services, which are essential for keeping the electricity system balanced. It can also contribute to the secondary reserve, which regulation will allow it to do. The value of storage as an alternative to network investments has not yet been proven. However, it could find itself in competition with transitional resources used during particular phases and, as indicated above, storage needs will increase as a result of the deployment of renewable energies, in order to avoid wasting excess production when solar or wind generation exceeds demand.

The corresponding regulation needs to be designed to support the “decentralisation” of the electricity system: more distributed generation, more local fluctuations, more means of local flexibility, part of which could be battery storage.

In particular, network operators will have to be given greater latitude to install and operate storage facilities. It is their responsibility to choose the most appropriate and cost-effective means of managing the network, using new technologies wherever appropriate. The current provisions are too restrictive and will need to be changed. In specific cases where it is necessary, network operators must be able to provide and operate storage facilities. By lifting the restrictive barriers in the *Clean Energy Package*, network operators will then be able to integrate storage into the network management toolbox.

The impact of digital technology

The digitisation of the electricity network is underway and will remain a major project for years to come. It will be necessary to manage an increasingly complex, decentralised network that relies increasingly on renewable energy sources. We must recognise the central role smart meters will play in this area. They are a key enabler of the digitisation of the system. Data interoperability must be considered within a simple, secure, and fair framework for all stakeholders, particularly with a view to the future European energy data space.

Against a backdrop of increasing digitisation, cybersecurity represents a major challenge, necessitating a harmonised operational framework at European level to prevent and deal with threats.

Developing skills and expertise

In a context of strong growth in the operations and responsibilities of electricity networks, the issue of skills and expertise remain a challenge. Workers in the electricity industry are in short supply, and the needs of Europe’s energy transition will require tens of thousands of additional workers every year. We need to anticipate and support these massive human resources needs now. The sector needs to develop skills initiatives, make its professions more attractive to young people and those undergoing retraining or reintegration, and ensure that training is in line with the needs of the electricity sector.

Strengthening supply chain resilience

Current manufacturing capacity for cables, transformers, converter stations, and other network equipment is far from sufficient to meet growing demand. In order to secure investments in new generation capacity, European suppliers of network technologies are calling for better conditions for their investments in new industrial capacity and for long-term demand predictability on the part of network operators. Network operators, in turn, are demanding

clear commitments from industry to invest in generation capacity and supply chain organisation, in a manner that clearly benefits the European economy and allows for rapid implementation of network investment plans.

In this context, the Commission should send out a strong political message to activate all levers likely to support investment in a solid European industrial base.

In particular, the Commission should support measures to facilitate the standardisation and interoperability of network technologies. Longer-mandate contracts and greater flexibility in the choice of the best available technologies should be made possible within the procurement framework. Voluntary joint procurement of essential components could be considered, and ways to reduce the administrative burden of the tendering process should be found. Access to financial support and risk mitigation mechanisms, as well as accelerated permitting for new investment in European-based network manufacturing capacity, should be encouraged under the NZIA.

Mobilising the necessary financial resources

In order to achieve European objectives, it will be crucial for network operators to be able to anticipate users' needs, which will be reflected in investment plans and greatly increased financial requirements. At the same time, rising interest rates and increased risk profiles, including for innovative solutions, are driving up financing costs. However, regulatory frameworks have not often kept pace with these developments. In many countries, there is a real risk that financing costs will rise higher than the regulated income from investments, thereby diminishing their value for investors and shareholders.

Regulators have a role to play (a subject to which we will return later) and the Commission should facilitate changes in the regulatory frameworks of national regulators and the ACER to ensure the attractiveness of investments in order to recruit the necessary financing on the capital markets and support anticipated investments.

EU funding is a complementary tool for stimulating investment in projects and mitigating the potential increase in tariffs that could result from increased investment.

Numerous European funds exist today, but it has been observed that the needs of network operators are not fully considered, given the current very limited allocations of funds to the projects they carry out. This is particularly obvious with respect to projects organised by distribution systems operators, as the eligibility criteria for the various European funding programmes, such as Horizon Europe and the European Interconnection Facility, are not sufficiently adapted to these projects, not to mention the lengthy and resource-intensive application and assessment processes.

One solution could be to introduce into the 2028–2034 Multiannual Financial Framework (MFF), a programme designed to support decentralised energy infrastructures, with an emphasis on electricity networks.

As regards support for the development of network technologies, the creation of the Strategic Technologies for Europe Platform (STEP) is very welcome. However, it is rather unambitious, with only €10 billion (limited in a first step to €1.5 billion) to be divided between various funds; it is to be hoped that STEP will serve as a pilot project prior to the creation of a sovereignty fund capable of supporting investment in network technologies.

Facilitating and accelerating network rollout

The authorisation process for network improvements and expansions, whether physical or digital, needs to be simplified. **Networks must be recognised both legally and politically as critical infrastructure of major public interest**, in line with the provisions of the revision of the Renewable Energy Directive. Such measures, within the framework or by extension of the NZIA, should allow for network improvement and expansion applications to be processed by the competent authorities within strict deadlines. Guidelines from the Commission on the implementation of the revision of the RED will also be required.

