The economic impact of the EU's safeguard on GOES

An Implement Consulting Group study commissioned by Hitachi Energy
November 2026

The provisional safeguard leaves the EU's GOES gap open, costs the transformer industry up to EUR 480m and destroys 1,500 transformer jobs

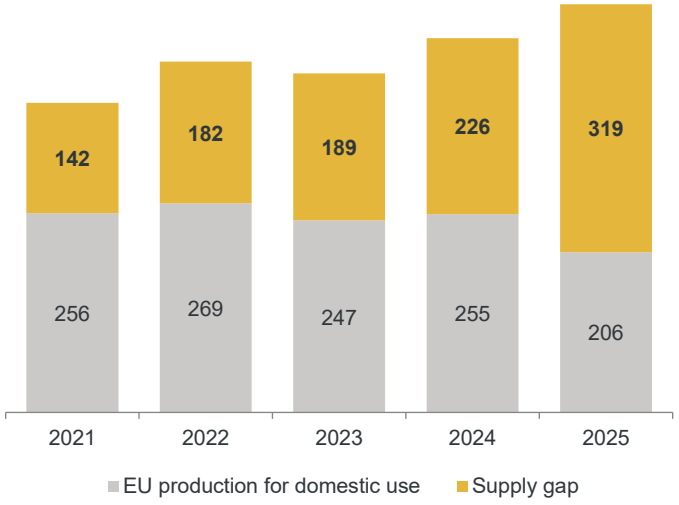
1 The EU has a structural GOES shortage, not an import-substitution problem

Imports are structurally necessary to supply the EU's transformer industry. EU production cannot meet current demand and supplies too few of several high-performance grades needed for efficient transformers.

319 kt

EU supply gap in 2025, up from 142 kt in 2021 and equal to about 61% of EU consumption

EU consumption of GOES coils and SLCs, thousand tonnes



2 The safeguard redistributes value rather than creating any meaningful new European supply

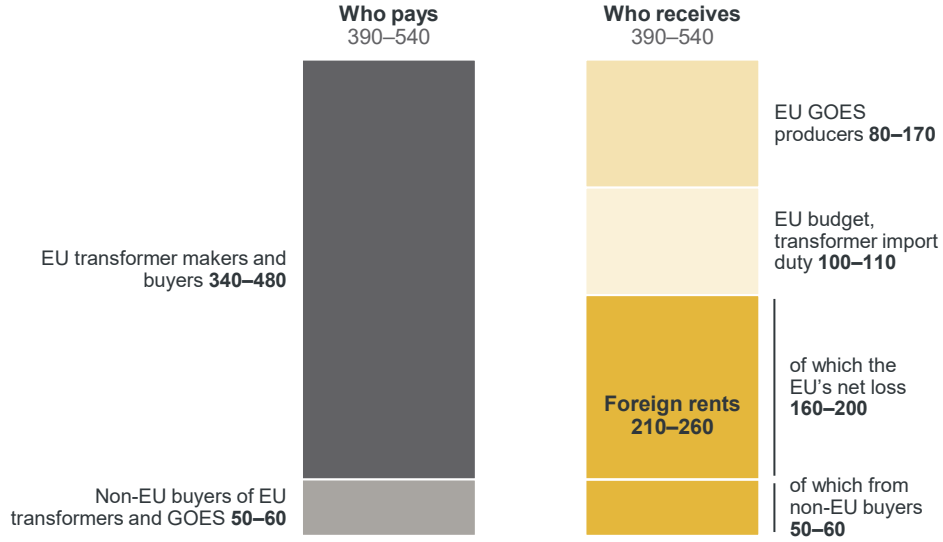
It works through higher prices, not new EU GOES capacity.

Implement modelling shows that Union GOES producers gain at most EUR 170m, while EU transformer makers and buyers lose up to EUR 480m. Even counting the transformer duty revenue, the EU loses up to EUR 200m net, and foreign GOES exporters gain rents of up to EUR 260m.

EUR 480 million

Loss for EU transformer makers and buyers, with the main gains redistributed as foreign rents to e.g. Chinese producers

Redistribution from the measure, EUR million per year



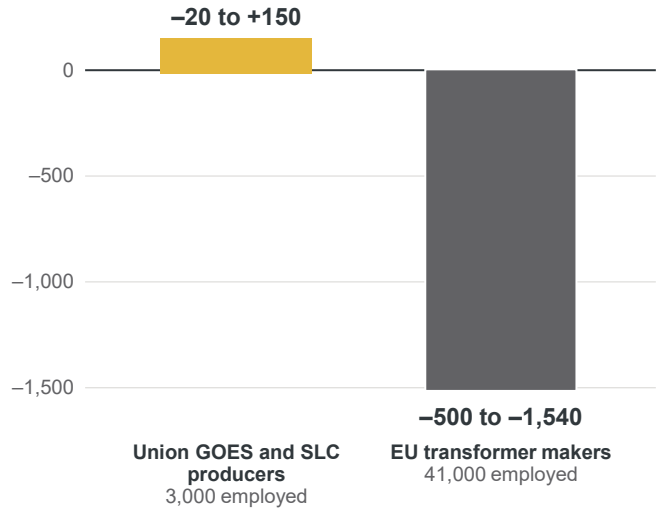
3 For every steel job gained, up to ten transformer jobs are lost

EU transformer makers employ over 41,000 people, 13 times the 3,000 at Union GOES and SLC producers. Steel output rises only slightly, so at most 150 steel jobs are created. Even with the EUR 1,140/t duty on GOES in imported transformers, EU transformer production will suffer up to 1,500 jobs as imported transformers gain market share.

1 : 10

steel jobs gained vs transformer jobs lost

Change in EU jobs, with the transformer import duty, persons



Notes: GOES covers coils and SLCs. Supply gap = consumption minus production for domestic use. Model effects per year at 2025 volumes and prices, with the provisional EUR 1,140/t transformer duty.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM, SBS), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133 (Tables 5–7).

Beyond the cost: an uneven playing field risks pushing future transformer capacity abroad and deepening the EU's import dependence

4 The downstream correction does not restore a level playing field

The EUR 1,140/t embedded-core duty does not restore competitive neutrality between transformers made inside and outside the EU.

ISSUE #1

The duty is too low to offset the cost

At the level of 1,140/t, the output from EU transformer makers is still set to shrink. Adequate protection would take a duty of around 3,700-3,900 EUR/t.

ISSUE #2

One flat duty across very different cores

The import price of cheap cores rises by 3-4 times the duty paid for those very same cores inside an imported transformer. EU makers importing cheaper cores, often smaller producers, will lose unless the duty is increased substantially.

ISSUE #3

Exempt origins enter duty-free

Transformers from 122 exempt countries enter the EU without the duty. They already supplied EUR 183m (8%) of imports in 2025, and future production will move there to take advantage of duty-free imports into the EU.

5 The issue is not only cost, but European industrial capacity and investment

It is not only about today's industry, but where tomorrow's industry will be.

Beyond the 1,500 jobs lost, the measure structurally raises the cost of making transformers in Europe relative to other regions, in a market where grid investment is surging worldwide.

TODAY

Existing EU production

- Higher GOES cost on all EU output
- Output down EUR 130–400m a year
- Around 1,500 jobs at risk

TOMORROW

Location of new capacity

- EU production costs more than elsewhere
- New capacity, investment and jobs may go abroad

Grid investment needs, in the EU and in EU makers' export markets

EUR 1.2tn
EU grid investment needed by 2040 (European Commission)

+2,820
new power transformers planned by European TSOs, 2026–2035, on a fleet of 5,649 (ENTSO-E)

USD 1.4tn
planned US investor-owned utility capex to 2030, nearly half for transmission and distribution

+50%
rise in global grid investment needed by 2030, from about USD 400bn a year (IEA)

6 This potentially increases Europe's strategic dependence

Europe could end up importing finished transformers instead of the steel that goes into them.

A measure meant to strengthen resilience could shift dependency downstream, from imported GOES to imported transformers, and move value creation outside Europe.

44%
of EU transformer imports came from China in 2025

+EUR 210–340m
rise in EU transformer imports a year without downstream protection (model, no transformer duty)

EU transformer imports by origin, 2025, EUR million (total 2,380)



Exempt countries: 183 (8%)

Notes: Exempt: Norway, Iceland, Liechtenstein, Ukraine, Kenya and developing countries except China. Imports: EU27 grid-size transformers from non-EU countries, 2025. ENTSO-E covers 40 TSOs in 36 European countries, transmission level only. US figure is planned capex of investor-owned utilities, all asset types. Location and investment effects are not modelled.
Source: Implement Economics (GSIM model, Eurostat, UN Comtrade, Regulation (EU) 2026/2133); European Commission, European Grids Package (Dec 2025); ENTSO-E, Transmission Grid Investment and Supply Chain Assessment Report 2026; PowerLines (Apr 2026); IEA, Electricity 2026.

About this report

This report has been prepared by Implement Economics, the economics practice of Implement Consulting Group, at the request of Hitachi Energy. It assesses the economic effects in the EU of the safeguard measure on grain-oriented electrical steel (GOES) and steel laminations and cores (SLCs), introduced provisionally by Commission Implementing Regulation (EU) 2026/2133.

Hitachi Energy commissioned Implement Consulting Group to undertake this study as an independent economic assessment. While the scope of the study was agreed with Hitachi Energy and the company provided certain data and factual inputs, Implement Consulting Group retained full responsibility for the methodology, analysis, interpretation of evidence and conclusions. Results are EU-wide: Hitachi Energy is one of many EU transformer makers.

How the analysis was done

Implement Economics has analysed the impacts of the measures in the provisional safeguard for GOES using a partial equilibrium model, cf. Francois and Hall in a set-up with three markets: GOES coils, SLCs and transformers. The model is calibrated to detailed trade and production data from Eurostat (Comext, PRODCOM), UN Comtrade and data from the Commission Regulation. Parameters are taken from published studies, and results are shown as ranges across price scenarios for the measure. Effects are annual and use 2025 volumes and prices as the baseline.

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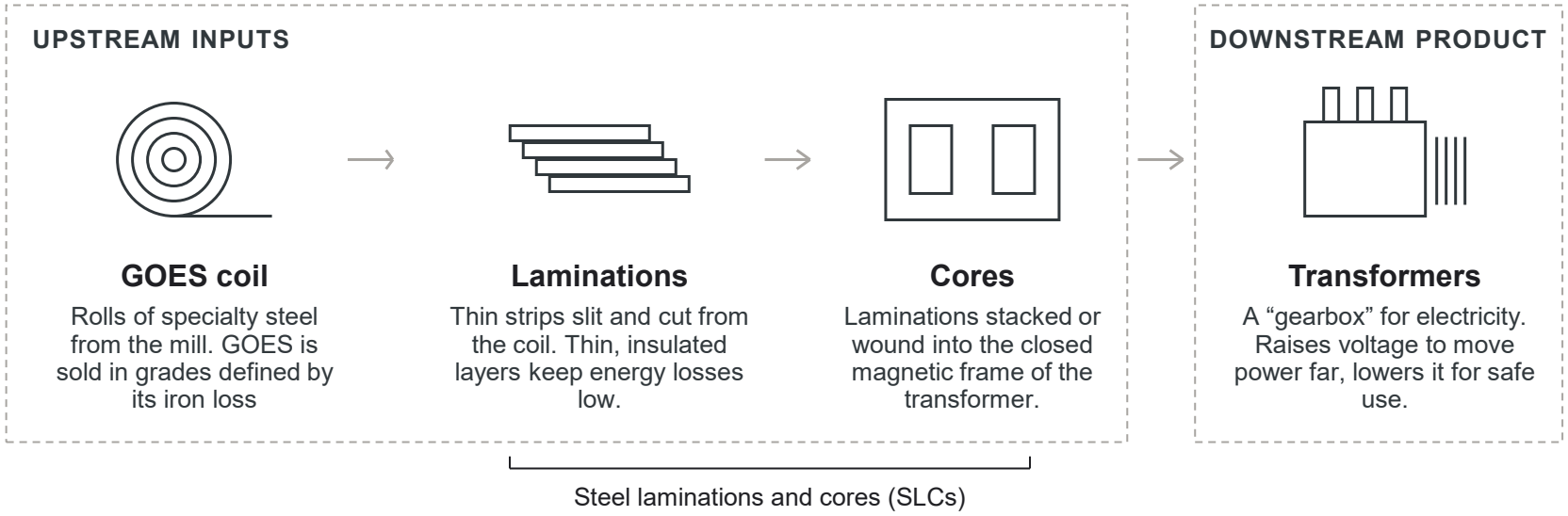
01

The grain-oriented steel market

What GOES is, who uses it and where the EU's supply comes from

Grain-oriented electrical steel (GOES) is a key component of transformers

Value chain from GOES coil to transformer



Three grades of GOES coils, defined by iron loss

Watt per kg of steel (W/kg)

Conventional grade	Mid-range grade	High-end grade
above 0.9 W/kg	0.7–0.9 W/kg	below 0.7 W/kg

Higher losses, lower price — Lower losses: more efficient transformers, higher steel price

Grain-oriented electrical steel (GOES) is a specialty steel that carries a magnetic field with very little energy loss. Cut and stacked into a core, it is the magnetic heart of transformers. Transformers are by far the largest use of GOES.

The coils are cut into laminations, which are stacked or wound into cores. Laminations and cores are together called SLCs. Transformer makers either cut their own cores from coil or buy finished cores.

GOES is typically grouped in grades by iron loss: high-end (below 0.7 W/kg), mid-range (0.7–0.9 W/kg) and conventional (above 0.9 W/kg). The lower the loss, the more efficient the transformer and the higher the steel price. High-end grades are often required to meet the EU’s Tier 2 EcoDesign criteria for certain transformer types and applications.

Each mill produces a mix of grades, which depends on its technology. High-end grade is typically a small share of the output, and most of it is mid-range.

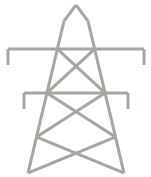
Grades are not easily interchangeable, and the EU GOES producers have limited capacity and limited production of the high-end grades with losses below 0.7 W/kg.

This makes the foreign supply of high-end grades critical for EU transformer makers.

Note: Iron loss in W/kg. Grade thresholds as defined by the Commission. Typical mill output based on an interview with Hitachi Energy. SLCs = steel laminations and cores, the Commission's term.
Source: Implement Economics based on Commission Implementing Regulation (EU) 2026/2133 (recitals 12–15), Hitachi Energy (interview, 21 October 2026) and Hitachi Energy technical note on GOES grades.

Grid operators are the largest buyers of transformers, followed by power producers, industry and data centres

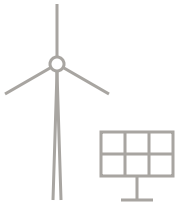
Main buyers of transformers in the EU



Grid operators

Companies that run the electricity grid. They need transformers in every substation, from the high-voltage grid to the local street.

Mainly buy
Power and distribution transformers



Power producers

Wind farms, solar parks and batteries need transformers to feed their power into the grid.

Mainly buy
Power and distribution transformers



Industry infrastructure

Factories, large buildings and railways need transformers to take power from the grid at the voltage they use.

Mainly buy
Dry-type, distribution and special transformers



Data centres

Data centres need transformers for their own power supply.

Mainly buy
Dry-type and distribution transformers, growing demand for power transformers

The electricity grid is run by two types of grid operators. Transmission system operators run the high-voltage grid that carries power over long distances and buy large power transformers. Distribution system operators run the local grids that bring power to homes and businesses and buy distribution transformers in large numbers. Together, they are by far the largest buyers of transformers.

Grid operators are regulated. They mostly buy through tenders and long-term framework agreements of up to eight years, and recover the cost through network tariffs, which households and businesses pay on their electricity bills.

