

THE IMPORTANCE OF A REVISED PRIMARY ENERGY FACTOR (PEF) TOWARDS ACHIEVING THE EU'S LONG TERM ENERGY & CLIMATE TARGETS



What is the Primary Energy Factor?

- A Primary Energy Factor (PEF) connects primary and final energy. It indicates how much primary energy is used to generate a unit of electricity or a unit of useable thermal energy.
- Electricity is a final energy carrier, produced from different primary energy sources, including fossil energy fuels (gas/oil/coal), nuclear, and renewables (hydro/wind/solar).
- While there is a connection between energy use and (carbon) emissions this is not reflected by the PEF.
- The current default PEF in the EU is 2.5.¹ It implies that each unit of electricity requires an input of 2.5 units of primary energy. This therefore assumes that all power generation (independent of source) in the EU is only 40% efficient ($100 \div 2.5 = 40$).

Where is the Primary Energy Factor used?

The PEF is applied in several pieces of EU legislation to translate primary into final energy use. It affects:

- **Energy Efficiency Directive (EED):** The EU-wide Energy Efficiency target has been expressed in both primary energy and final energy. When Member States choose to express their savings in primary energy, the PEF is applied to convert final energy savings into primary energy. In this case savings in electricity can be multiplied by the PEF factor of 2.5.
- **Energy Performance of Buildings Directive (EPBD):** This Directive aims at reducing the primary energy demand for buildings. Since technologies applied in the building and improvements in the building envelope lead to savings in final energy, the PEF is applied to convert these savings into primary energy. In both the EED and EPBD, Member States can choose to apply their own PEF value.
- **EcoDesign Directive and Energy Labelling Directive:** The energy efficiency of products is expressed in primary energy in order to make products using different energy carriers comparable in the internal market (e.g. to compare efficient electric heat pumps or electric boilers with fossil ones). A PEF is applied to convert electricity (final energy) into primary energy. The PEF used in EcoDesign legislation is a variable set within the Regulation, which was originally taken from the Energy Services Directive.

¹ It was introduced with the Energy Services Directive (2006) and has not been changed since.

The Primary Energy Factor has an impact on:

- How Member States calculate energy they save;
- How energy efficient the building stock is perceived to be;
- The competitiveness of technologies in the market place, in particular in the heating sector;
- Which energy label class is achieved by energy using products – the class achieved is expected to directly affect product sales.

What's the problem with the Primary Energy Factor?

The fact that the European power sector is decarbonising needs to be reflected in the PEF, thus justifying a reduction. Specifically, the PEF impacts several pieces of legislation of which it is part:

- **In the EED it incentivises savings in electricity over direct fossil savings to meet the targets.** As currently massive renewable generation capacity is added to the electricity system an increased coupling of the electricity and heat sectors could greatly help accommodate the related integrating challenges. The current PEF for electricity is therefore acting as a barrier for the decarbonisation of the heating sector.
- **In EcoDesign legislation, the PEF of 2.5 misrepresents the efficiency of electricity using products. With a lower PEF, heat pumps as the most efficient heating technology would lead over fossil alternatives by an even bigger margin, and other electricity using products would become more competitive.** The current PEF gives an advantage to fossil technology and thus encourages the use of more fossil fuels, despite the overall intention to incentivise a reduction in fossil fuel use by using efficient products and systems. This approach motivates consumers to purchase products that run on fossil energy at end-user site, instead of electricity, regardless of whether this can increase both the energy bill for consumers and greenhouse gas emissions or lower the EU's security of energy supply.
- **The current PEF methodology is outdated and needs a review.** The PEF of 2.5 is based on old data reflecting a European power system without any significant share of renewables in the power generation mix. In 2015 the average RES share for electricity in the EU was 28%. This share will increase further every year and the carbon intensity of power generation is continuously decreasing. By 2030 the EU RES share in power generation is projected to be 45% (Eurostat), based on the 2030 RES target.

The way forward

- We welcome the direction of the European Commission's proposal to reduce the PEF from 2.5 to 2.0 as a first step. It is based on a scientific approach and better aligns the factor with the reality of power production as it is today. It also better reflects the EU energy mix and the higher share of renewable electricity generation.
- **However, we stress the need for a larger gap between the PEF for fossil fuel and for renewable energy.** Nearly equal factors for both (under the EED the Commission proposes: RES 1; Fossil 1.1) do not reflect the benefits of renewable energy over fossil fuels. We thus clearly support Fraunhofer ISI's proposal to use a factor of <1 for non-combustible renewables, based on the European Commission ordered "review of the default primary energy factor".²
- Any adjustment made to the PEF should include an assessment of the impact on the related legislation (EcoDesign / EPBD / EED) and energy statistics.

² [Available here](https://ec.europa.eu/energy/sites/ener/files/documents/final_report_pef_eed.pdf): https://ec.europa.eu/energy/sites/ener/files/documents/final_report_pef_eed.pdf.