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Practice report on transmission tariff methodologies in Europe

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Contents

1. Introduction

(1) Pursuant to Article 59(1)(a) of the Electricity Directive (EU) 2019/944[1], each national regulatory authority (NRA) has the duty of fixing or approving, in accordance with transparent criteria, transmission tariffs or their methodologies, or both. Pursuant to Article 18(1) of the Electricity Regulation (EU) 2019/943[2], tariffs for access to the transmission network shall, *inter alia*, be cost-reflective, transparent, take into account the need for network security and flexibility, reflect the efficient actual costs incurred, be applied in a non-discriminatory manner, and be non-distance related.

(2) In accordance with Article 18(9) of Regulation (EU) 2019/943, ACER shall provide and update, at least every two years, a best practice report on transmission tariff methodologies, while taking account of national specificities. Regulatory authorities shall duly take the best practice report into consideration when fixing or approving transmission tariffs or their methodologies.

(3) In addition to national tarification, an EU framework is defined to compensate transmission system operators (TSOs) for costs incurred as a result of hosting cross-border flows of electricity on their networks, the inter-TSO compensation (ITC) mechanism. This mechanism is subject to regular ACER monitoring reports and therefore it is out of the scope of this Report.

(4) Previous ACER activities already discussed and proposed improved practices on transmission tarification. For instance, ACER Opinion No 09/2014 on the appropriate range of transmission charges paid by electricity producers[3] concluded that energy-based G-charges (expressed in €/MWh) shall not be used to recover infrastructure costs, that the use of energy-based charges for recovering the costs of losses and ancillary services could provide efficient signals and that power-based G-charges (expressed in €/MW) or lump-sum G-charges, as long as they reflect the costs of providing transmission infrastructure services to generators, can be appropriate. Therefore, ACER considered it unnecessary to propose restrictions on cost reflective power-based G-charges and on lump-sum G-charges.

(5) Moreover, in its conclusions report in 2015 after a scoping activity on the potential harmonisation of electricity transmission tariff structures, ACER concluded that the need for a Framework Guideline and a subsequent Network Code was not evident and that the existing policies, including implementation of the ACER Opinion No 09/2014, would have been sufficient to prevent potential negative effects from any lack of harmonisation in electricity transmission tariff structures.

(6) This Report complements these previous ACER activities and shall be considered as a first step towards delivering a report pursuant to Article 18(9) of Regulation (EU) 2019/943, as well as towards pursuing the objectives indicated in recital (40) of that Regulation to increase transparency and comparability in tariff-setting. In such a context, this Report provides a status review of transmission tariff structure across European countries, including 28 EU Member State

[1] Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU. OJ L 158, 14.6.2019, p. 125.
[2] Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity. OJ L 158, 14.6.2019, p. 82.
[3] ACER Opinion No 09/2014 of 15 April 2014 on the appropriate range of transmission charges paid by electricity producers.
https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2009-2014.pdf

jurisdictions[4], as well as Norway. In addition, it presents the findings of ACER's regular monitoring of the appropriateness of the ranges of allowable transmission charges paid by producers ("G-charge"), pursuant to annex Part B of Commission Regulation (EU) No 838/2010 since 2013[5]. The G-charge monitoring also includes Switzerland beyond the above mentioned jurisdictions.

(7) The status review of European distribution tariff structures and the identification of best tariff practices will be subject to future ACER reports.

(8) This Report is based on the input provided by the NRAs between 14 August 2019 and 28 October 2019 via an online data collection tool (EU Survey) and/or by email on their respective transmission tariff structures. The regulatory period and the tariff year for which the information on tariff practices was referred to is presented in Table 20 in Annex 1 to this Report. The monitoring of G-charge was carried out by ACER on an annual or biennial basis based on NRAs inputs.

(9) Tariff setting is the result of a three steps process. First, the allowed revenues (including the remuneration method for TSO costs) and other relevant costs are determined. Second, the tariff structure is defined. Third, the costs are allocated to each of the tariff structure's items (i.e. charges paid by network users). This process, described in the tariff methodology, can take various forms according to the principles and objectives pursued and is, in several instances, imposed by the law. This Report focuses on the last two steps.

(10) This Report is structured as follows:

- Chapter 2 provides some definitions;
- Chapter 3 recalls the key principles for fixing transmission tariffs;
- Chapter 4 introduces tariff-setting practices, as regards the responsibilities of the actors involved and the timeframes;
- Chapter 5 reviews the practices regarding transparency on the processes for setting transmission tariffs;
- Chapter 6 analyses the tariffs applied to different groups and subgroups of network users;
- Chapter 7 describes the exemptions applied to specific users inside each subgroup;
- Chapter 8 reviews the bases used for transmission tariffs;
- Chapter 9 investigates the cost categories recovered by transmission tariffs, including the treatment of losses;
- Chapter 10 analyses the use of time signals in transmission tariffs;
- Chapter 11 presents the practices of some jurisdictions regarding the use of locational signals;
- Chapter 12 reports on recent updates and ongoing options for updating transmission tariff methodologies;
- Chapter 13 summarises the main findings of the Report;
- Annex I presents detailed data, jurisdiction by jurisdiction;
- Annex II presents a brief overview of the connection charges across Europe;
- Annex III provides the results of the G-charge monitoring performed by ACER since 2013.

[4] Malta has no TSO or transmission tariff and thus not further discussed in this Report. For the purpose of this Report, United Kingdom consists of 2 NRA jurisdictions (i.e. Great Britain and Northern Ireland).
[5] Information on G-charges for years 2011-2012 as a results of ACER's monitoring activity is provided in ACER Opinion No 09/2014.

2. Definitions

(11) According to the definitions set by Directive (EU) 2019/944 and Regulation (EU) 2019/943:

- **Transmission** means the transport of electricity on the extra high-voltage and high-voltage interconnected system with a view to its delivery to final customers or to distributors, but does not include supply;
- **Distribution** means the transport of electricity on high-voltage, medium-voltage and low-voltage distribution systems with a view to its delivery to customers, but does not include supply;
- **Transmission system operator (TSO)** means a natural or legal person who is responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity;
- **Distribution system operator (DSO)** means a natural or legal person who is responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity;
- **Producer** means a natural or legal person who generates electricity;
- **Energy storage** means, in the electricity system, deferring the final use of electricity to a moment later than when it was generated, or the conversion of electrical energy into a form of energy which can be stored, the storing of such energy, and the subsequent reconversion of such energy into electrical energy or use as another energy carrier;
- **Final customer** means a customer who purchases electricity for its own use.

(12) For the purpose of this Report, the following additional definitions apply:

- **Regulatory period** means the time period for which the general rules for the allowed transmission revenues (and their recovery via tariffs) are set;
- **Public consultation** means a publicly announced consultation, in which any individual, group or organisation is allowed to participate;
- **Injection charge** means all transmission charges paid by producers, except for charges for physical assets required for connection to the system or the upgrade of the connection (i.e. connection charges), but including other non-connection charges (such as charges related to ancillary services and system losses). The term “injection charge” is different from the term “**G-charge”,** whose annual average value is capped by Commission Regulation (EU) No 838/2010 and refers to the transmission charges paid by producers, excluding connection charges, charges related to ancillary services and specific system loss charges;
- **Network user** means a natural or legal person connected to the transmission or distribution network (excluding the DSO and TSO), who injects electricity in and/or withdraws electricity from the network;
- **Locational signal** means signals, differentiated by location, to indicate where electricity is most or least needed;
- **Time-differentiated network tariffs** means tariffs, differentiated by the time-of-use e.g. by peak/off-peak, season, month, weekdays/weekends, hour, which indicate when the cost of electricity transmission services are higher or lower, and as such allocate the costs to reflect responsibilities of the network users for these costs.

3. Tariff setting principles

(13) Electricity tariff design, in general, aims at recovering the costs incurred by a monopolistic system operator while stimulating efficiency. Costs recovery is the core objective of tariffs. Efficiency mainly relates to cost-reflectivity and the economic signals sent to the network users for optimal use of the network.

(14) Other principles, such as non-discrimination, transparency, non-distortion, simplicity, stability, predictability and sustainability, are usually also pursued. In practice, it is difficult to meet all of the principles simultaneously to their full extent. Therefore, the NRAs should aim to achieve a balance between these principles and sometimes they have to make certain trade-offs according to their priorities, while also respecting the legal boundaries.

(15) The transmission tariff structure should reflect the structure of transmission costs. According to the pursued principles, the most suitable tariff basis (capacity, energy and/or lump-sum) and targeted user groups should be determined to compose the tariff structure. The tariff structure can be limited to a single transmission tariff, which covers all allowed costs of the TSO, or the tariff structure can consist of several tariffs, i.e. there is a "primary" transmission tariff and there are other (additional, complementary) charges, which recover specific parts of the TSO costs. The network users may also be subject to tariffs for various non-TSO costs (such as support schemes for renewable energy sources, or co-generation of heat and power, etc.).

(16) Part of the incurred transmission costs might vary according to the time or the place in which they occur. A cost-reflective tariff can be location- or time-differentiated. Locational signals are related to differences in costs for congestion and losses between different network nodes. Time signals can be a useful tool for reducing system peak-load, which is a main driver for network investments. Both types of signal aim to promote network efficiency. As any regulatory mechanism, they should be properly designed to avoid becoming counter-productive to this objective and/or detrimental to the fulfilment of other principles, as described above.

(17) Once the allowed revenues (including the remuneration method), other costs and the tariff structure are set, costs are allocated to the network users. This task is complex and can take various forms. Most allocation procedures use an accounting approach, allocating costs to a matrix of tariff basis (components), time-periods and user groups. Other procedures, much more complex, but more cost-reflective, use a marginal cost approach. Certain network users can be exempted or provided with allowances.

4. Responsibilities and timeframe for tariff-setting

(18) In about 75% of the jurisdictions (i.e. 22 out of 29) the NRA directly defines the transmission tariff methodology, while in three other jurisdictions (DK, GB, NI) the NRA approves the tariff methodology defined by the TSO. In Germany, the Ministry defines the tariff methodology, while the NRA supervises the compliance of the tariff calculation by the TSOs with the law and the tariff methodology. In Sweden and Finland, the TSO defines the tariff methodology, which is not subject to NRA approval. However, the NRA approves the revenue cap for the TSO and supervises the compliance between the applied methodology and the national law. In situation of discordance, the NRA can take out an injunction. In Spain, currently the Government establishes the relevant tariffs, but from 1 January 2020, the Spanish NRA will be responsible to set the relevant tariffs[6].

(19) ACER considers it essential to provide NRAs with sufficient leverage and regulatory control over the tariff setting. Such leverage appears to be ensured in the vast majority of the jurisdictions, by legally granted powers directly to define or approve the tariff methodology, also in line with the provision of Article 59(1)(a) of the Electricity Directive (EU) 2019/944.

(20) As shown in Table 1, the length of the regulatory period, for which the tariff methodologies are typically defined, is between 4 and 5 years in most jurisdictions (i.e. 5 years in 9 jurisdictions, 4 years in 6 jurisdictions). In Spain, the regulatory period is 6 years. Three additional jurisdictions (IT, GB, FI) seemingly have a longer regulatory period (i.e. 8 years), but which includes a mid-term review after 4 years. In the remaining jurisdictions, a shorter regulatory period is applied: a 3-year regulatory period in three jurisdictions (CZ, PT, SI) and a 1-year regulatory period in four jurisdictions (AT, BG, HR, PL). There are three jurisdictions (DK, EE, LV) where the length of the regulatory period is not defined.

(21) In all 22 jurisdictions with a multi-year regulatory period, the tariff values appear to be calculated ex-ante for all the years of the regulatory period or updated every year, based on the methodology defined for that regulatory period (e.g. tariff level/values are updated in some jurisdictions by taking into account yearly variations of the cost amounts to be recovered). The transmission tariff methodologies and/or the set tariffs are also subject to revision during the regulatory period in some jurisdictions.

(22) ACER considers that the length of the regulatory period, and the conditions under which the tariff methodologies can/shall be revised or the tariff values updated, represent a decisive element of the regulatory framework and can significantly influence the tariff cost-reflectivity and predictability. Setting tariff methodologies for multiple years (and allowing their revision only under strict and duly justified conditions) can support tariff predictability, while regular update of the tariff level/values may result in better cost-reflectivity, and if done based on a pre-defined methodology can also preserve a level of predictability.

[6] Pursuant to the Royal Decree 1/2019 of 11 January 2019.

Table 1: Methodology setting in the European jurisdictions

Jurisdiction	Length of the regulatory period[7] [year]	Update / revision of tariff values (in case of multi-year regulatory period)	Responsible party to set the tariff methodology
Austria / AT	1	N/A	NRA
Belgium / BE	4	Tariff values are set (ex-ante) for the whole regulatory period, but the values differ each year. The tariff methodology can be revised during the regulatory period.	NRA
Bulgaria / BG	1	N/A	NRA
Croatia / HR	1	N/A	NRA
Cyprus / CY	5	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Czech Republic / CZ	3[8]	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Denmark / DK	No defined period	Tariff values are updated annually on the basis of a pre-defined methodology.	TSO (subject to NRA approval)
Estonia / EE	No defined period[9]	The tariff are applied until the NRA approves new tariffs.	NRA
Finland / FI	8 (4 year sub-periods)	Tariff values are updated annually by the TSO on the basis of a pre-defined methodology. Within a year, the TSO can update the tariff values when needed, but there is a 15% cap for tariff increases.	TSO (without NRA approval)[10]
France / FR	4	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Germany / DE	5	Tariff values are updated annually on the basis of a pre-defined methodology.	Ministry of economic affairs
Greece / GR	4[11]	Tariff values are updated annually on the basis of a pre-defined methodology The tariff methodology can be revised during the regulatory period.	NRA
Hungary / HU	4	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Ireland / IE	5	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Italy / IT	8[12] (with mid-term update)	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Latvia / LV	No defined period[13]	Tariff values are set for one year. If the TSO doesn't submit new tariff proposal and the NRA doesn't oblige the TSO to do so, the same tariffs apply for next year.	NRA

[7] Length of the regulatory period for which the tariff methodology is set.
[8] Current regulatory period is prolonged to 5 years.
[9] The typical duration of the period is 3-4 years.
[10] There is no ex-ante approval of tariffs or prices of network services by the NRA nor any other authorities. The NRA confirms ex-ante the revenue cap and connection charges. The NRA shall also approve ex-ante the terms and conditions of transmission and connection services before the network operators apply them. In addition the NRA supervises the compliance between methodology and the Finnish electricity act. In situation of discordance, the NRA could decide on injunction.
[11] The regulatory period for setting allowed revenue is 4 years. Tariff methodology is independent from this cycle and can be revised within a regulatory period.
[12] Since 2016 it is 8 years, two sub-periods 4 years each. However, the WACC period is different (6 years with two sub-periods)
[13] Methodology does not specify the regulatory period. TSO or system users can submit a request for changes in tariff calculating methodology. NRA evaluate submitted requests and make amendments if it is necessary.

Jurisdiction	Length of the regulatory period[7] [year]	Update / revision of tariff values (in case of multi-year regulatory period)	Responsible party to set the tariff methodology
Lithuania / LT	5	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Luxembourg / LU	4	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Malta	N/A	N/A	N/A
The Netherlands / NL	3-5	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Norway / NO	minimum of 5 years[14]	Tariff values are updated annually on the basis of a pre-defined methodology. The tariff methodology can be revised during the regulatory period (smaller changes).	NRA
Poland / PL	1[15]	The tariffs values are set for one year, but can be revised.	NRA
Portugal / PT	3	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Romania / RO	5	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Slovak Republic / SK	5	Tariff values are updated annually on the basis of a pre-defined methodology.	NRA
Slovenia / SI	3	Tariffs are (ex-ante) pre-defined for each year of the regulatory period separately. There is a possibility to revise the tariff values[16].	NRA
Spain / ES	6	Tariff values are updated annually.	Currently the Government/from 2020 onwards the NRA
Sweden / SE	4	Tariff values are updated annually on the basis of a pre-defined methodology.	TSO (without NRA approval)[17]
UK (Great Britain) / GB	8 (mid-term review after 4 years)[18]	Tariff values are updated annually on the basis of a methodology which is subject to change through an industry-led self-governance process.	TSO (subject to NRA approval)
UK (Northern Ireland) / NI	5	Tariff values are updated annually on the basis of a pre-defined methodology.	TSO (subject to NRA approval)
Total:	4 annual, 22 multi-year, 3 non-defined		22 set by NRA (+1 from 2020), 5 by TSO, 1 by Ministry

[14] The general rules for the allowed transmission revenues (and their recovery via tariffs) shall be periodically reviewed. Each period must last a minimum of 5 years. Smaller changes in the regulation and changes in the tariff methodology do not follow the same periodical system and may be amended at any time. Any changes in the rules and regulations will be subject to a public consultation.

[15] Tariff is approved for 1 year. Some assumptions (e.g. on RoC) are made for 5 years period.

[16] In case where the volatility of the planned energy quantities (inputs) would result in a more than 10% increase of the tariffs.

[17] The NRA defines only the revenue cap. Currently the regulation regarding transmission and distribution tariff methodology is being reviewed by the Swedish NRA, with the purpose of introducing secondary legislation on network tariffs in Sweden in 2020. Sweden has previously only had a general tariff regulation (in the Swedish Electricity act and Electricity Regulation). From 2019, the NRA has the right to introduce more detailed regulation on tariffs on both TSO and DSO level, this work started early 2019 and will proceed until spring 2020.

[18] From 2021 Great Britain is moving to a 5 year price control for transmission.

5. Consultations and transparency in setting transmission tariffs

(23) Within the scope of this Report, two layers of transparency are distinguished:

- transparency granted during the process of setting methodologies, which is mainly achieved by consultations; and
- public availability of relevant tariff-related information to the network users and stakeholders.

