

ENTSO-E

Overview of Transmission Tariffs in Europe: Synthesis 2024



CONNECTING EUROPE,
ELECTRIFYING THE FUTURE

Mission Statement

ENTSO-E – the European Network of Transmission System Operators for Electricity – brings together 40 electricity Transmission System Operators (TSOs) from 36 countries. ENTSO-E members are responsible for the secure and coordinated operation of Europe's electricity system. Together, they operate a system of around 500,000 km of power lines – **the largest interconnected electrical grid in the world** – and serve about 520 million citizens.

Electricity is not merely a market commodity, it is an essential service, and TSOs are fully regulated public service entities whose work is essential to powering Europe. The grid is the backbone of the electricity system and has extended over the whole Continent, beyond the borders of the EU. TSOs working together guarantee a functioning infrastructure that makes the trade of electricity possible, contributes to decarbonisation goals, and ensures a reliable and efficient power supply for all members of society.

These shared public service responsibilities need close cooperation beyond national borders, which led to the creation of ENTSO-E. Today, the association serves two main complementary purposes:

1. Cooperation of European TSOs

The foundations of this cooperation date back to the 1950s with the creation of electrical synchronous areas and interconnections, which laid the groundwork for today's interconnected European power system. TSOs established associations to work together on their own mandates and missions, that came together into what today is ENTSO-E. The European electricity system is one of the most stable and reliable grids in the world and is supported by the cooperation and coordination of TSOs both within the European Union and closely interconnected European countries. ENTSO-E strives to build consensus for decision-making amongst its member TSOs as this forms the strongest foundation for cooperation.

2. Fulfilling EU legal mandates

With the adoption of the Third Energy Package in 2009, ENTSO-E's role was formally recognised by European institutions. ENTSO-E was granted legally mandated tasks to further develop the European interconnected grid and to facilitate the integration of European electricity markets. These mandates cover a large spectrum of tasks, including system operation, system development, market integration, information technologies, R&D and innovation.

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1 Executive summary

Transmission tariffs are one of the key elements of the Internal Electricity Market (IEM). Different tariff schemes have evolved and co-exist across Europe.

To compare TSO tariffs, the ENTSO-E Economic Framework Working Group calculates an annual “Unit Transmission Tariff” (UTT) for each participating country on a pre-defined “base case”. It is this virtually created UTT expressed in €/MWh that is discussed throughout this document. Thus, this overview does not compare individual transmission tariffs directly. Moreover, this overview does not consider differences between countries in areas such as quality of service, market arrangements, technical characteristics, environmental aspects, or the location and density of generation/load, despite these factors having an influence on the absolute level of tariffs. The “base case” used for the calculation of the UTTs is characterised by a pre-defined voltage level to which load and generation are connected, and pre-defined power demand and utilization time. The calculation of the UTT covers charges invoiced to base case grid users (generation and load) for the purpose of covering both TSO costs (infrastructure, system services and losses) and, where applicable, non-TSO costs (renewable energy support, regulatory levies, stranded costs, etc).

As in past years, two clarifications to the data submitted by TSOs for the 2024 ENTSO-E Overview of Transmission Tariffs are worth to be reminded. Firstly that, in general, the total UTT includes non-TSO costs charged to “base case” users, even if they do not form part of the TSO tariffs in the participating countries and even if they are not charged directly to base case users. This is because in some countries, non-TSO costs do form part of or are invoiced along with the TSO tariff and therefore, for consistency, it is necessary to include them. However non-TSO costs can still be disaggregated and are shown separately in this document to be transparent about the different elements charged to base case users. The non-TSO costs mostly relate to renewable energy support (RES) schemes. It must be clear that the focus of this report is on the charges that relate to the services provided by the TSOs.

In terms of the main findings, the table below summarises the annual, real change in the average UTT components and their values for 2024:

	2024	real change 2024/2023
Average European UTT	18.15 €/MWh	+17.20 %
Due to TSO Costs	14.95 €/MWh	+5.98 %
Due to Non-TSO Costs	3.20 €/MWh	+131.76 %

See country remarks for details of the UTT changes. When annual changes exceed 10% compared to last year, reasons are provided.

The graph below illustrates how the UTT has evolved over recent years:

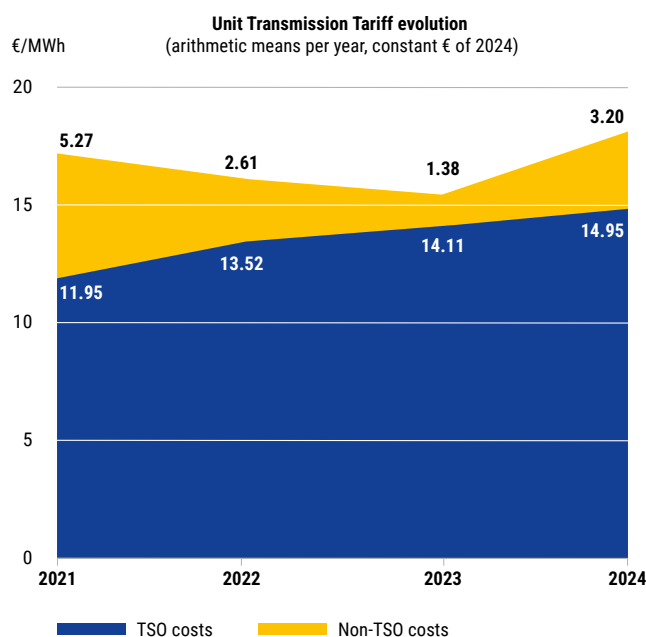


Figure 1.1: Evolution of UTT from 2021 – 2024

On average, in 2024 the TSO cost component of the UTT is divided 43.6 % for the infrastructure, 39.6 % for the system services and 16.8 % for the losses. On average, 65.1 % of the TSO cost component is invoiced based on energy (i.e. on a volume, or MWh basis), while 34.9 % is invoiced based on power (i.e. a capacity, or MW basis). The TSO part of the UTT is applied both to generation and load in 18 countries, whereas in 18 countries as well only load is charged. The average of the TSO part of the UTT is 13.96 €/MWh for load and 0.99 €/MWh for generators. In five countries the TSO part of the UTT is charged by using locational signals.

It should be noted that the tariff comparisons shown in the report does not represent a comparison of costs. Tariff levels are, directly or indirectly, influenced by the level of congestion rents in each country, and this effect may be very substantial. In addition, different national practices of public grants and TSO's use of connection fees, can also influence the tariff level. Hence, the report's tariff comparisons should be interpreted with caution and not viewed as conclusive.

2 Introduction

Transmission tariffs are one of the key elements of the Internal Electricity Market. It should be noted that this Overview is not a direct comparison of transmission tariffs and if used in this way, any conclusions drawn are likely to be misleading. Based on different national contexts and national policies, which transmission tariffs must meet, there are numerous approaches which implies a considerable complexity throughout Europe.

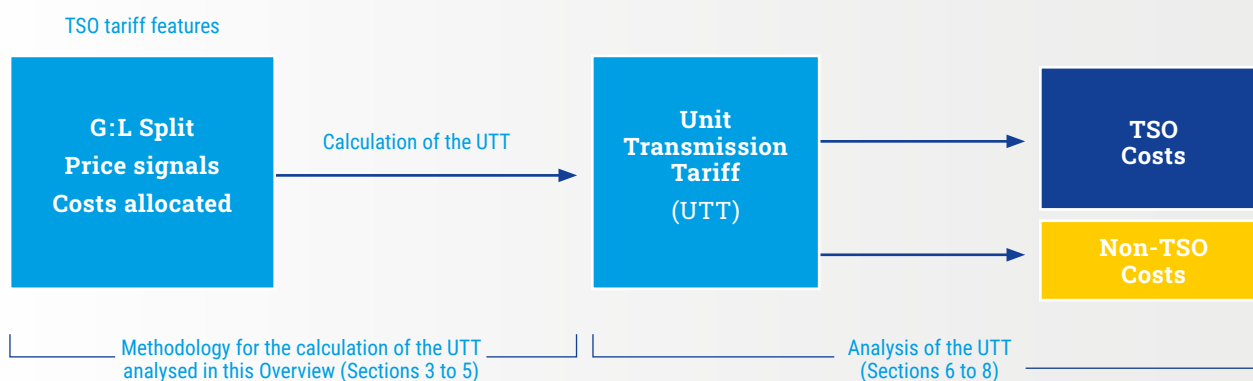


Figure 2.1: Summary of document structure

It is outside the scope of this report to analyse all influences that shape the tariffs in each system. As there is no single “correct solution” for the allocation of costs to transmission users, different tariff schemes exist in Europe. Differences might include whether market mechanisms are used as part of the regulatory regime, the treatment of transmission losses and of ancillary services, and the level of first connection costs to which transmission grid users are exposed. This Overview does not consider the differences among countries in areas such as quality of service, market arrangements, technical characteristics, environmental aspects, consumption density, and generation location – all factors that influence the level of such tariffs.

With the above in mind, to make the tariffs more comparable across the ENTSO-E countries participating in this report, a “Unit Transmission Tariff” (UTT) is calculated for a pre-defined “base case”, discussed further in Section 3. Thus, this overview does not compare individual transmission tariffs, but calculated Unit Transmission Tariffs expressed in €/MWh which may significantly differ from country specific TSO tariffs. **It is this “Unit Transmission Tariff” that is discussed throughout this document.**

The above diagram summarises how this document is structured. Section 3 describes the methodology for the calculation of Unit Transmission Tariffs and the definition of the base case. Section 4 outlines the main characteristics of the TSO tariffs considered in the calculation of the Unit Transmission Tariffs. Section 5 provides detail on the costs that have been considered in the calculation of Unit Transmission Tariffs for each country, including where estimations have been made. Section 6 outlines the resulting Unit Transmission Tariffs for 2024. Section 7 analyses the TSO components of the Unit Transmission Tariffs. Section 8 examines the non-TSO components of the Unit Transmission Tariff, i.e. those costs included in the Unit Transmission Tariff, but not directly attributable to the activities of TSOs. Finally, the appendices contain further detail, including country-specific remarks providing additional clarity on the reasons for any significant differences, voltage levels operated by TSOs, tariff areas with different locational differentiation, first connection charges, special tariffs, tariff treatment of different customer types, reactive energy and netting of flows application.

3 Methodology

The main purpose of this ENTSO-E overview is to present a comparison of calculated 2024 Unit Transmission Tariffs expressed in €/MWh for a pre-defined “base case”.

The “base case” is characterised by (i) a pre-defined voltage level to which load and generation are connected; and (ii) a power demand and utilization time, as follows:

- › **Voltage level:** Since voltage levels of transmission networks vary across Europe, (see Appendix 2), to facilitate comparison an assumption has been made that both producers and consumers are connected to the EHV (Extra High Voltage) network (400 kV – 330 kV). For countries with no EHV network, load or representative load connected to the EHV network, tariffs for lower voltages have been considered.
- › **Power demand and utilization time:** The typical load considered has a maximum demand of 40 MW when it is connected to the EHV network, and a maximum demand of 10 MW when it is connected to lower voltages. In both cases 5000h of utilization time has been assumed.

“Base case users” are users with the characteristics of connection, power demand and utilization time specified above.

The Unit Transmission Tariff is calculated under the hypothesis of the “base case” by adding the charges applied to load (L) and generation (G) (in cases where G is charged). For countries with different tariff rates per location, an average value has been taken.

To make the overview as comparable as possible, the calculation of the Unit Transmission Tariff covers tariffs and charges invoiced to the base case users (even if those charges are not recovered through TSO tariffs) to allocate the following costs:

- › **“TSO costs”**, i.e. costs related to TSO activities: Infrastructure costs (OPEX, depreciation and return on capital), costs of purchasing system services and losses compensation costs.
- › **“Non-TSO costs”**, i.e. costs not directly related to TSOs’ activities. For example: stranded costs, costs of renewable or cogeneration support schemes, regulatory levies, costs of diversification and security of supply, etc. Taxes for funding non-TSO Costs are not included in the calculation of the UTT.

The above is particularly relevant when considering the graphs in this document.

In addition, some examples are calculated by varying the “base case” assumptions:

- › The voltage level (See Section 6).
- › The load’s utilization time (see Section 7.4).
- › The location of generation and load (same area/ different area) (see Section 7.5).

For countries outside the Eurozone, local currency exchange rates as of 31st December 2024 have been used to calculate the Unit Transmission Tariff expressed in € (see Appendix 12: Exchange rates).

The diagram below summarises the methodology of this Overview:

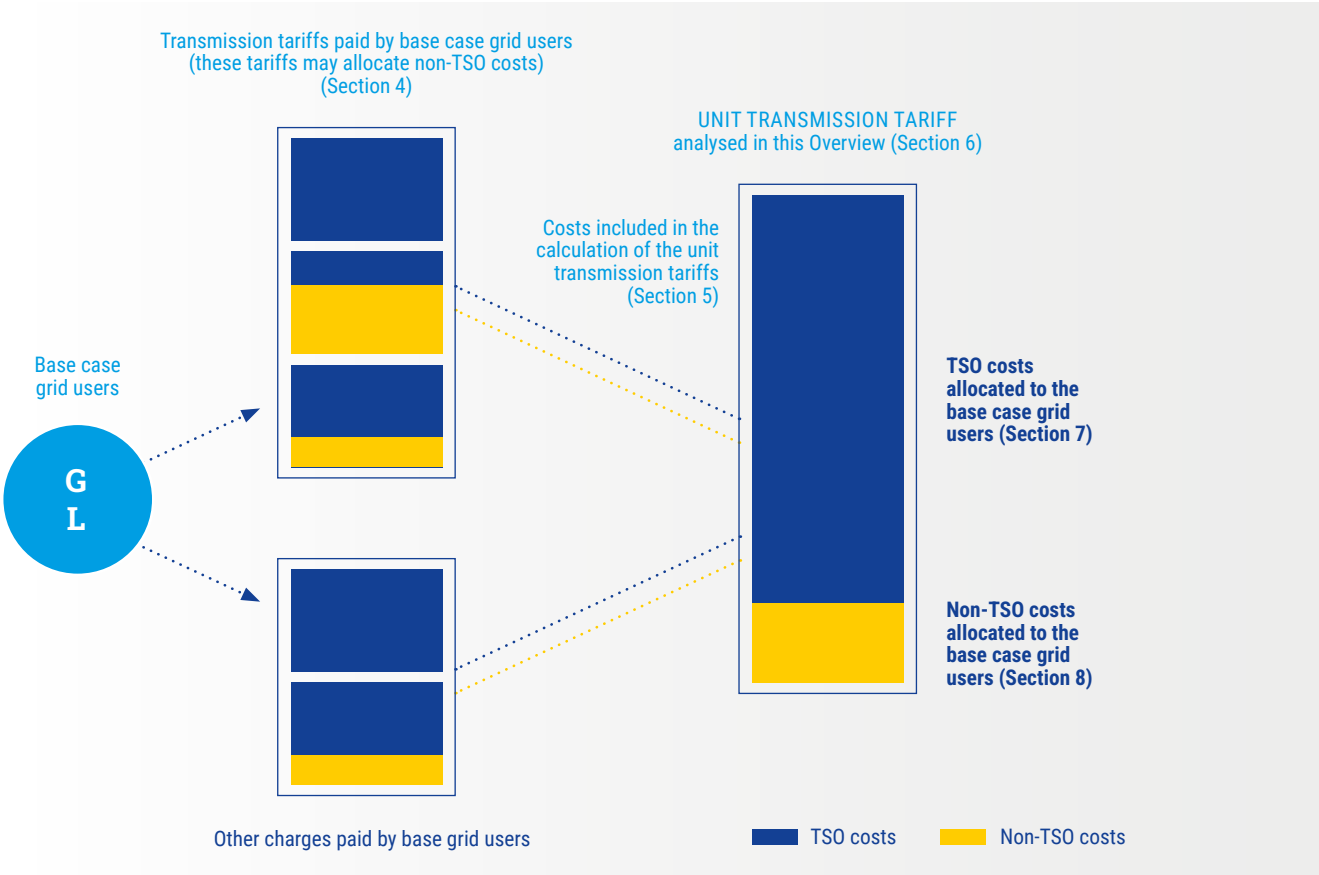


Figure 3.1: Methodology

4 Main characteristics of TSO tariffs in Europe

Table 41 summarises the main characteristics of TSO tariffs considered in the calculation of the Unit Transmission Tariffs shown in this overview: share of G and L network charges in %, seasonal and locational differentiation, whether the costs

of losses and system services are included in TSO tariffs and whether they are charged by TSOs. As shown in section 3, TSO tariffs applied as a charge to the users of transmission networks may allocate both TSO costs and non-TSO costs.

	Sharing of network operator charges		Price signal		Are losses included in the tariffs charged by TSO?	Are system services included in tariffs charged by TSO?
	Generation	Load	Seasonal	Location		
Albania	0.0 %	100.0 %	X	No	Yes	Yes
Austria	44.0 %	56.0 %	No	No	Yes	Yes
Belgium	19.0 %	81.0 %	X	No	Yes	Yes
Bosnia and Herzegovina	0.0 %	100.0 %	No	No	Yes	Yes
Bulgaria	38.0 %	62.0 %	No	No	Yes	Yes
Croatia	0.0 %	100.0 %	X	No	Yes	Yes
Czech Republic	0.0 %	100.0 %	No	No	Yes	Yes
Denmark	6.0 %	94.0 %	No	No	Yes	Yes
Estonia	0.0 %	100.0 %	X	No	Yes	No
Finland	31.0 %	69.0 %	X	No	Yes	Yes
France	2.0 %	98.0 %	XXX	No	Yes	Yes
Germany	0.0 %	100.0 %	No	No	Yes	Yes
Great Britain	15.0 %	85.0 %	XXX	Yes	No	Yes
Greece	0.0 %	100.0 %	XX	No	No	Yes
Hungary	0.0 %	100.0 %	No	No	Yes	Yes
Iceland	3.0 %	97.0 %	No	No	Yes	Yes
Ireland	25.0 %	75.0 %	X	Yes	No	Yes
Italy	0.0 %	100.0 %	No	No	Yes	Yes
Latvia	2.0 %	98.0 %	No	No	Yes	Yes
Lithuania	0.0 %	100.0 %	No	No	Yes	Yes

	Sharing of network operator charges		Price signal		Are losses included in the tariffs charged by TSO?	Are system services included in tariffs charged by TSO?
	Generation	Load	Seasonal	Location		
Luxembourg	0.0 %	100.0 %	No	No	Yes	Yes
Montenegro	34.0 %	66.0 %	X	No	Yes	Yes
Netherlands	0.0 %	100.0 %	XXX	No	Yes	Yes
North Macedonia	0.0 %	100.0 %	X	No	Yes	Yes
Northern Ireland	25.0 %	75.0 %	X	Yes	No	Yes
Norway	28.0 %	72.0 %	XX	Yes	Yes	Yes
Poland	0.0 %	100.0 %	No	No	Yes	Yes
Portugal	0.0 %	100.0 %	XX	No	No	No
Romania	7.0 %	93.0 %	No	No	Yes	Yes
Serbia	0.0 %	100.0 %	X	No	Yes	Yes
Slovak Rep	2.0 %	98.0 %	No	No	Yes	Yes
Slovenia	0.0 %	100.0 %	XXX	No	Yes	Yes
Spain	1.00 %	99.00 %	XXX	No	No	No
Sweden	37.0 %	63.0 %	X	Yes	Yes	Yes
Switzerland	0.0 %	100.0 %	No	No	Yes	Yes
Ukraine	17.0 %	83.0 %	No	No	Yes	Yes

Remarks:

- The % shares of network charges between G and L are provided for the base case charge.
- The “X” indicates time differentiation. With one “X”, there is only one time differentiation (for example, “day-night”, “summer-winter”). With two “X” (or more), there are two (or more) time differentiations.

Table 4.1: Main characteristics of TSO tariffs in Europe

5 Costs included in the calculation of the Unit Transmission Tariffs

Country	Infrastructure				System Services	
	ITC	Opex	Depreciation	Capex Return	Primary Reserve	Secondary Reserve
Albania	C	C	C	C	N	C
Austria	B/C	C	C	C	N	C
Belgium	B/C	C	C	C	C	C/B
Bosnia and Herzegovina	B/C (estimated)	C	C	C	C	C
Bulgaria	B/C	C	C	C	C	C
Croatia	B/C	C	C	C	C	C
Czech Republic	B/C	C	C	C	C	C
Denmark	B/C (estimated)	C/B (estimated)	C (estimated)	C (estimated)	C (estimated)	C (estimated)
Estonia	B/C	C	C	C	N	N
Finland	B/C	C	C	C	C	C
France	C	C	C	C	N	N
Germany	C/B	C/B	C	C	C	C
Great Britain	C/B	C	C	C	C	C
Greece	C/B	C	C	C	C (estimated)	C (estimated)
Hungary	C/B (estimated)	C	C	C	C (estimated)	C (estimated)
Iceland	N	C	C	C	C	C
Ireland	C	C	C	C	C	C
Italy	C	C	C	C	C	C
Latvia	C/B (estimated)	C	C	C	C	C
Lithuania	C/B	C	C	C	N	C
Luxembourg	C	C	C	C	C	C
Montenegro	B/C	C	C	C	N	C
Netherlands	C/B	C (estimated)	C	C	C	C
Northern Ireland	C	C	C	C	C	C
Norway	C	C	C	C	C	C
Poland	N	C	C	C	C	C
Portugal	C/B	C	C	C	N	N
North Macedonia	B/C (estimated)	C	C	C	N	C
Romania	C	C	C	C	N	C
Serbia	B/C	C	C	C	C	C
Slovak Republic	B/C	C	C	C	C	C
Slovenia	C/B	C/B	C/B	C	C	C
Spain	N	C (estimated)	C (estimated)	C (estimated)	N	C (estimated)
Sweden	B/C	C	C	C	C	N
Switzerland	B/C (estimated)	C (estimated)	C (estimated)	C (estimated)	C (estimated)	C (estimated)
Ukraine	N	C	C	N	C	C

Legend:

- C if a given cost item is included in the calculation of the Unit Transmission Tariff.
- B/C if for a given activity where both costs and benefits exist, the costs are higher than benefits, and the difference is included in the calculation of the Unit Transmission Tariff (surplus of costs).
- B/C if for a given activity where both costs and benefits exist, the benefits are higher than costs, and the difference reduces the Unit Transmission Tariff.
- N if a given cost is not considered in the calculation of the Unit Transmission Tariff.
- C or C/B or B/C marked as "estimated" indicate that the cost item is not invoiced by the TSO and estimated values are provided for comparability purposes.

Table 5.1.Costs included in the calculation of the Unit Transmission Tariffs

Table 5.1 provides information on different cost items related to energy transmission included in the calculation of the Unit Transmission Tariff for the base case comparison and presented in this overview. Some of these costs may

not be included in the TSO transmission tariff or be included only partially but are added for comparability purposes. First connection costs are not included in the Unit Transmission Tariffs. For further details, see country remarks.

