

CASE STUDY

Communication About Energy- Efficient and Flexible Buildings

The study gave Eurima material for effective communications



Open
Energy
Transition

- Buildings account for >30% of EU’s energy-related greenhouse gas emission. Business association Eurima saw the need to gather arguments and narratives about how to address demand peaks through energy efficiency.
- The results of the study were used in the Your Home, Our Future campaign. They contributed to policy communication, strategic partnerships across the construction and energy systems sectors, and presentations at various conferences.

Thanks to Salvatore Fantoni and Dimitar Kolichev from Eurima.

This study took place over 10 months and concluded in the end of 2024.

The objective of this study is to assess the impact of various energy efficiency measures in buildings on reducing energy generation needs, flattening the peak demand curve, and influencing energy system costs, and energy bill prices.

The focus of this particular study was on the representation of building retrofitting, which implies improvement of the building envelope, as well as the implementation of "active" demand-side measures.

The study was later published as a report for the Your Home, Our Future Campaign and later an academic article in Applied Energy in April 2025.

The model is publicly available on GitHub.

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Introduction

“ I was positively surprised by what the model could take into account when analysing energy prices and electricity costs. It was also welcomed by the policy makers and energy stakeholders we discussed the results with. It was very impressive.

- Salvatore Fantoni, Sustainable Construction and Communications Manager, Eurima

The European Insulation Manufacturers Association (Eurima), commissioned a study together with the International Copper Association Europe and the European Climate Foundation in 2023, titled "Flattening the Peak Demand Curve Through Energy Efficient Buildings: A Holistic Approach Towards Net-Zero Carbon," later turned into the Your Home, Our Future campaign.

Eurima is a Brussels-based business association representing mineral wool insulation manufacturers. Communicating the benefits of mineral wool insulation, Eurima assists its members in fields such as product standardisation and EU-focused issue monitoring and management, helping them to stay informed and contribute to EU affairs relevant to mineral wool insulation products and the industry's licence-to-operate.

Based on the study results, Eurima....

40+

held meetings across the EU construction and energy environment

6+

events where study results were presented

5+

facilitated stakeholder workshops

Why Conduct an Open Energy System Study?

Buildings account for over 30% of the EU's energy-related greenhouse gas emissions when using fossil fuels. The wish for a study was based on the need to address demand peaks through energy efficiency, flagged by members of Eurima.

It was a topic of great interest to the insulation and building sectors on how to achieve energy efficiency and performance requirements. Eurima saw the need to address this issue by gathering arguments and narratives to contribute to European policy in the context of rapid electrification and the implementation of the Energy Performance of Buildings Directive.

Research had to look into the cost-optimal mix of measures needed in buildings to drive decarbonisation, grid planning, and lower Europeans' electricity bills. It required an energy system modelling study with different scenarios.

After being introduced to an open energy model study with PyPSA-Eur in 2023, they decided to explore PyPSA further. *"It seemed to be the perfect type of modelling instrument for our needs,"* says Salvatore Fantoni, (Sustainable Construction and Communication Manager) at Eurima.

“We needed the results to be scientifically sound, effective, and transparent to support our ongoing activities. The study was incredibly useful. Due to popular demand, we are now working towards a second iteration of the study with even more granularity.