(24) In some jurisdictions (AT, CY, FI and SE), transparency is enhanced by providing the tariff-related information not only in their official language(s), but also in English and thus facilitates understanding by non-local stakeholders.

(25) In the vast majority (23 out of 29, i.e. about 80%) of the jurisdictions, a public consultation is carried out (typically by the NRA) before the transmission tariff methodology is defined, as shown in Table 2. In Spain, the current transmission tariff methodology (set by the Government) is not subject to public consultation, but such consultation is introduced/carried out for the tariff methodology to be set by the NRA. In the remaining 5 jurisdictions (AT, DE, HU, NL, PL), at least a consultation with some of the key stakeholders is conducted.

(26) Regarding public availability of some basic tariff-related information, as shown in Table 2 below, the values of the transmission-related tariffs/charges (except connection charges)[19] paid by different network users are available in all jurisdictions. The information on which cost categories are recovered by tariffs is made public in all jurisdictions, except in Austria. Detailed information on the transmission costs (e.g. operational expenditures, depreciation cost of capital, losses) is publicly available in about 40% of the jurisdictions. In 9 additional jurisdictions, at least the overall transmission cost value is available.

Table 2: Public consultations and public availability of basic information related to the calculation and value of transmission tariffs

Jurisdiction	Public consultation of the tariff methodology (structure)	Transmission charges (values) paid by different grid users[20]	Cost categories (list) covered by tariffs	Transmission cost values
Austria	Only specific stakeholders[21]	X	Not publicly available	Not publicly available
Belgium	X	X	X	Only overall costs[22]
Bulgaria	X	X	X	X
Croatia	X	X	X	Not available
Cyprus	X	X	X	Only overall costs

[19] Connection charges are in many instances individually set one-time charges based on actual costs, which are not publicly available.
[20] Not accounting for connection charges which are not publicly available in several jurisdictions (including BG, EE, GB, IT, NL, LU).
[21] According to the national law, the Federal Economic Chamber, Federal Chamber of Agriculture, Federal Chamber of Labour, Austrian Trade Union Federation have to be consulted.
[22] Only annual TOTEX budget is publicly available. Detailed costs figures are considered confidential.

Czech Republic	X	X	X	Not available
Denmark	X[23]	X	X	Only overall costs
Estonia	X	X	X	Not available
Finland	X[24]	X	X	X
France	X	X	X	X
Germany	Only specific stakeholders[25]	X	X	Only overall costs
Greece	X	X	X	X
Hungary	Only specific stakeholders[26]	X	X	Only overall costs
Ireland	X	X	X	X
Italy	X	X	X	X[27]
Latvia	X	X	X	Only overall costs
Lithuania	X	X	X	X
Luxembourg	X	X	X	Only overall costs
The Netherlands	Only specific stakeholders[28]	X	X	X
Norway	X	X	X	X
Poland	Only specific stakeholders[29]	X	X	Not available
Portugal	X	X	X	X
Romania	X	X	X	Not available
Slovak Republic	X	X	X	Not available
Slovenia	X	X	X	Only overall costs
Spain	Introduced for the methodology set by the NRA[30]	X	X	Only overall costs
Sweden	X	X	X	X
UK (Northern Ireland)	X	X	X	X
UK (Great Britain)	X	X	X	X
Total:	24 public / 5 specific stakeholders' consultation	29 publicly available	28 publicly available	13 detailed / 9 only overall costs

[23] NRA conducts the public consultation. The TSO might also conduct a consultation prior to sending the methodology to the NRA for approval.
[24] The public consultation is not formally (legally) required and carried out by the TSO.
[25] There are no formal requirements for consultation when adopting the ordinance for the tariff methodology. However, it is set after consultation of the relevant energy industry associations.
[26] The tariff methodology is set after consultation of the relevant stakeholders as required by the Hungarian Electricity Act.
[27] The cost values are not systematically published every year. Still, they are usually published before the beginning of the regulatory period (in consultation documents regarding tariff setting) or occasionally in some NRA reporting.
[28] When preparing a change to the national tariff code, the TSO has to consult with stakeholders. The decision on the tariff methodology is taken by the NRA after consultation of the relevant stakeholders in the context of the Dutch administrative law. The tariff decision is not subject to formal consultation, but there is an informal consultation of the proposal by the TSO.
[29] The NRA consults the TSO before and during the tariff approval process (not necessarily every tariff year).
[30] Currently, the transmission tariff methodology of the Government is not public, but annually the Government consults on the tariffs for the following year. The NRA proposed to introduce a public consultation of the tariff methodology to be set by the NRA.

(27) Other relevant tariff related information, such as information on locational signals and time signals is publicly available in all the jurisdictions where they are applied, information on the share of transmission costs covered by final customers and producers as well as information on tariff components (e.g. energy-based, power-based, etc.) is also available in the vast majority of the jurisdictions, where applicable.

(28) ACER considers that sufficient transparency regarding tariff setting is of utmost importance. Effective involvement of stakeholders and the general public in the tariff setting process, by proper public consultations, supports well-informed regulatory decisions. Moreover, providing relevant tariff related information to the public provide the following advantages:

- transparent transmission tariffs are an essential precondition for an effective competition in the internal market for electricity[31];
- the current or future network users need to understand the transmission tariff values to a reasonable degree in order to incorporate that information into their decision-making process.

(29) While the extent and scope of publicly available tariff-related information may vary across the jurisdictions, based on the ACER findings the vast majority of jurisdictions appear to provide a reasonable level of transparency.

[31] Cf. recital 26 of the Regulation (EU) 2019/943 on the internal market for electricity.

6. Groups of network users subject to transmission tariffs

(30) Network users subject to transmission tariffs can be divided into two major groups:

- network users which are injecting electricity into the network; and
- network users which are withdrawing electricity from the network.

(31) The network users who are both injecting into and withdrawing from the network belong to both groups. For these users, a preliminary survey was carried out while preparing this Report, which helped identifying different situations for different type of users (e.g. prosumers, auto-producers[32], withdrawals for auxiliary services of generators, etc.), as well as the need of a clear categorisation. Detailed information in this regard will be provided in future reports.

(32) Network users subject to transmission tariffs (either directly, via a transmission-related tariff component, or indirectly, via a part of the distribution tariffs) can be connected either to the transmission network or to the distribution network (indeed a distribution-connected network user benefits from the existence of the transmission network and is therefore usually called to contribute to its cost recovery).

6.1. Network users who inject electricity into the network

(33) As shown in Table 3, transmission tariffs for injection (i.e. injection charges) are applied in 14 jurisdictions, including Spain where injection charges are proposed to be phased out from 2020. There are 15 jurisdictions that do not apply injection charges[33].

(34) Based on NRAs' responses, injection charges are applied for a number of reasons, including among others recovery of transmission costs, ensuring better cost-reflectivity, provision of price signals to postpone new network reinforcements, provision of price signals to avoid congestion in the transmission grid.

(35) Based on NRAs' responses, the most frequent reasons for the non-application of injection charges are the legal barrier (i.e. this possibility is not provided by the law) or the willingness to provide a level playing field for local producers vis-à-vis producers in other jurisdictions where such injection charges are not applied.

Table 3: Application of transmission tariffs for injection in European jurisdictions

Jurisdiction	Application of injection charges	Reason underlying the injection charge approach (i.e. reason for application or non–application of injection charges)
Austria	Yes	Better cost reflectivity

[32] In Ireland the definition of autoproducer, in accordance with the NRA's direction CER/01/179, and only intended to be used for the purpose of such direction, is: a generator that produces electricity through a Combined Heat and Power process under a licence by the NRA or a generator that is generating essentially for its own use where the Maximum Export Capacity (MEC) is less than twice the Maximum Import Capacity (MIC), unless either the operator or the customer can point to special circumstances which would warrant departing from this presumption.
[33] The Dutch NRA reported that a small administrative charge also applies in the Netherlands for producers, but it is not considered as an injection charge.

Jurisdiction	Application of injection charges	Reason underlying the injection charge approach (i.e. reason for application or non–application of injection charges)
Belgium	Yes	Injection charge recovers part of the balancing reserves costs, which also benefits producers. The purpose of the injection tariff is therefore ensuring costs reflectivity.
Bulgaria	No	Under the national legislation such kind of charges are not applicable.
Croatia	No	Injection charges are not applied in accordance with the methodology-ordinance by NRA.
Cyprus	No	Only the connection charges are paid by the producers.
Czech Republic	No	Disadvantage for the local producers vis-à-vis producers in other jurisdictions where such injection charges are not applied pose a barrier to any type of injection charge.
Denmark	Yes	Injection charges are applied to recover part of grid and system costs from the producers.
Estonia	No	
Finland	Yes	Cost reflective cost recovery
France	Yes	The injection charge covers losses generated by the exportation of electricity.
Germany	No	Injection charges must not be applied according to national law.
Greece	No	
Hungary	No	The system already lacks conventional power plants, which discourages the introduction of any non-zero injection charge.
Ireland	Yes	Underpinned by national legislation (i.e. Electricity Regulation Act 1999, as amended).
Italy	No	Injection charges have been applied till the middle of the regulatory period 2008-2011. Later, regulatory decision 203/2009 deleted (with effects from year 2010 onwards) the tariff element to be paid by producers, taking into account a provision set by the currently repealed Article 33(5) of Italian law 99/2009
Latvia	No	Level playing field for local producers vis-à-vis producers in other jurisdictions where such injection charges are not applied.
Lithuania	No	Not provided by the law.
Luxembourg	No	The connection costs are covered by producers whereas the costs of operating the network are covered by consumers. Producers are not directly connected to the transmission network.
The Netherlands	No	Producers only pay a fixed (small amount) fee. Injection charges are not applied in order to provide a level playing field for producers in the Netherlands relative to other producers abroad.
Norway	Yes	
Poland	No	Injection charges are not allowed under the current national law.
Portugal	Yes	The injection charge was introduced to ensure a level playing field for generators on the Iberian wholesale market, given that Spain introduced a G-charge of 0.5 €/MWh.
Romania	Yes	The injection charge covers a small part of grid losses and congestion costs to ensure better costs reflectivity; according to the electricity law.
Slovak Republic	Yes	

Jurisdiction	Application of injection charges	Reason underlying the injection charge approach (i.e. reason for application or non–application of injection charges)
Slovenia	No	Injection charges are not provided by legislation (Energy Act).
Spain	Yes	Currently applied, but for the next regulatory period, no injection charges are proposed.
Sweden	Yes	
UK (Northern Ireland)	Yes	
UK (Great Britain)	Yes	The primary objective of the generation charges is to reflect relative difference in transmission costs across the system, incentivising them to locate or expand their generation capacity in demand dominant zones and disincentivising them from locating or expanding their generation capacity in generation dominant zones. The injection charges are charges reduced from the modelled cost-reflective level to meet the EU limit on G-charges set for Great Britain.
Total:	14 Yes / 15 No	

(36) Within the first group, network users can be classified into the following sub-groups:

a) Producers (including both renewable energy (RES) and Non-RES producers), which do not withdraw electricity from the network except for the purpose of feeding the auxiliary services of their power plant;
b) Pumped hydroelectric energy storages (PHES);
c) Non-PHES storage facilities (e.g. batteries);
d) Other network users, who both inject and withdraw (not further detailed in this Report).

Injection charges applied to transmission-connected network users

(37) The network users directly connected to the transmission network that are subject to transmission tariffs for injection are presented for each jurisdiction in Table 4. The jurisdictions, which do not apply any transmission tariff for injection at transmission or distribution level, are not included in the Table.

(38) Regarding the application of injection charges to transmission-connected network users, ACER notes the following:

- All 14 jurisdictions apply injection charges to transmission-connected renewable energy (RES) and non-RES producers;
- 9 jurisdictions apply injection charges to transmission-connected pumped hydroelectric energy storage facilities;
- 7 jurisdictions apply injection charges to other transmission-connected energy storage facilities (such as batteries).

Table 4: Transmission-connected network users subject to injection charges

Jurisdiction	Producers	Pumped hydro-electric storage	Non-PHES storage (e.g. batteries)
Austria	X	X	N/A
Belgium	X	X	X
Denmark	X	N/A	N/A
Finland	X	N/A	X

France	X	X	X
Ireland	X	X	X
Norway	X	X	X
Portugal	X	X	N/A
Romania	X	X	N/A
Slovak Republic	X	Not subject to transmission-related costs	N/A
Spain	X	X	N/A
Sweden	X	N/A	N/A
UK (Northern Ireland)	X	N/A	X
UK (Great Britain)	X	X	X
Total:	14	9	7

Note: N/A means there is no such network user group in that jurisdiction.

Injection charges applied to distribution-connected network users

(39) The network users connected to the distribution network that are subject to transmission tariffs are presented for each jurisdiction in Table 21. The jurisdictions which do not apply any transmission tariff for injection are not included in the Table.

(40) Out of the 14 jurisdictions that apply injection charges, 10 jurisdictions (AT, DK, FI, IE, NI, NO, PT, RO, ES, GB) apply these charges to at least some distribution-connected network users. More specifically, ACER notes the following:

- All 10 jurisdictions apply injection charges to distribution-connected RES and non-RES producers;
- 7 jurisdictions apply injection charges to distribution-connected pumped hydroelectric energy storage facilities;
- 6 jurisdictions apply injection charges to other energy storage facilities (such as batteries) connected to the distribution network.

6.2. Network users who withdraw electricity from the network

Withdrawal charges applied to transmission-connected network users

(41) Within the second network user group, network users can be classified into the following sub-groups:

a) Consumers;
b) Pumped hydroelectric energy storage facilities (PHES);
c) Non-PHES storage;
d) Other network users, who both inject and withdraw (not further detailed in this Report).

(42) The network users directly connected to the transmission network that are subject to transmission tariffs, by way of withdrawal charges, are detailed in Table 5. All the 29 jurisdictions apply withdrawal charges to at least some of the network users directly connected to the transmission network. More specifically, ACER notes the following:

- All 29 jurisdictions apply withdrawal charges to transmission-connected consumers;

- About half of the jurisdictions (i.e. 13 out of 29) apply withdrawal charges to transmission-connected pumped hydroelectric storage facilities for withdrawal;
- 8 jurisdictions apply customer charges to other transmission-connected storage facilities (such as batteries) for withdrawal.

Table 5: Transmission-connected network users subject to withdrawal charges

Jurisdiction	Consumers	Pumped hydro-electric storage	Non-PHES storage (e.g. batteries)
Austria	X	X	N/A
Belgium	X	X	X
Bulgaria	X	X	X
Croatia	X	X	N/A
Cyprus	X	N/A	N/A
Czech Republic	X	X	N/A
Denmark	X	N/A	N/A
Estonia	X	N/A	N/A
Finland	X	N/A	X
France	X	X	N/A
Germany	X	X	X
Greece	X	X	N/A
Hungary	X	N/A	N/A
Ireland	X	X	X
Italy	X	Not subject to transmission-related costs	Not subject to transmission-related costs
Latvia	X	Not subject to transmission-related costs	Not subject to transmission-related costs
Lithuania	X	Not subject to transmission-related costs[34]	Not subject to transmission-related costs[35]
Luxembourg	X	N/A	N/A
The Netherlands	X	N/A	N/A
Norway	X	X	X
Poland	X	Not subject to transmission-related costs	Not subject to transmission-related costs
Portugal	X	not subject to transmission-related costs	N/A
Romania	X	X	N/A
Slovak Republic	X	Not subject to transmission-related costs	N/A
Slovenia	X	Not subject to transmission-related costs	Not subject to transmission-related costs

[34] Electricity consumption for final uses at the plant (i.e. not for pumping/charging) is subject to withdrawal charges.
[35] Idem.

Jurisdiction	Consumers	Pumped hydro-electric storage	Non-PHES storage (e.g. batteries)
Spain	X	X[36]	N/A
Sweden	X	N/A	N/A
UK (Northern Ireland)	X	N/A	X
UK (Great Britain)	X	X	X
Total:	29	13	8

Note: N/A means there is no such network user group in that jurisdiction.

Withdrawal charges applied to distribution-connected network users

(43) The network users connected to distribution network that are subject to transmission tariffs, by way of withdrawal charges, are presented in Table 22. The vast majority of the jurisdictions, also apply withdrawal charges to at least some of the distribution-connected demand users. More specifically, ACER notes the following:

- 28 jurisdictions apply withdrawal charges to consumers (either directly, via a transmission-related tariff component, or indirectly, via a part of the distribution tariffs);
- 10 jurisdictions apply withdrawal charges to pumped hydroelectric storage facilities for withdrawal;
- 8 jurisdictions apply withdrawal charges to other storage facilities (such as batteries) for withdrawal.

[36] Currently, pumped hydroelectric energy storage facilities should pay access charges. Under the Spanish NRA's methodology proposal, pumped hydroelectric storage facilities do not pay transmission and distribution charges.

7. Tariff exemptions

7.1. Injection charges exemptions

Exemptions on injection charges for transmission connected network users

(44) Out of the 14 jurisdictions applying injection charges for network users directly connected to the transmission grid, 5 (BE, FR, GB, PT, SK) reported that they provide exemptions or allowances (tariff reductions) to some network users within the identified network user groups of producers, PHES and/or non-PHES. Some NRAs also reported exemptions or allowances for other network user groups (e.g. auto-producers, prosumers), however, these cases are not further detailed in this Report.

(45) Regarding exemptions among the transmission-connected network users, ACER notes the following:

- Some of the producers are fully exempted for injection in France, Portugal and the Slovak Republic and partially exempted in Great Britain;
- Some of the storage facilities (both PHES and Non-PHES) are fully exempted for injection in France and partially exempted in Belgium and Great Britain.

(46) ACER notes that the exemptions and allowances are related to lower voltage-level connection, or smaller-sized capacity, technology or they are applied to facilitate new investments. For more details, please refer to Table 6 below.