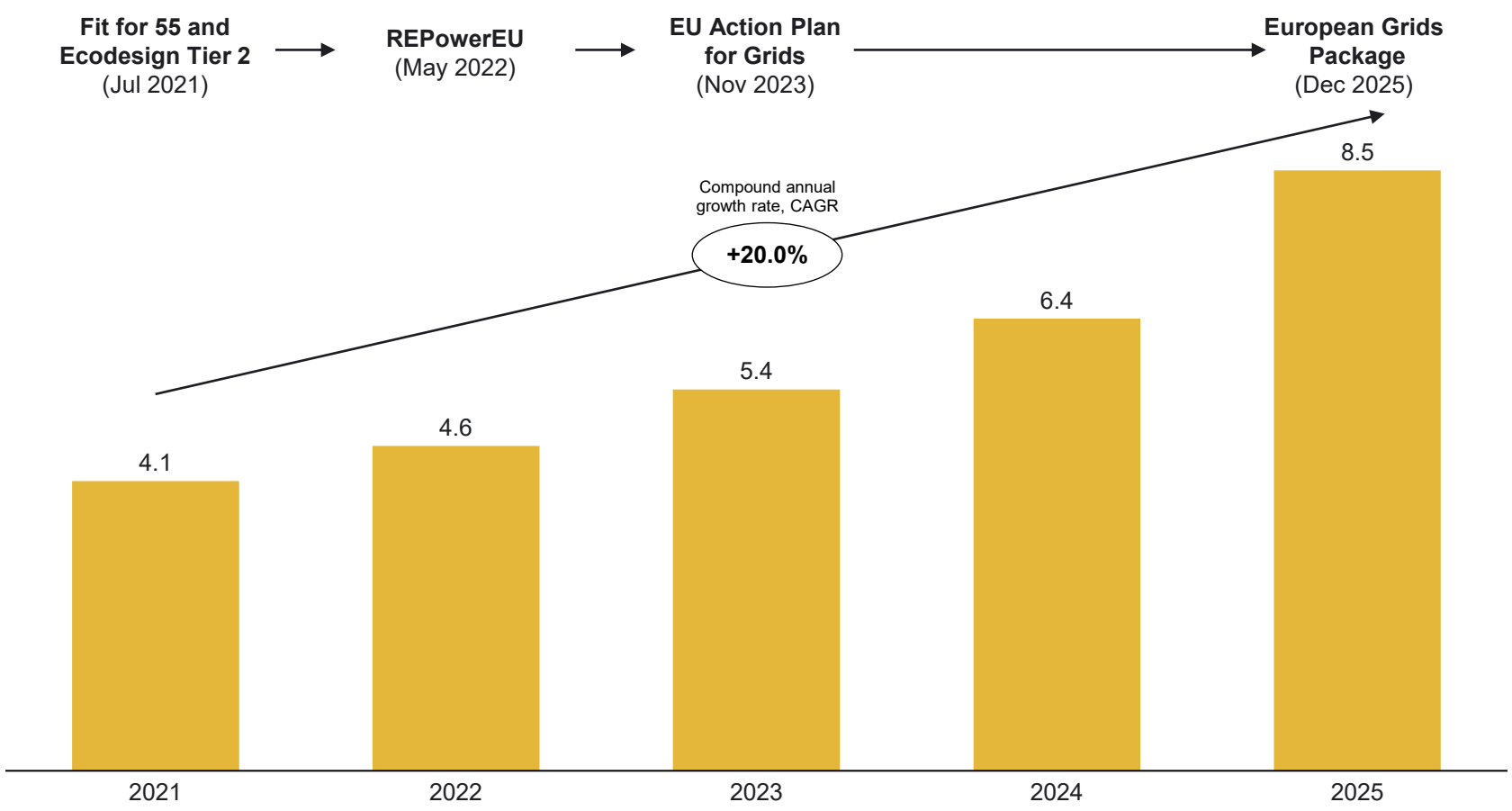
Power producers, industry and data centres buy fewer, often specialised transformers. Their demand grows with renewable power, the electrification of industry and transport, and new data centres.

Note: Columns ordered by our assessment of each group's importance as buyers; no public breakdown of EU transformer demand by buyer exists. Offshore wind connections are often bought by the grid operator.
Source: Implement Economics based on Directive 2014/25/EU (Art. 51), IEA (Building the Future Transmission Grid, 2025), European Commission COM(2026) 500 and Siemens Energy (2025).

EU GOES demand is driven by demand for transformers to meet electrification needs

EU transformer market

EUR billion, 2021 prices



The EU's climate and energy targets require infrastructure investments to expand the electricity grid. In its European Grids Package of December 2025, the Commission estimates that around EUR 1.2 trillion of investment in electricity grids is needed by 2040.

Transformers are a key part of grid infrastructure. They raise the voltage of electricity to move it over long distances and lower it again for safe use. Every power plant, substation and grid connection needs one, so a larger grid means more transformers.

The EU transformer market has more than doubled, from EUR 4.1 billion in 2021 to EUR 8.5 billion in 2025 in 2021 prices, an increase of 107%.

The EU market has grown every year since 2021, with the largest increase in 2025.

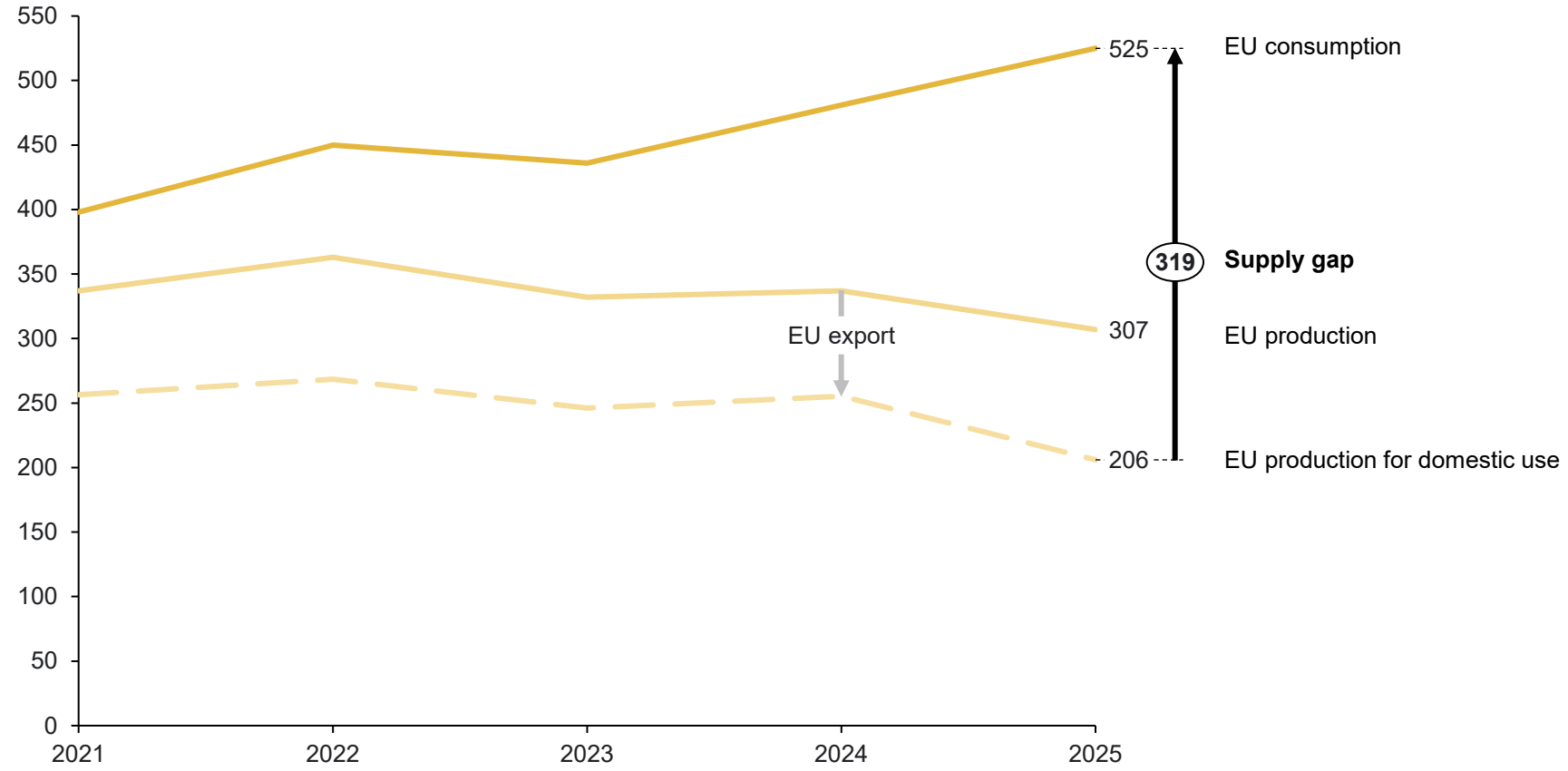
The EU need for transformers is forecasted to grow at around 7% annually towards 2031.

Note: Apparent consumption = production + imports − exports of liquid-dielectric and dry-type transformers (PRODCOM 27.11.41.20/50/80 and 27.11.43.30/80), deflated to 2021 prices with the EU producer price index for NACE 27.11. The index also covers motors and generators, so real growth is an upper bound. 2025 values are partly estimated by Eurostat.
Source: Implement Economics based on Eurostat (PRODCOM, sts_inpp_a), European Commission SWD(2022) 230, mordorintelligence and Wood Mackenzie.

EU GOES supply is insufficient to cover domestic demand

Union consumption and production of GOES (coils and SLCs)

Thousand tonnes



According to Commission data, Union consumption of GOES and SLCs has risen from 398 thousand tonnes in 2021 to 525 thousand tonnes in 2025. Apart from a small dip in 2023, consumption has increased every year, in line with the growing demand for transformers.

EU production of GOES – coils and SLCs combined - has not followed the increase in demand. It rose from 337 to 363 thousand tonnes in 2022, but has since fallen back to 307 thousand tonnes in 2025.

As production has not increased to meet domestic demand and EU GOES export has increased from 81 thousand tonnes in 2021 to 101 thousand tonnes in 2025, the Union supply gap has increased from 142 thousand tonnes in 2021 to 319 thousand tonnes in 2025.

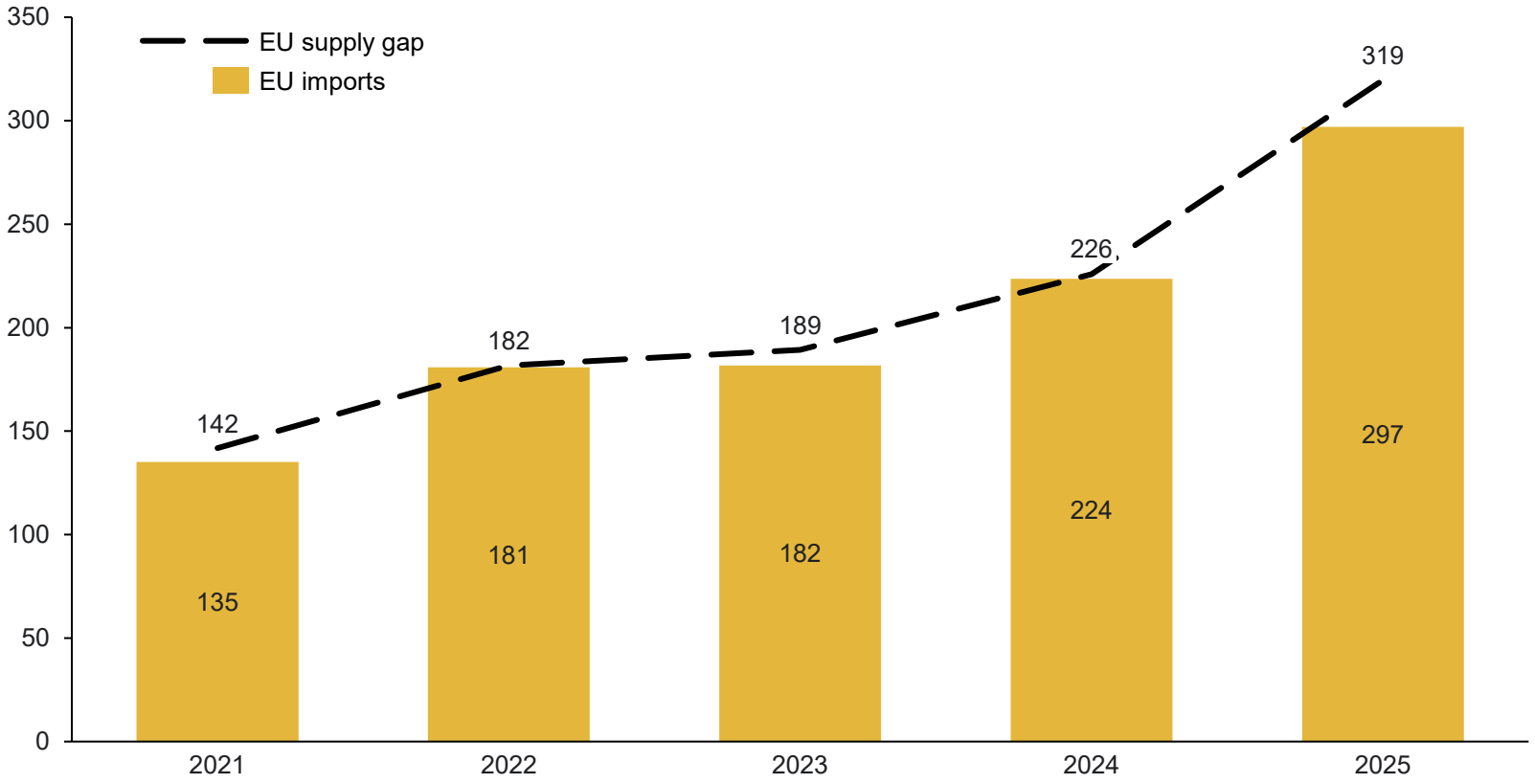
Moreover, Union producers supply very limited volumes of the highest grades needed for the most efficient transformers, which further enhances the need for import from foreign GOES producers.

Note: Consumption = Union producers' sales in the Union + imports (Commission definition). Production data is from the EU Commission questionnaire to Union suppliers and may deviate from Eurostat data.
Source: Implement Economics based on Commission Implementing Regulation (EU) 2026/2133 (Tables 1, 5, 6 and 7; recitals 32 and 61).

The EU has increased imports to cover its growing supply gap

EU supply gap and annual EU imports of GOES coils and SLCs

Thousand tonnes, GOES coils and SLCs combined



EU demand for GOES has grown faster than what EU producers supply to the EU market. The supply gap more than doubled, from 142 thousand tonnes in 2021 to 319 thousand tonnes in 2025.

Imports have grown with the gap, from 135 to 297 thousand tonnes, and cover most of it.

