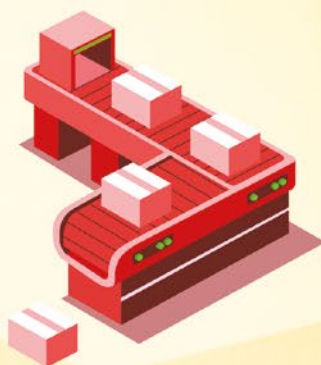


Firms are leaving major energy savings on the table

Some use 20 times more energy than
their peers to produce the same output



The latest disruption to oil and gas flows is a reminder of a vulnerability that never fully went away. Global energy prices had already tripled between 2020 and 2022, prompting Organisation for Economic Co-operation and Development (OECD) economies to spend around 0.7% of their GDP shielding households and firms from the shock. Now, with supply routes under pressure again, the question of how firms use energy has become urgent in a new way.

The answer is: very unevenly. Our research shows that the gap between the most and least energy-efficient firms within the same industry is vast, and that closing even part of it could more than halve industrial energy use and emissions without sacrificing output or waiting for new technologies. In a world of volatile energy markets, that gap is not just an environmental problem, but also one of competitiveness and economic security.

How do we measure firms' energy productivity?

Our research draws on official firm-level data for manufacturing firms with at least 20 employees across nine countries, including the UK, covering the period 1995–2021. For each firm, we observe energy use alongside economic variables such as value added, employment, labour productivity and capital investment, and compute energy productivity as value added per unit of energy used – measured in physical terms (joules) rather than expenditure. This allows for direct comparison of how efficiently firms convert energy into output, independent of price fluctuations.

The variation in energy productivity is striking. Across all nine countries, firms at the 90th percentile of energy productivity generate roughly 20 times more value added per unit of energy than those at the 10th percentile (Figure 1). Put simply, where two firms consume identical amounts of energy, the frontier firm could produce 20 times more output. These gaps are four times larger than those observed in labour productivity. UK dispersion in energy productivity is slightly below the average but still large, at 16 times.

This spread signals a large and largely untapped opportunity to reduce energy use and emissions by helping lagging firms to improve.

What would happen if laggards caught up?

We estimate a conservative scenario: raising the quarter of firms with the lowest energy productivity in each industry up to the level of the 25th percentile – a realistic improvement that is still far from the frontier. The result, across all nine countries, is a 42% reduction in manufacturing energy use with no loss of output (39% for the UK). Lifting all firms in the bottom half of the distribution to the median would cut energy use by 61% on average across countries and in the UK, with comparable reductions in energy-related emissions.

These gains are possible across all manufacturing sectors, but they are largest in high-emitting industries such as chemicals, paper products and non-metallic minerals including cement (Figure 2).

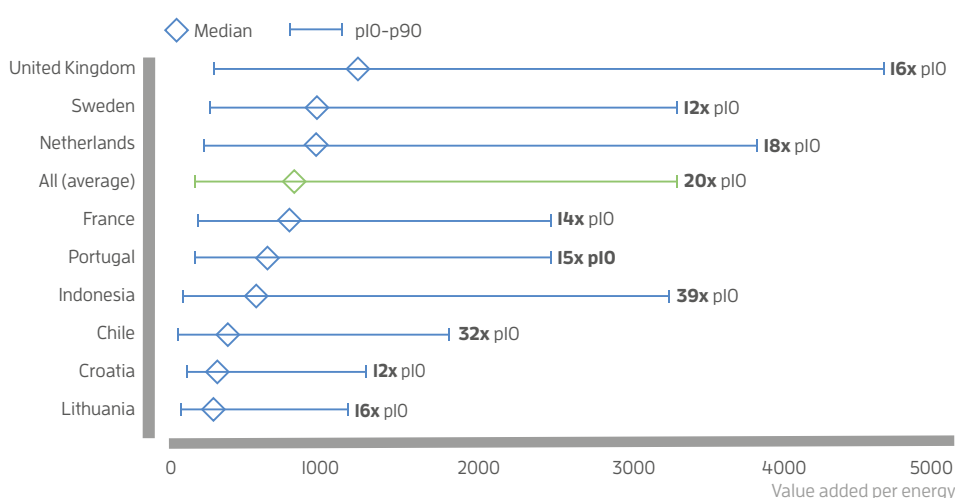
The implication is important: reducing industrial energy use and emissions does not depend on speculative technology breakthroughs. The production technologies and practices already exist, and they are in use by firms operating in the same countries and industries as the laggards.

In other words, a large share of the potential reduction in industrial energy use and emissions could, in principle, be achieved simply by spreading current best practices more widely. The challenge is therefore not invention but diffusion.



Reducing the gap in energy productivity could cut industrial use by more than half using existing technologies

Figure 1: Firms' energy productivity near the bottom and top with the ratio between them



Notes: The chart plots the mean and 10th, 50th and 90th percentiles of energy productivity for each country, averaged across industries, in the latest year of available data for each country up to 2019. The units are thousands of dollars per tera joule of energy (or dollars per mega joule).

Source: De Lyon and Dechezleprêtre (2025).

Why are the gaps so large?

Several factors explain why less efficient firms are not being forced or incentivised to improve. Younger firms and those using newer production technologies tend to be more energy productive.