System Services						Losses (cost)	Other
Tertiary Reserve	Congestion Management (internal)	Congestion Management (crossborder)	Black Start	Voltage Control	System Balancing		
C	N	B/C (estimated)	N	N	N	C	N
N	C	C	C	C	N	C	C
C/B	C	C/B	C	C	N	C	C
C	N	C	C	N	C	C	N
C	C	C	C	N	N	C	N (cost is not included in UTT)
C	N	N	C	C	C/B	C	C
C	C	C	C	C	C/B	C	N
C (estimated)	C/B (estimated)	C/B (estimated)	C (estimated)	C (estimated)	C/B (estimated)	C (estimated)	C (estimated)
C	N	C	C	C	N	C	C
C	C	C	C	C	C	C	C
N	C	B/C	C	C	C	C	C
C	C	C	C	C	N	C	C
C	C	N	C	C	C	N (cost is not included in UTT)	C
N	N	B/C	N (cost is not included in UTT)	N	N	C (estimated)	C
C (estimated)	N	B/C	C (estimated)	C (estimated)	B/C (estimated)	C (estimated)	C/B
C	N	N	C	C	C	C	N
C	C	C	C	C	C	C	C
C	B/C	B/C	C	C	C	C (estimated)	N (cost is not included in UTT)
C	N	N	C	C	C/B	C	N
C	N	N	C	C/B	N	C	N
C	C	C	C	C	C	C	C
C	N	B/C (estimated)	N	N	C	C	N
C	C	C	C	C	N	C	N (cost is not included in UTT)
C	C	C	C	C	N	C	C
C	C	C	C	C	C	C	N
C	C	B/C (estimated)	C	C	C	C	C
N	N	B/C	C	B/C	N	C (estimated)	C (estimated)
C	N	B/C (estimated)	N	N	C	C	N
C	C	N	N	C	N	C	N
C	C	C/B	C	C	C	C	C
C	C	B/C	C	C	N	C	N
C	C	C	C	C	C/B	C	C
C (estimated)	C (estimated)	N	C (estimated)	N	C (estimated)	C (estimated)	N
N	N	N	C	C	N	C	N
C (estimated)	C (estimated)	B/C (estimated)	C (estimated)	N (cost is not included in UTT)	B/C (estimated)	C (estimated)	C (estimated)
C	C	N	C	N	C	C	C

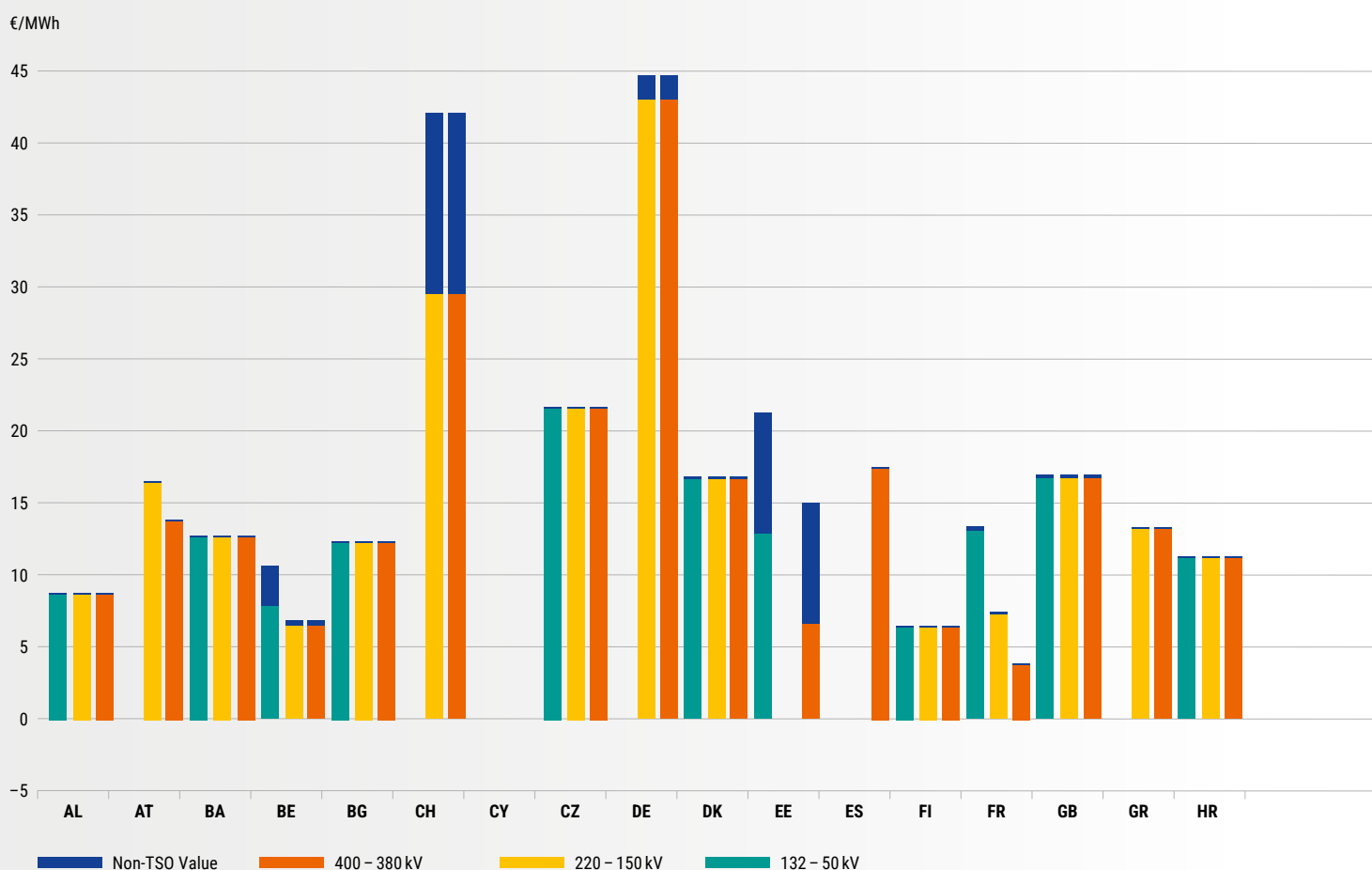
Remark:

This chapter is referring to total costs (TSO costs and non-TSO costs) included in the calculation of the Unit Transmission Tariff.

6 Unit Transmission Tariffs in 2024

Chart 6.1 illustrates total Unit Transmission Tariffs when the base case is modified by varying the voltage level (three different voltage level in kV). Charges related to TSO activities

are coloured in light blue (132 – 50 kV), yellow (220 – 150 kV) and red (330 kV and above), whereas other regulatory charges not directly related to TSOs' activities are marked in dark blue.

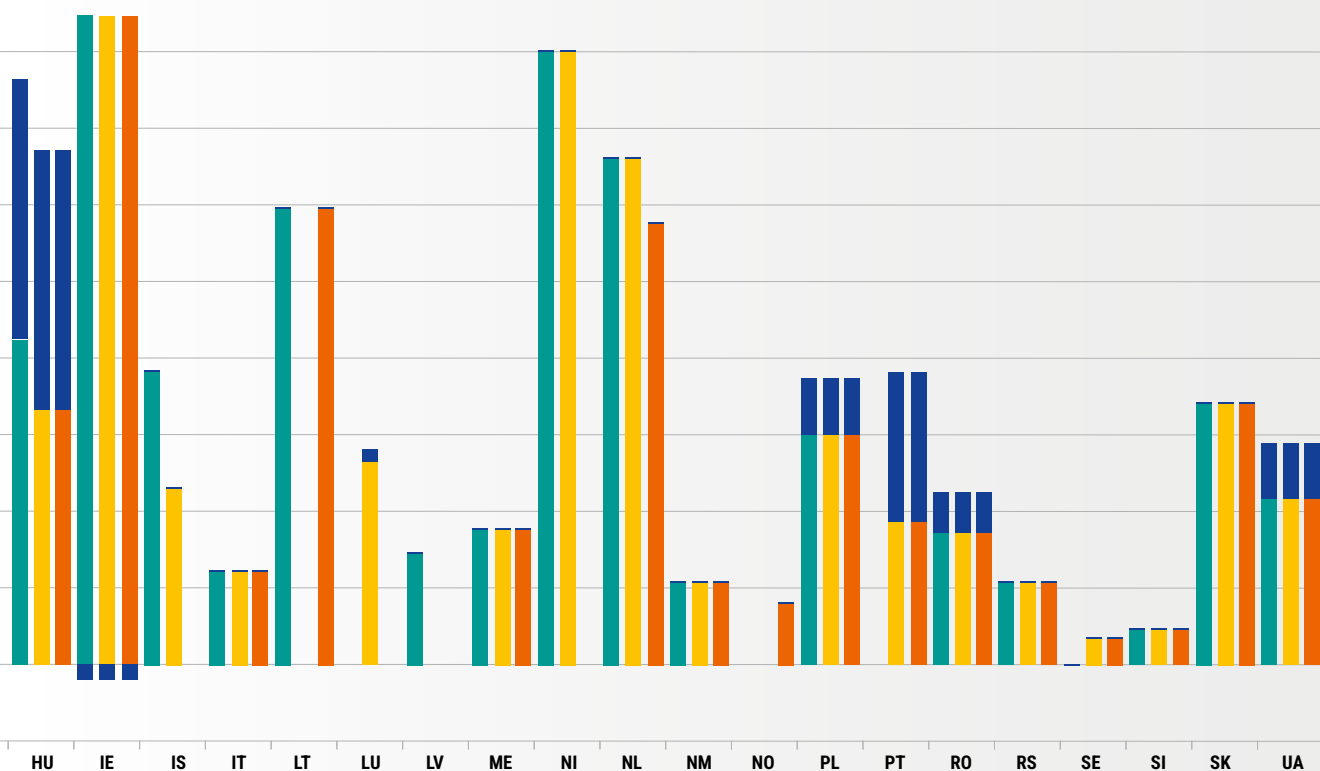


		AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR
Total	400 – 380 kV	8.66	13.76	12.70	6.79	12.27	42.10		21.62	44.67	16.76	14.93	17.43	6.37	3.81	16.90	13.25	11.21
	220 – 150 kV	8.66	16.45	12.70	6.79	12.27	42.10		21.62	44.67	16.76			6.37	7.40	16.90	13.25	11.21
	132 – 50 kV	8.66		12.70	10.59	12.27			21.62		16.76	21.23		6.37	13.29	16.90		11.21
TSO	400 – 380 kV	8.66	13.76	12.70	6.48	12.27	29.50		21.62	43.00	16.62	6.53	17.43	6.37	3.81	16.73	13.18	11.20
	220 – 150 kV	8.66	16.45	12.70	6.48	12.27	29.50		21.62	43.00	16.62			6.37	7.23	16.73	13.18	11.20
	132 – 50 kV	8.66		12.70	7.84	12.27			21.62		16.62	12.83		6.37	13.03	16.73		11.20

Remarks:

- The example taken for this comparison is the base case (see Section 3) modified by considering different voltage levels.
- Other charges not directly related to TSO activities **are included** in the calculation of the Unit Transmission Tariff.
- When a voltage level is not relevant, as it is not operated by the relevant TSOs the value is reported as 0.
- Values have been rounded.

Chart 6.1: Split of the Unit Transmission Tariffs between components related to TSO activities and non-TSO activities



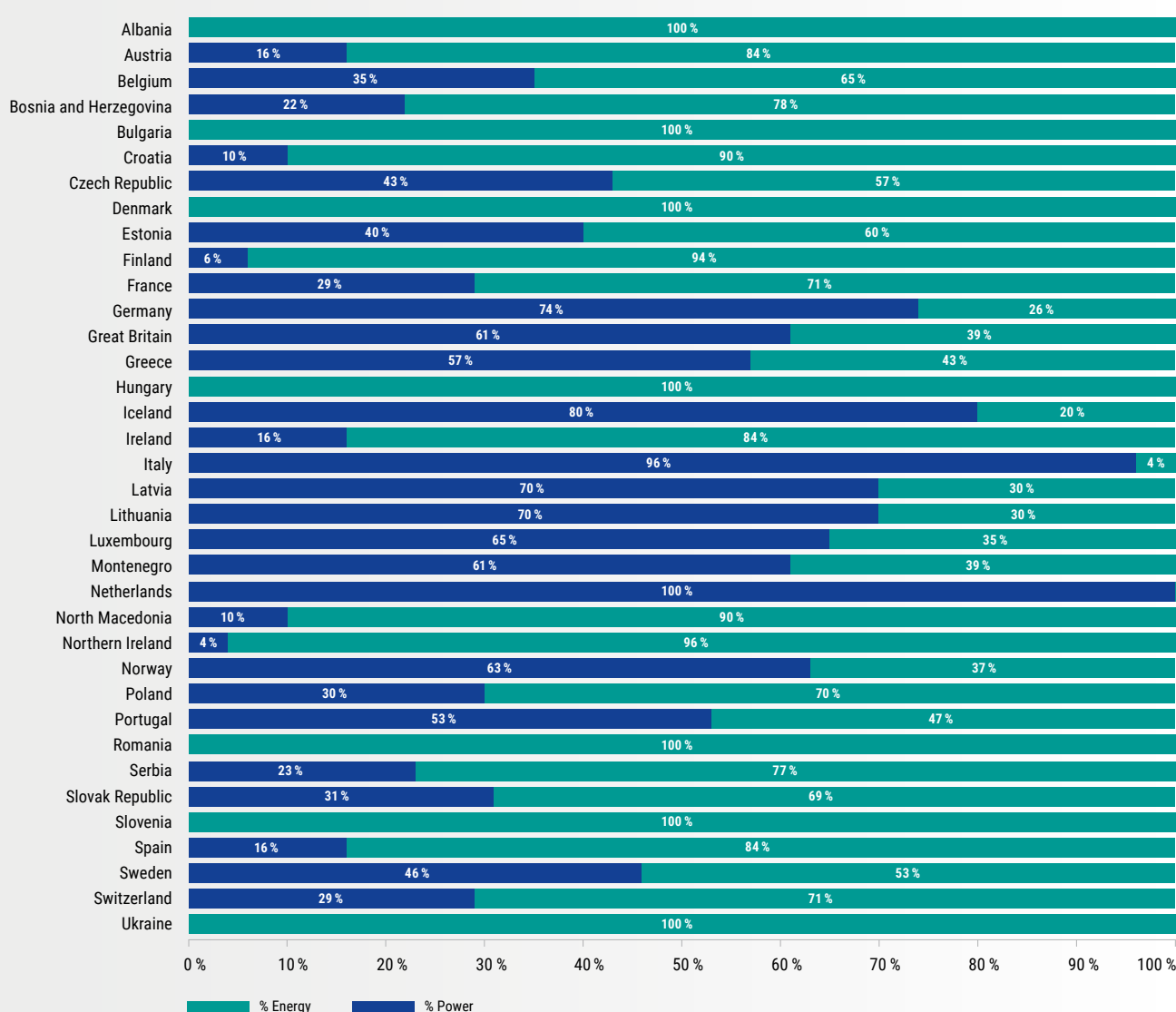
HU	IE	IS	IT	LT	LU	LV	ME	NI	NL	NM	NO	PL	PT	RO	RS	SE	SI	SK	UA
33.56	41.32		6.11	29.76			8.82		28.78	5.42	3.97	18.60	18.99	11.13	5.40	1.70	2.27	17.07	14.38
33.56	41.32	11.49	6.12		14.04		8.82	40.05	33.05	5.42		18.60	18.99	11.13	5.40	1.70	2.27	17.07	14.38
38.15	41.33	19.13	6.12	29.76		7.24	8.82	40.05	33.05	5.42		18.60		11.13	5.40	0.00	2.27	17.07	14.38
16.58	42.32		6.11	29.76			8.82		28.78	5.42	3.97	14.93	9.21	8.55	5.36	1.70	2.23	17.07	10.79
16.58	42.32	11.49	6.12		13.19		8.82	40.05	33.05	5.42		14.93	9.21	8.55	5.36	1.70	2.23	17.07	10.79
21.17	42.33	19.13	6.12	29.76		7.24	8.82	40.05	33.05	5.42		14.93		8.55	5.36	0.00	2.23	17.07	10.79

Country remarks regarding Croatia, Denmark, Finland, Germany, Hungary, Latvia, Lithuania, North Macedonia, Portugal, Romania, Slovak Republic and Slovenia are to be found in Appendix 1.

7 Analysis of TSO cost components of Unit Transmission Tariffs

7.1 Energy-related and Power-related components

The main revenue drivers for Unit Transmission Tariffs are power (capacity), energy (volume) or both. Chart 7.1 presents the shares of power and energy components of the TSO components of the Unit Transmission Tariffs for the base case.



Remarks:

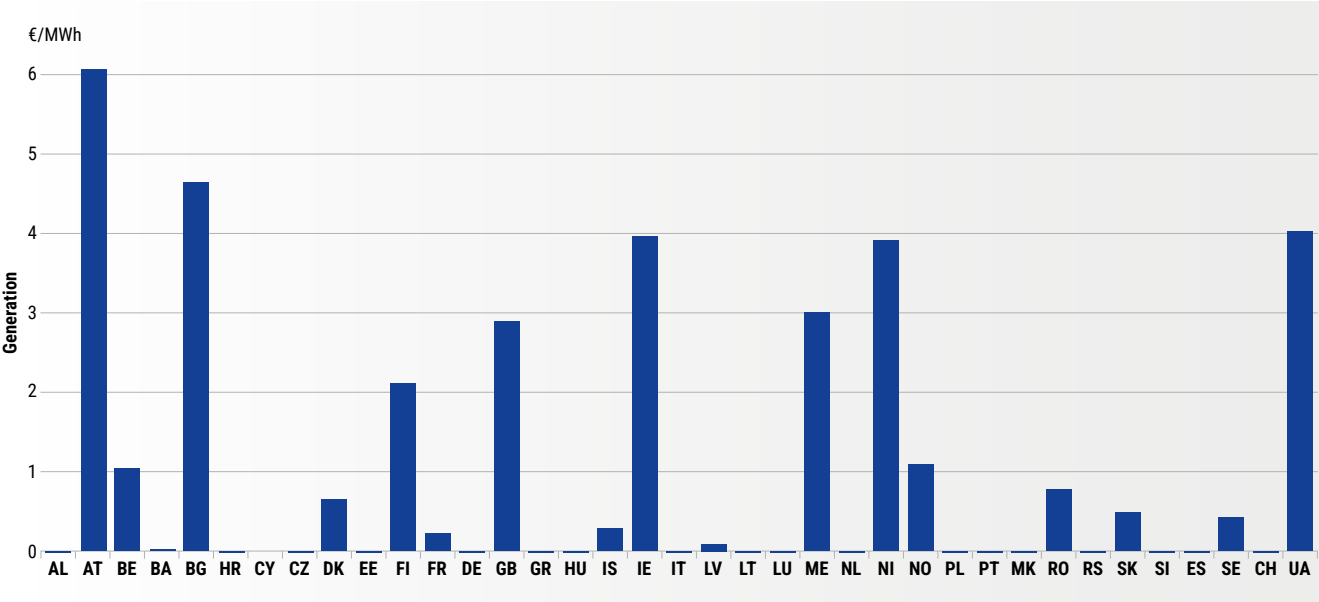
- The example taken for this comparison is the base case (see Section 3).
- Other charges not directly related to TSO activities (i.e. non-TSO costs) **are not included** in the above graph.
- Values have been rounded.

Country remarks regarding Austria, Iceland and Romania are to be found in Appendix 1.

Chart 7.1: Energy-related and power-related components of the TSO components of the Unit Transmission Tariff

7.2 Generation component

The Unit Transmission Tariff is calculated by adding the charges applied to the generation (G) and load (L). Chart 7.2 provides the part of the TSO components of the Unit Transmission Tariff that corresponds to generation.



Remarks:

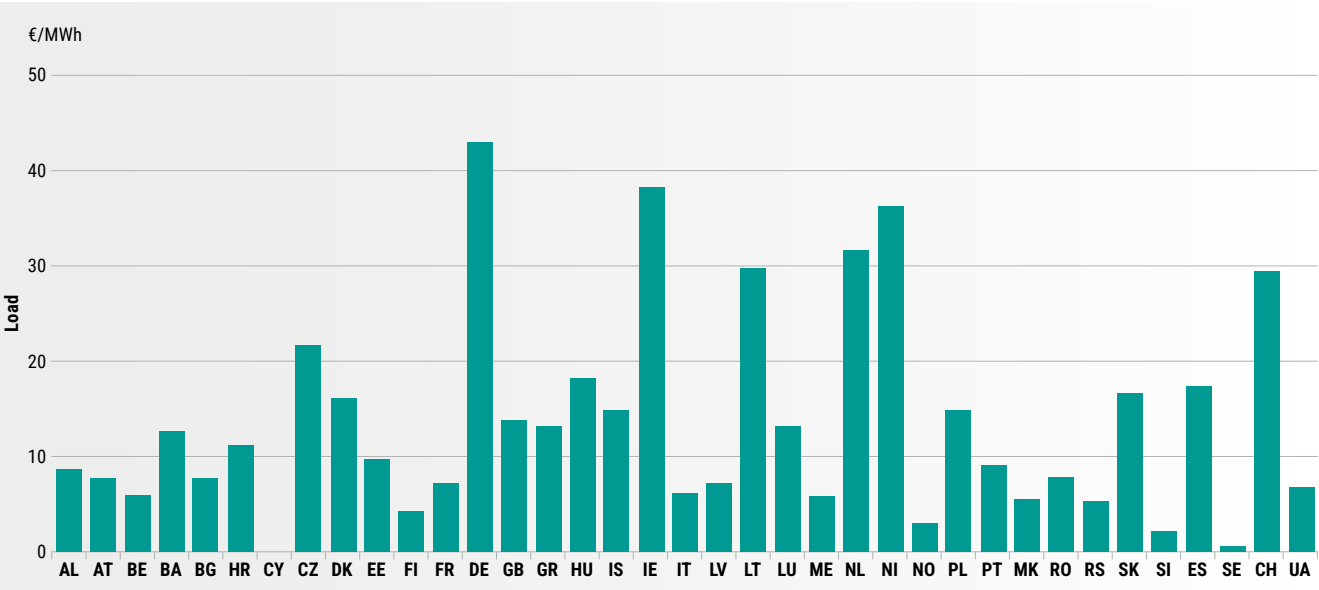
- The example taken for this comparison is the base case (see Section 3).
- Other charges not directly related to TSO activities (i.e. non-TSO costs) **are not included** in the above graph.
- Values have been rounded.
- Commission Regulation (EU) no 838/2010 places limits on annual average transmission charges paid by producers in each Member State. It is not possible to draw the conclusion from the above graph that some countries are breaching this Regulation because the graph is comparing G charges based on Unit Transmission Charges, and not actual tariff levels charged by TSOs. Separate monitoring procedures are in place to ensure TSOs remain compliant with EC Regulations.

Country remarks regarding Austria, Bulgaria, Denmark, Finland, France, Germany, Great Britain, Iceland, Ireland, Netherlands, Poland, Romania, Serbia, Slovak Republic and Ukraine are to be found in Appendix 1.

Chart 7.2. G components of the TSO components of the Unit Transmission Tariffs in 2024

7.3 Load (Demand) component

The Unit Transmission Tariff is calculated by adding the charges applied to the generation (G) and load (L), which includes infrastructure costs, the costs of purchasing system services and losses. Chart 7.3 provides the part of the TSO components of the Unit Transmission Tariff that corresponds to load only.



Remarks:

- The example taken for this comparison is the base case (see Section 3).
- Other charges not directly related to TSO activities (non-TSO costs) **are not included** in the above graph.

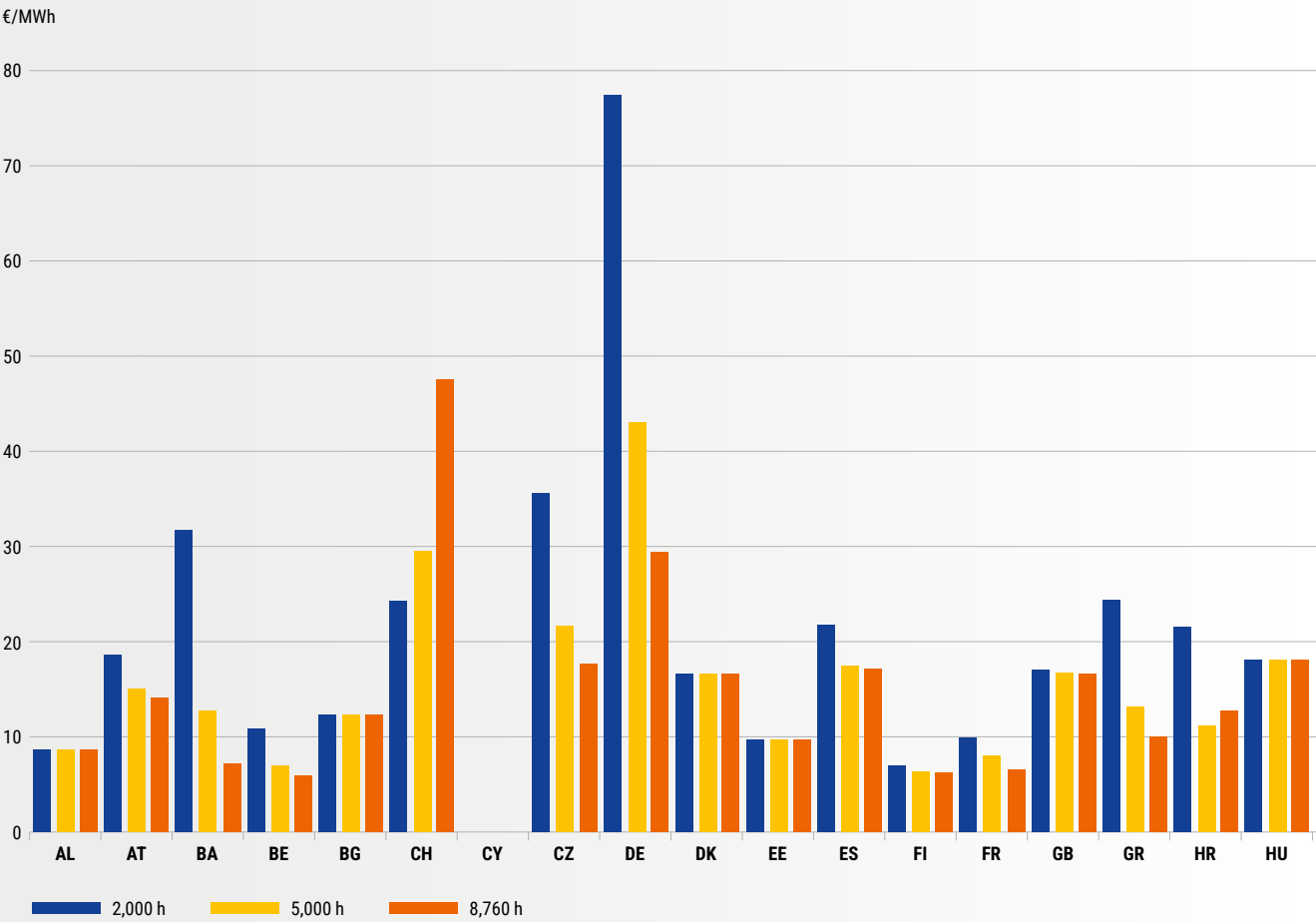
Country remarks regarding Austria, Denmark, France, Great Britain and Iceland to be found in Appendix 1.