Table 6: Categories of transmission-connected network users exempted from injection charges

Jurisdiction	Producers	Pumped hydro-electric storage	Non-PHES storage (e.g. batteries)
Belgium		New or substantially increased storage facilities receive 80% tariff reduction for 10 or 5 years (from 2020).	New or substantially increased storage facilities receive 80% tariff reduction for 10 or 5 years (from 2020).
France	Producers connected under 150 kV are fully exempted[37].	PHES connected under 150 kV are fully exempted.	Non-PHES storages connected under 150 kV are fully exempted.
Portugal	Generators benefitting from feed-in-tariff schemes are fully exempted (RES and co-generation).		
Slovak Republic	Producers operating a hydroelectric power plant with a total installed capacity up to 5 MW and producers whose electricity generating plant is used solely to provide		

[37] Only producers connected in 400 kV, 225 kV and 150 kV pay the injection charges, as they are the ones mainly responsible for electricity exportation.

	ancillary services to the TSO are fully exempted.		
UK (Great Britain) [38]	Scottish generators (under 100MW) connected to the 132 kV transmission network receive a tariff reduction.	Scottish PHES (under 100MW) connected to the 132 kV transmission network receive a tariff reduction.	Scottish non-PHES storages (under 100MW) connected to the 132 kV transmission network receive a tariff reduction.
Total:	1 partial / 3 full exemptions for some producers	2 partial / 1 full exemptions for some PHES	2 partial / 1 full exemptions for some non-PHES storage

Note: the table does not include those instances where the entire group is not subject to charges.

Exemptions on injection charges for distribution-connected network users

(47) Out of the 10 jurisdictions applying injection charges for network users connected to the distribution grid, 6 jurisdictions (AT, DK, IE, GB, PT, RO) reported that they provide exemptions (including allowances, e.g. tariff reductions) to some network users within the identified network user groups of producers, PHES and/or non-PHES.

(48) Regarding the 6 jurisdictions providing exemptions to distribution-connected users, ACER notes the following:

- Some of the producers are fully exempted from injection charges in 6 jurisdictions (in AT, GB, IE, PT and RO both some RES and some non-RES producers, in DK only some RES producers);
- Some of the pumped hydroelectric storages facilities are fully exempted from injection charges in Romania and Great Britain;
- Some of the non-PHES storage facilities (such as batteries) are fully exempted in Great Britain.

For more details, please refer to Table 23 in Annex I.

7.2. Withdrawal charges exemptions

Exemptions on withdrawal charges for transmission-connected network users

(49) Out of the 29 jurisdictions, 6 jurisdictions reported that they provide exemptions (including allowances, e.g. tariff reductions) on withdrawal charges to some network users within the identified network user groups of consumers, PHES and/or non-PHES. Some NRAs also reported exemptions or allowances for other network user groups (e.g. auto-producers, prosumers), however, these are not further detailed in this Report.

(50) Regarding the 6 jurisdictions providing exemptions to transmission-connected users, ACER notes the following:

[38] Transmission-connected producers below 100 MW do pay generation charges, but receive discounts to reflect that their DNO-connected counterparts have different arrangements. These users still experience a locational charging signal, but which is different from the one faced by larger users and is capped in some areas to reflect the practicalities of charging small users who are not themselves in a contractual relationship with the TSO.

- Some of the consumers are fully exempted from withdrawal charges and partially exempted from withdrawal charges in France, Germany, Lithuania, the Netherlands and the Slovak Republic;
- Some of the pumped hydroelectric storages are fully exempted from withdrawal charges in Ireland, Germany, and partially exempted in France and Ireland;
- Some non-PHES storages facilities (such as batteries) are fully exempted from withdrawal charges in Germany.

For more details, please refer to Table 7 below.

Table 7: Categories of transmission-connected users exempted from withdrawal charges

Juridiction	Consumers	Pumped hydroelectric storage	Non-PHES storage (e.g. batteries)
France[39]	Some of the largest industrial consumers are partially exempted (tariff reduction).	Some PHES are partially exempted (tariff reduction).	
Germany[40]	Tariff reduction (discounts) is applied for consumers whose individual peak load predictably differs in a considerable way from the annual peak load of the grid and users who consume for 7.000 h/a at one connection point and whose annual consumption at this connection point crosses 10 GW/h.	PHES whose pump capacity or turbine power increased by at least 7.5% or whose storage capacity increased by at least 5% after 04.08.2011 are fully exempted for the first 10 years.	Non-PHES storage facilities built after 31.12.2008 and put into operation within 15 years from 04.08.2011 are fully exempted for the first 20 years of operation.
Ireland		Some PHES are fully exempted (i.e. Turlough Hill)	
Lithuania	Consumers whose electrical equipment has a permissible capacity less than 30 kW are partially exempted.		
The Netherlands	The large industrial consumers connected to the EHV or HV transmission grid receive partial tariff exemption if they meet certain criteria (consumption level and profile).		
Slovak Republic	Some of the largest industrial consumers are partially exempted (tariff reduction)		
Total:	3 partial / 2 full exemptions for some consumers	1 partial / 2 full exemptions for some PHES	1 full exemption for some non-PHES storage

Note: the table does not include those instances where the entire group is not subject to charges.

[39] Exemptions provided pursuant to Décret n° 2016-141 from 11.02.2016.
[40] Exemptions provided pursuant to Article 19(2) of the Stromnetzentgeltverordnung and Article 118(6) of the Energiewirtschaftsgesetz.

Exemptions on withdrawal charges for distribution-connected network users

(51) Out of the 24 jurisdictions, which apply withdrawal charges for distribution connected network users, 5 jurisdictions (CZ, DE, GR, LT, SI) provide exemptions (including allowances, e.g. tariff reductions) to some network users within the identified network user groups of consumers, PHES and/or non-PHES, as indicated in Table 24.

(52) Regarding the 6 jurisdictions providing exemptions to distribution-connected users, ACER notes the following:

- Some of the consumers are fully exempted from withdrawal charges in Greece and some of the consumers are partially exempted from withdrawal charges in Germany, Greece and Lithuania and Slovenia;
- Some of the pumped hydroelectric storages are fully exempted in Germany and partially exempted in the Czech Republic;
- Some non-PHES storages facilities (such as batteries) are fully exempted in Germany.

(53) Several rationales have been mentioned by the NRAs for granting exemptions to injection charges or withdrawal charges for some network users, including low capacity requirement by the concerned network users, reduction of administrative burden, simplification of pricing for micro generation, promotion and support of technologies (Combined Heat and Power producers, storage facilities), better cost-reflectiveness, as well as the support of generators useful for ensuring adequacy.

(54) ACER underlines that, while applying exemptions may be reasonable in certain instances, they shall not be in conflict with the legal requirement set by Article 18(1) of Regulation (EU) 2019/943 that tariffs shall be applied in a non-discriminatory manner.

8. Tariff bases

8.1. Transmission tariffs applied for injection (injection charges)

(55) As presented in Section 6, 14 jurisdictions apply some kind of injection charges. As shown in Table 8 below, the composition of these tariffs varies across the relevant jurisdictions. However, in the vast majority of jurisdictions, the injection charge is based (at least partially) on the energy injected into the grid and only in Ireland, Northern Ireland and in the Slovak Republic solely on a power-based component.

(56) More specifically, regarding the (at least partially) energy-based tariffs, ACER notes the following:

- In 7 jurisdictions (AT, BE, DK, ES, FR, PT, RO), the injection charge has an energy component only;
- In 3 jurisdictions (FI, GB, SE), the injection charge has an energy-based and an additional power-based component; and
- In Norway, the injection charge has an energy-based and an additional lump-sum component.

Table 8: Tariff bases of injection charges and their variations

Jurisdiction	Energy-based	Power-based	Lump sum	Further description and variations of the applied tariff basis
Austria	X			
Belgium	X			No variation
Denmark	X			Variation based on the type/size of the generator
Finland	X (93%, other charges than reserve costs)	X (7%, covers reserve costs)		No variation of the basis. Fixed capacity fee per MW and energy-based charge for the use of grid / input into the grid.
France	X			Variation based on voltage level
Ireland		X		Transmission Use of System tariffs are composed of two elements: (1) a postage stamp which is applied evenly to all generators and calculated based on the generators' Maximum Export Capacity; (2) locational signal.
Norway	X (48% losses charges, 8% system charges)		X (44%)	The lump sum portion is calculated from the 10-year average energy production.
Portugal	X			The injection charge has a peak/off-peak structure. Prices are set in order to target an average price harmonised with Spain, equal to 0.5 €/MWh.
Romania	X			No variation, all producers who are subject to injection charge pay the same.

Slovak Republic		X		No variation. Fixed capacity fee per MW
Spain	X			
Sweden	X (30%)	X (70%)		Variation based on location
UK (Great Britain)[41]	X (67.9% system charges and losses charges)	X (32.1% transmission charges)		Variation based on location that reflect the long-run marginal cost of use of the system at particular points.
UK (Northern Ireland)		X		Transmission Use of System tariffs are composed of two elements: (1) a postage stamp which is applied evenly to all generators and calculated based on the generators' Maximum Export Capacity; (2) locational signal.
Total:	7 energy only, 4 combined	3 power only, 3 combined	1 combined	

(57) Decisions on the application of energy and/or capacity-based injection charges may have important implications on the (long-term) investment decisions and the (short-term) operation decisions of a producer. Given that the necessary investments in the network are strongly linked to the peak capacity, power-based charges may be deemed more cost reflective for the recovery of infrastructure costs, insofar as individual peak hours are synchronous with grid peak hours. At the same time, energy-based tariffs, particularly when combined with time signals, may better facilitate optimal system operation, by shifting production from certain periods to others and reducing the need for new investments.

(58) ACER notes that, among the jurisdictions which apply multiple tariff bases, the different bases are applied, in some instances, in conjunction with different cost categories. Injection charges (regardless of their basis) may also differ based on the voltage level, location, time of use and/or type/size of generators.

(59) Transmission costs are fully borne by consumers in about half of the European jurisdictions. However, producers pay a share of transmission costs (ranging from around 2% up to 35%) in the following jurisdictions: Austria and Belgium (about 5%), Denmark (approx. 3%), Finland (13.4%), France (2%), Ireland and Northern Ireland (25%), Norway (22%), Portugal (approx. 8.2%), Romania (7%), the Slovak Republic (approx. 2.6%), Spain (7.6%), Sweden (35%), and Great Britain (16% transmission network and 50% balancing services).

8.2. Transmission tariffs applied for network users which withdraw electricity

(60) As presented in Section 6, all jurisdictions apply some kind of transmission tariffs for withdrawal. As shown in Table 9, the composition of these tariffs only slightly varies across the jurisdictions.

(61) In the vast majority of jurisdictions (i.e. 22 out of 29, or approx. 75%), the transmission tariffs for withdrawal have both an energy-based component and a power-based component, while there are 6 jurisdictions (BG, CY, DK, EE, HU, RO) which apply only an energy-based component and

[41] Data refers to 2018/2019 average share.

only the Netherlands apply a combination of power-based component and lump-sum component. There is no jurisdiction which apply only a power-based withdrawal charge.

Table 9: Tariff basis of withdrawal charges and their variation

Jurisdiction	Energy-based	Power-based	Lump sum	Further description and variations of the applied tariff basis
Austria	X	X		Tariffs depend on voltage levels and areas.
Belgium	X (around 60%)	X (around 40%)		Most tariffs depend on voltage levels. One power-based tariff depends on the time of use.
Bulgaria	X			No variation. The tariffs are calculated based on consumed energy.
Croatia	X (53.6% energy component)	X (23.9% power component)		Tariffs depend on the voltage level, the time of use and the contracted power: Customers connected to HV, MV and LV with contracted power over 20 kW pay a combination of energy-based and power-based components. Other LV customers pay only an energy-based component.
	+ (22.5% energy component in combination with power component)			
Cyprus	X			The transmission tariffs applied to consumers are based on voltage level.
Czech Republic	X (19%, charge mainly for losses)	X (81%, charge for other costs)		
Denmark	X			Uniform charge energy-based tariff (per kWh)
Estonia	X			Energy-based tariffs are based on voltage level and peak load.
Finland	X	X		Energy-based tariffs vary on time of use.
France	X (65%, charge for losses, mutualised transmission infrastructure costs[42])	X (35% charge for other costs)		Tariffs depend on voltage levels (400 kV; 150 and 225 kV; 63 and 90 kV).
Germany	X	X		The weight of the components depends on the user's peak load that occurs simultaneously with the annual peak load of the network.[43]
Greece[44]	X (37%)	X (63%)		Allocation of costs based on aggregate demand of each consumer class (HV, MV, LV) during the summer and winter peak (2 hours annually). HV/MV customers pay fully capacity-based tariffs, LV customer tariffs are mostly energy-

[42] Depends on participation rate during peak hours

[43] For users exceeding 2,500 hours of consumption, the capacity-based term is higher than the energy-based term. The opposite is true for consumers under the 2,500-hour threshold. (I.e. according to the latest data from year 2015, for transmission-connected grid users exceeding 2,500 hours of consumption/year: 83.4% capacity charge, 16.6% volumetric. For grid users under 2,500 hours: 25.5% capacity, 74.5% volumetric.)

[44] Indicative percentages for the share of energy and power based components, calculated by available data of 2017.

Jurisdiction	Energy-based	Power-based	Lump sum	Further description and variations of the applied tariff basis
				based (80-100%, depending on the type of customer)
Hungary	X			Basically uniform energy-based tariff system with some variations according to voltage levels[45].
Ireland	X (40% system charges)	X (60% charge for other costs)		The network capacity charge varies based on how the demand customer is connected to the grid, i.e. transmission-connected, distribution connected with a Minimum Import Capacity (MIC) ≥ 0.5MW or distribution-connected with MIC < 0.5MW. The energy transfer charge does not vary.
Italy	X (about 10% for EHV, HV and 100% for MV, LV)	X (about 90% for EHV, HV)		Customers on HV and EHV levels pay the same power-based component, while the energy-based component is slightly lower for EHV customers. Customers at lower voltage levels pay on the basis of energy.
Latvia	X (67%)	X (33%)		System loss and technical expenses are directly attributed. Other expenses are allocated according to set coefficient, which are coordinated with NRA.
Lithuania	X (about 68%)	X (about 32%)		The price cap set by the NRA for the transmission service shall not be differentiated and is energy-based. However, the TSO can differentiate power and energy components. In practice, the TSO differentiates the transmission service tariff (about 68% energy-based and 32% power-based).
Luxembourg	X (25%)	X (75%)		Power-based component depends on the metered yearly ¼-hour peak[46].
The Netherlands		X (99.9%)	X (0.1%)	Capacity-based component is partly based on annual contracted maximum capacity (kW) and a monthly peak capacity (kW). For customers connected directly to EHV and HV levels, part of the cost of the EHV network is passed on (cascaded) to the consumers of the HV network based on their share of total contracted capacity.
Norway	X (5%)	X (95%)		Distribution network companies and industry customers connected to transmission pay an energy-based tariff for marginal losses (same principles as for generation). The power-based component depends on the consumer's power output (in MW) during the system peak load hour[47].

[45] I.e. withdrawal charge for transmission-connected network users is approx. 10% higher than for distribution-connected network users.
[46] With one single consumer on the transmission network, the ratio might vary from one year to another. For 2019 75% was power-based.
[47] Power outputs are calculated for each connection point in the transmission network. The calculation is based on measured net power exchange during the peak load hour adjusted for production during the peak load hour.

Jurisdiction	Energy-based	Power-based	Lump sum	Further description and variations of the applied tariff basis
Poland	X (51%, variable costs, quality and market fee)[48]	X (49%, fixed fee, covers transmission infrastructure costs)		There are different rates for points of delivery (PODs) in transmission network: (1) for a final PoD (where end consumption is connected) the capacity charge is based on the reserved contractual capacity; (2) for network PoD (where distribution is connected) the contractual capacity is based on actual energy flows.
Portugal	X (16.5%)	X (83.5%)		The energy-based component includes active energy (14.0%) and reactive energy (2.5%). The former reflects infrastructure costs that are realized with the purpose of reducing grid losses, while the latter provides incentives to users to reduce reactive energy at consumption sites. The power-based component includes contracted power (10.5%) and peak power (73.0%). The former recovers infrastructure costs that are considered peripheral (dimensioned for individual user peaks), while the latter recovers infrastructure costs that are considered central (dimensioned for the system peak)[49].
Romania	X			No variation, according to the electricity law. Uniform energy-based tariff.
Slovak Republic	X (20%)	X (80%)		There is no variation of the tariffs, one voltage level, one power-based tariff, one energy-based tariff.
Slovenia	X (39%)	X (61%)		No explicit division which costs are covered by each component (i.e. power or energy-based) of transmission tariff.
Spain	X	X		
Sweden	X (20%)	X (80%)		
UK (Great Britain)	X (approx. 75% transmission infrastructure charge)	X (approx. 25% charge for other costs)		Users with half-hourly settled meters pay power-based cost-reflective charges determined by the cost of transmission in different demand zones. Users without half-hourly settled meters pay energy-based charges that also vary by location.
UK (Northern Ireland)	X	X		All TSO costs are charged to demand consumers and are energy-based. Transmission Asset Owner (TAO) costs are broken down into an energy-based component (75%, paid by demand consumers) and a power-based component (25%, paid by generators).
Total:	6 energy / 22 combined	23 combined	1 combined	

(62) Withdrawal charges with multiple tariff bases, apply different bases, in some instances, in conjunction with different cost categories.

[48] Variable network fee approx. 10%, quality fee approx. 40-41% and market fee approx. 0.1%.
[49] The energy-power breakdown is based on a data forecast for 2019.

