

SUPEERA

Policy Brief



Setting the scene

Two years after the launch of the European Green Deal, the European Union has taken substantial steps in its effort to promote the green transition. Since the announcement, a string of policy measures detailing the Green Deal ambitions have followed. The Fit for 55 package is the most telling example of this endeavour and the finalisation and roll out of the legislative proposals contained in it will be crucial to attain the 2030 and 2050 EU climate goals.

The year 2022 also marks a crucial moment for the EU in general and European research in particular. It will not only signal the halfway of the current European Commission and European Parliament terms, but it will also see the Horizon Europe Missions, a new and innovative instrument, at work after being launched in 2021,

The result of these efforts will depend on the active participation and support of the research community. Only by combining state of the art research with careful policymaking the EU will be able to reach its ambitious goal of becoming climate neutral by 2050. The research community has a pivotal role to play in this process by supporting identified political priorities with empirical findings and developments. It can also advise policymakers on the way forward through fundamental research, particularly focused on low TRLs, to advance breakthrough technologies and materials, while also giving prominence to systemic approaches.

In the context of the SUPEERA project, a series of policy briefs are currently being developed to identify concrete R&I challenges in EU policies relevant to the energy research community. The final goal is to support the achievement of the Clean Energy Transition (CET). This Policy Brief will focus on the Proposal for a Directive on Energy Efficiency (recast). This directive will set the stage for a leap in the energy efficiency performance of the EU, including but not limited to buildings and industry. It will have a significant impact on the EU's energy system and set the bloc on the path to a more sustainable building environment.

As this brief was in preparation, the Russian invasion in Ukraine prompted the EU to put forward the REPowerEU communication, spelling out short term actions to substantially decrease Europe's dependency on Russian gas. Energy efficiency is essential given its short-term impact. However, it also calls to strengthen the urgency and volume of energy efficiency efforts, while emphasises the need to quickly address energy poverty issues to protect vulnerable customers from high energy prices.



The EC proposal for a recast of the Energy Efficiency Directive

The proposed energy efficiency recast Directive lays down rules designed to implement the “energy efficiency first” principle across all sectors, remove barriers in the energy market and overcome market failures that impede efficiency in the supply and use of energy. It also advocates for the establishment of indicative national energy efficiency targets between 2020 and 2030.

The text is built around six chapters outlining the European Commission's revised priorities for implementing energy efficiency measures at national, regional and local levels. The 2021 recast introduces a new chapter that considers energy justice and empowerment of citizens as a key priority for Member States.

Key priorities	Main elements in the priorities
Energy efficiency first principle	<ol style="list-style-type: none"> 1. Member States shall ensure that energy efficiency solutions are taken into account in the planning, policy and major investment decisions related to the following sectors: energy systems and non-energy sectors, where those sectors have an impact on energy consumption and energy efficiency. 2. Member States shall collectively ensure a reduction of energy consumption of at least 9 % in 2030 compared to the projections of the 2020 Reference Scenario 3. Member States shall also provide the shares of energy consumption of energy end-use sectors, including industry, residential, services and transport, in their national energy efficiency contributions. Projections for energy consumption in information and communications technology (ICT) shall also be indicated.
Exemplary role of public sector	<ol style="list-style-type: none"> 1. Member States shall ensure that the total final energy consumption of all public bodies combined is reduced by at least 1,7% each year, when compared to the year X-2 (with X as the year when the Directive enters into force). 2. Member States shall include, in their national energy and climate plans and updates thereof, a list of public bodies which shall contribute to the fulfilment of energy efficiency obligations, the reduction of energy consumption and the measures they plan to achieve it by each of them 3. Member States shall ensure that regional and local authorities establish specific energy efficiency measures in their decarbonisation plans after consulting stakeholders and the public. They should include particular groups at risk of energy poverty or more susceptible to its effects. 4. Member States shall support public bodies in the uptake of energy efficiency improvement measures, including at regional and local levels, by providing guidelines, promoting competence building and training opportunities and encouraging cooperation amongst public bodies.
Consumer information and empowerment	<ol style="list-style-type: none"> 1. Member States shall ensure that information on available energy efficiency improvement measures, individual actions, and financial and legal frameworks is transparent and widely disseminated to all relevant market actors. 2. Member States shall take appropriate measures to empower and protect people affected by energy poverty, vulnerable customers and, where applicable, people living in social housing. 3. Member States shall take appropriate measures to empower and protect people affected by energy poverty.
Efficiency in energy supply	<ol style="list-style-type: none"> 1. As part of its integrated national energy and climate plans, and respective progress reports, each Member States shall notify to the Commission a comprehensive heating and cooling assessment. 2. Member States shall ensure that the public is allowed to participate in preparing heating and cooling plans, the comprehensive assessment and the policies and measures. 3. To increase primary energy efficiency and the share of renewable energy in heating and cooling supply, an efficient district heating and cooling system is a system that meets a set of criteria. The criteria specify the development of the share of renewable energy, waste heat and the share of renewable energy in the waste heat in the period 2025 to 2050.