Chart 7.3: L components of the TSO components of the Unit Transmission Tariffs in 2024



7.4 Impact of Utilization Time on the TSO cost component of UTT

Transmission charges paid by network users, and subsequently Unit Transmission Tariffs, change due to the Utilization time if the applied tariffs have power (capacity) as a revenue driver. Chart 7.4 shows the impact of the Utilization time on the TSO components of the Unit Transmission Tariff.

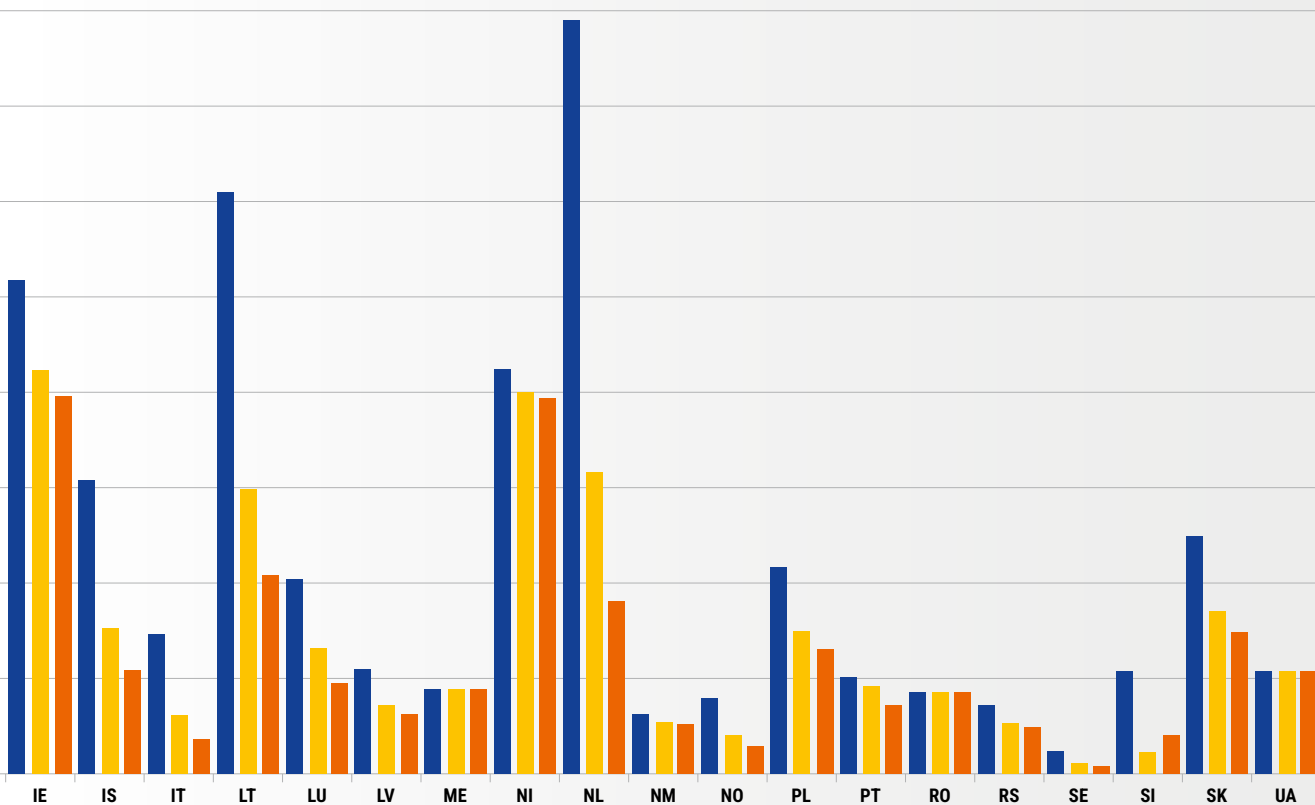


	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU
2,000 hours/year	8.66	18.63	31.75	10.81	12.27	24.32		35.61	77.38	16.62	9.68	21.72	7.02	9.86	17.12	24.42	21.54	18.11
5,000 hours/year	8.66	15.11	12.70	6.93	12.27	29.50		21.62	43.00	16.62	9.68	17.43	6.37	8.03	16.73	13.18	11.20	18.11
8,760 hours/year	8.66	14.10	7.25	5.82	12.27	47.60		17.62	29.35	16.62	9.68	17.16	6.17	6.48	16.62	9.96	12.70	18.11

Remarks:

- The example taken for this comparison is the base case (see Section 3) modified by considering different utilization times.
- Other charges not directly related to TSO activities (i.e. non-TSO costs) **are not included** in the above graph.
- For most TSOs, a typical customer is a DSO with a seasonal load profile. Neither a full annual utilization time of 8760 h nor a low utilization time of 2000 h are realistic examples that occur on the grid. The results for these hypothetical utilization times are presented for comparison purposes only, to illustrate how fixed components of the tariffs impact on the average transmission charges.

Chart 7.4: Impact of the Utilization time on the TSO components of the Unit Transmission Tariffs in 2024

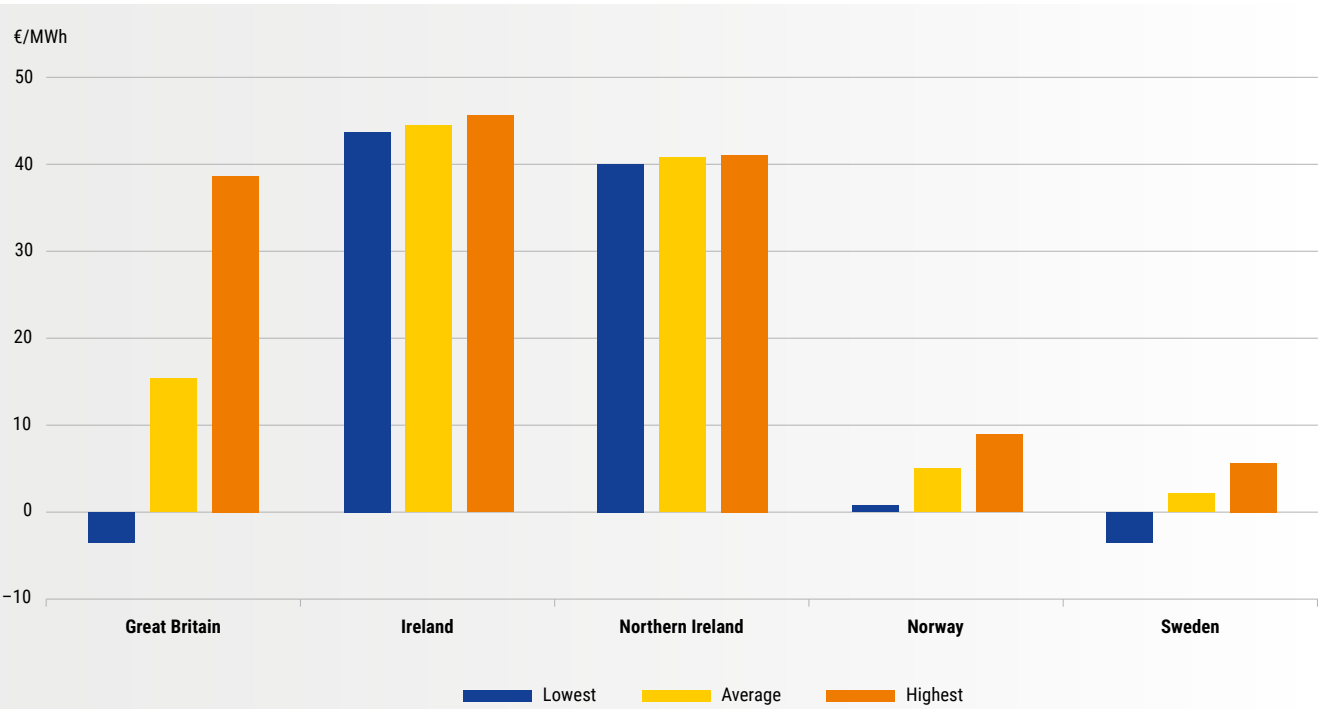


IE	IS	IT	LT	LU	LV	ME	NI	NL	NM	NO	PL	PT	RO	RS	SE	SI	SK	UA
51.77	30.82	14.60	60.94	20.37	10.97	8.82	42.44	79.06	6.22	7.86	21.57	10.11	8.55	7.17	2.33	10.80	24.98	10.79
42.32	15.31	6.12	29.76	13.19	7.24	8.82	40.05	31.62	5.42	3.97	14.93	9.21	8.55	5.36	1.13	2.23	17.07	10.79
39.61	10.87	3.70	20.84	9.50	6.18	8.82	39.37	18.05	5.19	2.86	13.03	7.16	8.55	4.84	0.78	3.99	14.81	10.79

Country remarks regarding France, Great Britain, Northern Ireland, Norway, Portugal, Serbia, Slovenia and Sweden are to be found in Appendix 1.

7.5 Impact of location on the Unit Transmission Tariffs

Some transmission tariffs are differentiated by location. Chart 7.5 illustrates the impact of location on the TSO components of the Unit Transmission Tariff.



Remarks:

- The example taken for this comparison is the base case (see Section 3) modified by considering different locations.
- Other charges not directly related to TSO activities (i.e. non-TSO costs) **are not included** in the above graph.
- For more details about locational differentiation of transmission tariffs see Appendix 5. Tariff areas in countries with generation/consumption tariffs with locational differentiation.

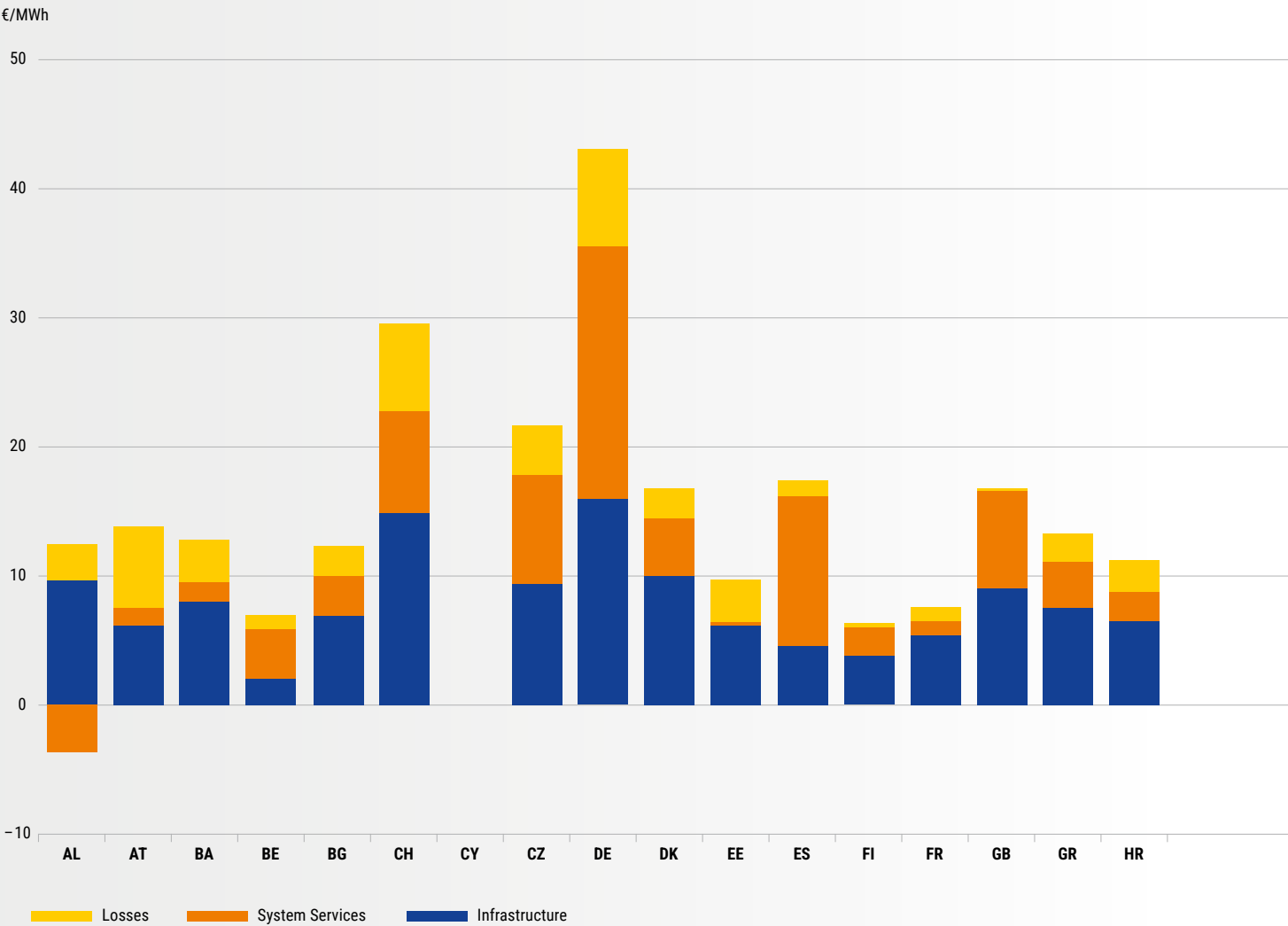
Further details regarding Great Britain, Ireland, Northern Ireland and Sweden are to be found in Appendix 5.

Chart 7.5: Impact of location on the Unit Transmission Tariffs in 2024



7.6 TSO Cost components of the Unit Transmission Tariffs

Chart 76 provides the split of the different TSO components of the Unit Transmission Tariff that is calculated in this report.



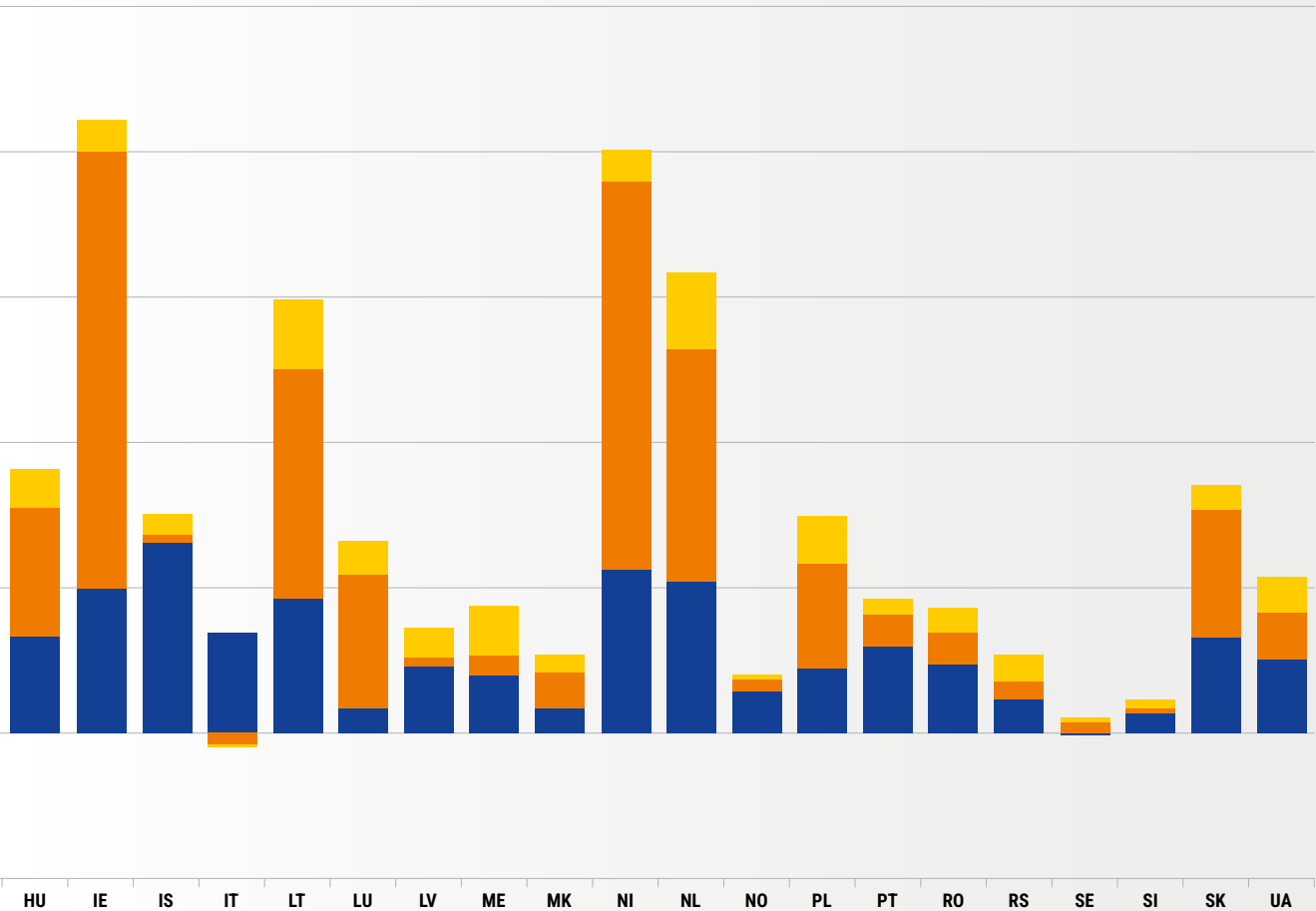
	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR
Losses	2.71	6.18	3.12	1.05	2.30	6.72		3.84	7.54	2.35	3.18	1.35	0.36	0.97	0.00	2.10	2.47
System Services	-3.74	1.40	1.62	3.93	3.09	7.88		8.45	19.55	4.49	0.30	11.51	2.15	1.17	7.67	3.59	2.34
Infrastructure	9.69	6.18	7.96	1.95	6.88	14.90		9.33	15.91	9.92	6.20	4.57	3.86	5.32	9.05	7.49	6.38

Remarks:

- The example taken for this comparison is the base case (see Section 3)
- Other charges not directly related to TSO activities (i. e. nonTSO costs) **are not included** in the above graph.
- The figures in the chart are estimations of the value of each final price component
- For countries where it is not possible to split the tariff as it is done in this chart, some assumptions and estimations have been made System services include system balancing if applicable.

A country remark regarding Belgium, Czech Republic, Great Britain, Hungary, Poland, Portugal, Slovak Republic and Ukraine can be found in Appendix 1.

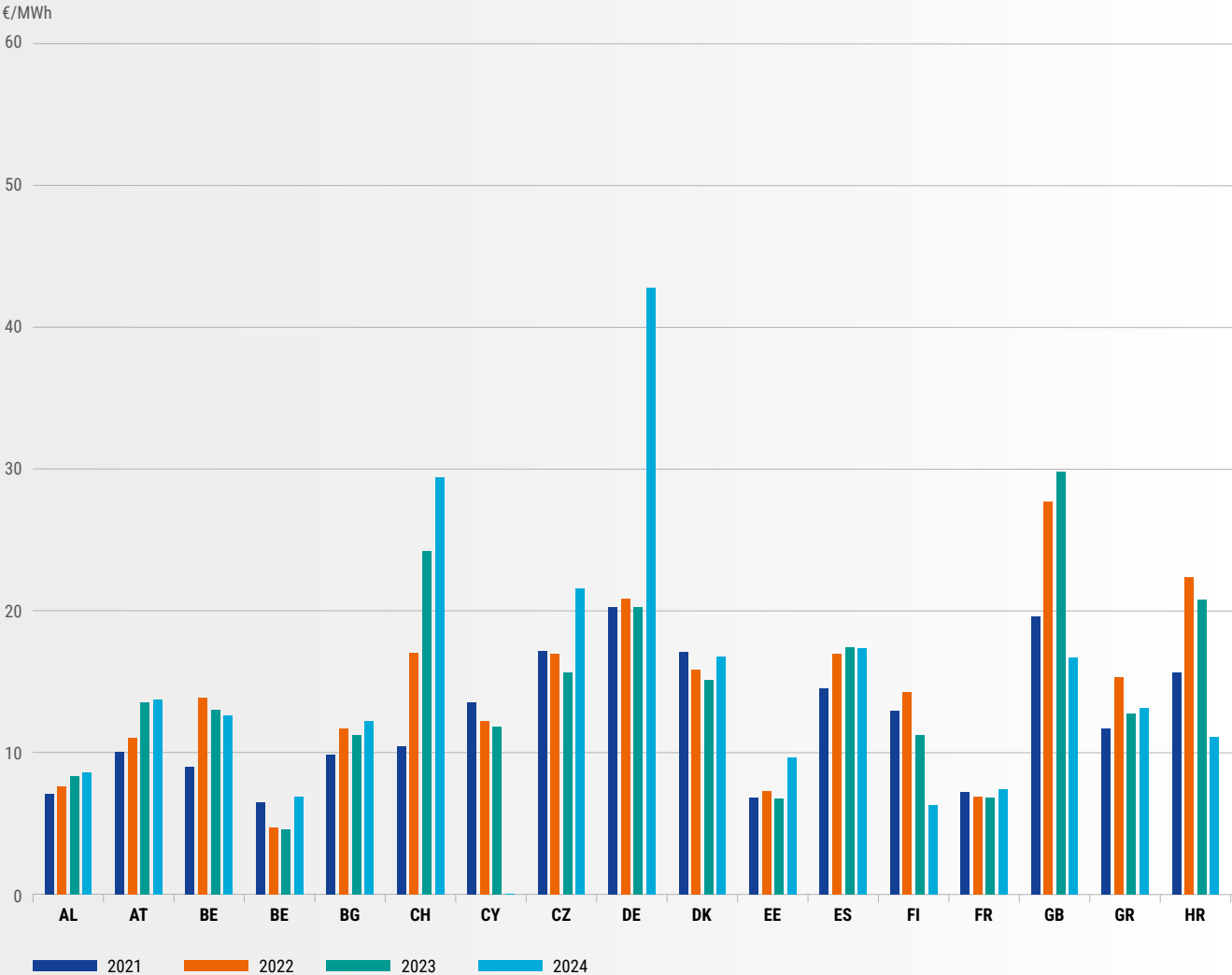
Chart 7.6: Components of TSO costs of the Unit Transmission Tariffs in 2025



HU	IE	IS	IT	LT	LU	LV	ME	MK	NI	NL	NO	PL	PT	RO	RS	SE	SI	SK	UA
2.60	2.24	1.36	-0.01	4.69	2.21	1.97	3.42	1.25	2.25	5.18	0.32	3.22	0.99	1.67	1.89	0.30	0.61	1.72	2.45
8.84	30.03	0.63	-0.71	15.83	9.24	0.59	1.48	2.49	26.75	16.01	0.85	7.28	2.13	2.18	1.13	0.83	0.30	8.68	3.28
6.67	9.92	13.12	6.84	9.25	1.74	4.68	3.92	1.68	11.14	10.43	2.89	4.43	6.04	4.70	2.33	0.00	1.32	6.67	5.06

7.7 Evolution of TSO cost components of Unit Transmission Tariffs

Transmission tariffs change over time. Chart 7.7 shows the evolution of the TSO components of the Unit Transmission Tariffs over the period 2021 – 2024 in € using exchange rates on 31st of December 2024.



