Project Deliverable Report

Smart Building – Smart Grid – Smart City

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Regulatory state-of-the-art analysis and potential barriers identification

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Executive summary

The base of preparing this document was given by 82 questions on 10 topics prepared by the University of Zagreb Faculty of Electrical Engineering and Computing. The questions were answered by the following organizations for the concerned countries:

- Croatia and Bulgaria: Hrvatska elektroprivreda d.d. and University of Zagreb Faculty of Electrical Engineering and Computing
- Serbia and Romania: University of Belgrade Faculty of Mechanical Engineering
- Hungary and Germany: E.ON Tiszántúli Áramhálózati Zrt.
- Slovenia and Czech Republic: E3, ENERGETIKA, EKOLOGIJA, EKONOMIJA, d.o.o.
- Austria and Slovakia: European Centre for Renewable Energy Güssing Ltd. and Energy Güssing Ltd.
- Bosnia and Herzegovina and Montenegro: JP Elektroprivreda Hrvatske Zajednice Herceg Bosne

Questions and the answers concerning the given countries are in Appendix A.

Based on the answers given to the questions, E.ON Tiszántúli Áramhálózati Zrt., as the responsible organization for preparation of this document, incorporated recommendations of the project management and prepared the analysis in chapter 2 and the Conclusion in chapter 3.

The most important conclusions based on the answers are the following (see more details in chapter 4. Conclusion):

1. Smart meter roll-out is quite diverse in the Danube region: in certain countries it is carried out, in others it is not yet decided. There are no legislative barriers for the roll-out.
2. Technical specifications for smart meters do not cover the possibility of communication with the building energy management system, which might be a technical barrier to our findings.
3. Cooperation and information exchange between TSOs and DSOs in the context of flexibility-based services is still limited and further steps are necessary.

1. Introduction

The goal of Work Package 3 of the project Smart Building – Smart Grid – Smart City (3Smart) is to provide regulatory and technology frameworks for a successful integration and an active role of flexible distributed energy sources and prosumers in low-carbon energy systems. The focus of 3Smart is on demand response. Therefore, the aim is to provide a wider and more a comprehensive proposal for the development of national legislation, meaning that all active participants at the distribution level (generation, storage, demand response, etc.) should be involved. A questionnaire was circulated in the Danube region countries to get overviews of the national regulatory frameworks and to identify regulatory barriers.

Furthermore, this document addresses the state-of-the-art technologies in energy management systems for buildings (Project Activity 3.1). The 3Smart consortium analyzed the existing technologies in order to derive conclusions on how to attach the developed building-side EMS to the existing technologies. In this process technical and economic characteristics of the existing equipment have been taken into account, as well as maintaining comfort in buildings. Understanding the current issues and status of buildings as potentially flexible distributed prosumers (producers/consumers) is the starting point for future development of smart systems in buildings or smart cities.

The following diagram presents the structure of the state of the art assessment in WP3, as well as the different topics put in focus.

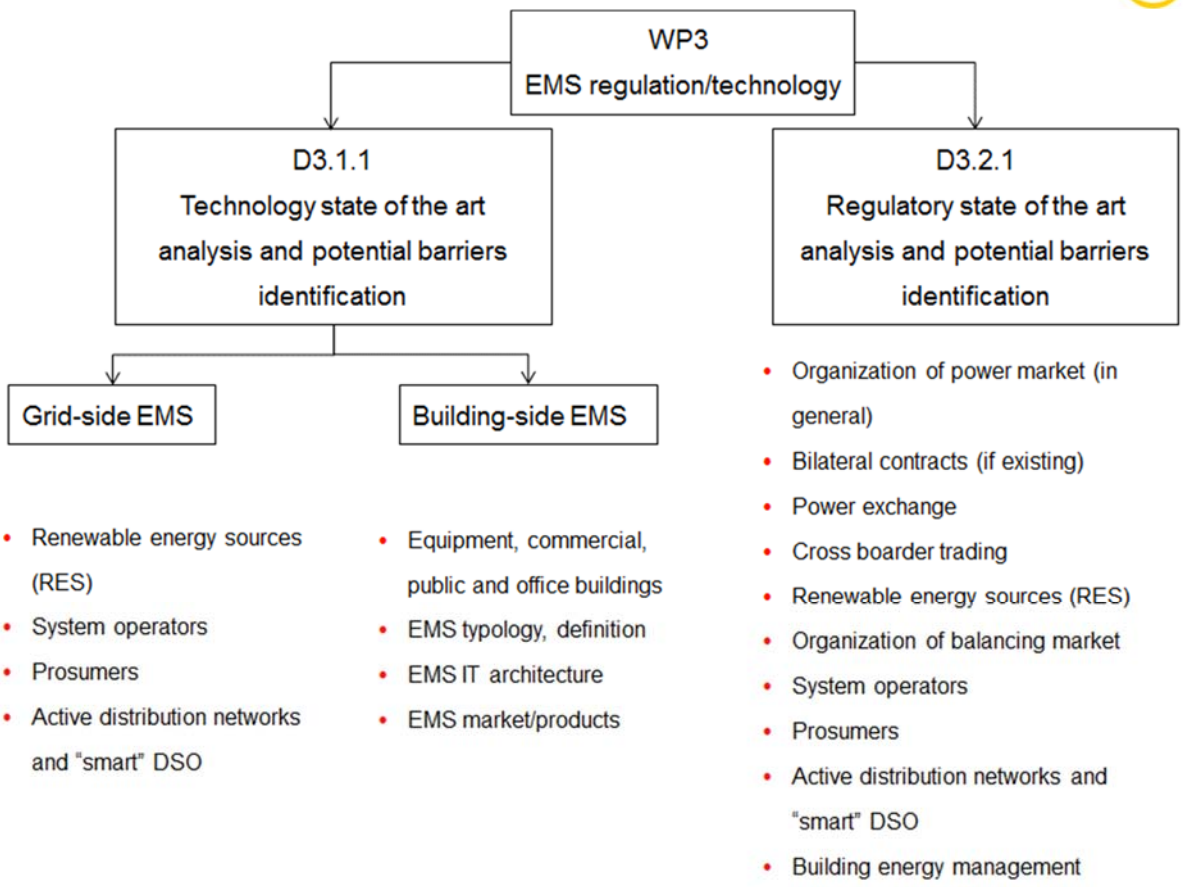

Figure 1 WP3 state-of-the-art assessment part

2. State-of-the-art analysis

The state-of-the-art analysis was carried out based on a questionnaire on the energy market regulatory framework of the Danube region countries. The countries involved in the analysis are: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Montenegro, Romania, Serbia, Slovakia, and Slovenia.

Answers to the questionnaire were obtained either through interviewing relevant stakeholders (e.g., regulators, distribution system operators, etc.) or by checking the relevant legislation and available documents.

After completion of the analysis, the Final Draft Version was sent to the identified stakeholders in the Danube region. The project has received feedbacks and additional contributions and comments from the stakeholders.

This chapter gives a summary topic by topic and findings of the questionnaire by highlighting regulatory barriers to prosumers offering flexibility services on the distribution level. The answers to each question for different countries can be found in Appendix A.

2.1 Organization of power market (in general)

Summary of the answers to the Questionnaire

In the analysed Danube region countries, organizer of the power market is 'de iure' an autonomous and non-profit public institution. Its roles and responsibilities vary according to the geographical location and political-social system, but in general they include licensing, supervision of licensees, price regulation, tariff and fee preparatory tasks – mainly in the fields of electricity, natural gas, and district heating.

In most of the Danube region countries' regulatory authorities (i.e. Regulators) were established during period of 2000-2010 and with certain exemptions are more or less centralized (one national regulatory authority). EU Energy legislation (applicable to EU member states and Energy Community Contracting parties) defines a general setup for national energy legislation. Certain "policies" and secondary legislation may be different in different regions within a country. As an example, in Germany, energy policy is developed and implemented at federal and regional levels, and in Bosnia and Herzegovina there are three regulators responsible for the power market.

Generally, electricity can be traded in two types of wholesale markets: bilateral over-the-counter (bilateral OTC) and in an organized power exchange. Bilateral contracts are still dominant, whereas open market contracts are mainly day-ahead based in most of the countries. Intraday trading is notably lagging behind, but the growth of intermittent generation capacity has increased the importance of efficient intraday markets. Balancing markets exist in each country, primarily managed by national TSOs.

In the majority of the Central and South Eastern European countries, end-price regulation for residential customers and smaller industrial customers still exists to some extent, however it should be noted that this is mostly limited to setting price-caps (with possible exemptions in relation to issues of vulnerable customers, universal service, etc). Network charges are, as a rule, regulated in line with EU energy legislation which is not surprising since energy networks are a natural monopoly.

In all the countries, energy market entities are distinguished by their role in the energy value chain: generation, system operation (TSO/DSO), supply (wholesale/retail including Universal Service Providers, i.e. USPs) and end-customers. Market participants are usually those

comprising the energy supply and demand – generators on one hand and supplier on the other hand (end-customers are seldom directly involved in wholesale markets).

In the Danube region countries energy market participants are required to be licensed or should be registered by their national regulatory bodies. It should also be mentioned that power-exchanges generally do not have “licences” and are not regulated but in some cases for example in Hungary power-exchange requires licence from the regulatory authority. Nominated Electricity Market Operators and other entities, defined by EU legislation, are partially under regulatory scrutiny due to regulation set by the EU legislation, but essentially are not “regulated” energy entities.

Identified barriers

All Danube region countries have autonomous energy regulators with more or less the same tasks. However, there are huge differences in levels of energy market liberalization, market competitiveness and independency of the Regulators. One of the main obstacles for residential consumers to become prosumers are fixed, low residential energy prices.

2.2 Bilateral contracts (if existing)

Summary of the answers to the Questionnaire

Bilateral trading is the simplest way of energy trading, besides licenses and trading agreements, no other preconditions are needed. Market participants can conclude trades with those counterparties who offer the required products on a required price with respect to the related risk measures. This form of trading supports the new market participants in their trading activity as there are no additional costs or formal preconditions before starting their activity.

Well-functioning bilateral trading exists in all queried countries. In the western part of the Danube region the ratio of bilateral trading is approx. half of total electricity sales, while in the eastern and southern countries bilateral trading is the main form of energy trading.

Based on the answers to the questionnaire, there are no special requirements for bilateral contracts in any of the Danube region countries; a market participant who has a license can conclude a bilateral contract. Participants of the 3Smart project have listed the following participants of bilateral energy markets:

- suppliers;
- traders;
- producers;
- consumers.

Identified barriers

Based on the answers for bilateral trading, there are no identified barriers for dynamic pricing related to bilateral contracts and trading. Market participants in all countries can enter to this market without any special requirement.

2.3 Power exchange

Summary of answers to the Questionnaire

Power Exchanges are usually organized in more developed energy markets. Becoming a member of a power exchange requires fulfilling several administrative tasks and complying with the financial requirements, so trading on an exchange requires higher (administrative and financial) efforts from the market participants. Hence, exchange trading is set up only in countries where the energy market is more liberalized and competitive, with several counterparties who can provide enough liquidity for the exchange.

According to the answers to the questionnaire, power exchange has not yet been established in Bosnia and Herzegovina and Montenegro. Except for Bulgaria, Croatia and Serbia, where exchanges have started their operation in 2016, other power exchanges have been operating for some years at least with a day-ahead market. Exclusive blocks in Hungary, Serbia and in Germany and hourly blocks in all relevant markets are available for trading.

Answers to liquidity of the specific markets are not comparable as they do not refer to the same period (yearly, monthly, daily).

In countries where a power exchange exists, there are no identified barriers to trade on the market; any market participant, who has trading license and/or membership agreement with the power exchange, is allowed to conclude deals on the exchange.

Regarding the future plans of the existing power exchanges, four main stages can be identified:

- setting up a new (mainly intraday) market;
- increasing liquidity on the exchange;
- market coupling with other regions/countries;
- introducing new products in the market.

The above mentioned development plans indicate that energy markets are changing continuously to a common direction, in order to serve the market participants more efficiently with higher liquidity and lower energy prices.

Identified barriers

Dynamic pricing for end customers reflecting wholesale prices of power exchange is not yet offered as a service by the suppliers/retailers. Furthermore, since power exchange has not been established in Bosnia and Herzegovina and Montenegro yet, there are additional steps required to make this available as an option in the future. In all other countries power exchanges exist and operate with the expected preconditions and features.

2.4 Cross-border trading

Summary of answers to the Questionnaire

Interconnections are essential in order to handle the electricity demand of a country (or a balancing area) effectively and securely. Market participants are able to reach different market sources and widen the available capacities via cross-border trading. Hence, it is the interest of all countries (balancing area) to set up enough interconnections towards other markets.

According to the answers to the related questions, there are several institutions participating in capacity allocations of the interconnections. Mainly transmission system operators and Joint Allocation Office are the organizers of the cross-border trading. The organizers may differ at the different borders of a country (balancing area) or for the different auction period (yearly/monthly/daily/intraday). The available capacities are also different at all borders and the method of the capacity allocation (explicit/implicit; short/long) varies in case of each interconnection (see details relating to each country in the detailed answers).

In case of more developed cross-border trading (namely Austria, Czech Republic, Germany, Slovakia, Slovenia and Hungary) the organizers of the cross-border allocations are the members of a Price Coupling or Multi-Regional Coupling area. Croatian power exchange (CROPEX) is using Price coupling of the regions (PCR) algorithm, and full member with no capacity in Market regional coupling (MRC) project. In other countries plans are not available yet.

Based on the answers provided by the participants, it is the task of the transmission system operators to procure/supply the losses on the cross-border lines.

Regarding the plans for the further development, the following target models can be identified:

- move forward to the European market coupling;
- use a flow-based capacity allocation mechanism;
- establish an organized daily and intraday electricity market.

Identified barriers

There are different participants in cross-border trading. The participants may differ by one country to another, but the common interest of the participants to move forward to market coupling in every country can be assessed. As there were no hints among the answers to the lack of the interconnections or inefficiency of the organizer, we can conclude that within the cross-border trading topic there is no identified barrier for dynamic pricing.

2.5 Renewable energy sources (RES)

Summary of answers to the Questionnaire

Within the Danube region, Feed-in Tariff (FiT) schemes are the most widespread form of renewable energy subsidy. Renewable FiT systems subsidize RES depending on renewable plant type and size. The amount of subsidized renewable energy is maximized for the whole length of subsidized period. Currently almost all RES technologies are subsidized (e.g.: Wind energy, Solar energy, Geothermal energy, Biogas, Hydropower (in case of small hydro-power plants), Biomass) in different Danube region countries.

As feed-in support systems dominate the Danube region, auctions have been only introduced at the beginning of 2017 in a few EU countries of the Danube region (Germany, Hungary, Slovenia, and still needs to be implemented in Croatia). Tenders are either organized for predefined renewable energy types or bigger installations. Subsidy is awarded at the auction depending on the financial performance of the project.

In those countries of the Danube region, where RESs penetration is low and/or the energy market is less competitive, RESs have a priority access and dispatch to the grid without reporting daily schedule to the system operator or they are not penalized for deviation from the provided forecast. In these cases RESs usually belong to one special balancing group operated by the national system operator, and balancing costs are paid by the end-users.

In other Danube region countries with high RESs penetration and/or a more competitive market, RESs are treated almost equally as conventional power producers: renewable energy producers sell their electricity on the market, choose their balancing group, do their own forecasting, submit their schedules, handle their own imbalances and bear their own balancing costs (this is namely the case for Germany, Austria, Slovenia and Hungary).

Renewable energy aggregators (single market entity representing a cluster of one or more RES units) exist in a few Danube region countries (namely Germany and Austria). Electricity generated from RES is sold in all forms: through bilateral contracts or on power exchanges. In the majority of the Danube region renewables have priority grid access, which is only curtailed in case of a system emergency.

RES are only allowed to participate in the ancillary services market in Austria, Hungary and Germany, and they are encouraged to do so in even less countries (only Germany and Austria).

Overall, each Danube region country supports electricity production from RES and plans to increase RES usage by improving current RES regulatory set-ups. All analyzed Danube region countries have ambitious renewable targets for 2020 and beyond. To achieve those, as integration of RES increases, the current subsidy system will need to be oriented towards electricity markets, encouraging competitive RES to participate in the market (e.g. tenders). This will ensure a more even market position of renewables as that of conventional power producers.

Identified barriers

To stimulate growth of renewable energy production in Danube region these sources are being subsidized, usually by guaranteed buyoff prices that are higher than electricity market prices (energy prices). Having guaranteed prices for all electricity injected into the grid, these units are not encouraged to balance their own production or to, for example, participate in the demand response. The majority of Danube region countries still do not have developed ancillary services markets, meaning that RES, even if they were not subsidized by feed-in-tariffs, cannot participate in the ancillary services market. With the exception of Germany and Austria, aggregators of renewable energy are very rare in the Danube region, although there are some indications they will be present in the near future.

2.6 Organization of balancing market

Summary of the answers to the Questionnaire

Transmission system operators (TSOs) are generally the organizers of the balancing duties in all countries.

Besides balancing, TSOs are generally responsible in Danube region countries for the following:

- management of grid operations in the high and extra-high voltage grid;
- load flow optimization;
- congestion management;
- the coordination of disconnections for maintenance and inspection;
- coordination and control of cross-border electricity flows.

The BRP (Balancing Responsible Party) is the responsible entity within the Balancing Group to make balancing group contracts with the TSO; it contracts with the balancing group members, prepares the schedule of the balancing group and submits it to the TSO in time. Finally, its

duty is also to manage the settlement both with the TSO and with the balancing group members.

In order to become a BRP, a balancing responsibility agreement has to be concluded with the TSO.

TSOs are responsible for determining and settling the amounts of balancing energy taken by the BRPs operating in their respective control areas. Control reserves (ancillary services) are procured usually on regular tenders of the TSO. Nonetheless, in Croatia at the moment control reserves are procured bilaterally under transparent regulatory mechanisms (cost based methodology and data publication). In Croatia on the Slovenian border imbalance netting procedure is in operation.

Frequency regulation and active power regulation - primary, secondary and tertiary reserves in all countries exist, but they are differently utilized. In Hungary, voltage-reactive power control and black start are also available.

Suppliers of control reserves have to provide evidence that they are able to fulfil the technical requirements for provision of different control-reserve qualities and have to undergo a technical pre-qualification.

In Bosnia and Herzegovina, there is reserve and balancing energy market. In other West Balkan countries the development of this market is still ongoing. In Croatia procurement of reserves is regulated in a transparent manner, however the market for those services is still in the development phase. In Central and Western European countries these markets are already established.

Identified barriers

Market access and integration has to be strengthened. Intraday markets have to be introduced where they are still missing. Procurement of reserves through auctions should be more promoted in the South Eastern European region.

Furthermore, renewable energy and load (demand side management) participation in ancillary services and in balancing needs to be improved in all countries.

In EU countries, the implementation of the:

- Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (Text with EEA relevance) [EB],
- Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation (Text with EEA relevance) [FCA],
- Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (Text with EEA relevance) [RfG], and

- Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection (Text with EEA relevance) [DCC]

is also an impending task.

2.7 System operators

Summary of the answers to the Questionnaire

Being in charge of the power system backbone, the transmission and distribution network, TSO and DSO have similar roles in power systems of the Danube region countries – with the exception that, at least at the moment, the TSO is additionally responsible for the organization and operation of the balancing market and maintaining stability and security of the entire power system.

The tasks of TSO and DSO (according to Directive 2009/72/EC) can be found in Appendix B.

TSOs and DSOs purchase the network losses on the power market, typically via tenders. The purchase of ancillary services takes place similarly, via different procedures (tender, auction, bilateral agreements etc.)

Communication between TSOs and DSOs is different for each country. Usually TSOs and DSOs exchange real time network data or information which are necessary for the operation of the transmission and distribution network. Besides that, aggregate metering data exchange exists between TSOs and DSOs, which, among others, ensures the settlement of balancing energy.

Currently, in none of the DR countries suppliers do not offer dynamic energy tariffs reflecting wholesales market prices to the end-users, but in several countries (e.g. Austria, Germany) there are ongoing discussions on its introduction. Similarly in Slovenia as there was a pilot project focused on that. Similar to dynamic energy tariffs reflecting wholesale electricity prices, modifications of the network tariffs are on the agenda in several countries, but the direction of the changes is not yet known.

Electricity price components are the following:

- Network tariffs are paid for the transmission and distribution of energy to the TSO and DSO.
- Energy is the price of the consumed electricity paid to the energy supplier.
- Levies and taxes: energy taxes, VAT.

Network tariffs are typically kWh- and kW-based (except for Romania, where it is only kWh-based, but there is a plan to introduce a kWh- and kW-based mixed system), and their amount depends on the voltage level of the connection. Time of use network tariffs exist (e.g. Croatia).

In some of the Danube region countries (e.g. in Hungary, Bosnia and Herzegovina and Serbia) a fixed fee element is set per each connection/measurement point.

Identified barriers

Currently, the end-users in the Danube region countries are not encouraged by dynamic electricity prices or network tariffs to perform flexible response, either depending on conditions on wither wholesales market (dynamic electricity tariffs) or network technical aspects (network tariffs as one way of doing this). However, based on the answers to the above questions (operation of TSO/DSO, their participation on the electricity market, the current tariff system), there seems to be no general obstacles to the implementation of mechanisms such as dynamic tariffs.

2.8 Prosumers – generation, storage and flexible demand connected to the distribution network

Summary of answers to the Questionnaire

In the Danube region countries all consumers can freely select an energy supplier. Certain countries (e.g. Serbia, Hungary) allow a certain group of consumers (e.g. household consumers) to purchase electricity at a regulated price also from Universal Service Providers (USPs).

The technical and economic conditions for connecting generators to the network are defined in national regulation. Typically the connection cost is borne by the producer. Contracts between DSOs and producers on adjusting output power based on network conditions are not typical in the DR, but there are examples where, for example, the n-1 network rule is taken into account in the contracts (for example in Hungary and Croatia). In Hungary and Croatia the n-1 rule can allow curtailment.

Certain countries do not allow small generators or generators such as intermittent RES to participate in the balancing and ancillary services market (e.g. Bosnia and Herzegovina, Bulgaria, Serbia, Czech Republic); in other countries such DER participation is allowed (e.g. Croatia, Germany, Hungary).

Most DSOs do not involve generators in providing balancing and/or ancillary services.

There is no framework that encourages/requires generators to provide any other flexibility service. Exception is Germany: so called „zuschaltbare Lasten“ (additional loads) are to come

in 2017 to avoid curtailment of wind in northern Germany by ramping up power-to-heat modules.

Except for Germany, aggregators are not sufficiently defined as market participants in the legal framework and their roles can be interpreted as an additional aspect of supplier business or as that of an independent aggregator. These details are further explained in document D5.1.1.

German regulatory framework is under revision, however aggregation is already possible on the basis of bilateral agreements supplier-BRP and aggregator-BRP. Aggregator can be defined as BRP in parallel with customer's conventional supplier with a mandate to manage the customer's flexibility without causing imbalances to the supplier-BRP. The provision of balancing and ancillary services by the aggregators is allowed, they can provide these services from the portfolio of distributed flexible sources.

In Austria, Germany, and Hungary there is a legal possibility for DSOs to use storages to handle network constraints, but in practice there are no real examples for this (as there are more cost-efficient solutions).

Identified barriers

Based on the facts described in this chapter (supplier selection, DERs, aggregators, storage) there seems to be no general obstacle to include flexible end-users, distributed generators, storage devices etc. as equal market participants providing different services increasing the power system flexibility. However, multiple aspects still need to be analyzed (from technical, economic and regulatory aspects) and local implementations need to be synchronized with the European regulatory recommendations.

2.9 Active distribution networks and “smart” DSOs

Summary of the answers to the Questionnaire

In some countries of the Danube region there are no decisions on the utilization of smart meters, and no cost-benefit analyses (CBAs) were prepared (although there is a CBA methodology provided by EU Commission and CBA is prescribed by 72/2009/EC directive), or their results are not known. However, all countries already have smaller or bigger smart grid pilot projects. In certain countries (e. g. Austria, Germany, Croatia and Slovenia) there are decisions on full or partial roll-out of smart meters, and time frames are available for the realization.

Generally, there are technical specifications for smart meters installed by DSOs - not necessarily on national level– however, they do not cover the possibility of communication with the building energy management system.

Some Danube region countries (e.g., Austria, Montenegro, Czech Republic) have smart grid strategies. The smart grid developments of certain countries are accepted in the network tariff structure if they are justified to the regulator (e.g. Germany, Hungary, Montenegro).

In Austria and Germany there are already plans that micro and small scale generators take part in the provision of flexibility services. In Hungary there is also a theoretical possibility for DERs to provide such kind of a service as a virtual power plant.

There are no concrete plans of DSO evolution in the examined countries, and DSOs' more active participation on the electricity market, however, in certain countries there are such negotiations between the regulatory authority and the market players.

Identified barriers

Smart meters are essential for utilization of dynamic tariffs, providing ancillary services, or to enable aggregation . In certain countries there is no decision on the smart meters roll-out. In other countries which decided on smart meters roll-out, the installation is still ongoing, therefore at present this hinders the full-scale introduction of dynamic tariffs. However, a further investigation is needed to decide how to gain highest benefits from applying smart meters and dynamic pricing. Technical specifications for smart meters do not cover the possibility of smart meter communication also with the building energy management system which, if made possible, would lower the cost of the building energy management system installation.

2.10 Building energy management

Summary of answers to the Questionnaire

The vast majority of the countries have no special regulation for energy management in case of newly built properties, but there is an obligation to issue a building energy certification and in special cases an (energy) audit as well. This audit can also contain Energy Management System related topics and obligations in certain cases.

There are also authorities (mostly national and urban building authorities or ministries) or certified engineers who are responsible for the building construction quality. However, Danube region countries either have no strategy related to energy management systems or this strategy is not known. Serbia is an exception, where energy management introduction strategies exist related to public, commercial and industrial sectors.

Requirement of zero-energy buildings:

- EU member states: in EU countries where the nearly zero-energy buildings are required from 2019 or 2021, there are national plans. In some cases graduate schemes define

energy relevant key figures. In other cases support systems are adopted and demonstration projects help in order to reach the requirements of 2010/31/EU for new buildings and refurbishment. Implementation in case of new public institution buildings: from 31 December, 2018; in case of other new buildings: from 31 December, 2020.

- Non EU countries: mostly there are no requirements or plans in the non-EU countries of the Danube region related to zero-energy buildings

Main heating types are different in the Danube region countries. In certain cases main form of heating can be electricity (Serbia, Austria, Bosnia and Herzegovina), natural gas (Germany, Hungary) or solid fuels (e.g.: wood or coal) (Slovenia, Montenegro) as well. In certain cases (e.g. Austria) there are several (up to 3) heating types in an average household.

Identified barriers

There are relatively few available regulations or strategies in the Danube region countries in the context of Energy Performance in Buildings Directive. Almost none of the Danube region countries could answer to specific questions.

3. Conclusion

Market participants, system operators and regulators are responsible for more or less the same tasks in the Danube region countries, however, the level of market liberalization is quite diverse within the Region. Power exchanges exist in the majority of the Danube region, bilateral trading exists in all countries. The participants of cross-border trading may differ by one country to the other, but the common interest of the participants to move forward to market coupling in every country can be defined.

Renewable energy producers are on a special and protected market in the majority of Danube region countries, without real competition, which also means that they are not incentivized and usually not allowed to participate in other markets. In several cases, RESs are not incentivized to balance their own production, neither to participate in demand response. The majority of Danube region countries do not allow renewables to participate in the ancillary services market, and even less countries encourage renewables to offer ancillary services. Aggregators are very rare in the Danube region. Furthermore, renewable energy and load (demand side management) participation in ancillary services and in balancing needs to improve in all countries. However, there are plans in Austria and Germany that micro and small scale generators take part in the provision of flexibility services. In Hungary there is also a theoretical possibility for micro and small scale generators to provide such kind of a service as a virtual power plant. These initiatives should be carried out and spread throughout the Danube region.

Smart meters roll-out is quite diverse in the Danube region: in certain countries it is carried out, in others it is not yet decided. **Even more important in the 3Smart project is that technical specifications for smart meters do not cover the possibility of communication with the building energy management system, which might be a barrier to our findings, and a special attention needs to be put on that. This issue properly addressed will potentially significantly reduce costs for the BEMS installation on the building side, considering that without it an additional meter on the building side would be necessary.**

Currently, in the Danube region suppliers do not offer dynamic electricity tariffs reflecting wholesales market prices to their end-users (at least not on large scale). Additionally, there is no implementation of dynamic network tariffs, however, there are no barriers to their application. To define if and where these concepts should be implemented there should be a detailed analysis of potential benefits. It needs to be mentioned that **smart meters roll-out is essential for: i) adequate estimation of available flexibility from medium (MV) and low voltage (LV) distribution network users, ii) economic evaluation of benefits for deploying this flexibility, iii) technical requirements to enable MV and LV user flexibility utilization, iv) adjustments (if needed) of the regulatory aspects removing obstacles for full-scale deployment of end-user flexibility, v) definition of information exchange interfaces as well as security requirements related to big data exchange (real-time or close to real-time)**.

Cooperation and information exchange between TSOs and DSOs in the context of flexibility-based services is still limited, and further steps are necessary. DSOs will play more important role in network management. The result of 3Smart project and can be used independently from the coordination model even if they need different regulations. This means that the result can also be valid for

- a direct link between the DSO and a smart building and
- if besides DSO, TSO (or other market participants) can also have acces to flexibility services provided by smart buildings.

Overall, based on the answers to the questionnaire (see: Appendix A) there are no major barriers for involving building energy management in network energy management, in case this is economically viable.

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Appendix A: Answers to the regulatory questionnaire

1. Organization of power market (in general)

1.1. Which institution is the organizer of the power market?

Austria

Energie Control GmbH (E-Control), founded in 2001, it was transformed into a public authority in 2011 by a legal act.

Bosnia and Herzegovina

Institution for the power market organization has not been established in Bosnia and Herzegovina (BiH). Nevertheless, there are several institutions responsible for the power market:

- "Državna regulatorna komisija za električnu energiju" – DERK (State Electricity Regulatory Commission), [1]
- "Regulatorna komisija za energiju u Federaciji Bosne i Hercegovine" – FERK (Regulatory Commission for Energy in Federation of Bosnia and Herzegovina), [2]
- "Regulatorna komisija za energetiku Republike Srpske" – RERS (Regulatory Commission for Energy of Republic of Srpska), [3]
- "Nezavisni operator sustava Bosne i Hercegovine" – NOSBiH (Independent System Operator in Bosnia and Herzegovina), [4]
- "Operator za obnovljive izvore energije i efikasnu kogeneraciju" – OIEiEK (Operator for Renewable Energy Sources and Efficient Cogeneration). [5]

Bulgaria

Electricity System Operator (ESO EAD) is certified as Independent Transmission Operator who has a responsibility to run electricity market in Bulgaria, while Independent Bulgarian Energy Exchange (IBEX) is nominated electricity market operator (NEMO) with the obligation of organizing power exchange in Bulgaria.
For more details, check: http://tso.bg/default.aspx/eso/en

Croatia

Croatian Energy Market Operator ltd. (HROTE) is the Croatian market operator with duties related to the functioning of the electricity and gas market in Croatia.

CROPEX is a power exchange in Croatia that has also been designated as a nominated electricity market operator (NEMO) with the obligation to provide day-ahead and intraday coupling.

HERA (Hrvatska energetska regulatorna agencija – the Croatian Energy Regulatory Agency) is the Croatian national energy regulatory authority.

Czech Republic

OTE a.s.

Germany

Energy policy in Germany is developed and implemented at the federal and regional levels. Within the government, the responsibility for energy policy is divided between the Federal Ministry of Economic Affairs and Energy (Bundesministerium für Wirtschaft und Energie, or BMWi) and the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, or BMUB). Since 2014, responsibility for the power sector is mainly concentrated in the BMWi – with the exception of nuclear safety and climate protection.
On the federal level, the German power sector is chiefly regulated by the Bundesnetzagentur (BNetzA), the federal network agency, and by the Bundeskartellamt (BKartA), the federal cartel office. Both offices fall under the authority of BMWi. The power to regulate the power sector arises from the federal Energy Industry Act.

Hungary

Hungarian Energy and Public Utility Regulatory Authority

Montenegro

The operator of the power market in Montenegro is limited liability company ”Montenegrin operator of the electricity market – COTEE doo Podgorica”.[22]

Romania

The organizer of the power market (energy and gas) is National Regulatory Agency.

Serbia

The only TSO in Serbia is the Joint Stock Company „Elektromreza Srbije“ (EMS AD) and they are in charge of organizing and administrating power market. SEE Power Exchange (SEEPEX) is in charge of organized market.

Slovakia

Energy regulation in Slovakia is undertaken by the Regulatory Office for Network Industries (abbr. English „RONI“) ("Úrad pre reguláciu sieťových odvetví" abbr. Slovakian „URSO“) which was established in 2001. The laws transposing the Directives of the Third Energy Package do not fully ensure that URSO can take autonomous decision independently from the Ministry and the State Inspection and do not foresee that decisions taken by the URSO have to be fully reasoned and justified.

Slovenia

ELES as TSO should ensure the transfer of all necessary energy. Participants of the organised electricity market do not have any limitation about trading volume. Therefore, no one checks feasibility of contracted volumes.

1.2. Does this institution have another role/responsibility (with regards to the previous question)?

Austria

E-Control´s functions include the electricity and gas market

Bosnia and Herzegovina

DERK is an independent and non-profit institution in BiH, which acts in accordance with objectivity, transparency and equality principles, and has jurisdiction over the electrical energy transmission, transmission system operations and international power trade, as well as with the generation, distribution and supply of electrical energy for the customers in the Distrikt Brčko in BiH. [8]
FERK is specialized, autonomous, independent and non-profit organization and has jurisdiction over the production, distribution, power trading and supply of electrical energy for the customers in the Federation of Bosnia and Herzegovina (FBiH), including the supervision of power market.
RERS is specialized, autonomous, independent and non-profit organization and has jurisdiction over the production, distribution, power trading and supply of electrical energy for the customers in the Republic of Srpska (RS) and regulates and monitors power market.
NOSBiH is a non-profit company owned by BiH entities FBiH and RS, which carries out its activities throughout the whole territory of BiH and its role is to manage the balance market on power market in BiH.
OIEiEK is a non-profit legal organization and has responsibility for the implementation of system for deriving the production and purchase of electrical energy which comes from plants using renewable sources of energy and efficiency cogeneration.

Bulgaria

To gain the right of nominating transactions for electricity, all market participants in Bulgaria need to register with the Electricity System Operator. While the Electricity System Operator (in Bulgaria this is EAD) is responsible for maintaining instantaneous generation-consumption balance in real time, the market balancing responsibility at the day-ahead is passed on to the Balancing Groups (BGs).

According to Electricity Market Rules in Bulgaria the following participants have balancing responsibility:

- Electricity Producers;
- Electricity transmission company;
- Electricity distribution company;
- Electricity Traders;
- The Electricity System Operator;
- Public suppliers;
- Public providers;
- Distribution company of traction power;

The following Balancing Groups exist in Bulgaria:

- Standard Balancing Group;
- Special Balancing Group;
- Special Balancing Group of producers from renewable energy sources (RES).

Balance Group Managers are responsible for the imbalances caused by balance group members. The Electricity System Operator, Electricity transmission company and Electricity distribution company are registered as a Balance Group managers of Special Balancing Groups. Electricity Producers and Electricity Traders can be Balance Group Managers or members of Standard Balancing Group. The consumers members of the Public supplier and the Public providers, as well as producers with total installed power up to 30 kW, shall transfer automatically the responsibility for balancing at registration of the Public supplier and Public providers as balance responsible parties of special balancing groups to the registered balance responsible party of special balancing group.
For more details, check:
http://www.tso.bg/uploads/file/eto/en/pdf/MarketRules_ENG_StateGazette_2010.pdf

Croatia

In Croatia, the Croatian TSO (HOPS) is responsible for system balancing. Each market participant must be a member of a certain Balance group .There are several types of balance groups:

- Market Balancing Group (M-BG),
- Power Exchange Balancing Group (PE-BG),
- the EKO balancing group (aggregates all RES/CHP generators in the Croatian FiT support scheme)), which will be established by 1 January 2019.
- TSOs Balancing Group (TSO-BG) for network losses,
- DSOs Balancing Group (DSO-BG) for network losses.

Since HROTE is the single buyer of electricity produced from generators in the Croatian FiT, HROTE in fact is an aggregator of RES/CHP production. Currently, HROTE sells electricity to suppliers

proprotionally to their market share at a regulated price, but this will change by January 1st of 2019 when HROTE will sell electricity to the market and pay for imbalances to HOPS on hourly basis.

HROTE, as the market operator, delivers the day-ahead market plan to HOPS.
The results of trading, carried out on the power exchange (CROPEX), are also delivered to HROTE.

Czech Republic

Key business activities:

- Evaluation, billing and settlement of imbalances between the contracted and metered electricity and gas supply or consumption,
- Organization of the short-term electricity and short-term gas market in cooperation with the transmission system operator also organization of the regulating energy balancing market,
- Compilation of monthly and yearly reports on the electricity market and monthly and yearly reports on the gas market in the Czech Republic,
- Compilation of reports on future projected electricity and gas consumption, and on the method of ensuring balance between electricity and gas offer and demand,
- Preparation of documents for draft Electricity Market Rules and Gas Market Rules,
- Ensuring real values of electricity and gas supply and consumption for market participants,
- Ensuring preparation of load profiles in collaboration with distribution systems' operators,
- Drafting of market operator's business terms for the power sector and for the gas sector,
- Billing and settlement of regulating energy and balancing gas including billing during emergencies.

Germany

No.

Hungary

Yes, it has responsibility related to the following services:
- natural gas,
- district heating,
- water supply,
- waste management.

Montenegro

a) Operator of the power market carries out the activity of organizing and managing electricity market energy on the territory of Montenegro.
b) Operator of the power market performs particularly the following tasks:

- maintains records of bilateral agreements concluded in the power market in accordance with these Rules,
- calculates the quantity of imbalances in delivery and receiving electrical energy according to timetables, as well as financial accounting and financial control
- publishes the information necessary for the smooth operation of the market energy activities in accordance with the Law on its website,
- keeps records of suppliers and eligible customers and their mutual obligations,
- establishes rules and procedures for tendering in accordance with the instructions agency,
- concludes contracts with suppliers in order to ensure minimum share of electricity produced from renewable sources of electricity and high-efficiency cogeneration,
- collects fees for promoting renewable energy sources and cogeneration from suppliers of tariff and eligible customers,
- concludes contracts with privileged producers who are entitled to a price support scheme,
- calculates, collects and distributes the funds collected from fee for encouraging renewable energy sources and cogeneration producers of electricity from renewable sources and high efficiency cogeneration on the basis of contracts concluded,
- gives an opinion on the rules for the application of transparent procedures management and allocation of cross-border transmission capacity of electrical energy. [23]

Romania

CN Transelectrica SA, the Romanian Transmission System Operator (TSO) is the Balancing Market Operator and responsible for the organisation and management of the balancing market.

Serbia

PE EMS is the holder of licences for energy operations such as transmission, transmission system operation, organisation and administration of bilateral and balancing electricity market.

Slovakia

The activities of URSO cover:

- generation, transmission, distribution and supply of electricity and the related services,
- performance of the short-term electricity market administrator´s activities,
- production, transport, distribution, storage and supply of gas and the related services,
- production, distribution and supply of heat,
- production, distribution and supply of potable water by public water supply system,
- diversion and purification of sewage through public sewerage system,
- abstraction of surface water and energy water from water flows, utilization of the hydro-potential of the water flows.

The Regulatory Office for Network Industries is a state authority which is independent from the both state power and regulated entities. Within its performance, the Office is not subject to any political or business groups.

Slovenia

- activities of balance scheme management
- recording of closed contracts
- elaboration of indicative operating schedule
- imbalance settlement and financial settlement of transactions
- centre for RES/CHP support
- stimulation of environmental policies and promotion of public awareness
- support scheme operator for the generation of energy from renewable energy sources and highly efficient cogeneration of heat and power
- wood biomass portal
- legislation and integration of the Slovenian electricity market to the integrated European electricity market
- actively engages in issues connected with renewable sources, guarantees of origin, white certificates, emission allowances and natural gas

1.3. How is the power market currently organized; what type of market(s) is in force at the moment (organized-power exchange, organized-over the counter, bilateral-over the counter, financial market, other)?

