



EUROPEAN RESEARCH
PLATFORM ON ENERGY
AND CLIMATE LAW

Energy & Climate Law Insights n°1

Mainstreaming sufficiency in energy law in the
EU: Why and How?

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Abstract

This policy brief reviews and gathers the main conclusions arising from the work of the working group members « Energy sufficiency » of the European Research Platform on Energy and Climate Law, following the question « Mainstreaming sufficiency in energy law: why and how? ».

The first part of the research brief addresses the 'why' question by presenting our approach to energy sufficiency, based on the literature and our research, and explaining its significance in the current climate change context. It also examines which sufficiency-related actions and objectives are currently addressed in European Union laws and Member States policies, highlighting the initial steps taken and the gaps that still need to be filled.

Finally, the policy brief links the identified objectives to the actual regulation and provides an overview of how sufficiency is and can be integrated into energy law, along with a mapping of existing EU-level sufficiency measures. After briefly analysing why sufficiency is often absent or fragmented in legal frameworks, we provide concrete suggestions for how it could be better integrated into EU law.



Mainstreaming sufficiency in energy law in the EU: Why and how?

Key messages

- Energy sufficiency is essential for the EU's energy transition.
- The concept of « energy related sufficiency » extends the definition of energy sufficiency, encompassing not only direct energy consumption but also embodied energy.
- The current EU legal framework does not explicitly incorporate energy sufficiency principles.
- A clear imbalance appears across sectors, with the transport sector receiving the most measures identified as “energy related sufficiency measures”.
- 8 recommendations for comprehensive and systematic energy related sufficiency policies are outlined.

Introduction

The fight against climate change and the transition to a more ecological world are heavily dependent on reducing energy demand. Energy efficiency – defined as maintaining the same level of energy performance or output while reducing the amount of energy input required (typically through technological or technical improvements [1] – has long been a cornerstone of EU policy. Yet, despite significant progress, energy-intensive sectors such as transport (32 % of EU energy consumption in 2022) and residential use (26%) [1] have not achieved sufficient reductions in demand.

To overcome efficiency limitations, modifications in practices and social norms that enable societies to remain within planetary limits while meeting

human needs must arise. This approach is commonly referred to as energy sufficiency [3].

Although the term itself is not always employed, public policies in favour of sufficiency already exist. Several EU Member States have introduced relevant measures in their national energy-climate plans, although the scope, ambition and instruments used vary considerably. Nonetheless, at the EU level, the concept of energy sufficiency has yet to be formally incorporated into law. Having a clear and coherent legal framework is, however, essential for the effective design, implementation and scale up of sufficiency policies.



This policy brief therefore addresses four key questions:

- What is energy sufficiency and why is it important?
- What energy sufficiency measures can / should be implemented?
- What energy sufficiency policies are currently emerging at the European level?
- To what extent, and through which mechanisms, can EU law be reoriented to reflect sufficiency principles?

Analyses

1. Understanding energy-related sufficiency and the importance of structural change

1.1. What is energy-related sufficiency?

The concept of energy sufficiency has come under renewed attention in recent years, both in response to climate change and in light of the current geopolitical context. Public debate has increasingly highlighted the urgency of reducing demand as a complement to efficiency, as illustrated for example by recent discussion in the French press [4].

The notion of energy sufficiency is framed within broader strategies for bringing our society back within the planetary boundaries, such as degrowth and post-growth, which challenge economic growth dependency and propose profound institutional and lifestyle changes [5]. However, while post-growth provides a broader economic and societal framework within which sufficiency appears as necessary, it extends far beyond the scope of energy demand. It is therefore not employed in this brief.

Instead, we adopt the concept of “energy-related sufficiency”. This notion extends the definition of energy sufficiency, encompassing not only direct energy consumption but also embodied energy - “the sum of all energy required to produce goods or services, and includes the energy required from the extraction and processing of natural resources to manufacturing, transportation and product delivery” [6]. To give an example, while energy sufficiency will focus on behaviour changes to reduce residential heating, energy-related sufficiency will integrate other aspects such as behavioural changes to buy less clothes, given the energy-footprint (among others) of clothes-making.