At local level, the new prerogatives conferred on local authorities create some overlap with those of network operators, as well as with renewable energy communities and citizen energy communities, which bring consumers together around collective self-consumption operations or other closed distribution networks. These players will have to coordinate in order to ensure optimal network balance and, at the very least, avoid system failures.

Without coordination, there is a risk that the system will become inefficient or even disorganised. This requires clear technical rules and relevant economic signals. This also means defining the areas of responsibility of the new and old players in the energy transition, in particular to determine who is liable in the event of a supply disruption, and defining the principles for remuneration and redistribution of revenue.

Pricing: better value for power

The public electricity network operator provides a number of services to customers: electricity transmission and distribution, contract management, metering, guaranteeing available power, and electricity delivery and/or collection.

The tariff is set by the regulator to cover the network operator's costs. Each customer therefore pays a tariff comprised of several components: a fixed component, a "power" component, and an "energy" component, which correspond to the various services provided by the network operator. With the transformations underway, energy flows on the network will decrease, even as investments increase, with network operators increasingly taking on the role of an insurance provider. This argues in favour of a **shift in its remuneration towards a higher proportion corresponding to guaranteed power and a lower proportion to kWh delivered.**

In particular, the power component of the tariff needs to be increased to take account of the development of electric vehicle charging points and individual self-consumption. These installations create at least as much demand on the network as conventional uses, but use of the guaranteed power service at the network connection point takes precedence over the energy delivery service.

Reviewing regulatory architecture and enabling a more forward-looking approach

Most regulatory frameworks in Europe are aimed more at avoiding excessive investment in networks than at enabling them to meet future needs. To keep pace with the EU's energy ambitions, regulators will need to adopt a more forward-looking approach. Needs must be anticipated so that they can be financed now, particularly in terms of network digitisation and skilled human resources, as the investments to be anticipated are not limited to the physical infrastructure.

The ability to identify and exploit technological opportunities may result from a combination of the know-how of network operators and the disruptive approach of new players. In addition, it appears that many emerging innovations, such as storage and the flexibility provided by digital technologies and smart meters, could be exploited through network services. However, the current regulatory framework tends to limit the scope for network operators to invest in certain areas of innovation.

This framework will have to evolve so that network operators can see their management assessed according to criteria that are less traditional and more responsive to the industrial world.

Restoring the role of socio-economic concerns

Each Member State must have an aggregate understanding of its own infrastructure networks, the services it provides to their users, its environmental footprint, and its resilience, in order to define its investment programmes and encourage interconnections, interactions, and synergies between these networks.

In this context, they will need to reconcile the modernisation of existing infrastructure with development projects, which requires the right dimensioning of fixed infrastructure costs. This implies assigning all necessary importance to strategic and socio-economic concerns, which must have their place in investment choices faced with certain objectives, poorly documented as they may sometimes be, such as the minimum levels of interconnection requested of Member States by the European Commission.



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CONCLUSION

The task facing the new mandate of office is almost Herculean. It will have to take responsibility for the energy and climate targets set by its predecessors. Any backtracking would be interpreted as evasive and would be politically difficult to accept at a time when climate change is beginning to be seen as an essential issue by most citizens. Nevertheless, the task is difficult, as these targets are very ambitious and the general context has become more complex with the emergence of major concerns in terms of energy independence, industrial sovereignty, and the fight against energy poverty.

The next mandate will have to do its utmost to get as close as possible to the targets it inherits, as it has no other choice: the fight against climate change is incumbent on us all. Now is the time for action, pragmatism, and results. It's not about setting new targets, ever more ambitious yet ever more distant.

In an increasingly multipolar world, Europe must also learn to better defend itself and must not persist in trying to play the role of top of the class when it does not have the means to do so. Nonetheless, it remains a leading economic and political entity, with exceptional skills and expertise, which can find in the energy transition the means to sustain its leadership position, to modernise its economy, and to regain its place among the world's major industrial players.

There is no silver bullet: this White Paper attempts to draw up a series of areas of action, presented in the introduction to this document, on which every candidate aspiring to hold office in the next mandate can draw in order to ensure that the next five years are a period of renewal in the energy sector, which remains at the root of all progress in the environment, the economy, and society.

ABOUT EDEN



Founded in 2010, the goal of *Équilibre des Énergies* is to help decarbonise.

The members of EdEn are all involved in the energy, construction, and mobility sectors, and are part of the economic fabric of France and Europe: major industrial groups, SMEs, VSEs, trade unions, professional federations, tradespeople, and consumer associations. All promote innovation and industrial excellence to reduce greenhouse gas emissions. They are working to gradually transition away from dependence on fossil fuels. Together, they bring their expertise and experience to bear in proposing practical solutions that are feasible and acceptable in view of the economic realities of their sector.

EdEn' recommendations to French and European decision-makers are based on recognised economic and technical expertise derived from the work of its scientific committee.

EdEn's mission

EdEn is helping to prepare for a carbon-neutral world by 2050 and a society more resilient to the consequences of climate change.

As such, EdEn recommends measures to French and European decision-makers in the fields of energy, construction, and mobility policy, in order to transition away from fossil fuels and help our societies adapt to climate change.

EdEn's members



EdEn would like to thank all the members who contributed to the drafting of this White Paper.

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