9. Costs recovered by tariffs

(63) ACER differentiates the following major cost categories, which may be recovered by transmission tariffs:

- "capital expenditure costs" (depreciation and return on capital) of transmission investments;
- "operational expenditure costs" of transmission investments;
- "cost of losses";
- "infrastructure-related compensations or other monetary transfers";
- "cost of ancillary services and system balancing (energy)";
- "costs of congestion management";
- "non-TSO costs", which are costs not directly related to transmission or system services (i.e. typical TSO activities), such as costs of stranded assets, costs of various support schemes including those for renewables, for cogeneration of heat and power, for fossil fuels, for security of supply, etc.

(64) The costs may be recovered fully or partially by:

- a (single) tariff (covering both transmission costs and costs for system services); or
- a primary transmission tariff and additional or complementary charges levied on network users (referred to as "other charges" in this Report).

(65) Certain costs in certain jurisdictions may not be recovered by any tariff or charge levied on network users (e.g. generators are obliged to provide a product or system service, free of charge, or there are mechanisms/penalties, e.g. for causing imbalances or exceeding contracted capacities).

9.1. Capital and operational expenditures of transmission investments:

(66) The capital expenditures of electricity transmission investments (depreciation and return on capital) are recovered by a single or primary transmission tariff in all jurisdictions. The operational expenditures are also recovered only by a single or primary transmission tariff, according to the relevant regulatory framework[50], except in Great Britain, where the recovery of the operational expenditures is split up between two different tariffs levied on network users, i.e. the costs of system operation are recovered through Balancing Services Use of System charge (BSUoS), and the costs for operation and maintenance are recovered for the Transmission network Owners via Transmission Network Use of System charge (TNUoS).

[50] It does not mean that the efficient cost level of the expenditures cannot be set by the NRA or certain operational costs (e.g. personnel costs) cannot be managed separately from simple pass-through costs.

9.2. Costs of losses

(67) In the vast majority of the jurisdictions (21 out of 29, about 70%), the costs of losses are recovered by the transmission tariff paid by either only consumers or by various network users. In Great Britain and the Slovak Republic the costs of losses are recovered by other charges. In 6 jurisdictions (ES, GR, IE, IT, PT, NI), such costs are not covered by any tariff or charge levied on network users, but instead producers cover losses through injection of additional energy or suppliers procure additional energy, etc. The details for each jurisdiction is available in Table 10 below.

Table 10: Recovery of costs of purchase of losses

Jurisdiction	Cost-recovery mean	Further description
Austria	TRM-T	Losses are paid by all consumers but only by producers with installed capacity greater than 5 MW.
Belgium	TRM-T	Balance responsible parties (BRPs) are obligated to inject an additional amount of energy to compensate for losses at HV levels (above 70 kV) in their portfolio. This way of compensation might evolve in the near future as the federal network code has recently been updated and now allows for compensation of losses at HV levels by the TSO and for cost recovery through tariffs.
Bulgaria	TRM-T	
Croatia	TRM-T	
Cyprus	TRM-T	
Czech Republic	TRM-T	
Denmark	TRM-T	Net losses are covered by network tariffs.
Estonia	TRM-T	
Finland	TRM-T	Consumers and producers pay through tariffs, but producers' tariff takes into account the benefits of connecting generation to network.
France	TRM-T	Losses generated by the exportation of electricity are paid by generators connected to the 400 kV and 225 kV grid.
Germany	TRM-T	
Greece	Not recovered by any tariff or charge	Cost of transmission losses is borne by transmission-connected producers (conventional generators and importers). RES generators are excluded.
Hungary	TRM-T	Partial recovery by setting a price of losses (based on market trends) justified by the NRA and using the factual volume of year n-2. There is an ex-post partial correction in both directions.
Ireland	Not recovered by any tariff or charge	The Transmission Loss Adjustment Factors (TLAFs) are applied to generators to ensure that that the costs of transmission losses are borne by market participants who cause them. TLAFs are applied to generators' outputs so that their contribution to the market is adjusted. The value of TLAFs depends on the generator point of connection to the grid. A similar system is used in Northern Ireland.
Italy	Not recovered by any tariff or charge	Consumers pay (in kind, i.e. as additional energy bought in the energy market) for a "standard" level of losses. The difference between the actual losses and the standard losses is paid (or retained) by network operators. The reason for introducing standard level of losses (and thus an implicit reward/penalty scheme for network operators) is to incentivise network operators to reduce losses in their networks.
Latvia	TRM-T	

Jurisdiction	Cost-recovery mean	Further description
Lithuania	TRM-T	
Luxembourg	TRM-T	
The Netherlands	TRM-T	
Norway	TRM-T	The marginal loss tarification aims at providing a more correct price signal in each node reflecting the changes in overall losses by a marginal input/output on the system.
Poland	TRM-T	
Portugal	Not recovered by any tariff or charge	Suppliers must buy the energy for their clients' consumption in addition to energy to compensate for losses which is calculated by using the 15-minute loss profiles approved and published annually by the NRA. The loss profiles are differentiated by network type (transmission and distribution) and voltage level (EHV, HV, MV, LV). In this sense, there are no tariffs for losses, since losses are purchased by suppliers on the market.
Romania	TRM-T	Losses are paid by all consumers and by the producers with installed capacity greater than 5 MW.
Slovak Republic	Other charge	All consumers pay a separate tariff for losses.
Slovenia	TRM-T	
Spain	Not recovered by any tariff or charge	Suppliers must buy the energy for their clients including losses. The standard losses are established and published (currently by the Government and from January 1, 2020 by the NRA). The standard losses are differentiated by voltage level and period.
Sweden	TRM-T	
UK (Great Britain)	Other charge	The rationale is to share losses equally between generation and supply and reflect that losses vary by location. A locationally specific adjustment is added to the volumes of energy to adjust for volumes lost in a locationally cost-reflective manner.
UK (Northern Ireland)	Not recovered by any tariff or charge	Suppliers procure more energy than metered and producers are obligated to inject this additional energy.
Total:	21 recovered by TRM-T, 2 recovered by other charge	

Note: TRM-T means that the cost is fully recovered by a single transmission tariff or (in case multiple charges apply) by the primary transmission tariff.

9.3. Infrastructure-related compensations or other monetary transfers between TSOs

(68) As shown in Table 11, in 26 out of 28 jurisdictions[51] (96%), costs related to the ITC mechanism[52] are recovered by the TSO only via regulatory charges: in 24 jurisdictions (85%) via the single or primary transmission tariff, in Greece partially by transmission tariff and partially by another charge; and in Italy it is fully recovered by other charges levied on network users. In the Czech Republic and Poland the ITC payments (if occur) at least partially are recovered by the congestion income.

[51] Cyprus is not part of the ITC mechanism.
[52] Cf. Commission Regulation No 838/2010.

(69) As shown in Table 11, for 25 out of 29 jurisdictions (86%), the cross-border payments related to cross-border cost allocation decisions[53] are recovered by the single or primary transmission tariff. In the remaining 4 jurisdictions (CY, IT, NL, PL), the NRAs reported that since such costs have not yet been incurred (e.g. in lack of CBCA cross-border payments) their regulatory treatment is not decided yet, or they are not applicable in lack of cross-border trade (CY).

Table 11: Recovery of costs related to cross-border monetary transfers

Jurisdiction	Costs related to cross border monetary transfers	
	Recovery of costs related to the Inter-TSO compensation mechanism	**Recovery of cross-border payments related to cross-border cost allocation decisions**
Austria	TRM-T	TRM-T
Belgium	TRM-T	TRM-T
Bulgaria	TRM-T	TRM-T
Croatia	TRM-T	TRM-T
Cyprus	Not applicable as Cyprus is not part of the ITC mechanism	No regulatory decision made yet on such payments (No cross-border electricity flows in Cyprus yet)
Czech Republic	Recovered by congestion income[54]	TRM-T
Denmark	TRM-T	TRM-T
Estonia	TRM-T	TRM-T
Finland	TRM-T	TRM-T
France	TRM-T	TRM-T
Germany	TRM-T	TRM-T
Greece	Partially recovered by transmission tariff and partially by other charges	TRM-T
Hungary	TRM-T	TRM-T
Ireland	TRM-T	TRM-T
Italy	Recovered by other charges (up to 31.12.2019)	No regulatory decision made yet on such payments (In lack of CBCA payments made to other project promoter)
Latvia	TRM-T	TRM-T
Lithuania	TRM-T	TRM-T
Luxembourg	TRM-T	TRM-T
The Netherlands	TRM-T	No regulatory decision made yet on such payments (In lack of CBCA payments made to other project promoter)
Norway	TRM-T	TRM-T
Poland	Recovered by congestion income (with a possibility to partially include in the transmission tariff)[55]	No regulatory decision made yet on such payments (In lack of CBCA payments made to other project promoter)
Portugal	TRM-T	TRM-T

[53] In line with Article 12 of Regulation (EU) No 347/2013, a TSO may be liable to borne (part of) the efficiently incurred investment costs of a project of common interest of a different promoter, if the project provides a net positive impact to the Member State of the TSO, regardless whether the asset is located or not in the territory of such Member State. Pursuant to Article 12(1) of the same Regulation, the relevant costs shall be paid for by network users through tariffs for network access in that or those Member States.

[54] In case of an annual final net positive position in the ITC mechanism for the Czech ITC Party, the income from the ITC is allocated to a separate fund which can be used solely for infrastructure renewal or development. In case of an annual final net negative position in the ITC mechanism, the related cost would be covered by the congestion income from cross-border long-term auctions.

[55] In case of deficit between ITC contributions and ITC compensations, the difference is covered by revenues from cross-border capacity allocation mechanism. In case it is not fully recovered, there is a possibility to include such costs in the transmission tariff.

Romania	TRM-T	TRM-T
Slovak Republic	TRM-T	TRM-T
Slovenia	TRM-T	TRM-T
Spain	TRM-T	TRM-T
Sweden	TRM-T	TRM-T
UK (Great Britain)	TRM-T	TRM-T
UK (Northern Ireland)	TRM-T	TRM-T
Total:	24 fully recovered by TRM-T, 1 partially by TRM-T and partially by other charge, 1 by other charges, 2 by congestion income	25 fully recovered by TRM-T, 4 without regulatory decision on the treatment

Note: TRM-T means that the cost is fully recovered by a single transmission tariff or (in case multiple charges apply) by the primary transmission tariff.

9.4. Costs of ancillary services and system balancing (energy)

(70) As shown in Table 12, regarding the cost-recovery of ancillary services:

- In 7 out of 29 jurisdictions (about 25%), the frequency containment reserve does not constitute a cost to the TSO, either because it is provided by the generators on a mandatory basis without any compensation (ES, HR, IT, RO, SI, PT) or because it is ensured by a neighbouring TSO free of charge (EE). In about half of the jurisdictions (i.e. 13 jurisdictions out of 29) the costs of the frequency containment reserve are included in the single or primary transmission tariff; in 8 jurisdictions, it is included in another (separate) charge, and in 1 jurisdiction, it is split between the (primary) transmission tariff and another charge.

- The frequency restoration reserve is recovered via network user charges in all but three jurisdictions (EE, ES and PT) and either included in the single or primary transmission tariff (in 14 jurisdictions), or in another charge (in 11 jurisdictions) or the costs are split between the (primary) transmission tariff and another charge (in three jurisdictions). In Estonia the frequency is held by the Russian TSO, in Portugal it is paid by the balancing responsible parties (BRPs).

- Replacement reserves are not provided in 10 jurisdictions (AT, BE, DE, DK, FI, HR, HU, LU, NL and SI). Out of the 19 jurisdictions where replacement reserves are provided, the related costs are part of the single or primary transmission tariff in 8 jurisdictions, part of another charge in 9 jurisdictions, while in Portugal and Spain the costs are not recovered by any charge levied on network users.

- The reactive support and voltage control system service is provided in all jurisdictions. Its costs are recovered through the single or primary transmission tariff in 17 jurisdictions (about 80%), through other charge in 9 jurisdictions, while it is included partially in the (primary) transmission tariff and partially in other charge in Estonia. It is not recovered by any tariff or charge levied on grid users in Italy and Spain.

- The black start system service is provided in all jurisdictions. In most jurisdictions (i.e. 15 out of 29 jurisdictions), the related costs are included in the (single or primary) transmission tariff. In 8 jurisdictions, it is included in other charges and in Sweden the costs are split between the (primary) transmission tariff and another charge. In 5 jurisdictions (EE, FR, GR, NO, RO), it is not included in any tariff or charge but is typically provided by the generators on a mandatory basis for free.

(71) Energy balancing costs (i.e. increasing or decreasing injected or withdrawn energy volumes) in most jurisdictions (20 out of 29) are not recovered by any charge, but typically borne by balancing responsible parties (BRPs) at a price set by the market. In Hungary (part of) such costs is included in the transmission tariff, in 7 jurisdictions (CY, GB, GR, IE, NI, LT, SK) they are recovered by other charge (e.g. system service charge or balancing charge) and in Italy partially recovered by other charge levied on network users.

(72) While the means of recovering the costs of ancillary services and balancing (energy) may be indifferent to the final consumers (because they will pay the costs through either higher tariffs or higher energy prices), the difference can be crucial for generators. The obligation to offer ancillary services and balancing (energy) for free may create a similar effect to an injection charge with the caveat that the generator has no leverage on them and their impact may significantly differ based on their basis (i.e. capacity or energy).

Table 12: Cost recovery of various system services

Jurisdiction	Frequency containment reserve	Frequency restoration reserve	Replacement reserve	Reactive support and voltage control	Black start capability	Balancing energy
Austria	Other charge	Both TRM-T and other charges[56]	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs
Belgium	TRM-T	TRM-T	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs
Bulgaria	TRM-T	TRM-T	TRM-T	TRM-T	TRM-T	Imbalance settlement / BRPs
Croatia	Not recovered by any charge[57]	Partially TRM-T[58]	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs
Cyprus[59]	Other charge	Other charge	Other charge	Other charge	Other charge	Other charge
Czech Republic[60]	Other charge	Other charge	Other charge	Other charge	Other charge	Imbalance settlement / BRPs
Denmark[61]	Other charge	Other charge	N/A	Other charge	Other charge	Imbalance settlement / BRPs
Estonia	Not recovered by any charge[62]	Not recovered by any charge[63]	TRM-T	Both TRM-T and other charges	TRM-T	Imbalance settlement / BRPs

[56] Mostly covered by balance groups and generators.
[57] Provided by generators on a mandatory basis without compensation by the TSO.
[58] Mainly recovered by the transmission tariff and approx. 20% recovered via imbalance settlement / BRPs. This will change in 2020 (i.e. 0% BRPs).
[59] There is a specific tariff for provision of ancillary services.
[60] System services are not included in the basic (primary) transmission tariff, they are charged separately.
[61] Included in the so-called system tariff.
[62] Frequency is held by Russian TSO for free of charge.
[63] Idem.

Jurisdiction	Frequency containment reserve	Frequency restoration reserve	Replacement reserve	Reactive support and voltage control	Black start capability	Balancing energy
Finland	Both TRM-T and other charges[64]	Both TRM-T and other charges[65]	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs
France	TRM-T	TRM-T	TRM-T	TRM-T	Not recovered by any charge levied on grid users[66]	Imbalance settlement / BRPs
Germany	TRM-T	TRM-T	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs
Greece[67]	Other charge	Other charge	Other charge	Other charge	Not recovered by any charge levied on grid users[68]	Other charge
Hungary	TRM-T	TRM-T	N/A	TRM-T	TRM-T	Partially recovered by TRM-T[69]
Ireland	TRM-T	TRM-T	TRM-T	TRM-T	TRM-T	Other charge[70]
Italy	Not recovered by any charge[71]	Other charge	Other charge	Not recovered by any charge[72]	Other charge	Partially recovered by other charge
Latvia	TRM-T	TRM-T	TRM-T	TRM-T	TRM-T	Imbalance settlement / BRPs
Lithuania[73]	Other charge	Other charge	Other charge	Other charge	Other charge	Other charge
Luxembourg	TRM-T	TRM-T	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs
The Netherlands	TRM-T	TRM-T	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs[74]

[64] The costs of reserves are allocated to balance service charge and to other transmission services charge.
[65] Idem.
[66] Mandatory service by large generators.
[67] The listed system services charges are included in the so-called uplift account charge.
[68] Provided by generators on a mandatory basis without compensation by the TSO.
[69] Payments from BRPs via Imbalance settlement procedure is a “negative cost item” that reduces the costs to be recovered via the transmission tariff.
[70] Imperfections charge
[71] Frequency containment reserve is mandatory and free of charge.
[72] Reactive support is mandatory and free of charge. The costs of market-based voltage control actions by generators (to avoid voltage violations) are treated under the intra-zonal congestion charging mechanism.
[73] Charge for system services is applied, including all these costs.
[74] Costs are levied on the BRPs causing the imbalances only. Any remaining revenues for the TSO are refunded to the system users in the yearly tariff decision.