- Dimitar Kolichev, Energy & Climate Policy Manager, Eurima



The Study

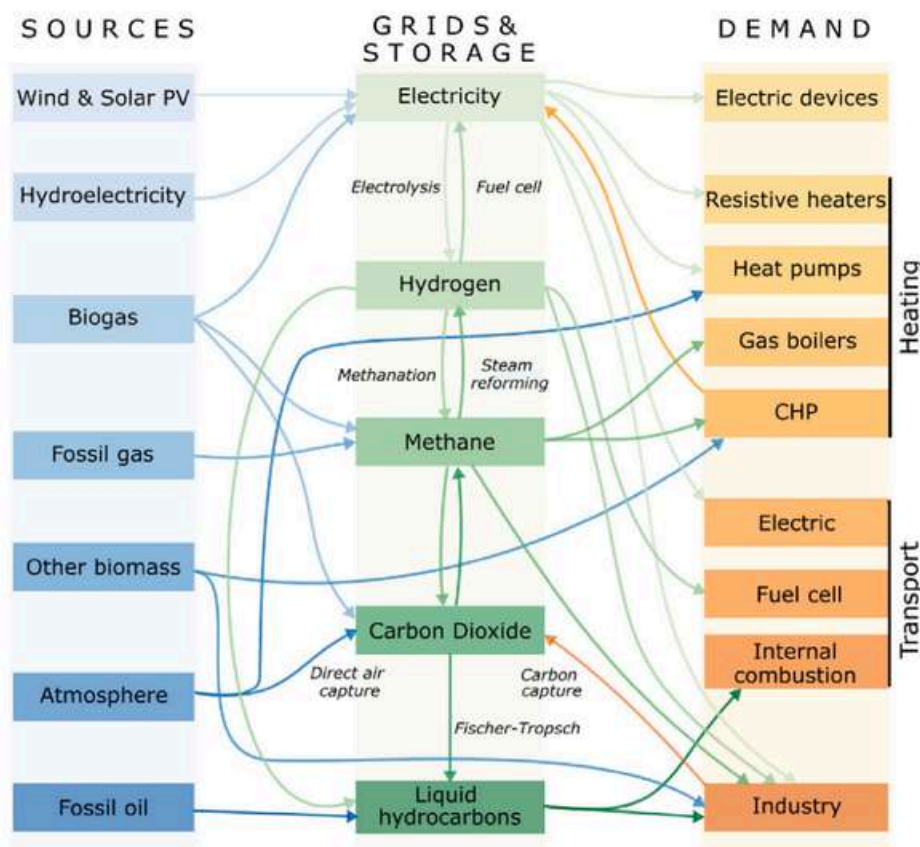


Fig. Interactions in PyPSA-Eur

The study encompassed several areas, including energy affordability, social and household impacts, and industry considerations using [PyPSA-Eur](#). PyPSA-Eur is an open-source energy system model and open dataset that represents the entire European energy system at high spatial and temporal resolution, ideal to simulate and analyse future energy scenarios across Europe.

Time horizons of 2030, 2040, and 2050 were considered, which assumed emissions targets that represent the evolution of the energy system towards climate neutrality. All scenarios were designed in the context of a pathway towards meeting 90–95% emissions reduction by 2040 (compared to 1990) as set

by the [EU Scientific Advisory Board on Climate Change](#) in the EU's [2040 Climate Target Impact Assessment](#). Reaching the emissions targets requires a combination of measures, including commissioning renewable generation and electrochemical storage, expansion of transmission and distribution grids, implementation of heat pumps and solar thermal, and the use of hydrogen technologies and, of course, improving the energy efficiency of European buildings.

In the study, flattening of the demand peaks through building envelope improvements was shown to impact all aspects of the energy system, including total energy costs, emissions, and optimising the need for generation and transmission infrastructure.

Awareness and Behaviour Change

"We are going for a paradigm shift," say Salvatore Fantoni (Sustainable Construction and Communication Manager) and Dimitar Kolichev (Energy & Climate Policy Manager). Even though impact is not always easy to quantify, the study is widely seen as having made a strong contribution, with elements already incorporated into policy.

The results of the study were used in the [Your Home, Our Future](#) campaign. They contributed to policy communication, strategic partnerships across the construction and energy systems sectors, and presentations at various conferences.

As Salvatore Fantoni and Dimitar Kolichev explain, most European-level energy system modelling is based on proprietary tools, where underlying assumptions, methodologies and data inputs are not always fully transparent or accessible, which limits the ability of external stakeholders to scrutinise, replicate or build upon the results. The open model approach built credibility as the results, assumptions, and methods were transparent. Highlighting relevant code snippets or cost assumptions

directly in the model (on GitHub) during the study fostered constructive discussions and suggestions for improvement.







One of the most remarkable findings, according to Salvatore Fantoni, was the impact that energy efficiency in buildings can make on actual physical space. Improving the energy performance of buildings optimises the supply-demand nexus, meaning that energy generation infrastructure can be built fit for size to meet optimised consumption needs. These infrastructure optimisations can mean up to 200 km² more can be used for, for instance, biodiversity preservation in Europe simply by insulating buildings. It also means lower costs for the consumer. The study is also meant to show homeowners that they have an important role to play in the energy transition. Peak demand impacts their lives and they can do something about it.

Changing behaviours does not happen overnight. It is a gradual process and Eurima will keep working on the peak demand and electrification agenda, possibly with another study very soon.



Key findings

By implementing widespread energy efficiency and flexibility improvements in buildings, the EU could reduce peak energy demand by up to 49% compared to current renovation levels and thereby:

-  Reduce associated total energy system costs by **€312 billion a year**.
-  Save an extra **0,2 billion tons of GHG** emissions by 2030, allowing to reduce emissions by 10% beyond current emission targets. Lower peak demand also means that coal and gas can be phased out of the energy mix by 2040.
-  Save **€44,2 billion** every year in distribution grid investments and decrease shadow costs associated with transmission congestion by almost 4 times.
-  Ease the pressure on renewable energy infrastructure. This reduction could potentially save up to **600 GW onshore and offshore wind capacity, and 872 GW solar PV capacity**. Additionally, they allow a more efficient operation of renewable energy sources, **reducing curtailment by up to 3 times**.
-  **Optimise transmission and supply investments**, decreasing total electricity prices and increasing the equality in electricity prices between European countries. These savings trickle down to end users, translating into substantial reductions in energy bills for European households and enabling European industries to operate decarbonised production processes at more competitive energy costs.
-  Optimise the average required size of a home's heat pump by **3 times**, maximising the use of available resources and helping **achieve the EU's 60 million heat pump goal** more affordably.

Why conduct an open energy study?

To accelerate the energy transition, we need to plan it well. Open energy models are transparent, reproducible, and collaborative. They can produce scenario analysis, optimal generation mix, investment plans, and grid operation insights for communication and policy recommendations.