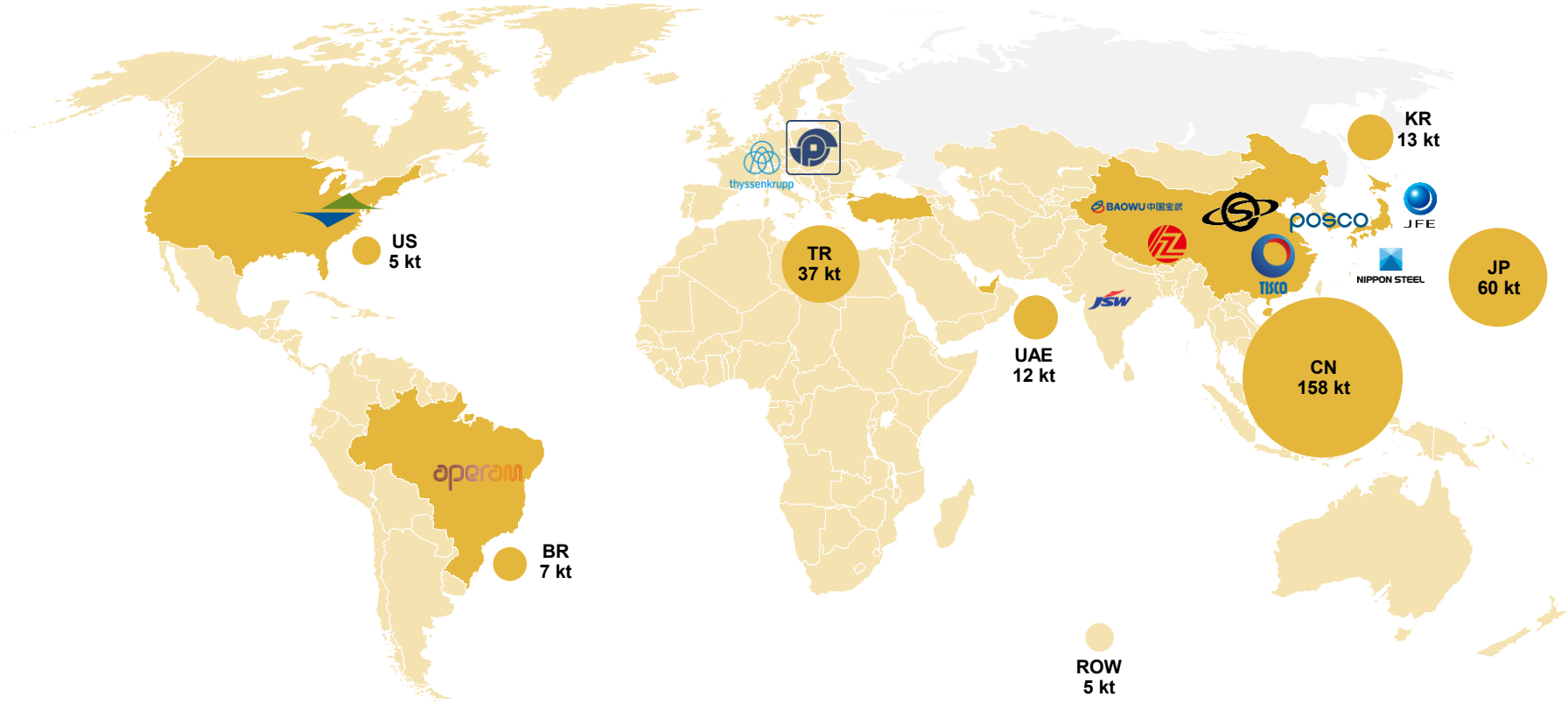
China, Japan, Türkiye and the UAE supplied close to 90% of EU imports in 2025. Japan mainly supplies high-end and mid-range grades, which EU producers make in limited volumes. Türkiye and the UAE mainly supply laminations and cores.

Note: EU supply gap is defined as consumption minus production for domestic use. Production for domestic use is calculated as production (EU 2026/2133, table 7) minus exports to unrelated customers (EU 2026/2133, table 7).
Source: Implement Economics based on Commission Implementing Regulation (EU) 2026/2133.

Five countries supply around 95% of EU imports of GOES coils and SLCs

Global GOES producers and EU imports of GOES coils and SLCs

2025 EU imports of GOES coils and SLCs, thousand tonnes



China, Japan, Türkiye, Korea and the UAE supplied almost 95% of the EU import of GOES coils and SLCs in 2025.

GOES coils are made by a small number of mills worldwide. Significant suppliers include:

- **EU**: ThyssenKrupp Electric Steel, Stalprodukt
- **Japan**: Nippon Steel, JFE Steel
- **China**: China Baowu, Shougang, TISCO, Wangbian Electric
- **Korea**: POSCO
- **United States**: Cleveland-Cliffs
- **Brazil**: Aperam
- **India**: JSW JFE Electrical Steel

Laminations and cores are mainly imported from:

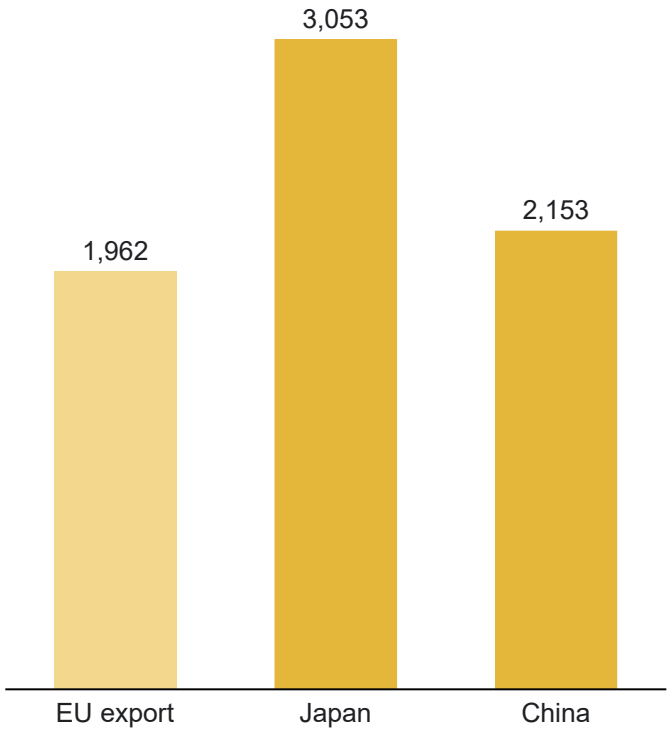
- **Türkiye:** Predominantly cores
- **China:** Predominantly cores
- **UAE:** Predominantly laminations

Note: Bubble size shows 2025 EU imports of GOES coils and SLCs combined. ROW = Rest of world. Russian steel is under sanctions and cannot supply to the EU.
Source: Implement Economics based on Eurostat (Comext), Commission Implementing Regulation (EU) 2026/2133 (recitals 17, 25, 30 and 89) and company information.

GOES coil import prices vary by exporter, driven by differences in grades and other quality factors, such as supply chain risks

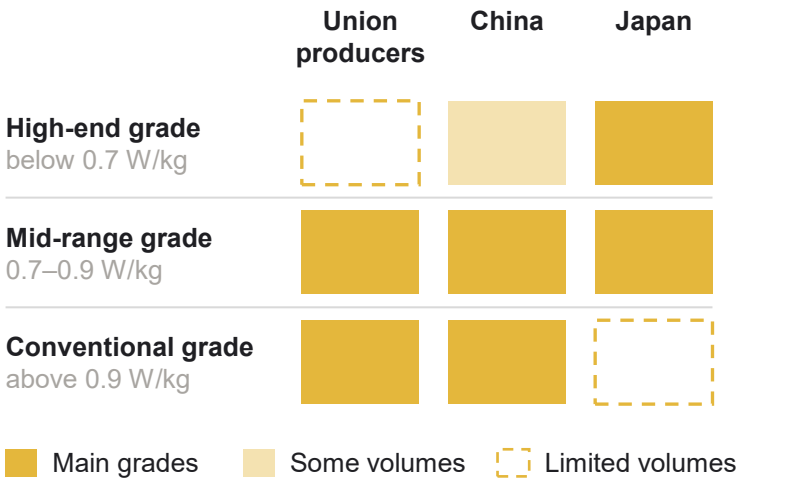
GOES coil price by origin

Average EU prices of GOES by origin (EUR/t, 2025)



GOES coil grade mix by origin

Assessed mix of GOES imported by the EU



In 2025, the average EU import price of GOES coils ranged from EUR 2,153 per tonne for China to EUR 3,053 for Japan. GOES from Japan cost 42% more than GOES from China.

Grades with lower core losses are more expensive, and each country supplies a different mix of grades to the EU.

Japan and Korea supply mainly high-end and mid-range grades, and limited volumes of conventional grade.

China supplies mainly mid-range and conventional grades, and some high-end grade. Its average price is the lowest.

Union producers supply mainly mid-range and conventional grades, and limited volumes of high-end grade. According to the Commission, EU producers manufacture limited volumes of the highest grade coils needed for some types of transformers.

The prices also reflect quality factors other than grade mix, such as product consistency and supply chain risks.

Transformer design adjustments can accommodate differences in GOES grade performance; however, economic and practical limits on transformer size and weight constrain how far design changes can compensate for lower grade GOES.

Note: Grade mix assessed from the Commission's findings and expert interviews. Unit value for GOES coil (CN 7225 11 00 and 7226 11 00), all grades, 2025. Japan and China: EU imports from that country (CIF). EU export: EU exports to all non-EU countries (FOB).
Source: Implement Economics based on Eurostat (Comext), Commission Implementing Regulation (EU) 2026/2133 (recitals 13–14, 49, 63) and Hitachi Energy.

02

The EU's provisional safeguard measure

How minimum import prices and tariff quotas work, and what they do to price setting

The EU has imposed provisional safeguard measures with quotas and minimum import prices for coils and SLCs

Minimum import prices and tariff quotas

GOES product and grade *(core loss)*	In quota *(EUR/t)*	Out of quota *(EUR/t)*
Coils, high-end grade (<0.7 W/kg)	3,400	3,500
Coils, mid-range grade (0.7–0.9 W/kg)	3,100	3,500
Coils, conventional grade (>0.9 W/kg)	2,800	3,500
Laminations	4,000	4,550
Cores	5,000	5,600

Quota by origin *(tonnes)*	25 Sep 2026–26 Feb 2027	Annualised
GOES coils, all grades		
China	30,694	72,279
Japan	23,104	54,405
Korea	4,790	11,280
Other countries	5,360	12,623
Laminations and cores (SLCs)		
Türkiye	14,162	33,348
China	4,241	9,987
UAE	2,705	6,370
Other countries	2,694	6,345

In September 2026, the European Commission imposed provisional safeguard measures on imports of GOES coils and SLCs. These measures combine minimum import prices with a tariff quota for each exporting country.

If an import is priced below the minimum import price, the importer pays the difference as a tariff. For imports in quota, a lower minimum import price applies.

The in-quota minimum import price for coils is EUR 2,800–3,400 per tonne, depending on the grade.

Out of quota, all coil grades face the same minimum import price of EUR 3,500 per tonne, so the conventional grade faces the largest increase.

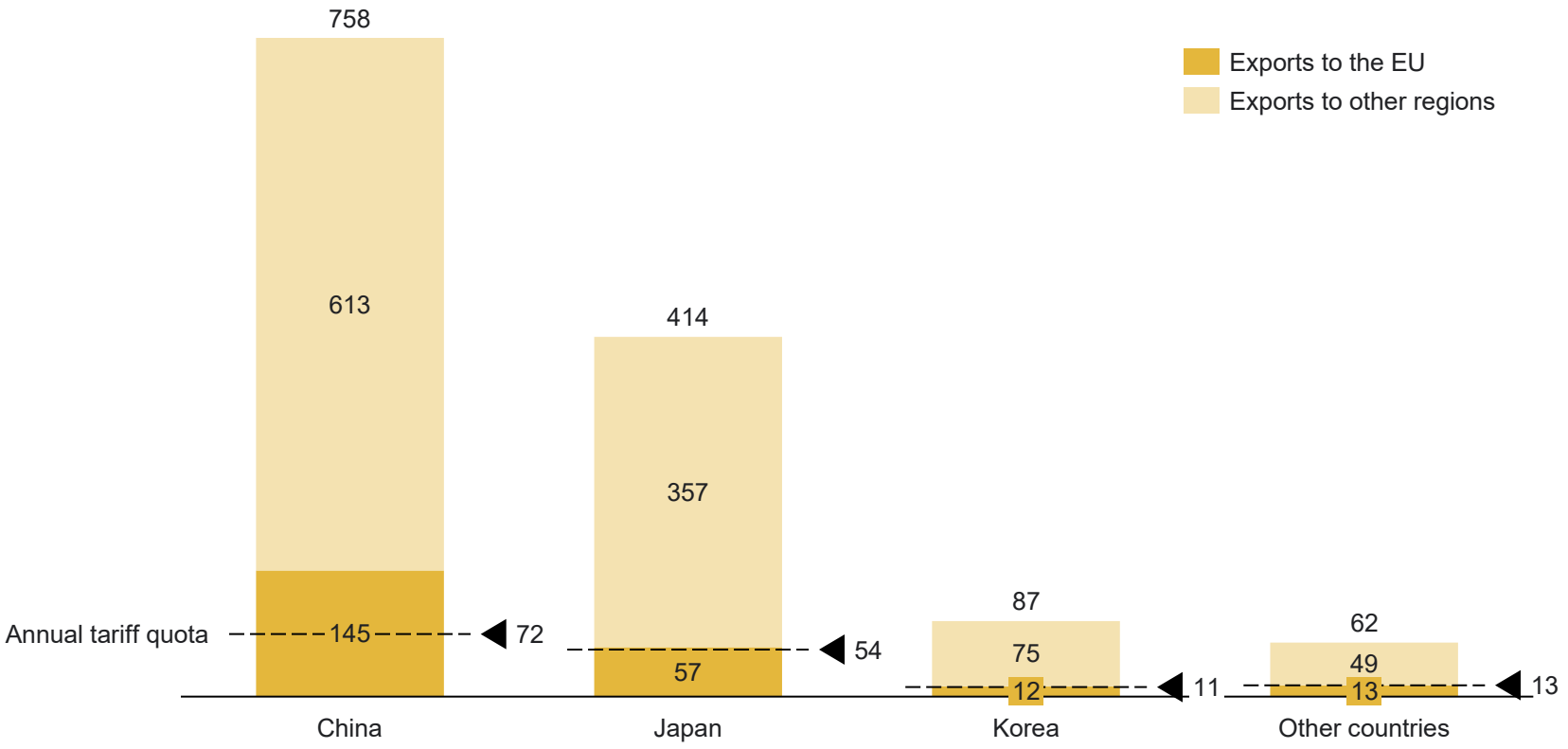
SLCs follow the same mechanism with their own minimum import prices: EUR 4,000 per tonne for laminations and EUR 5,000 for cores in quota, rising to EUR 4,550 and EUR 5,600 out of quota.

Note: Minimum import prices apply to the net free-at-Union-frontier price before duty. Tariff quotas run 155 days; annualised per year = tariff quota × 365/155. Tariff quotas are allocated first come, first served.
Source: Implement Economics based on Commission Implementing Regulation (EU) 2026/2133 (Articles 1 and 5, Annexes I–III; recitals 100–110).

Imports from all main suppliers already exceed the quotas, so most volumes will face the EUR 3,500 minimum price

GOES coil exports by origin

Thousand tonnes, 2025



The annual quotas are set below what China, Japan and Korea shipped to the EU in 2025. At 2025 volumes, the tariff quotas bind for all three main exporters of coils to the EU. For China, the quota is set at around 50% of its 2025 volume.

As the demand is expected to increase, the quotas will be increasingly binding.

Other countries, mainly the US and Brazil, shipped 13 thousand tonnes to the EU in 2025, about the same as their shared quota.

The tariff quotas are also small compared with what these countries can supply. China alone exported 758 thousand tonnes of GOES coils in 2025, more than ten times the EU quota.

Union production does not cover Union consumption, and Union production and the quotas together also fall short of Union consumption, so out-of-quota imports will still be needed.