Austria

Most of the electrical energy is traded directly between the producer and the consumer but brokers can also function as intermediaries (OTC-trade = "Over the Counter"-trade). Exchange trading, where producers, traders or electricity consumers place sale or purchase bids on the electricity exchanges thus determining the supply and demand curves which are used as a basis for determining the prices and the supply volumes, are growing in importance.
In the interest of transparent and non-discriminatory capacity allocation, cross-border transmission capacity is auctioned off in annual, monthly and daily explicit auctions and in intraday auctions. With the exception of the latter, they are conducted through dedicated auction platforms. For the borders with Switzerland and Italy, this is the Capacity Allocation Service Company (CASC); auctions for cross-border capacity with Slovenia, Hungary and the Czech Republic are conducted by the Central Allocation Office (CAO) in Freising, Germany. Intraday capacity auctions are split between the Austrian and neighbouring CAM.
Most wholesale transactions are bilateral contracts between suppliers and generators on the OTC market. However, there are also formalised markets such as the Austrian EXAA, German EEX or French EPEX power exchanges.

Bosnia and Herzegovina

The power market in BiH is unique and consists of wholesale market and retail market. Wholesale market is related to power trading between licensed companies for production, supply and power trading.
Retail market is related to the supply of end customers by licensed power supply companies. [6]

Bulgaria

In Bulgaria electricity can be traded in two types of wholesale markets: bilateral over-the-counter (bilateral OTC) and power exchange.
Bilateral over-the-counter trading means that the producer and the supplier make direct trading contracts and these contracts are independent on belonging to BGs. In other words, supplier can make bilateral contracts with members of its own BG or some other BG.

Croatia

In Croatia electricity can be traded in three types of wholesale markets: bilateral over-the-counter (bilateral OTC), power exchange and balancing market.
Bilateral over-the-counter trading means that the market participants make direct trading contracts. In other words, market participant can make bilateral contracts with members of its own balance group (BG) or some other BG, or with Croatian transmission system operator (HOPS) for balancing. Most of the electricity in Croatia is traded through bilateral over-the-counter market. Every market participant from the Croatian bidding zone (except RES in the FiT support scheme who have contracts with HROTE) can make bilateral contract with any other market participant from Croatian bidding zone and can engage in cross border trading. Balancing market is not yet operational.
In addition, market participants in Croatia can participate and trade on CROPEX power exchange, jointly owned by HROTE and HOPS. CROPEX has been in operation since 10 February 2016. CROPEX has enabled intraday and day ahead trading.

Czech Republic

Majority of energy is exchanged on bilateral basis (closed contracts) and spot market. In Czech Republic exist day ahead market, intraday market, week ahead market and balancing market with regulation energy.

Germany

The German wholesale electricity market is broadly made up of three elements: (1) a forward market; (2) a day-ahead market; and (3) an intra-day market. Electricity supply deliveries in the forward market can be negotiated up to seven years in advance, but for liquidity reasons typically only look out three years, and in fact most futures trading focuses one year ahead.

While the majority of wholesale transactions occur through bilateral "over the counter" contracts, an increasing proportion of transactions occur via power exchanges.
Most trading for Germany occurs on three exchanges: the European Energy Exchange (EEX) in Leipzig, the EPEX SPOT in Paris, and the Energy Exchange Austria (EXAA) in Vienna.

Large industrial customers account for nearly half of German consumption. Residential customers, which are the largest customer class by number, account for about a quarter of total consumption, and smaller industrial and business customers account for just over a quarter.
Since 1998 all customers have been able to choose their electricity supplier. However, in practice the percentage of switching from traditional suppliers for non-industrial customers (especially from traditional Stadtwerke) has been a relatively slow process. When retail competition was first introduced, there were no standards for contracts, times and switching costs, which caused a great deal of uncertainty. As regulation has been introduced to control these factors, customer switching has increased.

Hungary

The Hungarian electricity market overview can be found in point 1.6., based on which the different types are the following:

- incumbent supplier, ensures electric energy to the universal service supplier;
- organized-power exchange (hupx.hu)
- over the counter (bilateral)
- market of renewable energy resources (at TSO operated, obligatory takeover price; traders have to purchase the energy purchased this way from TSOs)

Montenegro

Model of the wholesale power market includes:
a) In a long term - Market based on bilateral agreements,
b) In a medium term – Day-ahead market (can be set to a certain level of market development)
c) In a short term - Balancing market and
d) Activities post real time - calculation and alignment deviations.

The Agency will establish the retail power market on the principles of:
a) Facilitating competition in the supply of issuing licenses for the supply of electricity in the procedure prescribed by law,
b) Providing the necessary commercial arrangements for the public supplier, who will be responsible for the electricity supply of tariff customers (households and small unprotected consumers who do not want to change suppliers).

Romania

The power market is currently organized as power exchange.

Serbia

Power market includes:

1. guaranteed supply for households
2. bilateral energy market
3. balancing energy market
4. organized energy market

The market scheme is shown in Figure A.1.3.1.

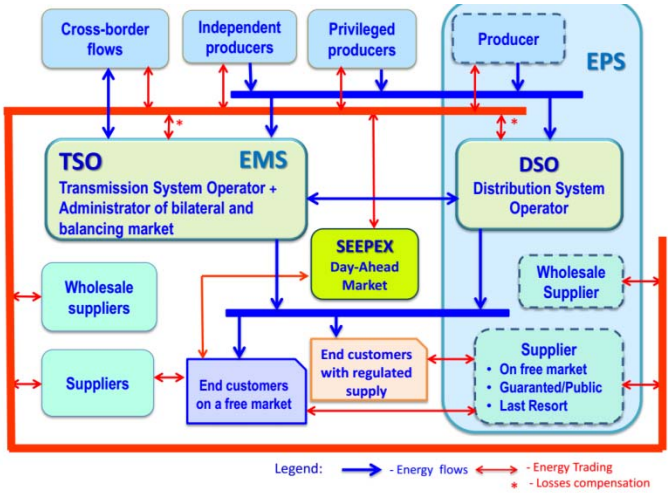


Figure A.1.3.1: Electrical energy market scheme

The bilateral trade is dominant. Bilateral contracts are between producers and consumers and they are reported to the TSO (Elektromreza Srbije).
About 60% of electricity supply is for households and small consumers through bilateral contracts. Households and small consumers are part of regulated market.
About 40% of electricity is sold through the open market, organized by SEEPEX. Open market contracts are day-ahead based.

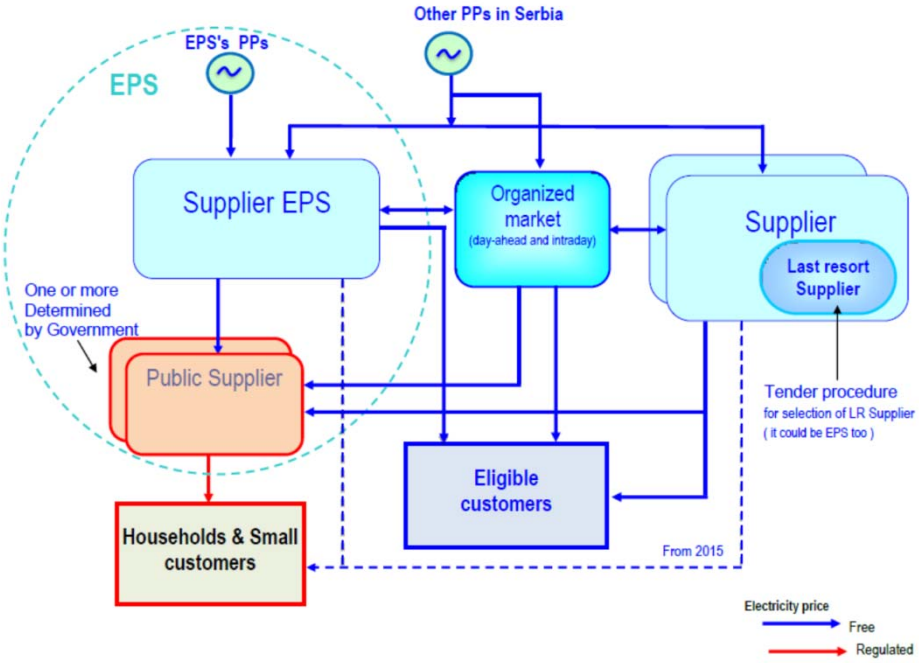


Figure A.1.3.2. Electricity supply scheme in **Serbia**

Conditions for market functioning

The bylaws necessary for the functioning of the market were adopted by competent bodies. Some of them were harmonized with the Law and some of them will have their amendments prepared so as to have them harmonized with the Law and mutually harmonized.

The following bylaws are applicable:

- Rules on conditions for the issuance, modification and withdrawal of the energy license;
- Decrees on conditions for electricity and natural gas delivery and supply (have not been harmonized with the Law);
- Electricity Transmission Network Code (applied as of 2008 and amended several times, including in 2015) and electricity Distribution Network Code (applied as of the beginning of 2010 and harmonized with the Law and market requirements during 2013, 2014 and 2015);
- Natural Gas Transmission Network Code of PE Srbijagas which also includes the necessary natural gas market rules (the newly drafted and harmonised version has not been submitted to the Agency for approval);
- Natural Gas Transmission Network Code of Yugorosgaz (approved by the Agency in January 2015);
- Natural Gas Distribution Network Code (of PE Srbijagas was approved by the Agency in December 2014, and of most of other distribution companies in early 2015);
- Rules on the allocation of cross-border transmission capacity with joint auctions on 5 borders (with Hungary, Romania, Bulgaria, Croatia and Bosnia and Herzegovina) for the allocation of 50% of cross-border capacities on 3 borders (with Macedonia, Montenegro and Albania);
- Electricity market rules;
- Supplier switching rules;
- Rules on monitoring technical and commercial indicators and on regulating quality of electricity and natural gas delivery and supply;
- Methodologies for setting electricity, i.e. natural gas transmission and distribution use-of-system charges (the methodology for setting natural gas storage access price was also adopted but it will be applicable to new storages that will be built in the future);

- Methodologies for setting regulated price of electricity and natural gas supply of households and small customers which are not supplied in the open market and
- Methodologies for setting electricity, i.e. natural gas transmission and distribution connection charges.

Electricity transmission use-of-system charges have been regulated since 2008, while the distribution ones have been regulated since 2010.

Regulated and open market prices

The reforms of the energy sector defined by the Energy Law enabled the development of the electricity and natural gas markets. Energy activities are classified as market activities (production and trade/supply) and regulated natural monopolies (electricity and natural gas transmission and distribution, i.e. network systems). If a customer wants to be supplied by either electricity or natural gas, the customer is supposed to buy energy from a supplier and pay the transmission and distribution service, i.e. delivery of the purchased electricity/gas all the way into his facility. As of 01/01/2015, all customers choose their suppliers and negotiate electricity and natural gas prices under market conditions, while households and small customers are still in a position to purchase electricity and natural gas at regulated prices. They will be able to exercise this right until price regulation cease in case of these customers as well. All customers pay the transmission and distribution service at a regulated price which is charged in line with adopted methodologies.

Slovakia

Short-term electricity Market Operator - OKTE, a.s. (hereinafter referred to as the "OKTE, a.s.") was established as a subsidiary of Transmission System Operator (Slovenská elektrizačná prenosová sústava, a.s.) which is the owner of 100% of shares. Within electricity market in the Slovak Republic, OKTE, a.s. is classified by Energy Act as the entity that is subject to regulation by Regulatory Office for Network Industries (RONI), is authorized for activities as Short-term electricity Market Operator in the Slovak Republic.

OKTE, a.s. shall treat all electricity market participants on the basis of open, transparent and non-discriminatory conditions when providing services. The scope of activities OKTE, a.s. arises out of international and national legal documents. OKTE, a.s. organize and evaluate the organized Short-term cross-border electricity market and provide clearing of imbalances in the Slovak Republic. Simultaneously OKTE, a.s. is in the process extension of its scope of activities, especially the administration and collection of metered values and central invoicing.

OKTE, a.s. actively cooperates upon execution of its activity within the national cooperation with several state institutions (the Ministry of Economy of the Slovak Republic, the Regulatory Office for Network Industries), with the Transmission System Operator in the Slovak Republic, with distribution systems operators as well as other market participants.

Within the international cooperation, from 22nd November, 2011, OKTE, a.s. is a member of the international association of exchanges and market organizers EUROPEX. EUROPEX associates exchanges and market organizers from the European Union countries which provide for trading in electricity, gas or emission quotas. Within the membership in EUROPEX, OKTE, a.s. together with its

further members strives for assertion of tasks of energy exchanges and market organizers in the European Union, increase of economic competition by establishment of price transparency, dealing with issues covering establishment of a single European market and communication and cooperation with the institutions within the European Network of Transmission System Operators for Electricity and Gas (ENTSO-E, ENTSO-G) and with the Agency for Cooperation of Energy Regulators (ACER), etc.

Wholesale trading of electricity in Slovakia may be carried out by over-the-counter trading (OTC), on the exchange, on the short term electricity market and by way of auctions:

- OTC: The Electricity Trader shall conclude a Sale and Purchase Agreement and an Agreement on Settlement of Imbalances (see section I.3.2 below);
- Trading on the exchange: Electricity may be exchanged via the Slovak electronic exchange system maintained by the power exchange operator SPX (Slovak Power Exchange). For entry into the SPX, a trader must conclude an agreement with SPX and pay a monthly fee;
- Short-term electricity market (day-ahead market): The organised short-term electricity market allows participants (Electricity Traders) to offer or demand electricity and helps to decrease the possibility of imbalances.
- Auctions may be used for cross-border trading on cross-border profiles or for auctions established by an electricity trader in compliance with the regulation adopted by URSO.

Slovenia

Slovenian futures market exists but is illiquid. Majority of energy is exchanged on bilateral basis (closed contracts) and spot market.

1.4. How are the market participants classified (producers, suppliers, traders, large consumers, renewable energy sources, others and which)? Please list all of them, and explain their role.

Austria

To enable consumers to choose their supplier freely and guarantee that all trades and supply deals can be settled correctly, Austria introduced balance groups.
Balance groups serve a two-fold purpose: they reflect commercial flows (as opposed to physical flows through the grid) between the market players, and they enable the correct allocation of balancing energy to the market players. Therefore, all market players – be they producers, consumers, suppliers or traders – must be members of commercial balance groups.

The most prominent participants in the Austrian electricity market are:

Injecting party
A producer or electricity undertaking feeding electric energy into the grid.

Control area manager (CAM)
The entity which is responsible for load-frequency control within a control area; this function may also be carried out by a third company based in another member state of the European Union.

System operator (SO)
The operator of a transmission or distribution grid with a nominal frequency of 50 Hz. The responsibilities of system operators also include metering, confidential handling of grid user data, and nondiscriminatory submission of information to all market participants; at the same time, they must ensure that data is submitted only to those parties that are actually entitled to receive it.

Trader
A natural or legal person or a commercial undertaking selling electric energy with a view to profit.

Supplier / retailer
A natural or legal person or commercial undertaking that provides electric energy to other natural or legal persons.

Consumer
A natural or legal person buying electric energy for own use.

Clearing and settlement agent (CSA), aka balance group coordinator
A natural or legal person with an official license to operate a clearing and settlement agency for the purpose of organizing, clearing and settling balancing within a control area.

Balance responsible party (BRP), aka balance group representative
The entity representing a balance group vis-à-vis other market participants and vis-à-vis the clearing and settlement agent.

Balance group members
Suppliers or customers joined into balance groups within which injection and withdrawal of electricity are balanced.

Transmission system operator (TSO)
A natural or legal person or a registered partnership that is responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission system and, where applicable, the interconnectors to other systems, and for ensuring the long-term ability of the system to meet a reasonable demand for the transmission of electricity; transmission system operators in Austria are Verbund- Austrian Power Grid AG, TIWAG-Netz AG and VKW-Übertragungsnetz AG.

Distribution system operator (DSO)
A natural or legal person or a registered partnership that is responsible for operating, ensuring the maintenance of, and, if necessary, developing the distribution system of 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.

Bosnia and Herzegovina

Wholesale market participant owns a minimum of one license related to production, trade and power supply in BiH, which is issued by in charge Regulatory Commission in BiH. Market participant, according to owned current licenses, may have one or more roles:

- Manufacturers produce electrical energy within their production facilities, and have the right to sell generated electrical energy on the market in accordance with the owned license.
- Suppliers, in accordance with the owned license, in addition to the wholesale market, have the right to participate in the retail market and to supply consumers. Exceptionally, system operator can have the supplier role in case of electrical energy procurement to cover losses in managed network in accordance with legal restrictions, and by an appropriate decision of the regulatory commission in charge.
- In accordance with the owned license, the traders have the right to buy and sell electrical energy. Operator for renewable sources of energy can participate on power market, taking into account the limitations prescribed by the legal acts which regulate subject's activities.

Retail market is related to the supply of end customers by licensed power supply companies [6].

Bulgaria

Under the Electricity Market Rules, market participants in Bulgaria are classified as follows: Electricity producers, the Electricity traders, the Consumers, the Transmission System Operator, the Public Supplier, the Public Providers of electricity and the Distribution System Operators.

The transmission company and distribution companies purchase electricity only for coverage of the technical losses in the networks for each separate interval of delivery.
The Electricity System Operator concludes transactions for purchase and/or sale of electricity with market participants, owners of dispatchable generating units and /or consumption installations for covering of the imbalances in the national market zone.
Electricity producers, suppliers and traders can buy electricity from other producers, suppliers, traders, exchange markets or by cross-border trading (import from other market zones other than Bulgaria). The same definition is applied when selling electricity.

Croatia

Under the Electricity Market Rules, market participants in Croatia are classified as follows: producers, Transmission System Operator (HOPS), Distribution System Operator (HEP-ODS), Electricity exchange (CROPEX), Market operator (HROTE), traders, and suppliers.
Market participants can freely trade with each other. CROPEX is operated as a central and anonymous trading platform.
Additionally, a public service supplier is HEP Elektra d.o.o.
Only suppliers can supply end-customers (conclude supply contracts).

Czech Republic

In CZ there are many market participants. Their current number is 30.823. List of registered participants http://www.ote-cr.cz/registration-and-agreements/market-participants-list/attached/All_registered_participant_list_EN.xls

Germany

The German power system is dominated by four large companies, which continue to own significant generation, distribution, and retail assets: E.ON, RWE, EnBW, and Vattenfall.

Ownership and operation of the German transmission system is divided between four transmission system operators (TSOs). As a result, there is not a single German grid for the highest voltage level, but four autonomous zones—and each operator is responsible for network functioning in its respective zone. The four system operators coordinate in order to maximize economic and operational efficiency among the four zones.

The distribution system in Germany is the most complex in Europe, with around 900 distribution system operators serving 20,000 municipalities. This includes the four large companies as well as about 700 Stadtwerke (municipally owned utilities) and a number of regional companies. The four large DSOs—RWE, EnBW, E.ON, and Vattenfall—operate a significant portion of the distribution grid through concession contracts with municipalities. Under these contracts, municipalities rent out their distribution franchise for up to 20 years. Under the Energy Industry Act, these concession agreements have to be renegotiated under non-discriminatory rules and can be cancelled. It is worth noting that there is a movement today for Stadtwerke to take over their own grid operations as many concession contracts come up for review.

In 2013, four companies owned about 56 percent of installed generation capacity in Germany: E.ON, RWE, EnBW, and Vattenfall. Most of the capacity owned by these companies is coal, nuclear, and gas capacity.

The four biggest electricity generators are also the biggest retail suppliers, and in total they supplied 45.5 percent of the total delivered volume of energy (in TWh) to end-use customers in 2012. The remaining energy is supplied by Stadtwerke and independent suppliers.

The retail market in Germany has grown increasingly competitive since retail competition was introduced in 1998. However, the percentage of switching from traditional suppliers for non-industrial customers (especially from traditional Stadtwerke) was relatively low in the beginning. More recently, retail competition has been increasing, and in 2012 about 20 percent of household customers had a contract with a competitive supplier.

Sector	Leading Companies	Market Share	Total Number of Providers
Transmission	Amprion Transnet BW (ENBW) TenneT 50Hertz Transmission	**100%** Combined	4
Distribution	EnBW E.ON RWE Vattenfall	The big 4 distribution companies own and operate a significant portion of the distribution system, though the exact level is not clear.	approximately 890* DSOs, about 700 of which are municipally owned *Stadtwerke*
Total Generation	EnBW E.ON RWE Vattenfall	**56%** installed capacity** (June 2014) **~59 %** of electricity generated (2012).***	over 1000 producers (not including individuals)
Retail Suppliers	EnBW E.ON RWE Vattenfall	**45.5%** of total electricity offtake (TWh).****	over 900 suppliers

Table A.1.4.1.

Hungary

The major market participants:

- **users:** receive electric energy for using it in their own place via public or private network

Special categories within this:

- **users entitled to universal service:** domestic customers, not bigger that 3*63 A connection capacity LV users/
- **domestic customers:** users who purchase electric energy for the use of their own household
- **producers** (power plants)

Special categories within this:

- **small power plants** (lower than 50 MVA nominal capacity)
- **household-sized small power plants** (smaller than 50 kVA capacity power plants connected to LV)
- **producers using renewable sources**
- **traders** (within this universal service provider is a special category)
- **organized electric energy market**: trading system that enables the regional electric energy turnover, in which the energy sales and the related transactions concluded and managed in a standardized form.

Montenegro

Market participant, according to owned current licenses, may have one or more roles:

- producers produce electrical energy within their production facilities, and have the right to sell generated electrical energy on the market in accordance with the owned license,
- suppliers, in accordance with the owned license, in addition to the wholesale market, have the right to participate in the retail market and to supply consumers,
- system operator can have supplier role in case of electrical energy procurement to cover losses in managed network in accordance with legal restrictions, and by an appropriate decision of in charge regulatory commission,
- in accordance with the owned license, the traders have the right to buy and sell electrical energy
- operator for renewable sources of energy can participate on power market, taking into account the limitations prescribed by the legal acts which regulate subject's activities,
- supplier of last resort and vulnerable customers,
- transmission system operator,
- distribution system operator,
- operator of the power market.

Romania

In Romania the following types of participants play on the energy market: producers, suppliers, traders and consumers.

Serbia

According to the Energy Law [36] market participants are classified as follows:

1. Electrical power producer
2. Supplier
3. Wholesale supplier
4. Final user
5. Transmission system operator
6. Distribution system operator
7. Closed distribution system operator
8. Market operator

In addition to above listed entities, other legal entities can participate on market, according to rules on organized market.
For markets scheme, please refer to Figure A.1.3.1.

Slovakia

Dominant generators
The main participants in the Slovak electricity market are a single, dominant generation company and three large distribution/supply companies, which cover the entire territory of the country. Slovenská Elektrárne (SE-Enel) is the main generation company with a share of production close to 84%. Recently,

competition has started to develop between them for industrial and business customers. Supply licenses have also been awarded to 18 other companies. Several companies from the Czech Republic have entered the market, including ČEZ, while suppliers are also able to source electricity from the Czech, Austrian and German wholesale markets. Apart from a few large users, there has been little meaningful customer switching to date.

Transmission System Operators

In Slovakia , the only TSO, the state-owned Slovenská elektrizačná prenosová sústava (SEPS, a.s) is responsible for the transmission of electricity on the whole territory of Slovakia and ensures the electricity transmission from power plants to the distribution network and major customers connected to the 220 kV and 400 kV grids. The company was founded in 2002 through separation from Slovenské elektrárne, a.s., shortly before its planned privatization.

Even after the dissolution of Czechoslovakia and the emergence of the independent Slovak Republic, the transmission grid in Slovakia is still closely connected with the Czech transmission grid. SEPS operates lines with nominal voltages of 400 kV, 220 kV and in some cases 100 kV with a total length of 2,331 km as well as 25 power stations in various places in Slovakia. In 2009, SEPS transferred a total of 24,116 GWh of electricity with transmission losses of 0.93%

Distribution System Operators

The Slovak distribution grid is divided between three DSOs:

- Západoslovenská energetika (ZSE) in Western Slovakia,
- Stredoslovenská energetika (SSE) in Central Slovakia and
- Východoslovenská energetika (VSE) in Eastern Slovakia.

These three distributors are partially owned (49%) by E.ON, RWE, and EDF respectively, with the remaining share being held by the Slovak government. These three companies source their supply on negotiated terms from Slovenská Elektrárne (SE).

Since 2006, these distribution grid operators were transformed into three separate companies ensuring the distribution of electricity (in lines up to 110 kV) as well as three energy suppliers responsible for customer contacts. Thus, in Western Slovakia the companies ZSE Energia a.s. and ZSE Distribúcia a.s. emerged, in Central Slovakia Stredoslovenská energetika a.s. and Stredoslovenská energetika - Distribúcia, a.s., and in Eastern Slovakia Východoslovenská energetika a.s. and Východoslovenská Distribučná a.s.

ZSE is a member of the German energy group E.ON. On 1 July 2007, ZSE created subsidiary companies for the operation of distribution systems and trade and sales of electricity. Both, ZSE Energia, a.s. and ZSE Distribúcia, a.s., are 100% subsidiaries of ZSE.

In 2001, the state-owned company SSE was converted into a joint-stock company; in the following year, the Slovak government sold the majority shares to its strategic partner Electricité de France (EDF). As the DSO of Central Slovakia, SSE delivers electricity to almost 700.000 final customers.

The company is in charge of the regions Žilina, Trenčín and Banská Bystrica. SSE operates lines with nominal voltages of 0.4, 22, and 110 kV.

VSE became a member of German RWE Group in 2003 and supplied electricity in the amount of 3,755 GWh (2009) to approximately 500.000 customers. The shares of VSE are owned by Fond národného majetku (National Property Fund) (51 %) and the German Group RWE (49 %).

Slovenia

producers, consumers, traders, suppliers, regulators

1.5. What market participants act as regulated participants on power market (TSO, DSO, market organizer, power exchange organizer, subsidized RES, other RES, others and which)? Please list all of them, and explain their role in details.

Austria

All suppliers and traders that want to become active on the Austrian market must be balance group members. Balance groups are established by BRPs, who are also their representatives towards the CSA and the CAM. Licences for BRPs can be applied for with E-Control.
Suppliers/traders can choose whether to join an existing balance group or form a balance group of their own. The CSA centrally records each supplier's and trader's balance group membership.
As representative of the balance group, the BRP is responsible for sending the schedules to the CSA and CAM and for settling imbalances with the CSA.

Bosnia and Herzegovina

Market participants that act as market regulators are Transmission System Operator, Distribution System Operator and Operator for Renewable Energy Sources and Efficient Cogeneration.
Transmission System Operator is a company whose obligation is electrical energy transmission and all activities related to electrical energy transmission, which includes, but is not limited to electrical energy transmission, maintenance, construction and expansion of electricity transmission network in BiH.
Distribution System Operator is a company whose obligation is to:

- manage, maintain, build and develop the distribution system,
- have metering devices on takeover and delivery points,
- monitor the quality of electrical energy delivered to the distribution system,
- maintain supply continuity and security,
- maintain voltage quality and service quality,
- prepare short- and long-term plans for development and construction of the distribution network that are consistent with the physical, regulatory and urban plans,
- changes in the consumption, taking into account the real implementation of above mentioned plans and the impact of the tariff rates for distribution system in accordance with the law etc.

Operator for Renewable Energy Sources and Efficient Cogeneration is a company that performs activities:

- collects, processes and keeps track of the total electrical energy produced in plants from qualified manufacturers,
- performs calculation and payment of funds for delivered electrical energy from privileged producers who have concluded a contract with OIEiEK with guaranteed prices and qualified producers at reference price for delivered electrical energy production,
- makes analyses of generated electrical energy volumes in relation to the planned electrical energy generation produced from renewable sources of energy etc.

Bulgaria

ESO EDV, Electricity distribution company, Public Supplier are regulated market participants in Bulgaria.
Subsidized RES (RES FiT) have privileged status since they have both grid and market priority.

Croatia

Croatian transmission system operator (HOPS) and Croatian distribution system operator (HEP-ODS) and market operator (HROTE) are regulated market participants in Croatia.
RES/CHP generators may obtain a so-called "eligibility status" granting them both grid (priority dispatch) and market priority. The majority of "eligible electricity producers" are also subsidized RES/CHP generators within the Croatian FiT. The operation of generators within the FiT support scheme is regulated.

Czech Republic

OTE as a market organizer
Power exchange for central Europe as a power exchange

Germany

All parties listed and explained in questions 1.3 and 1.4 act as regulated participants.

Hungary

<u>License-required activities:</u>

- activity of TSO
- activity of DSO
- electric energy trade
- universal service
- establishment, generation, termination of generation of power plants and small power plants (above 500 kVA and above nominal capacity)
- power exchange organizer
- establishing, extending, termination of private network (if other consumer(s) is/are also connected to the private network)
- operation of public lighting appliances
- operation of public e-mobility chargers
- operation of 0,5 MW and exceeding this nominal output capacity electric energy storage

Montenegro

Market participants that act as market regulators are Transmission System Operator, Distribution System Operator and Operator of the power market.
Transmission System Operator is a company whose obligation is electrical energy transmission and all activities related to electrical energy transmission, which includes, but are not limited to electrical energy transmission, maintenance, construction and expansion of electricity transmission network in Montenegro.
Distribution System Operator is a company whose obligation is to:

- manage, maintain, build and develop the distribution system,
- have metering devices on takeover and delivery points,
- monitor the quality of electrical energy delivered to the distribution system,
- maintain supply continuity and security,
- maintain voltage quality and service quality,
- prepare short- and long-term plans for development and construction of the distribution network that are consistent with the physical, regulatory and urban plans,
- manage consumption variations, taking into account the real implementation of above mentioned plans and the impact of the tariff rates for distribution system in accordance with the law etc.

Operator of the power market:

- Market Operator carries out the activity of organization and management of the electricity market, with the exception of operation of the balancing electricity market, based on the license, in accordance with this Law.
- The operator of the power market determines the rules for the balancing of the electricity market, which delivers to the Agency for approval.
- The rights and duties of the founders of Operator of the power market is permitted by the Government.

Romania

The market participants who act as regulated participants on power market are:

TSO – Transmission and System Operator
DSO – Distribution and System Operator
Power exchange – the energy is sold or bought only by the power exchange.

subsidized RES – these RES receive the Green Certificates for the energy delivered in the electricity network of TSO or DSO.

Serbia

Electricity market participants are:

1) electricity producer;
2) supplier;
3) wholesale supplier;
4) end customer;

5) electricity transmission system operator;
6) electricity distribution system operator;
7) closed electricity distribution system operator;
8) market operator.

In addition to the market participants mentioned above, the organized electricity market participants may also be other legal persons, in accordance with the rules on the organized market operation.
Electricity market participants shall submit to the transmission, i.e. distribution system operator all the needed data in accordance with the rules on the transmission system operation, the rules on the distribution system operation, and the rules on the electricity market operation.
The transmission system operator shall purchase electricity from and sell it to the balancing electricity market participants for the purpose of balancing and ensuring the safe system operation.
The price of electricity for the needs of system balancing and ensuring its safe operation shall be determined based on the market principle, in accordance with the rules on the market operation.
The share in the balancing market shall be regulated by an agreement to be concluded between the transmission system operator and an electricity market participant, in accordance with the rules on the electricity market operation.

Slovakia

At national level, Slovenské elektrárne is the biggest electricity provider in Slovakia with 69% of the country's generation market. Slovenské elektrárne is the main supplier of electricity for the three biggest regional distribution companies in Slovakia (ZSE, SSE and VSE) and also supplies electricity to large businesses. Slovenské elektrárne is the main provider of ancillary services in Slovakia. Slovenské elektrárne is not active in the electricity transmission sector or in electricity distribution. However, since 2009, Slovenské elektrárne expanded in the distribution market for small and medium-sized companies in Slovakia and the Czech Republic. In 2009 Slovenské elektrárne established SE Predaj, a 100% subsidiary that operates in the Slovak SME market. In 2011, it started selling electricity also in the regulated household segment. Since 2013, the subsidiary offers also gas to its customers from the business sector.
The three biggest distribution companies ZSE (West), SSE (Central), and VSE (East of Slovakia) are 51% controlled by the State, but the remaining minority shares and the executive rights are in the hands of private investors such as the German E.ON, the Czech-Slovak private equity fund Energy and Industrial Holding plc, or the German RWE Group, respectively.

The key players in the electricity market in the Slovak Republic in 2012 were the following en-terprises:
- **Slovenské elektrárne, a. s.** (hereinafter only „SE, a. s.—) – the most significant (dominant) elec-tricity generator that in 2012 provided 69.68 % of electricity generation in Slovakia from internal generation plants. Electricity production amounting to 19,785 GWh covers 68.73 % of electricity generation in the Slovak Republic. An installed capacity in internal generation plants owned by SE, a.s. is 4,992.9 MW. Apart from household consumers the company provided its 37 consumers on the restricted territory with total supply being 17,945, of which 2,360 GWh was for final consumers.
- **SEPS** as a sole holder of electricity transmission licence, the national TSO acting as the energy dispatcher (providing the balance on the restricted territory of the Slovak Republic). In October 2010 SEPS founded a daughter company OKTE, a.s., whose role is to evaluate and organise the short-term day ahead electricity market and to ensure the settlement of deviations on the territory of the Slovak Republic.

- **OKTE a.s.,** an organiser of the short-term day ahead market with electricity as an institution for assessment and organisation of the short-term day ahead market and ensuring the financial settlement, assessment and deviation settlement on the territory of the Slovak Republic.
- **ZSE Distribúcia, a. s.** (Western Slovak Power Utility), Stredoslovenská energetika - Distribú-cia, a. s. (Central Slovak Power Utility – Distribution) and Východoslovenská distribučná, a. s. (Eastern Slovak Power Utility) – exclusive operators of regional distribution systems (hereinafter
only „RDS—) on the respective parts of the restricted territory where more than 100,000 points of supplies are connected.

Apart from the above-mentioned three companies in the electricity market there are also 159 holders of electricity distribution license. These are the operators of local distribution systems within the premises of both manufacturing and non-manufacturing companies where fewer than 100,000 points of supplies are connected.
- ZSE Energia, a. s., Stredoslovenská energetika a. s. (hereinafter only „SSE—) and Výcho-doslovenská energetika, a. s. (hereinafter only „VSE—) – dominant electricity suppliers (hereinaf-ter only „retail suppliers—), being part of the vertically integrated company that at the same time provides electricity distribution. A proportion of electricity supply of these three companies on the electricity consumption of the Slovak Republic in 2012 accounted for 47.18 %, which represents a 6.83 decline, compared to 2011. If needed, final electricity consumers also act as the last resort supplier on a respective part of the restricted territory.
- The overall number of entities that possess valid license for electricity supply is 407, of which 41 electricity suppliers provided electricity supply to household consumers.

Slovenia

Borzen: organisation of the electricity market
SODO: electricity distribution system operator
individual electricity distribution companies (EDCs) in the Republic of Slovenia: Elektro Celje, d. d., Elektro Gorenjska, d. d., Elektro Ljubljana, d. d., Elektro Maribor, d. d., Elektro Primorska, d. d. and some closed distribution systems in the Republic of Slovenia
Energy Agency: national regulatory authority of the Republic of Slovenia. It directs and supervises electricity and gas energy operators and carries out tasks regulating energy operators' activities in the field of heating and other energy gases
ELES: electric power transmission system

1.6. How is the power market organized, please give a detailed explanation ()? Are there any near future plans for market development?

Austria

Electricity is traded on the markets in the same way as other commodities, and prices are driven by the interplay of supply and demand. A variety of standardized products are offered on the exchanges; these are mainly differentiated by the delivery dates.
In the case of futures, a specified quantity of electricity is bought and delivered at a given price, over a predefined future period of time. The purpose is not physical fulfilment but hedging against future

spot price movements. Futures products differ according to whether they are baseload or peak-load contracts.
On the spot or day-ahead market, electricity is traded on an hourly basis for delivery on the following day. The arithmetic mean of all the hourly prices yields the base index, whereas on most European exchanges the peak index is the arithmetic mean of the prices from 8 am to 8 pm.

Bosnia and Herzegovina

Market participant submits daily schedule through ESS platform (ENTSO-E Scheduling System) to NOSBiH, either individually or through its BRP (Balance Responsible Party) as defined in the process of market participant registration. Each submitted daily schedule of BRP or market participant should be balanced for all the production/ purchase/reception of electrical energy and consumption/sale/supply of electrical energy for each trading period. Delivery format is defined in the ESS platform. Nominations and renominations of daily schedules are made within the time limits and in the manner defined in the "Uputstva za dostavljanje dnevnih rasporeda" (Instructions for Daily Schedules Delivery). The latest version of daily schedule approved by the NOSBiH is binding and used in imbalance calculations. [6]
Instructions for daily schedules delivery:
Daily schedules nominations in day in advance time frame (D-1) are carried out in two steps:

- nomination of transactions related to long-term rights to use cross-border transmission capacity (Yearly and Monthly cross-border capacities) which must be completed by 8:00 on "D-1" for the day "D";
- nomination of internal transactions and transactions related to daily rights to use cross-border transmission capacity that must be completed by 14:00 on "D-1" for the day "D".

Daily schedule nomination in the intraday time frame (D) can be carried out from 18:00 on "D-1" to "H-1" day "D", where "H" is an hour in which the planned exchange begins. [7]

Bulgaria

Please refer to Question 1.3. for a detailed answer.

Croatia

Please refer to Question 1.3. for a detailed answer.

Czech Republic

The market is organized as a day ahead market.

Germany

-Energy only market with main focus on Day ahead market (all physical orders)

-Strong Intraday trading to close open positions (all physical) with nomination until 45 min before delivery
-Balancing market (Prime, Secondary, Minute-reserve) described in https://www.regelleistung.net/ext/

Hungary

The Hungarian electricity market is organised according to the bellow mentioned graph:

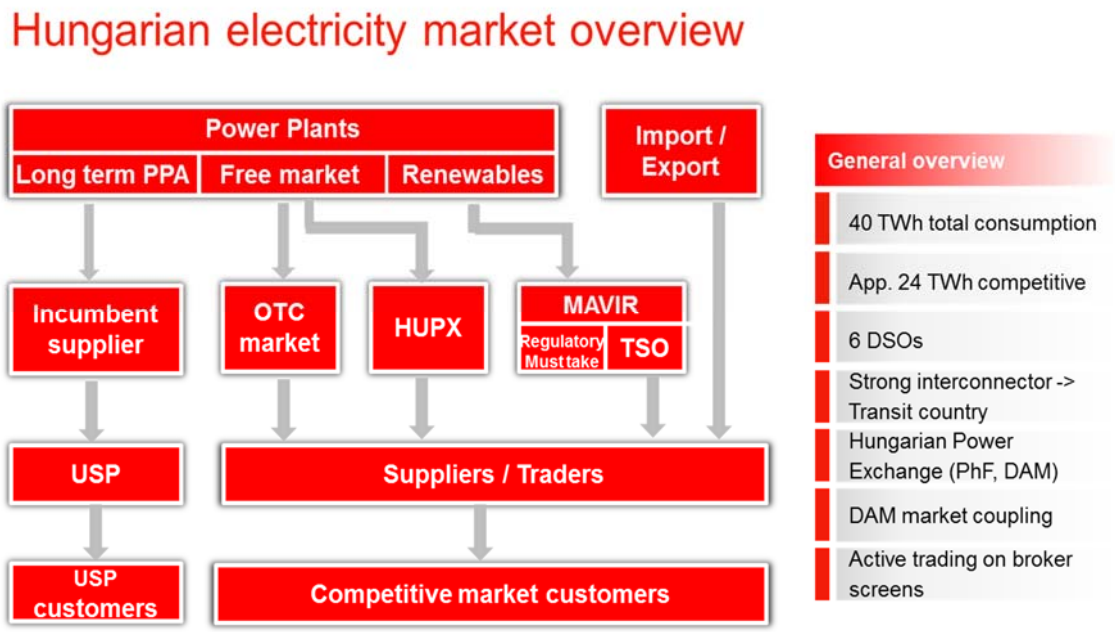


Figure A.1.6.1.

