

ESG Economist

EU-27 energy efficiency and renewable energy growth needs to accelerate

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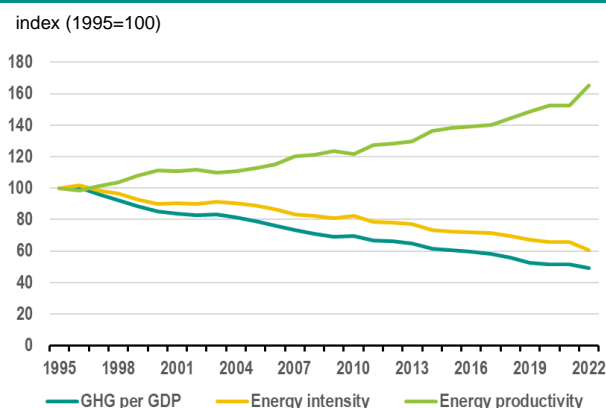
- ▶ The EU is committed to improving the energy efficiency of its energy system, as it can make a major contribution to accelerating the energy transition
- ▶ This also applies to an acceleration in power generation from renewable sources
- ▶ To further improve energy efficiency in Europe and energy generation with renewable sources, the European Commission has set ambitious targets towards 2030
- ▶ However, based on the post-Paris trend growth in both energy efficiency and energy generation from renewable sources, it appears that these targets are not yet within reach
- ▶ To reduce the carbon intensity of the economy, the main focus should be on energy generation from renewable sources and improving energy efficiency. However, it requires more investment to close the potential gaps

Increased energy efficiency helps to cost-effectively reduce overall energy consumption, while also reducing overall greenhouse gas (GHG) emissions. But a stronger expansion of energy supply based on renewable energy is also crucial in this regard. Both keep the EU's energy and climate targets in sight. However, differences between EU countries are large, especially in improving energy efficiency. Moreover, in some EU countries, energy intensity is still worryingly high. In this analysis, we look at these in energy efficiency differences between EU countries and provide insight into the trend in the growth of renewable energy sources in the EU. In doing so, we also ask whether the European Commission's (EC) energy efficiency targets are ultimately achievable and indicate which measures help to improve energy efficiency and reduce carbon intensity of the EU-27 energy mix.

Energy efficiency in the EU-27

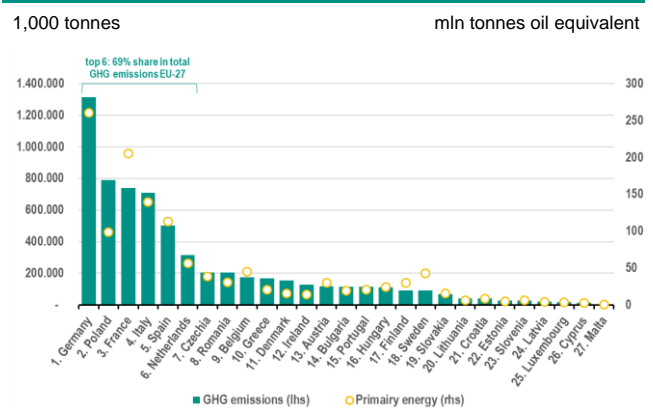
Improving energy efficiency can give a competitive advantage to both countries (macro level) and companies (micro level). Micro-level energy efficiency often refers to improvements in processes at the technological level. At the macro level, it relates to a country's overall energy system.

EU-27 emissions, energy intensity and productivity



Source: EDGAR, Eurostat, ABN AMRO Group Economics

GHG emissions and primary energy EU-27



Source: Eurostat, ABN AMRO Group Economics

Policymakers generally value highly improvements in the energy efficiency of the energy system. This is because it plays a crucial role in improving energy security and, ultimately, energy affordability. Moreover, energy efficiency helps to accelerate the energy transition. As there is no universally accepted definition of energy efficiency, energy efficiency can be monitored in different ways.

In general, energy efficiency refers to using less energy to produce the same unit of product or service. This way it is defined as the ratio of energy use per unit of activity. Sometimes this is output, and it can also be, for example, added value or by population (per capita). More concretely this means that there are several indicators that can be used to estimate energy efficiency improvements. In the left graph on the previous page, we show the trend in two macro-level indicators: energy intensity and energy productivity. Both are similar, but are calculated differently. Energy intensity is the amount of energy consumed in relation to GDP. Since 1995, energy intensity has decreased by 40% and runs parallel over time to the GHG intensity of GDP. This has decreased by 51% over the same period. Energy productivity gives insight into the amount of economic output produced per unit of gross available energy. This indicator has increased by 65% since 1995. This way we can conclude that on balance, energy efficiency in Europe increased by an average of about 1.6% annually over the period 1995-2023.