Jurisdiction	Frequency containment reserve	Frequency restoration reserve	Replacement reserve	Reactive support and voltage control	Black start capability	Balancing energy
Norway	TRM-T	TRM-T	TRM-T	TRM-T	Not recovered by any charge levied on grid users	Imbalance settlement / BRPs
Poland	TRM-T	TRM-T	TRM-T	TRM-T	TRM-T	Imbalance settlement / BRPs
Portugal[75]	Not recovered by any charge levied on grid users[76]	Not recovered by any charge levied on grid users	Not recovered by any charge levied on grid users	Other charge	Other charge	Imbalance settlement / BRPs
Romania	Not recovered by any charge levied on grid users [77]	Other charge[78]	Other charge	Other charge	Not recovered by any charge levied on grid users [79]	Imbalance settlement / BRPs
Slovak Republic[80]	Other charge	Other charge	Other charge	Other charge	Other charge	Other charge
Slovenia	Not recovered by any charge levied on grid users [81]	TRM-T	N/A	TRM-T	TRM-T	Imbalance settlement / BRPs[82]
Spain[83]	Not recovered by any charge levied on grid users	Not recovered by any charge levied on grid users	Not recovered by any charge levied on grid users	Not recovered by any charge levied on grid users	Not recovered by any charge levied on grid users	Not recovered by any charge levied on grid users
Sweden	TRM-T	Other charge	Other charge	TRM-T	Both TRM-T and other charges	Imbalance settlement / BRPs

[75] The costs incurred by the TSO (paid to BSPs) associated to Frequency Restoration Reserves, Replacement Reserves and Balancing (energy) are paid by BRPs accordingly to their imbalance or their consumption portfolio. Cost categories of reactive support and voltage control as well as black start capability are levied on grid users through 'global use of system tariff'.
[76] Provided by generators on a mandatory basis without compensation by the TSO.
[77] Idem.
[78] System services charge
[79] Provided by generators on a mandatory basis without compensation by the TSO.
[80] These cost categories are recovered by Tariff for system services.
[81] Provided by generators on a mandatory basis without compensation by the TSO. From 2020, it will be recovered by the transmission tariff.
[82] Recovered by the Market Operator (Borzen d.o.o.) through the imbalance settlement process.
[83] The costs of the ancillary services are included in the commodity price

Jurisdiction	Frequency containment reserve	Frequency restoration reserve	Replacement reserve	Reactive support and voltage control	Black start capability	Balancing energy
UK (Great Britain)[84]	Other charge	Other charge	Other charge	Other charge	Other charge	Other charge
UK (Northern Ireland)	TRM-T	TRM-T	TRM-T	TRM-T	TRM-T	Other charge[85]
Total	13 TRM-T, 8 other charge, 1 both	13 TRM-T, 1 partially TRM-T, 10 other charge, 2 both	8 TRM-T, 9 other charge	17 TRM-T, 9 other charge, 1 both	15 TRM-T, 8 other charge, 1 both	1 partially TRM-T, 7 other charge, 1 partially other charge

Note: TRM-T means that the cost is fully recovered by a single transmission tariff or (in case multiple charges apply) by the primary transmission tariff. Imbalance settlement / BRPs means that these costs are not recovered via a transmission-related charge which is levied on the network users, but recovered by the parties responsible for imbalances (via an imbalance settlement mechanism), typically at a price set by the market.

9.5. Cost of congestion management

(73) As shown in Table 13, the costs of congestion management in most jurisdictions (17 out of 29, approx. 60%) are part of the single or primary transmission tariff. In 7 jurisdictions, they are recovered by other charge(s), while in 5 jurisdictions (BG, CY, EE, ES, SK) such costs are not applicable (i.e. they do not occur) or they are not recovered by any tariff or charge; instead, they are addressed directly in the energy market via the energy prices (across zones) or it is the responsibility of the suppliers and it is not remunerated by any charge, but potentially included in the commodity price.

Table 13: Cost recovery of congestion management costs

Jurisdiction	Cost recovery mean
Austria	TRM-T
Belgium	TRM-T
Bulgaria	Not recovered by any tariffs or charges levied on grid users
Croatia	TRM-T
Cyprus	Not recovered by any tariffs or charges levied on grid users
Czech Republic	TRM-T
Denmark	Other charge[86]
Estonia	Not recovered by any tariffs or charges levied on grid users[87]
Finland	TRM-T
France	TRM-T
Germany	TRM-T
Greece	Other charge[88]

[84] BSUoS costs are passed through 50/50 to producers and end consumers.
[85] Cost of balancing is captured under the Market Operator charges, which are separate from transmission system use charges. This cost is covered by the Imperfections Charge levied by the Market Operator.
[86] Recovered via System tariff.
[87] Congestion management is a service for suppliers and is not remunerated by any charge, but it is included in the commodity price.
[88] Congestion management costs are allocated to suppliers through uplift account charges, in proportion to energy withdrawals.

Hungary	TRM-T
Ireland	Other charge[89]
Italy	Other charge[90]
Latvia	TRM-T
Lithuania	TRM-T
Luxembourg	TRM-T
The Netherlands	TRM-T
Norway	TRM-T
Poland	TRM-T
Portugal	Other charge[91]
Romania	TRM-T
Slovak Republic	Not recovered by any tariffs or charges levied on grid users
Slovenia	TRM-T
Spain	Not recovered by any tariffs or charges levied on grid users[92]
Sweden	TRM-T
UK (Great Britain)	Other charge[93]
UK (Northern Ireland)	Other charge[94]
Total	7 other charge, 17 TRM-T

Note: TRM-T means that the cost is fully recovered by a single transmission tariff or (in case multiple charges apply) by the primary transmission tariff.

9.6. Costs not related to transmission or system operation services

(74) Table 14 shows the cost recovery of 5 different support schemes implemented in the European jurisdictions. ACER finds that only in a few instances (mainly with regard to the costs of measures for ensuring adequacy), the costs of these support schemes are part of the (primary) transmission tariff. Instead, they are rather recovered through other charges set by a public authority (or the TSO) and levied on all or some of the network users or they do not levy a charge on network users to recover the costs of such support schemes, but they socialise them to all taxpayers (i.e. paid e.g. from the state budget):

- Out of 23 jurisdictions who reported to apply support schemes for RES, none includes the related costs in the primary transmission tariff. Instead, they are covered fully (in 17 jurisdictions) or partially (in two jurisdictions) by another charge levied on network users. In the remaining 4 jurisdictions, such costs are not recovered by any tariff or charge levied on network users.

- None of the 13 jurisdictions where a co-generation of heat and power support scheme is applied includes such costs in the (primary) transmission tariff. In 10 jurisdictions, the costs are covered fully and in two partially by another charge levied on network users. In one jurisdictions, they are not recovered by any network user tariff or charge.

- Out of the 6 jurisdictions with support schemes for fossil fuels, no jurisdiction recovers any part of their costs via the transmission tariff. In 4 jurisdictions, such costs are

[89] Recovered via imperfections charge levied on suppliers.
[90] Congestion between zones (Italy has a zonal market mechanism) is addressed directly in the energy market via the energy prices, therefore without any charging account. The costs of intra-zonal congestion management are recovered by a specific charge.
[91] Global use of system tariff.
[92] The costs of the congestion management are included in the commodity price.
[93] Recovered via BSUoS.
[94] Cost of congestion management is captured under the Market Operator charges, which are separate from transmission system use charges. This cost is covered by the Imperfections Charge levied by the Market Operator.

recovered by other charges levied on network users. In two jurisdictions, such costs are not recovered by any tariff or charge levied on network users.

- Out of 18 jurisdictions applying measures for ensuring adequacy (e.g. strategic reserve plants, support for peaking units, charges for interruptible loads, etc.), 9 jurisdictions recover their costs via transmission tariffs, 9 recover them by other charge.

- Out of the 8 jurisdictions with stranded costs of phased-out power plants, two jurisdictions recover them at least partially as part of the primary transmission tariffs and two jurisdictions include them in other charges levied on network users. In the remaining 6 jurisdictions, this is not recovered by any tariff or charge levied on network users.

Table 14: Cost recovery of various support schemes

Jurisdiction	Costs of supporting schemes for renewables	Costs of supporting schemes for cogeneration of heat and power	Costs of supporting schemes for fossil fuels	Costs of measures for ensuring adequacy	Stranded costs of phased-out power plants
Austria	N/A	N/A	N/A	N/A	N/A
Belgium[95]	Other charge	Other charge	N/A	Other charge	Partially recovered by TRM-T
Bulgaria	N/A	N/A	N/A	TRM-T	N/A
Croatia	N/A	N/A	N/A	N/A	N/A
Cyprus	Other charge[96]	N/A	N/A	Other charge[97]	TRM-T
Czech Republic	Partially recovered by other charge[98]	Partially recovered by other charge[99]	Not recovered by any charge levied on grid users	TRM-T	Not recovered by any charge levied on grid users
Denmark	N/A	N/A	N/A	N/A	N/A
Estonia	Other charge[100]	N/A	N/A	N/A	N/A
Finland	Not recovered by any charge levied on grid users[101]	N/A	N/A	Other charge	N/A
France[102]	Partially recovered by other charge	Partially recovered by other charge	N/A	TRM-T	Not recovered by any charge

[95] The costs of RES support is sometimes recovered through a dedicated tariff recovered by the TSO. Costs for Public Services Obligations (PSO), including RES support and adequacy are added to the transmission tariffs according to the electricity law. Tariffs for PSO are therefore added to the transmission tariffs structure.
[96] Recovered by the RES Fund charge.
[97] Costs of measures for ensuring adequacy recovered by the "Tariff for the provision of ancillary services (T-AS).
[98] Costs of RES support is financed partially through the state budget and partially by a separate charge paid by network users
[99] Idem.
[100] Costs of RES support are recovered by additional charge which is calculated by TSO using principles which are set in Electricity Market Act.
[101] Costs of supporting schemes for renewables are covered by the state budget, not by TSO charges. TSO is responsible for the electronic guarantee of origin (GO) register service in Finland.
[102] Costs of RES and co-generation are supported by a dedicated taxation (TICFE).

Jurisdiction	Costs of supporting schemes for renewables	Costs of supporting schemes for cogeneration of heat and power	Costs of supporting schemes for fossil fuels	Costs of measures for ensuring adequacy	Stranded costs of phased-out power plants
					levied on grid users
Germany	Other charge[103]	Other charge[104]	N/A	TRM-T	N/A
Greece	Other charge[105]	Other charge	Other charge[106]	Other charge[107]	N/A
Hungary	Not recovered by any charge levied on grid users[108]	N/A	N/A	N/A	N/A
Ireland[109]	Other charge	N/A	Other charge[110]	TRM-T	N/A
Italy[111]	Other charge	Other charge	Not recovered by charge levied on grid users	Other charge	Other charge
Latvia[112]	N/A	N/A	N/A	TRM-T	Not recovered by any charge levied on grid users
Lithuania	Other charge[113]	N/A	N/A	Other charge[114]	N/A
Luxembourg [115]	Not recovered by any network tariff	Not recovered by any network tariff	N/A	TRM-T	N/A
The Netherlands	N/A	N/A	N/A	N/A	N/A
Norway	Not recovered by any charges levied	N/A	N/A	N/A	N/A

[103] EEG-Umlage (renewables).
[104] KWKG-Umlage (cogeneration of heat and power).
[105] Through the RES levy (ETMEAR), auctioning of CO2 emission allowances and wholesale market uplift charges.
[106] Costs of fossil fuel support scheme are recovered through wholesale market uplift charges.
[107] Adequacy related costs are covered through wholesale market uplift charges.
[108] Supporting schemes for renewables are financed through levies set by the Government, which are not part of the tariff structure.
[109] The PSO charge is designed by the Government and consists of various subsidy schemes to support its national policy objectives related to renewable energy and indigenous fuels (peat).
[110] PSO levy scheme will support peat until the end of 2019.
[111] A3-SOS is the tariff element to cover the costs for supporting renewable sources and CIP 6/92 cogeneration.
[112] Support schemes for RES, co-generation and fossil fuels are not applicable since 2013. However, some of those power plants which were granted till 2013 with such an support (for 10-20 years) receive payments (the last one until 2037) from the obligatory mandatory component (OMC) set by the regulatory every year, separately from the transmission tariff.
[113] Costs of supporting schemes for renewables are the public service obligation. The public services obligation price is part of the final price of electricity, which is paid by the consumer.
[114] Costs of measures for ensuring adequacy are system service. The system services price is part of the final price of electricity, which is paid by the consumer.
[115] Supporting schemes for renewables and cogeneration are financed through levies and general taxes and are not part of the tariff system.

Jurisdiction	Costs of supporting schemes for renewables	Costs of supporting schemes for cogeneration of heat and power	Costs of supporting schemes for fossil fuels	Costs of measures for ensuring adequacy	Stranded costs of phased-out power plants
	on grid users[116]				
Poland	Other charge[117]	Other charge[118]	N/A	TRM-T	Other charges[119]
Portugal[120]	Other charge	Other charge	Other charge	Other charge[121]	N/A
Romania	Other charge[122]	Other charge[123]	N/A	N/A	N/A
Slovak Republic[124]	Other charge	Other charge	Other charge	N/A	N/A
Slovenia	Other charge[125]	Other charge[126]	N/A	N/A	N/A
Spain	Recovered by access tariffs	Recovered by access tariffs	N/A	N/A	N/A
Sweden	Other charge[127]	N/A	N/A	Other charge[128]	N/A
UK (Great Britain	Other charge[129]	N/A	N/A	Other charge[130]	Not recovered by any charge levied on grid users[131]
UK (Northern Ireland)	Other charge[132]	N/A	N/A	TRM-T	N/A
Total	17 other charge, 2 partially other charge	10 other charge, 2 partially other charge	4 other charge,	9 TRM-T, 9 other charge	1 TRM-T, 2 other charge, 1 partially TRM-T

Note: TRM-T means that the cost is fully recovered by a single transmission tariff or (in case multiple charges apply) by the primary transmission tariff.

[116] Costs of supporting schemes for renewables are covered by BRPs and implicitly passed on through the retail energy bill.
[117] Related costs are recovered by a RES charge, which is set annually by the NRA.
[118] Related costs are recovered by a cogeneration charge, which is set annually by the Minister of Energy.
[119] Stranded costs are recovered by a transition charge calculated by the NRA.
[120] Costs of supporting schemes for renewables, cogeneration and fossil fuel are recovered through “global use of the system tariff”.
[121] Interruptibility costs are recovered by transmission tariff in accordance with applicable legislation.
[122] Promoting electricity production from renewable energy sources (green certificates).
[123] Cogeneration costs are recovered through the fee for high-efficiency cogeneration.
[124] Cost for such support schemes are recovered by system operation tariff.
[125] Supplement charge (feed-in-tariff) set by Government and levied on each network users subject to transmission tariff.
[126] Idem.
[127] Electricity certificate charge is applied (not included in tariff).
[128] Separate power reserve charge is applied.
[129] The costs are born by energy consumers via their bills, though the renewables support programmes are the responsibility of the UK government, not the NRA.
[130] The costs are born by energy consumers via their bills, though the capacity support programmes are the responsibility of the UK government, not the NRA.
[131] Support scheme applies in case of decommissioned Nuclear plants.
[132] Support for renewable's falls under the Northern Ireland Renewables Obligation (NIRO) which is 'socialised' and paid for by all consumers, but not included in specific transmission tariffs.

9.7. Concluding remarks on recovered costs

(75) The categories (or items) of transmission-related costs recovered through charges levied on network users vary across the jurisdictions. In some jurisdictions, certain cost categories (or cost items), such as ancillary services, are not recovered by any tariff or charge, but borne by the providers of such services. In some jurisdictions, costs of adequacy measures are included in the transmission tariff and/or certain costs of energy policy support schemes are recovered by other tariff/charge levied on network users.

(76) The way in which these costs are recovered also varies across the jurisdictions. The costs can be recovered via a single transmission tariff alone or by several different transmission-related charges (e.g. one primary transmission tariff for network-related costs and another charge for system-related costs). ACER notes that this variety of tariff structures, including the different perimeters of the transmission tariff makes the comparison of transmission tariffs in Europe a difficult task, where distinguishing at least between network tariffs from charges for system services would be helpful.

10. Time-differentiated network tariffs

(77) Out of 29, 11 jurisdictions (about 40%) have time-differentiated network tariffs: Belgium, Croatia, Estonia, Finland, France, Norway, Portugal, Slovenia, Spain, Great Britain and Northern Ireland.

(78) The time signals are embedded mostly in the withdrawal charges, either in the energy component (8 instances) and/or the power component (5 instances). Further, in some jurisdictions time signals are (also) embedded in the injection charges: in the energy component (4 instances) and/or in the power components (two instances). This information is detailed in Table 15.