Montenegro

Power market is organized in such a way that the timetable is made for each hour of the following day and includes:
a) consumption plan (in MWh/h) in the intake and delivery points for each hour, as a result of the total amount of bilateral agreements,
b) production plan (in MWh/h) in the intake and delivery points for each hour, as a result of the total amount of bilateral agreements and
c) a plan of exchange (in MWh/h) in the intake and delivery points for each hour, as a result of the total amount of bilateral agreements.
Those responsible for the application timetables are obliged to Market Operator, up to 12 hours of the current day to submit their schedules for the next day.
The market operator is required to acknowledge receipt and time of receipt of each timetable to parties responsible for the application of the timetable within 30 minutes after admission. In the case that the party responsible for the application of the timetable does not receive confirmation of receipt, is requested to check with the Market Operator that the timetable was received.
The timetables that are not received within the prescribed time limit, the market operator does not include in the indicative timetable, but on their arrival and presence notifies the TSO and DSO.

The market operator shall indicatively perform timetable delivery TSO and DSO till 13 hours of the current day for the next day. OPS is required to immediately report to the Market Operator errors in the master schedule.
Correction of timetable framework is implemented by the procedure laid down in the Guidelines for the application and development of timetables.
At the moment of the introduction of the ESF format for reporting timetables recommended by ENTSO-E, the party responsible for the application will report timetables automatically through its information systems. [23]

Romania

Power market is organized based on balancing responsible parties (BRPs) system; Transelectrica has two BRPs: to control the losses and to control unplanned exchange with neighboring TSOs.
The participants buy (suppliers, traders and consumers) or sell (producers, suppliers, traders) the energy by the Long Term contract, Day-Ahead and Intraday markets. All the participants on the energy market have obligation to submit contract for their physical delivery one day in advance.

Serbia

Bilateral electricity market
Both electricity purchase and sales are organized on the bilateral market directly between market players, while on the wholesale bilateral market, the players trade in electricity at open market prices, while on the retail bilateral market, supply was organized at open market prices and regulated prices due to the fact that in 2015, all customers except for households and small customers were obliged to purchase electricity in the open market. Households and small customers had an option to select a supplier in the open market, but they could always switch back to the supplier of the last resort/public supplier.

Wholesale market
In 2015, wholesale electricity market was based on trade between suppliers since there are almost no independent electricity producers at all. The activities of the suppliers in the open market are mostly concerned with the field of cross-border exchange, mostly for transit through Serbia which is dominant due to the central geographic position of the power system of Serbia in the region with 8 existing borders, as well as for the purpose of export and import meant for final customers. In 2015, electricity export was higher than the import meant to cover the demand of customers in Serbia, due to favorable meteorological and hydrological situation and continual operations of thermal power plants since there were sufficient quantities of coal necessary for their electricity production.

The number of auction participants is rising, year by year. One of the most important reasons for this increase is the fact that by organizing joint auctions with neighboring system operators on some of the borders even entities which are not licensed in Serbia have access to cross-border capacities via these joint auctions. In 2015, capacity application was submitted by 58 participants in the market on all borders.

Year	2008	2009	2010	2011	2012	2013	2014	2015

Number of market players	30	31	35	35	45	37	47	58

There were 46 electricity market players entitled to nominate operational plans based on a relevant contract signed with PE EMS in 2015, while there were 41 of them actively participating. There were 38 participants dealing with cross-border exchanges, 8 of them dealing with the supply of final customers and one participant was purchasing electricity in the open market to meet its own demand.

EMS acting as TSO is responsible for organizing bilateral and balancing market. SEEPEX is acting as Operator of the organized day-ahead market. The both operators must have day-ahead hourly schedules. The detailed explanation is provided within the Market Code.

Slovakia

General availability of market

On 1 July 2009 the organized day-ahead market was opened in Slovakia. Before the day-ahead market was launched in 2009, the only possibility to trade electricity in Slovakia was on the basis of bilateral contracts. The integration of the Czech and Slovak day-ahead markets was established in accordance with a Cooperation Agreement between the Czech and Slovak TSOs relating to the "Czech and Slovak Electricity Markets Coupling" (MC) project. The TSOs has been charged with the task of organizing the common spot market coupling by using implicit auctions for the interconnector of the Czech Republic and Slovakia. Since 1 September 2009 the common spot market has been based on the principle of implicit capacity allocation through a Market Coupling mechanism. The capacity allocation procedure applies an identical scheduling and matching concept within the CEE region except for the gate closure time.

Electricity trading in the Slovak wholesale market is mainly organized by the Slovak Power Exchange company (SPX s.r.o.), which was founded in January 2005. The SPX platform enables registered market participants to trade electricity in delivery points of the TSOs from Slovakia, Czech and Hungary (SPX 2011).

The Ministry of Economy of the Slovak Republic established a separate regulating authority, the Electricity Market Operator (OKTE) to promote the development of the short term markets. OKTE was established as a subsidiary of SEPS on 1 January 2011 and is responsible for the registration and matching of orders, the settlement of daily market as well as for the publishing of data. Currently there are 34 listed electricity market participants registered by OKTE. From the beginning of the day-ahead market on 1 July 2009 until the end of 2009 the total supply through the market reached 529 GWh. In 2010 the overall day-ahead market results reported by OKTE was a total supply of around 2,005 GWh (OKTE 2011). Compared to the electricity consumption of 27,368 GWh, the amount of electricity traded on the day-ahead market has only a small share of around 8 % in 2010 (ÚRSO 2010).

OKTE provides the XMtrade®/ISOT information system portal to fulfil its obligations. The internet portal shall also promote the process of a common Czech-Slovak organized intra-day market, as well as the possibility of the introduction of a block or balancing market. These plans are also confirmed by the preliminary agreement between the Czech and Slovak TSOs, but until now there are no intraday

trading activities published on the website. There is also a discussion in Slovakia as to the further connection with neighboring markets on the basis of market coupling (ÚRSO 2010).

Intraday-market and gate closure

Currently there is a discussion between different market participants on opening an intraday market in Slovakia. According to CEZ Slovakia, the intraday market would be helpful for energy traders to lower their imbalance costs. However, OKTE pointed out that the opening of a Slovak Intra-Day market is currently not being considered due to an analysis, which confirmed that the Slovak market by itself would not be sufficiently liquid. According to United Energy Trading the low liquidity should not be a reason to avoid the implementation of an intraday market. Whether the intraday market would be liquid or not, can be concluded first when the market already works. OKTE stated that intraday trading could be included into the Czech-Slovak market coupling, but there are no further plans for this to happen. According to SEPS this discussion will also be influenced by the interconnector capacity available between the countries.

Slovenia

All participants of the organized electricity market should report concluded bilateral contracts (closed contracts) to Borzen. Day ahead indicative operating schedule is reported to Borzen by every balance group member. The difference between the amounts of bilateral contracts and scheduled demand, is balanced per day (spot) market.

1.7. After collecting all contracts which institution checks for physical feasibility of contracted delivery; who is in charge of making sure the contracts comply with the system and network constraints (line and transformers loadings, congestions)?

Austria

To ensure frequency and voltage stability, the amount of electricity fed into the grid must always be exactly the same as the amount that is extracted by the consumers. Producers and consumers are bundled in balance groups. Each balance group is obliged to balance energy consumption and generation within the group. In the event of unforeseen fluctuations in generation (e.g. through power plant failures, changing wind speeds in the case of wind power) or deviations from the expected consumption level, the energy balance in the grid must be guaranteed by the control area manager through the connection or disconnection of generation units (e.g. special backup power plants) ("minute reserve")

Bosnia and Herzegovina

For each concluded bilateral agreement, market participant is obliged to submit to NOSBiH information that is in this context referred to as contract notification. Contract notifications are delivered via

electronic platform “Contract Notification”, in which market participants enter the following information:

- Contract identification number,
- Contract parties EIC codes,
- Contract type (domestic trade, cross-border trade, transit),
- Place of receipt and delivery,
- Type of cross-border capacity,
- Contract duration,
- Agreed amounts and the corresponding hourly programs.

These requirements apply to all bilateral contracts, including contracts for export and import of electrical energy. As part of contract notifications, market participants do not need to submit prices and other confidential information of financial nature. The data submitted in the process of notifying about the contracts, NOSBiH uses to produce reports on internal and cross-border trade. Contract notifications of market participants related to same transaction must match, i.e. sales volumes of electrical energy must be equal to purchased volumes. NOSBiH does a cross-check of contract notifications provided by market participants and nominations submitted by each BRP and, in case of non-compliance, demands corrections. Agreed monthly report on internal and cross-border trade, NOSBiH submits to DERK, in charge entity regulators and market participants, no later than the 10th day of the month M for the month M-1. [6]

Bulgaria

This is the task of the Electricity System Operator EAD (ESO EAD), Bulgarian Independent transmission operator. Please see answer to question 1.2. for more specifics.

Croatia

This is the task of HOPS, the Croatian TSO. Please see answer to question 1.2. for more specifics.

Czech Republic

OTE check all the contracted delivery, OTE also has all measurement data

Germany

4 big transmission system operators
http://www.amprion.net/
http://www.50hertz.com/de/
https://www.transnetbw.de/de
http://www.tennet.eu/de/

Hungary

MAVIR (Hungarian TSO)

Montenegro

The parties are obliged all contractual obligations of the bilateral agreement, except commercial, to announce to the Market Operator, which enters it into the database. The market operator:
a) maintains records of bilateral agreements concluded in the electricity market in accordance with these Rules,
b) calculates the quantity of imbalances in delivery and electricity from timetables, as well as financial accounting and control of financial settlement of the established tolerances,
c) publishes the information necessary for the smooth operation of the market and energy activities in accordance with the Law on its website,
d) keeps records of suppliers and eligible customers and their mutual obligations,
e) establishes the rules and procedures of public bidding in accordance with the instructions of the Agency,
f) concludes contracts with suppliers in order to ensure minimum contribution of electricity produced from renewable energy sources and high efficiency cogeneration,
g) collects fees for promoting renewable energy sources and cogeneration from tariff suppliers and eligible customers,
h) concludes contracts with privileged producers who are eligible for price support scheme,
i) calculates, collects and distributes the funds collected from fees to encourage renewable energy and cogeneration producers of electricity from renewable sources and high efficiency cogeneration on the basis of contracts concluded,
j) gives an opinion on the rules for implementation of transparent operation and allocation of cross-border capacities for transmission of electricity.

Romania

The conditions under that a power plant or a consumer can be connected to the public energy network (to the TSO or DSO) are done by the TSO-s based on the Solution Study.

Serbia

EMS acting as TSO is responsible for organizing bilateral and balancing Market. SEEPEX is acting as Operator of the organized day-ahead market. The both operators must have day-ahead hourly schedules.

Slovakia

In Slovakia, there is effective the EU directive no. 1227/2011 for REMIT (Regulation on Wholesale Energy Market Integrity and Transparency), where participants of wholesale market have a duty to

provide information regarding wholesale market contracts to ACER. This is done especcialy for checking and transparrency purposes.

Within REMIT mechanism, there is a rolel of RRM (registered reporting mechanism to ACER). In Slovakia, there stands this role market operator – OKTE. For this could be nominated also other parties.

REMIT contracts are transactions concluded at organized trading venues and bilateral contracts for the physical supply of electricity and their derivatives, the provision of transmission capacities and the supply of anciliary and system balancing services.

The aim of REMIT is to ensure that energy consumers and other market participants can have confidence in the integrity of electricity so that prices set on wholesale energy markets reflect a fair and competitive interplay between supply and demand and that profits from market abuse.

Slovenia

Borzen, d.o.o.

1.8. Please provide conceptual description of current market design including interactions between market participants such as contractual, financial etc.

Austria

	CAM	CSA	BRP	Supplier / retailer	Trader	TSO/DSO	Consumer	Producer
CAM								
CSA	Information exchange contracts							
BRP	Information exchange contracts	BRP contract						
Supplier / retailer	-	Information provision contract	Information exchange contracts	-				
Trader	-	-	Information exchange contracts	Electricity supply contract	Electricity trade contract			
TSO/DSO	-	Information exchange contracts	Information exchange contracts	-	-	System access contract		
Consumer	-	-	-	Electricity supply contract	-	System access contract		
Producer	Information exchange contracts	-	Information exchange contracts	Electricity supply contract	Electricity supply contract	System access contract	-	

Table A.1.8.1.

Bosnia and Herzegovina

Not available.

Bulgaria

The current market is best described with the following Figure, taken from http://energeo.bg/en/electricity-market

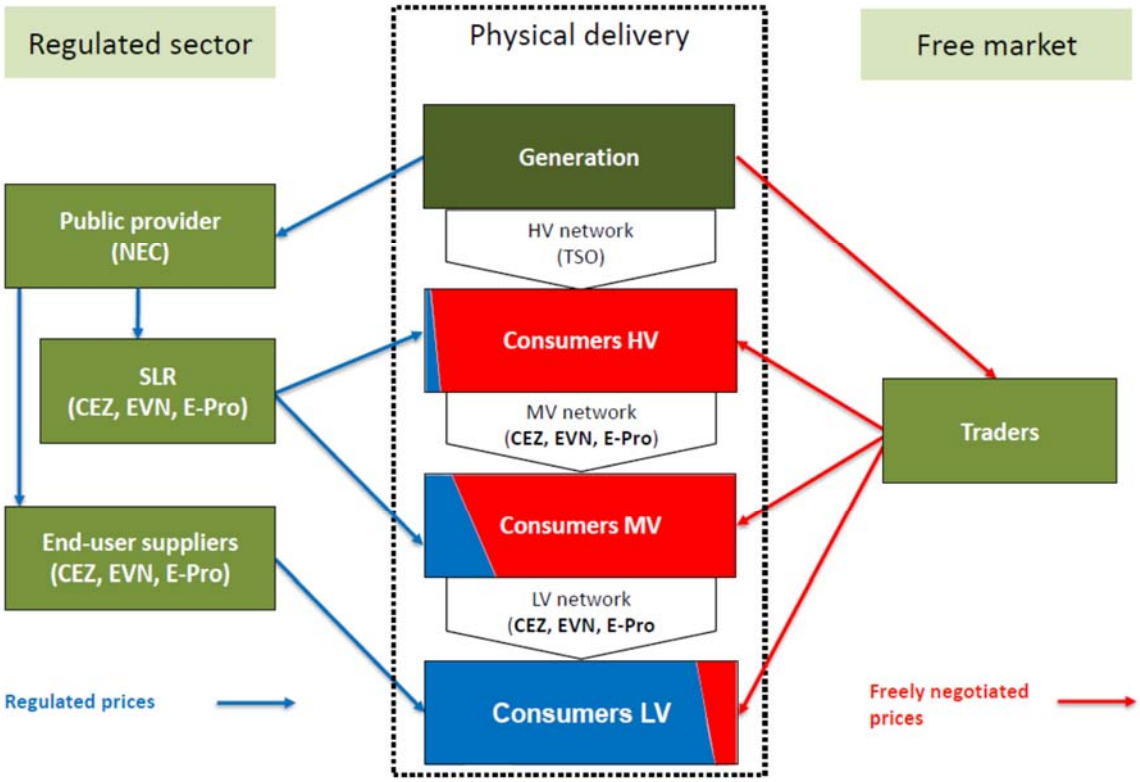


Figure A.1.8.2. Bulgarian electricity market structure as of 1.07.2014.

Croatia

The current market is best described with the following Figure, taken from http://www.hrote.hr/market-model

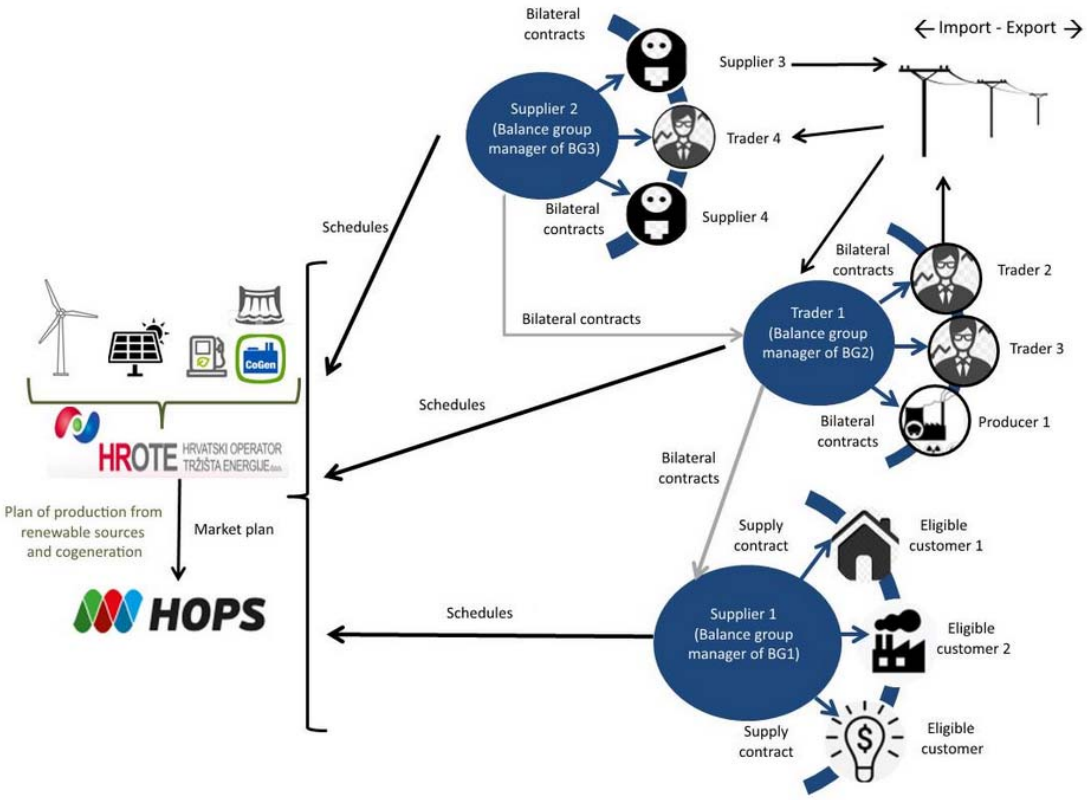


Figure A.1.8.3 description

Czech Republic

No information available

Germany

Energy only market with mainly physical transactions however financial transaction via EEX continuously increases volume. Currently 50% of all transactions financial
Contractual basis: EFET contract or contract with EEX/EPEX-Spot

Hungary

Market participants' relations are shown in the diagram in 1.6.

Montenegro

Not available.

Romania

Please see the answer of 6th question.

Serbia

The concept is that the participants enter into contracts between themselves and the transactions are confirmed by submitting the data to „ELEKTROMREŽA SRBIJE“ by the balancing responsible parties. In addition there is the possibility of buying e.e. on the Stock Exchange.

Slovakia

Participants in the Slovak electricity market include one major generation company and three large distribution and supply companies, which cover the entire territory of the country. Slovenské elektrárne, a.s (SE) is the dominant electricity producer with a share of 73% of electricity generation in Slovakia in 2009 from its own sources. Besides the three major distribution companies which each deliver a regional distribution area, there are also 167 smaller supply licensees with less than 100,000 delivery points. The total volume of the electricity supplied by the three main suppliers accounted for almost 57% of the Slovak consumption in 2009. Slovakia has a single TSO Slovenská elektrizačná a prenosová sústava, a. s. (SEPS), which is responsible for dispatch and balancing. Due to the central location of Slovakia in Central Eastern Europe, it has a relatively high interconnector capacity with the Czech Republic, Hungary, Poland and Ukraine of around 10,000 MW in both directions. However, there is only a minor amount of this capacity which is freely available (ÚRSO 2010).

Slovenia

See answer at 1.6.

2. Bilateral contracts (if existing)

2.1. What is a percentage of bilateral contracting in power market?

Austria

~45% physical - OTC
~55% financial

Bosnia and Herzegovina

The percentage of bilateral contracting in power market is 100%.

Bulgaria

Please refer to Question 1.3 for answer – most of the electricity trade in Bulgaria is done by bilateral contracting (rough estimate is over 90%).

Croatia

Please refer to Question 1.3 for answer – most of the electricity trade in Croatia is done by bilateral contracting.

Czech Republic

Approximately 60%

Germany

-50% physical OTC deals
-50% financial via EEX Power Exchange

Hungary

Ratio of bilateral trading on day-ahead market: approx. 1/3 is traded on the OTC market, 2/3 is traded via exchange. As the physical future market of the Hungarian Power exchange is quite illiquid, we can say that only bilateral trading exists on the forward market.

Montenegro

The percentage of bilateral contracting in power market is 100%.

Romania

On the power exchange site (OPCOM) there can be found the annual reports where can be found the percentage of bilateral contracting in the energy market. The web address is www.opcom.ro. For example 58.55% for February 2017.

Serbia

In 2015 63% of electricity was sold through bilateral contract to households and small consumers. [35]

Slovakia

Trading is mostly performed through bilateral contracts.

Slovenia

Between 75% and 90 %.

2.2. Which market participant can participate in the bilateral market and make contracts?

Austria

Any participant who is an accredited member of a balance group and thus having a trading license.

Bosnia and Herzegovina

Suppliers and traders can participate in the bilateral market and make contracts.

Bulgaria

Please refer to Question 1.3 for answer.

Croatia

Please refer to Question 1.3 for answer.

Czech Republic

all

Germany

Bilateral market is a physical market but also banks and other financial institutions like hedge funds (without physical asset/sales position) can trade physical power based on an EFET contract.

Hungary

Any participant who has trading licence is able to make contracts on the wholesale energy market and can conclude bilateral trades. Only respective trading contracts are needed (mainly MTA, EFET contracts).

Montenegro

Suppliers and traders can participate in the bilateral market and make contracts.

Romania

Producers, suppliers, traders and consumers.

Serbia

The Law on Energy [36] or Market Code in the year of the incentive period does not make distinction between Market Participants defined under 1.4 and Bilateral Market Participants.

Slovakia

The Slovak wholesale electricity market mainly depends on bilateral contracts. On 1 July 2009 the organised day-ahead market was opened in Slovakia on the basis of a common market coupling between the Czech Republic and Slovakia. Since 1 September 2009 the common spot market has been based on the principle of implicit capacity allocation through a Market Coupling mechanism. In 2010 approximately 8 % of the Slovak electricity consumption was traded on the day-ahead market. The Slovak electricity generation is dominated by Slovenské elektrárne, a.s, which produced 73 % of electricity generation in Slovakia in 2009 from its own sources. Including long-term contracted capacities, it ensures around 80% of the Slovak consumption. Currently there is neither an intraday market nor a balancing market available in Slovakia. However, there is an ongoing discussion between market participants on setting up both markets, in particular regarding the implementation of the intraday market on the Czech-Slovak interconnector.

Slovenia

Anyone who has a trading license for energy activities.

3. Power exchange

3.1. Does the power exchange exist and if yes – when was it established? (Subsequent questions for the Power exchange bullet should be addressed only if the answer to this question was positive).

Austria

Yes, since 2002: EXAA

Bosnia and Herzegovina

In Bosnia and Herzegovina the power exchange is not yet established.
So, there is no answer for other questions in chapter 1.3.

Bulgaria

Power exchange exists and it has been in operation since 19 January 2016.

Croatia

Power exchange exists and it has been in operation since 10 February 2016.

Czech Republic

Yes in 2007

Germany

Power Exchange does exist:
https://www.eex.com/en/ for curve trading (set up 2002)
http://www.epexspot.com/en/ for the Day ahead/intraday market (set up 2008 but out of EEX which was set up 2002)

- Power exchange EEX (Leipzig) since 2002
- Spot exchange shifted to EPEX Spot (Paris) in 2008

Hungary

Hungarian Power Exchange exists since July 2010.

Montenegro

In Montenegro the power exchange is not yet established.

Romania

The power exchange exists from 2007.

Serbia

Southeastern Europe power exchange (SEEPEX) electricity market was founded in late 2015 and started to work on February 17, 2016. It was founded by "Elektromreže Srbije" (75%) and Evropska berza električne energije EPEX SPOT (25%).

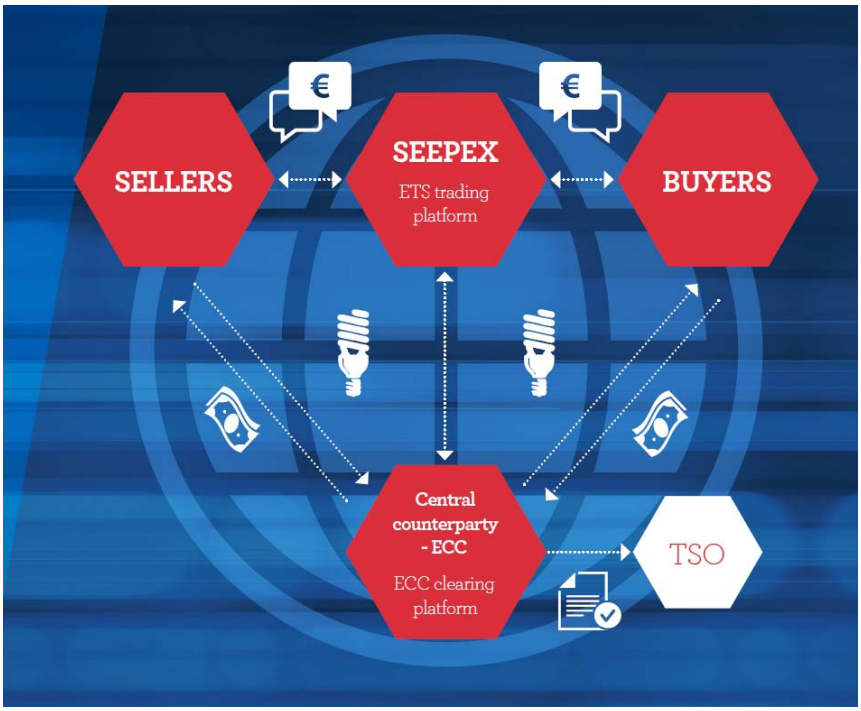


Figure A.3.1.1. Trading Scheme on SEEPEX

Slovakia

POWER EXCHANGE CENTRAL EUROPE, a.s. (PXE) was established on 8 January 2007 as Energetická burza Praha. PXE offers services on the electricity market, namely anonymous trading in, and settlement of, standardised products, where a single account provides access to the electricity market with the place of delivery in the Czech Republic, Slovakia, Hungary, Poland and Romania.

PXE also enables end customers – in particular firms, municipalities, government organisations and any large consumers in general – to find the most suitable electricity and natural gas supplier via electronic auctions at the best price possible and under fully transparent conditions.

In 2016, PXE became a part of the EEX Group, after the European Energy Exchange (EEX) acquired 66.67% of PXE shares. PXE has been closely cooperating with the EEX Group since 2012, through the ECC clearing house, which provides clearing and settlement of trades for the Prague exchange.

PXE continues to cooperate closely with entities of the PX group, which includes Burza cenných papírů Praha, a.s., (the Prague Stock Exchange, PSE) – one-third owner of PXE, and Centrální depozitář cenných papírů, a.s. (the Central Securities Depository Prague, CSD Prague). PSE is the largest and oldest securities market organiser in the Czech Republic. CSD Prague, which has a dominant position in settlement of securities trades on the Czech capital market, maintains a central register of dematerialised securities issued in the Czech Republic.

Slovenia

BSP Southpool, estabilshed in 2008.

3.2. What types of markets exist at the power exchange (continuous multiday market, day ahead hour auctions, day ahead intra-hour auctions, intraday auctions, intraday continuous market…)?

Austria

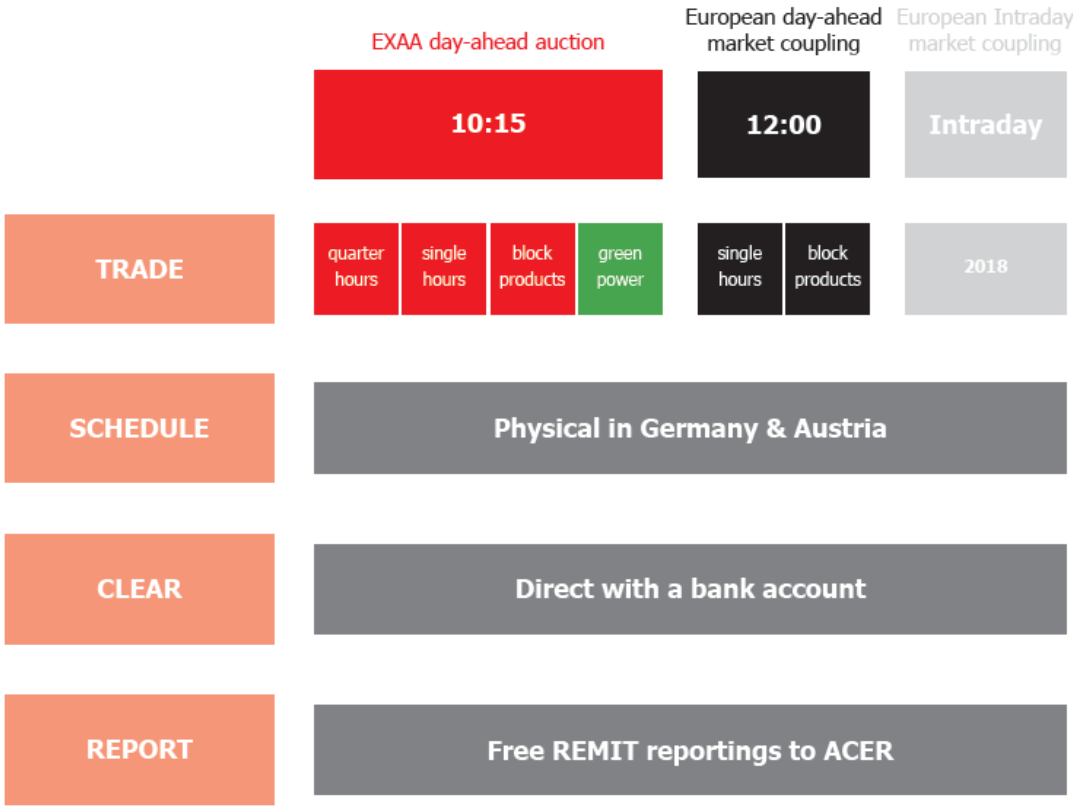


Figure A.3.2.1.

Bosnia and Herzegovina

-

Bulgaria

Day-ahead hourly auctions already exist, while intraday continuous market is expected to be operational in the fourth quarter of 2017.

Croatia

Day-ahead and intraday power exchange on CROPEX exist.

Czech Republic

In the power market are present:

- Base Load - delivery all hours of all days

- Peak Load - delivery Monday to Friday 8:00 a.m. - 8:00 p.m. CET (GMT+1) regardless the public holidays
- Extended 15h Peak Load – delivery Monday to Friday 7:00 a.m. - 10:00 p.m. CET (GMT+1) - applicable in Poland
- day-ahead
- weekend, weekend days

Monthly contracts in delivery are not tradable. PXE publishes the price only for the purpose of settlement.

Germany

-EPEX Spot

- Continuous multiday market
- Day ahead auction (hourly/quarter hourly)
- Intraday continuous trading
- Intraday auction

-EEX Continuous multiday market for financial and physical Non-MTF Futures

Hungary

The following markets exist on the Hungarian Power Exchange:

-Physical Futures
-Day-ahead
-Intraday market.

Montenegro

No information available

Romania

The power exchange offers the followings markets: Bilateral Contracts, Day-Ahead hour auctions market, Intraday.

Serbia

The auction for each hour of the following day. Day ahead market place for single hour products. Orders contain up to 256 price/quantity combinations for each hour of the following day. A blind auction takes place once a day, 365 days a year. ECC as a central counterparty is responsible for financial clearing and physical delivery. ECC schedule provided to TSO is mandatory.

Slovakia

On 11 July 2013, representatives of the national regulatory authorities (ERÚ, ÚRSO, HEA, URE and ANRE), transmission system operators (ČEPS, SEPS, MAVIR, PSE, and Transelectrica) and market operators/power exchanges (OTE, OKTE, HUPX, TGE, and OPCOM) from the Czech Republic, Slovakia, Hungary, Poland and Romania signed the Memorandum of Understanding on cooperation with respect to Romania's and Poland's adhesion to the integrated day-ahead electricity markets of the Czech Republic, Slovakia and Hungary.

The Czech Republic, Slovakia and Hungary have been successfully operating coupled day-ahead electricity markets (so called CZ-SK-HU Market Coupling) since 11 September 2012. Romania and Poland decided to join the trilateral project in order to benefit from the integration and to contribute to the development of the single European Internal Electricity Market. Coupling the national electricity markets based on the target model – Single Price Market Coupling used for the day-ahead electricity trading and implicit cross-border transmission capacity allocation – should bring a harmonised approach to market organisation, more effective usage of cross-border transmission capacities, more competition as well as more stable and convergent electricity wholesale prices and deeper market liquidity.

This pentalateral project of market coupling is called 5Market Market Coupling (5M MC). It will be developed in accordance with European targets and the future EU legislation taking into account the views and demands of the affected market players as well.

Slovenia

Spot market – Day-Ahead Auction trading (hourly products), Intraday Continuous trading (Hourly, 15 minutes, hourly and 15-min Block products, Base, Peak), Intraday Auction trading (hourly products)

3.3. What is liquidity of the power exchange for each specific markets and what is the total market liquidity (calculated as consumed/traded energy in specific time period)?

Austria

Since the Austrian electricity market is bound strongly to the German market, main exchanges are with the neighbour country

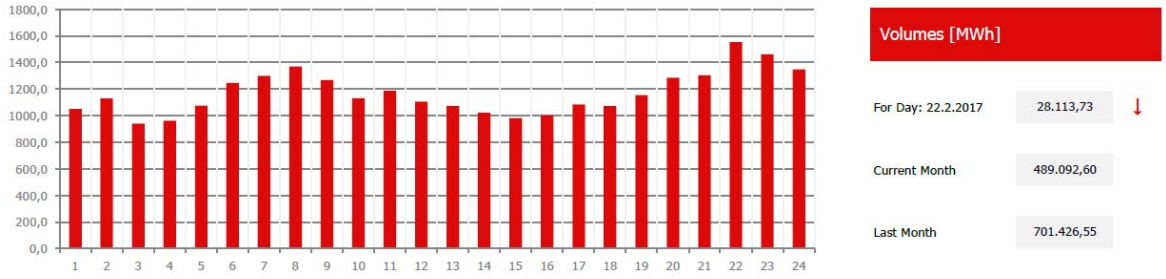


Figure A.3.3.1.

Bosnia and Herzegovina

No information available

Bulgaria

No information available.

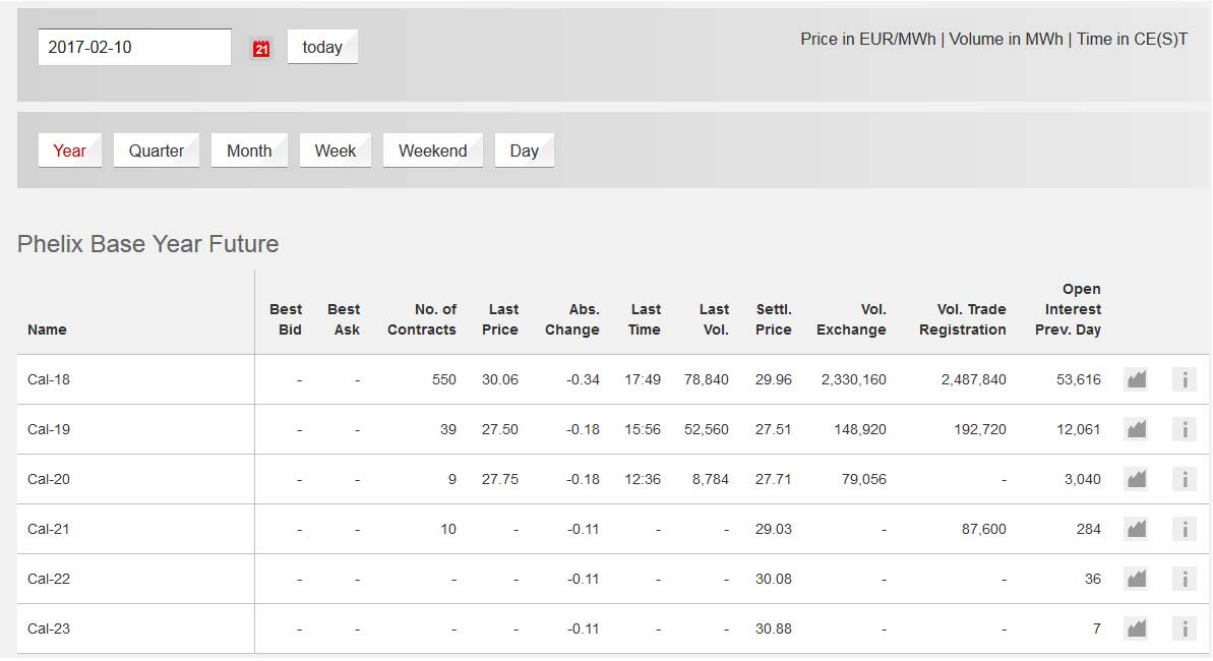
Croatia

From 10 February 2016 till the end of 2016, 0,3 TWh was traded on CROPEX . Liquidity is continuously increasing and the trend is expected to continue in the future as well.

Czech Republic

No data

Germany



2017-02-10 today

Price in EUR/MWh | Volume in MWh | Time in CE(S)T

Year Quarter Month Week Weekend Day

Phelix Base Year Future

Name	Best Bid	Best Ask	No. of Contracts	Last Price	Abs. Change	Last Time	Last Vol.	Settl. Price	Vol. Exchange	Vol. Trade Registration	Open Interest Prev. Day
Cal-18	-	-	550	30.06	-0.34	17:49	78,840	29.96	2,330,160	2,487,840	53,616
Cal-19	-	-	39	27.50	-0.18	15:56	52,560	27.51	148,920	192,720	12,061
Cal-20	-	-	9	27.75	-0.18	12:36	8,784	27.71	79,056	-	3,040
Cal-21	-	-	10	-	-0.11	-	-	29.03	-	87,600	284
Cal-22	-	-	-	-	-0.11	-	-	30.08	-	-	36
Cal-23	-	-	-	-	-0.11	-	-	30.88	-	-	7

Figure A.3.3.2.

Hungary

Traded volumes at Hungarian Power Exchange in 2016:

-Day ahead market: 17.720 GWh

-Physical Futures: 6.858 GWh

Montenegro

No information available

Romania

No information available

Serbia

Day Base Load	**Wed, 15/02**	**Thu, 16/02**	**Fri, 17/02**	**Sat, 18/02**	**Sun, 19/02**	**Mon, 20/02**	**Tue, 21/02**
Prices (€ /MWh)	48,85	54,90	56,11	49,96	40,95	51,73	53,60
Volumes (MWh)	890,3	924,9	260,2	641,6	594,5	871,4	822,7
Day Peak Load							
Prices (€ /MWh)	55,15	60,24	62,44	52,22	45,36	60,27	61,23
Volumes (MWh)	449,8	601,8	156,1	486,9	325,3	323,8	272,0

Table A.3.3.3.