From a national perspective, energy sufficiency also holds potential to mitigate energy poverty and strengthen energy independence. Energy-related sufficiency is inherently multifaceted and can be classified in several ways [7]. Resuming the study of Zell-Ziegler et al., sufficiency can be characterised into reduction (e.g. smaller car, building of smaller dwellings, speed limits on road), substitution (e.g. modal shift from individual car to bicycle) and ensuring social foundation (e.g. make sustainably-produced basic goods cheaper than non-sustainable) [8].

To be effective, energy-related sufficiency must be approached systematically and in a structured manner. In consumerist societies, individuals are encouraged to increase consumption and production, thereby driving energy demand, without in-depth reflection on fundamental needs and social justice [9]. Achieving a sufficient society therefore requires collective, organised, and planned



changes that guarantee adequate living conditions for all human and non-human beings. This transformation is not only about individual behaviour change; it must be underpinned by values, education [10] and above all political and legal frameworks [11].

1.2. The legal framework

In the policy and regulatory arena, however, actions toward sufficiency remain undervalued.

At the highest level of the EU legal order, the EU founding Treaties may constrain the large-scale implementation of sufficiency-oriented measures. If applied broadly, such measures could potentially slow economic growth – a development that would conflict with the Treaties, which enshrine economic growth as a core objective of the internal market (Article 3.3 TEU). The Treaty framework also makes it difficult for policymakers to ensure economic and social stability without growth. Indeed, it hinders the adoption of policy measures that would address the need for growth to avoid economic, social and psychological harms. For instance, the freedom of capital movement may not be compatible with the need to depart from profitability as the driver of private-sector economic activity to ensure economic stability without growth. There is nevertheless space for more sufficiency-oriented measures within the current Treaty framework, as long as the impact on economic growth remains limited, which would represent the lowest-hanging fruit [12].

Regarding secondary law, the concept of sufficiency has not yet been formally

integrated into EU law. More precisely, the relation between efficiency and sufficiency is not clear in EU texts. For example, as early as 2006, in its energy efficiency Directives, the EU defined ‘energy efficiency improvement’ as “an increase in energy efficiency as a result of any technological, **behavioural** or economic **changes**” (emphasis added) [13]. However, this definition presumes that efficiency alone can deliver long-term reductions in energy consumption, a presumption increasingly questioned in the literature.

A structural change in EU energy governance requires complementing energy-efficiency measures with a coherent energy sufficiency perspective, particularly as the EU and the Member States begin to operationalise the Energy Efficiency First (EEF) principle. Recent research notes that the EEF principle has been progressively integrated into EU legislative and policy instruments, requiring a systematic consideration of demand-side measures when assessing possible energy solutions. Yet its practical focus remains largely limited to efficiency improvements that maintain existing levels of energy service, leaving insufficient attention to rebound effects and to the broader objective of reducing absolute energy demand [14].

At the same time, the increasing emphasis on integrated energy system planning across electricity, gas, heat and hydrogen creates an opportunity to embed sufficiency considerations into infrastructure planning and network development. Specific research on Hydrogen System Planning argues that integrated, cross-sectoral planning and a



Careful assessment of real infrastructure needs are necessary to avoid over investment, prevent stranded assets, and ensure coherence with decarbonisation and security-of-supply objectives. Interpreted systemically, this suggests that achieving these objectives ultimately depends on structurally reducing system-wide energy needs, not only on improving efficiency [15]. Incorporating sufficiency into both the EEF principle and integrated planning frameworks is therefore essential to achieve lasting demand reduction and to steer energy-system transformation toward long-term sustainability.

Analyses of EU and national legal frameworks reveal that certain provisions are compatible with the concept of degrowth, including aspects related to energy and energy-related sufficiency [16]. France provides an illustrative example at the national level, as its legal framework has incorporated several provisions and policy initiatives aligned with sufficiency principles. Yet, neither the EU nor the French legal frameworks show a consistent increase in sufficiency-related measures over time. On the contrary, these measures appear to peak during major economic, geopolitical or health-related events, such as the Paris Agreement, the COVID-19 crisis and the war in Ukraine [17]. Ultimately, voluntary sufficiency emerges as the predominant approach, typically expressed through non-binding acts, soft instruments (e.g. information) and soft wording (e.g. “could”, rather than “shall”) [18].

