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OPINION

Europe's competitive edge: Industrial energy efficiency as a structural game-changer

Jan Rosenow[1,2*], **Barbara Schlomann**[3], **Wolfgang Eichhammer**[3,4,5], **Nils Borg**[6]

1 University of Oxford, Environmental Change Institute, Oxford, United Kingdom, **2** University of Cambridge, Cambridge Institute for Sustainability Leadership (CISL), Cambridge, United Kingdom, **3** Fraunhofer Institute for Systems and Innovation Research ISI, Karlsruhe, Germany, **4** Institute for European Energy and Climate Studies IEECP, Amsterdam, Netherlands, **5** Utrecht University, Utrecht, Netherlands, **6** ECEEE, Stockholm, Sweden

* jan.rosenow@eci.ox.ac.uk

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The Draghi Report, The Future of Europe's Competitiveness, in September 2024, followed by the Competitiveness Compass and the Clean Industrial Deal in early 2025, has placed the strategic renewal of Europe's industrial base at the forefront of the political agenda. These foundational documents state that future European competitiveness must be built upon innovation, a joint plan for decarbonisation, and enhanced energy security. However, within this crucial policy architecture, the unique and indispensable role of improved energy efficiency as a structural, long-term driver of competitiveness requires far greater recognition and proactive prioritisation than currently afforded. Energy efficiency is a central mechanism for achieving all three of the Draghi Report's objectives and Europe's triple challenge of decarbonisation, energy security, and high energy prices [1].

Addressing the Draghi imperatives through efficiency

Energy efficiency directly contributes to the core strategic mandates boosting EU competitiveness. It constitutes the most competitive pathway for the joint plan for decarbonisation and competitiveness. Decarbonisation is fundamentally a dual challenge: transitioning energy supply to renewable sources and dramatically reducing overall energy demand. Energy efficiency measures yield consistently a greater positive impact on key economic factors determining competitiveness - for both individual firms and the macro-economy - than supply-side interventions alone. By reducing the required energy input, efficiency lowers the overall cost and volume of the necessary renewable energy infrastructure, accelerating the transition while minimising capital expenditure as well as broader environmental impacts of renewables [2].

Furthermore, the need for increasing security and reducing dependencies is directly met by efficiency. The Competitiveness Compass identifies Europe's high and volatile energy prices as a key challenge. Efficiency acts as a powerful buffer against both price volatility and geopolitical supply risks. By permanently reducing energy demand, European countries decrease their reliance on imported fossil fuels, enhance energy security and protect its industries but also individuals from global market shocks [3].

The potential for additional energy efficiency remains substantial: By 2030, cost-effective energy efficiency measures could reduce industrial energy demand by 25% [4]. Electrification of industry is still in its infancy and can leverage large efficiency gains [5]. Best-practice adoption alone reduces energy intensity in industry by an additional 20% in the near-term [6].

Reframing competitiveness: From price to productivity

The public and policy debate on European industrial competitiveness is frequently framed narrowly around energy prices. This focus, while understandable given recent energy crises, is myopic. As argued by Paul Krugman [7], countries are not firms and national prosperity depends on productivity and efficient resource allocation, not merely on outcompeting others on price. At the macro-level, competitiveness is defined by broader structural factors: productivity growth, innovation capacity, and the efficient transformation of inputs into economic output.

From this perspective, energy efficiency emerges as a fundamental structural component of competitiveness at the macro level. The critical variable is how efficiently energy inputs are transformed into economic output [8]. Countries requiring significantly more energy than their peers to produce a similar economic output are structurally disadvantaged, irrespective of short-term price fluctuations. Research indicates that European firms have managed to compensate for price disadvantages partly through their superior energy efficiency [9].

Data supports this structural view. The International Energy Agency [10] uses the progress in energy intensity in industry sector (industrial energy consumption per value added), as a robust proxy for improved competitiveness via efficiency and related cost savings. Between 2000 and 2023, energy intensity in the EU decreased by 35%. This sustained reduction demonstrates a clear, structural strengthening of the European industrial base over two decades.

At an economy-wide level Europe (includes non-EU countries) used 34% less energy per unit of GDP than the US and 55% less than China (Fig 1).

Further quantitative evidence is provided by ODYSSEE-MURE [12], which employs decomposition analysis to quantify the impacts of various factors on industrial energy demand. This analysis reveals the strategic role of efficiency: energy demand in EU industry in 2023 would have been 39% higher than observed had the energy efficiency measures implemented since 2000 not taken place. This figure represents an enormous, ongoing, and embedded economic dividend, a form of self-provided structural relief that far outweighs the impact of temporary price subsidies.

The holistic value proposition: Beyond the energy bill

Energy efficiency's contribution to competitiveness, while formally recognised in the Energy Efficiency Principle of the Energy Efficiency Directive, is often underestimated because analyses frequently focus solely on direct energy cost savings [13]. Projects such as EU-Life SEED-MICAT [14], which calculates the Multiple Impacts of efficiency, highlight that direct savings are only part of the equation.