Figure A.3.3.4. Annual data of power market-price

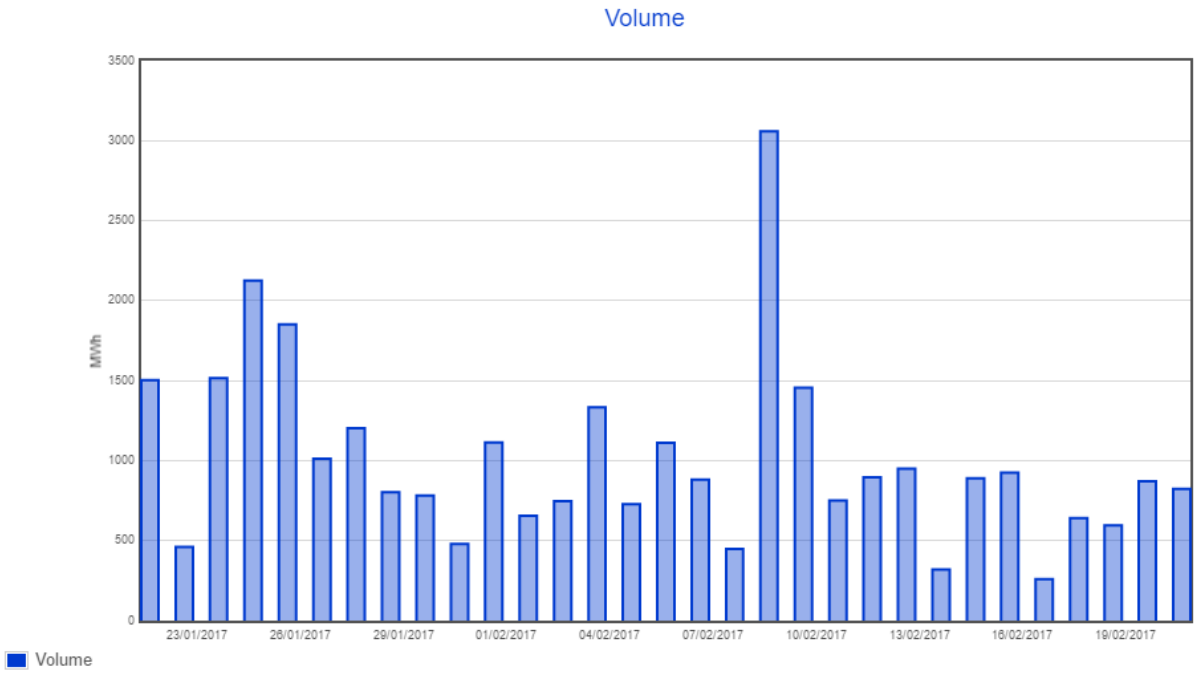


Figure A.3.3.5. Annual data of power market-volume

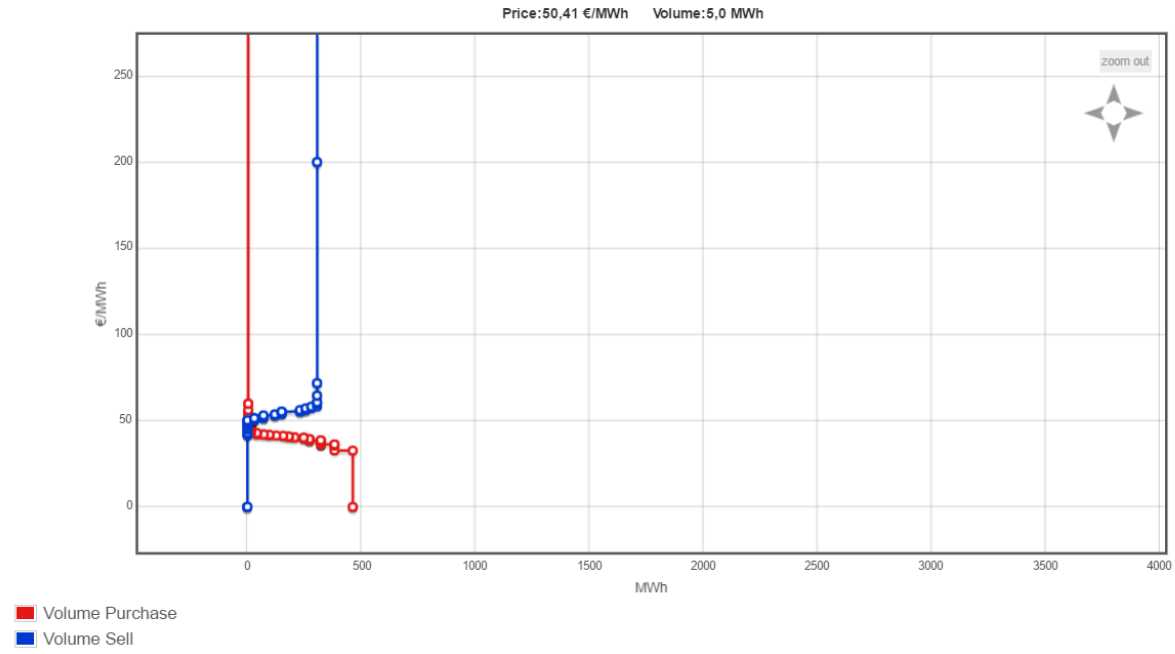


Figure A.3.3.6. Aggregated curve on 18-2-2017 (00-01)[38]

Slovakia

Electricity supply in the Slovak Republic is relatively reliable, with the minimum occurrence of outages that would endanger the security of electricity supply. The difference between consumption and production in 2014 could also be covered by domestic sources, but the import of electricity was more efficient on the market than its production in the Slovak Republic and was not caused by insufficient sources of electricity in the Slovak Republic.

PXE is the most liquid electricity power exchange office in CEE region. It is also a prefered power exchange office. For futures it operates in Czech republic, Slovakia, Hungary, Poland and Romania. In PXE, there is a possibility to use auction services for endusers. Market is dedicated especialy for companies, cities and public sector.

Total volume of trading in 2016 on PXE (CEE region) was more than 33 TWh which represents 23% increase in comparison with previou year.

Slovenia

Traded volumes at Slovenian power exchange in 2015:

- Day-ahead market: 6.071.966 MWh
- Intraday market: 3.715 MWh

3.4. What products are available at the power exchange (hour blocks, linked blocks, exclusive group…)?

Austria

See graphic above (3.2)

Bosnia and Herzegovina

No information available

Bulgaria

Unknown.

Croatia

Day-ahead trading includes continuous submission of Hourly Orders until Gate Closure, after which qualifying Orders will be matched using the Auction method set out in the Day Ahead Market Regulations.

For intraday trading, continuous trading is carried out during Trading Hours during which transactions are matched automatically. 6 types of orders are defined (Fill, All-or-Nothing, Fill-or-Kill, Immediate-or-Cancel, Iceberg, Block).

For details see:
https://www.cropex.hr/images/nova_pravila_2017.1.1/engl/3._Product_specification_18.12.pdf

Czech Republic

Spot market – Day-Ahead Auction trading (hourly products), Intraday Continuous trading (Hourly, 15 minutes, hourly and 15-min Block products, Base, Peak), Intraday Auction trading (hourly products)

Germany

Type of orders

Individual hours

Orders contain up to 256 price/quantity combinations for each hour of the following day. Prices must be between -500 €/MWh and 3000 €/MWh. The 256 prices are not necessarily the same for each hour. A volume – whether positive, negative or nil – must be entered at the price limits. A price-inelastic order is sent by putting the same quantity at the price limits.

Blocks

Block orders are used to link several hours on an all-or-none basis, which means that either the bid is matched on all of the hours or it is entirely rejected. Block orders have a lower priority compared with single hourly orders. The quantity may be different for every hour of the block. A block order is executed for its full quantity only. A block order is executed or not by comparing its price with the volume-weighted average of the hourly market clearing prices related to the hours contained in the block.

Standard block orders

Block **Baseload** covering hours 1 to 24
Block **Peakload** covering hours 9 to 20
Block **Night** covering hours 1 to 6
Block **Morning** covering hours 7 to 10
Block **High Noon** covering hours 11 to 14
Block **Afternoon** covering hours 15 to 18
Block **Evening** covering hours 19 to 24
Block **Rush Hour** covering hours 17 to 20
Block **Off-Peak 1** covering hours 1 to 8
Block **Off-Peak 2** covering hours 21 to 24
Block **Business** covering hours 9 to 16
Block **Middle-Night** covering hours 1 to 4
Block **Early Morning** covering hours 5 to 8
Block **Late Morning** covering hours 9 to 12
Block **Early Afternoon** covering hours 13 to 16
Block **Off-Peak** covering hours 1 to 8 and 21 to 24
Block **Sun-Peak** covering hours 11 to 16

User Defined Blocks

Trading members have also the possibility to submit user-defined blocks linking several hours of their choice.

SMART BLOCKS

It is also possible to trade smart blocks: smart blocks bids available: linked block orders and exclusive block orders.

Linked block orders:
- A linked block orders family is a set of block orders which have together a linked execution constraint.

Exclusive block orders:
- An exclusive group of block orders is a set of block orders within which a maximum of one block order can be executed.
- An exclusive block order is a block order which is part of an exclusive group. Such a block order has to fulfil the execution constraints of a simple block order.

For more information on the smart blocks, please click here.

Hungary

There are hour blocks and exclusive groups (OTC label) as traded products on the exchange

Montenegro

No information available

Romania

No information available

Serbia

SEEPEX operates an organized electricity market, with the standardized electricity products and delivery within a day-ahead time frame with the aim to offer electricity product for trading in Serbia and in the SEE region. Auction products are: Hour blocks, linked blocks and exclusive group.

Slovakia

It is depending on a exchange trade office that is object of interest of each supplier. In Slovakia, there is usualy used PXE and EEX power exchange office for wholesale market.

For example, PXE echange power office enables trading in electricity in the form of commodity's „futures" with financial and physical settlement. The physical point of supply is the transmission system in the Czech Republic, Slovakia, Hungary, Poland and Romania. In Slovakia, we could recognize:

- Base load – ALL DAYS 0:00 – 24:00
- Peak load – MO – FR 8:00 – 20:00 (incl. holidays)

Slovenia

Spot market – Day-Ahead Auction trading (hourly products), Intraday Continuous trading (Hourly, 15 minutes, hourly and 15-min Block products, Base, Peak), Intraday Auction trading (hourly products)

3.5. Who can bid in the power market?

Austria

Participants with a trading license

Bosnia and Herzegovina

No information available

Bulgaria

Members of the power exchange can be all market participants who have the right to trade on the Bulgarian electricity market. To become members of the power exchange market, participants have to sign a Membership Agreement with IBEX.
For more details, check: http://www.ibex.bg/en/become-a-member/dam/admission-of-exchange-members/

Croatia

Members of the power exchange trade on CROPEX. To become a member, participants have to sign a Membership Agreement with CROPEX.
Requirements for the Membership include a valid Energy License issued by the Croatian Energy Regulatory Agency (HERA), a Balance Responsibility Agreement with Croatian Transmission System Operator Ltd. (HOPS) and a Electricity Market Participation Agreement with CROATIAN ENERGY MARKET OPERATOR Ltd. (HROTE).

More on CPOPEX membership:
https://www.cropex.hr/en/membership/how-to-become-a-member.html
http://www.cropex.hr/images/nova_pravila_2017.1.1/engl/0._Trading_Rules_-_General_Terms_18.12.pdf

Czech Republic

All registred participant

Germany

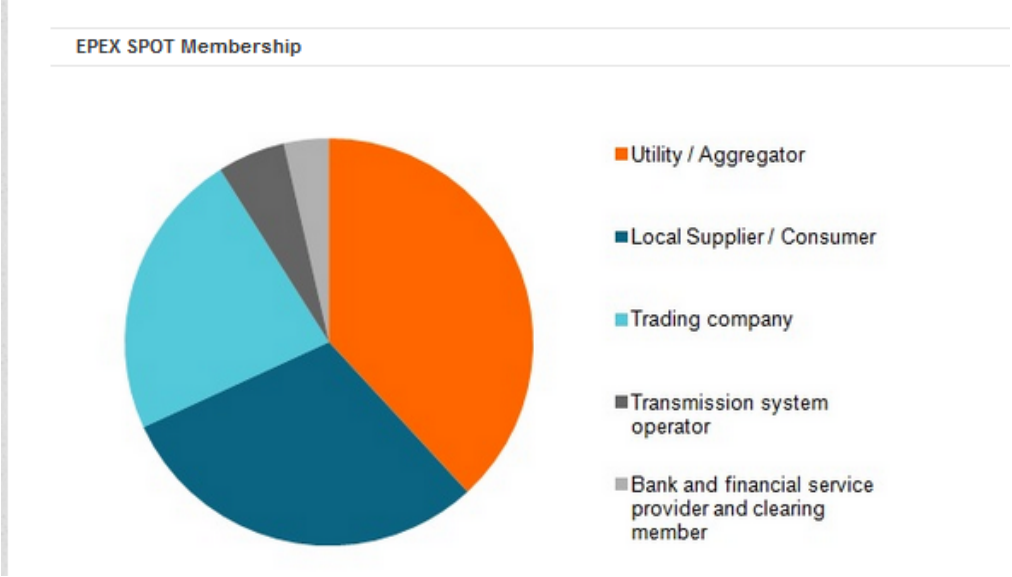


Figure A.3.5.1.

Hungary

Only exchange members are able to trade on HUPX. The below listed requirements are essential to get admission to the HUPX:

-Trading licence issued by the National Regulatory Authority
-Own balance group, or approved Balance group membership
-Membership at European Commodity Clearing
-Traders with HUPX or EEX trading exam

Montenegro

No information available

Romania

In the power exchange market can bid producers, suppliers, traders and consumers.
In the balancing market can bid only producers.

Serbia

On the organized electricity market domestic and foreign companies possessing a valid license issued by the Energy Agency can participate. Foreign companies must have licenses for the wholesale supply of electricity, while the domestic need to have one of the following licenses: a wholesale supply license, license for supply, license for electricity production. As a domestic participant, the end user who purchases electricity for its own needs (industrial consumers) may appear. Currently, on the organized electricity market there are 11 participants registered [39]

Slovakia

A person authorized to trade on the Exchange shall be a person who meets the conditions of participation in trading on a Market of the Exchange in accordance with legal regulations, the Exchange Rules, and the Exchange Regulations .

Slovenia

BSP Market participants.

3.6. What are the future plans for power exchange development (establishment of new market types, increasing liquidity, market coupling …)?

Austria

European intraday market coupling (from 2018 on)

Bosnia and Herzegovina

No information available

Bulgaria

The Bulgarian national regulatory authority (Energy and Water Regulatory Commission), the Bulgarian transmission system operator (Electricity System Operator EAD) and the Bulgarian power exchange

(Independent Bulgarian Energy Exchange EAD) have formally declared their willingness to actively participate in the WB6 regional electricity market integration initiative.

The next steps for power exchange development are introduction of intraday market platform at IBEX.

Croatia

The first goal is to couple to Croatian market with Slovenia and Hungary. If possible, it is planned to couple even before the implementation timeframe related to CORE CCR in which Croatian borders with Slovenia and Hungary are included.

For CORE CCR timelines see:

https://www.entsoe.eu/major-projects/network-code-implementation/cacm/core-ccr/Pages/default.aspx

Czech Republic

Market integration within EU, market coupling with AUT and DE.

Germany

Increased activity in Market Coupling (implicit auctions via flow based mechanism)

Hungary

HUPX DAM is working according to the pre-defined requirements, there is enough liquidity for the market participants and the DAM prices are considered as the Hungarian Market Price. Currently both the PhF and ID market is in lack of liquidity. In case of PhF, the trading fees are quite high, therefore the market participants trade on the OTC market instead of using the exchange. The liquidity of the ID market is also highly below the requirements. So the main aim of the Exchange is to increase liquidity of the PhF and ID market. In case of ID market some regulatory support is also envisaged, as some of the production of weather dependent power plants seems to be traded on this market in the near future thanks to the new regulations.

Montenegro

No information available

Romania

The future plans for power exchange are part of European regulatory framework. Now, Transelectrica is coupled under 4MMC (with Hungary, Slovakia and Czech Republic) on the DAM (Day Ahead Market).

Serbia

Connecting with other stock exchanges, to Central Europe and Italy.

Slovakia

In January 2016, the shareholders of PXE signed an agreement to enter a strategic partner into PXE. Based on this Agreement over the 2016 transferred a two-third share to European Energy Exchange AG (EEX). EEX is the largest European energy stock owned by German Deutsche Börse AG. This activity will have also positive effect on trading on PXE. PXE products became therefore available to other market parcicipants and could lead to increased market liquidity.

PXE is responsible for the entire Central and Eastern European region, which was already under the EEX Group geographical coverage, including any further expansion.

There is a plan of EEX and PXE consolidation in terms of a number of structural changes in PXE service offerings. PXE launched trading in 2016 for end-consumers in a new business system.

Slovenia

Increase liquidity, market coupling, new products

4. Cross-border trading

4.1. Which institution is the organizer of the cross-border trading?

Austria

Austrian Power Grid AG; E-Control

Bosnia and Herzegovina

Market participant who holds the license for international trade and who wants to import or export electricity must ensure right to use the cross-border transmission capacity. NOS BiH will accept nominations of daily schedule for cross-border transactions only to those market participants who are entitled to use cross-border transmission capacity. [6]
In Bosnia and Herzegovina there is still no organized electricity market. Currently, the market includes retail and wholesale energy trading. The wholesale market is related to trade between licensed companies for production, supply and trade of electricity. The retail market relates to the supply of end customers by licensed companies for electricity supply. Transactions of electricity within the daily schedules are submitted to NOSBiH (daily schedule for the day D + 1 is delivered in the day D, and any change of schedule is also submitted to NOSBiH during intraday activity).

Bulgaria

Independent transmission operator ESO EAD organises auctions for allocation of cross-border transmission capacity in accordance with the requirements of Regulation (EC) 714/2009 in coordination with the system operators of the neighbouring countries pursuant to the Auction Rules, approved by SEWRC and published on the internet site of the independent transmission operator. In case agreement is not reached for the execution of bilateral coordinated auctions with any of the neighbouring system operators, the independent transmission operator shall apply temporary rules for allocation of 50 % of the transmission capacity on the relevant border. The rules shall be approved by SEWRC and shall be published on the internet site of the independent transmission operator.

Croatia

In Croatia, cross-border trading is handled by the Croatian transmission system operator (HOPS).
All market participants from Croatian market zone can trade with electricity using cross border transmission capacities. Capacity allocation in Croatia is done on an annual, monthly or daily auction and on intraday allocation organised by HOPS, TSOs in neighbouring countries or the Joint Allocation Offices (JAO) and SEE-CAO. Annual, monthly and daily auctions between Croatia and Slovenia and between Croatia and Hungary are organised by Joint Allocation Office. Intraday allocation of cross border trading capacity between Croatia and Hungary started in the beginning of 2018. Intraday cross border allocation between Croatia and Slovenia is organised by Slovenian TSO. The Coordinated Auction Office in South East Europe (SEE-CAO) is responsible for organizing of annual, monthly and daily auctions between Croatia and Bosnia and Herzegovina, while HOPS is responsible for intraday cross border allocation. HOPS is responsible for organizing annual and monthly auctions between Croatia and Serbia, while Serbian TSO is responsible for daily and intraday auctions (Serbian borders are not included in SEE-CAO).

Czech Republic

Joint Allocation Office S.A. (JAO)

Germany

http://www.jao.eu/main
Joint Allocation Office

Hungary

	Yearly auction	Monthly auction	Daily auction	Intraday auction
Austrian border	JAO	JAO	JAO	CEPS
Slovakian border	JAO	JAO	CZ-SK-HU-RO MC	CEPS
Croatian border	JAO	JAO	JAO	-
Serbian border	MAVIR	MAVIR	EMS	EMS
Romanian border	MAVIR	MAVIR	CZ-SK-HU-RO MC	TEL
Ukrainian border	-	MAVIR	MAVIR	-

Table A.4.1.1.

Montenegro

Operator of the power market is the organizer of the cross-border trading and coordinates the activities of sales and trade of electricity, in particular:
a) sales of electricity produced,
b) imports of electricity to meet the needs of EPCG AD,
c) exports of electricity,
d) continuing analysis of the electricity market,
e) all activities related to the purchase and sale of electric energy in an optimal way in order to maximize profits and reliable supply. [24]

Romania

Transelectrica organizes the cross-border trading.

Serbia

The organizer of the cross-border trading is PE EMS.

Slovakia

Generally, in Slovakia cross-border trading of electricity is organised by SEPS.

The following essential requirements for cross-border transmission apply:

- Conclusion of an Agreement on Transmission of Electricity through Cross-border Connection with SEPS;
- Agreement on Settlement of Imbalances concluded with OKTE (see sec 3.2 above);
- Allocation of transmission capacities on the cross-border profiles of SEPS. Annually, monthly, weekly and daily, SEPS determines and publishes on its website the transmission capacity of the connection lines to each profile, which is available to market participants for the import or export of electricity as free available trading capacity for cross-border exchange of electricity. Cross-border transmission capacity may also be allocated to OKTE for organising implicit auctions in accordance with its own rules.
- Sale and Purchase of Electricity Agreement concluded with a suitable foreign partner meeting the conditions of its local transmission system operator.

The Slovak transmission system has three cross-border interconnections with the Czech Republic, two with Hungary, one double line to Poland and one to Ukraine. Bottlenecks may still occur in certain circumstances in case of interconnectors with Hungary. The list of bottlenecks is published by SEPS on its website.

The process of market coupling is increasing opportunities for cross–border wholesale trading in Slovakia. Since June 2010, the national markets of Slovakia and the Czech Republic are connected through the daily organised markets via the abovementioned ČEPS/SEPS profile. As of 1 July 2012, Hungary is also a member of this market coupling project. There are initiatives to also include the markets of Romania and Poland into this project.

Slovenia

Joint Allocation Office (JAO)

4.2. Elaborate on the interconnection capacities, to which countries do interconnections exist (also the capacity of the interconnection lines) and how large is the cross-border transmission capacity of your country?

Austria

Cross-border interconnection points	Annual capacity in MW, 2008
Austria-Switzerland	130
Switzerland-Austria	450
Austria-Slovenia (base load)	200
Austria-Slovenia (peak load)	50
Slovenia-Austria (base load)	250
Slovenia-Austria (peak load)	300

Austria-Hungary	300
Hungary-Austria (base load)	200
Hungary-Austria (peak load)	150
Austria-Czech Republic	300
Czech Republic-Austria	200
Austria-Italy	182
Italy-Austria	70

Table A.4.2.1.

Bosnia and Herzegovina

Bosnia and Herzegovina has transnational power lines with Serbia, Croatia and Montenegro. Cross-border capacities are coordinated with all neighboring system operators, and are calculated according to ENTSO-e rules. Depending on the planned operations and switching state, their value is different for each month.

Bulgaria

The interconnection lines exist to: Serbia (440 kV to Niš and 110kV lines to Zajecar and Vrla), Macedonia (400 kV line to Stip and 110 kV line to Kriva Palanka), Greece (400 kV lines to Thessaloniki and N. Santa), Turkey (2*400 kV line to Hamitabat), Romania (400 kV lines to Isaccea and Rahman and a double 400 kV line to Tintareni) – data can be found at http://www.tso.bg/default.aspx/basic-data/en.

Croatia

The interconnection lines exist to: Hungary (double 400 kV line from Žerjavinec to Heviz), Serbia (two 400 kV lines to S. Mitrovica and Ugljevik), Bosnia and Herzegovina (400 kV line to Mostar; double 220 kV line to Gradačac and Tuzla, two 220 kV lines to Prijedor) and Slovenia (double 400 kV lines to Krško, 400 kV lines to Divača, 220 kV line to Divača).
Average values for cross border capacities for 2015 are given in table below. Table originates from Croatian energy regulatory agency (HERA) Annual report for 2015 (https://www.hera.hr/hr/docs/HERA_izvjesce_2015.pdf). The values are given separetly for winter (hr. Zimske vrijednosti) and summer values (hr. Ljetne vrijednosti).

Zimske vrijednosti [MW]						Ljetne vrijednosti [MW]					
Smjer			2014.	2015.	Promjena	Smjer			2014.	2015.	Promjena
HR	←	BA	706	766	8%	HR	←	BA	662	632	-5%
HR	→	BA	645	657	2%	HR	→	BA	630	651	3%
HR	←	SI	1.358	1.489	10%	HR	←	SI	1.328	1.464	10%
HR	→	SI	1.225	1.489	22%	HR	→	SI	1.168	1.464	25%
HR	←	RS	511	586	15%	HR	←	RS	406	385	-5%
HR	→	RS	519	546	5%	HR	→	RS	443	470	6%
HR	←	HU	1.161	1.200	3%	HR	←	HU	1.200	1.200	0%
HR	→	HU	961	1.000	4%	HR	→	HU	1.000	1.000	0%

Table A.4.2.2.

Czech Republic

AUT, DE, SK, POL

Germany

Note: Import and export transmission capacities are end-2014 estimated maximum net transfer capacity (NTC). Source: IHS, European Network of Transmission System Operators for Electricity

Figure A.4.2.3.

Hungary

Hungarian transmission system has interconnections to the following countries with the below listed capacities:

HU-SK 1000MW	-SK-HU 1300MW
HU-RO 1100MW	-RO-HU 1100MW
HU-UA 650MW	-UA-HU 850MW
AT-HU 800MW	-HU-AT 800MW
HU-RS 600MW	-RS-HU 700MW

HU-HR 1200MW -HR-HU 800MW

Montenegro

Montenegro has transnational power lines with Serbia, Bosnia and Herzegovina and Albania. Cross-border capacities are coordinated with all neighboring system operators, and are calculated according to ENTSO-e rules. Depending on the planned operations and switching state, their value is different for each month. [25]

Romania

Transelectrica allocates the interconnection capacity on the border with Bulgaria, Serbia, Hungary and Ukraine. The allocation process is public one. All the information related to the allocated capacity can be found on Transelectrica web site (www.transelectrica.ro).

Serbia

The Republic of Serbia borders with eight countries and there are eleven interconnection overhead lines (400kV and 220kV) where PE EMS allocates the rights to use transmission capacities. On the Serbian-Hungarian border since 2011, Serbian-Romanian border since 2013, Serbian-Bulgarian and Serbian-Croatian since 2014 and on Serbian-Bosnian and Herzegovinian border since 2014, joint explicit auctions have been organised for the allocation of 100% of available capacity. On the borders with Albania, Macedonia and Montenegro, PE EMS and neighbouring transmission system operators allocate 50% of cross-border transmission capacities each.

Slovakia

Slovakia is a moderate net importer of electricity. There are significant exchanges with the Czech Republic and Hungary, whereas the exchanges with Poland and Ukraine are modest. There is no interconnection with Austria. For the first time in many years, Slovakia recorded an export surplus during the first six months of 2011, which was also caused by the massive increase of PV generation.

Slovenia

Austria, Italy, Croatia

4.3. How is the cross-border trading organized (explicit/implicit transmission capacity allocation, short/long term)?

Austria

Beteiligte ÜNB und thermische Kapazitäten nach Grenzen gegliedert				
Grenze	**RZF**		**Spannung**	**Thermische Kapazität**
AT - CZ	APG	CEPS	380 kV, 220 kV	2061 MVA
AT - HU	APG	MAVIR	380 kV, 220 kV	1932 MVA
AT- SLO	APG	ELES	380 kV, 220 kV	3379 MVA
AT- IT	APG	TERNA	220 kV	257 MVA
AT - CH	APG, VKW	Swissgrid	380 kV, 1100	3957 MVA

Table A.4.3.1.

Bosnia and Herzegovina

The allocation of transmission capacity is explicit, and the capacity is allocated on an annual, monthly, daily and intraday level - annual auctions, monthly auctions, the daily auction and the intraday allocation of capacity.
The rules for the annual, monthly and daily auctions on the borders of Bosnia and Herzegovina - Montenegro and Bosnia-Herzegovina - Croatia (enforced by the auction house for South East Europe - SEE CAO) are:

- „Pravila za godišnje i mjesečne aukcije na granici Bosna i Hercegovina – Srbija“

(Rulebook for the annual and monthly auctions on the border of Bosnia and Herzegovina – Serbia)

- „Pravila za dnevne aukcije dodjelu na granici Bosna i Hercegovina – Srbija“

(Rulebook for allocation of daily auction on the border of Bosnia and Herzegovina – Serbia)

- „Pravila za unutardnevnu dodjelu kapaciteta na granici Bosna i Hercegovina – Crna Gora“ (Rulebook for the intraday capacity allocation on the border of Bosnia and Herzegovina – Montenegro)
- „Pravila za unutardnevnu dodjelu kapaciteta na granici Bosna i Hercegovina – Hrvatska“ (Rulebook for the intraday capacity allocation on the border of Bosnia and Herzegovina – Croatia)
- „Pravila za unutardnevnu dodjelu kapaciteta na granici Bosna i Hercegovina – Srbija“ (Rulebook for the intraday capacity allocation on the border of Bosnia and Herzegovina – Serbia).

Bulgaria

Cross border trades for a given date can be found here:
http://www.tso.bg/default.aspx/cross-border-schedules/en

Croatia

Please refer to question 4.1. for answer.

Czech Republic

Long term yearly auction, monthly auction, daily auction.

Germany

-Day ahead: implicit auction
-Monthly/Yearly Long term auction

Hungary

Please see at question 4.1.

Montenegro

CGES AD (Montenegrin Electric Transmission System J.S.C.) publishes conformed value of net transmission capacity (NTC) and available transmission capacity (ATC) on interconnection lines, as well as other information related to the Allocation procedure. It also assesses the value of NTC's for next year, based on an annual that can now offer part of the cross-border transmission capacity. Part of the annual estimate of ATC for which is responsible, CGES awarded using the explicit auctions. CGES may reserve part of the monthly transmission capacity for daily allocation, of which it shall inform the participants. In the case of increased interest in the remainder of the ATC for which is responsible, CGES organize daily explicit auctions. [25]
The rules for the annual, monthly and daily auctions on the borders of Montenegro-Bosnia and Herzegovina and Montenegro-Albania implemented auction house for South East Europe - SEE CAO). [26]**Hiba! A hivatkozási forrás nem található.**

Romania

The cross-border allocation capacity is organized based on the followings slot of time:

Long term – yearly and monthly on borders (RO-BG, RO-RS, RO-HU and RO-UA) under explicit auction; Daily on borders (RO-BG, RO-RS) under explicit auction; For RO-HU the allocation is implicit one; Intraday on borders (RO-RS and RO-HU) under explicit auction;

Serbia

Being the transmission system operator in Serbia, PE EMS is responsible for the allocation of rights to use available cross-border transmission capacities on interconnection lines of the Serbian power system. The mechanism for the allocation of rights to use available cross-border transmission capacities is defined by the Transmission Network Code, the Agreements between the transmission system operator of the Republic of Serbia (PE EMS) and the transmission system operators of Hungary, Romania, Bulgaria, Bosnia and Herzegovina and Croatia on the procedure and method of allocation of cross-border capacities and access to cross-border transmission capacities and general Rules for Available Cross-Border Transfer Capacities Allocation on Borders of Control Area of Republic of Serbia. The rules and agreements which were applicable in 2015 were approved by the Agency Council in the end of 2014.

Slovakia

Based on the Market rules the exchange capacity of interconnectors shall be organised follows:

Free tradable transmission capacity of interconnector is allocated to market participants as

a. long-term (for a period longer than one day, usually for a year and a month),
b. daily (for a period of one day),
c. intraday (for a period of less than one day).

The allocation of free tradable interconnector capacity may take place

a. in the form of an explicit auction,
b. in the form of an implicit auction,
c. according to the time schedule of received requests without determining the price for allocated transmission capacity and without payment of the price for the allocated transmission capacity,
d. in the form of free nominations without determination of the price for the allocated transmission capacity and without payment of the price for allocated transmission capacity.

General description:
In the case of an explicit auction, free tradable transmission capacity of a cross-border profile shall be allocated to electricity market participants in a transparent and non-discriminatory manner, based on their requirements and quotations, within the deadlines and according to the auction rules applicable to the relevant cross-border profile.

Free tradable transmission capacity of a cross-border profile may be assigned to the short-term electricity market operator for the purpose of implicit auctions conducted within the organized short-term electricity market in accordance with the Operational code of the short-term electricity market operator.

When an implicit auction evaluation process fails, an explicit auction organized by the TSO may be used for the allocation of interconnector capacities within a given time frame. It is done in cooperation with neightboring TSO's or an auction office.

Slovenia

Long term yearly auction, monthly auction, daily auction.

4.4. Is the relevant institution in your country a member of PCR/MCR (Price Coupling of Regions, Multi Regional Coupling)?

Austria

Yes

Bosnia and Herzegovina

In Bosnia and Herzegovina, concerning the electric power system at the state level, there are established institutions DERK, NOSBiH and Elektroprijenos BiH, however, organized electricity market has not been established yet. It is necessary to legally define the institution that will be a member of the PCR/MCR.

Bulgaria

No.

Croatia

CROPEX is full member with no capacity in the Market regional coupling (MRC) project while the Croatian transmission system operator (HOPS) an observer in MRC project.

Czech Republic

yes

Germany

Yes, Price Coupling of Regions
Germany: Flow based coupling with FR, NL and DE

Hungary

Day-Ahead Market Coupling exists in the region with participation of four countries: Czech Republic, Slovakia, Hungary, Romania. The responsible institution is MAVIR (Hungarian TSO) and HUPX (Hungarian Power Exchange).

Montenegro

Not available.

Romania

Not!

Serbia

No.

Slovakia

Slovaka is not a full member of TCV, at the moment. Slovakia is considered as associate member of PCR.

Slovak TSO and market operator are members of 4M MC initiative, which leads to establishment of Czech, Slovak, Hungarian and Romanian Power market coupling.

Slovenia

Yes, ELES is a member of MRC as a transmission system operator. The cooperation (between the power exchangers and transmission system operators of 90 % of European countries) operates a price coupling of the Day-Ahead wholesale electricity markets, increasing the efficiency of the allocation of interconnection capacities of the involved countries and optimizing the overall social welfare.

4.5. Who is responsible for compensation of losses and balancing of cross-border lines?

Austria

Austrian Power Grid AG

Bosnia and Herzegovina

NOSBiH procures energy to cover losses and to compensate unwanted deviations for regulation district of Bosnia and Herzegovina. About balancing the cross-border power lines, each operator regulates and balances their system.

Bulgaria

Independent Transmission System Operator – Electricity System Operator EAD (or ESO EAD).

Croatia

The Croatian Transmission System Operator (HOPS).

Czech Republic

Čeps

Germany

Transmission System operators (depending on Boarder)

Hungary

Hungarian TSO (MAVIR) is responsible for the procurement of the losses of the transmission system and the balance of Hungarian transmission system.

Montenegro

The operator of the energy market of the country of auction participants is responsible for compensation of losses. About balancing the cross-border power lines, each operator regulates and balances their system.

Romania

Transelectrica is responsible for compensation of losses and balancing of cross-border lines.

Serbia

PE EMS acting as TSO.

Slovakia

Purchasing of regulatory electricity is performed by the transmission system operator under a contract made with a provider of auxiliary services, or a supplier of regulatory electricity. The transmission system operator may only supply regulatory electricity by automated activation of regulatory electricity with the parameters of the secondary output control via management information system of the transmission system operator's dispatching in cooperation with neighbouring transmission system operators within the GCC system and at a price set in a price decision of the Office or via emergency assistance from neighbouring transmission system operators. The regulatory electricity purchased by the transmission system operator is booked as secondary regulatory electricity at a special price set by RONI during evaluation, clearing and settlement of the deviation.

Slovenia

ELES is responsible for the procurement of losses of the transmission system and the balancing of cross-border lines.

4.6. What are the future plans for cross-border trading (integration to common European power market)?

Austria

European intraday market coupling (from 2018 on)

Bosnia and Herzegovina

Further plans are to establish organized daily and intraday electricity market in Bosnia and Herzegovina and integration into the regional market, as well as into the common European market afterwards (organisation, in general, depends on the regulation adopted on the state level).

Integration into MRC – Multi Regional Coupling where implicit cross-border coupling will be used.

Croatia

The first goal is to market coupling with Slovenia and Hungary. If possible, it is planned to couple even before the implementation timeframe related to CORE CCR where Croatian borders with Slovenia and Hungary are included.

For CORE CCR timelines see:
https://www.entsoe.eu/major-projects/network-code-implementation/cacm/core-ccr/Pages/default.aspx

After successful completion of all testing activities in May and June 2018, the launch of the Slovenian - Croatian Market Coupling will take place on June 19 2018. From this date onwards, capacity for the Slovenian - Croatian border will be implicitly allocated through the PCR solution for the Day-Ahead markets, making the border a part of the Multi-Regional Coupling (MRC).

In the context of intraday continues market coupling, Croatian parties (TSO and PX) are involved in LIP 15 (engl. Local Implementation Project) of the pan-European project XBID. It is expected, that intraday coupling on Croatian borders with Slovenia and Hungary, which are included in LIP 15, will be enabled in the middle of 2019.

Czech Republic

Copupling with all off the market in the region

Germany

Probably full integration to common European power market based on flow base mechanism and full implicit auctions

Hungary

Integration to the common European power market via extending the current Market Coupling area with Austria.

Montenegro

Not available.

Romania

Please see the CACM (Regulation 1222/2015) and FCA (Regulation 1719/2016) NCs.

Serbia

Connecting with regional markets.

Slovakia

SEPS, a.s. is involved in ongoing negotiations with all neighbouring transmission system operators on how to strengthen their joint sections. In this regard, the priority is to reinforce
the section between Slovakia and Hungary. In light of the ongoing negotiations and the unsatisfactory approach by the Hungarian transmission system operator, it is currently impossible to set concrete dates for the reinforcement of the Slovak - Hungarian section with any confidence. Most projects to reinforce international interconnection capacity do not appear to be viable until after 2015 or 2020.

Slovenia

Since the Slovenian electricity market is already a part of the European common market, its participants can use mechanisms that are not available in our market. Such example in trading on the future (derivatives) markets, where deals are concluded with derivative financial instrument, such as futures contracts and options. This type of trading that takes place for a few years ahead and is mainly used as an instrument to hedge risk.

5. Renewable energy sources (RES)

5.1. Are RES subsidized and, if yes, how (feed in, market premium, other)? Please explain and give a timeframe for relevant changes.

Austria

Yes, The amount of tariff is determined for each source of energy by the Minister of Science, Research and Economy (§ 19 par. 1 ÖSG 2012).

Wi	**If the application is submitted in 2017: €ct 8.95 per kWh (§ 6 ÖSET-VO 2016)**

nd energy	
Solar energy	PV installations on roof-tops and façades with capacities over 5 kWp, up to 200 kWp, if application submitted and contract concluded until the end of 2016: €ct 7.91 per kWh (§ 5 par. 1 ÖSET-VO 2016). In addition to the feed-in tariff, an investment subsidy of 40 % of the investment costs up to 375 € per kWp is granted for PV installations on buildings (§ 5 par. 2 ÖSET-VO 2016).
Geo-	If the application is submitted in 2017: €ct 7.36 per kWh (§ 7 ÖSET-VO 2017)
Biogas	**Biogas plants** If the application is submitted in 2017: €ct 12.38 – 18.48 per kWh, depending on the maximum bottleneck capacity (§ 10 par. 1 ÖSET-VO 2017). The tariff is only granted if pure agricultural substrates and fertilisers of animal origin with a share of 30% are deployed which has to be declared to the Clearing and Settlement Agency annually. If other input materials are used, the tariff will be cut by 20% (§ 10 par. 2 ÖSET-VO 2016). **Electricity from CHP-plants (CHP-bonus)** For CHP-plants operating on the basis of biogas for which an application has been submitted within the prescribed period, (§§ 1 par. 2 subpar. 2 Ö-SET 2016 in accordance with 15 ÖSG) the feed-in tariff applying for biogas is granted with a premium of ct€ 2 per kWh if certain efficiency criteria are fulfilled (§§ 10 par. 1 and 4 Ö-SET VO 2016 in accordance with § 8 par. 1 CHP-Act). **Biomethane** For electricity which is processed to the same standard as natural gas and is furnished from biogas plants, following feed-in tariffs are granted in 2016 according to the bottleneck capacity (§ 10 par. 6 Ö-SET VO 2016 in accordance with 8 par. 3 ÖSG 2012): €ct 12.38 – 15.99 per kWh. **Technology Bonus** For electricity from gas, a premium of €ct 2 per kWh is granted if the biogas fed into the grid has been upgraded to natural gas quality (§ 21 par. 1 ÖSG 2012 in accordance with § 10 par. 7 ÖSET-VO 2016). **Sewage gas plants** If the application is submitted in 2017: €ct 5.71 per kWh (§ 11 par. 1 ÖSET-VO 2016) Landfill gas plants: If the application is submitted in 2017: €ct 4.75 per kWh (§ 11 par. 1 ÖSET-VO 2016)
Hydro-pow	New or revitalised hydro-power plants (<2 MW) which have increased their efficiency by at least 50 % (§ 12 par. 1 ÖSET-VO 2016): If the application is submitted in 2017: €ct 4.82 – 10.25 per kWh, depending on the amount of electricity fed into the grid. Furthermore, revitalised hydro-power plants (< 2MW) which have increased their efficiency by at least 15 % are eligible as well. Revitalisation is defined by investing into at least two of the following components: (§ 12 par. 2 ÖSET-VO 2016 in accordance with §1 (26a) ÖSG 2012): Turbines, water catchment, pressure line, head race, power house, dam wall or weir system. If the application is submitted in 2017: €ct 3.14 – 8.02 per kWh, depending on the amount of electricity fed into the grid.

er	
Biomass	Solid biomass: • If application is submitted in 2017: According to maximum bottleneck capacity: €ct 10.5 – 22 per kWh (§8 par. 1 No. 1 ÖSET-VO 2016) • If total installed capacity exceeds 100 MW (application is submitted 2016): According to maximum bottleneck capacity: €ct 8.22 – 18.09 per kWh (§ 8 par. 1 No. 3 ÖSET-VO 2016) Waste with high biogenic share: • Plants using waste with high biogenic share are eligible for the reduced feed-in tariff which applies to solid biomass plants (§8 par. 2 ÖSET-VO 2016). The tariff reduction of 25%, respectively 40%, depends on certain criteria defined in the Annex 1 of the Green Electricity Act. • For certain primary energy sources, the tariff might be fixed at €ct 4.75 per kWh (§8 par. 2 subpar. 3 ÖSET-VO 2016). Liquid biomass: If the application is submitted in 2017: €ct 5.51 per kWh (§ 9 par. 1 ÖSET-VO 2016)

Table A.5.1.1.