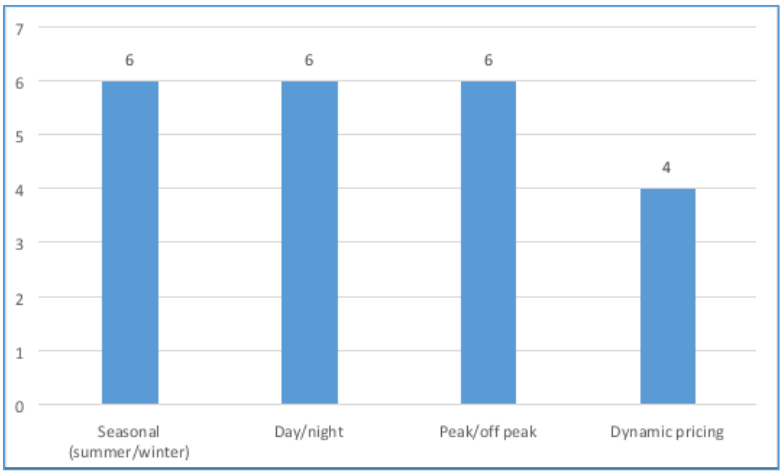
Table 15: Jurisdictions with tariffs including time signals

Jurisdiction	Time elements included in the tariffs				Applied to	Further description / Specifications / objective leading use of time-signals
	Seasonal	Day/night	Peak/off peak	Dynamic pricing		
Belgium	X	X	X		All consumers	A peak tariff period has been determined based on observations of synchronic peak load occurrences as being between 5 and 8 pm during the weekdays from November to March.
Croatia		X			Optional for consumers below 20 kW, mandatory for other consumers	Time element is optional for LV consumers with contacted power < 20 kW. Time element is mandatory for all other consumers.
Estonia			X		All consumers	Mandatory for all consumers and for all consumption.
Finland	X	X			All consumers	Time element only applies to withdrawal charges.
France	X	X	X		Optional for users in 400 kV, mandatory for users in 225 kV, 150 kV, 90 kV and 35 kV	There are 5 periods during the year. There are distinctions between "peak hours" and "off-peak hours" on one hand, and between summer and winter on the other hand. During the "peak hours" in winter, 252 hours distinguished from the other as the "peak period".
Norway				X	Mandatory for all generators and all consumers	Mandatory for all network users and all network use (injection and withdrawal).The marginal loss tarification aims at providing a more correct price signal in each node reflecting the changes in overall losses in the system by a marginal input/output.
Portugal	X	X	X	X	Mandatory for all producers, mandatory for all consumers	For the G-charge the time element is “Peak/Off-peak”. For consumers connected above normal LV (contracted power above 41.4 kVA) the transmission tariff includes, for the energy component, seasonal

					above 41.4 kVA contracted capacity, optional for other consumers	differentiation (by quarter) and a time-of-use structure with 4 periods. A time element is also present in the power component for these customers, charged to demand users as 'peak power'. For consumers connected to normal LV (contracted power up to 41.4 kVA) the transmission tariff does not include a time element on a mandatory basis (can range from a time-of-use structure with 3 periods in the energy component to the absence of time elements).
Slovenia		X			Optional for households and small business customers, mandatory for other consumers	Dynamic pricing is currently pilot project only for selected customers on DSO (only households and small business customers with connection power less than 43 kW).
Spain	X	X	X		Currently, mandatory for all consumers, except consumers connected in low voltage (less than 1 kV) with contracted power less than 15 kW	For consumers connected above 1 kV the transmission tariff (power and energy) includes seasonal differentiation (by quarter) and a time-of-use structure with 6 periods. For consumers connected to LV (less than 1 kV) with contracted power more than 15 kW, the transmission tariff (power and energy) includes seasonal differentiation (by quarter) and a time-of-use structure with 3 periods. For consumers connected to LV (less than 1 kV) with contracted power less than 15 kW, the transmission tariff does not include a time element on a mandatory basis (can range from a time-of-use structure in energy component with 3 periods to the absence of time elements).
UK (Great Britain)	X		X	X	All generators and some consumers	Seasonal, peak/off peak for NHH, seasonal dynamic for HH (demand and small distributed dynamic for Balancing. HH demand and embedded generation are only charged during the triad and NHH demand is only charged during 4-7 pm.
UK (Northern Ireland)	X		X		Mandatory for all network users	Mandatory for all network users and all network use (injection and withdrawal). This represents fixed time period seasonal charges as opposed to reactive time-of-use tariffs.
Total:	7	7	7	3	6 only consumers, 5 all users	

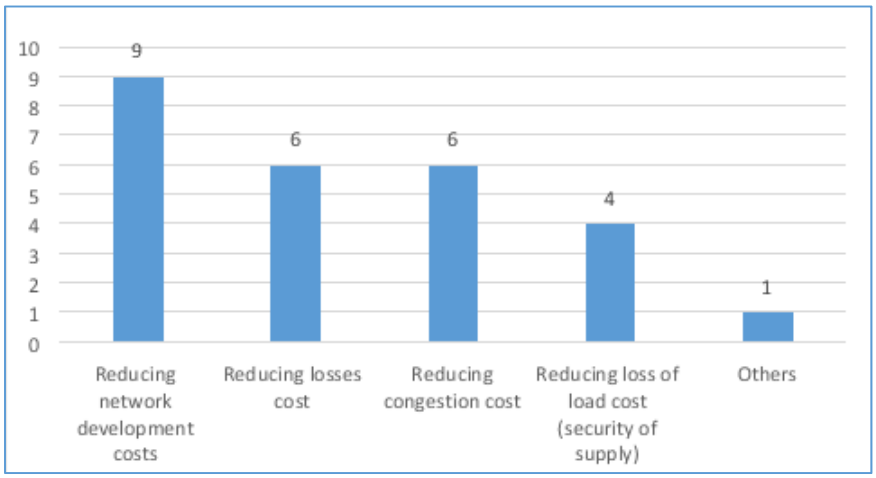
(79) The typology of time signals incorporated in the tariffs is shown in Figure 1. Several time signals types (seasonal/day and night/peak/dynamic pricing) often coexist (in a jurisdiction) to provide price signals to consumption. Furthermore, those time signals can result in significantly different variation of prices/tariffs.

Figure 1: Typology of time signals incorporated in tariffs



(80) The history of the implementation of time signals varies among jurisdictions. Time elements were for example included in the tariff in 1960 in Slovenia, in the 1990s in Belgium, Croatia, France, Great Britain, Norway and Spain, in 2002 in Portugal and in 2008 in Estonia[133]. The objectives leading to the integration of time signals is shown in Figure 2.

Figure 2: Objectives leading to the integration of time signals



(81) The inclusion of time elements in tariffs primarily aims at reflecting the costs of related network investments/infrastructure, losses and congestion costs, with regards to national specificities, providing therefore economic signals for more cost-efficient use of the network. Time elements are particularly used for jurisdictions with important demand peak at certain period, notably due to thermo-sensitivity. In Great Britain, time signals are combined with locational signals. Table 16 below summarises the cost-drivers for time signal in the different jurisdictions.

[133] Time elements for consumption (winter weekday/other times) have been included in the tariffs in 1997, but these tariff structures are not applied anymore.

Table 16: Cost-drivers for the integration of time signals per jurisdictions

Jurisdiction	Cost-drivers
Belgium	Annual peak load
Croatia	Time elements encourage rational use of electrical energy/power. The goal is to reduce peak load during day.
Estonia	Estonian TSO tariffs are not calculated on specific cost drivers related to the time element. The tariffs are calculated so that they motivate consumers consume electricity off peak time.
Finland	The aim of the time element is to reduce consumption during the 900 hours of winter weekday (December – February at 7.00 am – 9.00 pm).
France	Power and energy components reflect the incremental contribution to the development cost of a hourly withdrawal, averaged on each of the 5 time periods. Maximum withdrawals are concentrated during morning peak (9.00-11.00 am) and evening peak (6.00-8.00 pm) of December, January and February.
Norway	Network losses
Portugal	The inclusion of a time signal is fundamentally driven by the economic rationale that network investments depend mainly on the system peak. Those network costs are computed as average long-term incremental costs and are reflected through the peak power billing variable. The peak period is signalled through a time-of-use schedule with up to four periods.
Slovenia	Main cost drivers are potential congestion in network, and higher costs of losses due to high demand (higher technical losses in lines and transformers).
Spain	Currently, the cost drivers are not explicit. Under the Spanish NRA proposal, the cost driver is the participation of each consumer group in the peak demand.
UK (Great Britain)	Locational costs from Transport and Tariff model and AGIC (Avoided Grid Infrastructure Credit) calculation, combined with measures of Peak transmission system demand.
UK (Northern Ireland)	The demand peaks have a large impact on driving network costs and are directly reflected in the cost allocations output. This is based on the principle that if a scenario has a higher peak associated with it, and therefore stressing the network more and driving investment, it will have a higher cost allocation.

11. Locational signals

(82) Transmission tariffs in most jurisdictions do not include any locational signal. Out of 29 jurisdictions, 6 jurisdictions (about 20%) incorporate locational signals in their transmission tariffs: Austria, Ireland, Northern Ireland, Norway, Sweden and Great Britain.

(83) Information regarding the application of locational signals (included in the transmission tariffs) in the different jurisdictions is detailed below in Table 17.

Table 17: Information regarding locational signals in different jurisdictions

Jurisdiction	First year of application	Where it is incorporated	Charged to	Cost drivers	Objective leading to use of locational signals
Austria	Tariff year 2001	Withdrawal charges: power-related and energy-related components	All consumers	Historical development due to a change in the TSO structure	Reduction of the network development costs
Ireland	Tariff year (Oct. 2012 - Sept. 2013)	Injection charges: power-related component	All generators	Continuous changing network configuration and changing demand/generation patterns	Reduction of the network development costs and efficient usage of the network
Norway	1990	Injection charges: energy-related component; Withdrawal charges: energy-related component	All generators and all consumers	Losses	Reduction of losses costs
Sweden	Approx. in 2000	Injection charges: power-related and energy-related components; Withdrawal charges: power-related and energy-related components	All generators and all consumers	Achievement of a cost reflective tariff with appropriate incentives	Reduction of the network development costs, losses costs and congestion cost
UK (Great Britain)	1992	Injection charges: power-related component; Withdrawal charges: power-related and energy-related components	All generators and all consumers	Impact on energy flows, combined with annuitised costs of transmission	Reduction of the network development costs

UK (Northern Ireland)	Tariff year (Oct. 2012-Sept.2013)	Injection charges: power-related component	All generators	Continuous changing network configuration and changing demand/generation patterns	Reduction of the network development costs
Total:	2 in early 1990s', 2 in early 2000s', 2 in 2010s'	1 in withdrawal, 2 in injection, 3 in both; 1 energy, 2 power, 3 combined components	2 generators, 1 consumers, 3 both		

(84) Among the 6 jurisdictions that include locational signals in their transmission tariffs, 5 jurisdictions incorporate them in the injection charges applied to transmission-connected generators; whereas 4 jurisdictions include them in the withdrawal charges applied to transmission-connected network users which withdraw electricity. Only Austria applies locational signals only to consumers.

(85) In Norway, for energy-related components, for consumption and generation, the tariff is differentiated at nodal level, i.e. one different marginal loss factor per node, per hour.

(86) In Great Britain, charges vary between 27 generation zones and 14 demand zones (demand zones mirror the distribution zones). Non-half-hourly-settled (i.e. users without smart metering) load energy charges (only energy-based) vary by location. Half-hourly (i.e. metered users) load power charges (having both energy and power-based components) vary by location. Generation power charges vary by location. All consumers and generators pay locational signals, although some generators have charges cap. Customers within each generation or demand zone pay the same charges, but zonal charges vary by location.

12. Latest and possible ongoing updates of transmission tariff methodologies

(87) This section presents an overview of recent significant changes in transmission tariff methodologies and of possible ongoing updates. Based on the limited scope of recent and ongoing possible changes, it appears that tariff predictability and stability of the tariff framework are key objectives being pursued when setting transmission tariffs.

(88) Significant changes were qualified in the questionnaire to NRAs as, for instance, a change of recovered cost categories, change of power-based vs. energy-based driver, change of Generation-Load split, introduction of time or locational signals, application/exclusion of tariffs for some user groups.

(89) 7 NRAs reported at least a significant change which took place in the current regulatory period, as described in detail in Table 18 below.

Table 18: Significant changes introduced in the transmission tariff methodology compared to the previous regulatory period

Jurisdiction	Length of the regulatory period (years)	Significant change(s)
Belgium	4 (2020-2023)	The possibility to apply the tariff for the use of reactive energy to the injected energy and a dedicated tariff for offshore connection were inserted in the new tariff methodology.
Hungary	4 (2017-2020)	Coverage of costs for frequency containment reserves (FCR).
Italy	8 with mid-period update (sub-period 2016-2019)	The charging of DSO tariff payments to the TSO has been modified to a combined power-based and energy-based tariff (with the largest part - 90% - of transmission allowed costs coming from the power-based component) by Decision 654/2015. The reason was to align this tariff structure to the one adopted since 1 January 2014 (Decision 607/2013) for the EHV and HV transmission users, which aimed at a better cost reflectivity of the tariff structure and at a more stable tariff income for the TSO. The change of DSO-to-TSO tariff structure was previously postponed due to implementation details regarding some TSO-DSO connection points.
Lithuania	5 (2016-2020)	A long run average incremental cost (LRAIC) model has been introduced, based on the assumption that the costs of the electricity transmission operator are variable in the long run, and that operator use efficient network, efficient technology and network elements and operating effectively in a competitive environment.
Portugal	3 (2018-2020)	A new assessment of the incremental costs of the transmission network has led to a new split between the contracted power component and the peak power component. It was primarily due to the inclusion of updated information on network investments and demand increases. As a result, for consumers connected to the transmission grid the contracted power and the peak power components changed by -25% and +14%, respectively. Note: contracted power = maximum power (in kW) measured for all 15-minute intervals during the last 12 months peak power = average power (in kW) measured during peak hours in the last billing period (month).

Slovenia	3 (2019-2021)	Seasonal tariffs were discontinued. The reason behind: internal analysis found that customers have not responded enough to different tariffs for two seasons (winter and summer season) for several years (seasonal tariffs have been applied only to industrial and commercial customers). Provisions have been added for pilot projects in the area of dynamic tariffing that can be used to encourage or involving active clients in participating in ancillary services. The existing pilot critical peak tariff is extended to "daily negative peak hours" when production exceeds consumption and hours of "night negative peak hours" when consumption is minimal. For these periods, it is sensible to shift the consumption of certain types of loads of active customers (e.g. operation of heat pumps, smart charging of electric vehicles, etc.) to reduce the peak (refers only to DSO).
UK (Great Britain)	8 with mid-period review (2013-2021)	Changes to reflect separately peak demand transmission costs and year-round transmission cost in charges - to better reflect the underlying cost drivers of investment (Project Transmit). Changes to remove non-cost-reflective credits to certain generators - to better reflect the costs and benefits from the use of distributed generation resources and provide a level playing field for generation (Embedded Benefits reform).

(90) 7 NRAs indicated that they are currently considering (or consulting or deciding) at least one significant change, as described in detail in Table 19.

(91) In addition, several NRAs indicated that they are currently carrying out a review of the transmission tariff methodology and/or they will amend some details to align it with the provisions of network codes and of the Clean Energy for all Europeans package.

Table 19: Significant changes of the transmission tariff methodology, which are currently being considered or introduced

Jurisdiction	Significant change(s) under implementation / consultation / consideration
Estonia	For the next regulatory period, the TSO intends to apply power-based and energy-based tariffs instead of the current energy-based tariffs. Reason: most of TSO's costs do not depend on the volume of electricity. Therefore, the TSO is of the opinion that combined power-based and energy-based tariffs are more cost effective.
France	Different subjects are under consideration (c.f. first public consultation for the next regulatory period TURPE-6): change of G-L split, introduction of locational signals for generation.
Greece	Improvements in definition of periods for applying transmission use of system charges (increased number of peak hours per year, ex-ante definition as opposed to determination ex-post). The changes aim to increase predictability and stability of charges among user classes and to promote more effectively changes in users' consumption patterns for peak shaving.
Italy	In its consultation document 481/2019, the NRA indicated that the cost recovery of ITC payments will be included in the transmission tariff from 1 January 2020.
Portugal	Subsequent to a pilot project, realized from June 2018 to May 2019, aimed at improving the network tariffs applied at EHV, HV and MV, the next regulatory revision (to be held in early 2020) may include some changes to the network tariffs applied to transmission (and distribution). The reason behind these changes relates to an attempt to strengthen demand response from industrial consumers through the TOU schedule in place.
Spain	The methodology for transmission and distribution tariffs submitted to public consultation proposed by the CNMC contemplates a modification of tariff structure for consumers and the elimination of G-charge.

	Regarding the tariff structure for consumers, the allowed revenues are recovered mainly by a capacity charge, medium voltage tariff are simplified (currently there are three tariff and the proposal includes a single tariff) and six time periods are introduced for all consumers included household consumers. The rationale is to increase the price signal to consumers to facilitate the electrification of the economy by minimizing investment in networks. Regarding G-charge, its elimination is proposed because the current configuration (the law establishes a postal tariff) does not allow to give signs to the location, the reduction of losses and the reduction of congestion.
UK (Great Britain)	Changes to G-L split - to ensure EU generation charge cap compliance (ongoing). Changes to charging zones - to account for changes to the generation fleet and the locational cost differences they lead to (Ongoing). Reform of non-cost-reflective charges for end users - to ensure equitable, non-distortive cost recovery (Ofgem's Targeted Charging Review). Reform of access charges and forward-looking charges - to improve cost reflectivity of forward-looking charges and better define access to the network, among other things (Ofgem's Access and forward-looking charges review).

13. Main findings

Tariff setting responsibility:

(92) In the vast majority of jurisdictions (25 out of 29), the NRA has the legally granted power to directly set or approve the tariff methodology. In these jurisdictions, this appears to provide sufficient leverage (regulatory control) over electricity transmission tariff methodologies. In Spain, the responsibility is being shifted to the NRA as from 2020. However, in the remaining three jurisdictions, either the Ministry (Germany) or the TSO (Finland and Sweden) is responsible for setting the tariffs. In these jurisdictions, the tariff methodology is not subject to NRA approval, but the NRA sets the revenue cap and/or supervises the compliance between the tariff calculations and/or the applied methodology and the law. In situation of discordance, the Finnish and Swedish NRAs can take out an injunction.

Stability of tariff methodologies and predictability of tariffs:

(93) Based on the limited scope of recent and ongoing possible changes, it appears that tariff stability and predictability are key objectives being pursued when setting transmission tariffs. In the vast majority of the jurisdictions (22 out of 29), the transmission tariff methodologies are set for multiple years (typically 4-5 years), and the tariff values are updated on an annual basis or ex ante for multiple years. In the remaining seven jurisdictions, the tariff methodology is set only for one year or the regulatory period is not defined.

Transparency in tariff-setting:

(94) In the vast majority of jurisdictions (23 out of 29), a public consultation is carried out before the transmission tariff methodology is set and such consultation is just introduced additionally in Spain. In the remaining jurisdictions, at least a consultation with some of the key stakeholders is conducted. In addition, general information concerning fundamental tariff elements, such as the cost categories covered by transmission tariffs and the transmission charges (values) paid by different grid users, are publicly available in all but one jurisdiction. The cost categories covered by transmission tariffs are not publicly available in Austria.

Injection and withdrawal charges:

(95) About half of the jurisdictions (14 out of 29) apply transmission charges for injection, including Spain where injection charges are proposed to be phased out from 2020, while 15 jurisdictions do not apply them. In Austria and Belgium the producers pay around 5% of the transmission costs, in Denmark approx. 3%, in Finland 13.4%, in France 2%, in Ireland and Northern Ireland 25%, in Norway 22%, in Portugal approx. 8.2%, in Romania 7%, in Spain 7.6%, in the Slovak Republic approx. 2.6%, in Sweden 35%, and in Great Britain 16% of transmission network and 50% of balancing services costs.