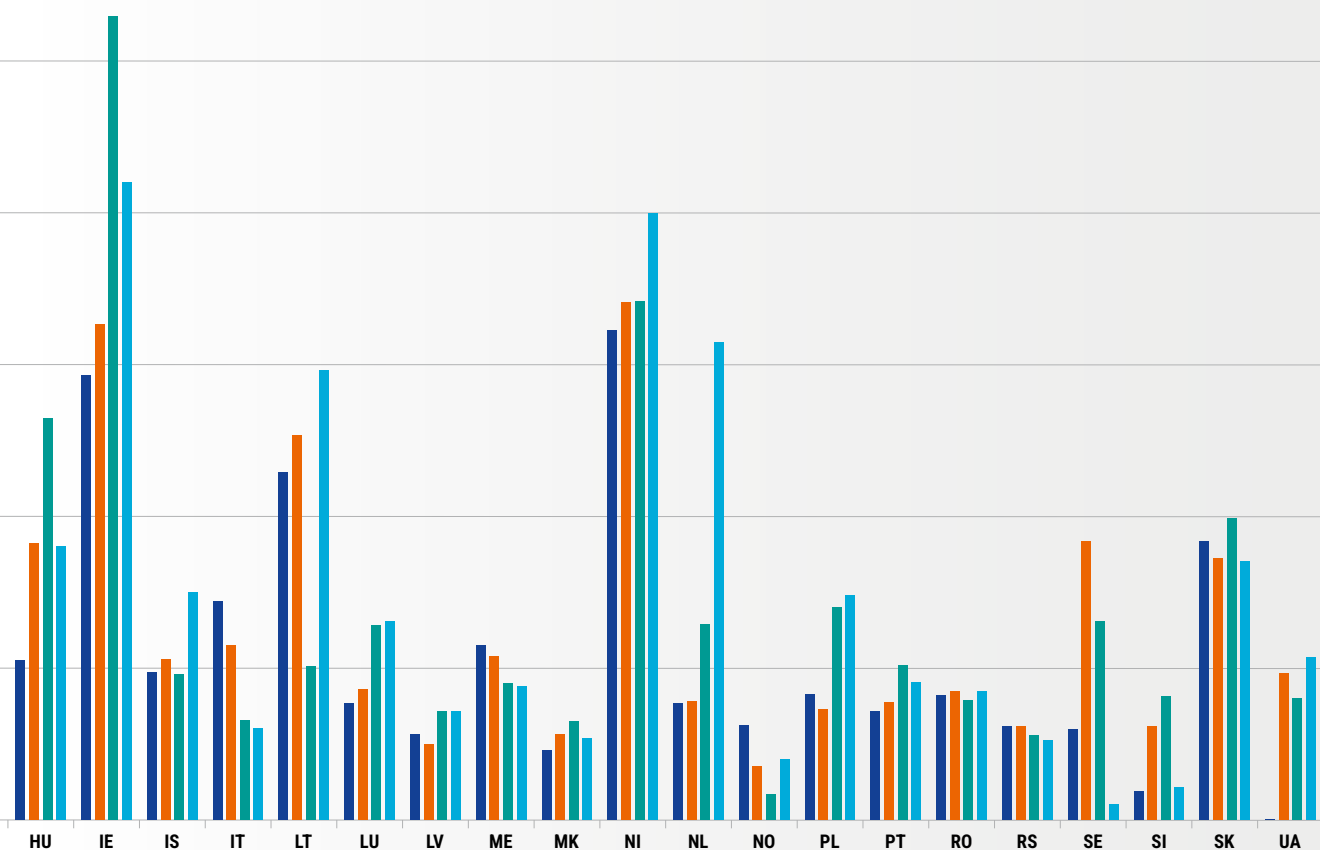
	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR
2021	7.14	10.1	9.02	6.54	9.81	10.4	13.6	17.3	20.3	17.1	6.87	14.6	13	7.25	19.8	11.8	15.7
2022	7.66	11	13.9	4.72	11.8	17.2	12.3	17	21	15.9	7.38	17	14.3	6.98	27.8	15.4	22.4
2023	8.38	13.6	13.1	4.61	11.3	24.2	11.9	15.7	20.3	15.2	6.76	17.5	11.3	6.81	29.8	12.8	20.8
2024	8.66	13.8	12.7	6.93	12.3	29.5		21.6	43	16.8	9.68	17.4	6.37	7.46	16.7	13.2	11.2

Remarks:

- The example taken for this comparison is the base case (see Section 3).
- Other charges not directly related to TSO activities (i. e. non-TSO costs) **are not included** in the above graph.
- Prices have been updated to 2025 by using the annual average rate of change in the Harmonised Index of Consumer Prices (HICP) as provided by Eurostat. If it is not available, the official CPI data from the country is taken.
- For countries not in the Euro zone the exchange rate as for 31st December 2025 is used.
- See Country remarks for details. When annual changes exceed 10% compared to last year, reasons are provided.

Country remarks regarding Croatia, Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Latvia, Poland, Portugal, Romania, Slovak Republic and Ukraine are to be found in Appendix 1.

Chart 7.7: Evolution of TSO components of the Unit Transmission Tariffs

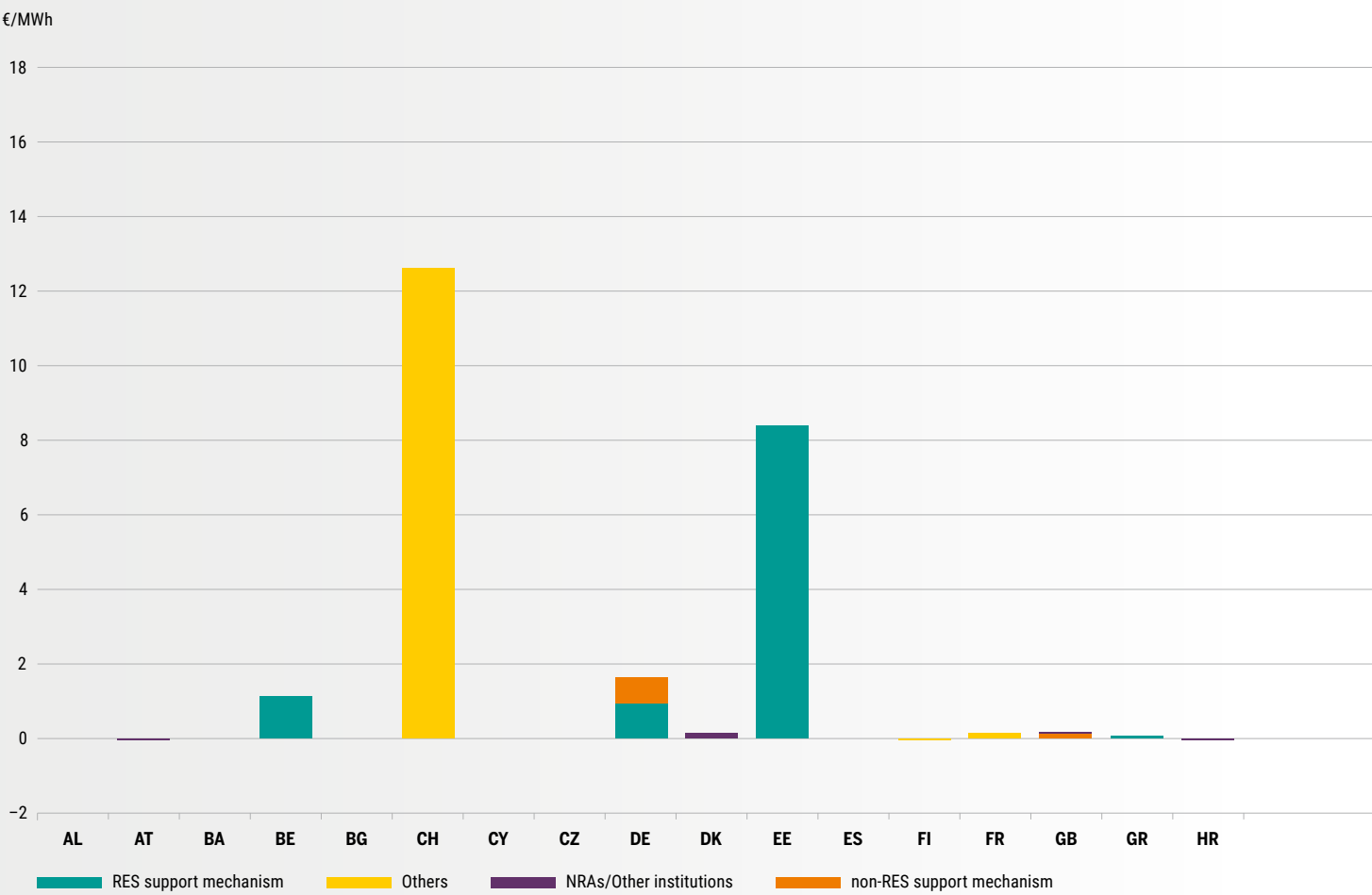


HU	IE	IS	IT	LT	LU	LV	ME	MK	NI	NL	NO	PL	PT	RO	RS	SE	SI	SK	UA
10.6	29.3	9.75	14.5	23	7.77	5.75	11.6	4.63	32.4	7.71	6.26	8.33	7.28	8.3	6.28	6.07	1.96	18.4	
18.3	32.8	10.6	11.6	25.5	8.64	5.01	10.9	5.75	34.2	7.88	3.6	7.34	7.81	8.55	6.29	18.4	6.23	17.3	9.79
26.5	53.1	9.6	86.64	10.1	12.9	7.24	9.02	6.55	34.3	12.9	1.67	14.1	10.2	7.98	5.61	13.2	8.21	19.9	8.04
18.1	42.2	15.1	6.12	29.8	13.2	7.24	8.82	5.42	40.1	31.6	4.05	14.9	9.16	8.55	5.36	1.13	2.23	17.1	10.8

8 Analysis of non-TSO components of Unit Transmission Tariffs

Many TSOs across Europe recover additional monies from their customers that are not directly related to TSO activities. TSOs are often obliged to recover these additional monies because of national or regional regulations and the charges may either form part of transmission tariffs directly or form part of separate charging mechanisms.

This section is divided in two parts. The first part details non-TSO costs by country and the second explores how non-TSO costs have evolved over recent years.



	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR
RES support mechanism				1.12					0.97		8.40					0.07	
Others						12.60							0.00	0.14			
NRAs/Other Institutions		0.00								0.14					0.02		0.01
non-RES support mechanism									0.70						0.15		
Stranded costs																	

Chart 8.1: Overview of non-TSO charges in the Unit Transmission Tariffs (€/MWh)

8.1 Non-TSO Costs

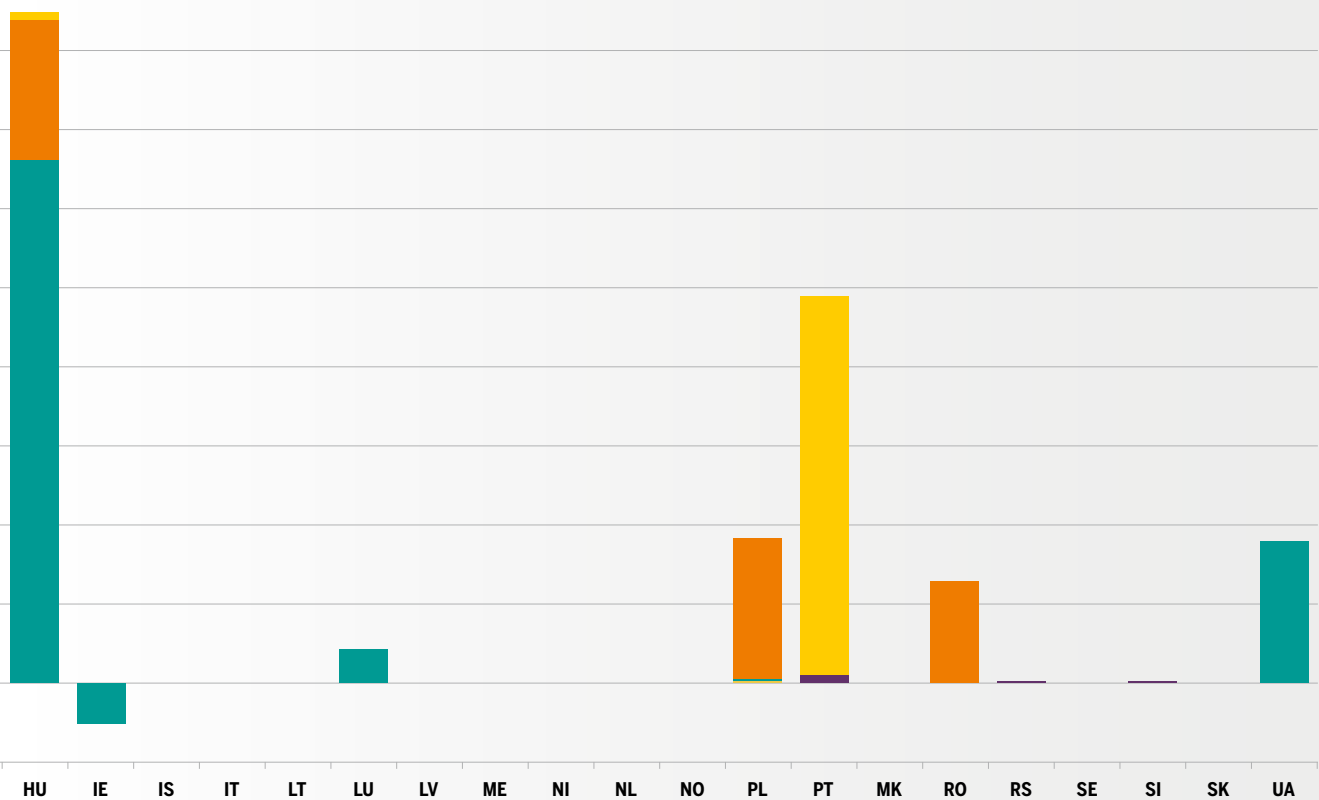
Non-TSO costs broadly fall into five main categories:

- › Renewable Energy Support (RES) mechanisms: these are costs recovered through TSO charges aimed at supporting government targets to increase renewable generation. These costs are used to finance subsidies to grid-connected renewable generators. In terms of level, RES mechanisms represent the most important component of non-TSO costs.

› Non-RES Support mechanisms: these are costs recovered through TSO charges generally aimed at providing financial support to other government objectives, such as energy efficiency or subsidising the costs of maintaining grid networks to rural areas, for example.
- › NRA/Other institutions: some costs are recovered through TSO charges that finance the activities of the relevant sector regulator or other institutions associated with the energy industry.

› Stranded Costs.

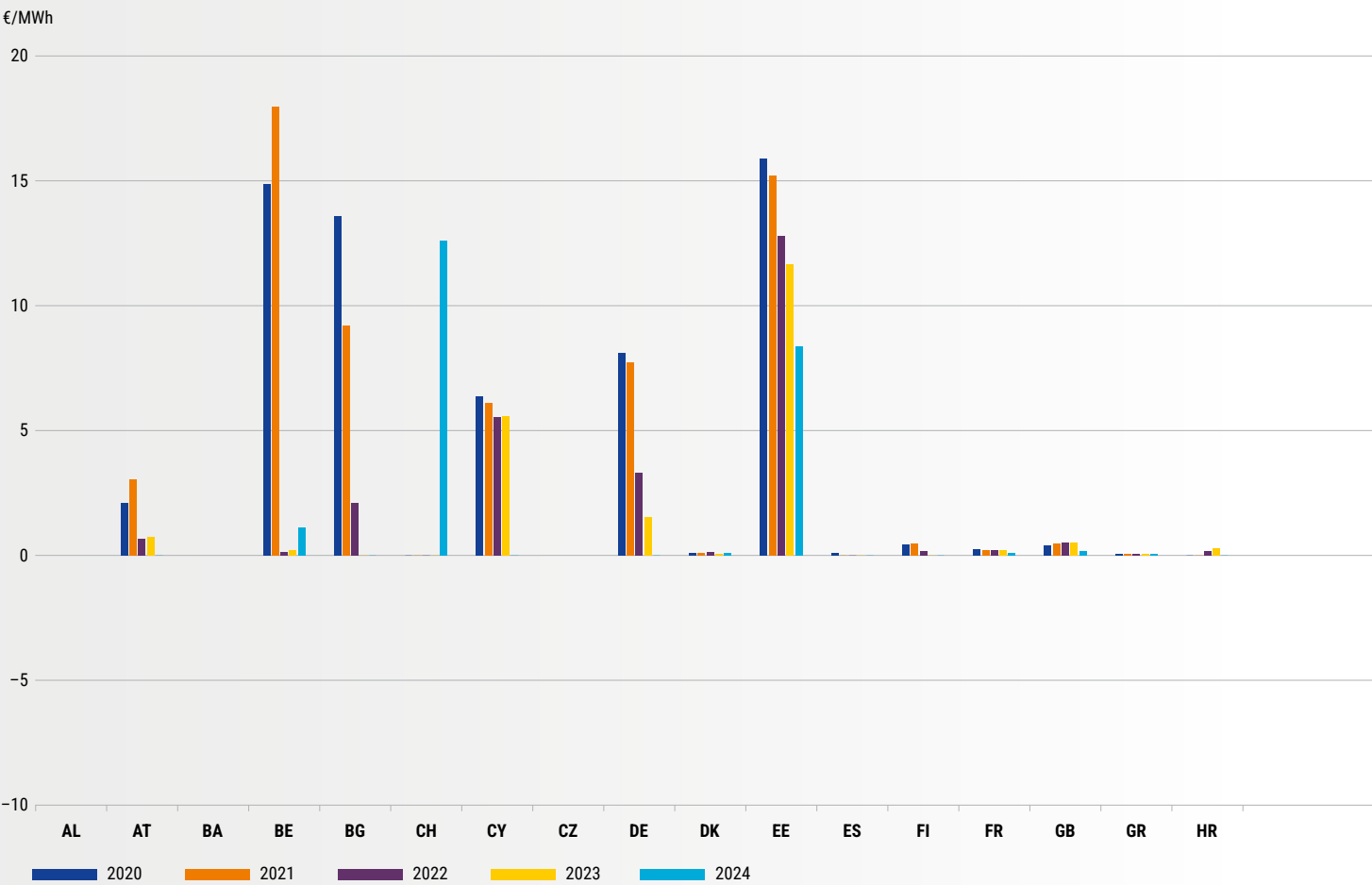
› Others.
- Also refer to Appendix 6 for additional information.



HU	IE	IS	IT	LT	LU	LV	ME	NI	NL	NO	PL	PT	MK	RO	RS	SE	SI	SK	UA
13.25	-1.00				0.85						0.00								3.59
0.20												9.58							
												0.21			0.04		0.04		
3.54											3.56			2.58					
											0.11								

8.2 Evolution of non-TSO costs

Non-TSO costs have received an increasing proportion of the Unit Transmission Tariffs and the data below show how these costs have changed over recent years:



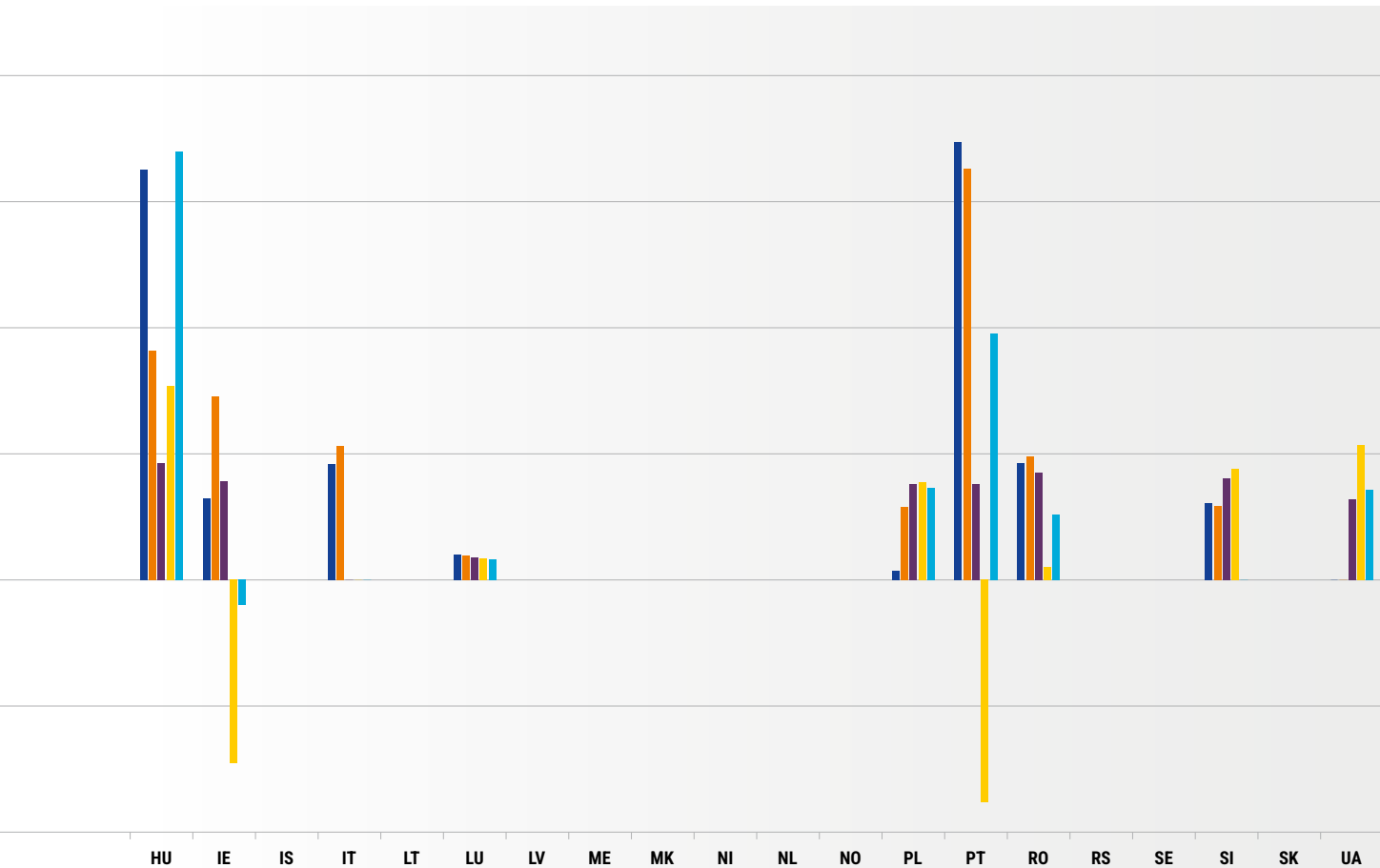
	AL	AT	BA	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR
2020		2.1		14.	13.		6.3		8.1	0.1	15.	0.1	0.4	0.2	0.4	0.0	0.0
2021		3.0		18.	9.2		6.1		7.7	0.1	15.		0.4	0.2	0.4	0.0	0.0
2022		0.6		0.1	2.1		5.5		3.3	0.1	12.		0.1	0.2	0.5	0.0	0.1
2023		0.7		0.2			5.5		1.5	0.0	11.		0.0	0.2	0.5	0.0	0.2
2024				1.1		12.			1.6	0.1	8.4		0.0	0.2	0.1	0.0	0.0

Remarks:

- The example taken for this comparison is the base case (see Section 3).
- Prices have been updated to 2025 by using the annual average rate of change in the Harmonised Index of Consumer Prices (HICP) as provided by Eurostat. If it is not available, the official CPI data from the country is taken.
- For countries not in the Euro zone the exchange rate as for 31st of December 2024 is used.
- See Country remarks for details. When annual changes exceed 15% compared to last year, reasons are provided.

Country remarks regarding: Austria, Belgium, Croatia, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Luxembourg, Montenegro, Poland, Portugal, Romania, Serbia, Slovenia, Switzerland and Ukraine are to be found in Appendix 6.

Chart 8.2: Evolution of non-TSO costs in the Unit Transmission Tariffs



HU	IE	IS	IT	LT	LU	LV	ME	MK	NI	NL	NO	PL	PT	RO	RS	SE	SI	SK	UA
16.	3.2		4.6		1.0							0.3	17.	4.7	0.0		3.0		
9.1	7.3		5.3		0.9							2.8	16.	4.8	0.0		2.9		
4.6	3.9				0.8							3.8	3.8	4.2	0.0		4.0		3.2
7.7	-7.2				0.8							3.8	-8.8	0.5	0.0		4.4		5.3
16.	-1.0				0.8							3.6	9.7	2.5	0.0		0.0		3.5

9 Appendices

1. **Country specific details**
2. **Voltage levels operated by TSOs**
3. **Comparison of network losses prices**
4. **Comparison of system services prices**
5. **Tariff areas in countries with generation/consumption tariffs with locational differentiation**
6. **Other regulatory charges not directly related to TSO activities**
7. **First connection charges**
8. **Special Tariffs**
9. **Treatment of Final Customers versus Distribution System Operators**
 - 9 a Treatment of Active Customers vs End Customers
 - 9 b Treatment of Storages vs End Customers/Generation
 - 9 c Treatment of Demand Response vs End Customers
10. **Reactive Energy**
11. **Netting of flows for the application of transmission tariffs**
12. **Exchange rates**
 - 12 a Consumer Price Index
13. **Glossary of terms**

Appendix 1:

Country specific details

Albania

— Components (First connection charges)

Charges are based on actual costs.