Bosnia and Herzegovina

Electricity generation from renewable sources in Bosnia and Herzegovina is subsidized through a guaranteed purchase price of electricity (FiT) for privileged producers and the reference price of electricity (20% higher than the market price) for qualified producers whose production is included in the Action plan for the use of RES in the Federation of Bosnia and Herzegovina – „APOEF“ and who did not acquire the status of privileged producer.
RES producers who acquired the status of a qualified producer have the following benefits:
a) priority delivery of electricity generated from RES in the grid, or the advantage of dispatch, in accordance with relevant rules and regulations governing the operation of the power system of Bosnia and Herzegovina
b) advantage delivery to the grid for electricity generated in power plants with installed capacity less than 150 kW, without reporting the daily schedule to system operator. The privileged producer is entitled to sell electricity at guaranteed prices over a period of 12 years, as defined in the power purchase agreement within RES producer and operator.

Bulgaria

In Bulgaria, electricity from renewable sources is promoted through a feed-in tariff. Producers of electricity from renewable sources are contractually entitled against the grid operator to the purchase and payment of electricity at a guaranteed price. The feed-in tariff may not be received on top of other incentives.
In Bulgaria, the connection of renewable energy systems to the grid is subject to the provisions of the general legislation on energy. Renewable energy is not given priority access. Plant operators are contractually entitled to have their electricity dispatched by the grid operator. Grid operators are obliged to upgrade and expand their grids if the upgrade or expansion is required to connect a plant.

Croatia

Since the end of 2016, total generation capacity in Croatia is 4794 MW (large hydro 45.37%, fossil thermal 42.10%, Wind 10.05%, Biomass 1.32%, Solar 1.16%).

Construction of over 750 MW of generation capacity has been supported by the Feed-in-Support scheme available to investors since 2007. Additional generation capacity is under construction, tied to FIT contacts concluded by the end of 2015. As of 1 January 2016 a new Act on renewable energy sources and high-efficiency cogeneration is in force, stopping new FIT contracts and providing a new framework for supporting RES and CHP electricity production via market premium contracts obtained through a bidding process. Secondary legislation needed for the implementation of these new support schemes is still under development.

Czech Republic

The RES are subsidized with feed in tariff and market premium and have the possibility to participate in the market. Requirements are under prequalification to provide standards of quality of supplied products.

Germany

The main support mechanism for renewable energy in Germany used to be the FiT, which has been in place since 2000 and provides a fixed price for power produced from renewable sources. The FiT is set for a 20- year term, varies by technology, and the tariff level is set at regular intervals. The cost of the FiT is covered through a surcharge on end-use customer electricity bills.

In 2014, the Renewable Energy Act was amended shifting renewables support from a traditional FiT to a mandatory feed-in- premium scheme. Instead of receiving the FiT amount directly, all new installations larger than 100 kW (and larger than 500kW before 2016) had to sell the electricity they produce, themselves or through a third party, and are then rewarded the difference between the FiT and the revenues earned on the wholesale electricity market.

In order to comply with new EU environmental state aid guidelines, Germany introduced auction schemes for renewable energy in 2016, to enter into effect in 2017. Small renewables installations of under 750 kW capacity (in the case of biomass under 150 kW) will not be part of the tender system - they will continue to receive feed-in remuneration.

However, it is important to note, that beside the existing subsidy schemes, the market has turned more and more towards direct sales on the market (so called „Direktvermarktung“) for most of the technologies in the last years.

Hungary

RESs are subsidised by:

- feed-in tariffs between 50-500 kW,
- premium between 0,5 -1 MW,
- tendering above 1 MW,
- brown premium for biomass

from 1, January 2017. (Previously - from 2007 - a feed-in support scheme was in place.)

Montenegro

RESs are subsidized in accordance with the documents:
- Decree on tariff system for determining the incentive prices for electricity produced from renewable energy sources and highly efficient cogeneration [27],
- Decree on incentive fees to encourage production of electricity from renewable energy sources and cogeneration [28],
- Rulebook on the amount of incentive fees to encourage production of electricity from renewable energy sources and cogeneration in 2016 [29].

Romania

RESs are subsidized by Green Certificate; These Green Certificates are sold on the Green Certificate Market organized by Power Exchange - OPCOM.

RESs are subsidized. Stimulation is done through a system of privileged producer of electricity and feed in tariffs. The period in which the contract is concluded for the purchase of electricity at preferential prices is 12 years. For a single plant this agreement may be contracted only once. Direct incentives for producers who produce electricity from renewable energy sources is achieved through the so-called system of feed-in tariffs. It is noteworthy that for solar power and wind power, "quotas" are defined which are valid until the "Decree on conditions and procedure for acquiring the status of privileged producer" [38] is valid. Power plants that obtain temporary status of a privileged producer or the status of a privileged producer occupy part of the capacity of the stipulated quota in accordance with the installed capacity of that plant. When the full amount of the quotas is allocated to investors, all subsequent applicants can not obtain either status or temporary status of privileged producer. This means that the free capacities are filled which are supported by incentive measures, or as the popular saying goes, "the quotas are filled". After the adoption of the new regulation laying down new "quota", the order of resolution of claims for the status of a privileged producer of electricity in accordance with the administrative procedure i.e. is defined by the order of submitted requests. After acquiring the status of privileged producer, and according to the Law on Energy after acquiring the status of a temporary privileged producer, producer of electricity shall be entitled to sign the contract on the purchase of the total amount of electricity generated (popularly PPA - Power Purchase Agreement) at preferential prices with a guaranteed supplier. Through this contract the rights of a privileged producer stipulated by law are realized too.

Slovakia

On 19 June 2009, Slovakia adopted a new Law on the Promotion of RESs and High-efficiency Cogeneration. This law revises the previous rules of RES-E support which was based on a fixed FiT. The new law entered into force on 19 September 2009 is available for the following technologies:

hydropower, solar, wind, geothermal, biomass (including all products derived from biomass processing), biogas, sewage gas and bio methane (Fraunhofer ISI 2009).
According to the law the fixed feed-in price for electricity from RESs consists of two components: the market price plus an additional payment. The market price is represented by the price of electricity to cover grid losses. It is calculated as the arithmetic average of the prices of electricity for covering the grid losses of all regional distribution system operators and will be determined by ÚRSO. The additional payment is the difference between this market price proxy and the RES-E tariff determined by ÚRSO. The tariff is calculated by the regulatory authority ÚRSO, according to a generally binding legal regulation. The feed-in tariff depends on the type of a RES, the technology used, the size of the installation and the date of the installation (RES LEGAL 2011).
The distribution system operators are required to take off the RES-E electricity and pay the price of electricity for losses. The RES-E producer receives the additional payment on the basis of an accounting document (invoice) issued by the distribution system operator (NREAP 2010).
The RES-E producer receives the feed-in tariff for 15 years after the initial operation, reconstruction or modernization of the power plant, no matter which technology it uses. According to § 3 par. 6 of law 309/2009 the support applies to power plants with an installed capacity of up to 1 MW during the whole lifetime of the power plant. The feed-in tariffs for installations which will be built in the next period are determined by ÚRSO on the basis of price trends in technology (NREAP 2010). There are some limitations in the maximum installed capacity of RES-E plants which are eligible for the support scheme. The overall maximum installed capacity is 125 MW, increasing to 200 MW if the electricity is produced in high efficiency cogeneration plants and the energy share of RESs in the fuel is higher than 20 %.

Slovenia

Support scheme with subsidies exists. It is managed by Centre for RES/CHP. The feed-in scheme, as well as other tasks, are financed through dedicated add-on charges on the network fee bills of all users of electricity in Slovenia.

5.2. Does the RES subsidy depend on the RES size or RES type? How?

Austria

Yes, see table above

Bosnia and Herzegovina

Subsidies for RES in the scope of electric power purchase price depends on the size (installed capacity) and the type of production facility.
Regulatory Commission for Energy in the Federation of Bosnia and Herzegovina (FERK) in 2014 adopted the Rulebook of methodology for determining the guaranteed purchase prices for electricity from RES power plants. [8] The aim of the rulebook is to provide guidelines for simple and user-friendly method

of calculation of guaranteed purchase prices, based on the known parameters that are enforceable in practice.

The act of the renewable energy and efficient cogeneration usage [9] stipulates that during the preparation of the methodology for determining the guaranteed purchase price is essential to take into account the form of primary energy, redemption period of 12 years, used technology, the date of power plant activation or date of reconstruction and/or installation upgrade, and installed capacity of power plant.

Classification of RES plant, depending on the installed power, is executed in accordance with the Regulation of the promotion of electricity produced from renewable energy sources and efficient cogeneration and determining incentive fees [10] in the following manner:

- micro power plants from 2 kW up to and including 23 kW
- mini power plants from 23 kW up to and including 150 kW,
- small power plants from 150 kW up to and including 1 MW,
- medium power plant: 1 MW up to and including 10 MW and
- large power plants: over 10 MW.

Classification of the renewable energy type is made according to the Regulation of the usage of renewable energy sources and efficient cogeneration [9], dividing plants into hydro, wind, solar, geothermal, biomass, biogas, cogeneration, sea power plants and power plants using municipal waste.

Bulgaria

For the feed-in tariff system which was valid until 01.01.2016, the answer is yes. Different feed-in tariffs are paid to different technologies as well as for their different installed capacities. RESs technologies with poorer market position were subsidized more than those who were/are profitable almost without subsidies. Smaller installed capacity RESs are subsidized more than the larger installed capacities.

New incentives/tariff system for small-scale renewables and new market premium subsidies system are not defined yet.

Croatia

Within the Croatian feed-in tariff system that was available to investors in the period 2007-2015, guaranteed buyoff prices (FIT prices) were different depending on source, technology and size. Within this period, three tariff systems were in place with decreasing prices (reflecting the developing competitiveness of technologies).

In relation to size, FIT prices for smaller generators were typically higher than those for larger generators (reflecting the decreasing cost per MW in relation to size).

Generators were categorized using the following thresholds: 10 kW, 30 kW, 300 kW, 1 MW, 2 MW, 5 MW, 10 MW. Other thresholds were technology specific.

The new support scheme for small-scale renewables (small FIT) and the new market premium subsidies system is yet not implemented.

Czech Republic

Yes, Different prize for different tecnology and size of the units.

Germany

The 2014 Renewable Energy Act introduced flexible caps ('breathing cap') to reach the annual renewable energy targets. If targets are met in a given year, the following year's FiTs for that technology will be reduced by a standard rate. If targets are exceeded, the incentives will decrease, and the more they are exceeded, the greater the decrease in FiTs. Conversely, if the target is not met, the FiT will not decrease but might even increase.
The quantitative targets for renewable energy are as follows:

- Wind onshore: additional 2,500 MW/year (net)
- PV: additional 2,500 MW/year (gross)
- Wind offshore: 6,500 MW by 2020
- Biomass: additional 100 MW per year (gross)

Hungary

RES is subsidised by size (see above) and the subsidised quantity is also set by RES type.

Montenegro

Subsidy depends on RES type:

- Wind power plants,
- Solid Biomass, a) from forestry and agriculture b) from wood-processing industry
- Solar power plants, a) on buildings and engineering constructions
- Solid waste,
- Waste gas,
- Biogas
- Small hydro power plants
- Highly efficient cogeneration plants,
- Reconstructed plants using RES or highly efficient cogeneration.

Subsidy depends on RES size for Small hydro power plants (< 1 MW, < 3 MW, < 5 MW, < 8 MW, < = 10 MW) and highly efficient cogeneration plants (< 1 MWe, < 5 MWe, < MWe) [27].

Romania

The value of subsidy of RES is based on the RES type (eolian, foto, biomass);

Serbia

The incentive purchase price for electricity produced is determined depending on the type and the installed capacity of the power plant, as well as the maximum effective operating time for the appropriate type of power plant.

Number	Plant type of privileged power producer	Installed capacity R (MW)	The incentive purchase price (c€/kWh)	Maximum effective operating time (h)
1.	**Hydropower Plant**	in the year of the incentive period 0,2	12,60	5000 in the year of the incentive period
1.1		0,2-0,5	13,933-6,667*P	
1.2		0,5-1	10,60	
1.3		1-10	10,944-0,344*P	
1.4		10-30	7,50	
1.5				
1.6	On the existing infrastructure	in the year of the incentive	6,00	5000 in the year of the incentive period
2.	**Biomass power plants**			8600 in the year of the incentive period
2.1		in the year of the incentive	13,26	
2.2		1-10	13,82-0,56*P	
2.3		over 10	8,22	
3.	**Biogas power plants**			8600 in the year of the incentive period
3.1		0-2	18,333-1,111*P	
3.2		2-5	16,85-0,370*P	
3.3		over 5	15	
4.	**Power plants on landfill gas and gas from sewage treatment of urban waste water**		8,44	8600 in the year of the incentive period
5.	**Wind power plants**		9,2	9000 u kvartalu podsticajnog perioda

Number	Plant type of privileged power producer	Installed capacity R (MW)	The incentive purchase price (c€/kWh)	Maximum effective operating time (h)
6.	**Solar power plants**			1400 in the year of the incentive period
6.1		at the facility in the year of the incentive period0,03	14,60-80*P	
6.2		at the facility 0,03-0,5	12,404-6,809*P	
6.3		on the ground	9	
7.	**Geothermal power plants**		8,2	8600 in the year of the incentive period
8.	**Natural gas power plants with highly efficient combined production of electricity and heat**			8600 in the year of the incentive period
8.1		to 0,5	8,20	
8.2		0,5-2	8,447-0,493*P	
8.3		2-10	7,46	
9.	**Waste power plant**		8,57	8600 in the year of the incentive period

Table A.5.2.1. *[40]*

Slovakia

In the case of photovoltaics, the surcharge only applies to roof-top or façade-integrated installations up to 30 kW. For all other renewable energy plants with an installed capacity of more than 5 MW (wind power plants: 15 MW), the surcharge is paid only for the proportionate amount of electricity produced annually.

In general, all renewable electricity generation technologies are eligible (§ 3 par. 1 in conjunction with § 2 par. 1 Letter a RES Act). However, the plant capacity is limited:

- Only plants whose total capacity does not exceed 125 MW are eligible for the feed in tariff and/ or the surcharge CHP plants with a total capacity over 200 MW and installations with a share of renewable energy of at least 30% are also eligible (§ 3 par. 3 Letter a RES Act).
- Only plants whose total installed capacity does not exceed 5 MW are eligible for the surcharge (§ 3 par. 4 a RES Act). Wind energy plants are eligible for the surcharge only if their total installed capacity does not exceed 15 MW (§ 3 par. 4 Letter d RES Act).
- Electricity produced from plants with a maximum installed capacity of 1 MW (or 30 kW for photovoltaic plants) will be purchased at the price of electricity to cover grid losses (§ 3 par. 3, 4 and 5 RES Act).

Plants whose total installed capacity exceeds 5 MW and wind energy plants whose total installed capacity exceeds 15 MW are eligible for a payment of the proportion of 5 (or 15) MW to the total installed capacity (§ 3 par. 4 Letter c and e RES Act). (http://www.res-legal.eu/search-by-country/slovakia/single/s/res-e/t/promotion/aid/feed-in-tariff-6/lastp/187/)

Wind energy	Eligible (§ 2 par. 1 Letter a No. 3 RES Act).
Solar energy	Eligible (§ 2 par. 1 Letter a No. 2 RES Act) with following exception: ▪ Only PV installations on rooftops or façades with an installed capacity of no more than 30 kW are eligible (§ 3 par. 10 RES Act).
Geothermal energy	Eligible (§ 2 par. 1 Letter a No. 4 RES Act).
Biogas	Biogas, landfill gas, sewage gas and bio-methane are eligible (§ 2 par. 1 a No. 6 and No. 7 RES Act).
Hydro-power	Eligible (§ 2 par. 1 Letter a No. 1 RES Act) with following exceptions: ▪ Pumped-storage facilities are not eligible (§ 2 par. 1 Letter b RES Act). ▪ Hydro power plants with an installed capacity of more than 5 MW are not eligible (§ 3 par. 14 RES Act).
Biomass	Eligible (§ 2 par. 1 Letter a No. 5 RES Act).

Figure A.xx caption http://www.res-legal.eu/search-by-country/slovakia/single/s/res-e/t/promotion/aid/feed-in-tariff-6/lastp/187/

The amount of tariff differs according to the source of energy used (for further information please see Decree No. 260/2016 of ÚRSO) and the year of commissioning/ the year in which a plant is put into operation / the year of reconstruction or upgrade. The amount of tariff is calculated by the regulatory authority ÚRSO.

Slovenia

Subsidy is RES size or type independent.

5.3. Do auctions for RES subsidies exist? If yes, explain how are they organized.

Austria

No

Bosnia and Herzegovina

There are no auctions for the renewable energy grants because the subsidy system is based on feed-in tariffs.

Bulgaria

No, Fit scheme is in place in Bulgaria.

Croatia

Auctions for concluding contracts for market premiums and small-scale FIT have been foreseen by the new Act on renewable energy sources and high-efficiency cogeneration in force since 1 January 2016, but the secondary legislation need for the actual implementation is still under development.

Czech Republic

No

Germany

An auction system was piloted in 2015 for ground-mounted solar installations. Key points of the new auction design:

- The Federal Network Agency (Bundesnetzagentur) will call for tenders for renewable installations, their volume will correspond to the development needed for a 40-45 percent renewables share in 2025
- Starting in 2017, there will be three to four rounds of auctions per year (for solar PV and onshore wind). Participants place single, sealed bids. Bidders have to lodge a security deposit to ensure that only serious bids are submitted. Bids are tied to projects and can generally not be transferred to other projects (onshore wind), or their funding will be reduced if they are moved (solar PV).
- The auctions will follow the pay-as-bid principle, i.e. the amount of funding corresponds to the individual bid placed.
- The lowest bids will be accepted until the volume of capacity auctioned is reached. A maximum price will be published in advance.
- Successful installations will receive the funding rate with which they won the bid for 20 years.
- Special rules for citizen energy projects: they also have to participate in the auction system but enjoy certain benefits, e.g. they will automatically receive the highest feed-in tariff accepted in the tender, rather than their own (possibly) lower bid.

Hungary

Auctions are organised for large RESs (above 1 MW). As the system started in 2017, no auctions were organised so far and the detailed rules are unknown yet.

Montenegro

There are no auctions for the renewable energy grants because the subsidy system is based on feed-in tariffs.

Romania

No any auctions for RES subsidies

Serbia

There are no bids for obtaining subsidies for electricity production from RES. There is a procedure that is prescribed by the Ministry of Energy, which is in accordance with the Energy Law, and is related to the acquisition or temporary status of a privileged producer of electricity from RES, as well as per rules of the Administrative Procedure Act [39].

Slovakia

To increase the share of power plants with fluctuating production, Slovakia will establish a system of tenders on the basis of reverse auctions effective as of 2012. This auction is a model of dynamic downward pricing with a focus on the buyer.
Investors submitting the lowest feed-in price for the construction of the power plants will be successful (NREAP 2010).

Slovenia

Yes. Funding is awarded at the auction depending on the financial performance of the project.

5.4. Are RES “allowed” to participate in the power market in the same way as conventional producers? In case RES are incentivized, do they have priority access to the market (compared to non-incentivized RES)? Are all RES coupled

in the same balancing group (aggregator group) or are they "allowed" to join balancing group of their choice?

Austria

RES are participating in the power market and are traded at EXAA and, if approved by OeMAG, part of the same balance group: „Ökobilanzgruppe".
Under Austria's electricity labelling regulations, all electricity suppliers are legally obliged to indicate on their bills the sources of the power they deliver to consumers. However, they are not required to disclose information on the extent to which the green power they supply is subsidised. The support payments are usually financed by electricity consumers and taxpayers.
As renewable energy comes in a variety of forms (supported and non-supported, old and new generating stations, hydro, photovoltaic and other technologies), suppliers have widely differing approaches to marketing green power.

Bosnia and Herzegovina

Producers of electricity from renewable energy sources which are included in the system of subsidization cannot act "freely" in the electricity market. Precisely, all customers and suppliers in the Federation of Bosnia and Herzegovina are obliged to purchase at the reference price the total amout of electricity from renewable energy that is produced during the Subsidy Contract, and the difference to the subsidized price is covered by collected incentive fees for renewable energy production.
By the day of contract termination with the RES operator, or after the expiration of the period within which the production is subsidized, qualified producer loses the status of privileged producer and continues to use all the rights related to eligible producer who is not in the system of incentives (e.g., to sell at the reference price) or can freely sell produced electricity on the market.
Renewable energy producers which have acquired the status of qualified producers have the advantage of priority delivery of electricity generated from RESs in the grid, or the advantage of dispatch, in accordance with relevant rules and regulations governing the operation of the power system of Bosnia and Herzegovina, as well as the advantage delivery to the grid for electricity generated in power plant with installed capacity less than 150 kW, without reporting the daily schedule to system operator. Therefore, even when manufacturers are no longer in the system of incentives they have priority of delivery to the grid, but it is not clearly defined whether there is a preference for "market" purchase in relation to "not encouraged" RESs.
RESs are part of the balance group of responsible system operator in whose distribution area they are located - hence, not all producers of electricity from renewable energy sources in the Federation are part of the single and joint balance group nor themselves have the possibility of preferential selection of the same.

Bulgaria

RES producers subsidized by the feed-in rules do not participate in market equally to conventional producers. They are all coupled in the special balancing group of producers from RESs. RESs whose subsidising period has ceased participate in the power market equally to conventional generators within standard balancing group.

Croatia

Renewable energy/CHP generators that have obtained the status of an eligible electricity producer have grid priority. Eligibility status is given for generators that use RES or are high-efficiency CHP units. Conditions of eligibility are defined by legislation and status is given automatically for so-called “simple generators” (for now exclusively PV installed on buildings) or is obtained by a ruling given by the Croatian Energy Regulatory Agency (HERA).

Eligible electricity producers that have concluded a feed-in contract with HROTE sell their electricity to HROTE. Consequently, they do not participate in the market. Generators within the feed-in support system will comprise the EKO balancing group that will be managed by HROTE (secondary legislation that will implement this is under construction).
Eligible electricity producers without a feed-in contract (e.g. old large hydro) can freely sell their electricity and can receive guarantees of origin for their production.

Renewable energy producers who are going to be subsidized by a market premium will have equal access to market as conventional producers and they can join the balancing group of their choice.

Czech Republic

Yes, they are. The market must buy all energy produced form RES. They are in the balacing group of their owner.

Germany

RESs are a part of the general balancing-circle-system. They are treated like conventional generators when it comes to forecasting & scheduling and handling imbalances.

Hungary

Under 0,5 MW there is a RESs balancing group, the balancing responsible party is the TSO. Above 0,5 MW all RESs join whichever normal balancing group they want.

Montenegro

Not available.

Romania

RESs are “allowed” to participate in the power market in the same way as conventional producers. RESs are allowed to join in their chosen balancing group. Anyway, they are organized in the group with their own dispatching center.

Serbia

The distribution system operator shall, within sixty days from the date of receipt of the written request, decide on the request for authorization to connecting the plant to the electricity grid. The relevant energy entity is obliged to issue a positive decision, if all conditions are met, based on a technical report, calculating connection costs and other available documents. Privileged electricity producers from RES have priority in retrieval of the total produced electricity into the transmission or distribution system, except in the case where the safety of these systems is compromised.
According to the Energy Law, the distribution system operator is obliged to take all the energy produced from renewable sources [36].

Slovakia

A RES plant is connected to the distribution under three conditions: the distribution grid has the technical capacity for the connection, the distribution grid is nearest located to the electricity generating installation and other grids are not in a technically and economically better location for the connection. The distribution grid is considered to have technical capacity even if the collection of electricity without detriment to the priority is only possible by the economically efficient extension of the grid, in which case the DSO, at the request of the electricity producer, is required to extend the grid (NREAP 2010).
If the system complies with the technical requirements and the terms and conditions, the grid operator shall connect the installation to its grid within five working days (§ 3 par. 5 Decree No. 317/2007, URSO 2011).
The grid operator is obliged to supply the renewable energy plant operator with information about the technical conditions and the operation rules of the grid (URSO 2011).
Even though renewable energy plants are generally entitled to the priority connection to the grid, investors are struggling with several problems during the connection process. According to the Slovak Association of Photovoltaic Industry (SAPI), the connection to the grid is in many cases either technically impossible or the whole process is severely delayed (SAPI 2011). The waiting time can amount to more than one year. Some applications dating back to January 2010 have still not been processed by the DSO in charge until May 2011 (SAPI 2011). The regulatory authority URSO also stated that the main problem during the connection process lies in the very time-consuming processing of the applications for grid connections and the conclusion of a connection agreement, allegedly due to the high amount of applications in these times (URSO 2011).

Slovenia

Producers choose trader by themselves. Power plant owners have the option of choosing between two types of support:

"guaranteed purchase", where Centre for RES takes over the electricity from the power plant and sells it to the market (the producer is thus included in the special balance group, operated by Centre for RES)

"operating premium", where the producer sells its energy on the market while Centre for RES only pays a premium as a difference between the full ("guaranteed purchase") price and the market price, which is determined ex ante on a yearly level, based also on plant type.

5.5. How are RES balanced?

Austria

By grid operators.

Bosnia and Herzegovina

In accordance with the Regulation of the renewable energy sources usage, privileged and qualified producers of electricity with installed capacity of more than 3 MW are obliged to submit the forecast of their hourly production to the relevant grid operator and the RESs operator for the day ahead. Relevant system operator is obliged to define the minimum installed capacity and type of renewable energy power plant, and the producer is responsible to establish its own control center.

The privileged and qualified producers, with installed capacity from 150 kW to 3 MW, are required to submit their weekly production plans to the relevant system operator and RESs operator, as well as to pay the costs of balancing their production to the RESs operator. The privileged and qualified producers with installed capacity of up to 150 kW are not required to submit their production plans, neither to pay the cost of balancing the power system.

Bulgaria

RESs are members of the special balancing group. Distribution companies are balance responsible parties of special balancing groups (RES) and imbalances are calculated by Electricity System Operator and approved by SEWRC. The Public supplier and the Public Providers can take the responsibility for balancing of the producers from RES with larger installed capacity.

Croatia

Based on the new Act on renewable energy sources and high-efficiency cogeneration in force since 1 January 2016, all generators in the Feed-in support scheme will comprise the EKO balancing group that will be managed by HROTE. HROTE as the aggregator will be selling electricity on the market via tenders, CROPEX and bilaterally (but in a transparent manner), until then HROTE is selling electricity from generators within the FIT support system to suppliers at a regulated price, where each supplier is obligated to buy a portion of that electricity accoring to his market share. HROTE will be responsible for managing the EKO balancing group (including planning) and will incur imbalance costs. Producers

within the EKO balancing group will pay a fee for group membership (membership for FIT generators is obligatory). Secondary legislation that will specify the functioning of the EKO balancing group and HROTE's activities is still under development.

New RES generators supported by the market premium system should be balanced within a market balancing group. ThisThat means that those producers will pay someone for balancing (the balancing group leader) or they will create their own balancing group.

Czech Republic

By large company who are the owner of the balance group who are the owner of the RES or by the electricity produced from RES.

Germany

Until GCT, the BRP has to balance fluctuation of RES in its balancing circle. After that, TSOs provide balancing energy which the imbalanced BRPs are charged for.

Hungary

Overall, the TSO balances the RES which take part in any form of the RES subsidy system. RES under 0,5 MW joins the special RES balancing group of the TSO, however, TSO only aggregates the RESs, and the balancing cost is born by non-household power consumers through their bills. RES above 0,5 MW joins a normal balancing group, and it bears its own balancing costs.

Romania

RESs are balanced as any market participant. Can be part of any BRP group. Please see the answer of above question.

Serbia

Producers of electricity from RESs by contract turn over responsibility and balancing costs to the customer. The seller belongs to the balancing responsible group of the Purchaser, respectively other entity on the energy market to which it has transferred its balancing responsibility.
Privileged and temporarily privileged producers of electricity from RESs are connected into a balancing group of the Public Supplier (EPS) [36] Articles 171-173, By-law on the contract on purchase of electricity - Model contract, Article 5 [40]). If for the point of handover balancing responsibility at some point is not regulated, this place is treated as forced balancing group for which the obligations regarding the financial settlement, based on the calculation of the deviations of that balancing group,

takes the market participant that is in accordance with the Law, balanced responsible for that place of handover. This market participant has the right to report daily plan for the forced balancing group [40].

Slovakia

Due to the minor share of fluctuating generation in the total RES-E production, balancing responsibility is not a major issue yet in Slovakia. There is no balancing responsibility or forecast obligation for RES-E in Slovakia (Fraunhofer ISI 2008). The distribution system operators are required to take all electricity generated from RESs to cover their losses. Detailed information about further cooperation between the RES-E producers and system operators are regulated by system operators in their operational procedures. If the electricity from RES-E exceeds the amount needed to cover losses in the distribution system, the distribution system operator is entitled to sell the electricity at the market price (NREAP 2010).

With more than 70% cumulated share of coal and nuclear, the Slovak power system is dominated by inflexible base load generation. As long as the share of variable renewables remains low as planned in the NREAP, the Slovak system is able to balance the domestic variable generation, though its substantial hydro capacities could be used in the future to balance variable generation from neighbouring countries like Poland and Hungary, that have less favourable conditions for storage and balancing capacities.

Slovenia

Balancing in obligation of balance group whom specific RES owner sells energy.

5.6. Whose obligation is planning of RESs production day-ahead or intra-day?

Austria

OeMAG's.

Bosnia and Herzegovina

The privileged and qualified producers of electricity with installed capacity of more than 3 MW are obliged to predict and submit their hourly production to the relevant system operator and the RES operator for the day ahead. The privileged and qualified producers with installed capacity from 150 kW to 3 MW are required to submit their weekly production plans to the relevant system operator and the RES operator.
System operators are obliged to prescribe the method of prediction and data delivery.
The privileged and qualified producers with installed capacity of up to 150 kW are not required to submit their production plans.

Bulgaria

The producers from RESs with total connected capacity higher than 30 kW, inclusive, shall send to the balance responsible parties hourly schedules for generation forecast. The balance responsible party of producers from RESs shall provide to the Electricity System Operator, to the Public supplier and to the Public provider, aggregated generation schedule as well as schedules per generation technology for the relevant balancing group.

Croatia

HROTE is obliged to plan the production of renewable energy producers subsidized by feed-in tariffs (FiT producers have the obligation to provide HROTE with necessary data and information needed for planning).
Renewable energy producers subsidized by market premium should plan their own production.

Czech Republic

Owner of the balance group.

Germany

Respective BRP.

Hungary

Planning is the obligation of the renewable energy producer. Balancing risk is born by the renewable energy producer, however, owners of RESs under 0,5 MW pay less balancing costs.

Montenegro

No information available

Romania

The planning of RES production is the RES owner's own obligation.

Serbia

Balance responsible parties (BRP), for the privileged producers that is EPS.

Slovakia

RES producers are contractually entitled against the grid operator to the connection of their RES plant. The TSO is required to enter into access contracts and system connection contracts with anyone who so requests, provided that they meet the technical and commercial conditions for access and connection to the grid (§ 3 par. 1 Decree No. 317/2007). The DSO is required to connect the installations of a producer of electricity from a RES preferentially to the grid upon payment of the connection price, if the producer meets the commercial and technical conditions while maintaining the safety, reliability, and stability of the grid (§ 3 par. 3 Decree No. 317/2007) (NREAP 2010).

Slovenia

Same as 5.5

5.7. Who bares the cost of balancing variability and uncertainty?

Austria

In line with section 68(1) Electricity Act 2010, costs for primary control are borne collectively by all electricity producers with a maximum capacity of more than 5 MW. They are distributed according to annual output.
Secondary control causes costs for the availability of balancing capacity and for the actual supply of balancing energy. Section 69 Electricity Act 2010 provides that 78% of these costs is covered by the system services charge, payable by all producers with a maximum capacity of more than 5 MW, while the residual 22% are reimbursed through the imbalance costs that are paid by the balance groups.

Bosnia and Herzegovina

Responsible institution in the Federation of Bosnia and Herzegovina which has the obligation to balance planned and actually delivered production from RESs, which entered the incentive system, is “Operator za obnovljive izvore energije i efikasnu kogeneraciju” – OIEiEK (Operator for Renewable Energy Sources and Efficient Cogeneration). Plans of these institution in the near future are to adopt the Rulebook of methodology for allocating costs of balancing and determination of costs to be paid with funds from the incentive fees.

Bulgaria

Imbalances caused by renewable energy producers subsidized by feed-in tariffs are paid by all end-consumers.

The financial responsibility towards the Electricity System Operator for the imbalances in the balancing group shall be taken by the balancing responsible parties of the standard and special balancing groups.

Croatia

Imbalances of the EKO balancing group will be charged to HROTE as the balancing group leader, but HROTE will be remunerated for this cost – by the levy payed by end-customers and membership fees of producers in the EKO balancing group. Secondary legislation setting these details is still under development.
Imbalances caused by renewable energy producers subsidized by market premiums will be attributed to the balancing group.

Imbalance costs for balancing groups are calculated based on HERA's methodology for defining prices for electricity balancing settlement.

Czech Republic

Mandatory buyer.

Germany

Respective BRP.

Hungary

RES under 0,5 MW joins the special RES balancing group of the TSO, however, TSO only aggregates the RESs, and the balancing variability and uncertainty and its cost is born by non-household power consumers through their bills. RES above 0,5 MW joins a normal balancing group, and it bears its balancing variability and uncertainty as well as its own balancing costs.

Montenegro

No information available

Romania

The maximum price on the balancing market is PIP (from DAM) + 450 lei

Serbia

End users- The Public Supplier (EPS) has balancing responsibility of privileged producers. The costs of balancing variability and uncertainty are covered by the funds collected from end-consumers of electricity. [36] are used - Article 79. [42]

Slovakia

After the payment of the connection price and the conclusion of the connection agreement, the grid operator is obliged to create reserve capacities within the grid. In other cases the reinforcement of the grid has to be economically viable for the grid operator. In a final step, this right can be enforced by legal action (URSO 2011).

Slovenia

Same as 5.5

5.8. Is there an institution (if yes, name which one) obliged to balance planned and actual delivered RES generation (again, please refer to the question above in terms of subsidized and non-subsidized RES)?

Austria

No

Bosnia and Herzegovina

Responsible institution in the Federation of Bosnia and Herzegovina, which has an obligation to take all the energy produced from renewable sources that are in the incentive system and sell that energy for the producers, is “Operator za obnovljive izvore energije i efikasnu kogeneraciju” – OIEiEK (Operator for Renewable Energy Sources and Efficient Cogeneration).

Bulgaria

Yes, ESO EAD.

Croatia

Yes, HROTE after 1 January 2019 (for RES producers subsidized by feed-in tariffs).

Czech Republic

Yes, mandatory buyer

Germany

No

Hungary

There is no such institution.

Montenegro

Not available.

Montenegro

Not available.

Romania

Not. The answer of this question is not in connection if RES is subsidized or non-subsidized.

Serbia

The transmission system operator purchases electricity from the participants and sells it to the balancing electricity market for the purpose of balancing and ensuring the safe system operation.
The share in the balancing market is regulated by an agreement to be concluded between the transmission system operator and an electricity market participant, in accordance with the rules on the electricity market operation [36] - Article 174.

Slovakia

The rensponsibility for planning is in hand of a participant, who takeover deviation responsibility. It is usualy one of this supplier. This participant has its balance groupwith responsibility for caused deviation (difference between plan and reality of generation and consumption).

Support for the RES is ensured by:
a) priority:
    1. in connecting the electricity power plant to the regional distribution system,
    2. access to the system,
    3. of electricity transmission, distribution of electricity and electricity supply services,
b) the take-over of electricity by the regional DSO to which the electricity producer's equipment is connected for the cost of electricity dedicated to losses,
c) feed in tarrifs,
d) responsibility for deviation by regional DSO.

Responsibility to take-over for deviation/imbalance from DSO has its limitations. It is relevant for RES power plants with total installed capacity less than 1MW and in case of PVE, there is limit in total instalation power capacity of only 30 kW.

Slovenia

Borzen

5.9. Is there an institution (if yes, name which one) obliged to take all energy generated by RES and sell it for them (act as a RES aggregator)?

Austria

Abwicklungsstelle für Ökostrom AG (OeMAG).

Bosnia and Herzegovina

In Federation of Bosnia and Herzegovina an institution obliged to take all energy generated by RES and sell it for them is “Operator za obnovljive izvore energije i efikasnu kogeneraciju” – OIEiEK (Operator for Renewable Energy Sources and Efficient Cogeneration).

Bulgaria

Unknown.

Croatia

Yes, HROTE for RES producers subsidized by feed-in tariffs.

Czech Republic

Yes

Germany

For those RESs which are still in the FiT-scheme, the TSO collects RES-generation from DSOs and sells the generation at the spot market.

Hungary

TSO takes RES generation under 0,5 MW (feed-in tariff) and sells it on the Hungarian Power Exchange (Hupx.hu). Above 0,5 MW (premium-system) and non-subsidised RES sell their own energy on the market.

Montenegro

Not available.

Romania

No.

Serbia

For a privileged energy producer from RES it is the guaranteed (public) supplier. For others it is the contractual customer [41].

Slovakia

In legislation, there is defined a support for RES to sell whole delivered electricity to the grid (not produced) to regional DSO, where RES is connected for losses purchace purposes. The price is defined by regulator. Producer could make a decision to sell this electricity to other market participant such as supplier. In this case the price is not regulated.

Slovenia

Borzen

5.10. In regards to the previous question, how can this energy be sold (power exchange, bilateral contracts, auctions, other)?

Austria

Power exchange

Bosnia and Herzegovina

In Federation of Bosnia and Herzegovina, energy from renewable sources is sold through bilateral contracts.

Bulgaria

The producers of electricity from RESs, depending on the network to which they are connected, shall conclude contract for access with the Electricity System Operator, the electricity distribution company, and will sign a contract with the Public supplier or with the Public provider for sale of electricity.

Croatia

At the moment all suppliers have an obligation to buy a share of energy generated by RESs in FiT regimeat a regulated price. However, subsidiesafter 1 January 2019 HROTE will sell electricity from of electricity from RESs in FiT regime on the market (tenders, CROPEX and OTC).

Czech Republic

In all possible modes, same as all other electrical energy

Germany

Power exchange

Hungary

The energy from RESs under FiT regime is sold on the HUPX. All other renewable energy can be sold in any kind of agreement (power exchange, bilateral contracts or through traders).