The transition to a more energy efficient Europe goes beyond technology

The concept of Energy Efficiency is one of the main pillars of the New European Bauhaus and the Fit for 55 package. A prominent reason is financial: **it is cheaper to save one unit of energy than to pay for the same amount of electricity**¹. But this is not the only reason: **energy efficiency will be crucial for reaching the declared objective of a carbon-neutral Europe by 2050**. Its scope spans from industry to public buildings and private homes.

Despite the attention given to the topic, **the level of investments linked to improvements in energy efficiency, especially in businesses, does not reflect its importance**². The recently proposed Energy Efficiency Directive (EED) recast will be deployed to spur more investment in energy efficiency activities to address this situation. The main aim of the proposed text is to increase the level of commitment, both at EU and Member State levels. Although still under discussion by the European Parliament and Member States, an informed analysis of the provisions currently on the table complemented by the viewpoint of the low carbon research community is presented. The objective is to suggest pathways that could be explored to maximise the directive's impact.

Supporting businesses to sort out their energy efficiency performance

The main objective of the recast directive is to reach a 9% energy efficiency target by 2030, equivalent to a 36% reduction of energy consumption for final energy³. This will impact all sectors, with a particular focus on businesses. For that, enterprises will have to develop technology related to infrastructure and processes, implement a circular economy and draw on digitalisation to align to the new rules and increase their performance in energy efficiency.

To start with, **investments in infrastructure are highly needed**. Under current circumstances, the industrial sector in the EU is responsible for around 16.4% of total energy consumption. The revised EED mainly addresses industry-related points concerning the insulation of buildings and heating and cooling technologies. However, it falls short of mentioning any details on making industrial processes more energy efficient. **Technological aspects linked to reducing the specific energy consumption in production processes will be key to unlocking energy efficiency developments in the sector in the coming years**.

Crucial in many industries⁴ will be the development of processes employing innovative materials and production methods. **Electrification from renewable energy resources available today is a fundamental tool**. Still, it currently supports only low-temperature industrial processes, while most barriers are met in high-temperature applications. Digitalisation and

¹ European Court of Auditors, 17 January 2022, "EU's contribution to energy efficiency in businesses is unclear", https://www.eca.europa.eu/Lists/ECADocuments/INSR22_02/INSR_Energy-effic-enterpr_EN.pdf

² European Court of Auditors, 17 January 2022, "EU's contribution to energy efficiency in businesses is unclear", https://www.eca.europa.eu/Lists/ECADocuments/INSR22_02/INSR_Energy-effic-enterpr_EN.pdf

³ The total energy consumed by end users, such as households, industry and agriculture

⁴ European Parliament, 2021, "Study/In-depth Analysis: The Road to Energy Efficiency", [https://www.europarl.europa.eu/RegData/etudes/STUD/2021/695480/IPOL_STU\(2021\)695480_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2021/695480/IPOL_STU(2021)695480_EN.pdf)



process automation are critical enabling technologies towards higher energy efficiency, providing new ways to improve flexibility in plants, optimise consumption and reduce GHG emissions.

Energy efficiency will also be crucial for making circularity possible in industrial processes. Today, 50% of the power consumption in Europe goes to heating and cooling, i.e. thermal energy. All industrial processes are affected by losses, mainly through heat not being utilised, which means that new alternatives should be developed to recover energy after the end of the cycle. In order to increase efficiency, **a substantial effort should be made to understand where the main opportunities lie regarding the life cycle of industrial production.** A leading example is the utilisation of waste heat. In this case, circularity is not limited to waste reuse but entails a broader scope of planning the design, production, construction and renovation processes in the industry and building sectors⁵.