Austria

— Main Characteristics

Higher increase in tariff for losses (G+L) and secondary reserve (G) compared to the transmission tariff (L) thus shift to G.

— Components (First connection charges)

Shallow for generation, deep for consumers. In form of an admission charge for compensating all direct costs arising from the connection paid by consumers and generators. Consumers pay a second charge for past and future system developments (system provision) based on load:

- › Network Level 1 – 8.70 €/kW
- › Network Level 2 – 9.80 €/kW

— Components (Range of components)

A 100% Energy share was filled in just because sum of Energy and Power must be 100%. Actually, it is not possible to give a percentage because there is no non-TSO costs in 2024.

— Coverages (Costs Included)

RES and NRA.

— Other regulatory charges not directly related to TSO activities

NRAs/Other Institutions: Included in infrastructure tariff and cannot be separated should be 'L' instead of 'DSO' but fill-in conditions do not allow for 'paid by L' if the Load Component is zero.

Belgium

— Components (First connection charges)

The tariff for using the first connection bay encompasses:

- › an annual fee for the installation, substantial modification, dismantling or renovation of the connection bay; and
- › an annual fee for managing the connection bay

— Components (Range of components)

Finances taxes and pylons.

— Other regulatory harges not directly related to TSO activities

Cost coverage for regional taxes for towers and cables.

Bosnia and Herzegovina

Components (First connection charges)

Grid users pay for the infrastructure connecting its installation to the transmission grid (line/cable and other necessary equipment).

Bulgaria

Components (First connection charges)

The price for connection is paid by the grid user for installations up to the point of connection. The cost of grid reinforcement is covered by the Operator. There is no differentiated treatment of users.

Croatia

Components (First connection charges)

The first connection charges for both generators (G) and loads (L) are regulated and applied by the HOPS under the supervision of national regulatory authority HERA. Connection charges are one-off payments and aren't part of the Unit Transmission Tariff (UTT). Connection charges cover the costs of physical connection assets as well as part of the costs related to creating technical conditions in the transmission network. The remaining network costs are included in the TSO's allowed revenue which is primarily recovered through transmission tariffs (UTT) alongside other regulatory mechanisms where applicable.

Other regulatory charges not directly related to TSO activities

Non-TSO costs include regulatory and administrative costs of the national regulatory authority (HERA). All licensed energy undertakings are required to contribute 0.05% of their total annual revenue to HERA's budget. These costs are not part of transmission network tariffs (UTT) and are therefore not included in TSO network charges but are recovered separately as a regulatory levy. In addition, the decrease in non-TSO costs in 2024 is driven by the same methodological changes affecting TSO costs. The introduction of the EHV tariff level with lower capacity prices, together with the correction of the reactive energy share in 'base case model' (from ~33% to ~5%), reduced the overall Unit cost (€/MWh). As non-TSO costs are calculated based on the same reference user and model, their decrease is proportional and expected. The changes observed in 2024 are primarily methodological and regulatory in nature, ensuring improved alignment with current national tariff structures.

Unit Transmission Tariffs

The decrease in TSO costs in 2024 is primarily driven by a change in tariff methodology and structure, rather than an actual reduction in system costs. As of 1 April 2024, following the decision of HERA, a dedicated tariff category for Extra High Voltage (EHV 400 kV) was introduced, featuring a significantly lower unit price for contracted capacity compared to the previously applied high voltage (HV) tariff. In previous ENTSO-E TTO Reports (2022–2023), HV tariff levels were used as EHV tariffs were not defined. In 2024, the model was aligned with the updated tariff structure and ENTSO-E methodology, resulting in lower unit costs (€/MWh). Additionally, the assumed share of reactive energy has been reduced ('in base case model') from approximately 33% to around 5%, in line with typical transmission system users of HOPS who maintain adequate reactive power compensation. This adjustment contributed to an additional decrease in total costs.

Czech Republic

Components (First connection charges)

30,176 €/MW for Power.

Components

Increase of infrastructure costs in 2024 is result of more robust investment strategy. Both UTT tariff related with system services and losses are susceptible to volatility based on the price signals on the market and it's further influenced by the clawback mechanism.

Denmark

Components (First connection charges)

L: Pays for the actual costs for connection to the substation.

G: Pays standard fees. One for connection to the substation, and one for costs related to the reinforcement of the underlying transmission grid.

Components (Generation and Load)

Geographical differentiated G-tariff was in charge in the first half of the year. For the second half it was set to zero.

Unit Transmission Tariffs

Increase due to difference in yearly statutory TSO payment to the NRA.

Estonia

Components (First connection charges)

Includes both the direct costs of building the connection equipment as well as the necessary reinforcements in the grid, if applicable.

Other regulatory charges not directly related to TSO activities

Cost related to RES.

Finland

Components (First connection charges)

Standard fee based on average costs of connection infrastructure. No differentiation of charges for L, G and DSO. No locational differentiation.

Other regulatory charges not directly related to TSO activities

Peak Load Capacity Fee, no capacity procured, only administration costs.

Unit Transmission Tariffs

Fingrid waived grid service fees for six months in 2023, but only for three months in 2024, which lead to an increase in collected tariff.

France

Components (First connection charges)

G, L and DSOs: The connection is made to the nearest substation where the appropriate voltage level is available and where this connection is technically possible. No locational differentiation, charges based on actual costs. Generators pay 100% of the cost, consumers pay 70% of the cost of their main connection.

RES: Upstream network development costs due to RES integration are pooled on a regional basis, via a regional share in k€/MW paid by RES in proportion to their maximum power.

Components (Generation and Load)

Generators pay only if they are connected to 150 kV or above. Generators only pay an energy charge.

Main Characteristics (Time Differentiation)

A year is divided into five periods: summer / winter, mid-peak hours / off-peak and from december to february a peak period.

Other regulatory charges not directly related to TSO activities

For the base case it is 0.233 €/MWh in 2024 for industrial customers only (0 for distributors). In 2005, the pensions system of people working in the gas and electricity industry was globally reformed. For the transmission tariff, it implied the creation of what is called in French "CTA" – Contribution tarifaire d'acheminement (Transmission Tariff Contribution). It is calculated on the fixed part of the tariff (power part of the transmission tariff). All the customers pay the "CTA" which does not cover any RTE cost.

The order of 20/07/2021 decreased this percentage to 10.11 % from 01/08/2021.

Germany

Unit Transmission Tariff

The network fees for 2024 compared with 2023, significantly increased, as there is no longer a federal subsidy to offset the cost increases as in the previous year. The level of grid fees is driven by persistently high costs for system services resulting from elevated prices on the energy markets. In addition, it should be noted that TSO grid charges in Germany have been fully harmonised since 2023, so that the 2024 grid fees are based on a uniform nationwide tariff structure.

Components (First connection charges)

Charging is generally based on actual costs. Grid users pay for their own connection line and substation. General reinforcements of the grid are socialised via tariffs. No differentiation of charges for L, G or DSO.

— Other regulatory charges not directly related to TSO activities

RES support mechanism: Extra charge related to the connection of Offshore Windfarms to the grid. According to a new law (NEMoG) effective since 1.1.2019 all offshore grid connection costs are included in this extra charge and are not included in transmission tariffs anymore. An average value for privileged consumers is considered here. It has to be mentioned, that all surcharges and levies related to the TSO business are reported as Non-TSO costs here. Offshore Grid connection costs are included in this surcharge since 2019. However, offshore connections belong to the core TSO business.

Non-RES support mechanism: Extra charge for costs according to the German law for Combined Heat and Power Production Promotion (According to an amendment to the law effective since 1.1.2017 an individual approval for privileged consumer will be applied. An average value for privileged consumers is considered.) + costs according to the German Grid Tariff Regulation Ordinance.

Great Britain

— Components

NESO do not finance the purchase of energy to cover the grid losses. Instead, the losses are covered by generators or loads through additional volumes. If a generator wants to sell 100 MWh to a load, it has to inject (for example) 104 MWh of energy into the grid. Similarly, if a supplier wants to withdraw 100 MWh from the grid, it has to purchase (for example) 106 MWh from a generator. This additional energy (4 MW + 6 MW) is grid losses. The ESO do not have visibility of the cost of energy (losses), as most of the energy transactions are done on the bilateral market.

— Components (First connection charges)

Connection Charges relate only to the costs of assets installed solely for, and only capable of use by an individual user. All other assets are assumed to be shared and their costs are included in the wider locational transmission tariff.

— Main Characteristics (Generation and Load)

Balancing SO costs moved from 50/50 load/generation to load only.

— Main Characteristics (Locational Differentiation)

TNUoS locational and BSUoS non-locational.

Generation charges highest in the north and lowest (negative) in the south where generation is scarce and demand highest. Demand charges highest in the south and lowest in the north where there is surplus generation.

— Main Characteristics (Netting of flows)

Charges are based on gross flows except where demand locational charges are applied to generators where the net station demand in the half hour of system peak demand is used.

— Main Characteristics (Time Differentiation)

Part of the GB transmission tariffs are dependent on the seasons (only for large demand users). For generators and small demand users, their tariffs are not seasonal. Small demand users also have time-varying transmission tariffs (part of the transmission charge for small demand users is based on peak hours use).

— Other regulatory charges not directly related to TSO activities

Non-RES support mechanism: Assistance for Areas with High Electricity Distribution Costs. The intention of the AAHEDC Scheme is to reduce the costs to consumers of the distribution of electricity in certain areas. Currently the only Specified Area is the North of Scotland. National Grid therefore recovers an Assistance Amount through the Scheme, which is passed to the Relevant Distributor in the Specified Area, Scottish Hydro Electric Power Distribution Ltd. This enables distribution charges to be reduced.

Also, NRA Licence Fees exists.

Greece

— Components (First connection charges)

Grid users pay for the infrastructure connecting its installation to the transmission grid.

The charge includes studies, materials check, construction, supervision and delivery costs.

The costs depend on distance or voltage level and they differentiate according to the installation location characteristics (e.g. ground morphology) or any other special project requirements.

— Other regulatory charges not directly related to TSO activities

Regulatory Authority Support cost.

Hungary

— Unit transmission tariff

The base cost has decreased based on reserve cost decreasing.

— Components (First connection charges)

Charging is based on actual costs.

— Components

The main reason for the increase of infrastructure costs is that the regulatory asset value (RAB) and the recognised cost of capital and depreciation have also increased significantly. Another reason for the increase originates from the difference from averaging on the infrastructure.

The reason of decrease of UTT tariff related with system services is significant decrease of cost of availability (ancillary services).

Decrease of UTT tariff related with losses is related with significant decrease of the average cost of purchasing network transmission losses, with the consolidation of electricity prices.

Other regulatory charges not directly related to TSO activities

RES support mechanism: The Renewable Energy Sources (RES) support scheme has two component parts (paid by competitive market consumers):

1. Feed-in Tariff (FIT): generated electricity shall be purchased from FIT Balance Group Members at the regulated price. Total generated electricity volumes of the FIT Balance Group are auctioned on the Hungarian Power Exchange;
2. Feed-in Premium (FIP): Generated electricity is sold by the power plants themselves on the electricity market. Monthly ex-post market reference price (average price of HUPX) will be supplemented with the subsidised price.

Non-RES support mechanism: Separate for Aid linked to the stranded costs of conversion of the cogeneration process. Paid by competitive market consumers.

Financial support for the provision of discount-rate electricity to personnel described in specific other legislation based on their previous or existing employment in the electricity industry. Paid by competitive market consumers

The number of people eligible for support has increased significantly (many PVs have been submitted), which has increased the absolute amount of support and therefore the RES support mechanism price.

Iceland

Components (First connection charges)

First connection charges are calculated case by case using an NPV-based methodology: the connecting G or L customer pays the difference between the required network investment and the present value of the future revenues attributable to the connection.

Future revenues are estimated differently for G and L customers. DSOs do not pay FCCs.

Components (Power and Energy)

Generators pay a fixed annual delivery charge per point of injection. The charge does not vary with injected energy or connection capacity.

Components (Range of components)

There is no non-TSO cost in Iceland's transmission Tariff.

Main Characteristics (Generation and Load)

An infeed tariff was in place in 2022 and 2023 but was removed from the tariff structure in 2024 resulting in a lower share of network operator charges allocated to generation.

Main Characteristics (Netting of flows)

No netting is applied. In the relevant direct-supply, cases G and L are charged separately; the load side may receive a reduced out-feed charge where energy is supplied directly from a power plant to a power-intensive user without being transmitted through the transmission system.

Ireland

Components (First connection charges)

All connecting parties pay for the connection to the system (using a least Cost Chargeable methodology). Demand customers only pay 50 % while generators pay 100 % of connection charges.

Components

The observed decrease in the losses related component in 2024 compared to 2023 (-28 %), followed by an increase in 2025 compared to 2024 (+20 %), reflects the year on year movement in the Average Imbalance Price. The Average Imbalance Price has been sourced from the SEMO Market Monitoring Reports.

The change in the L component of the UTT tariff related to TSO costs is driven by demand and constraint costs.

The decrease in the G component of the UTT tariff related to TSO costs in 2024 compared to 2023 is largely driven by a reduction in the estimated cost of losses. This reduction is closely linked to the decline in the Average Imbalance Price between 2023 and 2024, which resulted in lower losses costs being reflected in the 2024 tariff.

Other regulatory charges not directly related to TSO activities

Public Service Obligation (PSO) levy to support renewable energy.

Italy

Main Characteristics (Losses and System Services)

Losses on the Italian transmission network are purchased by load service entities on the basis of standard losses factors. Purely for comparison purposes, in this overview the value of losses has been estimated by applying an average losses factor related to 2022 (estimated on the total value of losses, including those on the grids lower than EHV).

System services costs are a passthrough component for the TSO.

Main Characteristics (Netting of flows)

Starting from 2016, the Italian transmission tariff is binomial. As described above, Distributors pay to Terna the 'CTR component' (infrastructure component of Transmission Tariff) for withdrawal of energy from NTG.

The CTR component is split into two different subcomponents:

- › CTRE: energy (volume) component in 'cent. €/kWh';
- › CTRP: power (capacity) component in 'cent. €/kW per year'.

Considering the energy component, it is applied on a monthly basis to the net energy withdrawn from distribution companies connected to the NTG. The transmission fee is applied only if the resulting balance is a withdrawal. For transmission fee purposes, the energy injected in the distribution grid at HV level (virtual interconnection points) is also considered as energy withdrawn from the NTG

Components (First connection charges)

Production pay Terna a fixed amount of 2,5 k€ to get a general appraisal of the possible connection solution ("STMG"). Once obtained the authorization, applicants pay upfront Terna an amount of 2,5 k€+ 0,5 €/kW (max 50.000 €) for a detailed technical connection solution ("STMD"). Reduced fees apply in case of connection of renewable and for high-performance co-generation plants and on transitory basis, for storage. Consumption units pay Terna the same amounts foreseen for STMG and STMD of production plant and a connection fee equal to 50% of the expenditure for building grid connection plant.

Components (Power and Energy)

Only L component of tariff exists.

Luxembourg

Components (First connection charges)

Grid users (L, G and DSO) pay the actual costs for their own connection line and substation. General reinforcements of the grid are socialised in the tariffs.

Other regulatory charges not directly related to TSO activities

RES support mechanism: 0.75 €/MWh: The tax "Mécansime de compensation" (0.75 €/MWh for customers $\geq$ 65 kW) serves to encourage and subsidise national energy production projects based on renewable sources or cogeneration.

Non-RES support mechanism: 0.1 €/MWh: Tax "Taxe Electricité" 0.50 €/MWh (consumers cat. B) * 0.10 €/MWh (consumers cat. C)** * Cat. B: consumers > 25 MWh except belonging to cat. C ** Cat. C: consumers > 25 MWh, electricity mainly used for chemical reduction, electrolysis or in metallurgical processes.

Montenegro

Components (First connection charges)

Shallow: Generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: Industrial customers have to pay the fee for the further network development if such is required. Connection fees are: 6.26 €/kW at 110 kV, 3.84 €/kW at 220 kV and 1.17 €/kW at 400 kV.

Other regulatory charges not directly related to TSO activities

Cost of Renewable energy Support mechanism aren't recovered through TSO charges, already recovered through Fid-in tariff. NRA institutions cost isn't recovered through TSO charges, too. NRA is the government body and belongs public administration.

Netherlands

Unit transmission tariff

Voltage level 220 kV is considered part of the extra high voltage grid in the Netherlands. Level 150 kV is part of the high voltage grid. Tariff included here is assumed to be the tariff of the high voltage grid.

Components (First connection charges)

Grid users pay a one-off connection fee for the costs of connecting to the grid.

Components (Range of components)

No non-TSO costs in UTT.

Coverages (Costs Included)

No non-TSO costs in tariffs.

Main Characteristics (Netting of flows)

Grid users only pay for offtake. If there is a net injection during the 15 minutes window, no tariffs are charged for this time interval.

North Macedonia

Unit transmission tariff

In 2023, total expenses were high due to the elevated energy prices needed to cover losses, which were driven by the energy crisis. Throughout 2024, a significant amount of RES capacity was installed in our network, leading to increased market competition and a decrease in the price of energy for covering losses.

Components (First connection charges)

Grid user has to pay for its own connection line and substation, to meet security criteria.

Northern Ireland

Components (First connection charges)

All connecting parties pay for the connection to the system.

Other regulatory charges not directly related to TSO activities

N/A

Unit transmission tariff

N/A

Norway

— Main Characteristics (Time Differentiation)

The energy charge (loss element) distinguishes between daytime and night-time/weekend periods.

— Components (First connection charges)

Connection fees are established based on the need for new capacity. Max connection fee is 50 % of investment cost.

— Components (Range of components)

There are no non-TSO costs included in UTT.

Poland

— Main Characteristics (Netting of flows)

Transmission tariff system doesn't provide settlements with generators (G tariff = 0). Netting flows is applied to settlements between TSO and DSO and final consumers connected to transmission network. In case the total feed-in energy to transmission network in PoD in certain month is greater than total energy taken-off transmission grid in this point monthly charge for DSO/final consumer is zero.

— Components

Tariff components related to (i) infrastructure costs in 2024 were higher than in 2023 as follows: fixed network charge was 21 % higher and charge resulting from quality rate was 32 % higher. The growth was caused by (i) inflation increase of risk-free rate and weighted average cost of capital included in calculation of return on capital and as well as (ii) growth of system services costs. Tariff component related to losses was lower in 2024 than in 2023 due to decrease of variable charge by 27 %. The drop was caused by decrease of electricity prices.

— Components (First connection charges)

The enterprise which is going to be connected pay for all the expenditures to build the connection site which contains the direct line and extension or rebuilding costs for the substation (if necessary) where connection takes place. The reinforcement and development of existing network is performed by TSO. Connection charges are:

— Final customers (load) pay 25%;

RES units of installed capacity ≤ 5 MW, CHP units of installed capacity ≤ 1 MW and grid energy storages pay 50 %;

of total investments expenditures. Other generators and distribution companies pay 100 % of total investment expenditures.

Other regulatory charges not directly related to TSO activities

RES support mechanism: For 2024 RES charge is 0.00 PLN/MWh.

Stranded costs: Stranded costs i.e. cost resulting from compensations paid to energy producers for dissolving (early termination) long term energy sales contracts concluded in the past with a single buyer company. The long term contracts obliged energy producers to modernise their production units, adjusting them to environmental standards. Those costs are recovered by a transition charge in the Tariff. Charge rates are set in the law. TSO charges final consumers connected to transmission network and DSOs at any voltage level (then DSO charge their final consumers).

Non-RES support mechanism: Connected with settlements with (i) CHP producers and (ii) capacity mechanism settlements recovered by respectively (i) CHP charge and (ii) capacity charge in the Tariff. TSO charges final consumers connected to transmission network and DSOs at any voltage level. For UTT calculation, both charges were calculated as the average for PSE end-consumers. Their payment of CHP charge depends on electricity intensity ratio of PSE end-consumers. Their payments of capacity charge depend on difference between average hourly electricity consumption in peak and off-peak periods in working days. CHP Charge rate is set annually by the Minister responsible for energy affairs. For 2024 the cogeneration charge is 6.18 PLN/MWh. Capacity charge rate is set annually by the NRA. For 2024 the capacity charge is 126.70 PLN/MWh.

Portugal

Unit Transmission Tariffs

The reduction in the market energy price had an impact both on the decrease in loss costs (1.7 €/MWh) and on the additional cost of the remaining PPA which reversed its sign: it ceased to be an amount to be returned to tariffs and became an amount to be recovered through tariffs (+18.30 €/MWh). Costs for losses and system-services costs are not recovered by a regulated tariff but are recovered in the energy price. They have been included in this overview only for comparison purposes.

Main Characteristics (Losses and System Services)

Costs for losses and system-services costs are not recovered by a regulated tariff but are recovered in the energy price. They have been included in this overview only for comparison purposes.

Main Characteristics (Time Differentiation)

Time of day: peak, mid-peak, off-peak and super off-peak, summer and winter timetable.

Components

Costs for losses and system-services costs are not recovered by a regulated tariff but are recovered in the energy price. They have been included in this overview only for comparison purposes.

— Components (First connection charges)

The grid user, either generator (G) or consumer unit (L), has to pay for the cost of the infrastructure needed to connect its installation to the transmission grid and a grid co-payment to the system according to Ordinance ERSE 10/2019 published by the Regulator.

In case of not enough reception capacity and new grid reinforcements are not included in the NDP G must pay the needed grid reinforcements.

Internal reinforcement/expansion of the grid is endorsed to TSO's responsibility.

DSO reinforcement needs all the costs are socialised via the tariff.

— Coverages (Costs Included)

Costs for losses and system-services costs are not recovered by a regulated tariff but are recovered in the energy price. They have been included in this overview only for comparison purposes.

— Other regulatory charges not directly related to TSO activities

Regulator costs (0.20542).

Islands tariff convergence costs (4.809212).

Surplus costs for the remaining Power Purchase Agreements (PPAs) (4.509913). Hydro power station land (0.173333).

Incentives related with consumption efficiency (0.083315).

Romania

— Main Characteristics (Netting of flows)

G and L are treated separately in the settlement.

— Unit Transmission Tariff

The values provided for 8760h, 5000h and 2000h utilization time are the same. The tariffs applied by Transelectrica are based only on the Energy component, not binomial (Energy & Power).

— Components

The main reasons that led to the increase in the tariff component related to system services in 2024 compared to 2023, were:

- 1) the increase of costs for acquiring the reserves necessary to restore frequency and voltage;
- 2) the decrease of the tariffable quantity of electricity forecasted for 2024.

— Components (First connection charges)

The connecting entity (generator/load) fully covers the cost of the equipment that connects their installation to the transmission grid.

Costs associated to upstream grid reinforcements required to safely connect new users (generators/loads) are:

- › shared between the TSO and generators connecting to the grid;
- › fully paid by the TSO (and therefore socialised across all transmission users) in case of loads connecting to the grid.

Connection charge is calculated based on actual costs (on a case by case basis).

No differentiation between G and L users.

— Components (Power and Energy)

The main reasons that led to the increase of L component in 2024 compared to 2023 were:

- 1) the value of correction related to costs and revenues for 2022 which was recovered in 2024 (the value of the correction recovered in 2024 includes also the final CPI index for 2023 and the estimated CPI index for 2024);
- 2) decrease of the tariffable quantity of electricity forecasted for 2024.

— Other regulatory charges not directly related to TSO activities

Mechanism designed to provide financial support to cogeneration plants.

Serbia

— Components (First connection charges)

Shallow: Generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: Industrial customers have to pay the fee for the further network development if such is required. Connection fees are: 16,030 € /MW at 110 kV, and 20,360 € /MW at 220 kV.

— Components (Range of components)

Only L component of tariff exists.

— Coverages (Costs Included)

Same coverages as before.

— Main Characteristics (Losses and System Services)

Losses and System Services are included.

— Main Characteristics (Time Differentiation)

Two different tariffs per day.

— Other regulatory charges not directly related to TSO activities

Tax for the financing of NRA (0.8 % of Transmission tariff).

Slovak Republik

— Unit Transmission Tariff

Same G share and L share as for 400-380 kV voltage level.

— Components

Decrease of UTT tariff related to infrastructure costs is caused by decrease of tariff for reserved capacity in 2024. Decrease of UTT tariff related to system services is caused by decreasing price of electricity on the energy markets in year 2023 which was the reason behind lower costs for purchasing ancillary services in 2024.