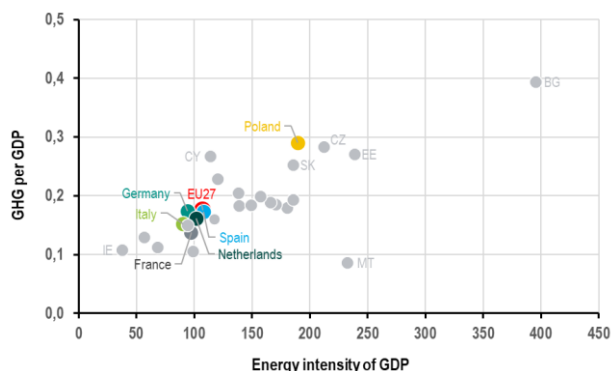
In the next part of our analysis, we focus on six countries. These are also included in the right-hand graph on the previous page. In that graph, we have ranked the 27 EU countries by amount of GHG emissions. The top six countries - successively Germany, Poland, France, Italy, Spain and the Netherlands - have a combined share of around 70% of the EU-27's total GHG emissions. However, the amount of primary energy consumption varies from country to country. Primary energy consumption is the total energy consumed in a country, which is available for conversion into products and for final energy consumption. Normally, high energy consumption goes hand-in-hand with high GHG emissions, as long as the energy supply is not largely based on renewable sources. For example, France relies largely on nuclear power in its energy supply, which emits relatively few GHG emissions. This explains why the total energy consumption in France is significant, while the amount of GHG emissions remains relatively low. In Poland, the opposite is true. In this country we see that primary energy consumption is relatively low, while GHG emissions are high. According to the *International Energy Agency* (IEA), fossil fuels still account for around 85% of Poland's total energy supply, of which coal burning - the most polluting fossil fuel - accounts for the largest share in the energy mix. Poland has made considerable progress in renewable energy, but this has not yet contributed to a strong reduction in GHG emissions.

Energy efficiency progress

To reach the EU climate goals for 2030 and 2050, it helps to understand the differences in energy intensity and energy productivity between EU countries. By doing this, it becomes clearer where the problem is most urgent. In the left-hand matrix below, we have plotted EU countries by GHG emissions intensity of GDP and energy intensity of GDP. We have coloured the top six largest emitters within the EU and the remaining EU-21 countries are included in this with the light grey colour. The figure shows that five of the top six countries are around the EU average. Poland is in negative position in the matrix, with higher GHG emission intensity on average and also higher GDP energy intensity.

Top 6 & EU21: energy intensity vs. GHG per GDP

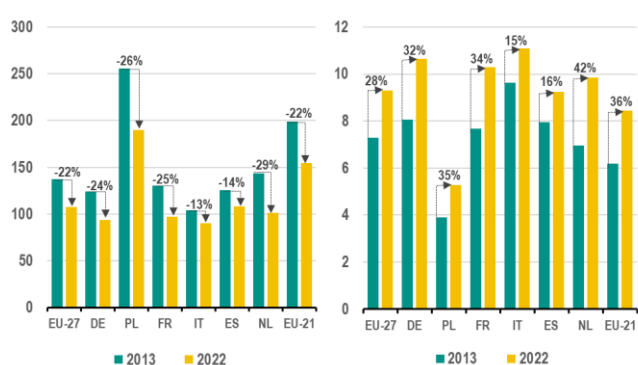
vert.: t CO₂eq/1,000USD & hor.: kg of oil equivalent (KGOE)/1,000EUR



Source: Eurostat, ABN AMRO Group Economics

EU energy intensity and productivity by country

Energy intensity (KGOE/1,000 euro) Energy productivity (EUR/KGOE)



Source: Eurostat, ABN AMRO Group Economics

Among the other EU-21 countries, the variation is much higher, with Bulgaria in particular standing out. Since 2016, the annual average growth of the Bulgarian economy has been around 3%, while GHG emissions in the post-Paris period (2017-2023) have increased by 2% on average year-on-year. Bulgarian measures to decouple economic growth and emissions are thus not yet bearing fruit. To reduce the carbon intensity of the economy, the main focus should be on energy generation from renewable sources and improving energy efficiency. This applies for most EU countries.

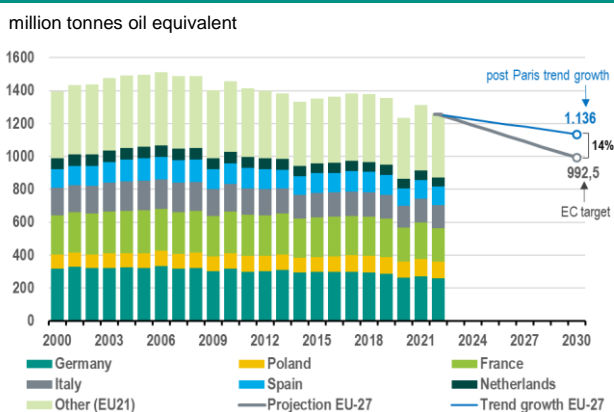
The good news is that over the period 2013-2022, energy intensity decreased by an average of 22% in the EU and energy productivity increased by 28%. Differences by country are sometimes large. Poland stands out in both positive and negative terms. The positive tone is set by the fact that on both energy intensity and energy productivity, improvements were much better than the EU-27 average over the 2013-2022 period. But on the other hand, the comparison between country also shows that Poland still lags significantly on both energy intensity and productivity. The differences here are significant. Another striking aspect is the sharp drop in energy intensity over the period 2013-2022 in the Netherlands, while at the same time energy productivity has made a sharp leap forward. This puts the Netherlands in fourth place with highest energy productivity, after Italy, Germany and France. Finally, both Italy and Spain's measures to reduce energy intensity have not resulted in much advances in energy intensity and productivity.