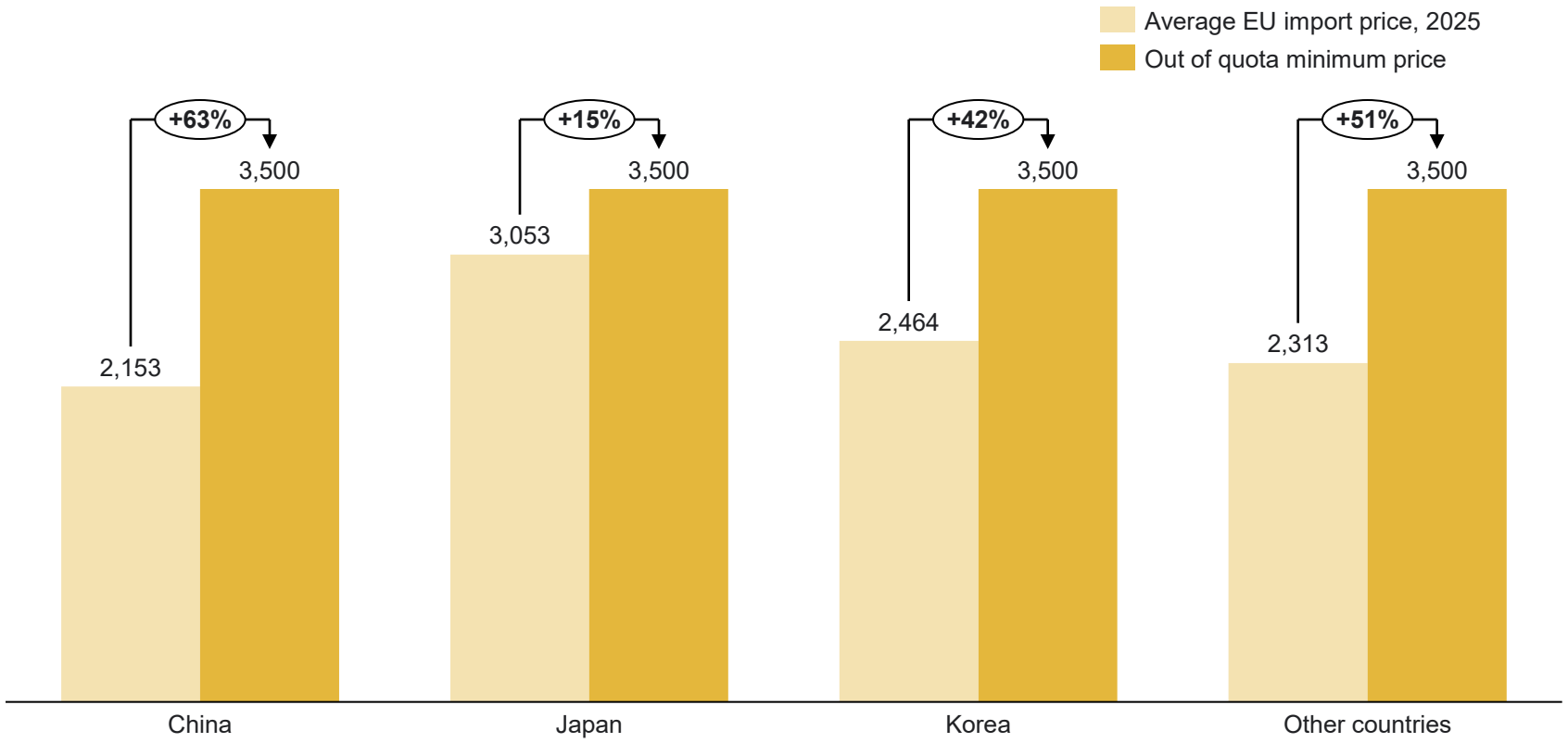
With the minimum import prices, the price in the EU will be higher than in other markets, both in quota and out of quota. Exporters are therefore expected to compete to sell to the EU first.

Note: GOES = CN 7225 11 and 7226 11. Tariff quotas set for 155 days, scaled to a full year (× 365/155). Total exports as reported by the exporting countries (UN Comtrade); EU imports as recorded by the EU (Eurostat). Other countries = origins under the “other countries” tariff quota, mainly the US and Brazil (Brazil from importer reports); Russia is excluded, as EU sanctions bar its steel from the EU.
Source: Implement Economics based on Commission Implementing Regulation (EU) 2026/2133 (Annex I.2; recitals 101 and 105), Eurostat (Comext), UN Comtrade and EU TARIC quota data.

The measure will affect price setting strategies for all players, raising prices of imported coils to at least EUR 3,500 per tonne

GOES coil import prices and minimum prices

EUR per tonne, 2025



In 2025, the average EU import price for coils was EUR 2,153 per tonne from China, EUR 3,053 from Japan, EUR 2,464 from Korea and EUR 2,313 from other countries. All are below the out-of-quota minimum import price of EUR 3,500.

As per the design of the measure, importers are required to pay the difference between the import price and the minimum price if import prices are set below minimum prices. Exporters will know this and this will influence their price setting. The minimum price will become the target price for all exporters.

At 2025 volumes, imports from China, Japan and Korea exceed their quotas, and imports from other countries are at their shared tariff quota. The last tonnes imported each period therefore cost at least EUR 3,500 per tonne.

A buyer can thereby import a tonne in quota at a lower price and resell it at the out-of-quota price, and arbitrage will ensure a market price of at least EUR 3500 per tonne. Whoever holds the in-quota tonnes keeps the difference.

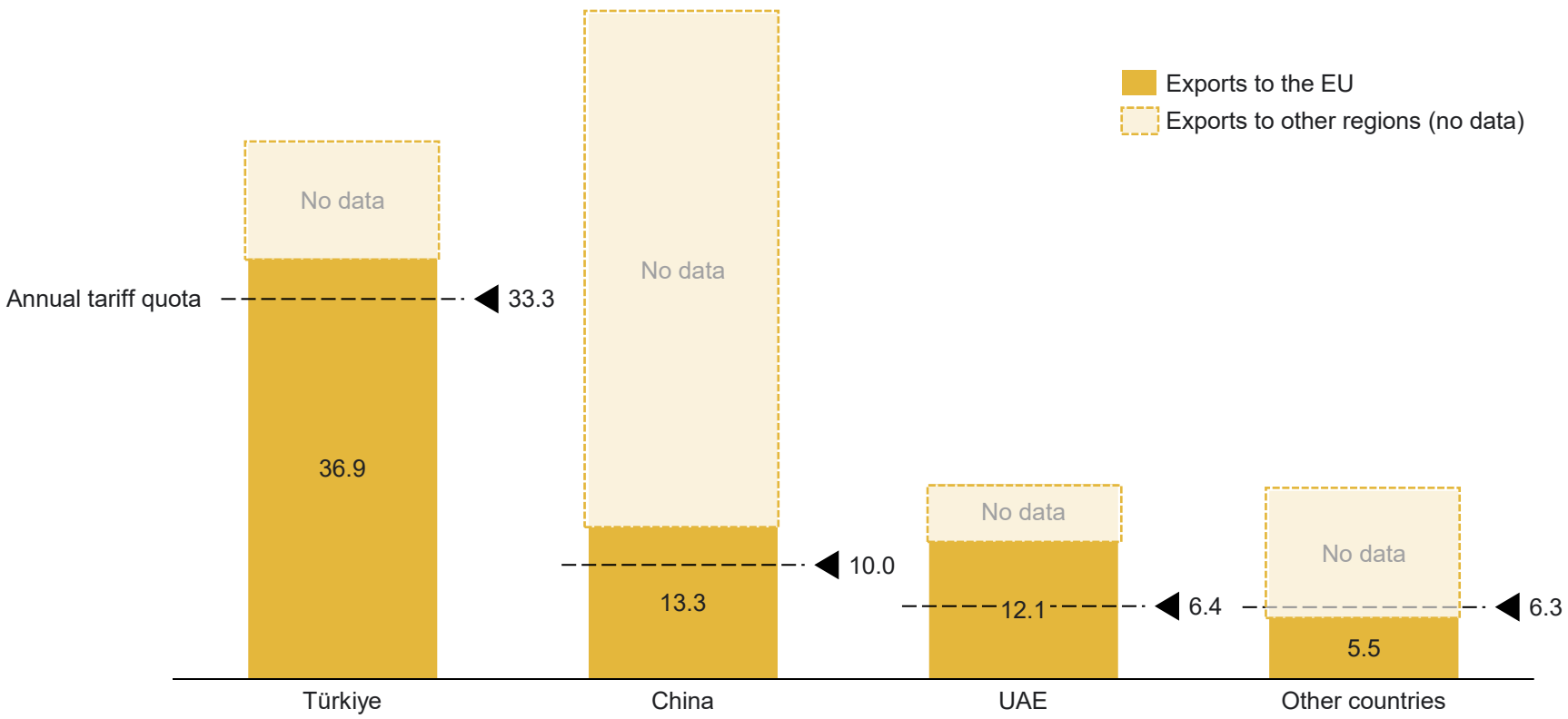
The minimum price of EUR 3,500 per tonne will result in an average price increase of 63% for China, 15% for Japan, 42% for Korea and 51% for other countries.

Note: 2025 price = average EU import value per tonne of GOES (CN 7225 11 00 and 7226 11 00), all grades. The price after the measure is a modelling assumption: out-of-quota imports set the price for all tonnes. Other countries: each origin raised to at least EUR 3,500, averaged with 2025 volumes.
Source: Implement Economics based on Eurostat (Comext) and Commission Implementing Regulation (EU) 2026/2133 (Annex I).

SLC quotas are also below what Türkiye, China and the UAE supplied to the EU in 2025

SLC exports by origin

Thousand tonnes, 2025



SLCs have their own tariff quotas. At 2025 volumes, the tariff quotas bind for Türkiye, China and the UAE. Imports from the UAE were almost twice its annual tariff quota.

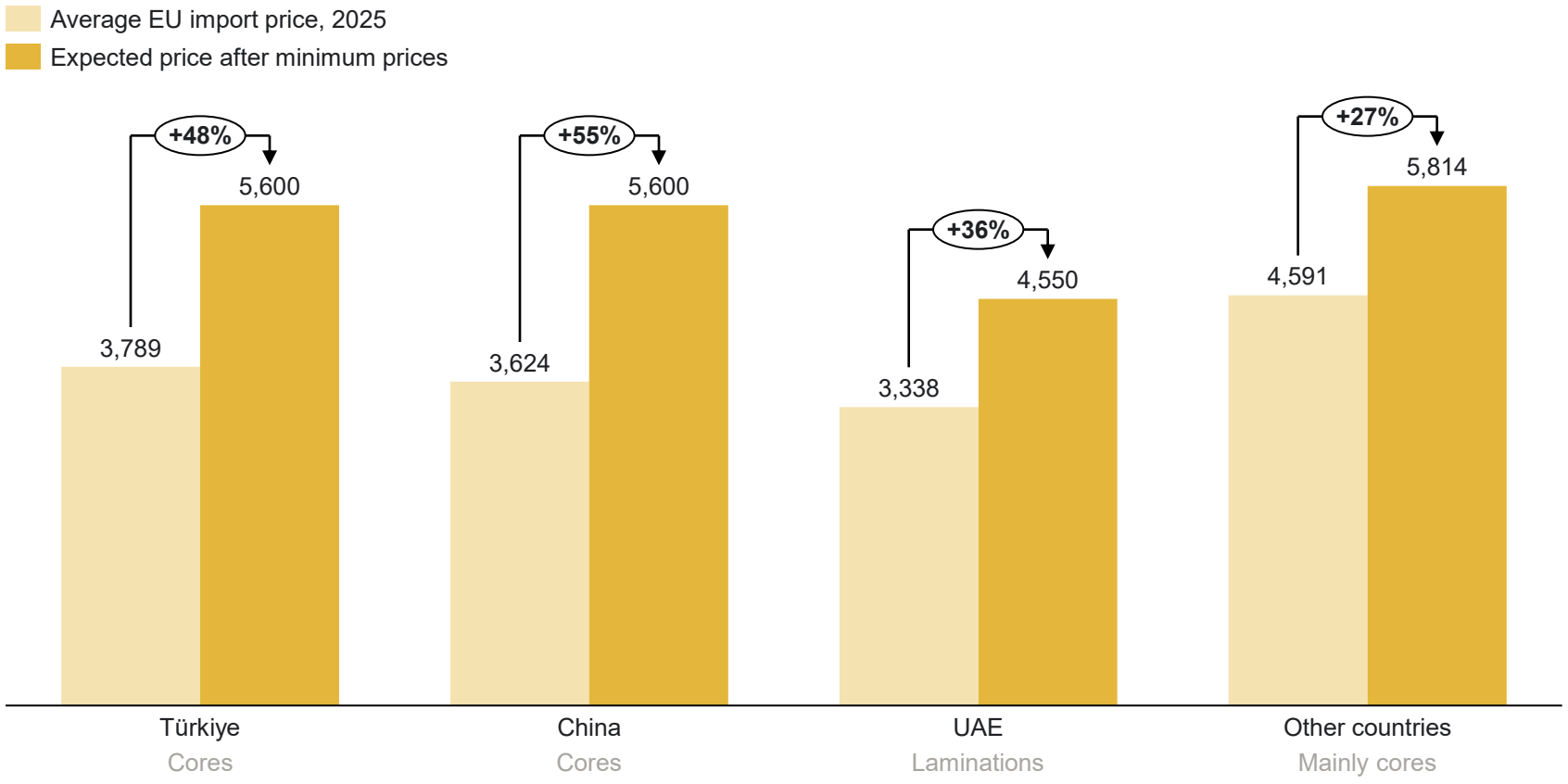
Imports from other countries were 5.5 thousand tonnes in 2025, below their shared tariff quota of 6.3 thousand tonnes.

As for coils, the minimum import prices make the EU a more attractive market than other markets, both in quota and out of quota.

Note: SLCs = CN 8504 90 13. Tariff quotas set for 155 days, scaled to a full year (× 365/155). EU imports as recorded by the EU (Eurostat). Türkiye's exports to other regions as reported by Türkiye (TurkStat, CN 8504 90 13); Türkiye reports 23 thousand tonnes of exports to the EU against 37 thousand tonnes recorded by the EU. Other origins: SLCs have no separate code in world trade statistics; bar heights are illustrative.
Source: Implement Economics based on Commission Implementing Regulation (EU) 2026/2133 (Annex I.2), and Eurostat (Comext).

The measure will also increase the import prices for SLCs to at least the minimum import price

SLC import prices after minimum prices
EUR per tonne, 2025



In 2025, the average EU import price of SLCs was EUR 3,789 per tonne from Türkiye, EUR 3,624 from China, EUR 3,338 from the UAE and EUR 4,591 from other countries.

The Commission concludes that "*the imports from UAE represent almost completely only laminations, and that the import price of cores should be an average of the remaining imports*".

Following this assessment, imports from the UAE should be treated as laminations and all other SLC imports as cores. Out of quota, cores face a minimum import price of EUR 5,600 per tonne and laminations EUR 4,550.

At 2025 volumes, imports from Türkiye, China and the UAE exceed their tariff quotas. As for coils, the out-of-quota minimum import price will therefore set the market target, because tonnes imported in quota can be resold at that price.

Imports from other countries were just below their shared quota in 2025. With the other quotas filled, some volumes can be expected to shift to these origins and push them out of quota too.

As with coils, the measure will push EU import prices up to the out-of-quota minimum import price: an increase of 48% for Türkiye, 55% for China, 36% for the UAE and 27% for other countries on average.