User groups:

(96) Injection charges are applied in 14 jurisdictions to one or more of the transmission-connected network user groups. All these jurisdictions apply injection charges to producers (including both RES and non-RES), 9 jurisdictions apply injection charges to pumped hydroelectric energy storage facilities, 7 jurisdictions apply injection charges to other energy storage facilities (such as batteries).

(97) All jurisdictions apply transmission tariffs for withdrawal to one or more of the network user groups connected to the transmission network. All jurisdictions apply withdrawal charges to consumers, 13 apply withdrawal charges to pumped hydroelectric energy storage facilities, and 8 jurisdictions apply withdrawal charges to other energy storage facilities (such as batteries).

Exemptions from charges:

(98) Full or partial exemptions from injection or withdrawal charges apply in several jurisdictions to some network users with particular features (e.g. to lower-capacity producers/ energy storage facilities, lower-voltage level connected users or new facilities).

Tariff bases:

(99) In the vast majority of the jurisdictions which apply an injection charge (11 out of 14), that charge is based (at least partially) on the volume of energy injected into the grid: in 7 jurisdictions the charge has only an energy-based component, in 3 jurisdictions it has an additional power-based component, and in Norway it has an additional lump sum component. In Ireland, Northern Ireland and the Slovak Republic, the injection charge has a capacity based component only.

(100) In the vast majority of jurisdictions (23 out of 29), the transmission tariff on network users for energy withdrawal from the grid is based on two components (an energy-based and a power-based). There are 5 jurisdictions which apply an energy-based component only and only the Netherlands apply a combination of power based and lump sum component.

Recovered cost categories:

(101) The categories of costs recovered by transmission-related tariffs vary across the jurisdictions. In some jurisdictions, certain cost categories (or cost items), such as some ancillary services, are not recovered by any transmission-related charge levied on network users, but borne by the providers of such services, while in some jurisdictions costs not related to transmission or system services (e.g. costs of certain energy policy support schemes) are also bundled into them. The recovery of these costs also varies across the jurisdictions. The costs can be recovered only via a single transmission tariff or by several different transmission-related charges. ACER notes that this variety of tariff structures, including the different perimeters of the transmission tariff, makes the comparison of transmission tariffs in Europe a difficult task, where distinguishing at least between network tariffs from charges for system services would be helpful.

Losses:

(102) In the vast majority of the jurisdictions (21 out of 29), costs of losses are recovered (at least partially) by a single or the primary transmission tariff paid by either network users which withdraw electricity or a combination of network users which withdraw electricity and producers. In Great Britain and the Slovak Republic, the costs of losses are recovered by other (additional, complementary) charges. In Greece, Italy, Ireland, Northern Ireland, Portugal and Spain such costs are not covered by any tariff or charge, but for example the producers pay-in-kind for losses (through injection of additional energy), which may be passed through to the buyers of their products and/or services.

Time signals:

(103) About 40% (11 out of 29) jurisdictions have time signals embedded in their transmission-related tariffs. The time signals are embedded mostly in the withdrawal charges. Several time signals types (seasonal/day and night/peak/dynamic pricing) often coexist in jurisdictions where they are implemented, to foster adequate guidance of the consumption.

Locational signals:

(104) About 20% (6 out of 29) of the jurisdictions incorporate locational signals in their transmission tariffs. Among the 6 jurisdictions that include locational signals in transmission tariffs, 5 jurisdictions incorporate them in the injection charges; whereas 4 jurisdictions include them in the withdrawal charges..

Annex 1: Detailed data for each jurisdiction

Table 20: Reviewed tariff practices and regulatory period/ tariff year to which the inputs refer to

Jurisdiction	Included in the G-charge monitoring (Annex III)	Assessed tariff practice in this Report	Referred regulatory period (and tariff-year)
Austria / AT	Yes	Yes	2019
Belgium / BE	Yes	Yes	2019-2020
Bulgaria / BG	Yes	Yes	01.07.2019-30.06.2020
Croatia / HR	Yes	Yes	2019
Cyprus / CY	Yes	Yes	2017-2021 (2019)
Czech Republic / CZ	Yes	Yes	2016-2020 (2020)
Denmark / DK	Yes	Yes	(2019)
Estonia / EE	Yes	Yes	(2017)
Finland / FI	Yes	Yes	2020-2023 (2020)
France / FR	Yes	Yes	2017-2021
Germany / DE	Yes	Yes	2019-2023
Greece / GR	Yes	Yes	2018-2021 (2017)[134]
Hungary / HU	Yes	Yes	2017-2020 (2019)
Ireland / IE	Yes	Yes	2016-2020 (2019)
Italy / IT	Yes	Yes	2016-2023 period, 2016-2019 sub-(2019)
Latvia / LV	Yes	Yes	(2016)
Lithuania / LT	Yes	Yes	2016-2020 (2019)
Luxembourg / LU	Yes	Yes	(2019)
Malta / MT	N/A (there is no TSO)	N/A (There is no TSO)	N/A
The Netherlands / NL	Yes	Yes	2017-2021 (2019)
Norway / NO	Yes	Yes	(2018)
Poland / PL	Yes	Yes	2019
Portugal / PT	Yes	Yes	2018-2020 (2019)
Romania / RO	Yes	Yes	2014-2019
Slovak Republic / SK	Yes	Yes	2017-2021 (2019)
Slovenia / SI	Yes	Yes	2019-2021 (2019)
Spain / ES	Yes	Yes	2014-2019 (2019) 2020-2025
Sweden / SE	Yes	Yes	2016-2019
Switzerland / CH	Yes	No	
UK (Great Britain) / GB	Yes	Yes	2013-2021 (April 2019–March 2020)
UK (Northern Ireland) / NI	Yes	Yes	2015-2020 (Oct 2019-Sept 2020
Total:	30	29	

[134] The tariff methodology was set in 2017 and it is still valid for the ongoing regulatory period (2018-2021). In the context of TSO's annual required revenue, tariff values are updated annually based on the respective methodology in effect at the time of setting the tariff.

Table 21: Distribution-connected network users subject to injection charges for transmission-related costs

Jurisdiction	Producers	Pumped hydro-electric storage	Non-PHES storage (e.g. batteries)
Austria	X	X	N/A
Belgium	Not subject to transmission-related costs	Not subject to transmission-related costs	Not subject to transmission-related costs
Denmark	X	X	X
Finland	X	N/A	X
France	Not subject to transmission-related costs	Not subject to transmission-related costs	Not subject to transmission-related costs
Ireland	X	N/A	N/A
Norway	X	X	X
Portugal	X	X	N/A
Romania	X	X	N/A
Slovak Republic	Not subject to transmission-related costs	Not subject to transmission-related costs	N/A
Spain	X	X	N/A
Sweden	N/A	N/A	X
UK (Northern Ireland)	X	N/A	X
UK (Great Britain)	X	X	X
Total:	10	7	6

Note: N/A means there is no such network user group in that jurisdiction.

Table 22: Distribution-connected network users subject to withdrawal charges for transmission-related costs

Jurisdiction	Consumers	Pumped hydro- electric storage facilities	Non-PHES storage (e.g. batteries)
Austria	X	X	N/A
Belgium	X (indirectly via distribution charges)	X (indirectly via distribution charges)	X (indirectly via distribution charges)
Bulgaria	X	N/A	N/A
Croatia	X	X	N/A
Cyprus	X	N/A	N/A
Czech Republic	X	X	Not subject to transmission-related costs
Denmark	X	X	X
Estonia	X	N/A	N/A
Finland	X	N/A	X
France	X	N/A	X
Germany	X	X	X
Greece	X	X	N/A
Hungary	X	N/A	X
Ireland	X	N/A	N/A

Italy	X	Not subject to transmission-related costs	Not subject to transmission-related costs
Latvia	Not subject to transmission-related costs	Not subject to transmission-related costs	Not subject to transmission-related costs
Lithuania	X	N/A	N/A
Luxembourg	X	N/A	N/A
The Netherlands	X (indirectly via distribution charges)[135]	N/A	N/A
Norway	X	X	X
Poland	X (indirectly via distribution charges)	X (indirectly via distribution charges)	X (indirectly via distribution charges)
Portugal	X	Not subject to transmission-related costs	N/A
Romania	X	N/A	N/A
Slovak Republic	X	Not subject to transmission-related costs	N/A
Slovenia	X	N/A	Not subject to transmission-related costs
Spain	X	N/A	N/A
Sweden	X	N/A	N/A
UK (Northern Ireland)	X	N/A	N/A
UK (Great Britain)	X	X	X
Total:	28	10	8

Note: N/A means there is no such network user group in that jurisdictions

[135] Reflection of transmission related charges by the DSO for distribution connected network users: The transmission related charges are estimated based on realizations of these costs in previous years. These estimations are incorporated in the determined income of the DSO's in a given year. Subsequently, the determined income is translated to individual tariffs. Therefore every type of consumer contributes to the transmission related charges pro rata.

Table 23: Categories of distribution connected network users exempted from injection charges for transmission-related costs

Jurisdiction	Producers	Pumped hydroelectric storage	Non-PHES storage (e.g. batteries)
Austria	Producers under 5 MW are fully exempted.		
Denmark	Some RES producers (e.g. residential PV, some small scale biomass) are fully exempted[136].		
Ireland	Producers under 5 MW are fully exempted and above there is a tariff reduction[137].		
Portugal	Producers connected to the LV distribution grid, producers benefitting from feed-in-tariffs and producers subject to earlier power purchase agreements[138] are fully exempted.		
Romania	Producers, whose installed capacity is less than 5 MW are fully exempted.	PHES, whose installed capacity is less than 5 MW are fully exempted.	
UK (Great Britain)[139]	Producers below 100 MW are fully exempted.	PHES below 100 MW are fully exempted.	Non-PHES storage facilities below 100 MW are fully exempted.
Total:	5 full exemption for some producers	2 full exemption for some PHES	1 full exemption for some non-PHES storage

Note: the table does not include those instances, where the entire category is not subject to charges.

[136] Only approximatively 1-3% of all production comes from exempted producers.
[137] i.e. a 7 MW generator is charged for 2 MW, a 12 MW generator is charged for 7 MW etc.
[138] These PPAs have been converted in 2006 into different contractual agreements (called “costs for the maintenance of the contractual equilibrium”). Under these agreements the concerned power plants get compensated for the amount paid in terms of injection charges.
[139] In some cases, smaller distribution connected users are credited for system operation charges rather than charged, and in some zones also receive an Embedded Export Tariff for their effect on the transmission system, which is part of the TNUoS regime. Transmission charges are capped for smaller distribution connected users at £0 to prevent charging of the suppliers of these generators, as these generators do not always have formal agreements with the TSO. This means these users only ever receive credits. These arrangements are currently subject to ongoing reform through Ofgem's Targeted Charging Review and its Access and forward-looking charges review.

Table 24: Categories of network users connected to distribution grid exempted from withdrawal charge for transmission-related costs

Jurisdiction	Consumers	Pumped hydroelectric storage	Non-PHES storage (e.g. batteries)
Czech Republic		PHES which inject at least 80 % of generated energy to the grid are exempted from the power-based component of the withdrawal charge and BSPs.	
Germany	Discounts are applied for consumers whose individual peak load predictably differs in a considerable way from the annual peak load of the grid and users who consume for 7.000 h/a at one Connection point and whose annual consumption at this Connection point crosses 10 GW/h[140].	PHES whose pump capacity or turbine power increased by at least 7.5% or whose storage capacity increased by at least 5% after 04.08.2011 are fully exempted for the first 10 years.	Non-PHES storages built after 31.12. 2008 and put into operation within 15 years from 04.08.2011 are fully exempted for the first 20 years of operation[141].
Greece	Agricultural users are fully exempted[142]. Night time consumption of LV consumers (where separately measured) is partially exempted[143].		
Lithuania	Consumers whose electrical equipment has a permissible capacity less of 30 kW shall not pay for the generation/use of reactive power.		
Slovenia	All final customers involved in the procurement of the ancillary services (i.e. demand-side response) are partially exempted in the part of calculation of peak demand.		
Total:	3 full exemption, 4 partial exemption	1 full exemption 1 partial exemption	1 full exemption

Note: the table does not include those instances, where the entire category is not subject to charges.

[140] Article 19(2) of the Stromnetzentgeltverordnung
[141] Article 118(6) of the Energiewirtschaftsgesetz
[142] from transmission use of system charges
[143] from the energy part of transmission use of system charge

Annex 2: Brief overview of connection charges

Connection charges are typically one-off charges covering the costs (or part of the costs) of connecting new users to the transmission system. Since the reinforcement of the network due to new connections can also benefit the other grid users, part of those costs may be covered by transmission tariffs, instead of the connection charges, as there is a connection between these regulatory charges.

For the purpose of this Annex, the following connection charge categories applied[144]:

- Super-shallow: All costs are socialized 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.

As shown in Table 25, ACER notes that in half of the jurisdictions (i.e. 15 out of 28 jurisdictions) a shallow connection charge is applied. In 9 jurisdictions deep connection charge is applied (mainly in the Baltic and Nordic jurisdictions). In the remaining 4 jurisdictions, a combination of those charges takes place (e.g. Slovakia reported applying both, the super-shallow and shallow tariff schemes, Romania reported applying both shallow and deep and Slovenia reported applying a charge including a mix of shallow and deep features.

The most common reasons mentioned by the NRAs for the reasons behind the application of deep connection charges are sending a locational signal, and increasing cost-reflectiveness. On the other hand, jurisdictions applying shallow connection charges appear to value its simplicity, more certainty and visibility provided to the network users.

For all jurisdictions, the most important cost driver for the connection charge is related to the actual cost (of part of it) of the new connection. Furthermore, more than half of the jurisdictions reported that they taking into account other cost drivers, which do seem to be linked to the chosen connection charging methodology:

- For 12 jurisdictions, the connection charge depends on the user type. Most commonly, different charges are applied to producers and consumers. Differentiation also appears for some groups of generators (e.g. RES power plants allowed to obtain full or partial exemptions in GR, HU, IT and PT); and
- For 11 jurisdictions, the connection charge depends on the voltage level and for 6 on the grid users' capacity need.

[144] Cf. ENTSO-E in its 2019 Overview of Transmission Tariffs in Europe.

Table 25: Type of connection charges applied in Europe and the relevant cost drivers

Jurisdiction	Connection charge category applied	Cost components / cost drivers	Further description and subject to connection charges
Austria	Shallow	€ - the actual cost	All network users are subject to connection charges. No exemptions are made.
Belgium	Shallow	€ - the actual cost	All network users are subject to connection charges. No exemptions are made.
Bulgaria	Shallow	€ - the actual cost	All network users are subject to connection charges. No exemptions are made.
Croatia	Deep	€ - the actual cost user type €/MW - contracted power	Goal is to avoid "socialization" of connection charges. Producers pay real costs of connection and reinforcement of network. Consumers pay unit costs (HRK/kW) multiplied with contracted power
Cyprus	Shallow	€ - the actual cost	The user/producer is charged based on the necessary equipment and the number of circuits required for its connection. HV Consumers and Producers are charged the same (100% of the charges). The connection charges to the transmission system are paid by producers
Czech Republic	Shallow	€ - the actual cost, user type, €/MW - contracted power location	Based on historic specifics of electricity market in CZ with respect to fair allocation to all customers. All the connected network users are subject to connection charges, none of them is exempted from charges, but the value in €/MW can differ.
Denmark	Shallow	€ - the actual cost	The choice of shallow connection charges, reflecting customer-specific connection costs only, has been found by the NRA as the fairest model. This will ensure that one customer doesn't take costs subsequent customers also benefit from.
Estonia	Deep	€ - the actual cost	All network users are subject to connection charges. No exemptions are made.
Finland	Shallow	€ - the actual cost, voltage level	All network users are subject to connection charges. No exemptions are made.
France	Shallow	€ - the actual cost, user type, voltage level	HV consumers have a 30% reduction, HV producers pay the full costs. Connections above 350 kV and above 500 kV are treated differently
Germany	Shallow	€ - the actual cost	TSOs can (and do) apply connection charges for all users connected to their grid. There is no immediate legal obligation to do so. All network users are subject to connection charges. No exemptions are made.
Greece	Shallow	€ - the actual cost, user type, €/MW - contracted power, voltage level	All network users are subject to connection charges. No exemptions are made. Each user is charged with the amount (lump sum) for the connection of his installation to the network, as this is being stipulated by the relevant Network Operator in the context of the interconnection terms and is being fixed in the connection agreement. It is considered that transmission network reinforcement produces overall benefits for system users.