Montenegro

Not available.

Romania

The energy from RESs can be sold by power exchange (which include bilateral contracts).

Serbia

Unsubsidized customers enter into bilateral agreements with customers [41].

Slovakia

This energy is sold based on billateral contract in both cases (regional DSO and supplier).

Slovenia

Energy is sold on market.

5.11. Do the RES have grid priority access?

Austria

Yes, if accredited by OeMAG

Bosnia and Herzegovina

Renewable energy producers which have acquired the status of a qualified producers have the advantage of priority delivery of electricity generated from RES in the grid, or the advantage of dispatch, in accordance with relevant rules and regulations governing the operation of the power

system of Bosnia and Herzegovina, as well as the advantage delivery to the grid for electricity generated in power plant with installed capacity less than 150 kW, without reporting the daily schedule to system operator.

Bulgaria

No.

Croatia

RES/CHP generators that have obtained the status of an eligible electricity producer have grid priority, i.e. when the TSO must curtail production, those producers will be curtailed last.

Eligibility status is given for generators that use RES or are high-efficiency CHP units. Conditions of eligibility are defined by legislation.
Eligibility status is given automatically for so-called “simple generators” (for now exclusively PV installed on buildings) or is obtained by a ruling given by the Croatian Energy Regulatory Agency (HERA).

Czech Republic

Yes

Germany

Plant operators are statutorily entitled to immediate priority connection of renewable energy plants by the grid operators.

Hungary

Household size RESs and feed-in tariff RESs (RESs under 0,5MW) have obligatory takeover.
RESs curtailment is only done in case of system emergency.

Montenegro

Privileged producer has grid priority access with the total produced electricity in the transmission or distribution system, unless it would endanger the safety of the system.
If the transmission or distribution system due to the safety of the system cannot give priority to the privileged producer, their obligation is to turn to the Agency (Energy Regulatory Agency – Montenegro [30]) and determine corrective measures for prevention of further denials of access to the system. [31]

Romania

No grid priority access for RES. No discrimination regarding to the grid access.

Serbia

Transmission system operator is obliged to give priority to take over the electricity produced from renewable energy sources, except in cases where safety is endangered of the transmission system [36]-Article 109.

Slovakia

A producer of electricity, who qualifies for support has the right to priority connection to the distribution grid, priority transmission of electricity, priority distribution of electricity and priority supply of electricity if the electricity generating installation meets the technical conditions of the system operator under special legislation and does not compromise the safety and reliability of the grid (RES LEGAL 2011).

Slovenia

Yes.

5.12. Are RESs allowed/encouraged/obligated to take part in provision of ancillary services?

Austria

Yes, allowed and encouraged, in some regions obligated.

Bosnia and Herzegovina

Qualified producers who have entered the incentive system, do not provide and have no obligation to provide ancillary services.

Bulgaria

No.

Croatia

RESsEvery producer is allowed but not encouraged to provide ancillary services.

Czech Republic

In CZ is public tendering procedure organized by TSO.

Germany

Yes, as long as they can fulfill the general prequalification requirements imposed by TSOs.

Hungary

RES is allowed, however, not encouraged to take part in the ancillary services market. RES usually cannot offer reserve market products.

Montenegro

Not available.

Romania

No. The RESs are not allowed/encouraged/obligated to take part in the provision of ancillary services.

Serbia

No information available

Serbia

It is not mandatory, but they are encouraged. RESs currently do not participate in the provision of ancillary services.

Slovakia

In legislation, there are defined legal and technical requirements to all ancillary services providers with no special treatment to RES.

Slovenia

No, RESs are not taking any part in provision of ancillary services.

5.13. What are the future plans for RESs integration?

Austria

Introduction of incentives scheme for enhanced self consumption and storage utilization regarding small generation facilities.

Bosnia and Herzegovina

According to APOEF [11] the policies, plans and indicative targets of the Federation of Bosnia and Herzegovina are determined relating to the share of energy from renewable sources in gross final consumption of electricity, energy for heating and / or cooling and energy for transport; taking into account the effects of regulatory measures for improving energy efficiency and energy savings of end-customers as well as other measures in order to fulfill the objectives.
APOEF is synchronized with the power strategy of the Federation of BiH and includes:
• planned total final energy consumption from renewable sources in heating and cooling, electricity and transport, taking into account the effects of energy efficiency and energy savings, expressed in kilotonnes of oil equivalent (ktoe)
• planned share of RESs in final consumption of energy in heating and cooling, electricity and transport, expressed in percentages,
• the share of renewable energy of each sector in final energy consumption,
• the share of renewable energy in transport,
• estimate of the total shares (installed capacity of total electricity generation) expected from each renewable energy technology,
• maximum installed capacity of privileged producer for each technology,
• policies and measures for promoting and encouraging the use of energy from renewable sources, in accordance with the regulations in the field of competition and state aid,
• common measures of ministries and institutions.
Also, the goal of total share of renewable energy sources in final energy consumption for 2020 is defined, which amounts to 41%.
Government of the Federation, on the proposal of the Ministry, may impose the following additional incentives:

a) facilities for domestic production and equipment procurement that is used for heating and cooling using renewable energy, such as solar collectors for hot water, heat pumps using aerothermal, geothermal and hydrothermal energy, etc.
b) creating a local market of thermal energy produced from renewable sources by introducing a register of the guarantees for heat origin and making it obligatory for large consumers of thermal energy (industrial and district heating) that part of the heat energy must be produced from renewable sources,
c) other incentives from APOEF.

Bulgaria

As mentioned before, new rules for RES subsidies are defined (the laws are already in power but still not applied in practice) and suggest replacing FiT by market premiums. Market premiums are additional remunerations for renewable energy producers who are selling their electricity on the market (in the same way as conventional producers).

Croatia

As mentioned before, new rules for RESs subsidies are defined (a new law is in force but secondary legislation needs to be passed) and mandate replacing FiT with market premiums. Market premiums are additional remunerations for renewable energy producers who are selling their electricity on the market (in the same way as conventional producers).

Czech Republic

Total electricity production from renewable and secondary sources of energy will continue to rise between 2010 and 2040. This is motivated by an effort to make the maximum possible use of this domestic energy source, although on the assumption that it is competitive. Besides hydro energy, the potential for which has now been practically exhausted after more than a century of developing hydro power stations in this country, there is a clear potential for the further development of biogas stations and PPS. Electricity generation from biomass and waste will continue to develop until domestic potential has been exhausted (according to the Action Plan for Biomass, statistics and forecasts concerning the production of waste and its fuel component).

Germany

Using market premium as preferred subsidy scheme while cutting the premium to a minimum by introducing competitive auctions

Hungary

As the current RESs system was introduced at the beginning of 2017, no changes are planned currently. Aggregation of RESs is planned to take part in the ancillary services market.

Montenegro

Not available.

Romania

No further plan for RESs integration.

Serbia

According to the Action Plan [42], in the electricity sector it is necessary to achieve an increase in production of energy from renewable sources to 43.3% (1,267 ktoe) compared to the baseline year 2009 (884 ktoe). This increase of renewable energy sources use in the sector 13 of electricity, represents a significant increase compared to BFPE: from 9.7 % in 2009 to 12.2% in 2020. To achieve its objectives in the electricity sector Republic of Serbia shall until 2020 install an additional 1092 MW.

Slovakia

The TSO SEPS and the Slovak Ministry of Economy take the final decision on priorities in the grid development. In this regard, the difference between the transmission and distribution grid lies in the necessary information which has to be handed in to the Ministry of Economy (URSO 2011). The development of the transmission grid is based on the Energy Security Strategy of the Slovak Republic and the Energy Policy of the Slovak Republic. Every year, the TSO SEPS draws up and updates the medium- and long-term Transmission System Development Programme, which has to be submitted to the Ministry of Economy. This programme specifies the impact of RES-E on the development of the transmission system and proposes measures for their implementation (NREAP 2010).
The development of the distribution grid is carried out within the scope of development plans, with reference to connection requirements. Distribution systems are developed in accordance with the "Five-year DSO Development Plan" (NREAP 2010).

Slovenia

Implementing DMS state-estimation technologies and investments in the grid.

6. Organization of balancing market

6.1. Which institution is the organizer of the balancing market?

Austria

Austrian Power Grid AG

Bosnia and Herzegovina

NOSBiH (Independent System Operator in Bosnia and Herzegovina) is the organizer of the balancing market in Bosnia and Herzegovina.

Bulgaria

The independent transmission operator shall conclude transactions for purchase and/or sale of electricity with market participants who owe dispatched generating and /or consuming sites for coverage of the imbalances within the national market area.

Croatia

HOPS is the organizer of the balancing market. However, the balancing market in Croatia is not yet fully operational.

Czech Republic

OTE a.s.

Germany

The German transmission system operators (TSOs) have to maintain the balance between electricity generation and consumption within their control areas at all times.

Hungary

The TSO (MAVIR Zrt.).

Montenegro

Balancing market organizer is Power Market Operator of Montenegro („Crnogorski operator tržišta el. energije“). However, Transmission System Operator („Crnogorski elektroprenosni sistem“) manages the Power Market. [32]

Romania

National Regulatory Authority.

Serbia

PE EMS.

Slovakia

In general there is no balancing market in Slovakia. The Transmission System Operator SEPS is responsible for the system stability and provides dispatching control of the system. But there is an ongoing discussion in Slovakia on the opening of a balancing market.

Slovenia

Borzen.

6.2. What is its role (besides this one, with regards to the last question)?

Austria

In the control centre of the APG all grid information pertaining to the Austrian transmission grid is collected and processed.
They do the coordination, planning and administration of 100,000 electricity transports per year.
APG is responsible for the following tasks:

- the management of grid operations in the high and extra-high voltage grid of Austrian Power Grid AG;
- load flow optimisation;
- congestion management;
- the coordination of disconnections for maintenance and inspection;
- the remote control of the substations and switching stations.

Due to the international exchange of electricity in the deregulated European electricity market, the activities of Austrian Power Grid AG extend well beyond the national frontiers. This calls for close co-operation with all national and European grid operators.

As control area manager, Austrian Power Grid AG is required by law to provide for a stable, secure transmission grid, especially considering Austria's central role in the European electricity market.
In close co-operation with the transmission system operators in the neighbouring European countries, they monitor, coordinate and control cross-border electricity flows and, within the framework of ENTSO-E (European Network of Transmission System Operators for Electricity), guarantee a long-term and sustainable electricity supply in Europe.
The safe operation and ongoing maintenance of the transmission facilities is one of their central tasks. Through careful and long-term transmission system planning, they ensure that Austria's electricity supply system will also be able to meet the continuously growing challenges of the future.

Bosnia and Herzegovina

NOSBiH is a non-profit company owned by BiH entities Republic of Srpska and Federation of Bosnia and Herzegovina, which carries out its activities throughout the territory of Bosnia and Herzegovina. The work of NOSBiH is regulated by DERK (State Electricity Regulatory Commission). There are three key roles and responsibilities of NOSBiH:

- operation of all high voltage transmission facilities in Bosnia and Herzegovina, voltage level of 110 kV or more,
- organization of the balancing market of electric power in Bosnia and Herzegovina,
- establishment of Indicative development production plan and review, approval, direct revision of Long-term transmission network development plan.

Bulgaria

Independent Transmission System Operator ESO EAD is responsible for the common operational planning, coordination and control of the Bulgarian power system and its parallel synchronous operation with neighbouring systems. Its purview also includes transmission grid operation, maintenance and reliable functioning, auxiliary network servicing, as well as maintenance and repair services in the energy sector. It also manages the power transit through the national grid and runs the electricity market.

Croatia

HOPS is Croatian TSO whose responsibility is planning and operational management of the Croatian transmission system.

Czech Republic

Evaluation, billing and settlement of imbalances between the contracted and metered electricity and gas supply or consumption.

Germany

Since 2001, the German TSOs have been procuring their required primary control reserve, secondary control reserve as well as minute reserve on an open, transparent and non-discriminatory market for control reserve according to the guidelines of the Federal Cartel Office (Bundeskartellamt - BKartA).

The procurement is carried out as a tender auction on the German Control Reserve Market with participation of numerous bidders (both plant operators and electricity customers).

Hungary

The role of the TSO is to ensure the operational requirements of the liberalized electricity market, the operation of the ancillary services market, the operation of the balancing group system and the management of the cross-border capacities.

Montenegro

The Market Operator is a legal energy entity, responsible for the organization and management of the power market in Montenegro, which represents its basic, also completely new energy activity of public interest, which it performs in accordance with the law, license, market rules and international regulations. Activities in the power market are organized and carried out in accordance with the objectives of the development of energy activities and the customers needs in Montenegro for providing safe, reliable and quality electrical energy supply, while respecting the principles of competitiveness, and an obligation to provide equal legal status of all energy entities and participants in the power market in accordance with the law.

Romania

The role of National Regulatory Authority is to issue the regulations based on that the BM operates.

Serbia

PE EMS is the holder of licences for energy operations such as transmission, transmission system operation, organisation and administration of bilateral and balancing electricity market.

Slovakia

Short-term electricity Market Operator - OKTE, a.s. started with an activities since 1st January 2011. OKTE, a.s. was established as a subsidiary of Transmission System Operator (Slovenská elektrizačná prenosová sústava, a.s.) which is the owner of 100% of shares. Within electricity market in the Slovak

Republic, OKTE, a.s. is classified by Energy Act as the entity that is subject to regulation by regulatory office, is authorized for activities as Short-term electricity Market Operator in the Slovak Republic.

OKTE, a.s. shall treat all electricity market participants on the basis of open, transparent and non-discriminatory conditions when providing services. The scope of activities OKTE, a.s. arises out of international and national legal documents. OKTE, a.s. organize and evaluate the organized Short-term cross-border electricity market and provide clearing of imbalances in the Slovak Republic. Simultaneously OKTE, a.s. is in the process extension of its scope of activities, specially the administration and collection of metered values and central invoicing.

OKTE, a.s. cooperates upon execution of its activity within the national cooperation with several state institutions (the Ministry of Economy of the Slovak Republic, the Regulatory Office for Network Industries), with the Transmission System Operator in the Slovak Republic, with distribution systems operators as well as other market participants.

Within the international cooperation, OKTE, a.s. is a member of the international association of exchanges and market organizers EUROPEX. EUROPEX associates exchanges and market organizers from the European Union countries which provide for trading in electricity, gas or emission quotas. Within the membership in EUROPEX, OKTE, a.s. together with its further members strives for assertion of tasks of energy exchanges and market organizers in the European Union, increase of economic competition by establishment of price transparency, dealing with issues covering establishment of a single European market and communication and cooperation with the institutions within the European Network of Transmission System Operators for Electricity and Gas (ENTSO-E, ENTSO-G) and with the Agency for Cooperation of Energy Regulators (ACER), etc.

Slovenia

Same as 1.6

6.3. Who are the BRPs (Balancing Responsible Parties)? Please explain.

Austria

A balance group consolidates suppliers and consumers into a virtual group within which supply (procurement schedules, injection) and demand (delivery schedules, withdrawals) are balanced. It requires both a clearing and settlement agent and a balance responsible party to function. All market players are obliged to join balance groups. They supply power to and/or procure it from their balance groups. The purpose of a balance group is to even out supply and demand fluctuations. The balance responsible parties represent their groups in dealings with other market players.

Tasks:

- Obtain day-ahead consumption forecasts from all the suppliers in their balance group,
- Send these forecasts to the clearing and settlement agent,

- Pay the clearing and settlement agent for the balancing energy,
- Bill the suppliers for the balancing energy required.

Bosnia and Herzegovina

Balancing group consists of one or more undertakings with all their handover points of electricity to the transmission and distribution networks in BiH. Market participants may associate balancing groups in order to reduce costs of imbalances or for other reasons. Balancing group must have one of the market participants defined as balance responsible party – BRP. BRP is financially responsible to NOSBiH for imbalance of balancing group that BRP presents.
Balance responsibility of the BRP towards NOSBiH is regulated by an agreement about balance responsibility.

Bulgaria

Each wholesale market participant is responsible for its own imbalances, i.e. each wholesale market participant is a BG member.
Detailed answer can be found in 1.1. and 1.8.

Croatia

Each wholesale market participant must belong to a balancing group. Exceptions are specific balancing groups tied to specific entities - TSO, DSO, PX and HROTE as explained earlier.
BRP are all market participants.

Germany

Suppliers and traders form balancing groups. These are entities within one control area in which feed-in of generators as well as offtake of customers and traded energy quantities of the members of the balancing group are pooled. Each quantity of generation, load and traded energy has to be allocated to exactly one balancing group at a particular time in order to guarantee a full and unambiguous balancing of the system. A BRP is responsible for the control of each balancing group.

Hungary

The BRP is the responsible person in the Balancing Group to make balancing group contract with the TSO, balancing member contracts with the balancing group members, prepare the schedule of the balancing group and submit to the TSO in time. Finally his duty is to manage the settlement both with the TSO and with the balancing group members.

Montenegro

Balance Responsible Party is any market participant who, as the holder of its own balance responsibility, takes financial responsibility; a holder of balancing group responsible party takes financial responsibility for its own balance deviation and balance deviation of members of its balance group entities settlement. [32]

Romania

The BRP can be any economic operator but with producer, suppliers or trader license. The maximum size of BRP can be 30% of the market energy.

Serbia

A participant in the electricity market shall regulate its balancing responsibility.
Balancing responsibility is regulated by the conclusion of an agreement on balancing responsibility with the transmission system operator or by transferring the balancing responsibility to balancing responsible party, in accordance with the Energy Law, the law governing contractual relations and rules on the electricity market.
By concluding a balancing responsibility agreement with the transmission system operator and fulfilling the conditions laid down by the rules on the electricity market operation, a participant in the electricity market acquires the status of a balancing responsible party.
Market participant transfers balancing responsibility by concluding an agreement on the transfer of the balancing responsibility with balancing responsible party.
By concluding a contract on full supply, the end-customer transfers the balancing responsibility for its handover site to the supplier.
By concluding a contract on full supply under Article 188 of this Law the transmission operator, respectively the distribution system operator transferrs balancing responsibility on the supplier.
By concluding the contract referred to in paragraphs 2 and 4 of this Article the producer transfers the balancing responsibility for its site on the handover site to the supplier.
The transmission system operator is responsible for the establishment and implementation of the balancing responsibility of participants in the electricity market [36] Article 171 [43].

Slovakia

ENERGA Slovakia, s.r.o. has been registered in the central system OTE as a Balance Responsible Party including access to short-term electricity markets organized by OTE with effect from 15th April 2016. Currently the short-term power market has 108 members.

Slovenia

Same as 5.5

6.4. Is there an institution which provides balancing energy for the entire market?

Austria

The TSOs

Bosnia and Herzegovina

NOSBiH provides balancing energy for the entire market of Bosnia and Herzegovina.

Bulgaria

ESO EAD acquires balancing electricity for the entire power system.

Croatia

HOPS acquires balancing energy for the entire power system.

Czech Republic

Yes. Čeps every year with Long-term and mid-term contracts and One Day-ahead ancillary services market.

Germany

TSOs are responsible for determining and settling the amounts of balancing energy taken by the BRPs operating in their respective control areas.

Hungary

Yes, the TSO.

Montenegro

Answer is in 6.1.

Romania

No. Any producer is obliged to provide the available capacity for balancing energy.

Serbia

The transmission system operator (Enterprise „Elektromreže Srbije“) buys and sells electricity from market participants on the balancing market of electricity for the purpose of balancing and ensuring secure operation of the system [36] – Article 174 .

Slovakia

Short-term electricity Market Operator - OKTE, a.s. is resposible participant for entire slovak electricity market dedicated to balance the electricity deviatons forom business perspective. Regarding physical involvemt of ancillary services provider, this responsibility of transmission system operator.

Slovenia

Yes, ELES as the TSO.

6.5. Regarding the previous question: how can the above mentioned institution acquire the balancing energy (own generation resources, market, bilateral contracts, ancillary services – control reserves, other)?

Austria

The responsibility of the control area operator to guarantee system stability lies with the transmission system operator. It lives up to this responsibility by carrying out load frequency control (section 7(60) Electricity Act 2010).
The control area operator procures the balancing services needed in regular tenders. All market players that fulfil the requisite technical conditions and have signed a corresponding framework agreement can participate in these tenders.

Bosnia and Herzegovina

NOSBiH purchases balancing energy in the market through a public tender for the procurement of ancillary services in secondary and tertiary regulation (annual and monthly procurement procedure);

registered providers of ancillary services are able to deliver voluntary offers unless they agreed to offer on daily market the balancing energy for tertiary regulation.

Bulgaria

The independent transmission operator maintains the balance of the electricity power system according to technical and economic criteria based on balancing market bids and offers. Balancing energy suppliers are all generators who operate adjustable units.

Croatia

Through bilateral contracts, activation of control reserves, balancing market (which is not yet operational) and through imbalance netting cooperation on Slovenian border (which is in operation).

Czech Republic

Public tender and bilateral contracts

Germany

By the deployment of control reserves.

Hungary

Control reserves (ancillary services) are procured only on regular tenders of the TSO. There are quarterly and weekly tenders for 4 types (secondary upwards, downwards and tertiary upwards and downwards) after each other. These are descending price auctions where the winners are obliged to offer their contracted (so-called market maker contract) capacity on the day-ahead auction while the TSO must accept the preciously contracted capacity. New offers can also appear on the day-ahead reserve market which are entitled for 'optional contract'.

Montenegro

Power and electrical energy which is needed for, TSO can provide:
1) by purchase or sale of electrical energy in the balancing market,
2) by purchase or sale of electrical energy in TSO's regulation area or abroad and
3) by activation of tertiary reserves. [32]

Romania

Please see the above answer.

Serbia

Ancilliary services are primary, secondary and tertiary regulation, regulation of voltage, no-voltage start and isolated operation.

Slovakia

Ancillary services providers conclude billateral contract with TSO based regulation rules. Those services are then activated based on needs by SEPS, a.s. in order to keep balance in system. Those costs for system servises are distributed thanks to market operator OKTE transparrently and proportionally to market parcicipants in volume of their imbalance share.

Slovenia

They acquire the balancing energy with their own generation resources (diesel aggregates), market and bilateral contracts.

6.6. What type of control reserves exist in your country?

Austria

There are reserves for primary, secondary and teriatry control, mainly provided by pump storage.

Bosnia and Herzegovina

Frequency regulation and active power regulation - primary, secondary and tertiary, voltage and reactive power regulation, the ability to run power plants with no external power supply, covering electricity losses in the transmission system, the elimination of deviations of balance responsible parties of daily schedule.

Bulgaria

Primary, secondary and tertiary reserve and cold reserve.

Croatia

Primary, secondary and tertiary reserve.
However, primary reserve is neither contracted nor remunerated.

Czech Republic

- Unit primary f control (PR)
- Unit secondary P control (SR)
- Unit tertiary P control (TR)
- Quick-start 10 minute reserve (QS10)
- Quick-start 15 minute reserve (QS15)
- Dispatch reserve available within t-minutes (DZt)
- Load change (ZZ30)
- Generation shedding (SV30)
- The Vltava (VSR)
- Secondary U/Q control (SRUQ)
- Island operation capability (IO)
- Black start capability (BS)

Germany

The German system services market consists of services structured into three main tiers: (1) the primary control reserve, activated within 30 seconds and available up to 15 minutes; (2) the secondary control reserve, activated within 5 minutes and available up to 15 minutes; and (3) tertiary control reserve, activated within 15 minutes and available for a minimum of 15 minutes up to 1 hour, or several hours in the case of several incidents.

Primary and secondary reserves are procured on weekly basis, and tertiary reserves on daily basis.

Hungary

Primary, secondary and tertiary reserve (frequency containment reserve-FCR, frequency restoration reserve-FRR and Replacement Reserve-RR, respectively), plus voltage-reactive power control and black start.

Montenegro

Not available.

Romania

The type of control reserves is primary, secondary and tertiary;

Serbia

Primary, secondary and tertiary reserves.

Slovakia

Regarding frequency regulation, Slovak republic could recognise three levels of regulation.

- Primary regulation – all UCTE country particitants are invloved in this type of regulation. All countries should participate proportionally to its impact of generation in total UCTE volume.
- Secondary regulation – service activited in case of primary regulation service cause an imbalance (agreed exchanges of electricity). It provides a frequency regulation and regulation of agreed electricity exchanges in range of 50Hz (20mHz accepted imbalance) and 100MW for electricity exchanges, where hour deviation could not exceed 20 MWh. Secundary regulation should replace a failure of the biggest production capacity, which is 440 MW (nucler power plant block).
- Terciary regulation – service actived for economical power distribution to each power plant blocks with respect to secondary regulation capacity backup. Terciary regulation is provided by following measures:
  - Connection/disconnetion of whole power plant block,
  - Increasing/decreasing of power turbine power,
  - Connection/disconection of pomping modes of pumping hydro power plants,
  - Power redistribution among secondary regulation participants,
  - Change of electricity exchange between regulation areas,
  - Management of consumtion, e.g. tripple system control devices.

Regarding voltage and reactive power regulation, there are used physical generator parameter adjustments. This adjustments influence reactive power of generation. Voltage is regulated from two perspectives: Customer perspective and system operator perspective. There exists more activities in order to improve voltage and reactive power quality. Those could be: generator regulaton, transformator equipment gearing or connecting additional regulaton transformer

Primary voltage regulation reacts to terminal voltage of generator. Secondary voltage regulation is excecuted by system stabilisator, which evaluates and regulates voltage in system pilot nodes. Terciary voltage regulation trigeer its service in order to distribute reactive power and voltage with minimalisation of trensmission losses purpose.

Slovenia

Primary, secondary and tertiary reserve (frequency containment reserve-FCR, frequency restoration reserve-FRR and Replacement Reserve-RR, respectively), voltage-reactive power control and black start.

6.7. Who can provide control reserves?

Austria

Austrian Powergrid (APG) is responsible for control reserves management.
In the APG control area, access to tenders is organised in two steps:
1. Technical prequalification
The technical prequalification is the first step to gain accreditation as a supplier of control energy. Suppliers undergo a technical prequalification to examine whether they meet the technical criteria required to guarantee the necessary quality of the primary, secondary and tertiary control. The prequalification procedure must be carried out separately for each type of control energy.

2. Framework Agreement
The second step in gaining accreditation as a supplier involves the conclusion of a Framework Agreement. This agreement, which contains details relating to the legal relationship between the supplier and the control area manager, is identical for all suppliers. The framework agreement itself does not oblige the supplier to supply primary, secondary and tertiary control power within the framework of a tender. When the agreement has been signed by both partners, the supplier will, however, be listed as an accredited supplier and, as of this point in time, has the possibility to participate in all tenders for control energy for the APG control area via the electronic tendering platform.

Bosnia and Herzegovina

Providers of ancillary services whose facilities fulfill the technical requirements for ancillary services regulation have the right to participate in a market procedure. Facilities that fulfill the technical requirements for ancillary services regulation were registered in „Registar resursa za pružanje pomoćnih usluga regulacije kod NOSBiH“ (Register of resources for the provision of ancillary services regulation at NOS BiH).

Bulgaria

Each market participant technically eligible and approved by ESO EAD.

Croatia

Each market participant technically capable and approved by HOPS.

Czech Republic

Any third party

Germany

Suppliers of control reserve products have to provide evidence that they are able to fulfil the technical requirements concerning the provision of different control-reserve qualities and have to undergo a technical pre-qualification (separately for each control reserve quality). According to the list of providers published by the German TSOs currently 22 entities are pre-qualified to provide PCR, 36 entities to provide SCR and 52 entities to provide TCR. While prequalified providers for PCR and SCR mainly (but not exclusively) comprise operators of large-scale power plants, numerous large-scale consumers and local municipal utilities operating smaller generation units are pre-qualified to provide TCR.

Hungary

Any producer (or consumer) with special accreditation per reserve type (accreditation briefly means integration to the TSO's control system, test of the control range and gradient). All producers are obliged to offer their control range on the ancillary services market.

Montenegro

Not available.

Romania

All the producers who are certificated to offer the reserves

Serbia

Any electricity producers.

Slovakia

Control rexerves in form of ancillary services are purchaced and activated by trasnmission system operator. Conditions of power plant involvement into ancillary services portfolio are regulated and there should be concluded a Contract for ancillary sercices and regulation electricity supply provision. The transmission system operator purchaces the required system support services in order to provide system services exclusively from service providers who meet the transmission system operator's technical conditions and business conditions, provide support services on facilities certified for this purpose in order to achieve the minimum cost of securing support services. It should be done on a transparent and non-discriminatory basis, on the basis of a contract for the provision of ancillary services and the supply of regulatory electricity or ancillary services contracts.

Slovenia

Synchronous motors.

6.8. Is there a reserve/balancing market (and if yes: what services exist in those markets)? If not, how are reserve requirements acquired?

Austria

A separate framework agreement must be signed for each type of control energy.

Bosnia and Herzegovina

There is no reserve balancing market. However, if the market is not supplied sufficient quantities capacity of ancillary services, in accordance with „Procedure za pomoćne usluge“ (Procedures for ancillary services), NOSBiH distributes missing quantities capacity secondary and tertiary regulation to individual service providers who have the technical ability to provide these services.

Bulgaria

Market for balancing energy, organized by the electricity system operator (ESO EAD).

Croatia

Currently, balancing energy and all capacity reserved for these services is acquired through bilateral contracts and through imbalance netting cooperation on Slovenian border.

Czech Republic

No information available.

Germany

There is a control reserve market in Germany. See answers for 6.6 and 6.7.

Hungary

Reserve market exists with the above mentioned tenders. Apart from that, GCC (Grid Control Cooperation) is used by the Hungarian TSO.

Montenegro

Not available.

Romania

The reserve is used on the balancing market to assure the deficit/surplus energy

Serbia

There is no market. All prices prescribed by AERS below market prices.

Slovakia

In 2016, there were 25 ancillary services providers, in the market.

TSO purchaces different types of ancillary services from its providers in order to provide system services. Those providers should fullfil technical and business conditions. Based on Peration code, TSO selects a best offer in order to reach minimal costs. We can distinguish following services:

- Primary power regulation +,
- Primary power regulation -,
- Secondary power regulation +,
- Secondary power regulation -,
- Terciary power regulation 3min +,
- Terciary power regulation 3min -,
- Terciary power regulation 10min +,
- Terciary power regulation 10min -,

- Terciary power regulation 15min +,
- Terciary power regulation 15min -,
- Terciary power regulation 30min +,
- Terciary power regulation 30min -,
- Consumption regulation – increase,
- Consumption regulation – decrease,
- Import of emergengy assistance,
- Non-guaranted regulation electricity +,
- Non-guaranted regulation electricity –,
- Possitive regulation electricity,
- Negative regulation eletricity,
- Start after blackout,
- Remote voltage regulation.

Slovenia

No, the TSO covers the balancing market with its own capacity or from others on bilateral contracts.

6.9. What are the future plans for balancing market development?

Austria

Network Development Plan 2016:
The Network Development Plan (NDP) is a legal requirement (in accordance with § 37 ElWOG 2010) and is based on the long-term strategic planning in the APG Masterplan 2030, the Ten Year Network Development Plan from ENTSO-E and the NDP 2015. By publishing this plan, APG informs all market participants about the important transmission infrastructures in transmission grid of APG that need to be upgraded or expanded in the next ten years (2017 – 2026). The NDP contains a list of investments that have already been decided upon, as well as projects that must be implemented in the next three years.
The completion of the projects in the Network Development Plan and the associated expansion of grid capacities in line with the existing requirements are essential prerequisites to ensure the monitoring and implementation of the “Energiewende” (transition of the energy system towards RESs). In addition to the integration of renewable energy sources, attention is focused in particular on guaranteeing the existing high level of security and reliability of supply for electricity consumers in Austria in the long term and the further development of the electricity market.

Bosnia and Herzegovina

Not avaliable.

Bulgaria

Future plans focus on introducing intraday market as a prebalancing market, procurement of reserves through auctions, stronger role of BGs, higher prices for balancing energy…

Croatia

Future plans include implementation of Network Codes since Croatia is a member of European Union. See:https://www.entsoe.eu/major-projects/network-code-development/updates-milestones/Pages/default.aspx.

Czech Republic

EU integration

Germany

The future plans include the implementation of the Electricity Balancing Network Code and the Forward Capacity Allocation Network Code. Furthermore, the aim is to facilitate renewable and load (DSM-demand side management) participation in the ancillary services market and in balancing.

Hungary

The future plans include the implementation of the Electricity Balancing Network Code and the Forward Capacity Allocation Network Code. Furthermore, the aim is to facilitate renewable and load (DSM-demand side management) participation in the ancillary services market and in balancing.

Montenegro

Not available.

Romania

No information available

Serbia

Market access and integration into future regional balancing market when it is formed.

Slovakia

Thanks to relatively low wholesale market prices, we could expect even higher involvement of other possible ancillary providers. Thanks to them, the market with ancillary services will become even more competitive.

Slovenia

No information available.

7. System operators

7.1. How are transmission and distribution system/network operator included in the power market? What are their roles?

Austria

As participants in the market.

Bosnia and Herzegovina

NOSBiH is authorized to perform activities relating to the operation of the electricity transmission and activities related to the transfer. They include system operation transmission to ensure reliability, the balance market, insurance ancillary services and the implementation of market rules.
Distribution System Operator (DSO) means a legal entity that owns the license to the activity of distribution and is responsible for the operation, management, maintenance, construction and development of the electricity distribution network and connection to new customers and producers.

Bulgaria

ESO EAD is in charge of checking technical viability of scheduled electricity transactions and organization of the balancing market. As an electricity buyer, it buys electricity for transmission network losses and interconnection losses.

Distribution system operator does not have a role in power market except that of an electricity buyer for covering distribution network losses.

Croatia

Croatian transmission system operator (HOPS) is in charge of checking technical viability of scheduled electricity transactions and organization of the balancing market. As an electricity buyer, HOPS buys electricity for transmission network losses and interconnection losses.
Distribution system operator does not have a role in power market except that of an electricity buyer for covering distribution network losses.

Czech Republic

Not really

Germany

They are market participants. Furthermore, the TSO is the system operator and responsible for matching schedules and maintaining security of supply.

Hungary

TSO and DSO cannot perform commercaial activity, cannot sell electric energy.
(Except for: cases when for a user not having commercial contract they can charge the used electric energy according to the regulation - the case related to purchasing network loss, detailed under the next point.)

Montenegro

Transmission system operator (OPS - TSO) and distribution system operator (ODS - DSO) are subjects that define market rules. OPS and ODS organize and manage the power market in Montenegro.

Romania

The role of transmission is to assure the transmission of energy in the secure conditions and the distribution is to assure the distribution of energy in the secure conditions. Also, the transmission and distribution operators assure the energy for the transmission and distribution losses.

Serbia

TRANSMISSION SYSTEM OPERATOR REGULATION

PE EMS is the holder of licences for energy operations such as transmission, transmission system operation, organisation and administration of bilateral and balancing electricity market

Transmission system operator is responsible for:

- secure, reliable and safe operations of the transmission system and electricity delivery quality;
- provision of adequate transmission capacity to create grounds for security of supply;
- transmission system operation and the operation of a part of distribution system of 110 kV which includes coupling bays 110 kV, bars 110 kV and line bays 110 kV, in a manner providing for the security of electricity delivery;
- non-discriminatory and transparent access to the transmission system and reasonable background in case of access denial;
- transmission system development providing for long-term capability of the transmission system to comply with rational requirements in terms of electricity transmission, bearing in mind environment protection;
- construction of connection to the transmission system;
- coordinated operations of the transmission system of the Republic of Serbia with interconnected transmission systems, i.e. with distribution systems in the Republic of Serbia; operation of power flows, bearing in mind exchanges with other interconnected systems, provision of necessary ancillary services, including the service of demand operation, to the extent where such availability is independent from any other transmission system with which the system is interconnected;
- system balancing;
- determination of technical and technological requirements as well as other necessary requirements for the connection of power facilities, devices and plants into a common system;
- accuracy and reliability of electricity measurements on delivery points from and into the transmission system;
- regulation and administration of electricity market within their jurisdiction; and
- efficient and functional connection of electricity market in the Republic of Serbia with neighbouring electricity markets, in cooperation with the electricity market operators in the Republic of Serbia, as well as with the transmission system operators and market operators from neighbouring countries, in line with internationally-based principles and assumed obligations.

DISTRIBUTION SYSTEM OPERATOR REGULATION

In the first half of 2015, there were five distribution system operators which were daughter companies within PE EPS, holding licenses for the performance of electricity distribution and distribution system operation. As of July 1, 2015, PE EPS was reorganised and a daughter company Distribution System Operator “EPS Distribucija” was established. It continued performing the activity of electricity distribution and distribution system operation on the territory of Serbia without APKM.

The transmission system operator is responsible for:

- safe and reliable distribution system operations and the quality of electricity delivery;
- operation transformer bays 110 kV in distribution transformer stations 110/x kV and the operation of the distribution system of medium and low voltage, in a manner providing the security of electricity supply;

- non-discriminatory and transparent access to the distribution system;
- distribution system development providing for long-term capability of the distribution system to comply with rational requirements in terms of electricity distribution;
- construction of the connection of the distribution system user;
- determination of technical and technological requirements for connection of power facilities, devices and plants into a common system;
- provision of the information relevant for an efficient access to the distribution system to energy entities and distribution system users, based on principles of transparency and non-discrimination;
- provision of information on future electricity demand and other information necessary to the transmission system operator and to the Agency; and
- accuracy and reliability of electricity measurements on delivery points from and into the distribution system.

Slovakia

TSO and DSO's have a monopoly position in the market. Thanks to introduced unbundling priciples, position of a supplier and a system operator should be kept as independent.

System operators are owners of infrastructure and they are obliged to measure electricity in points of supply and points of generation. Those data system operator sends to the market operator for settlement purposes and to supplier for billing purposes.

Slovenia

They act the role of transmission and distribution operator. Control of the network, operation of the network, maintenance, development, connection to the network.

7.2. How do TSO and DSO acquire energy for power losses in their network?

Austria

By tender and purchase

Bosnia and Herzegovina

NOSBiH provides the energy to cover losses on the transmission system purchasing electricity in the market through public offerings. The procedure of procurement of electricity to cover losses in the transmission system is implemented on an annual basis. The process of purchased power for 12 months next year is conducted at the end of the current year. In the case of incomplete purchase on

an annual basis, the purchase on a monthly basis is organized. NOSBiH will make an agreement with service providers in which will define mutual rights and obligations.
Costs for covering distribution losses are included into tariff rates for distribution system of JP Elektroprivreda HZ HB dd Mostar.

Bulgaria

Bilateral Over-the-Counter.

Croatia

Through tenders for electricity.

Czech Republic

Public tender

Germany

By being market participants responsible for their on balancing circles.

Hungary

TSO and DSO are obliged to tender and purchase the network loss in a way that is public to the national and international generators and traders. DSO has the right to sell the electric energy purchased for recovering the distribution network loss that exceeds actual network loss on the regulated electric energy market.

Montenegro

Electrical energy for covering losses in the distribution system, DSO can buy from manufacturers, suppliers and retailers.
The distribution system operator may pose a special balancing group, within which runs the purchase of electricity to cover losses in the distribution system.
The transmission system operator may present a special balancing group, in framework that enables purchasing electricity to cover losses in transmission system, and ancillary and system services and the purchase and sale of electricity energy for rectifying deviations (balancing system).

Romania

TSO and DSO acquire energy for power losses in their network from the centralized market (from the wholesale power exchange).

Serbia

PE EMS is using tender procedure to buy electricity from PE EPS (electricity market prices are applied).

Slovakia

System operators are also one of the biggest electricity consumers in the whole market and they purchace an electricity for losses and own consumption purposes. Thanks to law regulation, this electricity should be purchaced from RES power plants. It purchaced even based on billateral contract with producers, or as a energy service supply from tendered supplier.

Slovenia

The energy is acquired by a public tender. DSO selects a provider on a 2-annual basis through auction.

7.3. In what way does the TSO/DSO procure ancillary services (Ancillary services market, Bilateral Over-the-Counter, tenders, etc.)?