— Components (First connection charges)

Distribution companies pay 50 % of actual costs for the infrastructure connecting its installation to the transmission grid and 50 % of actual costs for the infrastructure connecting its installation to the transmission grid are socialised via the tariff of TSO (50 % shallow and 50 % super shallow).

— Coverages (Costs Included)

Pricing decree of Slovak NRA for 2024 explicitly allows for the possibility of using a proportionate share of congestion revenues/costs to reduce/increase the tariff for system services.

Slovenia

— Unit Transmission Tariff

In 2024 new tariff system was introduced. Until 30th. September 2024, a tariff system was in place that was primarily based on energy consumption and included three time-of-use periods (peak, off-peak and uniform tariff). The same tariff system as in year 2023. From 1st. October 2024 onwards, a new tariff system came into force, which is more focused on capacity charges (a shift from “how much you consume” to “when and how much you load the system”). It introduced multiple time blocks (five) depending on the season, day of the week and time of day. The chargeable capacity is based on recorded peak demand. Each user is assigned an agreed capacity and in case of exceedance higher costs apply. Throughout year 2024 government capped electricity prices for household consumers (90 % of electricity, 10 % is paid by market price). With the introduction of the new tariff system, the electricity prices for household consumers were capped 100%.

— Main Characteristics (Time Differentiation)

Up to 30th. September 2024 tariff system distinguished only higher and lower tariff periods. From 1st. October 2024, a new network tariff system is applied.

— Components (First connection charges)

Shallow: Generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: Industrial customers have to pay the fee for the further network development if such is required. Connection fees are: 43,970 € /MW.

— Other regulatory charges not directly related to TSO activities

Tax for the financing of NRA (2.7 % of Transmission tariff); In 2024, the exemption from paying RES levy applied to all household electricity consumers for the whole year 2024.

Spain

— Components (First connection charges)

All network users are subject to connection charges and pay for the infrastructure connecting its installation to the transmission grid valued as standard costs and the reinforcement of the grid.

Sweden

— Components (First connection charges)

In 2024, Svenska kraftnat implemented a shallow connection at the transmission level.

— Main Characteristics (Time Differentiation)

The energy charge is based on the day-ahead price.

Switzerland

— Components (First connection charges)

No first connection charge for assets which can be used by other grid users.

— Other regulatory charges not directly related to TSO activities

Reserve costs.

Ukraine

— Main Characteristics (Time Differentiation)

No.

— Components (First connection charges)

Shallow: Generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: Industrial customers have to pay the fee for the further network development if such is required.

— Components

Increase in infrastructure component of UTT tariffs is related to significant increase in CAPEX investments, increase in loan repayment and financial expense of the Company, and including in tariffs the repayment of previous year's losses. Increase in Losses component in 2024 year compared to 2023 year is related to increase in losses market purchase prices. Increase in System services component is caused by increase in volume of system services to be purchased by Company, main cause of which is the war.

The absence of non-TSO costs in G component is related to absence in tariffs compensation for the PSO services (Ancillary services on gas).

— Other regulatory charges not directly related to TSO activities

Payers are load customers except for "green" electro-metallurgists.

The reasons for non-TSO costs decrease is a decrease in volumes of production of electricity from alternative sources (destroyed as a result of russian missile and drone attacks) and increase in maximum selling price to Guaranteed buyer.

Appendix 2: Voltage levels operated by TSOs

Country	330 kV and above	220 – 150 kV	132 – 50 kV
Albania	13.0 %	39.0 %	48.0 %
Austria	35.0 %	45.0 %	20.0 %
Belgium	18.0 %	47.0 %	35.0 %
Bosnia & Herzegovina	13.0 %	24.0 %	63.0 %
Bulgaria	19.0 %	17.0 %	64.0 %
Croatia	16.0 %	16.0 %	68.0 %
Czech Republic	70.0 %	29.0 %	1.0 %
Denmark	29.0 %	50.0 %	21.0 %
Estonia	31.0 %	3.0 %	66.0 %
Finland	40.0 %	7.0 %	53.0 %
France	21.0 %	27.0 %	52.0 %
Germany	70.0 %	30.0 %	0.0 %
Great Britain	54.0 %	27.0 %	19.0 %
Greece	23.0 %	76.0 %	1.0 %
Hungary	67.0 %	29.0 %	4.0 %
Iceland	0.0 %	31.0 %	69.0 %
Ireland	6.0 %	25.0 %	69.0 %
Italy	18.0 %	16.0 %	66.0 %
Latvia	31.0 %	0.0 %	69.0 %
Lithuania	30.0 %	0.0 %	70.0 %
Luxembourg	0.0 %	100.0 %	0.0 %
Montenegro	23.0 %	28.0 %	49.0 %
Netherlands	25.0 %	51.0 %	24.0 %
North Macedonia	26.0 %	0.0 %	74.0 %
Northern Ireland	0.0 %	38.0 %	62.0 %
Norway	82.0 %	3.0 %	15.0 %
Poland	57.0 %	43.0 %	0.0 %
Portugal	34.0 %	66.0 %	0.0 %
Romania	57.0 %	43.0 %	0.0 %
Serbia	19.0 %	17.0 %	64.0 %
Slovak Republic	75.0 %	22.0 %	3.0 %
Slovenia	27.0 %	10.0 %	63.0 %
Spain	49.0 %	44.0 %	7.0 %
Sweden	74.0 %	26.0 %	0.0 %
Switzerland	29.0 %	71.0 %	0.0 %
Ukraine	22.0 %	58.0 %	20.0 %

Remarks:

- Percentages are calculated as the ratio between the kilometers of circuits for each voltage level and total kilometers of circuits operated by each TSO.
- Values have been rounded

Table A2: Voltage levels operated by TSOs

Appendix 3: Comparison of Network Losses Prices

Losses (€/MWh)	Country
<1	Finland
	France
	Great Britain
	Italy
	Norway
	Portugal
	Slovenia
	Sweden
≥1	Albania
	Austria
	Belgium
	Bosnia and Herzegovina
	Bulgaria
	Croatia
	Czech Republic
	Denmark
	Estonia
	Germany
	Greece
	Hungary
	Iceland
	Ireland
	Latvia
	Lithuania
	Luxembourg
	Montenegro
	Netherlands
	Northern Ireland
	Poland
	North Macedonia
	Romania
	Serbia
	Slovak Republic
	Spain
	Switzerland
	Ukraine

Remarks:

– The base case is taken (see Section 3).

A country remarks regarding Portugal and Serbia can be found in Appendix 1.

Table A3: Comparison of network losses prices

Appendix 4: Comparison of System Services Prices

Losses (€/MWh)	Country
>3	Belgium
	Bulgaria
	Czech Republic
	Denmark
	Germany
	Great Britain
	Greece
	Hungary
	Ireland
	Lithuania
	Luxembourg
	Netherlands
	Northern Ireland
	Poland
	Slovak Republic
	Spain
	Switzerland
	Ukraine
>1 -- ≤3	Austria
	Bosnia and Herzegovina
	Croatia
	Finland
	France
	Montenegro
	North Macedonia
	Portugal
	Romania
	Serbia
>0.5 -- ≤1	Iceland
	Latvia
	Norway
	Sweden
0.5≤	Estonia
	Slovenia
Negative	Albania
	Italy

Remarks:

– The base case is taken (see Section 3). These figures cover the system services listed in Table 4.1.

A country remarks regarding Germany, Hungary, Lithuania, Poland, Portugal, Romania, Slovak Republic and Ukraine can be found in Appendix 1.

Table A4: Comparison of system services prices

Appendix 5: Areas in countries with different Generation/ Consumption locational tariffs

Great Britain

Highest generation and lowest demand charges occur in the north (surplus area).
Lowest generation and highest demand charges occur in the south (shortage area).

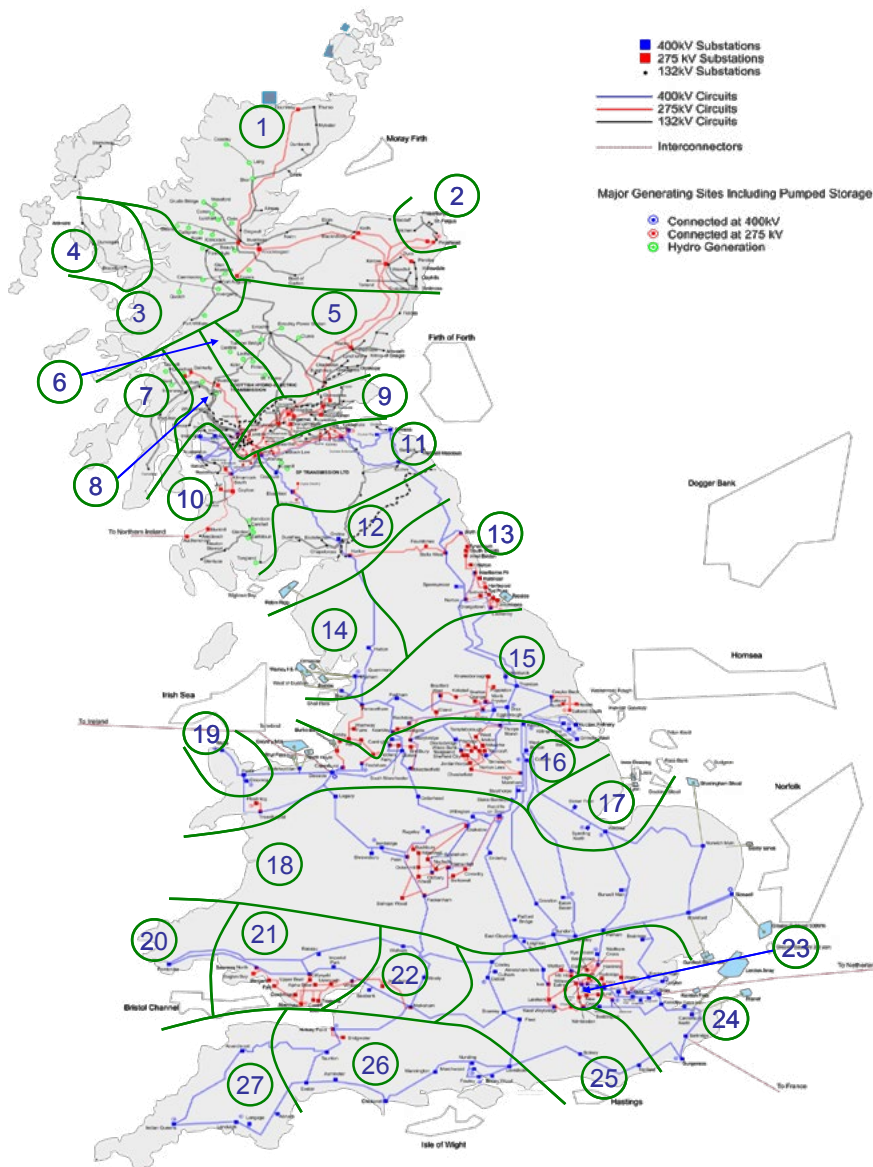


Chart A5.1: Great Britain

Ireland

The GTUoS capacity charge is calculated individually for each generator based on the location of its connection to the system. This GTUoS charge is capacity based (i.e. based on MEC of generator) there is no energy (MWh) component for GTUoS. The GTUoS tariff has a locational element; which is calculated considering the usage of current generation on future network using a “reverse MW mile” methodology.

It should be noted that these tariffs are “all island” in that EirGrid and SONI as TSOs coordinate to calculate using the same approved methodology. Hence, you will see the same report published by both TSOs. Other tariffs (demand side tariffs) are calculated differently in each jurisdiction.

Please find the link to the locational value file available on the SONI/Eirgrid websites:

Transmission loss adjustment factors (TLAFs) | SONI.

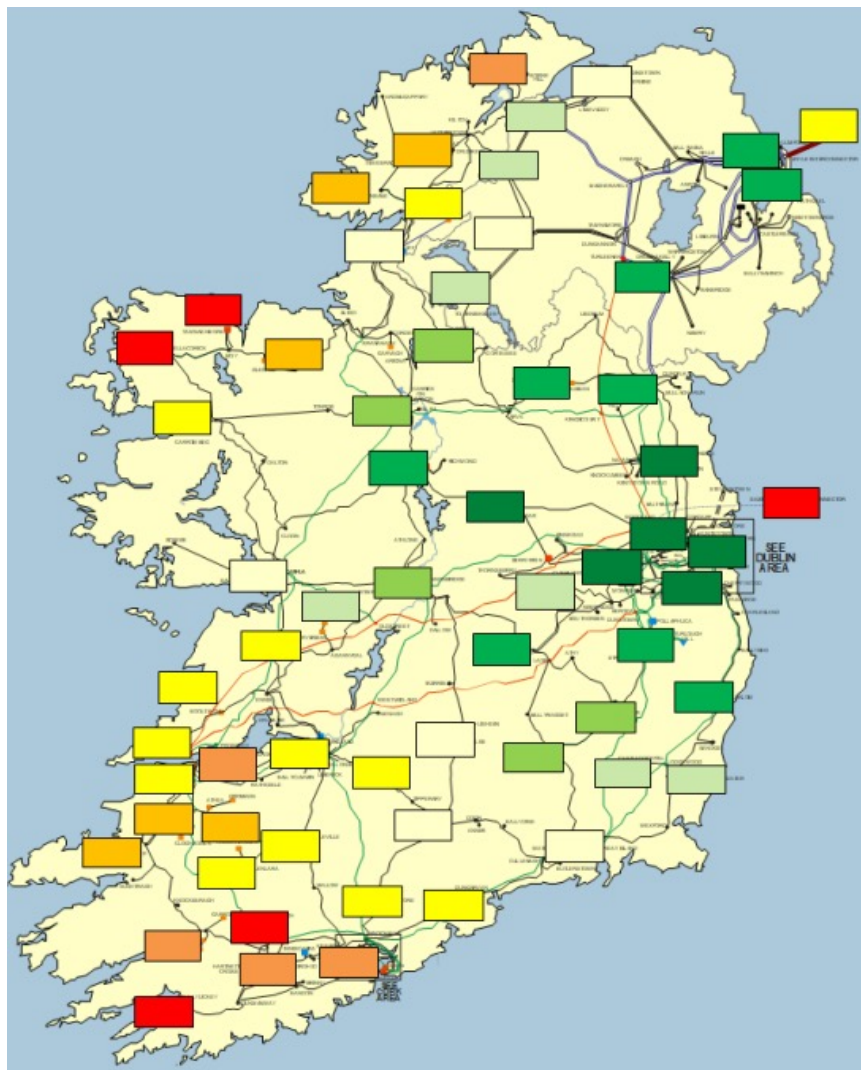


Chart A5.2: Ireland

Northern Ireland

This charge is calculated based on the Network Capacity Charge Rate (£/MW/month) and the Maximum Export Capacity of the generating unit. All-island GTUoS charges have been in effect since 2011, approved by our NRAs. The GTUoS Tariff is made up of two elements:

Locational Element – A maximum of 30 % of the GTUoS revenue requirement is recovered on a locational basis. Factors which effect the locational charge are:

- › Base Case load flows
- › Contribution of each generator to the direction of flows on each asset
- › Cost of each asset
- › Postage Stamp Element – This element is applied evenly to all generators and is calculated as minimum 70 % of the GTUoS revenue requirement / kW in model.

Publication of graph to highlight where they change year on year as shown below:

There is also a location specific file: <https://cms.soni.ltd.uk/sites/default/files/2024-09/2022-23-Approved-TLAFs-v1.0.pdf2526-Approved-GTUoS-Tariffs-NI-v1.0.pdf>

It should be noted that these tariffs are “all island ” in that EirGrid and SONI as TSOs coordinate their calculations using the same approved methodology. Therefore, the same report is published by both TSOs. Other tariffs (demand side tariffs) are calculated differently in each jurisdiction.

Norway

The tariff system in Norway consists of two elements that provide some degree of locational signaling:

- › Marginal Loss Factor (MLF)
- › k-factor

The Marginal Loss Factor is calculated for each point in the transmission grid. MLF is used when calculating the energy component (the marginal loss component) of the tariff and applies to both producers and consumers. The MLF indicates the percentage change in transmission losses when 1 MW is injected at a specific point. The MLF is the same for injection and withdrawal at the same point, but with opposite signs.

The MLF is calculated on a weekly basis.

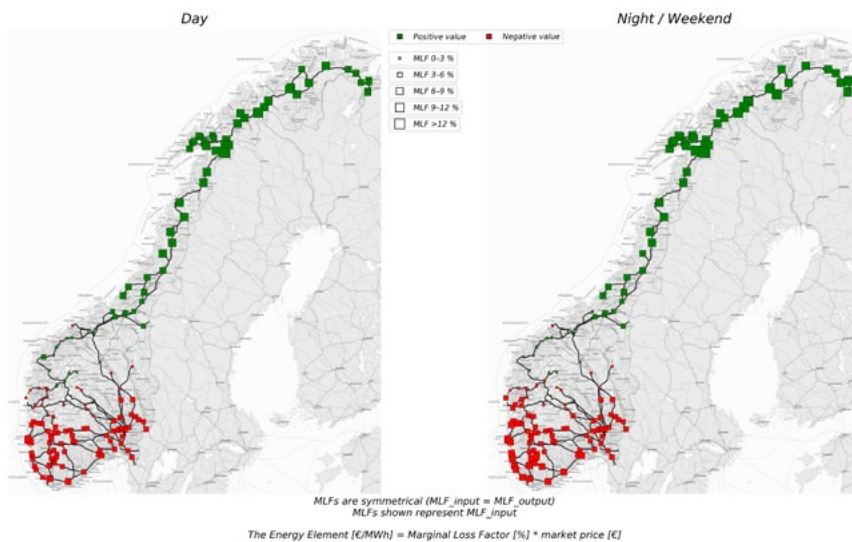


Chart A5.3: Norway. Marginal Loss Factors (MLF)

The K-factor is an adjustment factor that rewards consumption co-located with power production. The K-factor applies only to consumption (withdrawal). It is calculated for each connection point in the transmission grid. The K-factor at a given point decreases as more production is located behind that point. If there is no production behind a point, the K-factor is set to 1, meaning there is no reduction in the fixed tariff component. The more production present, the lower the K-factor. There is a minimum (floor) value of 0.6 for the K-factor, which means the maximum discount is 40%.

The k-factor is calculated on yearly basis.

K-factor is calculated individually for each connection point. Therefore, it is not practical to illustrate this with a map.

Sweden

The locational signal is based on the connection point's latitude in the grid. This means that each connection point has its own locational cost. The locational cost is determined by the distance between the latitude of the connection point and the neutral latitude. In the current tariff model, the neutral latitude is 57° for injection and 67° for withdrawal.

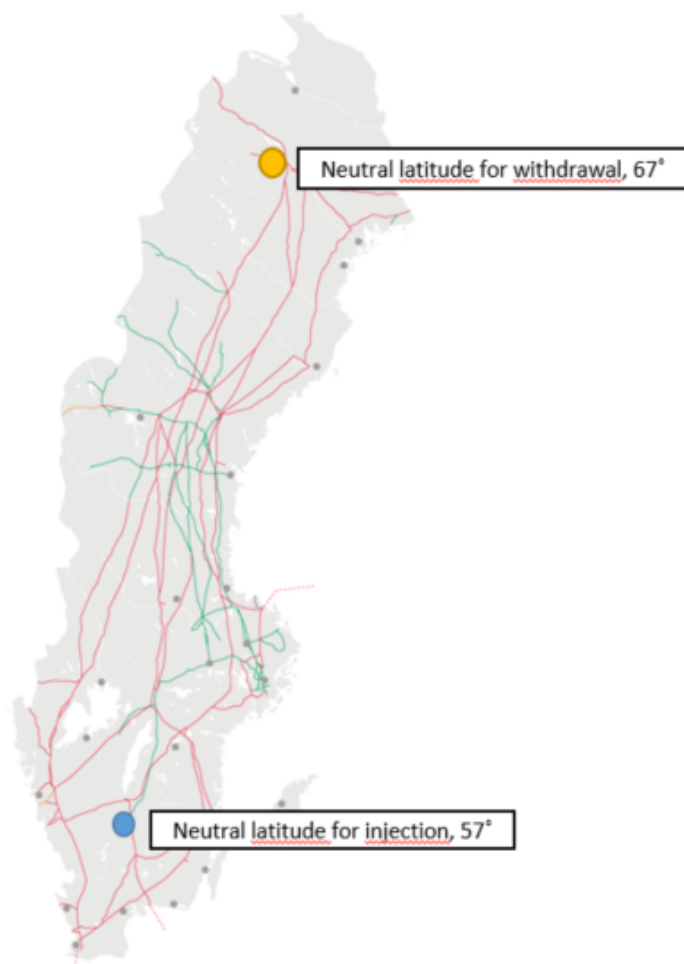


Chart A5.4: Sweden.

Appendix 6: Other regulatory charges not directly related to TSO activities

In some countries base case users are obliged to pay charges that are not directly related to TSO's activities but result from national/local regulation. These non-TSO costs are different in scope and are charged either through TSO tariffs or through separate charging mechanisms.

The table below summarises the main features of the charges/costs not directly related to TSO activities (non-TSO costs) and their charging mechanisms in force for the listed countries. these non-TSO charges/costs are included in the calculation of the Unit Transmission Tariffs:

Country	Type	Charge level (€/MWh)	Paid By	Description
Austria	NRAs/Other Institutions	0.00	DSO	Included in infrastructure tariff & cannot be separated should be 'L' instead of 'DSO' but fill-in conditions do not allow for 'paid by L' if value in column J of 'components' is 0
Belgium	RES support mechanism	1.12	L	Cost coverage for regional taxes for towers and câbles
Croatia	NRAs/Other Institutions	0.01	L	Non-TSO costs include regulatory and administrative costs of the national regulatory authority (HERA). All licensed energy undertakings are required to contribute 0.05% of their total annual revenue to HERA's budget. These costs are not part of transmission network tariffs (UTT) and are therefore not included in TSO network charges, but are recovered separately as a regulatory levy. In addition, the decrease in non-TSO costs in 2024 is driven by the same methodological changes affecting TSO costs. The introduction of the EHV tariff level with lower capacity prices, together with the correction of the reactive energy share in 'base case model' (from ~33% to ~5%) reduced the overall Unit cost (€/MWh). As non-TSO costs are calculated based on the same reference user and model, their decrease is proportional and expected. The changes observed in 2024 are primarily methodological and regulatory in nature, ensuring improved alignment with current national tariff structures.
Denmark	NRAs/Other Institutions	0.14	L	NRA + Danish Energy Agency
Estonia	RES support mechanism	8.40	L	Cost related with RES
Finland	Others	0.00	L	Peak load capacity fee, no capacity procured, only administration costs
France	Others	0.14	L	For the base case it is 0.233 €/MWh in 2024 for industrial customers only (0 for distributors). In 2005, the pensions system of people working in the gas and electricity industry was globally reformed. For the transmission tariff, it implied the creation of what is called in French "CTA" Contribution tarifaire d'acheminement (Transmission Tariff Contribution). It is calculated on the fixed part of the tariff (power part of the transmission tariff). All the customers pay the "CTA" which does not cover any RTE cost. The order of 20/07/2021 decreased this percentage to 10.11% from 01/08/2021.
Germany	non-RES support mechanism	0.70	L	Extra charge for costs according to the German law for Combined Heat and Power Production Promotion (According to an amendment to the law effective since 1.1.2017 an individual approval for privileged consumer will be applied. An average value for privileged consumers is considered.) + costs according to the German Grid Tariff Regulation Ordinance
	RES support mechanism	0.97	L	Extra charge related to the connection of Offshore Windfarms to the grid. According to a new law (NEMoG) effective since 1.1.2019 all offshore grid connection costs are included in this extra charge and are not included in transmission tariffs anymore. An average value for privileged consumers is considered here. It has to be mentioned, that all surcharges and levies related to the TSO business are reported as Non TSO costs here. Offshore Grid connection costs are included in this surcharge since 2019. However, offshore connections belong to the core TSO business.