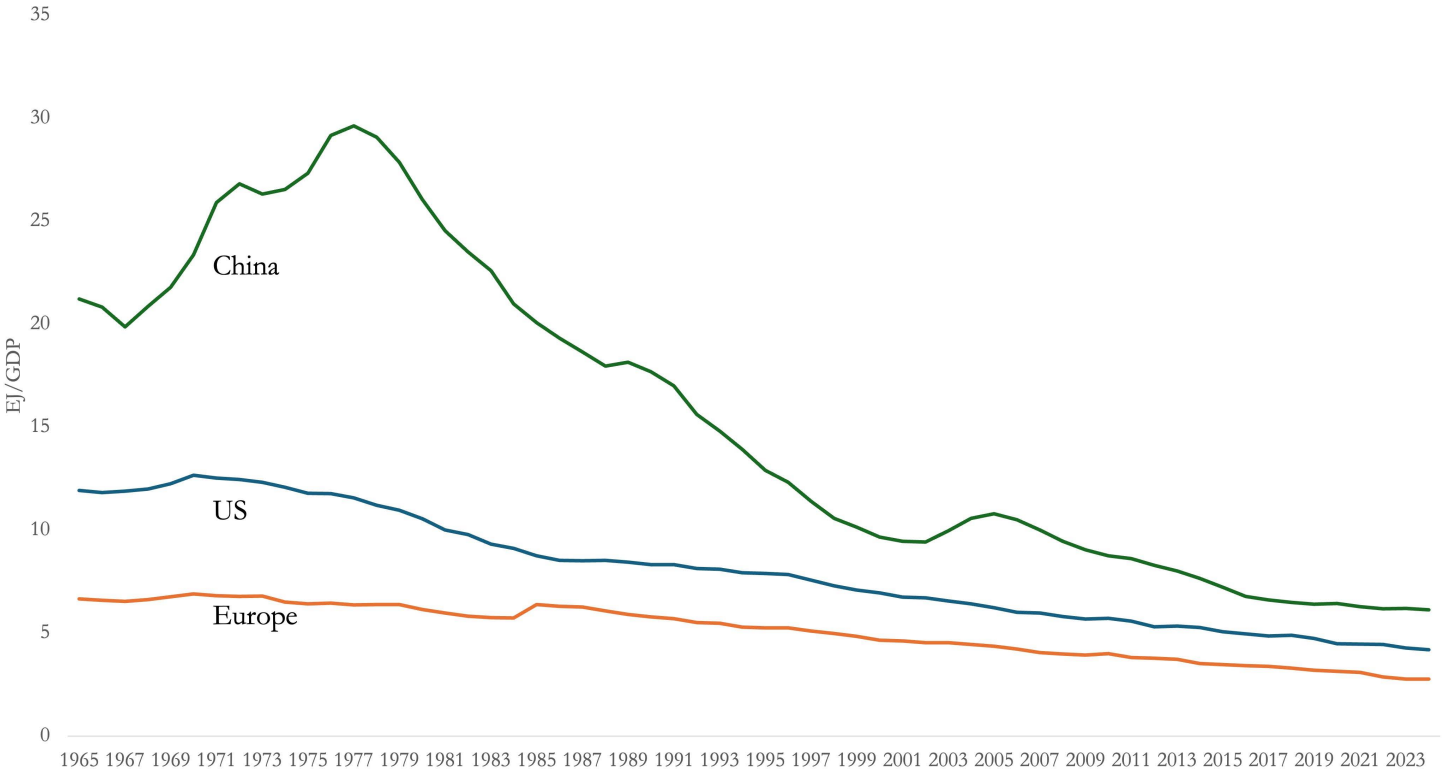

Fig 1. Energy intensity in EJ per unit of Gross Domestic Product (GDP). Source: based on [11].

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At the company level, energy efficiency investments generate a powerful cascade of non-energy benefits that are critical for achieving sustainable growth and prosperity. While firms can cut annual energy costs, the true value is amplified by those benefits. For every euro saved on energy, firms commonly gain an additional euro from non-energy factors, effectively doubling the total value of the efficiency investment [8]. These critical non-energy benefits include:

- Increased productivity: Efficiency measures reduce process instability, leading to less downtime, fewer equipment failures, and higher quality control.
- Improved resource utilisation: Optimisation of energy use frequently leads to simultaneous reductions in material and water inputs, enhancing resource efficiency.
- Enhanced operational performance: Better energy management improves working conditions, extends equipment lifespan, and lowers maintenance costs.
- Innovation and market position: Investing in cutting-edge efficient technology enhances a firm's image, improves its resilience to future price shocks, and increases the appeal of its products to increasingly sustainability-conscious global markets.

In summary, for companies, competitiveness depends on aligning decarbonisation with industrial performance, transforming the energy transition into an opportunity for innovation, market growth, and sustainable cost savings. Energy efficiency is the mechanism through which this alignment is achieved.

Policy implications for Europe

To effectively implement the strategic vision set out in the Draghi Report and the Competitiveness Compass, EU policy must shift its emphasis from short-term energy price mitigation to proactive, strategic efficiency enhancement [15]. Policy frameworks must be designed to capture and monetise the multiple benefits of energy efficiency, moving beyond simple payback calculations. This requires a long-term EU-wide vision for energy efficiency and ambitious 2040 energy efficiency targets. At the national level, member states should reassess their energy efficiency programmes for industrial energy efficiency and reward particularly those measures that deliver the most significant multiple benefits rather than short-term incremental gains. By embedding energy efficiency as core structural element into industrial modernisation, the European Union can secure a path towards sustained productivity growth, strategic independence, and true global competitiveness.

Author contributions

Conceptualization: Jan Rosenow, Barbara Schlomann, Wolfgang Eichhammer, Nils Borg.

Data curation: Jan Rosenow.

Project administration: Jan Rosenow.

Visualization: Jan Rosenow.

Writing – original draft: Jan Rosenow.

Writing – review & editing: Jan Rosenow, Barbara Schlomann, Wolfgang Eichhammer, Nils Borg.

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