Larger firms often underperform on energy productivity – in part because their scale gives them market power to negotiate lower energy prices, but also because, in many countries, larger energy users benefit from reduced energy taxes or exemptions. In the UK, for example, energy-intensive firms can pay as little as 8% of the Climate Change Levy on electricity and can be exempted from renewables levies on their bills. But lower prices reduce the pressure to improve efficiency, while simultaneously disadvantaging smaller, more energy-productive competitors.

There is a strong relationship between energy productivity and broader economic performance. Firms with higher labour productivity tend

to have higher energy productivity, and improvements in one track closely with improvements in the other. This matters for policy design: investments in management, skills and technology adoption could deliver a “double dividend” with higher output per worker and more output per unit of energy.

Two key policy levers could drive improvements in energy productivity

The first way in which policymakers could drive improvements is through fair energy and carbon pricing to incentivise energy productivity improvements. Rising energy prices are associated with narrowing gaps in energy productivity between firms, suggesting that price signals work when they apply broadly.

Subsidising cheap energy as an industrial strategy for energy-intensive sectors may protect some firms in the short run, but it delays efficiency improvements, disadvantages smaller, more efficient competitors and adds

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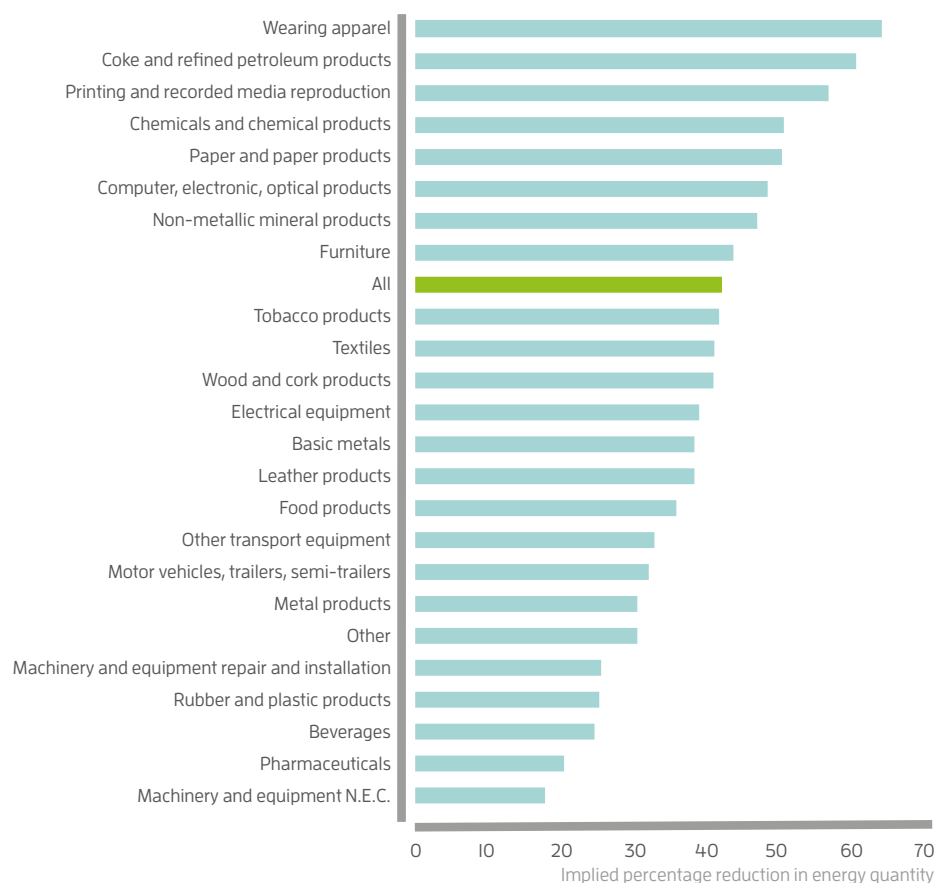
to fiscal costs. Broad-based carbon and energy pricing combined with targeted support for efficiency-improving investments is a more durable approach.

The second lever is fostering business dynamism and technology diffusion. Industries with stronger competition, better access to finance and more active innovation tend to show less dispersion in energy productivity.

When inefficient firms face genuine competition, they upgrade or contract; when productive firms can access capital and grow, best practices spread. Policies that lower barriers to entry, strengthen competition policy and support technology diffusion can support both growth and resilience.

The current situation makes the case for urgency. The technologies to close the energy productivity gap already exist. The firms that embody best practice are already operating. What is needed is the policy environment to ensure that their example is followed.

Figure 2: The percentage reduction in energy use by improving laggards



Notes: The chart shows the implied percentage reduction in energy that would be achieved if all firms had energy productivity at least equal to the 25th percentile firm in their 4-digit industry, with the results aggregated to the 2-digit industry-level. The data are for the latest year available in each country up to 2019.

Source: De Lyon and Dechezleprêtre (2025).

Subsidising cheap energy for energy-intensive firms and sectors may protect some firms – but it delays dynamic efficiency improvements

Further reading

De Lyon, J. and Dechezleprêtre, A. (2025) *The great dispersion in energy productivity between firms*, OECD Science, Technology and Industry Working Papers.