For its part, the built environment faces enormous challenges, with 75% of the EU building stock with low energy performance and responsible for about 40% of the EU's energy consumption and 36% of the GHG emissions. With clear targets for Nearly Zero Energy Building (NZEB) renovation, energy efficient measures are increasingly recognised as the first step to achieving better performance and consistently reducing energy demand. Moreover, using **nature-based building materials** could be an emerging integrative solution in **circular and green construction.** **Bioclimatic strategies** such as optimising the passive solar, natural ventilation, and natural light use complement the cost-effective solutions set for future NZEBs.

The second step towards NZEB renovation is the maximisation of renewable energy generation on-site. An efficient building operation and optimal use of renewables could be achieved through energy flexibility solutions and strategies such as effective monitoring, ICT, and smart technologies, providing direct interaction with building occupants and the buildings' environment.

Building the bridge between technology and implementation

Any development on the technology side will not be of much use if it cannot reach the market. Barriers like the uncertainty of energy efficiency return on investments constitute a significant factor in understanding the shortage in capital flows in the sector. One reason to explain this dynamic is the private sector's lack of modelling and data readability. A possible missing piece is the still **low level of interaction between research organisations and enterprises.** In this regard, **a closer relationship would benefit both the researchers and the industrial partners.**

Moreover, there is a lack of knowledge regarding the best available technology. A closer communication between all parties in the value chain could address this challenge. However, it will be crucial to **introduce a definition for “energy sufficiency” in the EU.** This concept entails a deliberate reduction of energy consumption, best exemplified in actions such as establishing lower maximum heating standards in private houses, and it is not yet contemplated in EU legislation.

⁵ European Parliament, 2021, “Study/In-depth Analysis: The Road to Energy Efficiency”, [https://www.europarl.europa.eu/RegData/etudes/STUD/2021/695480/IPOL_STU\(2021\)695480_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2021/695480/IPOL_STU(2021)695480_EN.pdf)



Conclusions

The potential for energy efficiency gains in the industrial sector is not given the place it deserves in the recast directive. The suggested provisions to remediate this shortcoming include:

- Stimulate more investments in energy efficiency in the industrial sector. A reduction of 15% in the global energy demand in 2040 could be possible by implementing efficiency opportunities. For example:
 - Showing benefits via industry demonstrations by developing more lighthouse projects;
 - Limiting dependency of the sector on natural gas reserves outside Europe;
 - Promoting cross-sectorial collaboration among energy-intensive industries and power companies. The surplus heat from energy-intensive industries will be a vital resource for the energy system.
- Promote R&D efforts towards specific technology developments that can reduce specific energy consumption needs in industrial processes. For example:
 - More efficient separation technologies;
 - Process intensification, including reactor design concepts and equipment and new catalyst development for resource and energy efficiency;
 - Energy-efficient solutions for drying & dewatering;
 - Heat to power technologies;
 - Thermal energy storage solutions for peak shaving and better utilisation of fluctuating heat losses (stabilising waste heat supply).
- Create greater demand for energy efficiency solutions in the industry. For example:
 - Energy management systems for analysis and control of a company's energy consumption and identifying opportunities for efficiency gains;
 - Energy efficiency regulations and control, levelling the playing field for industries. E.g., introducing import taxes for products with high carbon footprint/high energy consumption.
- Engage all parts of the value chain by, for example, promoting energy efficiency partnerships with all businesses' branches and sectoral plans for energy reduction towards 2050.

Additional research challenges concerning the building sector encompass:

- For building and district level:
 - Increase the use of nature-based solutions for the built environment;
 - Solutions for renewable integration;
 - Increase the use of ICT and smart technologies for buildings operations;
- Increase the implementation of bioclimatic strategies;
- Deploy energy flexibility solutions (microgrid, smart energy tariffs, etc.);
- Develop policies and strategies to address people affected by energy poverty, and assess and compare the impact of different energy efficiency measures implemented at Member States level to improve them;
- Promote the public sector to lead by example by implementing green criteria in procurement practices for the public building sector.





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