These findings indicate the EU currently lacks an integrated policy or coherent legal regime to support an energy-

sufficient society — a precondition for timely and large-scale decarbonization. The fragmentation of measures across various legal texts, along with their differing degrees of precision and clarity, makes it difficult to understand the actions, competences and responsibilities of the relevant parties regarding to the necessary changes.

2. Energy sufficiency in the transport sector

2.1. Energy sufficiency trends and measures in Transport

The transport sector is of particular interest, being one of the few sectors where energy demand has increased over the past decade in the EU: from 266 kilo tons of oil equivalent (ktoe) in 2013 to 289 ktoe in 2019 [2]. Moreover, passenger activity increased by 24.9 % between 1995 and 2022 and is expected to continue growing further [19]. Likewise, freight transport has increased significantly by 44,6 % from 1995 to 2022 [20].

Several European and national energy scenarios were used to identify the most relevant energy-related sufficiency measures for reducing transport energy demand, and to calculate the resulting reductions. For example, in a study of passenger transport in Lithuania [21], researchers used the distance travelled by different transport modes (passenger-kilometres (pkm) by car, bus, etc.) as an indicator of energy sufficiency. The potential fuel savings from energy sufficiency in Lithuanian transport are estimated to be 7.8% in 2030, representing 100 ktoe of oil products saved in passenger transport.



A sufficiency scenario study of the German transport sector demonstrates that demand-side transport policies for Germany could yield a significant annual reduction of 355 billion (pkm) (30 %) and substantial mode shift, decreasing car-driven kilometres by 400 billion pkm while increasing public transport by 45 billion pkm. This combined impact could reduce greenhouse gas (GHG) emissions by an additional 30 million tons (Mt) (or 33 %) by 2035, highlighting the potential of demand-side interventions beyond the focus on electric vehicles [22].

2.2. The legal dimension

Despite the lack of progress in transport to reduce energy consumption, we point out that transport is the sector where most sufficiency-related policies are implemented [23] – at least in terms of number and if mode shift (e.g. switching from personal car to bicycle) is included in the sufficiency definition. Against the evidential background that these policies are not effective enough, Citizen Assemblies also recommend a large number of additional and more substantial policies for the transport sector [8].

Similarly, an analysis of over a hundred texts on energy savings reveals that in both the EU [24] and the French [18] legal frameworks, most energy-saving measures are identified in the mobility sector, particularly through land-use planning.

3. Energy sufficiency in the residential sector

3.1. Energy sufficiency trends and measures in the residential sector

The residential sector accounted for 26% of energy consumption in the EU in 2023, the second largest consuming sector after transport [25]. Although consumption is trending downward, it remains high and is still far from the set targets.

Sufficiency potentials in the residential sector cover various aspects: the under-occupation of large living spaces (approximately one-third of the EU population lived in an under-occupied home [26]) while at the same time small spaces are over-occupied (17 % of the population [26]), vacancy of existing dwellings, construction of new buildings, behaviour within homes (e.g. heating temperatures) and, depending on definitions, household appliance choice and usage. Analysis and policy approaches are complicated by the interrelatedness of these aspects: inefficient space distribution puts pressure on new construction, as do dwellings that are vacant for various reasons. New construction in turn causes increases in living spaces and related energy consumption.

62.5% of the final energy consumption in the residential sector is attributed to space heating, and a larger living space leads to an increase in energy demand. In a study on the residential building sector of Lithuania and Hungary [27], it is estimated that thanks to energy sufficiency actions in the residential sector (reduction of the average



household size, average floor area per person, number of households and heated dwelling stock), household energy consumption savings are around 1.5% in 2025, and reach 18.3% in 2050 in Lithuania. This corresponds to a reduction of 3.6 % in the country's final energy consumption (including households but also transport, agricultural, industrial energy consumption, etc.), by 2050, equating to 240 ktoe. In Hungary, this measure reduces final energy demand from 0.7 % to 0.9 % per year by 2050. In absolute terms, the savings from the size limitation of new buildings are estimated at 210 ktoe.