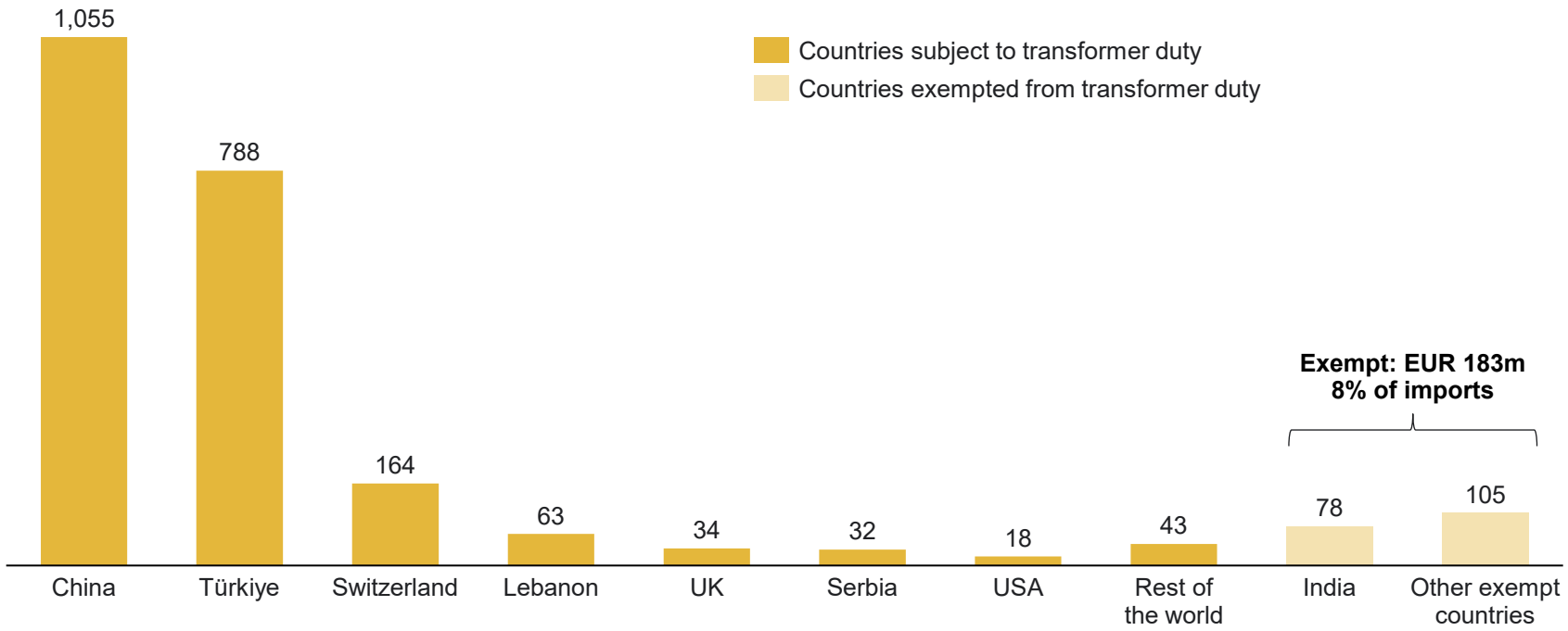
Note: 2025 price = average EU import value per tonne of SLCs (CN 8504 90 13). Trade statistics do not split laminations and cores; product mix as concluded by the Commission (recital 27). The price after the measure is a modelling assumption: out-of-quota imports set the price for all tonnes. Other countries: each origin raised to at least EUR 5,600 (origins already above keep their price), averaged with 2025 volumes; unspecified origins excluded.
Source: Implement Economics based on Eurostat (Comext) and Commission Implementing Regulation (EU) 2026/2133 (Annex I; recital 27).

Imported transformers pay EUR 1,140 per tonne of core with no quota

EU transformer imports by origin

EUR million, 2025

Product	Duty *(EUR/t of core)*	Exempt origins
Transformers	1,140	Norway, Iceland, Liechtenstein, Ukraine, Kenya, and developing countries except China



Note: Duty per Art. 1(6), on cores in transformers of CN 8504 21-34; no tariff quota. Exempt: Art. 5 (Iceland, Liechtenstein, Norway, Kenya, Ukraine) and developing countries in Annex III.1 except those listed in Annex III; cores in transformers are part of the laminations and cores product (Art. 1(3)). Imports: EU27 imports from non-EU countries, grid sizes (CN 8504 21-23, 33, 34), EUR 2,380m in 2025. Rest of the world: all other origins that pay the duty. Figures may not add due to rounding.
Source: Implement Economics based on Commission Implementing Regulation (EU) 2026/2133, Eurostat (Comext).

Imported transformers pay a duty of EUR 1,140 per tonne of core. Unlike GOES coil, laminations and cores, there is no quota and the duty thus applies from the first tonne.

The duty applies to all origins except the 122 countries that are exempt: Norway, Iceland, Liechtenstein, Ukraine, Kenya, and developing countries except China.

In 2025, EUR 183m of EU transformer imports came from exempt countries corresponding to 8% of total transformer imports. Imports from exempt countries are led by India.

Exempted countries such as India will see a relative cost advantage in the EU market vis-à-vis other exporters and vis-à-vis domestic producers.

As global value-chains are quick to adapt, transformer producers can relocate or expand production to one of the exempted countries, e.g. Vietnam, and export low priced transformers duty-free to the EU from there.

03

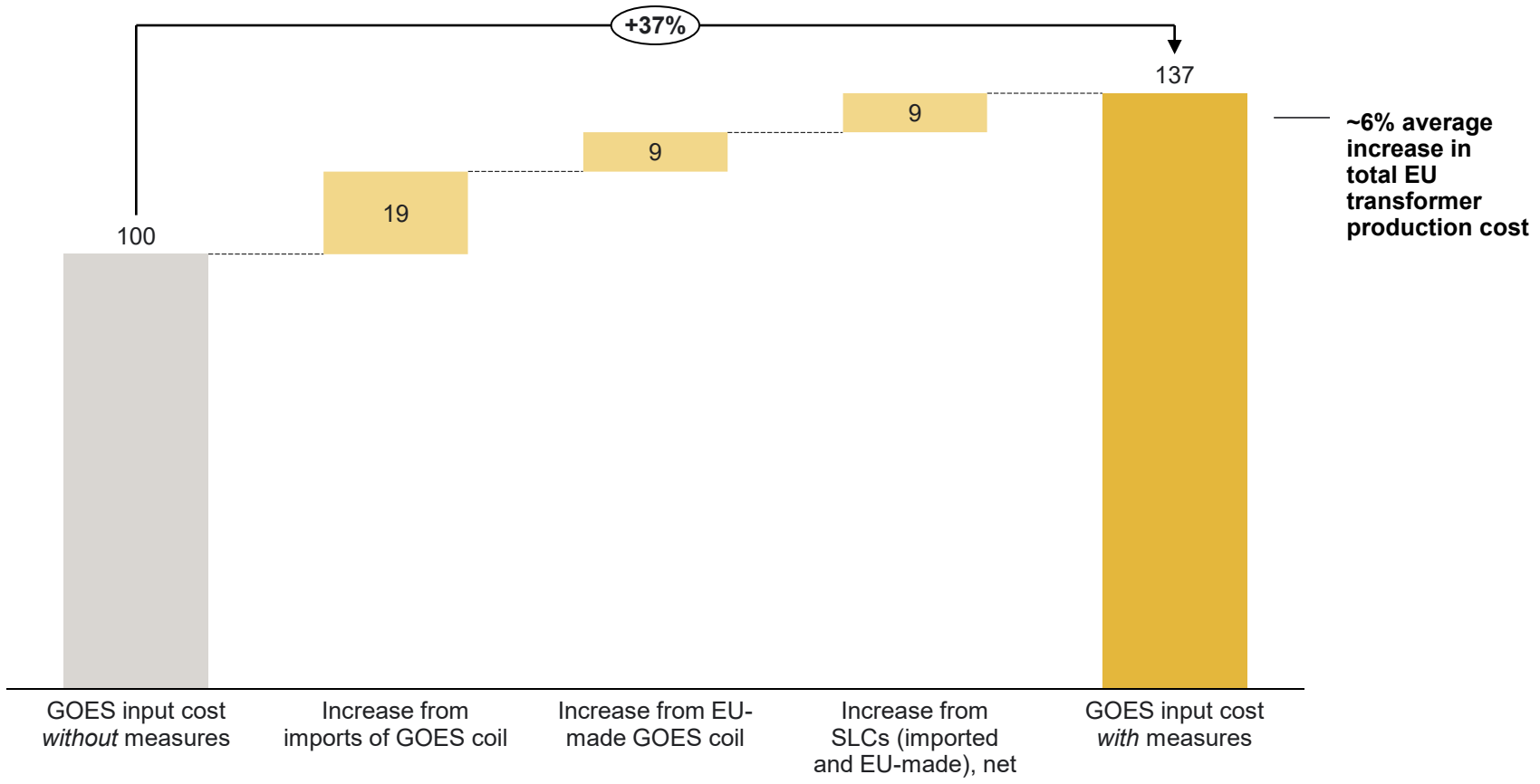
The measure's impact on the EU’s economy

Assessing the gains for the EU steel makers against losses for transformer makers and buyers

The safeguard on GOES will raise the GOES input cost of EU transformer makers by more than a third

GOES input cost of EU transformer makers

Index, GOES input cost without measures = 100 (2025 volumes)



The safeguard raises the price of GOES coils, laminations and cores sold in the EU. If imports from countries subject to the measure and EU-made products are all priced at the out-of-quota minimum import prices, the GOES input cost of EU transformer makers rises by about 37% at 2025 volumes.

About half of the increase comes from imported coil, a quarter from EU-made coil and a quarter from SLCs, net of the coil price increase that EU SLC makers pass on to transformer makers.

GOES makes up on average about 15% of transformer makers' total production costs, yet for some transformer types the share can be over 30 %. A 37% rise in GOES costs therefore raises total production costs by about 6% on average.

Short term, the cost increase will be borne by the transformer makers since the industry uses long term contracts that are typically priced years before delivery. Long term, the cost will be passed on to transformer buyers.

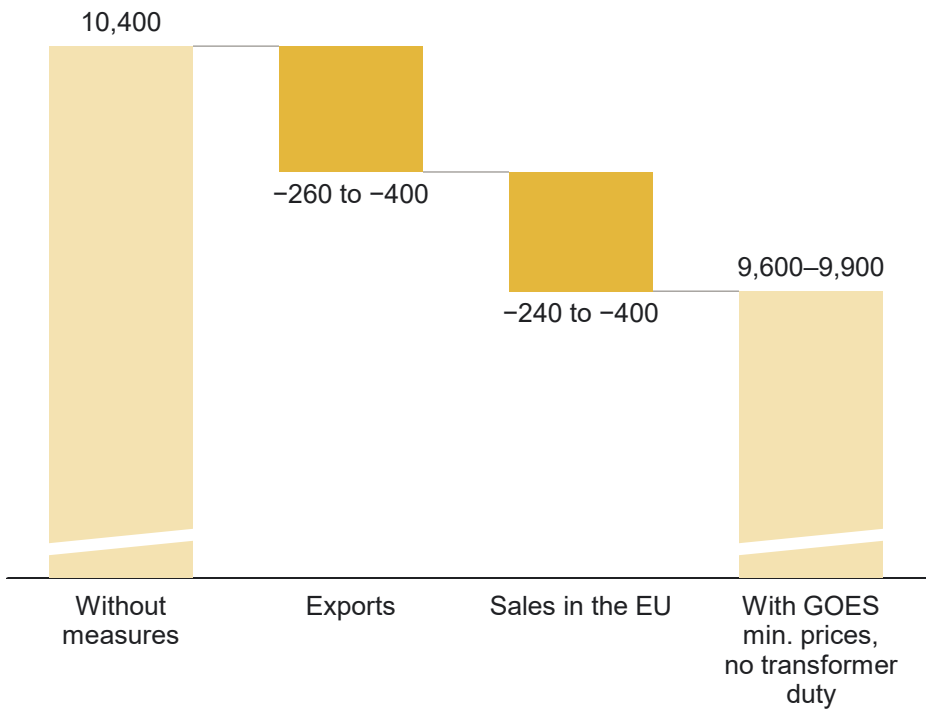
Note: Index: GOES coil, laminations and cores bought by EU transformer makers at 2025 volumes; cost without measures = 100. Imports from countries subject to the measure are priced at the out-of-quota minimum import prices (coil EUR 3,500/t; cores EUR 5,600/t; laminations from the UAE EUR 4,550/t). EU producers are assumed to raise their prices to the same levels. GOES share of total production cost: industry ranges of GOES share of material cost by transformer type; material costs make up ~50% of total production cost.
Source: Implement Economics based on Eurostat (Comext, PRODCOM), Hitachi Energy, and Commission Implementing Regulation (EU) 2026/2133 (Annex I; Tables 1, 4 and 5).

Without protection, transformer imports will increase and EU transformer output will fall by EUR 500-800 million a year

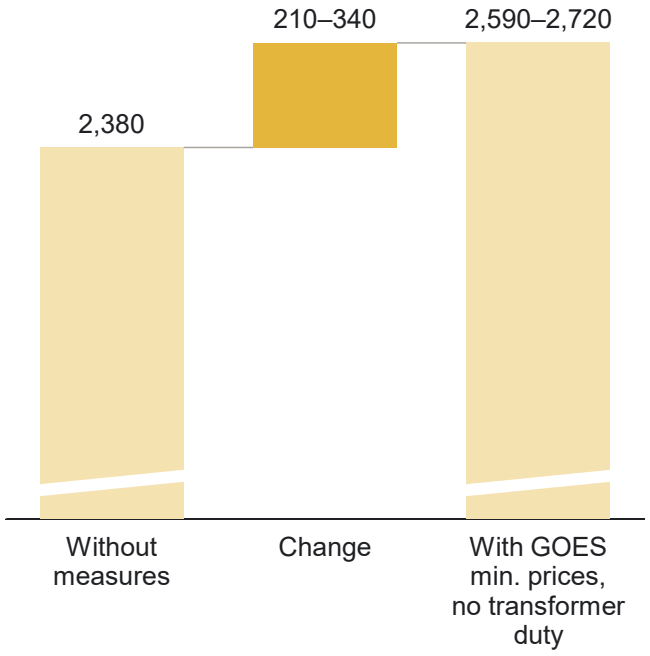
EU transformer output and imports

EUR million per year, 2025 prices

EU transformer makers:
Output drop of EUR 500–800 million



Import of transformers to the EU:
Increase of EUR 210-340 million



The minimum import prices increase the input cost for EU transformer makers.

Transformer makers outside the EU are not subject to the same cost increase, and without the transformer duty, non-EU producers would gain a cost advantage vis-à-vis EU producers.

Without a transformer duty, transformer imports would increase by up to EUR 340 million, and EU transformer output would fall by up to EUR 800 million, as EU transformer makers lose sales both in the EU and in export markets.

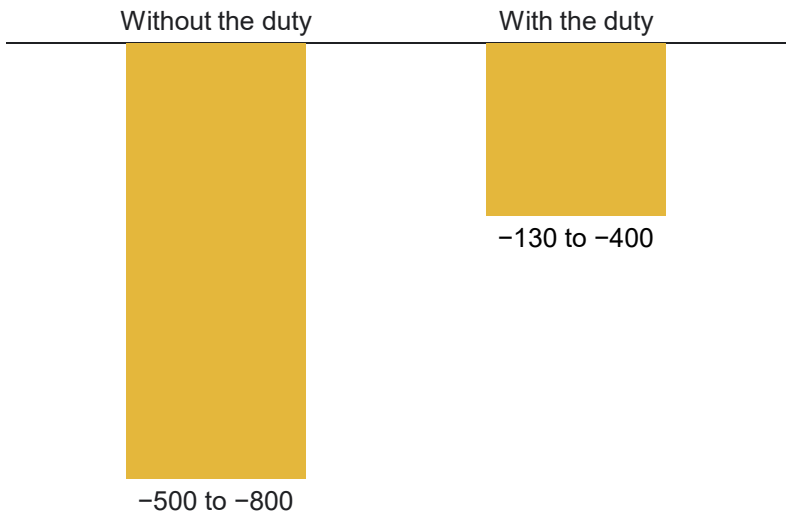
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

The transformer import duty does not restore a level playing field

EU transformer industry impacts from the provisional transformer duty

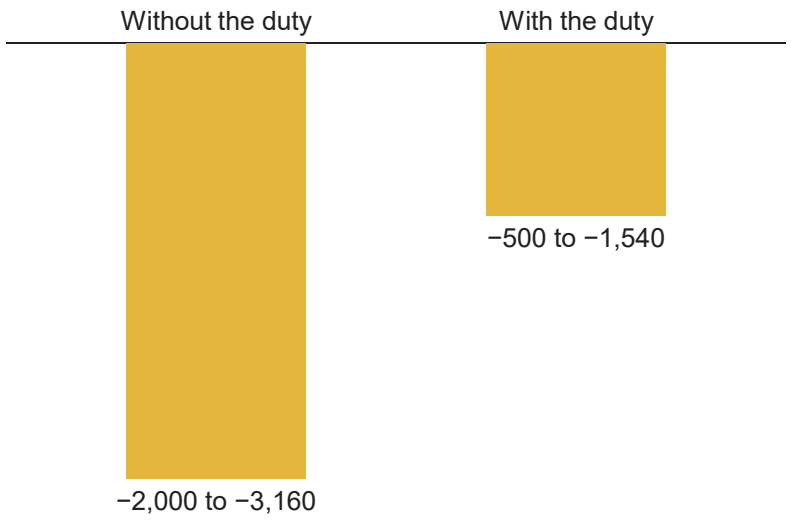
EU transformer output

EUR million per year, 2025 prices



Jobs at EU transformer makers

Persons



The provisional transformer duty charges EUR 1,140 per tonne of core on transformers imported from countries subject to the measure.