Country	Type	Charge level (€/MWh)	Paid By	Description
Great Britain	non-RES support mechanism	0.15	L	Assistance for Areas with High Electricity Distribution Costs. The intention of the AAHEDC Scheme is to reduce the costs to consumers of the distribution of electricity in certain areas. Currently the only Specified Area is the North of Scotland. National Grid therefore recovers an Assistance Amount through the Scheme, which is passed to the Relevant Distributor in the Specified Area, Scottish Hydro Electric Power Distribution Ltd. This enables distribution charges to be reduced.
	NRAs/Other Institutions	0.02	L	NRA Licence Fees
Greece	RES support mechanism	0.07	L	Regulatory Authority Support cost
Hungary	non-RES support mechanism	3.54	L	Separate for Aid linked to the stranded costs of conversion of the cogeneration process. Paid by competitive market consumers
	Others	0.20	L	Financial support for the provision of discount-rate electricity to personnel described in specific other legislation based on their previous or existing employment in the electricity industry. Paid by competitive market consumers
	RES support mechanism	13.25	L	The Renewable Energy Sources (RES) support scheme has two component parts (paid by competitive market consumers): 1.) Feed-in Tariff (FIT): generated electricity shall be purchased from FIT Balance Group Members at the regulated price. Total generated electricity volumes of the FIT Balance Group are auctioned on the Hungarian Power Exchange; 2.) Feed-in Premium (FIP): Generated electricity is sold by the power plants themselves on the electricity market. Monthly ex-post market reference price (average price of HUPX) will be supplemented with the subsidised price.
Ireland	RES support mechanism	-1.00	L	Public Service Obligation (PSO) levy to support renewable energy
Luxembourg	RES support mechanism	0.85	L	RES support mechanism: 0.75 €/MWh: The tax "Mécanisme de compensation" (0.75 €/MWh for customers ≥ 65 kW) serves to encourage and subsidise national energy production projects based on renewable sources or cogeneration. Non-RES support mechanism: 0.1 €/MWh: Tax "Taxe Electricité" 0.50 €/MWh (consumers cat. B)* 0.10 €/MWh (consumers cat. C)** * Cat. B: consumers > 25 MWh except belonging to cat. C ** Cat. C: consumers > 25 MWh electricity mainly used for chemical reduction electrolysis or in metallurgical processes.
Montenegro		0.00		Cost of Renewable energy Support mechanism aren't recovered through TSO charges already recovered through Fid-in tariff. NRA institutions cost isn't recovered through TSO charges too. NRA is the government body and belongs public administration.
Poland	non-RES support mechanism	3.56	L	Connected with settlements with (i) CHP producers and (ii) capacity mechanism settlements recovered by respectively (i) CHP charge and (ii) capacity charge in the Tariff. TSO charges final consumers connected to transmission network and DSOs at any voltage level. For UTT calculation, both charges were calculated as the average for PSE end-consumers. Their payment of CHP charge depends on electricity intensity ratio of PSE end-consumers. Their payments of capacity charge depend on difference between average hourly electricity consumption in peak and off-peak periods in working days. CHP Charge rate is set annually by the Minister responsible for energy affairs. For 2024 the cogeneration charge is 6.18 PLN/MWh. Capacity charge rate is set annually by the NRA. For 2024 the capacity charge is 126.70 PLN/MWh.
	RES support mechanism	0.00	L	For 2024 RES charge is 0.00 PLN/MWh. RES charge is set annually by NRA.
	Stranded costs	0.11	L	Stranded costs i.e. cost resulting from compensations paid to energy producers for dissolving (early termination) long term energy sales contracts concluded in the past with a single buyer company. The long term contracts obliged energy producers to modernise their production units, adjusting them to environmental standards. Those costs are recovered by a transition charge in the Tariff. Charge rates are set in the law. TSO charges final consumers connected to transmission network and DSOs at any voltage level (then DSO charge their final consumers).
Portugal	NRAs/Other Institutions	0.21	L	Regulator's costs
	Others	9.58	L	Islands tariff convergence costs (4.809212). Surplus costs for the remaining Power Purchase Agreements (PPAs) (4.509913). Hydro power station land (0.173333). Incentives related with consumption efficiency (0.083315)
Romania	non-RES support mechanism	2.58	L	Mechanism designed to provide financial support to cogeneration plants.
Serbia	NRAs/Other Institutions	0.04	L	Tax for the financing of NRA (0.8% of Transmission tariff)

Country	Type	Charge level (€/MWh)	Paid By	Description
Slovenia	NRAs/Other Institutions	0.04	L	Tax for the financing of NRA (2.7 % of Transmission tariff); In 2024 the exemption from paying RES levy applied to all household electricity consumers for the whole year 2024.
Switzerland	Others	12.60	L	Reserve costs
Ukraine	RES support mechanism	3.59	L	Payers are load customers except for “green” electrometallurgists

Country remarks regarding: Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Luxemburg, Montenegro, Poland, Portugal, Romania, Serbia, Slovenia. Switzerland and Ukraine are to be found in Appendix 1.

Table A6: Other regulatory charges not directly related to TSO activities

Appendix 7: First connection charges

The connection charge types are characterised by costs that are taken into account to calculate the connection charge. For the purpose of this Overview, first connection charges are defined as:

- › **Super-shallow:** All costs are socialised via the tariff, no costs are charged to the connecting entity;
- › **Shallow:** grid users pay for the infrastructure connecting its installation to the transmission grid (line/cable and other necessary equipment);
- › **Deep:** shallow + all other reinforcements/extensions in existing network, required in the transmission grid to enable the grid user to be connected

In case applied charging rules do not exactly suit any of the three above definitions, but are between any of them, it is reported as e.g. Super-shallow/Shallow, Shallow/Deep etc. with the corresponding explanation.

The table below summarises the main features of charging mechanisms in force for first connection to transmission grid

Country	Charge Type	Description
Albania	Shallow/Deep	Charges are based on the actual costs
Austria	Shallow/Deep	Shallow for generation, deep for consumers In form of an admission charge for compensating all direct costs arising from the connection, paid by consumers and generators. Consumers pay a second charge for past and future system developments (system provision) based on load: • Network Level 1 – 8.70 €/kW • Network Level 2 – 9.80 €/kW
Belgium	Shallow	The tariff for using the first connection bay and encompasses: • an annual fee for the installation substantial modification dismantling or renovation of the connection bay; and • an annual fee for managing the connection bay.
Bosnia and Herzegovina	Shallow	Grid users pay for the infrastructure connecting its installation to the transmission grid (line/cable and other necessary equipment)
Bulgaria	Shallow	The price for connection is paid by the user, for installations up to the point of connection. The price for reinforcement of the grid is paid by the operator. There is no any different treatment of users.
Croatia	Deep/Shallow	The first connection charges for both generators (G) and loads (L) are regulated and applied by the HOPS under the supervision of national regulatory authority HERA. Connection charges are one-off payments and aren't part of the Unit Transmission Tariff (UTT). Connection charges cover the costs of physical connection assets as well as part of the costs related to creating technical conditions in the transmission network. The remaining network costs are included in the TSO's allowed revenue which is primarily recovered through transmission tariffs (UTT) alongside other regulatory mechanisms where applicable.
Czech Republic	Shallow	30,176 €/MW for power – the increase compared to 2024 results from increased costs of infrastructure.
Denmark	Shallow/Deep	L: Pays for the actual costs for connection to the substation. G: Pays standard fees. One for connection to the substation. And one for costs related to the reinforcement of the underlying transmission grid.
Estonia	Shallow	Includes both the direct costs of building the connection equipment as well as the necessary reinforcements in the grid, if applicable.
Finland	Shallow	Standard fee based on average costs of connection infrastructure. No differentiation of charges for L, G, DSO. No locational differentiation.

Country	Charge Type	Description
France	Shallow/Super shallow	G, L, DSOs: the connection is made to the nearest substation where the appropriate voltage level is available and where this connection is technically possible No locational differentiation, charges based on actual costs. Generators pay 100 % of the cost, consumers pay 70 % of the cost of their main connection. RES: Upstream network development costs due to RES integration are pooled on a regional basis, via a regional share in k€/MW paid by RES in proportion to their maximum power.
Germany	Shallow/Super shallow	Charging is generally based on actual costs. Grid users pay for their own connection line and substation. General reinforcements of the grid are socialised via tariffs. No differentiation of charges for L, G or DSO.
Great Britain	Shallow	Connection charges relate only to the costs of assets installed solely for, and only capable of use by, an individual user. All other assets are assumed to be shared and their costs are included in the wider locational transmission tariff.
Greece	Shallow	Grid users pay for the infrastructure connecting its installation to the transmission grid. The charge includes studies, materials, check, construction, supervision and delivery costs. The costs depend on distance or voltage level and they differentiate according to the installation location characteristics (e.g. ground morphology) or any other special project requirements.
Hungary	Shallow/Deep	Charging is based on actual costs.
Iceland	Shallow/Deep	First connection charges are calculated case by case using an NPV-based methodology: the connecting G or L customer pays the difference between the required network investment and the present value of the future revenues attributable to the connection. Future revenues are estimated differently for G and L customers. DSOs do not pay FCCs.
Ireland	Shallow	All connecting parties pay for the connection to the system (using a Least Cost Chargeable methodology). Demand customers only pay 50 % while generators pay 100 % of connection charges.
Italy	Shallow	Production pay Terna a fixed amount of 2.5 k€ to get a general appraisal of the possible connection solution ('STMG'). Once obtained the authorization applicants pay upfront Terna an amount of 2.5 k€ + 0.5 €/kW (max 50,000 €) for a detailed technical connection solution ('STMD'). Reduced fees apply in case of connection of renewable and for high-performance co-generation plants and on transitory basis for storage. Consumption units pay Terna the same amounts foreseen for STMG and STMD of production plant and a connection fee equal to 50 % of the expenditure for building grid connection plant.
Latvia	Shallow/Deep	Includes both the direct costs of building the connection equipment as well as the necessary reinforcements in the grid, if applicable.
Lithuania	Deep	100 % of all actual connection costs.
Luxembourg	Shallow	Grid users (L, G and DSO) pay the actual costs for their own connection line and substation. General reinforcements of the grid are socialised in the tariffs.
North Macedonia	Shallow	Grid user has to pay for its own connection line and substation, to meet security criteria.
Montenegro	Shallow/Deep	Shallow: Generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: Industrial customers have to pay the fee for the further network development if such is required. Connection fees are: 6.26 €/kW at 110 kV 3.84 €/kW at 220 kV and 1.17 €/kW at 400 kV.
Netherlands	Shallow	Grid users pay a one-off connection fee for the costs of connecting to the grid.
Northern Ireland	Shallow	All connecting parties pay for the connection to the system
Norway	Deep/Shallow	Connection fees are established based on the need for new capacity. Max connection fee is 50 % of investment cost.
Poland	Shallow	The enterprise which is going to be connected pay for all the expenditures to build the connection site which contains the direct line and extension or rebuilding costs for the substation (if necessary) where connection takes place. The reinforcement and development of existing network is performed by TSO. Connection charges are: • Final customers (load) pay 25 % of total investment expenditures; • RES units of installed capacity ≤ 5 MW, CHP units of installed capacity ≤ 1 MW and grid energy storages pay 50 % of investment expenditures. Other generators and distribution companies pay 100 % of total investment expenditures.
Portugal	Shallow	The grid user either generator (G) or consumer unit (L) has to pay for the cost of the infrastructure needed to connect its installation to the transmission grid and a grid co-payment to the system according to Ordinance ERSE 10/2019 published by the Regulator. In case of not enough reception capacity and new grid reinforcements are not included in the NDP G must pay the needed grid reinforcements. Internal reinforcement/expansion of the grid is endorsed to TSO's responsibility. DSO reinforcement needs all the costs are socialised via the tariff.

Country	Charge Type	Description
Romania	Shallow/Deep	The connecting entity (generator/load) fully covers the cost of the equipment that connects their installation to the transmission grid. Costs associated to upstream grid reinforcements required to safely connect new users (generators/loads) are: • shared between the TSO and generators connecting to the grid; • fully paid by the TSO (and therefore socialised across all transmission users) in case of loads connecting to the grid Connection charge is calculated based on actual costs (on a case by case basis). No differentiation between G and L users.
Serbia	Shallow/Deep	Shallow: generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: industrial customers have to pay the fee for the further network development if such is required. Connection fees are: 16,030 €/ MW for 110 kV, and 20,360 €/MW for 220 kV.
Slovak Republic	Shallow/Super shallow	Distribution companies pay 50 % of actual costs for the infrastructure connecting its installation to the transmission grid and 50 % of actual costs for the infrastructure connecting its installation to the transmission grid are socialised via the tariff of TSO (50 % shallow and 50 % super shallow).
Slovenia	Shallow/Deep	Shallow: Generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: Industrial customers have to pay the fee for the further network development if such is required. Connection fees are: 43,970 €/MW.
Spain	Deep	All network users are subject to connection charges and pay for the infrastructure connecting its installation to the transmission grid valued as standard costs and the reinforcement of the grid.
Sweden	Shallow	Generators or consumers connecting to the grid pay the costs associated with their connection, such as lines and substations. In 2024, Svenska kraftnat implemented a shallow connection fee principle at the transmission level.
Switzerland	Shallow	No first connection charge for assets which can be used by other grid users.
Ukraine	Shallow/Deep	Shallow: Generators and DSOs have to pay fee for connection lines to match grid security criteria and for substation. Deep: Industrial customers have to pay the fee for the further network development if such is required.

Table A7: First connection charges

Appendix 8: Special tariffs

Special tariff conditions can exist in some countries e.g.:

- › Special tariff conditions for low utilization (auto production or own production units behind the connection site, second connection used for emergency situations, pumping stations...);
- › Special tariff conditions for high consumption (for instance over 100 GWh per year);
- › Special tariff conditions for users fulfilling defined technical criteria of its production/connection site;
- › Special tariff conditions for any group of users (e.g. any public utilities, army, etc).

The table below summarises different charging rules/tariff conditions or exemptions from rules defined as “standard” and applied by TSO’s for specific groups of network users

Country	Special Tariff Conditions
Albania	No.
Austria	1) For pump storage: the grid usage charge for pumped storage plants for all network levels is: • energy: 0.2510 c€/kWh; • power: 100.00 c€/kW. 2) Reduced infrastructure tariff for negative Ancillary Services • called energy: 0.085 c€/kWh • additional power: 100.00 c€/kW.
Belgium	No
Bosnia and Herzegovina	No
Bulgaria	No
Croatia	No
Cyprus	No
Czech Republic	No
Denmark	No
Estonia	No
Finland	No
France	* Specific tariff for a second connection used for emergency situations. * Specific tariff for multi-locations customers. This tariff considers a unique virtual site, summing all load of the concerned sites and calculating an annual fee proportional of the necessary length of network to connect these sites. * A DSO directly connected to the lowest voltage level of a transformer that belongs to the TSO can use the tariff of the highest voltage level of this transformer. * A DSO owning lines of the same voltage level as the lines of the TSO it is connected to benefits from a discount. * When the actual temperatures are very low compared to average temperatures, DSOs may benefit from a discount on their capacity overrun. * Occasional planned overrun of contracted capacity: a customer can benefit from a discount on its tariff during 2 weeks, provided it informs the TSO in advance. * Industrial customers connected to the transmission grid can benefit from a reduction of their transmission invoice from 50 % to 90 % depending on their demand (annual consumption annual usage duration usage duration during peak period vs. usage duration during off-peak period) or whether they have storage capabilities or not.

Country	Special Tariff Conditions
Germany	- Monthly power price: For final customers with a temporary high power consumption and an obvious lower or no power consumption in the remaining time, a monthly price instead of a yearly price for the power component is offered. - Individual tariff: For final customers with a peak load occurring at a different time period than the maximal power in the grid, an individual tariff is offered. The individual tariff must not be lower than 20% of the published regular tariff. - Grid fee reduction: For Energy intensive customers (typically heavy industry customers) with energy consumption that exceeds 7,000 full load hours per year and 10 GWh there is a fee reduction. Depending on full load hours, the grid fee has to be at least 10, 15 or 20% of the normal grid fee. - Grid fee exemption: For pump-storage power stations a grid fee exemption is possible for 10 years if the amount of storage energy has increased by 5% minimum. Other storage commissioned till 2029 is also exempt from grid fees. - The agreement on both for individual tariffs and grid fee reduction and exemption requires the approval of the regulator. - Grid fee reduction for customer with an exclusive usage of storage (not less than 20% of yearly power price).
Great Britain	No
Greece	No
Hungary	No
Iceland	Customers with curtailable transmission pay an energy charge but no capacity charge is levied and a 17% discount is granted on the charge for ancillary services
Ireland	Autoproducers pay capacity based TUoS charges on the greater of either their contracted Maximum Import Capacity or contracted Maximum Export Capacity, not both
Italy	Energy withdrawals for generation plants auxiliary services and for hydro pumping storage plants are exempt (if specific predetermined conditions are met) from transmission and distribution fees
Latvia	No
Lithuania	Zero transmission tariff in charging mode for storage (>1 MW)
Luxembourg	No
North Macedonia	No
Montenegro	No
Netherlands	Grid users with less than 600 full load hours pay a reduced tariff. They also pay for weekly peak load rather than monthly peak load. Furthermore, there is a considerably lower tariff for users that agree to a (partially) non-firm connection agreement
Northern Ireland	No
Norway	There is a 50% tariff reduction for large industrial users
Poland	A final consumer is entitled to pay 10% of the quality charge if in 2022 he fulfilled the following technical and economic conditions: - yearly consumption was not less than 400 GWh; - utilization of the contractual power was not less than 50%; - overall costs related to electric energy (purchase and transportation) constitute not less than 15% of the total production costs. A final consumer is entitled to pay 30% of the transition charge (covering stranded costs) if in 2022 they fulfilled the following technical and economic conditions: - yearly consumption was not less than 400 GWh; - utilization of the contractual capacity was not less than 60%; - overall costs related to electric energy (purchase and transportation) constitute not less than 15% of the total value of their production. A final consumer is entitled to pay: (i) 80% or (ii) 60% or (iii) 15% of the RES charge or cogeneration charge if its electricity intensity ratio is respectively: (i) not lower than 3% and not higher than 20% or (ii) higher than 20% and not higher than 40% or (iii) higher than 40%. Electricity intensity ratio is calculated as share of costs of electricity consumed for own use (cost of electricity, including the cost of fulfilling the RES obligations and the cost of all the network charges) in gross value added. The ratio is calculated as the arithmetic average of the three years preceding the year of obligation. If the business is conducted by less than 3 years, the period of business activity should be taken into account. A final consumer is entitled to pay: (i) 83% or (ii) 50% or (iii) 17% of the capacity charge if its difference between average hourly electricity consumption in peak and off-peak periods in working days is respectively: (i) not lower than 10% and lower than 15% or (ii) not lower than 5% and lower than 10% or (iii) lower than 5%. The above difference is calculated on the basis actual data, and for each decade (i.e. ten-day period) separately.
Portugal	Social tariff for vulnerable customers (domestic consumers with a contracted power less than 6.9 kVA, who benefit from social insertion income, invalidity and old age social pension). For 2024, the discount is 0.03 €/kVA at the fixed term of the access tariffs.

Country	Special Tariff Conditions
Romania	Small-sized generators (generators with installed capacity of up to 5 MW) are not subject to grid charges.
Serbia	For Railways power is charged by total maximum demand, not by maximum demand per substation Pump storage HPP are not subject of transmission tariff for load they consume. Generator's ancillary supply is subject of transmission tariff but only for its active energy part.
Slovak Republic	Consumers connected directly to transmission system pay in 2024: • negotiated discounted system services tariff is charged if the user's expected yearly consumption is over 100 GWh or if their utilization of maximum contractual capacity in 2022 was higher than 6,800 hours and perpetual deviation of the subject of settlement was lower than 0.025, • tariffs for access to transmission system and its management: › discounted by 25% if their maximum contractual capacity in 2024 is higher than 150 MW and their energy supplied over transmission system in 2022 was higher than 1 TWh, › discounted by 50% if their maximum contractual capacity in 2024 is higher than 250 MW and their energy supplied over transmission system in 2022 was higher than 1.5 TWh, › discounted by 75% if their maximum contractual capacity in 2024 is higher than 350 MW and their energy supplied over transmission system in 2022 was higher than 2.5 TWh.
Slovenia	No
Spain	No
Sweden	No
Switzerland	No
Ukraine	The "green" electrometallurgists with approved status pay lower transmission tariff: 0.20942 UAH/kWh (or 0.00496163 €/kWh). This special tariff depends, on the one hand, on the number of green electrometallurgical companies that have received certificates (valid for one year), and, on the other hand, on the amount of planned expenses included in the transmission tariff for each respective year (excluding RES-related costs). Requirements to obtain the status of "green electrometallurgist": 1) The carbon footprint of the produced steel must be significantly lower than traditional blast furnace routes 2) The electric arc furnace (EAF) must operate using electricity derived from renewable sources (solar, wind or hydro) rather than fossil fuels. 3) Utilizing high-quality scrap steel (Circular Economy) or green DRI (Direct Reduced Iron) produced using green hydrogen instead of natural gas. 4) Optimization of energy consumption in the melting process using advanced energy-efficient equipment (e. g. modern EAFs). 5) Compliance with international standards such as ISO 14064 (greenhouse gases) and receiving certifications like LEED (for sustainable construction materials) or specialised 'Green Steel' labels.

Table A8: Special tariffs

Appendix 9: Treatment of End Customers vs Distribution System Operators

Both DSOs and End Customers are seen as Load (L) from TSO's perspective

There might be different tariffs, charges calculation procedures or settlement rules for end customers and distribution system operators. Justification for different treatments might be the load volume of a given network user, the number of connection points to the transmission grid (simultaneous off-take), the network configuration conditions and the co-operation scheme of DSOs with the TSO (often DSOs' network plays a role of sub-transmission grid).

The table below summarises the main features of different treatment/charging mechanisms of end customers and distribution system operators per TSO.

Country	Different treatment between final customer and distributor	Difference final customer and distributor %
Albania	No	
Austria	No	
Belgium	Yes	The tariff for DSO is higher by 14.66 €/MWh
Bosnia and Herzegovina	No	
Bulgaria	No	
Croatia	Yes	HOPS charges transmission network tariffs directly to customers connected to the transmission system. For customers connected to the distribution network the transmission tariff component is collected by the distribution system operator (DSO) and subsequently transferred to the transmission system operator (TSO) HOPS.
Czech Republic	No	
Denmark	Yes	Only endconsumers pays tariffs
Estonia	No	
Finland	No	
France	No	Some parts of the tariff are only applied to DSOs: peak shaving in extreme cold weather, component for transformer use compensation for operating lines at the same voltage as the upstream public. They reduce the bill of DSOs by 0.1 %.
Germany	No	
Great Britain	Yes	DSOs are not charged, charges are levied on end users via their supplier.
Greece	Yes	Presently ADMIE does not charge final customers but load representatives. It is the load representative who charges final customers connected to the transmission network.
Hungary	No	
Iceland	Yes	There are separate tariffs for DSOs and Power intensive users (PIUs). Tariff for DSOs is higher and in ISK, the tariff for PIUs is lower and in USD.
Ireland	No	
Italy	Yes	The Distributors pay the 'CTR components' and recover it from the end-user through the 'TRAS component'.
Latvia	No	
Lithuania	No	

Country	Different treatment between final customer and distributor	Difference final customer and distributor %
Luxembourg	No	
Montenegro	No	
Netherlands	No	
North Macedonia	No	
Northern Ireland	No	
Norway	No	
Poland	No	There is no differentiation between final consumers and distributors but between kinds of points of delivery (PoD). There are two different rates for access to the transmission network: one called "final" PoD (where end consumption is connected) and other called "network" PoD (which are PoD of DSOs having more than two PoDs, and these PoDs are nodes of meshed distribution network 110 kV). In final PoD contractual capacity is reserved by and extra charges applied in case of exceeding, in network PoD contractual capacity is determined based on actual energy flows ,no extra charges in case of exceeding. The total charge (without non-TSO charges) for users connected in "final PoDs" amounts to 78% of the charge paid by DSO in "network PoDs".
Portugal	No	
Romania	No	
Serbia	No	
Slovak Republic	No	
Slovenia	No	
Spain	No	
Sweden	No	
Switzerland	Yes	Bundling of connection points for national railway operator (SBB)
Ukraine	No	No

Table A9: Treatment End Customers vs Distribution System Operators

Appendix 9a: Treatment of Active Customers vs End Customers

End Customers are seen as Load (L), while Active Customers are seen both as Load (L) and Generation (G) from TSO's perspective.

There might be different tariffs, charges calculation procedures or settlement rules for Active Customers and End Customers. Justification for different treatments might be the different power flows in the case of Active Customers and some RES incentive charges applied to End Customers which are not applied on Active Customers.

The table below summarises the main features of different treatment/charging mechanisms of Active Customers and End Customers per TSO.