Moreover, a study on under-occupation in Europe [28] finds that the issue of under-occupation is substantial: the total number of under-occupied rooms constitutes a theoretical housing potential for about 100 million people. Indeed, this potential cannot be fully harvested, but even a minor improvement may avoid new constructions, also contributing to easing the tense housing situation in many European countries in a quick and non-expensive manner.

3.2. The legal dimension

In contrast to the transport sector, building-related sufficiency measures make up a mere 4% of all sufficiency measures regarding energy and climate plans of the Member States [23]. A similar pattern is observed in French legislation, where only 1.8 % of energy sufficiency measures target the residential sector [18]. This low share reflects public debates and the reluctance of policymakers to interfere in housing, which is often regarded as a highly private

domain. Yet, housing measures represent 13% of the recommendations of Citizens' Assemblies, and a wide range of sufficiency policy proposals for this sector has been developed [29].

Moreover, in a study related to design spaces and legislation for sufficiency [30], the authors outline the importance of interactions between sufficiency actions in buildings (e.g. summer night ventilation and ceiling fans rather than air conditioning ; adequate floor space in m² per capita) and urban design choices and regulation (e.g. silence at night thanks to car-free zones ; pleasant common indoor/outdoor spaces thanks to mandatory requirements of green spaces and of shared spaces for meetings).



Conclusions and recommendations

Energy-related sufficiency represents a critical, yet underutilized, lever in the EU's efforts to reduce energy demand and achieve climate targets. While significant progress has been made in energy efficiency, particularly through technological improvements, structural and behavioural changes that curb energy consumption remain insufficiently addressed. The analysis shows a clear imbalance across sectors. Transport has received most sufficiency measures, yet demand continues to rise, highlighting the limitations of current policies. Conversely, the residential sector, despite its substantial energy consumption, remains largely neglected, reflecting social and political sensitivities around private housing.

Moreover, the current EU legal framework does not explicitly incorporate energy sufficiency principles, resulting in fragmented, non-binding, and often voluntary measures. This piecemeal approach impedes systematic policy implementation, weakens enforcement, and limits the potential for large-scale societal transformation. Citizen Assemblies and academic studies indicate that sufficiency policies are feasible and socially acceptable, particularly in housing, but require stronger legal anchoring and coordinated implementation across sectors.

As such, the following policy and legal recommendations are proposed:

For comprehensive and systematic energy related sufficiency policies

1. Integrate energy sufficiency into EU legislation: Complement the “energy efficiency first” principle with an “energy sufficiency first” principle, requiring policymakers, developers, and producers to assess whether energy use, construction, or production is necessary before implementing efficiency improvements.

2. Quickstart energy sufficiency measures for the residential sector: Identify and implement sufficiency measures in the residential sector, including reducing under-occupancy and vacancy, promoting appropriately sized housing, and integrating urban design choices that reinforce low-energy lifestyles.

3. Strengthen transport sector interventions: Scale up demand-side policies, such as modal shifts, land-use planning, and incentives for reduced travel, to ensure that existing transport sufficiency measures translate into measurable energy reductions.

For more effectiveness

4. Enhance regulatory effectiveness: Move beyond voluntary measures by establishing binding regulations, clear obligations, and enforceable targets, while ensuring flexibility for national adaptation.



5. Implement monitoring and feedback mechanisms: Integrate systematic evaluation tools within the legal framework to track policy outcomes, identify gaps, and enable timely adjustments.

6. Foster cross-sectoral coherence: Align sufficiency policies across energy-intensive sectors, including transport, residential, industry, and agriculture, to ensure holistic, systemic change rather than isolated interventions.

7. Promote research and knowledge sharing: Continue developing databases and indicators on sufficiency measures, instruments, and outcomes to inform evidence-based policymaking and identify best practices across Member States.

8. Guarantee science-based legal targets and instruments: Ensure that energy-related provisions are based on science, both regarding the scale of the energy reduction to be reached (including through energy sufficiency when required), as well as regarding the types of instruments which have proven efficient.

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