The duty is too low to offset the cost. At the level of 1,140/t, the output of the EU transformer industry is still set to shrink by up to EUR 400m.

Adequate protection would take a much higher duty of around 3,700-3,900 EUR/t (see section 4).

A key reason is that the duty only protects the EU domestic market. EU transformer makers are partly safeguarded in the domestic market, but in export markets they still carry the higher steel cost and become less competitive.

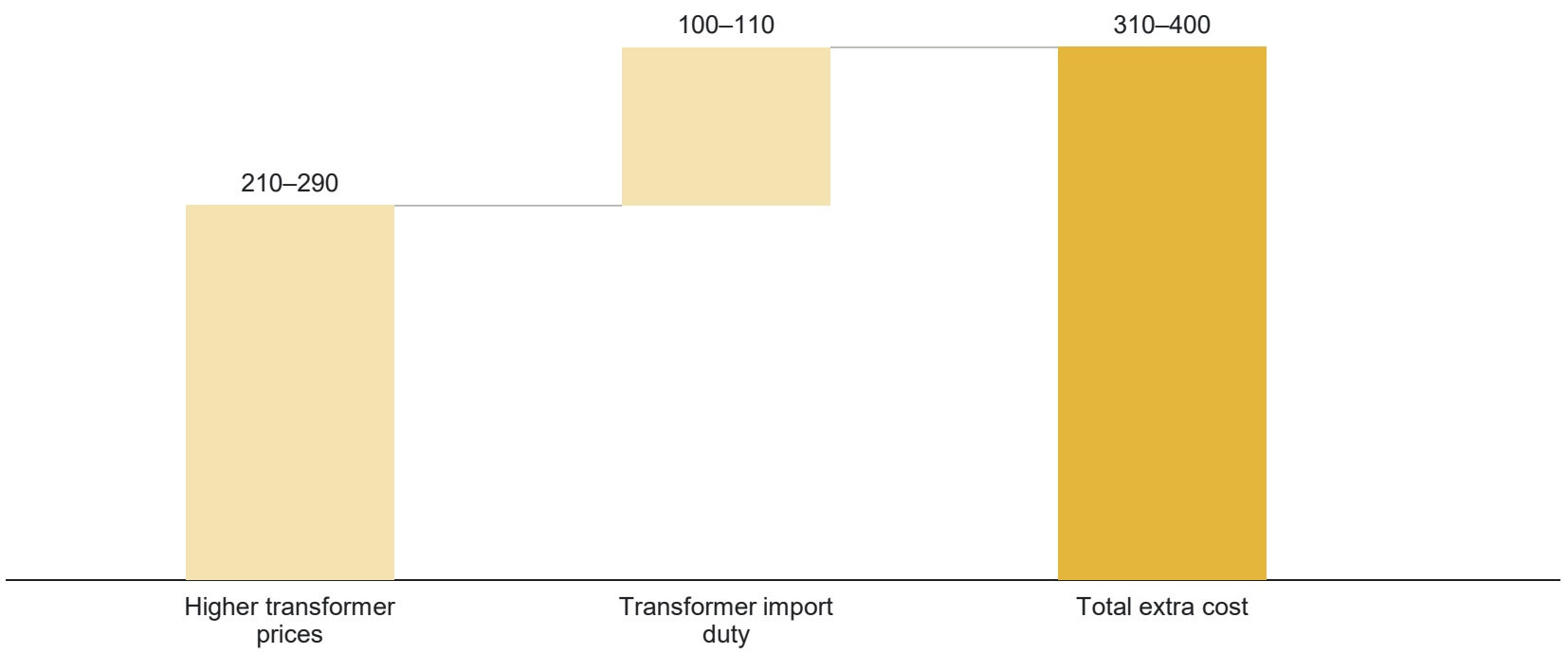
The duty also does not apply to the 122 exempt countries and these countries capture market shares in the EU market as a result of the measure.

Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM, SBS), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

GOES minimum import prices and the transformer import duty will increase the cost of Europe's critical electrification work by up to EUR 400 million a year

Extra cost for buyers of transformers in the EU, with the transformer import duty

EUR million per year, 2025 prices



Grid operators and power producers buy transformers to expand and renew the electricity grid.

With minimum prices on GOES and transformer import duty, European buyers of transformers pay up to EUR 400 million more per year.

Most of it, EUR 290 million, comes from higher transformer prices following the imposed minimum prices for GOES.

EU transformer makers can pass on part of their higher GOES cost, and they can raise prices because imported transformers become more expensive due to the downstream protection with the transformer duty.

The rest, EUR 110 million, is the transformer import duty. Buyers pay it, and it goes to the EU budget.

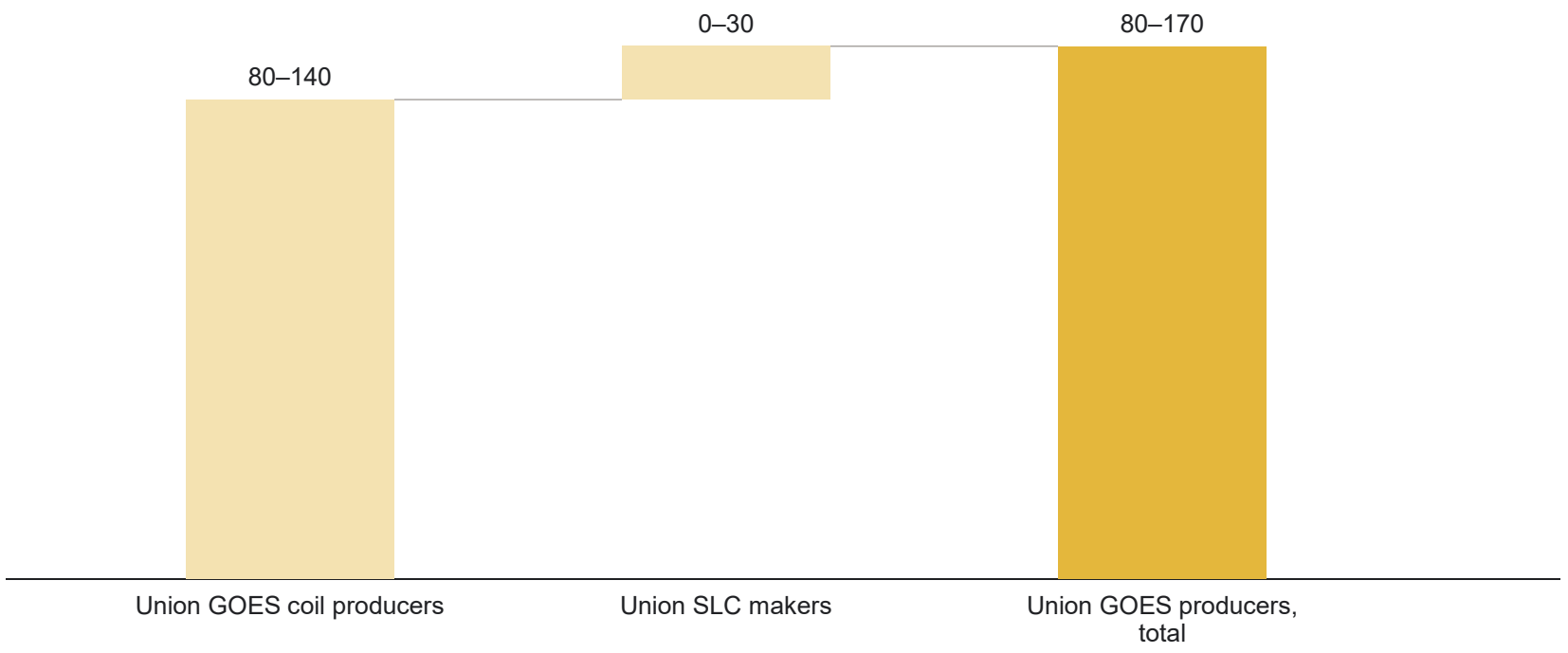
Grid operators recover their costs through network tariffs, so in the end households and businesses will pay through their electricity bills.

Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

The safeguard will generate relatively small gains of EUR 80–170 million a year for Union GOES producers, mainly via higher prices

Change in EU welfare of Union GOES producers, with the transformer import duty

EUR million per year, 2025 prices



Union GOES coils and SLC producers gain EUR 80–170 million a year, mainly from higher prices in the EU.

Union GOES coil producers raise their prices in the EU by 10–29%, but production by only 2–7%.

The main effect is from EU GOES coil producers redirecting some of the current export volumes to the EU market as higher prices in the EU will make this more attractive. A smaller part of the gain is from producing more coils in the EU.

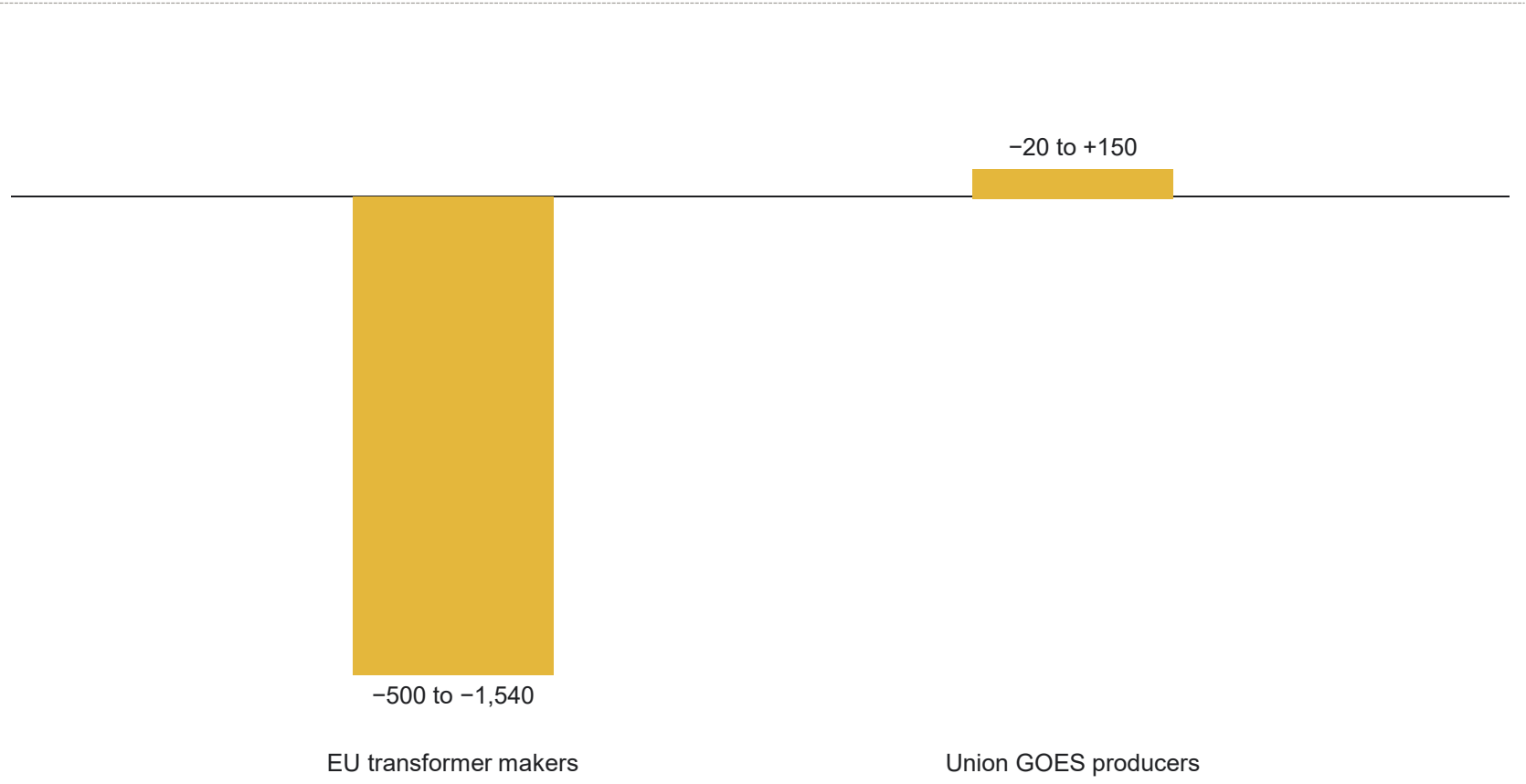
Union SLC makers raise their prices in the EU by 17–34%, while their production is set to fall by up to 6%. GOES coils, their main input, become more expensive, weakening their global competitiveness and exports, while EU transformer makers also buy fewer cores. They are set to gain at most EUR 30 million, also driven by higher prices.

Note: Welfare = change in consumer and producer surplus and duty revenue in a partial equilibrium trade model. Price changes are estimated for union producers' prices within the EU compared with 2025 prices (Reg. 2026/2133, Table 4); production in tonnes.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

Union GOES producers will gain at most 150 jobs, while over 1,500 jobs at EU transformer makers are lost

Change in jobs, with the transformer import duty

Persons



EU transformer makers employ over 41,000 people, 13 times as many as the 3,000 people employed at Union GOES producers.

With the decline in transformer production as imported transformers gain market shares, up to 1,540 EU transformer jobs are lost.

Since the Union GOES producers will only see small increases in production, the gain in GOES jobs is limited and estimated at 150 jobs at most.

There is even a plausible scenario whereby the Union GOES producers lose about 20 jobs, driven by job losses for the SLC makers. SLC makers cut jobs when their input costs rise, making EU SLC production less competitive which harms exports, at the same time as EU transformer makers buy fewer cores.

In net terms, around 1,400 jobs in the EU are at risk.

