

To:
Mr Joaquim NUNES DE ALMEIDA, DG GROW
Mr. Peter Handley, DG GROW
Ms. Immavera Sardone, Policy officer
HoUs DG ENVI
HoUs DG GROW
HoUs DG CLIMA

Brussels, 6 July 2022

Subject: Shortage of high-grade electrical steel affecting supply of power transformers

Dear Madam/Sir,

Eurelectric would like to draw the commission's attention to an ongoing issue faced by the electricity distribution industry in obtaining high-grade steel for transformers.

High-grade steel produces low losses of electricity and is used to produce transformers compliant with higher efficiency requirements (so-called Tier 2) mandated by the ecodesign regulation¹. Currently, such steel is not readily available in Europe² and is in short supply, at high prices, from Asia, where it is being diverted for use in Electric Vehicles. Consequently, manufacturers are using a higher quantity of low-grade, high-loss, steel instead. However, to meet Tier 2 targets requires a higher quantity of steel in a larger transformer volume, which then requires a greater quantity of mineral oil for the same usage. Moreover, this steel is produced in countries using fossil-fired generation with high CO₂/kWh. This causes higher CO₂ emissions elsewhere and contradicts EU sustainability objectives.

Meanwhile, savings achieved by higher efficiency in kWh within the EU will be in terms of reduced kWh losses where each kWh saved has a low CO₂ content. **Hence, this is not only negating the benefits foreseen by the implementation of the higher efficiency requirements but also causes CO₂ emissions to rise if the shortage situation persists.**

Eurelectric urges the commission to review the impact of this shortage and consider the following:

- 1) As an immediate action, assess the ongoing situation in concertation with key stakeholders and engage in dialogue with the Member States to explore possible solutions.
- 2) According to the proposal for a new ecodesign regulation³, aspects concerning durability, circular economy, reliability, recycling materials, second-life assets, and the presence of substances of concern have the same importance as efficiency. Therefore, any future regulatory measures must consider all these aspects and not just energy efficiency.

You will find below an explanation of two impacts associated with this shortage and why it is negating the benefits of the Tier 2 transformers.

Eurelectric requests the commission take action and would be happy to discuss this matter further.

Yours sincerely,



Kristian Ruby,
Secretary General, Eurelectric

¹ The Regulation (EU) N. 548/2014 and (EU) 2019/1783 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium, and large power transformers

² At least 7 member states are experiencing a supply chain bottleneck and many more are experiencing an increase in the price according to Eurelectric membership

³ [The proposal for a new Ecodesign for Sustainable Products Regulation, published on 30 March 2022](#)

Explanation of the impacts and why it is negating the benefits of the Tier 2 transformers

Impact 1: Substitution of High-Grade LOW Loss Steel with HIGHER Loss steel causing increased levels of embedded CO₂ during production

Using High Loss Steel to produce Tier 2 Transformers is required when Low Loss steel is unavailable. Furthermore, this requires the use of higher volumes of steel and mineral oil to reach Tier 2 Targets.

The incremental amounts of extra steel and oil for common sizes of Medium Voltage transformers are as follows:

400kVA: +125kg Steel + 24 Litres Mineral oil Extra Weight for Transport: 146kg⁴

630kVA: + 153kg Steel + 27 Litres Mineral oil Extra Weight for Transport: 176kg⁵

This extra steel is produced in steel plants which use fossil fuels and grid electricity which, depending on the country of production, could be mainly from a coal/oil burning power plant.

This means that the embedded CO₂ use in the production of the extra material is very high, yet the savings in CO₂ from lower kWh losses will come from a future EU grid which is largely run on renewables.

In short, the transformer uses 15– 20% more core steel and is about 10–15% larger in size so that more oil and paper are used, with a higher embedded carbon footprint.

Furthermore, the steel is produced in countries using fossil fired generation and high CO₂/kWh. However, the savings achieved by higher efficiency in kWh within the EU will be in terms of reduced kWh losses where each kWh saved has a low CO₂ content. Hence, this approach will result in increased levels of CO₂ emissions

Additionally, the higher transport weights result in extra use of fuel during transportation.

So, using this approach the Carbon Emissions from Tier 2 adaptation will actually increase CO₂ emissions over those which would have been produced had Tier 1 been used pending the availability of Low Loss Steel.

Additionally, at end of life, there will be more material which needs to be disposed.

Impact 2: Increased Cost to Customers as Cost/Benefit are no longer balanced due to the higher lifecycle costs created by the shortage of steel.

The Tier 2 Loss levels were justified on the basis that over the Transformer lifecycle the extra costs of a more efficient transformer would be balanced by the value of the energy savings made.

An increase in transformer costs was expected but was to be in the region of 10–15%, yet figures from ENEL below show that the actual market costs are significantly in excess of these levels (by over 40%) due to the shortage of Low Loss Transformer steel.

⁴ There will be additional weight for the tank and cover enlarging. This could not be calculated because of unavailability of data

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In 2021, transformers' prices increased by 40%, mainly due to a lack of raw materials and consequently wholesale market prices surged. These price increases affected both existing and new contracts because transformer contracts are generally made on the basis of pass-through costs for raw material prices (– as utilities are better able to absorb the risk of price increases than manufacturers, this approach reduces tender prices as manufacturers would price in risk at a higher cost than utilities).

Those market trends can be easily represented through the 2021 LME (London Metal Exchange) data: dramatic increases for Grain Oriented Electrical Steel (GOES), Aluminium, Copper and Hot Rolled Coil Steel.

	Δ vs Avg. 2020	Δ YTD
GOES	+69%	+64%
Aluminum	+72%	+46%
Copper	+59%	+23%
Steel HRC	+82%	+57%

Having said this, the following benefits were envisaged when the Tier 2 efficiency requirement for medium and large power transformers was introduced in the ecodesign directive.

- (a) Societal benefits of reduced CO₂ emissions from kWh saved plus the lifetime savings in the cost of associated fuel justified the extra initial capital costs of the transformers
- (b) Significant environmental benefits in terms of reduced CO₂ emissions

These benefits outweighed the extra initial capital costs for more efficient transformers. Moreover, the low-loss steel was expected to become readily available in the EU by 2021 and no supply chain disruption was expected. All these factors motivated the implementation of Tier 2 requirements for transformers. However, the current shortage not only negates these benefits foreseen but also places the Tier 2 requirement to increase the environmental and economic costs to society.

Therefore, Eurelectric requests the commission to take necessary action and consider Eurelectric's requests. Furthermore, Eurelectric encourages the execution of a Life Cycle Assessment of power transformers to identify other actions, beyond efficiency requirements, that could effectively lower the environmental impact of that equipment. In such context, alternative materials could be considered for metal parts as well as for insulating liquid (e.g. natural esters can be definitely considered more environmentally friendly than traditional mineral oil).

Eurelectric would be happy to support the commission to assess the situation.