Austria

Purchase or supply of control power

Bosnia and Herzegovina

Secondary control - NOSBiH procures capacity of secondary control through public procurement. Bids for secondary reserve are evaluated according to the bid price for booking capacity. Bids are selected with the aim of minimizing the cost of booking capacity of secondary regulation to the level of the required capacity of the secondary regulation, with the capacity in PPU (Ancillary Service Provider) offer can be shared. Selected offers are paid at the bid price for secondary control capacity (Pay-As-Bid). The price of secondary regulation capacity is limited to the border price $pMaxSecCap$ adopted by DERK and it is determined for the annual ($pMaxSecCapYear$) and monthly ($pMaxSecCapMont$) public procurement procedure.

Tertiary control - NOSBiH carries out the procedure of public procurement capacity of tertiary regulation upward and tertiary regulation downward. Offers for tertiary reserve are valued according to the bid price of capacity reservation. Bids are selected with an aim of minimizing the cost of booking capacity tertiary regulation to the level of the required capacity of tertiary regulation, with the capacity in PPU (Ancillary Service Provider) offer can be shared. Selected offers are paid at the bid price for tertiary control capacity (Pay-As-Bid). Upper limit amount of the reservation of tertiary regulation capacity $pMaxTerCap$ is determined by DERK.

Bulgaria

ESO EAD pays no thirdly regulation reserve.
Negotiation period:
-Primary and secondary regulation reserves (ancillary services reserve) are negotiated at annual basis, but ESO EAD monthly sets the range for each balancing energy supplier.
-Cold reserve is bought in auctions, usually for a month or a longer period.

Negotiation and reserve supply:
Until the 10th day of the month prior to the delivery month, ESO EAD determines the availability for participation in primary and secondary regulation of thermal power plants for the next month. Generators are obliged to allocate the set by ESO EAD availability for units on their planned operation on day D and inform ESO EAD on day D-1. Generators have no rights to sell electricity in the market over the availability set for ESO EAD.

Croatia

The TSO procures ancillary services based on prices in line with secondary legislation and based on bilateral contracts approved by the regulator.

Czech Republic

Public tender

Germany

Some, e. g. control power, in auctions, others, e. g. reactive power, bilaterally

Hungary

The system-level service is the sum of the all-time balance of the electric energy system and the services provided to sustain the adequate transmission quality by the TSO. The generator bearing license is obliged to offer the power plant capacity needed for ensuring the system-level services

prescibed in the electric energy supply regulations and cannot withold that or the electric energy generation without reason. TSO purchases the capacities necessary to ensure the system-level services and electric energy via public tender in a way that is accessible for any of the national or international generator, electric energy trader or any user having an equipment suitable for that.

The individual system-level service types and their purchase forms:

- Voltage and reactive power regulation (annual frequency, instead of tendering, it may happen according to the contract concluding and service providing obligation of the market participants having accreditation);
- Operation safety services (annual frequency, instead of tendering it may happen according to the contract concluding and service providing obligation of the market participants having accreditation);
- Balancing regulation (quarterly frequency, call for tendering);
- Managing network cross sections, intercepts.

Montenegro

Ancillary and system services, and electrical energy to cover losses in the transmission system and balancing system, OPS can buy from manufacturers, suppliers and retailers.

Romania

The ancillary services are assured by the Regulatory Orders and by tendering process. In the tendering process can participate only the producers which are qualified for that kind of ancillary services.

Serbia

OPS procures ancillary services over bilateral agreements.

Slovakia

The role for ancillary services purchace and provision of system services is a dedicated task of the TSO. DSO does not manage procurement of those services in any way. The transmission system operator purchaces the required system support services in order to provide system services exclusively from support service providers who meet the transmission system operator's technical conditions and business conditions, provide support services on facilities certified for this purpose in order to achieve the minimum cost of securing support services. It should be done on a transparent and non-discriminatory basis, on the basis of a Contract for the provision of ancillary services and the supply of regulatory electricity or ancillary services contracts .

Slovenia

Tenders.

7.4. How is communication and cooperation between TSO and DSO established (what information do they exchange, how often, how do they coordinate their operation, how does this change with the introduction of active distribution management)

Austria

Realtime data exchange on grid status

Bosnia and Herzegovina

Handover points of electrical energy in the distribution network can be:
- on the border of distribution network and transmission network,
- on the border of distribution network and manufacturing facilities,
- on the border of distribution network and the consumer/customer,
- on the border between neighboring distribution networks in BiH,
- on the border of distribution network in BiH and distribution systems of neighboring countries.

The obligation to submit data on injection, download and exchange of electricity from the accounting point (OMM) in handover points at the border of the transmission network is defined in „Mrežna pravila“ (Network rules). For data submission from the points of power handover at distribution network border, distribution system (ODS) is in charge. ODS is, for distribution network under its jurisdiction, obliged to submit to NOSBiH the following information:
- aggregated data as OMM, about injection and downloading electricity distribution network, for each manufacturer which owns facilities connected to the distribution network for which ODS is responsible;
- aggregated data as OMM, about injection and downloading electricity distribution network, for each supplier that supplies the consumers connected to the distribution network for which the ODS is responsible;
- aggregated data on injection and takeover of electricity to / from all the neighboring distribution networks in BiH;
- aggregated data about injection and downloading electricity networks from neighboring countries;
- data on actual distribution losses of the distribution area for which the ODS is in charge.

Data injection, download and exchange of electricity are measured values from the interval meters or its estimation (estimated) value based on replacement load curves.

Bulgaria

Their cooperation is mostly technical due to connection point of their networks (common interface). It is unknown (information unavailable) if they exchange information required for establishment of active distribution management.

Croatia

Their cooperation is mostly technical due to connection points connecting their networks.
Croatian distribution operator is obliged to deliver all necessary data to transmission system operator on request.

Czech Republic

No information available.

Germany

-

Hungary

TSO gives real-time data (measures, signals) to the DSO network controllers about the transmission network (via existing data connections), and the network environment next to the dispatching centers. DSO network controllers are obliged to ensure all the data (signals, measures) necessary for the operation network control and according to the Operations Agreement to the Service Operator.
DSOs send the previous days' measuring data (remote data) of the system users connected to the distribution network in balance district breakdown on a daily basis in an electronic format. DSO send weekly in advance the balance district profile diagram (data providing substituting the measurement) of the profile-settled users and of the system users connecting to the distribution network to the TSO.

Montenegro

The manner of communication and exchange of information and data between OPS, ODS and market participants to the Market Operator determines the Instruction on communication. Instruction on communication is issued by the market operator.
Information systems OPS, ODS, market participants and market operator must be configured so that they can support the mode of communication and exchange of information and details specified by instruction on communication.

Romania

Any access of power plant or consumer in the TSO or DSO network require acceptance from the DSO or TSO.

Serbia

OPS and ODS have active communication and exchange wide range of information in different periods. The operation is coordinated by meetings on which the information are defined and form of cooperation.

Slovakia

Those companies changes information especially for dispach purposes. TSO dispach centre is considered as superior dispach centre. This communication is done on strategy (planning) level and daily operational level). Because those companies are mutually connected, there is concluded a set of contracts among them (connection, trasmission of services, ets…). There is also close discussion of system technical development area, because of close coexistence.

Slovenia

Exchange on-line SCADA data, monthly reporting. Not much in reality.

7.5. What is the structure of network tariffs (high and low tariff, static based on kWh/kW/kWh-kW, or dynamically following demand pattern, other)? Please explain in as many details as possible.

Austria

The system charges are the amounts that system operators are allowed to charge to their customers for the system services they render. They are made up of the following components:

- the system utilisation charge, which covers the cost incurred by system operators in constructing, expanding, maintaining and operating their networks;
- the charge for system losses, which compensates system operators for the costs they incur in procuring the energy they need to cover grid losses;
- the metering charge, which compensates system operators for the costs directly related to the installation and operation of metering equipment – if system users provide their metering equipment themselves, this charge is reduced correspondingly;

- the system provision charge, which makes up for costs incurred by system operators when building and expanding the different network levels so that connection of individual facilities becomes possible in the first place;
- the charge for system services, which is designed to cover the costs incurred by control area managers in relation to the requirement to offset load variations by means of secondary control;
- the system admission charge, which compensates system operators for the costs directly arising from connecting a facility to a system for the first time or altering a connection to account for a system user's increased connection capacity; and
- supplementary service charges, which include regulated rates e.g. for payment reminders, extra meter readings and meter checks etc.

E-Control's Regulation Commission sets amounts or ceilings for the above charges

Bosnia and Herzegovina

TARIFF RATES FOR DISTRIBUTION SYSTEM USERS

ACCOUNTING ELEMENTS	UNIT OF MEASURE	DIFFERENTIATION		MEDIUM VOLTAGE		LOW VOLTAGE							
						HOUSEHOLDS		OTHER CONSUMPTION					
		SEASONAL	DAILY	35 kV	10 kV	I TARIF GROUP	II TARIF GROUP	I TARIF GROUP	II TARIF GROUP	III TARIF GROUP	IV TARIF GROUP	V TARIF GROUP	PUBLIC LIGHTING
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Capacity charge	KM/kW/month	HIGHER		7,73	8,71	6,64	6,64	11,12	11,12	11,12	6,64	6,64	1,8
		LOWER		5,94	6,7	5,11	5,11	8,56	8,56	8,56	5,11	5,11	1,38
Active energy	fening/kWh	HIGHER	HIGHER	2,05	2,47	7,61	9,51	7,98	11,31	9,05	7,61	9,51	10,69
			LOWER	1,02	1,24	0	4,75	3,99	5,65	0	0	4,75	0
		LOWER	HIGHER	1,57	1,9	5,85	7,31	6,14	8,7	6,96	5,85	7,31	8,22
			LOWER	0,79	0,95	0	3,66	3,07	4,35	0	0	3,66	0
Excess reactive energy	fening/kVArh			2,14	2,68	0	0	3,22	0	0	0	0	0

Table A.7.5.1.

Tariff rates for distribution system users are based on following table:

ACCOUNTING ELEMENTS	UNIT OF MEASUREMENT	DIFFERENTIATION		MEDIUM VOLTAGE		LOW VOLTAGE							
						HOUSEHOLDS		OTHER CONSUMPTION					PUBLIC LIGHTING
		SEASONAL	DAILY	35 kV	10 kV	1. tar. group	2. tar. group	1. tar group	2. tar. group	3. tar. group	4. tar. group	5. tar. group	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Capacity charge	KM/kW/month	HIGHER		5,953	6,909	4,849	4,849	9,347	9,347	9,347	4,849	4,849	0,000
		LOWER		4,579	5,315	3,730	3,730	7,190	7,190	7,190	3,730	3,730	0,000
ACTIVE ENERGY - distribution	fening/kWh	HIGHER	BIGGER	0,000	0,000	4,269	5,336	3,708	7,086	5,669	4,269	5,336	7,476
			SMALLER	0,000	0,000	0,000	2,668	1,854	3,543	0,000	0,000	2,668	0,000
		LOWER	BIGGER	0,000	0,000	3,284	4,105	2,852	5,451	4,361	3,284	4,105	5,750
			SMALLER	0,000	0,000	0,000	2,052	1,426	2,725	0,000	0,000	2,052	0,000
ACTIVE ENERGY LOSSES of the distibution network	fening/kWh	HIGHER	BIGGER	0,228	0,521	1,867	2,334	2,391	2,362	1,890	1,867	2,334	1,797
			SMALLER	0,114	0,260	0,000	1,167	1,195	1,181	0,000	0,000	1,167	0,000
		LOWER	BIGGER	0,175	0,400	1,437	1,795	1,839	1,817	1,454	1,437	1,795	1,383
			SMALLER	0,088	0,200	0,000	0,898	0,920	0,909	0,000	0,000	0,898	0,000
ACTIVE ENERGY LOSSES of the transmission network	fening/kWh	HIGHER	BIGGER	0,385	0,414	0,319	0,399	0,408	0,403	0,323	0,319	0,399	0,307
			SMALLER	0,192	0,207	0,000	0,199	0,204	0,202	0,000	0,000	0,199	0,000
		LOWER	BIGGER	0,296	0,319	0,245	0,307	0,314	0,310	0,248	0,245	0,307	0,236
			SMALLER	0,148	0,159	0,000	0,153	0,157	0,155	0,000	0,000	0,153	0,000
ACTIVE ENERGY - transmission tariff	fening/kWh	HIGHER	BIGGER	1,014	1,087	0,814	1,018	1,042	10,300	0,824	0,814	1,018	0,783
			SMALLER	0,507	0,544	0,000	0,509	0,521	0,515	0,000	0,000	0,509	0,000
		LOWER	BIGGER	0,708	0,836	0,626	0,783	0,802	0,792	0,634	0,626	0,783	0,603
			SMALLER	0,390	0,418	0,000	0,391	0,401	0,396	0,000	0,000	0,391	0,000
POWER CALCULATION - transmission tariff	KM/kW/month	HIGHER		1,773	1,797	1,795	1,795	1,775	1,775	1,775	1,795	1,795	1,795
		LOWER		1,364	1,383	1,381	1,381	1,365	1,365	1,365	1,381	1,381	1,381
ACTIVE ENERGY - tariff of "NOS"	fening/kWh	HIGHER	BIGGER	0,0858	0,0920	0,0689	0,0861	0,0882	0,0871	0,0697	0,0689	0,0861	0,0663
			SMALLER	0,0429	0,0460	0,0000	0,0430	0,0441	0,0436	0,0000	0,0000	0,0430	0,0000
		LOWER	BIGGER	0,0660	0,0708	0,0530	0,0662	0,0678	0,0670	0,0536	0,0530	0,0662	0,0510
			SMALLER	0,0330	0,0354	0,0000	0,0331	0,0339	0,0335	0,0000	0,0000	0,0331	0,0000
ACTIVE ENERGY tariff for system services	pf/kWh	HIGHER	BIGGER	0,3345	0,3587	0,2685	0,3357	0,3438	0,3397	0,2718	0,2685	0,3357	0,2585
			SMALLER	0,1672	0,1793	0,0000	0,1678	0,1719	0,1698	0,0000	0,0000	0,1678	0,0000
		LOWER	BIGGER	0,2573	0,2759	0,2066	0,2582	0,2645	0,2613	0,2090	0,2066	0,2582	0,1988
			SMALLER	0,1286	0,1380	0,0000	0,1291	0,1322	0,1307	0,0000	0,0000	0,1291	0,0000
Excess reactive energy	fening/kWh			2,14	2,68	0,00	0,00	3,22	0,00	0,00	0,00	0,00	0,00

Table A.7.5.2.

Bulgaria

Unknown. The consumers of the Public Providers who use the distribution networks pay all network services, inclusive green energy premium and premium for cogeneration (on top of energy).

Croatia

The structure of the network tariff system for final consumers consists of rates based on time of usage. Depending on the time of the year, the rates are:

- Winter period:
  - → Higher tariff rate – from 07.00 hrs until 21.00 hrs
  - → Lower tariff rate – from 21.00 hrs until 07.00 hrs
- Daylight savings time period:
  - → Higher tariff rate – from 08.00 hrs until 22.00 hrs

→ Lower tariff rate – from 22.00 hrs until 08.00 hrs

Depending on the category of the consumer, elements for defining the network charge include energy consumed (Hi/Lo tariff), peak load and excess reactive energy.

Czech Republic

High, low and unique tariff

Germany

Consumers pay for their grid use by capacity and energy. However, there are some incentives to consumers to reduce load during time of high grid stress.

Hungary

The network tariff system is a kW, kWh and connection point based static tariff system.

The fee elements are the following (Not all users pay all fee elements):

- takeover fee (for covering TSO costs);
- distribution base fee;
- distribution capacity fee;
- distribution turnover fee;
- distribution reacitve power fee;
- distribution loss fee;
- distribution schedule balancing fee;
- public lighting distribution fee (only for public lighting users).

The amount of the above fees depend on the voltage level of the connection point, which can be:

- high voltage connection (132 kV or higher);
- high/middle voltage connection (the user connects directly to high/middle voltage transformator station on 35, 22 or 11 kV);
- middle voltage connection (35, 22, 11 kV);
- middle/low voltage connection (the user connects directly to the middle/low voltage transformator station on 0,4 kV);
- low voltage connection (0,4 kV).

The last two voltage levels have further sub-cases, depending on whether the user is:

- remote measured (not profile-settled);
- profile-settled (not more that 3*80 A connection low voltage users, and independently from the connection capacity of the domestic customers).

One devides the profile-settled users category into normal (whole day) utilization, and the controlled utilization, which means the consumption of the appliances that can be remotely controlled (e.g., electric kettle, heat storing stove).

The following table shows the distribution costs valid for 2017, as an examaple, in HUF.

1.			Distribution base fee	Distribution capacity fee	Distribution turnover fee	Distribution reactive power fee	Distribution loss fee
			HUF/connection point/year	HUF/kW/year	HUF/kWh	HUF/kVarh	HUF/kWh
2.	High voltage connection		206 412	1 476	0,14	2,24	0,14
3.	High / Middle voltage connection		103 212	4 656	0,56	2,71	0,22
4.	Middle voltage connection		103 212	7 968	1,36	2,71	0,75
5.	Middle / low voltage connection						
	5.1	profile-settled(MV/LV I.)	3 444	-	6,18	3,75	1,44
	5.2	remote mesaured (MV/LV II.)	34 404	8 088	2,36	3,75	1,44
6.	Low voltage connection						
	6.1	profile-settled (LV I.)	1 446	-	9,55	3,75	2,22
	6.2	periodically switched (LV II.)	474	-	3,56	-	1,66
	6.3	remote mesaured (LV III.)	34 404	7 356	3,75	3,75	2,22

Table A.7.5.3.

Montenegro

Not available.

Romania

The transmission tariff is regional one and only for energy (per MWh).

Serbia

Electricity prices for tariff customers are stated at the tariff rates established by the tariff system on the basis of which sold electricity to the tariff customer is settled, for the settling period and they are established according to tariff elements for each category and group of tariff customers. Customer categories are determined based on: nominal voltage of network from which the electricity is delivered, type of measuring devices, respectively measurement methods and other criteria determined by the tariff system.
Customer categories are:

1. high voltage consumption;
2. medium voltage consumption;
3. low voltage consumption;
4. consumer consumption;
5. the public lighting.

In the category of high voltage are customers for whom the delivery point is on the high voltage transmission or distribution network - 110 kV or higher. In the category of medium voltage are customers for whom the delivery point is on the distribution network of voltage level higher than 1 kV and lower than 110 kV. In the category of consumption at low voltage are customers for whom the delivery point is on the distribution network voltage level up to 1 kV and to whom taken active power, active and reactive energy are determined by measurement. In the category commodity are customers for whom the delivery point is on the distribution network voltage level up to 1 kV, where the active

power is determined according to the approved power of connection, in accordance with the tariff system, retrieved active energy is determined by measurement and reactive power is not measured. In the category of Public Lighting are customers that are using electricity for lighting streets, squares, tunnels, pedestrian passages, parks, roads, historical and other features, devices for road signalling and other consumption for lighting of public spaces and public facilities and customers using electricity for the lighting of billboards, to whom retrieved active energy is determined by measurement or calculation according to time of retrieving, and active power and reactive power are not measured.
Tariff elements are:

1. "power";
2. "active energy";
3. "reactive energy";
4. "measurement point".

Tariff rates are determined for each of the tariff elements. For tariff element „power“, two tariff rates are established:

1. "settlement power";
2. "excessive retrieved power".

For tariff customers from the commodity category, tariff rates for active energy shall be determined also depending on the amount, purpose and methods of consumption of active energy:

1. "tariff rate for rational consumption";
2. "tariff rate for moderate consumption";
3. "tariff rate for high consumption".

"Tariff rate for rational consumption" includes monthly consumption up to 350 kWh - green zone).
"Tariff rate for moderate consumption" includes monthly consumption over 350 kWh to 1600 kWh blue zone.
"Tariff rate for high consumption" includes monthly consumption over 1600 kWh - red zone) [43].

Slovakia

This description describes a tarrif system for typical LV customer conneted to typical distribution system. For other types of customer (HV, EHV, season, etc…), there is set a different products with different structure. Regulation office set a DSO product portfolio as possible offer.

Final price for this kind customer is composed from tarrifs of supply and tarriffs of distibution/network. Network products, product conditions and tariffs are fully regulated by regulatory authority.

Distribution part:

- a fixed component of electricity tariffs. It reflects the continuing costs of the distribution system operator, linked to the provision of the required available reserved capacity in the distribution system for the electricity consumer. These costs refer to the technical unit (kW) or the ampere value of the main circuit breaker before the meter device (A),
- the variable component of electricity tariffs. It depends on the actual electricity consumption at the final customer's point of supply. It is an expression of the distribution system usage rate and it is measure by meter device (kWh). It could be dicveded into high and low tarrif based on DSO needs.

Other components of the final (integrated) electricity price:

- tariff for electricity distribution losses that takes into account associated costs with the purchase of electricity to cover losses that are physically incurred when distributing the required amount of electricity to the end,
- tariff for system operation. This part of the price supports the production of electricity from indigenous coal, renewable energy sources and high-efficiency cogeneration and the organizer of the short-term electricity market,
- tariff for system services. These are the costs associated with power system regulation,
- a deduction to the National Nuclear Fund for the decommissioning of nuclear installations and the handling of spent fuel and radioactive waste,
- VAT.

Slovenia

Static based per season, hour of the day, high, low, unique for kWh, pick power measured and tariffed. On household consumer based on the connection power fuse.

7.6. Are there any plans for change of tariff structure, including introduction of dynamic tariffs?

Austria

Yes, but the discussion is still in process

Bosnia and Herzegovina

No information avaliable.

Bulgaria

No information available.

Croatia

Suppliers are free to apply any type of energy pricing, but this is very rare in practice (usually just for large consumers with specific consumption).
In relation to network charges, dynamic elements for network tariffs are under consideration.

Czech Republic

No information available.

Germany

Permanently under discussion to shift from energy-focussed tariffs to capacity tariffs and to introduce system-friendly dynamics but nothing concrete yet.

Hungary

Concrete tariff modification plans are not known.

Montenegro

No information available.

Romania

Yes. The NRA has in plan to introduce the binom tariff (based on capacity and energy). TSO and DSO are under simulation in this year.

Serbia

There are plans but it is a political decision.

Slovakia

Thanks to smart metering implementaion projects in all DSOs, there is an intention to introduce dedicated distribution products tarriff system for this kind of equiped customers. In Slovakia, there are also intentions to introduced a product for eVehicles in order to their support.

Slovenia

A pilot dynamic tariff for pilot project has been introduced in 2016.

8. Prosumers – generation, storage and flexible demand connected to the distribution network)

8.1. How is the retail market organized (e.g. suppliers and end-consumers with retail contracts, other options)? Please explain.

Austria

Suppliers and end-consumers with retail contracts.

Bosnia and Herzegovina

Retail market is related to the supply of end-customers by licensed power supply companies.
Relations between the DSO, suppliers, end-users and producers of electrical energy are regulated by the following agreements:
a) connection/increase/reduction the connected load,
b) use of the distribution network,
c) electrical energy supply.

Bulgaria

In line with Directive 2009/72/EC and under the Bulgarian Energy Act (EA), the electricity market in the Republic of Bulgaria has been fully liberalized since 1 July 2007 with a stepwise liberalization process and currently electricity trade in Bulgaria is realized in two market segments freely negotiation prices and regulated prices. In 2015 the Bulgarian electricity market operated under a hybrid model, where part of low voltage customers trades were concluded at regulated prices approved by EWRC and the rest was traded in the liberalized market at prices negotiated with customers connected to middle and high voltage and part of low voltage industrial customers.
Consumers connected to the distribution network who are registered on the market at freely negotiated prices shall pay approved by SEWRC prices for access to the transmission network, for transmission through the transmission network, for access to and transmission through the distribution network, as well as green energy premiums and premiums for cogeneration, to the distribution company.

Croatia

Each consumer has to have a retail contract with a supplier. The supplier is acting as a wholesale buyer for consumers.

Czech Republic

Standard contracts, households on defined prices (packed), business consumers can negotiate the price.

Germany

Retail is unbundeled from grid, very competitive in Germany with around 1000 energy providers, customers can usually choose from a significant two-digit number of retailers.

Hungary

In order to ensure electric energy supply end-consumers have to conclude a contract with a trader. A special trader is the universal service supplier, which in the case of consumer demand has to conclude contract with the domestic customers, or for the case of not-higher-than 3x63A connection capacity, with other low voltage customers. Customers also have the possibility to purchase electric energy directly from the generator, with cross-border transport or at the regulated electric energy market.

Montenegro

The electricity market established in Montenegro comprises both a wholesale and a retail sale market. The wholesale electricity market comprises a long-term market (based upon bilateral contracts), a medium-term market (the day-ahead market), a short-term market (balancing market) and activities following real time (clearing and settlement of deviations). The retail sale market is established by the Agency according to the following principles: enabling competition in electricity supply by issuing licenses for the supply of electricity in the procedure prescribed by law, and providing the necessary commercial arrangements for the public supplier, who will be responsible for the electricity supply of tariff customers (households and small unprotected consumers who do not want to change suppliers).

Romania

The retail market is organized around the suppliers and end-consumers. The end-consumer has the right to choose the supplier.

Serbia

Suppliers licensed to supply conclude supply contracts on supply or full supply with end-user customers (purchasers).

Slovakia

The Act on Regulation introduced price regulation of electricity supply to vulnerable customers such as households and small businesses. Price regulation of electricity supply to vulnerable customers is governed by the Office Decree No. 221/2013 Coll. establishing price regulation in the electricity sector.

In 2014, price regulation of the electricity supply was applied to electricity supply to:

- households,
- small businesses,
- the last resort supplier regime.

Slovenia

Standard contracts, households on defined prices (packed), business consumers can negotiate the price.

8.2. Can the end-user choose its supplier?

Austria

Yes

Bosnia and Herzegovina

In FBiH, all end customers are qualified customers since 1st Jan, 2015 which gives them right to freely choose their supplier in accordance with the document “Pravilnik o opskrbi kvalificiranih kupaca i promjeni opskrbljivača” (Regulation on the Supply of Qualified Customers and Supplier Change) [12].
End customers in consumption category for households, as well as small businesses and commercial customers which did not select their supplier, have the right for electrical energy supply with standard quality at economically reasonable, easily and clearly comparable and transparent prices in the framework for universal service provision of the public supplier.
End customers in consumption category for households, as well as small businesses and commercial customers which did not select their supplier, have the right to choose the manner of electrical energy supply which means that a qualified customer can choose:
• to use their right to choose electrical energy supply with market suppliers,
• to manage electrical energy supply from public supplier, in the context of universal service,
• to be supplied by public supplier again, having previously used their right of choice and being supplied by market supplier.

Bulgaria

Yes (however, it is still partially restricted for the low voltage consumers).

Croatia

Yes.

Czech Republic

Yes.

Germany

Yes.

Hungary

The end-user can choose its supplier.

Montenegro

Yes. The supplier who has concluded a contract for the sale of electricity with a complete supply (open contract) is obliged to take balance responsibility for that customer.

Romania

The end-user has the possibility to choose the supplier.

Serbia

All can. Since 2008 all customers households, and since 2015 households too. For now, households and small consumers are not interested in a free market, because the regulated price is less than the market price.

Slovakia

The choice of a supplier by a customer is not limited at all since each electricity supplier in Slovakia operates in the whole territory of the country providing thus the customer with the same right to choose any supplier. Price regulation guarantees allowable costs and fair profit to the suppliers to SMEs.

Slovenia

Yes.

8.3. Do you have the universal service supplier (the last resort for consumers)? How is this last resort service regulated and provided (tariffs, users)?

Austria

Yes.

Bosnia and Herzegovina

Yes, on the basis of the document "Privremene smjernice elektroenergetske politike" (Temporary Guidelines in Energy Policy) [13] in FBiH there is clearly defined universal service provider. The Government of FBiH made a decision in 2014 to set providers for public/universal service and back-up supplier service. With this, JP Elektroprivreda BiH d.d. Sarajevo and JP Elektroprivreda HZHB d.d. Mostar are granted the status of public supplier and have established the obligation to provide public/universal service of supplying electrical energy and service of back-up supplier in the territory of the Federation of BiH, every of the 2 utilities on their operations area.
Public supplier is obliged, starting from 1st Jan 2015, to provide universal service of electrical energy supply - with standard quality, at economically reasonable, easily and clearly comparable and transparent prices – to all qualified electrical energy customers in customer category households, as well as small businesses and commercial customers, which did not select their supplier.
Also, public supplier, on its operation area, is required to provide the back-up supply service at market prices to all qualified customers which do not have the right to supply in the context of universal service, and which did not choose their supplier on the market.
The public supplier, on its operation area, provides the back-up supplier service and is obliged to supply the qualified customer, for a period not longer than 60 days for the following reasons:

- In the event of bankruptcy or liquidation of the selected supplier;
- Expiration or revocation of the selected supplier's license;
- When the customer has not found a new supplier, who will supply customer after the contract termination with existing supplier, unless the termination is not a result of the execution for not paying delivered electrical energy.

Bulgaria

Yes. Please see
http://www.tso.bg/uploads/file/eto/en/pdf/MarketRules_ENG_StateGazette_2010.pdf.
It is referred to as the Public Supplier and it delivers electricity to consumers who have not selected/changed their supplier.

Croatia

Yes. In case where the end consumer loses its supplier due to any reason, it is supplied by the supplier of last resort in case of industry and entrepreneurs or by the universal service provider in case of household customers. The remuneration of the last resort supplier for electricity is regulated by HERA' tariff systems, while tariffs for universal service are set by the supplier itself. Both functions are performed by HEP ELEKTRA d.o.o.

Czech Republic

Yes.

Germany

Yes.

Hungary

There is a universal service supplier that in the case of consumer demand is obliged to supply the domestic customers, or in the case of not-higher-than 3*63A connection capacity, other low voltage customers. The price of the electric energy purchased from the universal service supplier is determined in the decree of the assigned minister.

Montenegro

Information not available.

Romania

Yes, there is a universal service supplier.

Serbia

For the industry it is LR – alternate supplier, selected by the Government in the tender procedure, it is not regulated; and for households and small customers is the controlled Guaranteed Supplier.

Slovakia

In Slovakia, there are defined both roles. The universal service supplier and the last resort supplier.

The universal service is defined by law as service for household customers, or small businesses customers provided by an electricity supplier on the basis of a combined contract for electricity and which includes both supply of electricity and electricity distribution and a takeover for deviation/imbalance responsibility in the quality for reasonable, simple and clearly comparable, transparent and non-discriminatory prices.

The supply of the last resort to points of supply begins on the day following the day on which the original supplier lost its competence to supply electricity to these points; The distribution system operator shall at the same time assign these points to the balancing group of the last resort supplier and shall communicate this fact to the organizer of the short-term electricity market.

The supply of last resort takes for a maximum of three months, during which the supplier of the last resort is the supplier of electricity and related services to the given points of supply. The electricity customer who supplies the supplier with the last instance shall pay the supplier of the last resort the costs of supplying of last resort and the related services according to the price decision issued to the last resort supplier by regulator.

The electricity consumer may at any time during the supply of the last resort enter into a standard supplier's electricity supply contract or a combined electricity supply contract or may conclude these contracts with another supplier of electricity

Supply of last resort shall expire three months after its launch; If the electricity customer during the last resort of supply did not rpoceed a change, he shall continue to consume electricity even after the expiration of three months and pay it to the electricity supplier who provided him with the electricity last resort supply. The electricity supply is considered to be the electricity taken on the basis of an standard contract for an indefinite time period at the rate, product or price determined by the electricity supplier corresponding to the estimated annual consumption of the electricity consumer and the way of his using the electricity.

Last resort supply providers are nominated by regulation authorities and are vertically connected enterprises with DSO. Last resort suppliers are dominant players in their verticall connected enterprise territory.

Slovenia

The last resort for consumers is provided by system operator SODO. The tariffs are fixed and publicly published.

8.4. Can, and if yes, how can DERs participate in the power market?

Austria

Yes, if they are acknowledged member of a balance group.

Bosnia and Herzegovina

Considering that all DERs are actually renewable energy sources, they cannot participate on the market because they are mostly in Feed-in tariff system.

Bulgaria

In the document:
http://www.dker.bg/files/DOWNLOAD/el_market_rules_en.pdf
it states that (Chapter Three "Electricity Market Contracts", Section II, Parties and subject to contract): "producers connected to the electricity distribution network" can be market participants. However, no further details could be found.

Croatia

Producers or prosumers with installed generation capacity over 1 MW (regardless of technology) need a license for "electricity production" given by HERA.

Producers or prosumers can freely participate in the electricity market, however current legislation is primarily applicable to licensees. Therefore, producers and prosumers without licenses (small producers) have some limitations.

For smaller RES prosumers, that fulfill a set of conditions set in the Law on renewable energy sources and high-efficiency cogeneration, suppliers are obligated to offer a supply contract with their consumer by which they buy excess electricity from the consumer (prosumer). The price of excess electricity is set by Law in relation to the average energy price of the supplier (90% of the average price up to the amount of electricity purchased in that month). This is not a support scheme, but rather a protection feature for small prosumers that may encounter problems finding a market participant willing to buy their excess energy. Although the supplier is obligated to offer such a contract, the prosumer may conclude a different contract for supply or buyoff.

Czech Republic

No information available

Germany

Yes, via a market premium scheme similar to RES-subsidies.

Hungary

Features of the individual power plant types:
- **Household-sized small power plants** (power plant connecting to low voltage with less than 50 kVA capacity). Household-sized small power plant can be installed by already existing customer at his consumption place. Settlement of system utilization fees and electric energy fees for the settlement period (usually one year) is based on the energy balance (difference between consumption and fed energy). In case the balance value shows consumption system utilization fees and electric energy price is to be paid according to this consumption. In case the balance shows fed energy, then the traders purchase the fed energy at the price determined in the electric energy purchase contract for utilization.
In sum: In case of fed energy household-sized small power plants can sell the electric energy to the trader they have concluded an electric energy purchase contract with, at the price that is valid for the purchase, too.
- **Small power plants** (less than 50 MVA nominal capacity; 0,5 MVA and above is license required). In case the small power plant is entitled, it can sell the generated electric energy at the TSO operated system takeover - subsidized price.
Otherwise they can sell the generated electric energy based on agreement to trader, directly to customer or on the organized electric energy market.

Montenegro

Since all distributed energy sources in Montenegro are actually renewable energy sources, law stipulates that market operator buys the entire electricity from facilities that have the status of a privileged producer and pays to each producer according to the encouraging appropriate price, in accordance with the decree on the tariff system.

Romania

No information available

Serbia

They can. To enter into bilateral contracts or to go to the stock exchange. If they are privileged RES they have to sell to EPS at contracted prices.

Slovakia

Distributed energy resourses stand for a standard role of electricity producers. They could sell the electricity to the market or to use it by themselves. In Slovakia, small and green power plants have many regulation privilages in order to support their development.

Slovenia

Yes. They participate as energy vendors, as service providers for voltage regulation and as self-suppliers.

8.5. Do energy rules and laws recognize and define DERs? If yes, how are they defined?

Austria

No.

Bosnia and Herzegovina

Yes, distributed energy resources are defined within the documents:

- "Zakon o električnoj energiji u FBiH" (Electrical Energy Law in FBiH) [14];
- "Zakon o korištenju obnovljivih izvora energije i efikasne kogeneracije" (Renewable Energy Sources and Efficent Cogeneration Law) [9];
- "Pravilnik o stjecanju statusa kvalificiranog proizvođača" (Regulations on Acquiring Status of Qualified Producer) [15];
- "Opći uvjeti za isporuku električne energije" (General Conditions for Electrical Energy Supply) [16];
- "Pravilnik za mikropostrojenja obnovljivih izvora energije" (Rules for Micro Power Plants of Renewable Energy Sources) [17] etc.
- "Distributed Generation" means the production of electrical energy in facilities for electrical energy production connected to the distribution system.

Bulgaria

Yes, DERs are defined as explained in Question 8.4.

Croatia

Please refer to Question 8.4.

Electricity Market Act defines “End-consumer with self-generation” as an end consumer who has a generator within his installation and can inject excess electricity into network over his connection point.

Czech Republic

No.

Germany

No.

Hungary

DERs are not defined in the Hungarian legal system.

Montenegro

The only relevant Code of rules in Montenegro which gives technical specification of small power plant connection to the distribution network is Code of rules on technical conditions for connection of small power plants to the electro-distribution network.
Code of rules on technical conditions for connection of small power plants to the electro-distribution network from 2007 regulates the field of technical conditions for connection of new small power plants of 10 MVA power and small hydroelectric power plants (hereinafter referred to as “mHE”) the reconstruction of which influences the change of connection conditions and execution of the connection terminals. In regard to technical characteristics of the connection, this Code of rules is regarded as elementary having only two underlined characteristics:

- Small power plants are connected to the electro-distribution system in accordance with standard demands for electrical power quality and reliability of operation or power delivery to the existing electrical power system users.
- The electric energy produced in mHe and delivered to the customers has to be of nominal voltage and frequency. The network frequency is 50 Hz ± 5 Hz. The permitted voltage deviation at the point of power delivery from the standard voltage at the connection terminal of a small power plant to the electro-distribution system under normal operation conditions is: at low voltage of 230/400 V

from +10 % to - 10 %, at medium voltage ±5 %. The permitted change of voltage after activation or deactivation of the generator of electro-distribution system equals: in low voltage network: ± 6 % of nominal voltage (231/400 V), at medium voltage network: ± 2% of nominal voltage (10 kV; 20kV; 35 kV).

Romania

No information available

Serbia

No, except in the sense of obligation to be licensed if they have more than 1 MW.

Slovakia

In generally, DERs as a specific group could not be recognize in this country. Those DERs are treated as power producers and power producers are treated with respect to their installed power, type of energy source and other technical specification.

Slovenia

Yes, as in 2.4.

8.6. With regards to the previous question; how are DERs classified in the existing legal framework?

Austria

Not applicable.

Bosnia and Herzegovina

DERs in FBiH are not classified in legal framework.
In the document “Zakon o električnoj energiji u FBiH” [14] (Electrical Energy Law in FBiH) Distributed Generation (most similar to DER) is defined as production of electrical energy in facilities for electrical

energy production connected to the distribution system, without later classification. According to this, any production plant which is connected to voltage levels 35 kV or below (distribution network) can be considered as Distributed Generation.

Bulgaria

Please refer to Question 8.4 for answer.

Croatia

Please refer to Question 8.5 for answer.

Czech Republic

Not applicable.

Germany

NA

Hungary

8.4 answer contains the individual power plant types. There is no definition for DERs.

Montenegro

Power plants with installed capacity up to 1 MW connected to the distribution system:

- hydropower plants:
  - the installed capacity of up to 100 kW (micro hydropower plants);
  - the installed capacity greater than 100 kW (mini hydro powe plants);
  - hydropower plant on the existing infrastructure, such as pipelineand / or dams;
- wind power plants:
  - solid biomass power plants from: forestry and agriculture or wood processing industry;
- solar power plant:
  - on the buildings or building construction;
  - as an independent object;
- municipal solid waste plant;
- waste gas power plant;
- biogas power plants.

Power plants with installed capacity of 1 MW to 10 MW connected to the distribution or transmission system:

- hydropower plants;
- wind power plants;
- solid biomass power plants leaned to forestry and agriculture or wood processing industry;
- solar power plant;
- municipal solid waste plant;
- waste gas power plant;
- biogas power plants.

Romania

No information available

Serbia

Distributed energy resources according to the installed power are divided into:

1. Micro, power less than 5 kW
2. Small, power from 5 kW to 5 MW
3. Medium, power from 5 MW to 50 MW
4. Big, power more than 50 MW.

Slovakia

In this country, we could recognise only power plant classification based on type of resource. The volume of installed capacity is relevant from many perspectives, as well.

Slovenia

By law divided upon power generation; <1 MW, <10 MW, >10 MW. A new network code – requirements for generators is to be implemented in SLO law system, upon (EU) 2016/631, 14. April 2016.

8.7. What are the rules for connecting DERs to the distribution network? Is there any type of conditional contracts for DERs regarding grid connections (for example to mitigate congestions or avoid overinvestments)?