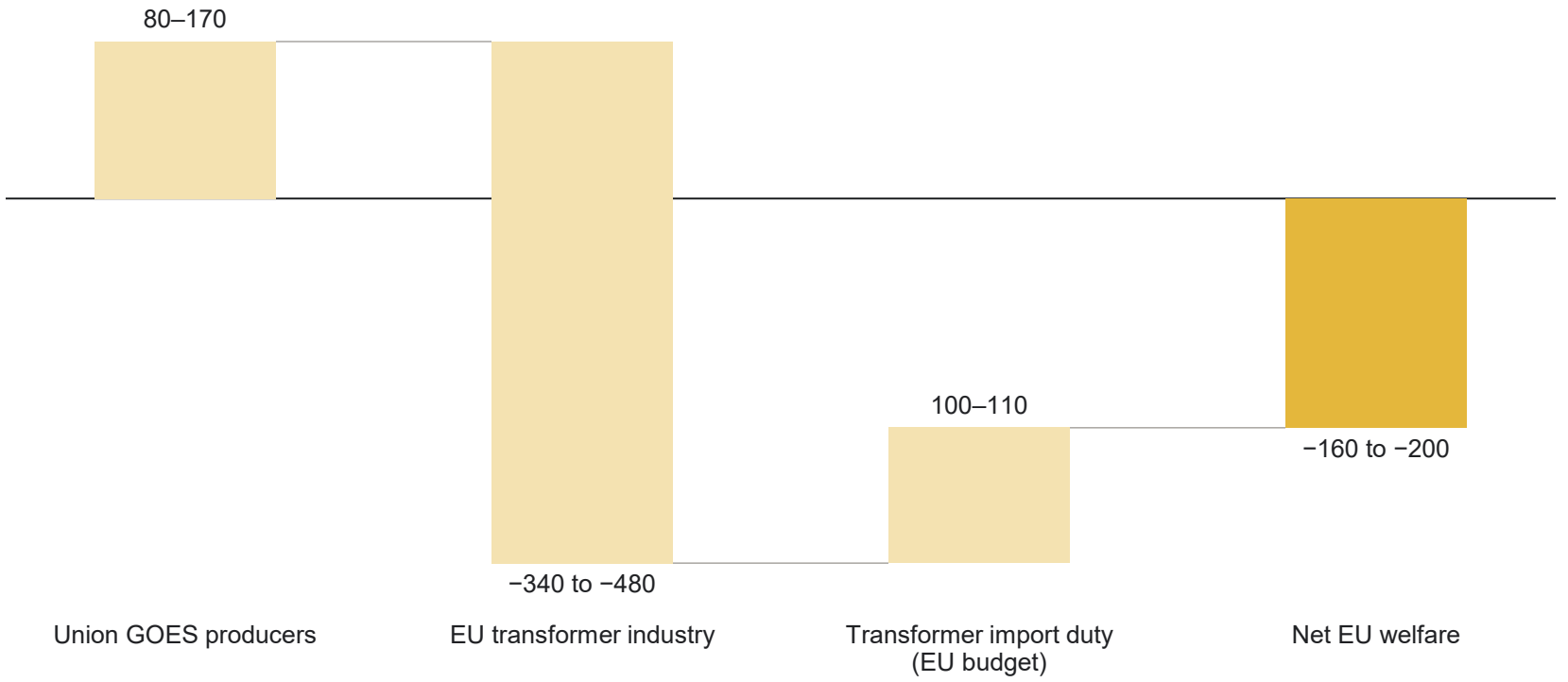
Or in other words, for every steel job the measure gains, ten jobs are lost at EU transformer makers.

Note: Job changes are modelled to follow one-for-one with output.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM, SBS), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

In total, the safeguard measure will reduce EU welfare by up to EUR 200 million a year

EU welfare

EUR million per year, 2025 prices



The measure redistributes welfare between groups in the EU. Union GOES producers and the EU budget gain a combined EUR 180–280 million a year.

Transformer makers and buyers together lose EUR 340–480 million a year. Initially, most of this burden will lie with the transformer makers, as existing contract prices are largely fixed.

Over time, the transformer contracts will be renewed, and EU producers will need to adjust prices upwards to account for increasing steel prices.

Long term, the cost increase will be borne by transformer buyers.

The losses for the transformer industry exceed the gains for EU GOES producers and the transformer import duty revenue.

The difference, EUR 160–200 million a year, is a net loss for the EU.

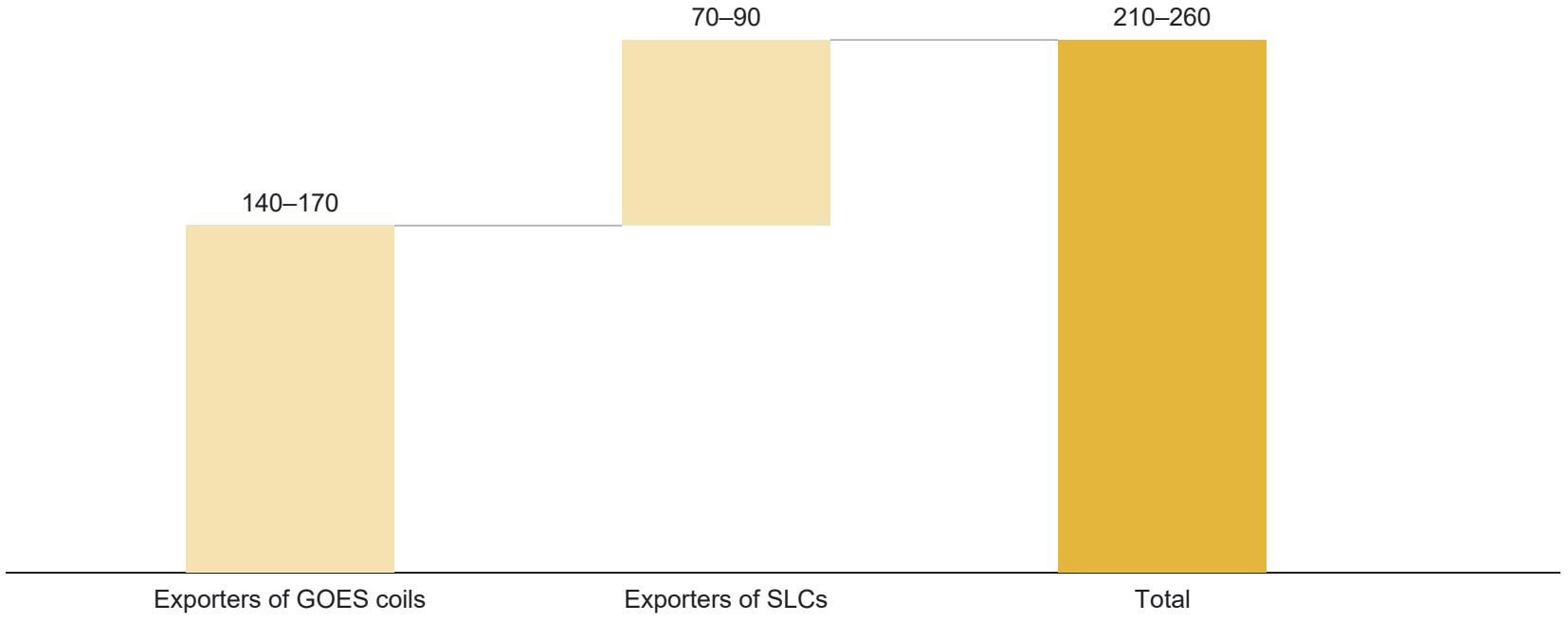
The measure also generates additional rents for GOES exporters to the EU (see next page).

Note: GOES covers producers of GOES coils and SLCs. EU transformer industry covers EU transformer makers and buyers together. Welfare = change in consumer and producer surplus and duty revenue in a partial equilibrium trade model. The welfare loss is smaller than the fall in EU transformer output. Output is the value of EU production; Welfare is the related incomes in the EU.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

Foreign exporters of GOES coils and SLCs will capture additional rents of up to EUR 260 million a year because of the minimum-price design

Additional rents for exporters to the EU from the minimum import prices, with the transformer import duty

EUR million per year, 2025 prices



If an exporter sells below the minimum import price, the importer pays the difference as a duty. Exporters avoid this by raising their own price to the minimum import price. The difference then becomes additional rents for the exporters.

A tariff of the same size would have contributed to the EU budget instead.

The additional rents are 1.5-2.5 times the gains of Union GOES producers. Exporters in China alone receive EUR 110–140 million a year.

Note: Assumes exporters raise their prices to the minimum import price and keep the full difference, as the Commission concluded for the steel safeguard (Reg. (EU) 2022/58, recitals 322, 334 and 343).
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

The EU transformer industry: Germany and Italy each lose up to 300 jobs

Job gains and losses across EU member states and industries, with the transformer import duty (ranges)
jobs in persons

Member state	GOES coil producers	SLC producers	Transformer makers	Total
Germany	+20 to +75	−5 to 0	−170 to −310	−95 to −295
Poland	+5 to +25	0	−30 to −110	−5 to −105
Spain	0	0	+10 to −110	+10 to −110
Italy	0	−35 to +5	−120 to −280	−115 to −315
Rest of EU	+15 to +45	−20 to 0	−190 to −730	−145 to −735
EU total	**+40 to +145**	**−60 to +5**	**−500 to −1,540**	**−350 to −1,560**

The total job loss for the EU transformer makers is estimated at up to 1,540 jobs. That is over ten times the estimated gain for EU GOES coil and SLC producers. Further, SLC producers do not stand to gain from the measure, due to increased input costs and lost competitiveness.

Germany and Italy, with the largest transformer industries, are each estimated to lose around 300 jobs at transformer makers; Spain and Poland around 110 each.

While Germany and Poland are also the main locations for the EU GOES production, both countries are estimated to suffer net job losses from the measure.

Note: Results for the upper end of the modelled range with the provisional transformer import duty, rounded. EU transformer industry covers EU transformer makers and buyers together. Jobs follow output, with the same output per job in every member state. Rest of EU = the other 23 member states.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

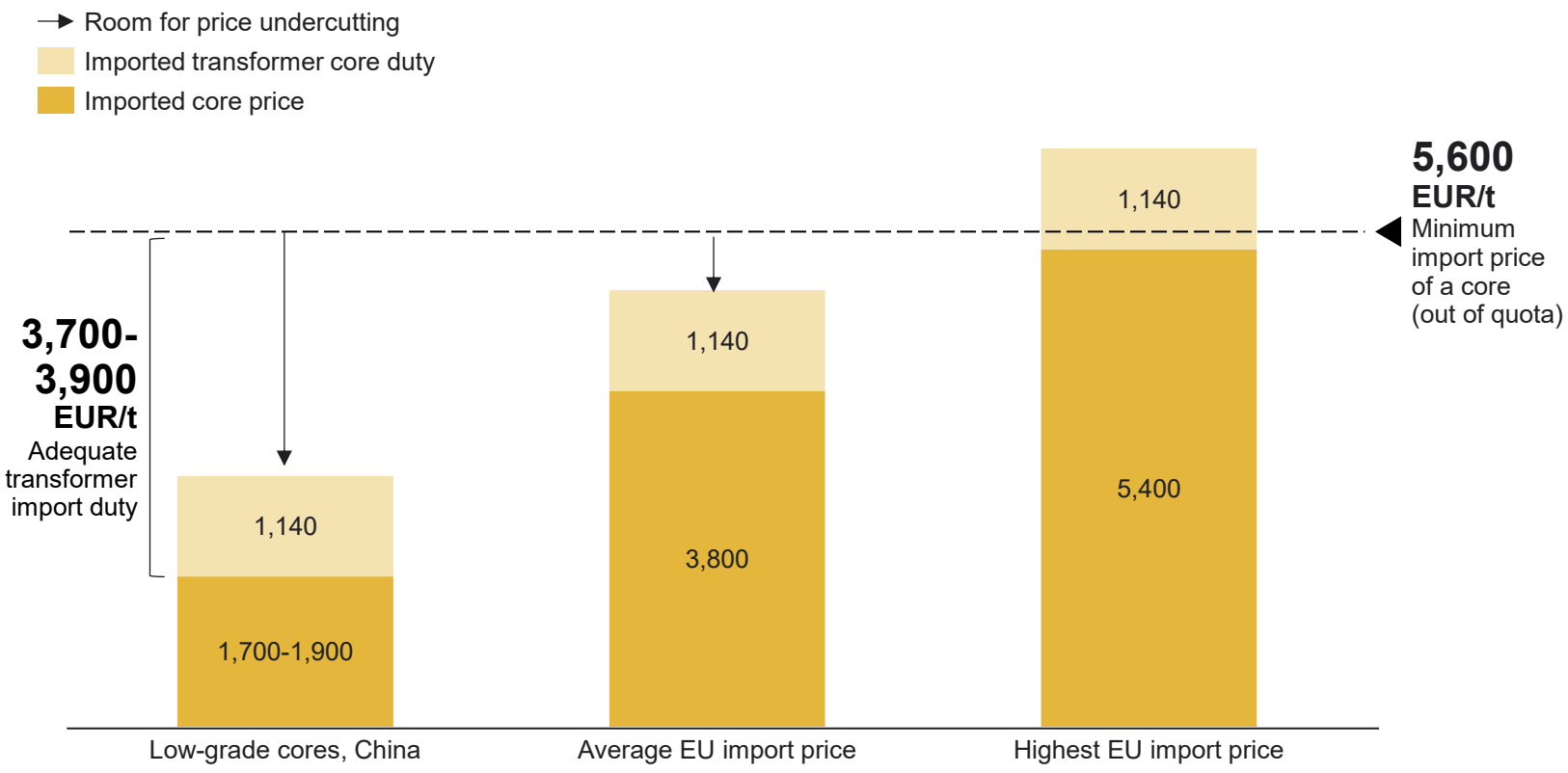
04

Where the current design falls short

Why the measure in its current form may not be the best way to reach its goal

A higher transformer duty is needed to restore a level playing field for the EU transformer industry

Savings from importing a core inside a transformer rather than importing the core on its own
EUR per tonne, 2025



With the duty of EUR 1,140 per tonne of core, the EU transformer industry risks losing up to EUR 400 million in output per year.

To safeguard the aggregate EU transformer industry and compensate it economically, the transformer duty would need to more than double the EUR 1,140 to restore a level playing field for "the average transformer".

However, transformer cores are not a uniform product. They come in many grades and designs, some with a high and some with a low price per tonne.

The measure sets one out-of-quota minimum price of 5,600 EUR/t for all imported cores, and a flat 1,140 EUR/t on the cores inside imported transformers. For low grade cores being imported at around 1,700-1,900 EUR/t, this means that imported low grade cores in transformers can enter at around only 2,840–3,040 EUR/t.

The EU price for cores will increase to the out of quota minimum price of 5,600 EUR/t and this leaves room for substantial undercutting by imported transformers. Transformers with lower-grade cores are often produced by the smaller producers, are thereby hit hardest by the measure's design. Protecting them would take a duty of around 3,700-3,900 EUR/t.