Energy consumption and targets

The benefits of improved energy efficiency are manifold. It can lead to lower energy costs for companies, improved competitiveness, reduced GHG emissions and decreasing dependence on energy imports. This makes it an important force behind the energy transition for the EC. To further stimulate improvement in energy efficiency in the coming years, the EC officially finalised the *Energy Efficiency Directive* (EED) in July 2023. In this directive, the EC set a target to reduce energy consumption in the EU to a primary energy consumption of 992.5 million tonnes of oil equivalent (Mtoe) by 2030. This is about 20% lower than the current total primary energy consumption level. See also the left graph below. However, this target will not be easily achieved. The peak in primary energy consumption was in 2006. After that, energy consumption has declined slowly. In the post-Paris period (2017-2023), EU-27 energy consumption has fallen by an average of 1.3% annually. Although this is still a relatively low rate, it is a clear acceleration compared to the long-term trend (which is -0.4% per year on average). However, if we consider the average decline in energy consumption in the post-Paris period, the set EC target is out of reach. Indeed, the gap between the EC target and trend growth is then still 14%. To close this gap, energy consumption needs to decrease by 2.6% on an annual basis in the period 2023-2030.

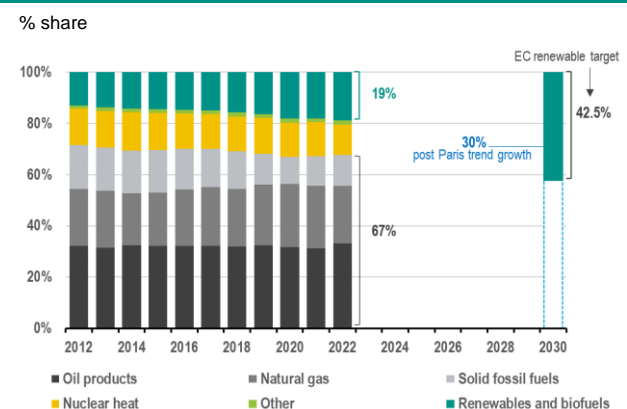
The EC's energy efficiency measures focus on energy saving in industry, transport, energy supply and building construction and renovation. This is where larger-scale gains can be made. Especially in the built environment, much can still be achieved with energy efficiency. These include improving insulation, speeding up the installation of heat pumps, installing digital thermostats and reducing household heat demand. And governments can launch large-scale renovation programmes. In any case, it puts public policy at the heart of meeting EU climate targets.

Primary energy consumption and EC target



Source: Eurostat, EC, ABN AMRO Group Economics

EU-27 goal in energy mix until 2030



Source: Eurostat, EC, ABN AMRO Group Economics

Improving energy efficiency is one way to meet climate targets. Another effective way is to reduce fossil fuel combustion faster. Fossil fuels dominate energy consumption in the EU, accounting for 67% of the energy mix. This keeps GHG emissions relatively high. The EU's main goal is to significantly reduce these emissions in the coming years. By 2030, GHG emissions in the EU should be 55% below 1990 levels, in 2040 the EC proposed a level of 90% below 1990 levels (see our

[note here](#)) and the target for 2050 is climate neutrality. To achieve this, both renewable energy generation and further increases in energy efficiency have a prominent role. In this, energy efficiency is as important a part of the EU's climate goals and transition to a clean energy system as renewable energy.

In addition, both energy efficiency and renewable energy are also part of the *Global Pledge* as a result of the COP28 (December 2023). That climate conference set a doubling of energy efficiency improvements from around 2% per year to more than 4% per year by 2030. Earlier, we noted that average energy efficiency gains in the EU are around 1.6% per year, which is still insufficient to meet the COP28 commitments. It was also agreed that a threefold increase in global installed capacity of renewables should be achieved. It is partly in line with the EC's new directive (in the *Renewables Energy Directive*, RED), where the target is around 42.5% share of renewable energy by 2030. However, based on the post-Paris trend growth in renewable energy generation, a 30% share in the energy mix by 2030 can be achieved. To boost the renewable transition, the EC pledged after COP28 to invest an additional EU 2.3 billion to support countries outside the EU as well. It contributes to meeting climate targets, but it is likely that more investment is needed for renewable energy generation and the additional measures to boost energy efficiency.

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