Country	Different treatment between Active Customer and End Customers	Difference from the total charge applied to the base case scenario (%)
Albania	No	
Austria	No	
Belgium	No	
Bosnia and Herzegovina	No	
Bulgaria	No	
Croatia	No	
Czech Republic	No	
Denmark	No	Prosumers pay consumption tariff when they draw energy from the net and G charge when they inject.
Estonia	No	
Finland	No	
France	No	
Germany	No	
Great Britain	No	
Greece	No	
Hungary	No	
Iceland	No	
Ireland	No	
Italy	No	
Latvia	No	

Country	Different treatment between Active Customer and End Customers	Difference from the total charge applied to the base case scenario (%)
Lithuania	No	
Luxembourg	No	
North Macedonia	No	
Montenegro	No	
Netherlands	No	
Northern Ireland	No	
Norway	No	
Poland	No	
Portugal	Yes	The prosumers that use National Grid don't pay some of non-TSO costs
Romania	No	
Serbia	No	
Slovak Republic	Yes	Prosumers are paying tariff for reserved capacity in the form of G component and only if generation exceeds load
Slovenia	No	
Spain	No	
Sweden	No	
Switzerland	No	
Ukraine	No	

Table A9a: Treatment Active Customers vs End Customers

Appendix 9b: Treatment of Storages vs End Customers/Generation

Storage is seen as both Load (L) and Generation (G) from TSO's perspective.

There might be different tariffs, charges calculation procedures or settlement rules for Storages (as Load) and End Customers and Storages (as Generation) and classic Generation. Justification for different treatments of storages might be the important role of storages in the system, thus some special tariff regimes may apply to it.

The table below summarises the main features of different treatment/charging mechanisms of Storages vs End Customers/Generation.

Member State Name	Different treatment between Storages and End Customers/ Generation	Difference between Storages and End Customers/Generation (%)
Albania	No	
Austria	Yes	For pump storage: The grid usage charge for pumped storage plants for all network levels is: • Energy: 0.251 c/kWh' • Power: 100.00 c/kw
Belgium	Yes	- 0.31
Bosnia and Herzegovina	No	
Bulgaria	No	
Croatia	Yes	Based on respective law just load self-consumption is a base for load tariffs
Czech Republic	No	
Denmark	No	
Estonia	No	
Finland	No	
France	No	
Germany	Yes	Storages do not pay grid charges at all (§ 118 paragraph 6 EnWG) or less grid charges in some cases (§ 19 paragraph 4 StromNEV)
Great Britain	Yes	Storage users are considered to be generation for charging purposes
Greece	No	
Hungary	No	
Iceland	No	
Ireland	No	
Italy	Yes	Storages don't pay Dispatching components because they are classified as negative injections.
Latvia	No	
Lithuania	Yes	Storage (only > 1 MW) does not pay transmission tariff for the charged amount if that amount is subsequently returned to the transmission grid

Member State Name	Different treatment between Storages and End Customers/ Generation	Difference between Storages and End Customers/Generation (%)
Luxembourg	No	
Montenegro	No	
Netherlands	No	All grid users pay for offtake. Storage have considerably more offtake than producers and hence pay higher grid fees. There is however no difference in treatment.
North Macedonia	No	
Northern Ireland	No	
Norway	No	
Poland	Yes	In case of fixed component of the network rate for final PoDs, the energy is reduced by the energy storage efficiency factor. In case of variable component of network rate for final PoDs, the amount of withdrawn energy is calculated as an excess of energy withdrawn over energy injected.
Portugal	Yes	The consumption of storage is not subject to grid tariffs
Romania	No	
Serbia	Yes	Storages don't pay transmission tariff either in Load or Generation regime.
Slovak Republic	Yes	Prosumers are paying tariff for reserved capacity in the form of G-component and only if generation exceeds load
Slovenia	Yes	Up to 30.9.2024 there were no differences. From 1.10.2024 with new network tariff system, storages that offer system services receive a discount – they don't pay tariff for energy and for excess power. Other storages don't pay any tariff within 3 years of receiving operation permit.
Spain	No	
Sweden	No	
Switzerland	No	
Ukraine	No	

Table A9b: Treatment Storages vs End Customers/Generation

Appendix 9c: Treatment of Demand Response vs End Customers

Both Demand Response and End Customers are seen as Load (L) from TSO's perspective.

There might be different tariffs, charges calculation procedures or settlement rules for Demand Response and End Customers. Justification for different treatments might be the additional service which Demand Response can provide to the system and market players, by changing its consumption pattern as per external signal.

The table below summarises the main features of different treatment /charging mechanisms of Demand Response and End Customers per TSO.

Country	Different treatment between Demand Response and End Customers	Difference from the total charge applied to the base case scenario (%)
Albania	No	
Austria	Yes	Reduced infrastructure tariff for negative ancillary services: • called energy: 0.085 c€/kWh • additional power: 100c€/kW
Belgium	No	
Bosnia and Herzegovina	No	
Bulgaria	No	
Croatia	Yes	In the HOPS transmission system end customers and demand response are treated differently in terms of system role but not as completely separate network tariff categories. End customers are passive users of electricity they pay standard transmission charges (UTT) and may be subject to reactive energy (power factor) penalties if applicable. Demand response refers to customers or aggregators that actively adjust their consumption in response to system needs or market signals. DR participants still pay the same basic network charges as regular customers but they can additionally participate in balancing and ancillary service markets (e.g. mFRR, aFRR) and receive payments for providing flexibility to the system.
Czech Republic	No	
Denmark	No	
Estonia	No	
Finland	No	
France	No	
Germany	No	
Great Britain	No	
Greece	Yes	The Demand Response portfolios participate in the Balancing Market as Balancing Service Providers while the load portfolios participate only as Balance Responsible Parties.
Hungary	No	

Country	Different treatment between Demand Response and End Customers	Difference from the total charge applied to the base case scenario (%)
Iceland	No	
Ireland	No	
Italy	No	
Latvia	No	
Lithuania	No	
Luxembourg	No	
North Macedonia	No	
Montenegro	No	
Netherlands	No	
Northern Ireland	No	
Norway	No	
Poland	No	
Portugal	Yes	The increase in consumption associated with demand response is not subject to grid tariffs.
Romania	No	
Serbia	No	
Slovak Republic	No	
Slovenia	Yes	Customers adapt their energy consumption based on tariffs in different time blocks from time block with higher tariff to time block with lower tariff.
Spain	No	
Sweden	No	
Switzerland	No	
Ukraine	No	

Table A9 c: Treatment Demand Response vs End Customers

Appendix 10: Reactive Energy

In some countries, charges for reactive energy are applied

The tariff rates may be applied to every Mvarh of measured reactive energy or only under pre-defined conditions

Two charging schemes for reactive energy exist:

- › **Reactive Tariff:** A regular tariff rate is applied to each Mvarh of reactive energy produced and/or consumed.
- › **Penalty:** Reactive energy produced and/or consumed is charged only if some pre-defined conditions are met. Examples can be excesses of energy off-taken/ fed-in during a given period or excess levels of $\cos\phi$ or $\tan\phi$.

The table below summarises main features of charging mechanisms applied by TSO's for reactive energy for users connected to transmission network

Country	Reactive Tariff Y/N	Penalty Y/N	Quantity/Conditions of application
Albania	No	No	
Austria	No	No	
Belgium	Yes	Yes	For each offtake or injection point a tariff for additional reactive energy is applied on a quarter-hourly basis for the offtake or injection of reactive energy should this exceed a certain proportion of the monthly reference peak the latter being the highest active energy peaks injected or withdrawn over the month.
Bosnia and Herzegovina	No	No	
Bulgaria	No	Yes	Different rules for injected and consumed reactive power are imposed to consumers (incl. generators in non-generating mode) and DSOs. The consumed reactive power for which the penalty is imposed is calculated on the basis of a formula: $Er_p = Er_{consumed} - 0.49 * Ea_{consumed}$ The penalty for consumed (transmitted) reactive power is 10 % of the wholesale price of the active power. For consumers (incl. generators in non-generating mode) the penalty for injected reactive power is 100 % from the wholesale price of active power.
Croatia	Yes	Yes	Reactive energy charges are part of total transmission tariff revenues but not part of the UTT. It represents a specific tariff element related to system operation. There is a tariff applied for excessive reactive energy consumption for users directly connected to the extra-high voltage (EHV) transmission network operated by HOPS network. This tariff is charged on a monthly basis based on metered reactive energy (kvarh). The applicable tariff level is 0.021236 EUR/kvarh. The charge is applied when the user's power factor ($\cos\phi$) deviates from the prescribed limits. The power factor represents the ratio between active and apparent power and ranges from 0 to 1. Lower power factor values indicate higher reactive power consumption which leads to increased network losses and reduced transmission capacity.
Czech Republic	No	No	
Denmark	No	No	
Estonia	Yes	No	
Finland	No	Yes	

Country	Reactive Tariff Y/N	Penalty Y/N	Quantity/Conditions of application
France	Yes	Yes	For loads: Grid reactive energy absorbed at a connection point is billed only from Monday to Saturday between 6.00 a.m. and 10.00 p.m. during the period from 1 November to 31 March at each hour when the tg $\varphi_{\max}$ set as 0.4 is surpassed. The reactive energy supplied to the grid at a connection point is billed only during the period from 1 April to 31 October at each hour when: - the physical reactive energy flows are injection flows and the reactive energy supplied is higher than a Qf threshold (in absolute value); - the physical active energy flows are withdrawal flows lower than a Pf threshold (percentage of subscribed capacity contracted in access contracts). The Pf and Qf thresholds are explained in the reference technical documentation of the transmission system operator. Hourly billing is applied to calculate unit overruns in each billing zone. The costs for overruns are defined in Tableau 52 below: - Billing zone for the reactive energy absorbed by the user: 11.54 €/Mvarh.
Germany	Yes	Yes	Charging schemes for reactive energy are not equally applied due to different contractual arrangements between TSOs and customers In particular circumstances customers are charged for reactive power usage (charge up to 9.20 €/Mvarh). Power Plants are reimbursed for the provision of reactive power.
Great Britain	No	No	
Greece	No	No	
Hungary	No	No	
Iceland	No	Yes	The tariff assumes a minimum average power factor of $\cos\varphi$ 0.9 at the out-feed for the consumers at each point of delivery. In the event that the average power factor of a single month falls below the limit the energy and capacity charge shall increase by 2 % for each 1 % that the power factor falls below the limit.
Ireland	Yes	Yes	Generator Performance Incentives Reactive Power Leading/lagging 0.34 €/Mvarh.
Italy	Yes	Yes	A charge is applied to DSOs/consumers for reactive energy injected into or withdrawn from interconnection points (TSO/DSO) and HV/EHV withdrawal points if: - ratio of reactive to active energy exceeds a pre-defined threshold (only for withdrawals) - reactive energy withdrawals exceeding the above threshold or reactive energy injections occur during pre-defined time slots. The unit tariff applied to reactive energy is 0.144 €cent/kvarh and increased by 0.056 €cent/kvarh for points belonging to areas with greater impact of reactive energy exchanges on voltages and costs. From 2026 charges applied for reactive energy at interconnection points with DSO networks will reduce transmission tariffs.
Latvia	Yes	No	
Lithuania	Yes	No	Applied to all consumers for each connection point: 1.05 €/Mvarh for consumption and 2.1 €/Mvarh for generation of reactive energy.
Luxembourg	No	No	
Montenegro	Yes	Yes	All grid users except generators pay reactive energy tariff for $\cos\varphi < 0.95$ – 0.010484 €/kvarh for LT and 0.005242 for HT. These tariffs are applied both to capacitive and inductive reactive energy.
Netherlands	No	No	
North Macedonia	No	Yes	The charges are applied to L and DSO. If consumed reactive energy is below level of $\cos\varphi = 0.95$ the charge for the exceeding reactive energy is 1.7 €/Mvarh.
Northern Ireland	Yes	Yes	Performance incentive charges are applicable
Norway	Yes	No	

Country	Reactive Tariff Y/N	Penalty Y/N	Quantity/Conditions of application
Poland	No	Yes	PSE S.A. applies penalties for excess reactive power by final consumers connected to transmission network in nodes where end consumption is connected and DSOs having only one connection point. The penalty is calculated for each MVahr of passive energy taken-off the HV and EHV network when phase factor $\text{tg}\varphi$ is above 0.4 (or otherwise, if specified in the agreement between PSE and customer, however not less than 0.2) and for each MVahr of passive energy fed into the transmission network regardless the value of phase factor. The charge for passive energy fed into transmission network is calculated as a product of the amount of passive energy, the price of active energy C_{rk} and coefficient $k = 0.5$. The charge for excess take-off passive energy (above $\text{tg}\varphi = 0.4$) is calculated according to the following formula: $O_b = k \times C_{rk} \times \left(\sqrt{\frac{1+\text{tg}^2 \varphi}{1+\text{tg}^2 \varphi_0}} - 1 \right) \times A$ where: k – coefficient equal 0.5, C_{rk} – unit price of active energy, $\text{tg}\varphi$ – measured value of phase factor in period used for settlement of the charges for excess take-off of passive energy, $\text{tg}\varphi_0$ – value of phase factor = 0.4 determined in an Agreement between PSE S.A. and customer (an agreement may specify otherwise, however not less than 0.2), A – amount of active energy taken-off the transmission network by customer in a settlement period. In justified cases, when rapidly changing reactive power loads occur, the settlement of excessive reactive energy consumption above the $\text{tg}\varphi_0$ coefficient is performed based on direct measurement of the excess reactive energy.
Portugal	Yes	Yes	Penalty: The Inductive reactive energy supplied by the transmission network outside the off-peak hours, is charged as follows: 7.6 €/Mvarh, if $0.3 \leq \text{tg}\varphi < 0.4$ 23.1 €/Mvarh, if $0.4 \leq \text{tg}\varphi < 0.5$ 69.3 €/Mvarh, if $\text{tg}\varphi \geq 0.5$ Tariff: The reactive energy received by the transmission network in the off-peak hours. is charged to 23.1 €/Mvarh.
Romania	Yes	Yes	Rate applied is 30.73 €/Mvarh (calculated as 30 % of the estimated price of electricity purchased by the TSO to offset network losses). Charged to both G and L Both capacitive and inductive. If $\cos\varphi < 0.65$ the penalty applied is three times the reactive tariff for: - Recorded capacitive energy - Inductive energy with the difference between the consumed reactive energy and the related reactive energy for $\cos\varphi = 0.9$.
Serbia	Yes	Yes	All grid users except generators, PSPP and auxiliary power for power plants are charged for reactive energy. If consumed reactive energy exceeds level of $\cos\varphi = 0.95$ the charge for the exceeding reactive energy is double. The base reactive energy tariff is 2.4467 €/Mvarh. The reactive energy tariff for $\cos\varphi < 0.95$ is 4.8934 €/Mvarh. These tariffs are applied both to capacitive and inductive reactive energy.
Slovak Republic	No	No	
Slovenia	No	No	

Country	Reactive Tariff Y/N	Penalty Y/N	Quantity/Conditions of application
Spain	No	Yes	In the Spanish electricity system reactive energy is not charged through tariffs as such; however regulated reactive energy terms apply with specific prices per kvarh established annually by the CNMC and included in tariff resolutions. Prices of inductive reactive energy terms: Periods 1 to 5: for $\cos \varphi \geq 0.95$ – 0.0000000 €/kvarh; for $0.80 \leq \cos \varphi < 0.95$ – 0.0415540 €/kvarh; for $\cos \varphi < 0.80$ – 0.0623320 €/kvarh. Prices of capacitive reactive energy terms: Period 6: for $\cos \varphi < 0.98$ – 0.0000000 €/kvarh.
Sweden	No	No	
Switzerland	Yes	Yes	This value is not included in the UTT calculation.
Ukraine	No	No	

Table A10: Reactive Energy

Appendix 11: Netting of flows for the application of transmission tariffs

When there is a situation of connected generation and load at the same connection point to the grid, those cases can be treated differently in transmission tariff settlement

One example of such case is connection of thermo generation units, where there are both directions of energy flows possible – injection of energy to the grid during regular generator operation, and extraction of energy from the grid when generator is down or during preparatory regime for the operation

Second possible example is the situation when grid user is having generation and another separate load connected to the same substation bus bars, acting as connection point. In this case energy can flow from user's generation to user's separate load via substation bus bars, without actually entering the grid.

The overview of particular national treatment of such situation is presented in the following table:

Country	Timeframe used for netting	Only G is considered in the settlement	Only L is considered in the settlement	G and L are treated separately in the settlement	Netting between G and L is performed in the settlement	Such cases are not existing or not allowed in the grid
Albania						X
Austria				X		
Belgium				X		
Bosnia and Herzegovina				X		
Bulgaria				X		
Croatia			X			
Czech Republic			X			
Denmark				X		
Estonia			X			
Finland	15 min				X	
France	10 min				X	
Germany			X			
Great Britain		X				
Greece			X			
Hungary						X
Iceland				X		
Ireland						X
Italy						X
Latvia						X
Lithuania	15 min				X	

Country	Timeframe used for netting	Only G is considered in the settlement	Only L is considered in the settlement	G and L are treated separately in the settlement	Netting between G and L is performed in the settlement	Such cases are not existing or not allowed in the grid
Luxembourg			X			
Montenegro			X			
Netherlands	15 min				X	
North Macedonia			X			
Northern Ireland						X
Norway				X		
Poland	60 min				X	
Portugal	15 min				X	
Romania				X		
Serbia			X			
Slovak Republic				X		
Slovenia	15 min				X	
Spain						X
Sweden	15 min				X	
Switzerland			X			
Ukraine				X		

Country remarks regarding: Great Britain, Iceland, Italy, Netherlands, Poland and Romania are to be found in Appendix 1.

Table A11: Netting of flows for the application of transmission tariffs

Appendix 12: Exchange rates

For countries for which currency is not €, the tariff figures in this report were converted into € by using the exchange rate dated 31st December 2024.

The table below summarises exchange rates applied

Country	Exchange rate
Albania	1ALL = 0.010188 €
Bosnia and Herzegovina	1BAM = 0.511290 €
Bulgaria	1BGN = 0.5112920 €
Czech Republic	1CZK = 0.0397060 €
Denmark	1DKK = 0.130000 €
Great Britain	1GBP = 1.209300 €
Hungary	1HUF = 0.002438 €
Iceland	1ISK = 0.006950 €
North Macedonia	1MKD = 0.020000 €
Northern Ireland	1GBP = 1.209300 €
Norway	1NOK = 0.234028 €
Poland	1PLN = 0.23000 €
Romania	1RON = 0.201041 €
Serbia	1RSD = 0.008500 €
Sweden	1SEK = 0.087100 €
Switzerland	1CHF = 1.050000 €
Ukraine	1UAH = 0.022770 €

Table A12: Exchange rates

Appendix 12a: Consumer Price Index

The table below summarises Consumer Price Index (CPI) for 2024 per each country, used for the calculation of evolution of UTT prices in 2024 constant Euros.

Country	CPI
Albania	2.56
Austria	2.92
Belgium	4.32
Bosnia and Herzegovina	4.00
Bulgaria	2.40
Croatia	4.02
Czech Republic	2.70
Denmark	1.28
Estonia	3.73
Finland	0.98
France	2.32
Germany	2.46
Great Britain	0.03
Greece	3.00
Hungary	3.72
Iceland	4.52
Ireland	1.36
Italy	1.16
Latvia	1.35
Lithuania	0.85
Luxembourg	2.25
Montenegro	3.60
Netherlands	3.22
North Macedonia	4.24
Northern Ireland	3.27
Norway	2.89
Poland	3.62
Portugal	2.66
Romania	5.84
Serbia	4.79
Slovak Republic	3.16
Slovenia	1.99
Spain	2.87
Sweden	2.01
Switzerland	1.08
Ukraine	6.57

Table A.12a. CPI

Glossary of terms

Active and Reactive Power

The instantaneous power can be decomposed into two time-varying functions: (i) the real or active power (P), which is measured in watts (W) and is always positive (or zero); and (ii) the reactive power (Q), which is measured in voltamperes reactive (vars) and has an average value of zero. The real or active power P represents the useful power being transmitted. The reactive power Q is capable of no useful work, but is required to control system voltages within adequate ranges for the reliability of the power system.

Active Customer

End user who engages in electricity market by producing, storing, selling or consuming self-generated electricity,

Black-Start

Black start is the procedure of reestablishing the electricity supply within a control area after a total disruption of the supply.

Consumer Price Index (CPI)

The Consumer Price Index (CPI) is a crucial economic metric that measures the average change over time in the prices paid by consumers for a market basket of goods and services.

Cross-border congestion

Situation in which an interconnection linking national transmission networks cannot accommodate all physical flows resulting from international trade requested by market participants, because of a lack of available capacity of the interconnectors and/or the national transmission systems concerned.

Demand Response

Demand response is a mechanism where electricity consumers voluntarily adjust their power usage, typically by reducing or shifting load, in response to grid stress, high electricity prices, or financial incentives.

Depreciation

TSO Investment costs (sometimes referred to as Capital Expenditures or CAPEX) are not charged to the users at the same time they are incurred. Instead, TSO investment costs are distributed over a regulated useful lifetime of the asset. Depreciation is the annual result of that distribution. Depreciation is charged to users through tariffs, thus allowing the TSO to recover its investment and renew the assets once they are completely depreciated.

Energy-related component

Components of charges allocated to energy (expressed in MWh) consumed, off-taken or injected (consumption and off-taken energy can be different in the case where generation is connected on the same transmission access point).

First Connection charges

Charges borne by new grid users (producer or consumer) aiming to connect to the transmission grid, consisting of TSO's costs for the build of the transmission facility to enable the connection.

G component

Transmission tariff component applied to energy injected into the grid (generation).

Internal congestion

Situation in which an internal national transmission network cannot accommodate all physical flows resulting from internal trade requested by market participants, because of a lack of capacity of the internal transmission system concerned.

ITC

The Inter TSO Compensation Agreement is a multiparty agreement concluded between ENTSO-E, ENTSO-E member countries. It is designed to compensate parties for costs associated with losses resulting with hosting transits flows on networks and for the costs of hosting those flows.

L component

Transmission tariff component applied to energy off-taken from the grid (load).

Locational signals

Tariff signals designed to promote the efficient location of generation and consumption.

Losses

The energy losses that occur in the transmission system as a result of the system operating conditions (MW and Mvar flows, Voltage levels, system topology, etc).

OPEX

Operating Expenses needed to operate TSO assets (maintenance costs, staff costs, etc).

Other Regulatory Charges

Charges resulting from provisions imposed by national laws or regulations that are recovered or invoiced by TSOs, but are not directly related to TSO activities. Examples of costs recovered through these types of charges might include: stranded costs, costs of supporting renewable or cogeneration energy production, regulatory levies, Public Service Obligation costs, etc.

Power-related components

Components of charges allocated to contracted power and/or peak power (expressed in MW) which consumed, off-taken or injected.

Primary Reserve

Power which is reserved to respond to frequency changes and which have a very fast response time.

Public Service Obligation

Public Service Obligations (PSOs) are compulsory services that regulators or governments may apply to companies in the public interest.

The transmission system operator and grid owners may be subject to a number of PSOs, such as supply security; payment of subsidies for environmentally-friendly electricity; and research and development of environmentally-friendly production technology, etc.

Return on capital

It is the regulated revenue that allows the TSO to be remunerated for investments. It is charged to users through tariffs.

Stranded costs

Costs incurred in the past by a stakeholder that, after the introduction of some policy change, are considered as not recoverable. In some jurisdictions, the regulator may allow stranded costs to be charged through transmission tariffs.

Seasonal/Time-of-day differentiation

Variation of tariff rates depending on the time of use. Tariffs may vary according to seasons, daily demand profiles, holiday periods, and peak usage times for example.

Secondary reserves

Power which is reserved to respond to frequency changes and which have a higher time of response than primary reserves.

Storages

Storage of electricity in the power system is the postponement of the final use of electricity until a certain point in time after production, or the conversion of electricity into a form of energy that can be stored, the storage of such energy and the subsequent conversion of that energy into electricity or its use in the form of another energy source.

System balancing

System service which involves activating secondary and tertiary reserves for correcting in real time energy deviations from the values specified in contractual schedules of market participants.

System Services or Ancillary Services

Ancillary service means a service necessary for the reliable operation of a transmission or distribution system. Depending on the jurisdiction, the ancillary services may include spinning reserves, frequency reserves, voltage control, black start, etc.

Tertiary reserve

Power available from generators which is reserved to respond to frequency changes which are manually activated.

Unit Transmission Tariff

It is the transmission tariff that is built specifically for the analysis carried out in this Overview. For each country, the Unit Transmission Tariff (UTT) is computed under the hypothesis of a pre-defined "base case" which is described in Section 3.

Transmission Voltage levels

Voltage levels of transmission networks vary across ENTSO-E members, especially the lowest voltage level classified as "transmission". However, in all Member States the voltage levels of 220 kV and above are included as transmission network.

Voltage Control

Voltage Control means the control actions designed to maintain the set voltage level or the set value of Reactive Power.

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