As currently designed, there are three core problems with the transformer duty:

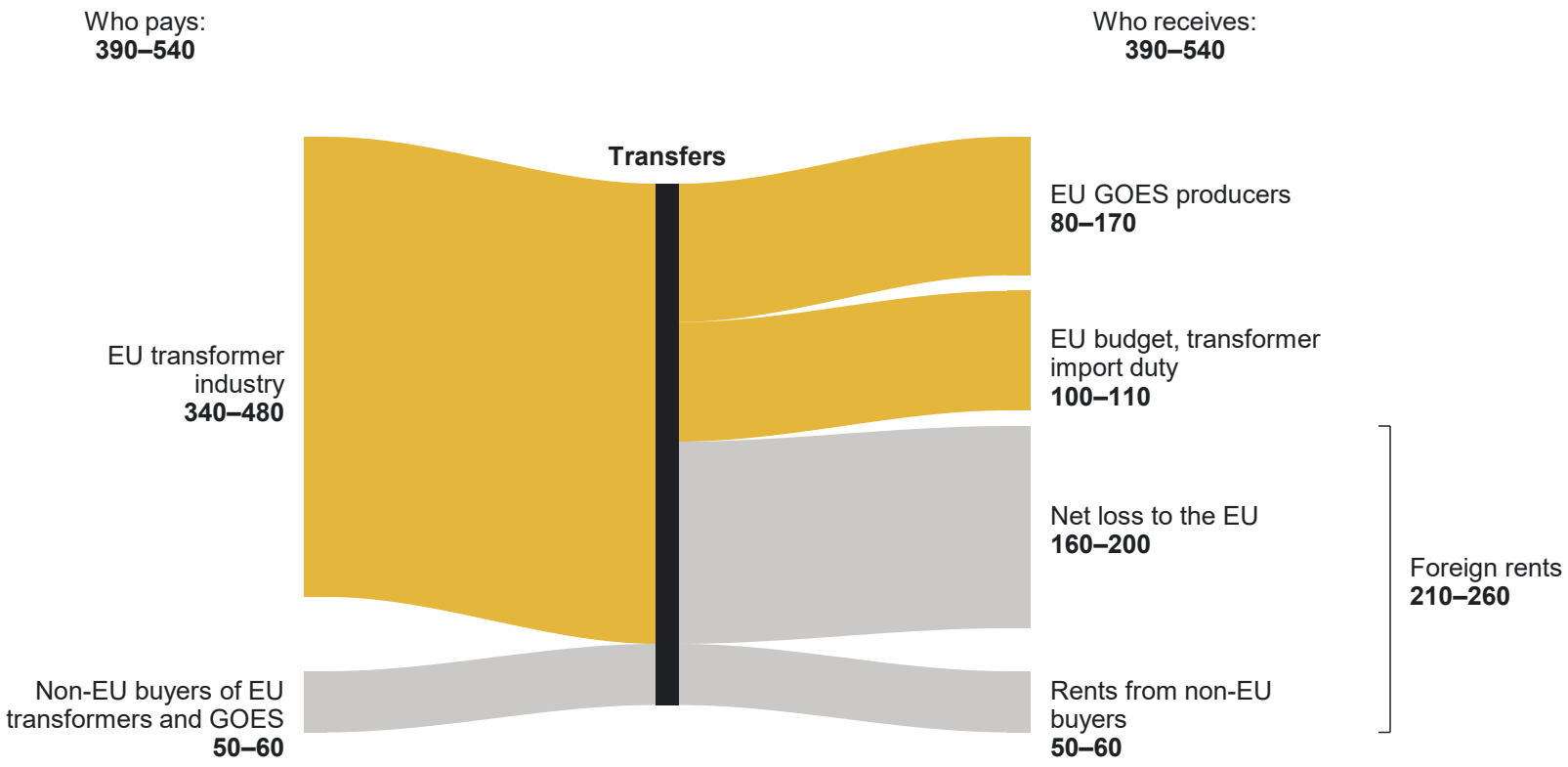
1) The duty of 1,140 EUR/t is too low to protect the average EU transformer.
2) The duty is much too low to protect the lower grade EU transformers
3) Finally, 122 countries are exempt from the duty, and the risk of circumvention from these countries would need to be addressed to fully safeguard EU transformer production.

Note: Low-grade cores: industry data input on the price range based on 2025 price-points of conventional-grade cores (core loss above 0.9 W/kg) bought from Chinese suppliers, excluding Chinese VAT, converted at the ECB 2025 average exchange rate. Average EU core imports based on 2025 average EU import price of cores, EUR 3,796 per tonne. Highest-priced EU core imports based on Switzerland, EUR 5,421 per tonne, the highest 2025 import price among origins supplying more than 1,000 tonnes (Eurostat, Comext, CN 8504 90 13). It exceeds the EUR 664 gap on average cores because it must also offset EU makers' lost competitiveness in export markets and the fall in transformer demand due to higher prices.
Source: Implement Economics based on industry information, a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

Industrial policies targeted at the EU steel production could be less intrusive and less costly

Money transferred by the measure, with the transformer import duty

EUR million per year, 2025 prices



The GOES safeguard forces higher import prices and imposes a transformer duty. It is an expensive policy resulting in a net loss to the EU economy of up to EUR 200 million per year.

As shown, less than half of the additional cost imposed on the EU transformer industry and its customers will stay within the EU. Some of the cost will transfer as a gain for other EU sectors. Up to EUR 170 million goes to Union GOES producers and up to EUR 110 million in transformer import duties ends up in the EU budget. Most of the cost increase, however, ends up with non-EU GOES suppliers gaining up to EUR 200 million as additional rents from EU buyers and up to EUR 60 million from non-EU buyers because of more costly EU transformers.

Overall, this is a costly intervention in which every euro gained by Union GOES producers costs the transformer industry and its buyers four times as much. For each steel job gained, the EU will lose ten transformer jobs.

Policy makers should therefore consider whether the objectives of maintaining or strengthening grain-oriented steel production in Europe could be achieved equally well with less costly measures.

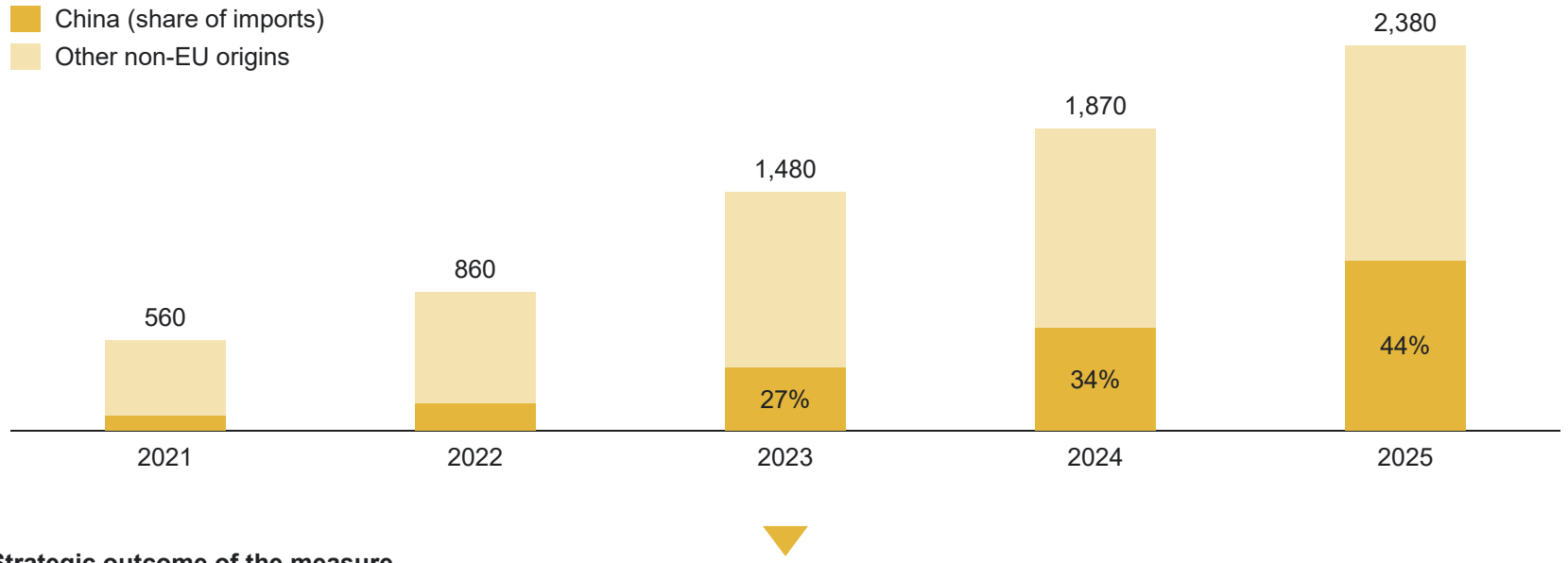
Industrial policies targeted at the steel industry to improve innovation, productivity and modernisation of capacity could be considered and the cost of this measure should be considered in relation to the net welfare loss of the proposed measure.

Note: GOES covers GOES coils and SLCs. EU transformer industry covers EU transformer makers and buyers together. Welfare = change in consumer and producer surplus and duty revenue in a partial equilibrium trade model. Non-EU buyers of EU transformers and GOES + rents from non-EU buyers equals foreign transformer suppliers absorbing part of the transformer import duty and foreign customers paying higher prices for EU exports, less the efficiency loss of the measure; calculated as net of other payments and receipts.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

The measure will increase Europe's strategic dependence as it leads to importing transformers instead of the steel that goes into them

EU transformer imports by origin

EUR million per year, current prices



Strategic outcome of the measure



The issue of the measure is not only cost, but European industrial capacity and investments.

EU imports of larger transformers have increased strongly, with China representing a very substantial share: 44% of EU transformer imports in 2025. The rise in imports to cover the EU's electrification needs does not only affect the GOES industry, but also the transformer industry.

With the measure and inadequate downstream protection, Europe ends up further importing finished transformers instead of the steel that goes into them.

A measure intended to strengthen European resilience therefore shifts the dependency downstream, from imported GOES to imported transformers.

Making European production more expensive will accelerate finished-transformer imports, shift value creation outside Europe and increase rather than decrease Europe's strategic dependence. Without the transformer import duty properly protecting the EU industry, EU transformer imports will rise by EUR 210–340 million a year.

Notes: Imports: EU27 from non-EU countries, grid sizes (CN 8504 21–23, 33, 34), current prices. Rise in imports without the transformer import duty: partial equilibrium trade model, two price scenarios, 2025 volumes and prices.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

05

Appendix: Model details

The model, data and assumptions behind the results

Partial equilibrium trade model methodology

A multi-region trade model

We use a multi-region partial equilibrium trade model in the GSIM tradition, widely used by trade authorities and researchers to assess trade measures. Three linked markets, GOES coils, SLCs and transformers, are solved together: higher steel prices raise transformer makers' costs, and lower transformer output reduces the demand for steel.

Each market covers the EU and its main trading partners. Products from different origins are close but not perfect substitutes, so buyers shift between suppliers gradually. Welfare is the change in producer and consumer surplus and duty revenue. Workers and capital leaving production are assumed to find other use at no cost, so the fall in EU output is not counted as a welfare loss. In practice, finding new jobs and putting factories to other use takes time and money, so the welfare loss should be read as a lower bound on the damage to the EU economy.

The measure and price scenarios

Minimum import prices, tariff quotas and the transformer import duty are modelled as set out in Regulation (EU) 2026/2133. Results are shown as a range reflecting plausible outcomes and uncertainties.

Market intelligence on transformer makers' GOES purchases indicates prices may go above EUR 3,500 per tonne for grades and origins in especially high demand. This is not modelled to remain conservative on the price impact.

Data

The model is calibrated to 2025, the latest full year. Trade flows by origin and destination come from Eurostat (Comext) and UN Comtrade, EU production from Eurostat (PRODCOM) and the Commission's own figures in the Regulation. Industry data give the weight of cores in transformers, cross-checked against the Commission’s Ecodesign preparatory studies on transformers. Tariff quotas set for 155 days are scaled to a full year. Effects are calculated at 2025 volumes; as transformer demand grows, the tariff quotas will bind more tightly in the future than in our model.

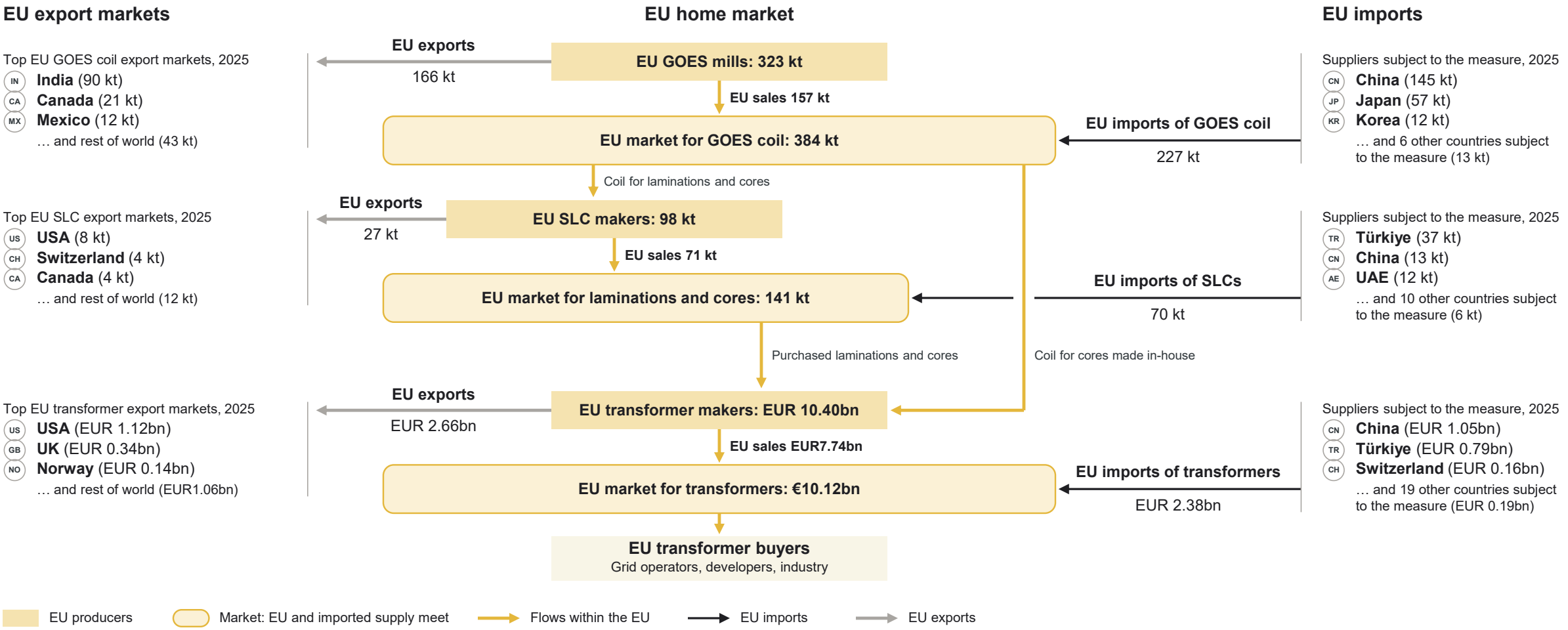
Parameters

How strongly supply, demand and buyers' choice of supplier respond to prices is based on published estimates, mainly the US International Trade Commission's investigations of GOES and large power transformers, and the trade literature.

The values reflect two features of the market. EU transformer makers cannot freely replace imported GOES, as Union producers make few of the highest grades, which come mainly from Japan and Korea and partly from China. Further, GOES supply is limited by the fact that new production capacity is costly and slow to expand.

Note: Model: Francois and Hall (2003), Global simulation analysis of industry-level trade policy. Parameters: USITC (2012), Large Power Transformers from Korea, Pub. 4346; USITC (2014), Grain-Oriented Electrical Steel from Germany, Japan, and Poland, Pub. 4491; USITC (2023), Economic Impact of Section 232 and 301 Tariffs on U.S. Industries, Pub. 5405; USITC (2024), Large Power Transformers from South Korea, second review, Pub. 5531; Francois and Baughman (2001); US Department of Energy (2012), distribution transformers, 77 FR 7282; GTAP Data Base (Purdue University); VITO-BIO (2011), Ecodesign preparatory study Lot 2: Distribution and power transformers; VITO (2017), Preparatory study for the review of Regulation (EU) No 548/2014 on transformers.
Source: Implement Economics based on a partial equilibrium trade model (GSIM), Eurostat (Comext, PRODCOM), UN Comtrade and Commission Implementing Regulation (EU) 2026/2133.

Overview of the EU GOES market in 2025



Note: EU trade with non-EU countries in 2025. GOES coil and SLCs in thousand tonnes (kt); transformers (grid sizes, CN 8504 21–23, 33, 34) in EUR billion. Market = EU sales (production − exports) + imports. Production: coil and transformers Eurostat PRODCOM (transformers: sold production value); SLCs GSIM base data. Imports from exempt countries not shown (coil 0.4 kt, SLCs 1.9 kt, transformers EUR 0.18bn). Figures may not add due to rounding.
Source: Implement Economics; Eurostat Comext and PRODCOM; Commission Implementing Regulation (EU) 2026/2133, Art. 5 and Annex III.

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