Jurisdiction	Connection charge category applied	Cost components / cost drivers	Further description and subject to connection charges
Hungary	Deep	€ - the actual cost, user type, voltage level	It considered by the NRA as a fair and transparent methodology. Charging is based on actual costs. Single customers and RES generators are subject to partial exemptions (allowances). Multiple generators and/or customers on the new connection are charged proportionally. No locational differentiation.
Ireland	Shallow	€ - the actual cost, voltage level	All network users are subject to connection charges. Demand customers pay 50%, while generators pay 100% of connection charges. The intent of these standard connection charges is to provide a reasonable degree of certainty for parties seeking to connect to the distribution and transmission systems in Ireland, particularly the large number of new renewable generators. Costs may vary based on voltage level, length
Italy	Shallow	€ - the actual cost, user type	EHV and HV producers are required to pay standard costs borne for connecting them, calculated by the TSO depending on the necessary minimal equipment (which is defined on a case-by-case basis after individual connection requests). EHV and HV RES and high-efficiency cogeneration benefit from caps / discounts. EHV and HV consumers are required to pay 50% of the costs borne for connecting them (which are defined on a case-by-case basis after individual connection requests)
Latvia	Deep	€ - the actual cost, user type	Consumers pay all necessary costs which is needed to build infrastructure and connect user to the grid. Other users shouldn't pay for other user connection. It is possible to build HV connection for free, if Cabinet of Ministers in accordance with Cabinet regulation gives permission.
Lithuania	Deep	€ - the actual cost, user type, voltage level	All costs of connection to the transmission network shall be paid by the consumer and the producer. However, there are some consumers, who shall pay just part (10 or 40%) of cost by the transmission system operator in connection with the connection of the customer's equipment to the distribution network.
Luxembourg	Shallow	€ - the actual cost	Connection charges for the transmission grid are provided upon request for connection and are examined on a case-by-case base. All network users are subject to connection charges. No exemptions are made
The Netherlands	Shallow	€ - the actual cost, voltage level	All network users are subject to connection charges. No exemptions are made. The connection charge ('aansluittarief') consists of two components: a one-time charge for the initial investment costs (covering the cut in the existing grid, the connection between the grid and the consumer and any installed security measures) and a periodic (monthly) charge for the maintenance of the connection. The connection charge depends on the installed capacity of the connection. For large

Jurisdiction	Connection charge category applied	Cost components / cost drivers	Further description and subject to connection charges
			connections (>10 MVA), the connection charge is based on pre-calculated project specific costs by the TSO.
Norway	Deep	€ - the actual cost, €/MW - contracted power, voltage level	All customers face connection charges if their connection lead to a network investment need. However, costumers under 1 MW will not face connection charges for investments necessary for the connection in networks above 22 kV. The network companies require that the customer (s) who trigger new network investments or reinforcement in existing networks cover up to 100 per cent of the necessary construction costs. How much the customer will cover depends on the customer's power needs, and whether there are, or will be, other customers connected to the network elements.
Poland	Shallow	€ - the actual cost, voltage level, user type	Final customers (load) pay 25% of total investment expenditures. RES units of installed capacity <=5 MW pay 50% of total investment expenditures. Co-generation units of installed capacity <=1 MW pay 50% of investment expenditures. Other generators and distribution companies pay 100% of total investment expenditures. RES units of installed capacity <=40 kW do not pay connection charges.
Portugal	Deep	€ - the actual cost	The connection charge methodology is established by Governmental decree. Connection charge includes grid reinforcement/extension [€ or €/kVA], connection services [€] and connection costs [€ or €/m] All network users are subject to connection charges. No exemptions are made.
Romania	Shallow and Deep	€ - the actual cost, user type, voltage level, €/MW - contracted power	The consumers do not pay for network reinforcement. Through deep connection charge it is given the locational signal for the producers, so they straighten to deficient areas where reinforcement works are not necessary. Reinforcement component of the connection charge depends on the cost of necessary works.
Slovak Republic	Super-shallow Shallow	€ - the actual cost, user type	Distribution companies pay 40% of actual costs for the infrastructure connecting its installation to the transmission grid and 60% of actual costs for the infrastructure connecting its installation to the transmission grid are socialized via the tariff of TSO (40% shallow and 60% super shallow). Direct customers and generators connected on the TSO pay 100% of actual costs for the infrastructure connecting its installation to the transmission grid (100% shallow).
Slovenia	Mix of shallow and deep	€ - the actual cost, user type, €/MW -	All network users are subject to connection charges. No exemptions are made. Connection charge methodology consists of all other reinforcements/extensions in the existing network required in the transmission grid to enable

Jurisdiction	Connection charge category applied	Cost components / cost drivers	Further description and subject to connection charges
		contracted power	the grid user to be connected. Costs for infrastructure connection depend on the individual case and its implementation/ construction, which are covered by customers.
Spain	Deep	€ - the actual cost	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	Deep	€ - the actual cost	All network users are subject to connection charges. No exemptions are made. Normally the connection charge is for a new station or a new bay in an existing station. It is very unusual that power lines are built that are included in the connection charges.
UK (Northern Ireland)	Shallow	€ - the actual cost	All transmission connected users are liable for connection charges. Distribution connected users that are expected to incur transmission costs are accounted for using the statement of works process. Users pay for the assets that bring them to the transmission network. Assets that are potentially shareable are seen as local, not connections, so connections are limited to small sections of sole-use assets.
UK (Great Britain)	Shallow	€ - the actual cost, voltage level	All network users are subject to connection charges. No exemptions are made. Connectees pay for the voltage they connect at and associated works for one voltage level above.

Annex 3: Results of the G-charge monitoring

Background:

Recital (10) of Commission Regulation (EU) No 838/2010 stipulates that the variations of transmission charges faced by producers across the EU should not undermine the internal market and should be kept within a range which helps to ensure that the benefits of harmonisation are realised.

Annex B of Commission Regulation (EU) No 838/2010 sets the legal ranges of the annual average transmission charges paid by producers, excluding charges paid for physical assets required for connection to the system or the upgrade of the connection, charges paid related to ancillary services and specific system loss charges, in each Member States. In addition, Decision of the EEA joint Committee No 7/2011 sets a legal range of the annual average transmission charges paid by producers also in Norway.

The Regulation also requires ACER to monitor the appropriateness of the ranges of allowable transmission charges paid by electricity producers (i.e. G-charges) in each Member State. ACER, in its Opinion No 09/2014 considered that the monitoring activity should be based on NRAs' reports regarding the level and the structure of G-charges and the average G-charge value in each year as well as on NRAs' notifications on any proposal or decision taken to amend the national G-charging methodology, submitting relevant information such as a detailed reasoning and evidence of cost reflectivity.

The results of the monitoring of the G-charges applied in 2011 and 2012 is provided in the Annex to the ACER Opinion No 09/2014. The results of the monitoring carried out for years 2013-2018 is provided in this Annex.

Application and the G-charge bases

In 2018, 12 jurisdictions applied transmission G-charge, including Denmark, Finland, France, Great Britain, Ireland, Northern Ireland, Norway, Portugal, Romania, Slovak Republic, Spain and Sweden. Out of the 12 jurisdictions, 11 already applied a G-charge in 2011 and the Slovak Republic introduced a G-charge from 01.01.2014. It has been reported that Latvia considers the introduction of a G-charge, starting from 2021.

G-charge may be applied based on various tariff bases (e.g. energy produced/injected into the grid, capacity connected to the grid, peak output, lump-sum payment or any combination of them). In 2018, as shown in Table 26 below, out of 12 jurisdictions, 5 apply an only energy based G-charge (DK, FR, PT, RO and ES), 4 apply an only capacity based G-charge (GB, IE, NI, SK) and only Norway apply a lump sum G-charge. The remaining 2 jurisdictions apply a combination of the different tariff bases (i.e. Finland applies both an energy-based and capacity-based G-charge, while in Sweden the TSO can apply different methodologies (incl. tariff basis) as long as it mirrors the producers' costs. Latvia, where currently no G-charge is applied, plans to apply a capacity / power based G-charge from 2021.

Table 26: G-charge bases

Jurisdiction	Energy-based charge	Capacity / power-based charge	Lump-sum	Description of the tariff basis
Denmark	X			Uniform charge energy-based tariff (per kWh). No variation.
Finland	X	X		G-charges consist of fixed capacity fee per MW for power plants (without variation) and energy-based charge for the use of grid / input into the grid.
France	X			G-charges is based on the injected energy into the grid and calculated to cover the costs of losses induced by exports and the costs of losses-related payments within the ITC mechanism.
Ireland		X		The Generators Transmission Use of System (G-TUoS) tariffs are calculated individually for each generator based on the location of its connection to the system. This G-TUoS charge is capacity based (i.e. based on MEC of generator). The G-TUoS tariff has a locational element; which is calculated considering the usage of current generation on future network using a “reverse MW mile” methodology. There is also a Postage Stamp element which applies evenly to all generators based on their MEC[145].G-TUoS is set to collect 25% of the approved revenue for network costs.
Norway			X	The G-charge covers a small portion of the TSOs capital and operational expenditures, new transmission investments, renewable energy sources transmission investments etc. However, the G-charge is not linked to individual investment costs or operating costs. The G-charge is a lump-sum payment that is fairly stable over time and covers a portion of the TSOs allowed revenue. The tariffs are based on a 10-year historical average of production and have been designed in order to be neutral with respect to short-run production decisions and long-run capacity investment decisions. For hydro-power, the charges paid by producers can, to a large extent, be considered as fixed, depending on the amount of precipitation and inflows to the reservoirs on average during the previous years. The generators cannot influence the annual cost by altering the operational decisions as the yearly amount is given at the start of the year.
Portugal	X			The prices are set in order to target an average price harmonized with Spain, equal to of 0.5 €/MWh. The ratio between the peak price and off-peak price follows the price ratio observed in the

[145] Maximum Export Capacity.

Jurisdiction	Energy-based charge	Capacity / power-based charge	Lump-sum	Description of the tariff basis
				spot market of the Iberian wholesale market over the two periods (peak / off-peak). Together with the forecast for energy injected into the grid one obtains the G-charges for each period.
Romania	X			Generators pay through the G-charge, up to one third of the cost of grid losses as well as the cost of congestion. Unique G-charge is applied for all generators.
Slovak Republic		X		The coefficient of inclusion of power generators´ reserved capacity (so called G-charge) shall be - according to the Decree of the Office - set in such a way so that the planned payments which power generators connected to the transmission grid make to the TSO for transmission network access in year t do not exceed the revenue set as multiplication of 0.5 EUR/MWh and the planned volume of power supplied to the transmission grid in year t by power generators connected to the transmission grid.
Spain	X			Currently, the G-charge is 0.5 €/MWh.
Sweden	X	X[146]	X	The system operators set the tariffs according to Swedish law. The tariffs should however mirror the producers' cost in relation to the system operator's income frame. Generators up to 1500 kW are relieved from charges other than cost of measuring. All levels of transmission are included, both TSOs and DSOs.
UK (Great Britain)		X		G-charge in GB comprises a locational charge and a residual charge. The locational charge is designed to reflect the difference in costs of providing transmission capacity to different locations. The residual charge recovers transmission costs that are not recovered via the locational charge.
UK (Northern Ireland)		X		The GTUoS capacity charge is calculated individually for each generator based on the location of its connection to the system. The GTUoS charge is capacity based (i.e. based on MEC of generator), there is no energy (MWh) component for GTUoS.

Variation of G-charges:

Jurisdictions may apply variation in their G-charges, among other reasons, to provide appropriate economic signals for efficient dispatch of energy generators. In 5 out of 11 jurisdictions (GB, IE, NI, PT, SE), the G-charges can vary based on location, time, voltage level and generator type. One or several of those variation can apply. Table 27 below shows the choices of the different jurisdictions.

[146] Output under peak conditions (i.e. power injection) (€/MW)

Table 27: Variation of G-charge

Jurisdiction	No variation of G-charge	Location	Time (e.g. peak / off-peak)	Voltage level	Generator type
Denmark	X				
Finland	X				
France	X				
Ireland		X			
Norway	X				
Portugal			X		
Romania	X				
Slovak Republic	X				
Spain	X				
Sweden			X	X	
UK (Great Britain)		X		X	X
UK (Northern Ireland)		X			

Regarding the basis of the G-charge (and its variation), the following changes were reported by the NRAs since 2012:

- In France: variation of G-charges based on voltage level was removed from 2017.
- In Portugal: variation of G-charges based on voltage level was removed from 2017.
- In Romania: variation of G-charges based on generators' location was removed from 2017.
- In Sweden: variation of G-charges based on location was removed in 2014.
- In Great Britain: a variation of G-charge based on the generator's type was added in 2014. In addition, there is an ongoing proposed modification to the Connection and Use of System Code examining which costs should be excluded from the G-charge as they are considered "connection charges".

Calculation of G-charge and annual average values

The annual average G-charge paid by is calculated by dividing the annual total transmission tariff charges paid by producers (shown in Table 28) by the annual total energy injected by producers into the transmission system (shown in Table 29). ACER notes that in most jurisdictions (including DK, ES, FI, IE, PT, RO, SE) the calculation of annual total transmission tariff charges paid by producers includes both the relevant payments by producers connected at transmission level as well as those connected at the distribution level.

Table 28: Value for annual total transmission G-Charges paid by the producers [M€]

Jurisdiction	Value for annual total transmission G-Charges paid by the producers [M€]					
	2013	2014	2015	2016	2017	2018
Denmark	12.18	11.71	14.21	10.04	10.9	11.1
Finland	30.08	29.7	33.91	44.28	53.53	56.33
France	91.4	89.8	90.6	95	88.5	92.8
Ireland	52.1	60.18	60.0	60.81	58.47	61.94

Norway	57.14	71.05	Not provided	69.37	Not provided	Not provided
Portugal	23.8	24.62	23.97	27.8	25.24	28.06
Romania	117.87	131.89	70.73	20.92	11.43	13.6
Slovak Republic	-	7.84	7.96	7.83	7.77	7.91
Spain	137.49	128.99	131.45	132.5	131.2	130.5
Sweden	86.02	85.76	90.49	75	90.58	Not provided
UK (Great Britain)	609.6	609.7	Not provided	Not provided	260.22	270.96
UK (Northern Ireland)	12.54	12.81	11.14	10.38	12.73	17.62

Table 29: Total measured energy injected annually by the producers to the transmission system [TWh]

Jurisdiction	**Total measured energy injected annually by the producers to the transmission system [TWh]**					
	2013	**2014**	**2015**	**2016**	**2017**	**2018**
Denmark	30.29	29.04	35.34	28.86	27.62	27.04
Finland	42.97	36.4	37.67	63.23	58.04	60.27
France	481.07	473	476.7	490	456.5	463.8
Ireland	25.62	25.78	Not provided	28.3	29.53	29.3
Norway	57.17	60.68	Not provided	63.04	Not provided	Not provided
Portugal	47.3	49.51	48.08	55.82	54.43	56.2
Romania	52.4	57.29	57.79	56.97	56.15	56.94
Slovak Republic	-	15.68	15.92	15.74	16.14	15.94
Spain	270.53	257.98	262.91	265.01	262.4	261
Sweden	105.3	116.6	117.8	118.05	122.34	124.4
UK (Great Britain)	307.0	298.4	Not provided	Not provided	247.23	234.29
UK (Northern Ireland)	7.46	7.45	8.19	8.03	8.73	8.17

From the data ACER gathered on the annual average G-charges were calculated, ACER notes that all G-charges, except one instance, are respecting their legal limit, set in the Annex Part B(3) of Commission Regulation 838/2010, as can be seen in the Table 30 in 2013, in Romania the annual average transmission charges paid by producers seemingly exceeded the legal limit. The Romanian NRA explained this higher value by high electricity price for grid losses.

Table 30: Annual average transmission G-charges paid by producers [€/MWh]

Jurisdiction	**Annual average transmission G-charges paid by producers [€/MWh]**						**Legal limit[147] [€/MWh]**
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	
Denmark	0.4	0.4	0.4	0.38	0.4	0.4	1.2
Finland	0.7	0.85	0.9	0.7	0.92	0.93	1.2
France	0.19	0.19	0.19	0.19	0.19	0.2	0.5
Ireland	2.03	2.33	0	2.15	1.98	2.11	2.5
Norway	1.00	1.17	1.04	1.1	Not provided	Not provided	1.2
Portugal	0.5	0.5	0.5	0.5	0.46	0.5	0.5

[147] Upper value of the range set by point 3 of Annex Part B of Commission Regulation 838/2010 and by the Decision of the EEA joint Committee No 7/2011.

Romania	2.25	1.97	1.22	0.37	0.2	0.24	2
Slovak Republic	Not applied	0.5	0.5	0.4974	0.48	0.5	0.5
Spain	0.5	0.65	0.77	0.5	0.5	0.5	0.5
Sweden	0.83	2.04	0	0.63	0.74	0	1.2
UK (Great Britain)	1.98	1.72	1.36	Not provided	1.05	1.16	2.5
UK (Northern Ireland)	1.68	0.4	0.4	1.29	1.46	2.16	2.5

Share of revenues generated from G-charges:

The share of revenues generated from G-charge varies widely across Europe, from 1.8% in Spain to 37% in Sweden, those shares from 2013 to 2018 are shown in Table 31 below.

Table 31: Share of the revenue generated by G-Charge from total transmission revenues (%)

Jurisdiction	**Share of the revenue generated by G-Charge from total transmission revenues (%)**					
	2013	**2014**	**2015**	**2016**	**2017**	**2018**
Denmark	3.76	3.86	4.69	3	3	3
Finland	10	9.6	11	14	13.2	13.4
France	2.17	2.3	2.3	2	2.1	2.1
Ireland	17	18	Not provided	18.6	16	14
Norway	11.59	13	13	12	Not provided	Not provided
Portugal	6	6.5	9.2	9.42	7.13	8.23
Romania	46.21	44.08	27	8.99	5.49	6.52
Slovak Republic	Not applied	5.73	5.77	5.73	2.49	2.55
Spain	8.6	7.7	7.68	7.51	7.72	7.59
Sweden	33	35	36	36	24	Not provided
UK (Great Britain)	27	27	Not provided	Not provided	9.8	9.5
UK (Northern Ireland)	25	25	25	22.23	33.7	37.11

Also with regard to the fact that Regulation (EU) No 838/2010 harmonises only transmission G-charges (i.e. through the definition of mandatory ranges), the Agency noted that this can potentially create a discrepancy that may affect investment decisions. For instance, it could result in a situation where a transmission G-charge may create more favourable conditions than a cost reflective distribution G-charge, and thus a network user subject to such G-charge rather connects at transmission level than distribution, regardless of the associated potential network efficiencies/ inefficiencies. In this regard, ACER recalls its view, as provided in ACER Opinion No 09/2014, that the effect of distribution G-charge shall also be considered to ensure the overall efficiency of the system or the energy investments and that pursuant to Article 18(1) of Regulation (EU) 2019/943, Member States should ensure that their tariff design does not create discrimination between production connected at the distribution level and at the transmission level.

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