Austria

NA

Bosnia and Herzegovina

- Technical and operational requirements for connection, access and use of distribution network are described in „Opći uvjeti za isporuku električne energije“ (General Conditions of Electricity Supply) [16] and „Pravilnik o priključcima“ (Rules of connections) [18], but in „Mrežna pravila“ (Network rules) [19] are described only requirements for connection that are not defined in the above regulations, and applicable standards and DSO’s recommendations.
- Special and additional technical and operating conditions are taken into account of operation specificities and technical characteristics of production units.

Bulgaria

No conditional contracts are mentioned in the available documents.

Croatia

When connecting a generator to the distribution network the investor pays for the entire grid upgrade/reinforcement (connecting lines and interface to the grid but also grid reinforcements due to new connection). However, in some cases the investor may waive the n-1 criterion in favor of a cheaper connection. The network usage contract concluded by the DSO and producer/prosumer may include limitations for the generator depending on actual network conditions (e.g. limitation of production in certain conditions).

Czech Republic

No.

Germany

General grid connection requirements apply to DERs as well.

Hungary

Connecting to the distribution network is recorded in regulation. Existing customers can realize household-sized small power plants at their consumption place, in a way that the already connected capacity for taking energy is available for feeding energy, too - without paying connection fee. In case of small power plant (not household-sized small power plant) connection 100% of the necessary network investments are to be paid as connection fee by the small power plant. Small power plants using renewable energy sources are entitled to connection fee discount (30 or 50%). There are individual, small power plants and DSO agreements based on which DSO is entitled to disconnect the small power plant along with pre-defined network states (e.g. n-1 status).

Montenegro

The distribution system operator ensures the fulfilment of conditions regarding the connection approval and concludes the connection agreement for a facility with the system user. The connection agreement includes: technical and operational characteristics of the facility; the methods and conditions of system operation; specification of negative rebound effects of the installed devices; rights and obligations regarding electrical power quality and the method of electrical power measuring at the connection points.

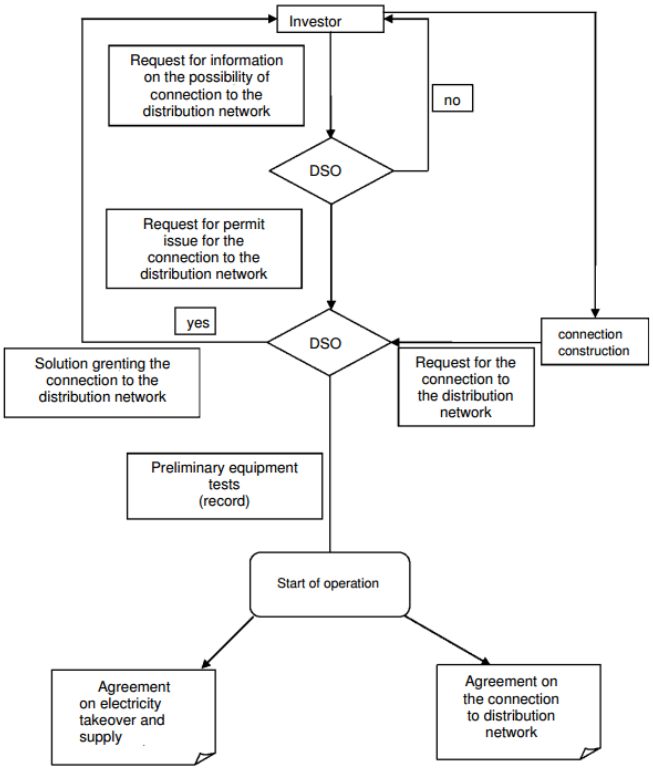


Figure A.xx Block diagram of the procedure for connection to the distribution network.

Romania

No information available

Serbia

There are no rules.

Slovakia

DER applicant for connetion should formally submit a request for connection to the grid to system operator. Based on that request, DSO will prepare a connection contract with many specific technical conditions. Those technical conditions are stated in Technical code and vary from DSO to DSO. Aplicant should conculde also connection contract for inflow part. After fullfillment of all business and technical conditions, DSO will install a smart meter device (obligatory type of meter device in Slovakia for producers on LV). RES have a special possition regarding connection to the grid – they are connected in prior (in comparison with any other consumer/producer).

Currently, there is a stop status for PVE power plants connection to the DSO above 10kW of installed capacity. This decision was done by DSO themselves. The basic reason are mitigations of uncertainty of a system stability and safety.

Slovenia

Conditions defined in System operational rules issued by SODO, with a dedicated allegation paper concerning connection of DERs.

8.8. Is there a framework/option for DERs to provide ancillary services?

Austria

General grid connection requirements

Bosnia and Herzegovina

There is no framework/option for DERs to provide ancillary services.

Bulgaria

No.

Croatia

A basic framework exists, but significant effort need to be made in order to allow micro to medium sized generators to provide ancillary services in practice.

Czech Republic

No.

Germany

General framework for ancillary services applies, enabling DERs to provide different ancillary services.

Hungary

DERs (except for household-sized small power plants) have theoretical possibilities to supply system-level services, but it is not frequent in practice.

Montenegro

According to the "Energy Law" [31] published in the “Official Gazette of the RS” the transmission and the distribution system operators are required to ensure availability of the auxiliary power and balancing services, on the principle of minimum costs, and are obliged to conclude agreements of that services.

Romania

No information available

Serbia

They have no obligation.

Slovakia

Ancillary services provider should fullfill many technical requirement given by transmission system operator, incl. power plant block should has installed power capacity equal or above 50MW. There is not possibility to install such a big resource into LV grid.

Slovenia

Voltage regulation and system operational rules.

8.9. If yes, is there a prequalification process for DERs to provide ancillary services?

Austria

Same process as for large scale generation.

Bosnia and Herzegovina

Yes, same as for large-scale conventional generation.

Bulgaria

No.

Croatia

Yes.

Czech Republic

No information available

Germany

Currently only reactive curtailment if security of supply is at risk or at the instruction of TSOs

Hungary

No.

Montenegro

DSO and TSO perform the selection of offers for ancillary services and balancing services in a transparent process and conclude contracts with the selected bidders regulating mutual rights and obligations.

Romania

No information available

Serbia

N.a.

Slovakia

Small DERs cannot provide ancillary services.

Slovenia

If they provide such service within defined margins, they don't have to pay eventual over or under consumed reactive power.

8.10. Is there a possibility for the DSO to activate DERs to provide any type of balancing and/or ancillary services? If yes, please elaborate.

Austria

Currently no.

Bosnia and Herzegovina

No, there is no possibility for the DSO to activate DERs to provide any type of balancing and/or ancillary services.

Bulgaria

Unknown.

Croatia

Yes. They have to be technically capable, tested and approved by the operator.

Czech Republic

No.

Germany

Currently only reactive curtailment if security of supply is at risk or at the instruction of TSOs.

Hungary

Providing system level services in Hungary is TSO competency.

Montenegro

No information available

Romania

No information available

Serbia

Not applicable.

Slovakia

In Slovakia, some of DSOs has a remotely controlled switch breaker connected to the SCADA as a condition for connection to the grid. It done maily for safety a system management purposes. DSO is not an ancillary services operator.

Slovenia

No. They provide services as pre-defined or set.

8.11. Is there a framework/option that encourages/requires DERs to provide any other flexibility service?

Austria

Currently no.

Bosnia and Herzegovina

There is no framework/option that encourages/requires DERs to provide any other flexibility service.

Bulgaria

No.

Croatia

Yes.

Czech Republic

No.

Germany

So called „zuschaltbare Lasten“ (additional loads) to come in 2017 to avoid curtailment of wind in northern Germany by ramping up power-to-heat modules.

Hungary

No, there is not.

Montenegro

Information not available.

Romania

No information available

Serbia

No.

Slovakia

From technical perspective, it is possible to establish a DSO flexible managament of distributed energy resources, thanks to strict technical conditions incl. advanced smart meter instalation. There are not any business or legal reason defined yet from DSO perspectives.
From supplier point of view, there are currently some small power plants installation supporting electricity purchace portfolio and there could be a reason for any power capacity management from supplier perspective in real time. Supplier could shink cost produced by portfolio imbalance effect.

Slovenia

No.

8.12. Is the aggregator defined in your legal framework?

Austria

No.

Bosnia and Herzegovina

There is no aggregator of electricity produced from renewable sources, each of the relevant system operator takes overall electricity produced from renewable energy in its distribution area, and in order of OIEiEK each supplier takes a certain share of electricity from RES (OIE) and according to their share in total final consumption of electrical energy in Bosnia and Herzegovina and the same is paid per reference price.

Bulgaria

Unknown.

Croatia

Yes. However, apart from a definition in the Law on Energy Efficiency, energy legislation does not recognize an aggregator as a market participant.

Czech Republic

No.

Germany

Formal framework currently elaborated by NRA and expected to come in 2017, aggregation already possible on basis of bilateral agreement between supplier-BRP and aggregator-BRP

Hungary

Not defined.

Montenegro

There is no aggregator of electricity generated from renewable sources. The law stipulates that market operator buys the entire electricity from facilities that have the status of a privileged producer and

pays to each producer following the encouraging appropriate price, in accordance with the decree on the tariff system.

Romania

No information available

Serbia

No.

Slovakia

No, agregator is not defined in Slovak market.

Slovenia

Can you make your question clearer please?

8.13. If yes, how is his role defined (similar to the supplier with inflexible consumers)?

Austria

Not applicable.

Bosnia and Herzegovina

There is no aggregator defined in the legal framework of Bosnia and Herzegovina.

Bulgaria

Not applicable.

Croatia

Based on the definition in the Act on Energy Efficiency, an aggregator is a service provider that combines short-term loads of end consumers for the purpose of selling or bidding on organized markets.

Czech Republic

Not applicable.

Germany

Aggregator most likely to be defined as BRP in parallel to customer's conventional supplier with mandate to manage customer's flexibility without causing imbalances to supplier-BRP

Hungary

Not applicable.

Montenegro

There is no aggregator of electricity generated from renewable sources.

Romania

No information available

Serbia

N.a.

Slovakia

Agregator is not defined in Slovak market.

Slovenia

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8.14. Is the provision of balancing and ancillary services allowed by the aggregators, can they provide these services from the portfolio of distributed flexible sources?

Austria

Not applicable.

Bosnia and Herzegovina

There is no aggregator defined in legal framework of Bosnia and Herzegovina.

Bulgaria

Not applicable.

Croatia

Yes. Provision of services must be tested and approved.

Czech Republic

No.

Germany

Yes.

Hungary

Not applicable.

Montenegro

There is no aggregator of electricity generated from renewable sources.

Romania

No information available

Serbia

Not applicable.

Slovakia

No they are not. Agregator is not defined in Slovak market.

Slovenia

No.

8.15. What is the legal status of energy storages in your country? Is it allowed for DSO's to use them for handling network constraints?

Austria

Storage use is allowed but currently no case of application known.

Bosnia and Herzegovina

There is no legal status of energy storages in Bosnia and Herzegovina.

Bulgaria

No.

Croatia

Energy storage has not been identified as a separate entity/activity. To some extent, storage can be viewed as a hydro power plant with pumped storage or a prosumer with a generator.
Consequently, current legislation does not prohibit the DSO to install storage devices within the electric distribution system.

Czech Republic

Not yet defined.

Germany

General laws and regulations apply to storage as well. Storage is allowed but DSOs usually make use of more cost-efficient measures to mitigate network constraints.

Hungary

The Electric Energy Law contains the concept of electric energy storage. Operating 0,5 MW and above nominal output capacity electric energy storage is an activity with license obligation.
DSO can also establish and operate electric energy storage in order to optimize the distribution activities, according to the principle of least cost with the maximum of 0,5 MW nominal output capacity. The details of the regulations in relation to electric energy storage is ongoing by the regulating authority with the involvement of the concerned participants.

Montenegro

Information not available.

Romania

No information available

Serbia

-

Slovakia

Energy storages do not have any special legal treatment. Energy storage is solved only from technical code of each DSO.

It is not prohibited to use energy storages by any party, but it is used only by HH customers in few instalations.

Slovenia

Not defined particularly.

9. Active distribution networks and "smart" DSO

9.1. **Have you started with the smart meter installations/replacements in the distribution network (with the final consumers)? If yes please explain on the numbers, the type, communication, strategy and CBA of smart meter roll out.**

Austria

Some pilot projects already have been realized. The smart meter rollout started in 2017 and is ongoing.

Bosnia and Herzegovina

In 2015, 1.511 electronic meters was installed, so that JP Elektroprivreda HZ HB dd Mostar has a total of 52.000 built-in electronic meters of which 40.344 pieces in the system of remote reading.

Bulgaria

Smart meters have been installed at several locations, however no data on total number could be found.

Croatia

In accordance with the Energy Act, the Croatian Energy Regulatory Agency (HERA) carried out a Cost Benefit Analysis (CBA) of introducing advanced metering systems for electricity in 2017.

The basis for CBA was the document of European Commission entitled Guidelines for Cost Benefit Analysis of Smart Metering Deployment (hereafter: Guidelines). Of course, national conditions were taken into consideration for preparing the cost benefit analysis in order to get a relevant analysis.

The CBA considers HEP-ODS (the Croatian DSO) as the implementer of the smart meter rollout and the owner of the metering equipment since the metering point and associated metering equipment is under the authority of the DSO, as prescribed by the Act on Electricity market.

Regarding this cost benefit analysis, the smart meter roll-out relates to the introduction of advanced metering equipment and systems for electricity end users (consumers) instead of existing metering equipment of households and entrepreneurs without power measurements. The roll-out also includes the installation of data concentrators at 10(20)/0,4 kV substations and implementation of advanced meter reading and meter data management.

The CBA was performed using a 16 year period, a period equal to the lifetime of an advanced metering device. Three scenarios were taken into the consideration:

- Basic scenario - considers the case without the implementation of the advanced metering equipment,
- Scenario 1 considers implementation of advanced measuring equipment in a period of 4 years and
- Scenario 2 considers implementation of advanced measuring equipment in the period of 11 years.

HEP-ODS provided HERA with the technical requirement and cost estimation of implementing the advanced metering equipment and systems for their interconnection. The technical requirements are in accordance with the Recommendation 2012/148/EU.

The CBA envisions installation of 85% of advanced metering devices using PLC data concentrators and 15 % of advanced metering devices using digital mobile phone networks.

The financial and economic indicators of the CBA ascertained that Scenario 1 and Scenario 2 have a positive B/C ratio.

In accordance to the provisions of the Act on energy, the analysis was submitted to the Ministry of environment protection and energy. Based on the CBA, the Ministry will prepare a plan and program of measures for implementation of the advanced metering equipment for the final consumers.

Czech Republic

Not yet.

Germany

• Germany starts with the deployment of smart meters in 2017 for customers with annual demand >10000 kWh. This threshold will be lowered to 6,000 kWh in 2020, which applies to approximately 15% of electricity consumers.

• Ownership, operation and maintenance will be carried out by DSOs.

• For the CBA, a study was commissioned and concluded that a mandate for all to have smart meters was not economically beneficial and instead recommended a selective rollout similar to the country's aforementioned strategy.

• The "Smart Meters Operation Act." (2016) sets out that smart meters shall provide a secure communication platform which will make the electricity supply system fit for the energy transition and also "establishes binding protection profiles and technical guidelines to ensure data protection, data security and interoperability"

Hungary

No legal framework for a mandatory rollout. Currently there is only an obligation to provide smart meters and variable tariffs where it is economically reasonable.
An economic assessment was carried out in 2012 with the conclusions that it was not economically reasonable to implement smart meters in the residential sector. This assessment was based on a theoretical CBA analysis. Since then, there was a Pilot Project in 2012-2014 performed by DSOs with the involvement of more than 10.000 household customers. The evaluations of this project finished in 2015, with the same results, that is, the implementation of smart meter is still not economically reasonable.

Montenegro

In 2010, the European Bank for Reconstruction and Development (EBRD) signed the original loan of 35 million euros to finance 45 million euros worth project of introducing 175,000 smart meters, out of which 164,000 have already built. The original project has already proved to be very successful in terms of improving energy efficiency and reducing CO2 emissions, and as a result, increased efficiency in distribution and responsibility for revenues realized consumption. EPCG also requested an additional loan to finance the purchase and installation of smart meters throughout the rest of the country.
Investments in new measuring points with smart meters are already in the past pilot projects proved to be economically justified investment. With smart meters and relocation of metering points, problems of commercial losses is solved to a large extent. This investments in metering infrastructure are considered as quickly profitable investments. Also, data from smart meters are considered as valuable inputs for network planning. The reduction of losses is on the top of the priority development of distribution, it is considered as of strategic importance. Therefore intensity of investing in measurement infrastructure, both in the meter and the measuring points is high. With the investment in primary and secondary network, this represents the largest investment worth over 43 million euros. This would switch all consumers to smart meters, which would provide the basis for further development and distribution of its services to consumers.

Romania

Italy's National Regulatory Authority for Energy ANRE has given Enel permission to install an additional 110,000 smart meters as part of a pilot in Romania. A local Romanian subsidiary of the Italian utility company installed smart meters for more than 30,000 clients last year. Enel is said to have plans to install similar meters for all 2.7 million clients in Romania, paving the way for larger smart cities and infrastructure. (https://www.metering.com/news/enel-110000-smart-meters-romania/) The CBA considered is that undertaken by AT Kearney in September 2012 for the European Bank of Reconstruction and Development (EBRD). The evaluated model in Romania is designed with a "middleware layer", consisting of data concentrators and balancing meters placed on each substation, with data communication occurring through PLC wiring from the meters to the concentrators and through various communication channels from concentrators to the central application. Some key lessons from the Romanian analysis are that:

• Where commercial losses are high relatively low cost forms of smart metering solutions can provide strong net benefit.

• To undertake an analysis most consistent with the methodological requirements of Recommendation 2012/148/EU, including minimum functionality, costs reflecting this functionality should be included in the analysis. In the case of Romania, while the analysis is logically coherent by neither including the costs of providing customer feedback nor any respective benefits, a more comprehensive result may be obtained by including all impacts.

Serbia

It is started at the level of distribution, technical requirements are defined in the rules on the distribution system operation.

Slovakia

CBA analysis for Smart metering installation has been prepared by regulation office in 2012. Based on its framework, there was set a legislation and strategy.

Curently in Slovakia, there is smart meter device installation/replacement already in process. It done based on slovak legal framework.

The distribution system operator should install an intelligent metering system into the following categories of end-customers (points of supply) connected to the distribution system at the low voltage level. It should be installed in volume at least 80% points of supply. We could distinguish following categories:

a. the end-user of electricity of category 1 - shall have an annual electricity consumption of at least 15 MWh and a maximum installed capacity of at least 30 kW or at least 45 A at the point of supply. Distribution system operator shall install an intelligent metering system with advanced functionality of the intelligent metering system. This category should be installed till end of 2015,

b. the end-user of electricity category 2 - shall have an annual electricity consumption of at least 4 MWh and a maximum installed capacity of at least 30 kW or of at least 45 A. Distribution system operator shall install an intelligent metering system with Advanced functionality of the intelligent metering system. This category should be installed till end of 2016,
c. end-users of electricity category 3 - has an annual electricity consumption of at least 4 MWh and a maximum rated installed capacity of less than 30 kW or less than 45 A. Distribution system operator installs an intelligent metering System with basic functionality of intelligent metering system. This category should be installed till end of 2020,
d. the end - user of Category 4 electricity - has a power generation system connected to the distribution system; a end-consumer having a charging station for electromobiles; points of supply with negative impacts of DSO system and the points of supply where DSO decides to monitor power and quality parameters of electricity. The distribution system operator shall install an intelligent metering system with special functionality of the intelligent metering system. This category should be installed till end of 2016.

Basic functionalty of inteligent metering system represents maily following functionalities:

- two-way communication,
- monitoring of consumption through secured serial interface, WiFi, bluetooth, impulse interface, or other open source protocol with published full documentation,
- continuous measurement of supply and production of active energy with remote meter collection, basic measurement interval is 15 minutes, basic interval for processing of measured data is at least once per month,
- registration of supply and generation at multiple tarrifs,
- regular meter reading and remote data transmission and the possibility of an irregular meter reading and irregular remote data transmission based on the request from the intelligent measuring system,
- switching tariffs according to the current rate,
- registration of non-standard events and failure statuses and sending them to the intelligent metering system.

Advanced functionalty of inteligent metering system represents maily following functionalities:

- basic functionalties of inteligent metering system,
- 4Q continuous metering of supply and generation of active power and reactive power. Basic meter reding interval is 15 minutes. interval for remote reading and processing of the measured data is at least one calendar day,
- remote swich off and swich on by an order,
- local swich on conditioned by remote allowance,
- current and voltage limitation,
- measurement of effective current and voltage values for each phase,
- evaluation of power factor,
- registration of alarms and atack to meter device.

Special functionality of inteligent metering system represents maily following functionalities:

- advancedl functionality of inteligent metering system,
- continuous measurement of the apparent energy and the evaluation of other power parameters such as arithmetic apparent power, correct apparent power, deformation power, power of asymmetry,

- quality measurement,
- dispatch interface.

The communication between the smart meter and the smart data central is realized through a communication network via direct communication with GSM, universal packet radio service GPRS or a computer network for local Ethernet networks or indirect communication using concentrators via PLC communications by narrowband or broadband technology or RF WAN Internet Protocol, or WAN Internet Protocol. The transmission speed for newly installed PLC concentrator communications devices is at least 30 kbps.

Slovenia

Yes. 40.000 of total 130.000. Type Iskra and Landis-Gyr. Communication PLC, planned G3.CBA done by the Regulator and SODO.

9.2. What are the plans for making a transition to active distribution networks? Is there a national Smart Grid Strategy (or national Implementation/Action plan)?

Austria

There is an existing technology roadmap for smartgrid development.

Bosnia and Herzegovina

There is no national Smart Grid Strategy in Bosnia and Herzegovina.

Bulgaria

Information not available.

Croatia

A national Smart Grid strategy does not exit, however several Smart Grid pilot projects have been initiated.

The implementation of Network Codes will have a substantial effect of the development of the electric distribution system and the operations of the DSO.

Czech Republic

No.

Germany

Digitalisation act sets out that TSO should be more involved in the digital transition, as there are less of them (compared to TSOs) so it should be easier.

Hungary

There is no strategy (action plan etc.) for a concrete national SMART GRID.

Montenegro

There is a strategy: Development program of the distribution network concept and the introduction of modern ICT systems of measurement, "smart grid" solutions.
With the modernization of substations are created the conditions for further rationalization of distribution grid, which are based on remote management of substations and grids. For years, all reconstruction and new construction works are systematically made in the way that the facilities are ready for remote control, so DSO is planning to build the management center in the next few years. This program can be achieved through the following:
• Smart meters with a system of remote communication with measuring centers are essential for the introduction of new innovative products in the electricity market.
• Additional features and services for consumers: control facilities, the provision of technical facilities and alarm, home automation, measurement of other infrastructure (water, gas, district heating), and similar.

	Activity	Responsibility	2016	2017	2018	2019	2020	Sum (2016-2020)
1.	New meters - project measurement and distribution	EPCG FC Distribution	15.873.684					15.873.684
2.	Meters for new consumers and substations 35/10kV and 10/0,4kV	EPCG FC Distribution		200.000	200.000	200.000	200.000	800.000
3.	Meters for new consumers and reconstruction of measurement points	EPCG FC Distribution	252.100					252.100
4.	Meter displacement (no cost to the meter) - selectively	EPCG FC Distribution	84.034					84.034
Sum (1-4)			16.209.818	200.000	200.000	200.000	200.000	17.009.818

Table A.9.2.1. Economic and financial data of the smart grid projects in Montenegro

Romania

In 2015, E.ON plans to invest more in Romania, especially in upgrading the distribution networks. For this, the German company has a EUR 400 million budget (EUR 90 million).

Serbia

The legal obligation is [36]:

Advanced metering systems

Article 115.
The transmission system operator shall establish technical requirements for the introduction of various forms of advanced metering systems and analyse technical and economic feasibility of the introduction of advanced metering systems and their effects on the market development.

On the basis of the analysis under Paragraph 1 of this Article, the transmission system operator shall prepare an implementation plan of economically justifiable forms of advanced metering systems and submit it to the Ministry and the Agency for their opinion.

The transmission system operator shall include in the system development plan the introduction of advanced metering systems, in accordance with the implementation plan, for a period for which the development plan is adopted.

Article 138.
The distribution system operator shall determine technical requirements for the introduction of various forms of advanced metering systems and analyse the technical and economic justifiability of

introducing advanced metering systems, the effects on the market development and benefits for individual categories of end electricity customers.

Based on the analysis under Paragraph 1 of this Article, the distribution system operator shall prepare the implementation plan of economically justified forms of advanced metering systems and submit it to the Ministry and the Agency for their opinion.

The distribution system operator shall include in the system development plan the introduction of metering systems in accordance with the implementation plan, for the period for which the development plan is to be adopted.

By the implementation plan under paragraph 2 of this Article, the distribution system operator shall cover at least 80% of the points of takeover in the category of end electricity customers for which the economic justifiability of implementation has been determined.

Slovakia

According to the Slovak National Renewable Energy Action Plan, legislation on intelligent networks is being prepared, but there are no clear expectations in this area at present. Under current legislation, purchasing of the entire production at any moment is required in relation to RES. Obligations to introduce smart metering systems are not defined by current legislation (NREAP 2010).

Slovenia

Only strategy for implementation of smart grid meters and goals. Advanced metering system strategy. SODO.

9.3. Are there any plans for further aggregation and integration of DERs? In particular, what are the plans for further active integration of DERs and provision of flexibility services?

Austria

The technology roadmap offers some approaches.

Bosnia and Herzegovina

Currently there are no plans for further active integration of DERs and provision of flexibility services.

Bulgaria

There are no strategic plans and decisions.

Croatia

There are no specific plans or decisions. However, the implementation of Network Codes will have a substantial effect on the development of demand response.

Czech Republic

Czech Republic decided not to be active on this subject.

Germany

There are plans to allow demand to turn up in order to reduce the curtailment of renewables. DERs can already operate within balancing markets.

Hungary

Virtual power plants are already operating in Hungary with the involvement of several small power plants.

Montenegro

In 2012 was made The Study of distributed source connection and operation in the electric power system of Montenegro. The Study analyses the regulatory situation and the existing Acts governing the area of distributed sources (DERs) connection to the electric power network of Montenegro. The development plans are verified for the transmission network. The methodology for the analysis of DERs connections to the network is conducted according to the regulatory situation and recommendations for the changes in technical regulations. Therefore, also the recommendation for DERs connection to the network is provided. For the practical application of methodology and recommendation, the study analyses technical and economical aspects of connections of large number of different types of DERs to the distribution network with various Montenegro Government tenders. Finally, the Study is supplemented also with the instructions and documents for the workers of the company Elektroprivreda Crne Gore who will conduct the analyses of DERs connection to the network by applying the program package PSS®SINCAL. [33]

Romania

Information not available.

Serbia

Information not available.

Slovakia

Strategy of regulation is described in document called Regulation policy for 2017-2022. Based on this documentation, there is set an intension of regulatory office in following years.

One of stategical goal is to optimise support of RES and highly efficient cogeneration power plants in terms of new criteria to reduce the financial burden and end-energy prices. There should be used stimulation and proper methodologies based on EU best practices to support RES, especially in area of local RES installations, but with no further negative impact to end-consumers.

For reaching this target in following time period, there were set an action list:

1. to establish proper conditions for establishment of unique RES and CGEH purchacer,
2. to set proper conditions for possibility to offer green energy for each supplier,
3. to establish a market with connestion capacity (regionally),
4. diversification of ancillary services for DSOs,
5. DERs support in industrial zones.

Slovenia

Not in particular. Described in previous topics.

9.4. Are there any plans for evolution of distribution system operator, for example for it to have a more active role in future power market?

Austria

Currently no plans.

Bosnia and Herzegovina

The power market is still in its early stages and as such there is no defined roles for participants so that there is no concrete plan for the evolution of DSO in terms of a more active role in future power market.

Bulgaria

No.

Croatia

There are no strategic plans. However, some development issues are mentioned in the DSO's TYNDP.

Czech Republic

No.

Germany

There are no plans for DSOs to have a more active role in power markets, the regulator would not allow this.

Hungary

In the past period with the involvement of the regulation authority and the market participants a common thinking has been started on the future role of ditributors. (e.g. distribution vision, role of storage, demand side management). Further nudge was given to that by the "winter package", resp. the "Clean Energy to all Europeans" complex EU regulation package, aired on 30th November 2016. It seems to accelarate the process, but no concrete results can be reported yet.

Montenegro

The document related to Market Rules „Tržišna pravila" [23] defines the way of organizing and managing the electricity market in Montenegro, rights, obligations and responsibilities of participants in the electricity market and energy companies (including and the distribution system operator), as well as issues related to the production of electricity from renewable energy sources and high efficiency cogeneration.
TSO and DSO are among the participants in the market if they are purchasing electricity in accordance with Article 27, paragraph 3 of these Rules:
"In the power market on the basis of bilateral agreements may participate:

- TSO, if the purchase of electricity is for ancillary and system services, also to cover losses and to balance system which performs in that market
- DSO, if the purchase of electricity is covering losses in the distribution system which performs in that market. "

DSO can buy electricity to cover losses in the distribution system from manufacturers, suppliers and retailers.
Participation in the balancing market is voluntary, but all users of transmission and distribution system of Montenegro are obliged to participate in deviation of alignment.
The transmission system operator and distribution system operator are obliged until 15th (fifteenth) in current for previous month to submit to the Market Operator the data of total delivered electricity, **expressed** in kWh, for each supplier.

Romania

No information available

Serbia

No information available

Slovakia

There is a plan to support purchace of electricity by DSO for losses and own consumption directly in the market. It will be an exemption of unbudling principles.

Slovenia

Not yet.

9.5. Do you have plans for installing smart meters and collecting continuous measurement in your test buildings and test distribution grid? If yes, what are the plans and what information will be available for those sites? (this should be compulsory for all test sites and test networks of the 3Smart project)

Austria

No information available

Bosnia and Herzegovina

There are plans for installing smart meters and collecting the results of continuous measurements in test building. All substations in test distribution grid are integrated into a system of automatic meter reading and EPHZHB's future strategy is coverage of all substations 10(20)/0,4 kV with AMR system and coverage of all consumer with AMM system but have not yet planned additional investment in the surrounding test distribution network.

Bulgaria

Cannot be applied.

Croatia

Smart meters are already installed at both locations, with historical data being recorded in HEP-ODS databases. This information is however on the interface of the consumer and distribution grid. Since for UNIZGFER only one of the Faculty buildings will be analysed additional smart metering system has been installed for the pilot building as well as for each floor of the building.
For both PV units (HEP and UNIZGFER) additional continuous measurement devices are installed.

Czech Republic

No information available

Germany

Unknown

Hungary

There are no nationally accepted plans in Hungary. But for example EON DSOs according to plan will only install SMART meters at customers having household-sized small power plants, therefore 15 min. metering data will be available about the consumed and fed energy quantities.

Montenegro

Montenegro is not a partner of the „3Smart“ pilot project and, therefore, have no such plans.

Romania

No information available

Serbia

There is a project for procurement of smart meters: The contract covers the purchase of smart electric meters, routers / gateways, communications and auxiliary equipment, hardware and software for the AMM and MDM/R applications as well as providing services for system integration and training. The project is realized under and in cooperation with EPS and the European Bank for Reconstruction and Development (EBRD). However, the tender has not yet been successfully implemented but several times was knocked down.

Slovakia

As is described before, there is smart metering rollout. Each customer with smart meter has a possiblity to get an access to his/her measured data via portal (DSO, supplier and OKTE) and local interface. Data provided via portal are limited in its range in comparison with the total range of data.

Slovenia

Yes. Some pilot projects are being prepared. Not relevant information at this time.

9.6. Did you perform (or has anyone) a national level CBA for smart meter rollout? If yes, please provide general information and conclusions (time frame, milestones, costs etc).

Austria

-

Bosnia and Herzegovina

Cost Benefit Analysis (CBA) for smart meter rollout in JP EP HZHB was made largely according to document „Guidelines for Cost Benefit Analysis of Smart Metering Deployment“ [20], which recommended a list of costs and benefits, as well as the method of their calculation in the framework

of the CB analysis. Conducted CB analysis roll-outs in accordance with previously stated objectives of implementation, taking into account all relevant costs of introducing smart metering system, while on the other hand takes only part of the benefits provided for these documents.
This means that the results of this CB analysis are quite conservative because it does not include all the benefits, however, can be considered that applying all the benefits of introduction of smart metering systems in the context of comprehensive analysis, justification for the introduction of the system would be higher. Such benefits include the reduction of CO2, SO2, NOx emissions, reduction of power failure in order to achieve better network control through smart meters advanced functions, control over the quality of delivered energy to end customers, reducing technical losses, the impact on distribution, transmission and generation of electricity, rational planning and investment in distribution network based on data load profiles per network segment, raising the possibility of connection of distributed generation in the form of mini-power plants, etc.
The analysis covers the period of 16 years from the start of the roll-out and first installed smart meters. It is important to note that after the completion of the investment in the roll-out in the 10th year of the project, there is six years period to accumulate accrued benefits. The annual amount of accrued benefits during the period 2023-2025 is sufficient to replace the equipment that comes out of their guaranteed useful life, therefore, no additional impact on the liquidity of the electric power industry.

Bulgaria

No (unknown).

Croatia

See Question 9.1.

Czech Republic

No.

Germany

Ernst and Young (now EY) conducted a national level CBA for the rollout. The conclusions were that only for customer with demand >6 MWh would smart meters be a reasonable solution. Intelligent metering solutions would be reasonable for customers with demand < 6 MWh.

The CBA recommended a rollout timetable that hit 12.5 million smart meters by 2016 and 32.6 million by 2022 with mandatory installations starting in 2013.

Hungary

There was an EC decision, which allocated some funds (38 M EUR - originated from the CO2 emission quota allocation) for a centralized smart metering Pilot Project which is managed by MAVIR (Hungarian TSO) and targeted a model based on centralized metering operator concept. The project provides data for economical assessment according to 2009/73 EC directive appendix 1. point 2. The launch of the Pilot Project was in October, 2016 by a subsidiary company of MAVIR pursuant to the provisions of the Government Regulation No. 26/2016, involving approximately 20.000 consumers, mainly in electricity, and in lesser proportion in gas, water utility and district heating.

Montenegro

There is no available cost-benefit analysis of smart metering system.

Romania

The CBA considered is that undertaken by AT Kearney in September 2012 for the European Bank of Reconstruction and Development (EBRD). The evaluated model in Romania is designed with a "middleware layer", consisting of data concentrators and balancing meters placed on each substation, with data communication occurring through PLC wiring from the meters to the concentrators and through various communication channels from concentrators to the central application.

Serbia

Yes. „Cost benefit analysis for implementation of a system for remote control and automatic meter reading" by N.Rajkovic et all [44].

Slovakia

Mentioned in previous points regarding Smart metering.

Slovenia

Yes. Done by Regulator and SODO. By 2025 all meters in SLO will be smart. Budget for the remaining part of the project is more or less 50 million €.

9.7. Are there maybe some technical requirements for smart meters already posed, especially those that would enable coupled energy management on

the building and the grid side, e.g. communication from the meter available on both sides in order to simplify installations, etc.

Austria

No information available

Bosnia and Herzegovina

„Pravilnik o mjernom mjestu krajnjeg kupca/proizvođača JP EP HZHB d.d. Mostar“ (Rule book about measuring point of the final customer/manufacturer JP EP HZHB dd Mostar) [21] establishes main general and technical requirements and conditions that measuring point of the end customer/manufacturer need to be fulfilled, and determine the respective rights and obligations of distributors and end-customers/producers in the area of the billing electricity metering.

Bulgaria

There are no technical requirements set specifically for smart meters in Bulgaria.

Croatia

See question 9.1.

Czech Republic

No information available.

Germany

No information available.

Hungary

There are no nationally unified technical specifications for SMART meters, those are separately defined in the pilot by the DSOs. The SMART meters installed within the pilot project are basically capable of communicating with the DSO metering center, but not with the building side energy management.

Montenegro

In Montenegro, more than 60 percent is in the system of remote reading and load management. The Energy Law stipulates that by 1 January 2019 at least 85 percent of electricity customers should be equipped with modern systems of smart metering. Therefore, and due to the fact that the project has given excellent results, EPCG is planning also the third phase of the project. The realization of the project began in 2011 and in the first phase, which costed 40 million euros, is built around 165,500 new multifunctional meters, (43 percent of Montenegro's consumption). In March 2016, EPCG started the implementation of the second phase of the project, which costed 36 million EUR, in which they will incorporate 80,000 new multifunctional meters. The project, in addition to installing the meters, includes the reconstruction of metering points, installation of new cabinets and bringing the associated network in the state that corresponds to and can support modern technology for remote measurement of electricity. The project has multiple positive effects on the entire distribution system by increasing reliability and security of electricity supply.

Romania

No information available

Serbia

Yes. More details can be found in [45].

Slovakia

In advanced functionality of smart meter, there is 4Q measurement, that enable to measure both generation and supply .

Slovenia

Yes. But there are constraints due to data security.

9.8. In your country, are the investments made by DSOs for smart grid technology recognized by regulator in tariff structure?

Austria

No information available

Bosnia and Herzegovina

No, the investments made by DSOs for smart grid technology are not recognized by regulator in tariff structure.

Bulgaria

No.

Croatia

Yes. Investments in smart grid projects are recognized in investments plans approved by the regulator. Those investment plans are then a basis for determining network tariffs, by which costs in those investments are recovered.

Czech Republic

No.

Germany

It depends. Yes they are but only if deemed necessary. Copper is king and it's much harder to justify digital investment. There is a cost base for smart metering, and costs of forecasting can sometimes be recouped. More innovative solutions, like batteries, are not allowed and investments are not recognized.

Hungary

Yes, they are recognized.

Montenegro

Yes. The Energy Regulatory Agency passed a decision on establishing the regulatory allowed revenues and prices, upon request of „System Operator CEDIS doo, Podgorica" for the period from 01 January 2017 to 31 December 2019, and a decision on establishing the regulatory allowed revenues and fees for operation of market system „Cote doo Podgorica" for 2017.
Of the total approved investments for CEDIS, for investment project AMM (advanced metering system), has been approved 14.5 mil. € for 2017, 16.9 mil. € for 2018 and 1.3 mil. € for 2019, which is

in line with the obligations established by the transitional provisions of the Act for this entity that until 1 January 2019, 85% of consumers in Montenegro are equipped by a modern meter.

Romania

No information available

Serbia

No information available

Slovakia

Yes, it is recognised as elligible cost for DSO by regulatory office.

Slovenia

Not directly in tariff structure. As incentive. Dynamic tariff system is available for some pilot projects.

10. Building energy management

10.1. Do you have any regulation for energy management in case of newly built properties?

Austria

No information available

Bosnia and Herzegovina

In case of newly built properties the “Act on Energy Efficiency in Federeation of Bosnia and Herzegovina” (“Zakon o energetskoj efikasnosti u Federaciji Bosne I Hercegovine”, Službene novine FBiH , br. 22/17) and “Rules of technical requirements for heat protection of facilities and racial use of energy” (“Pravilnik o tehničkim zahtjevima za toplotnu zaštitu objekata i racionalnu upotrebu energije, "Službene novine FBiH", br. 49/09) define this area.

Bulgaria

Section V of Chapter III in Bulgarian Energy Efficiency Act (EEA), promulgated, SG No. 105/30.12.2016 regulates the energy demand management. According to the provisions, the owners of buildings shall be bound to implement energy efficiency management.
Energy efficiency management shall be implemented by means of (Article 63(2)):

- organizing the implementation of programmes and measures leading to fulfilment of energy savings;
- preparing annually energy demand analyses;
- preparing monthly and annually energy balances, including purchased and sold energy.

For energy management in state- or municipal-owned buildings, expert councils may be established with the regional and municipal administrations to assist the activity of regional governors and municipal mayors. More detailed information can be found in the EEA.

Croatia

- According to Technical Regulation on energy and thermal protection in buildings (Tehnički propis o racionalnoj uporabi energije i toplinskoj zaštiti u zgradama) NN 128/15 when doing retrofit of existing buildings it is necessary to apply a Building Management System (Article 7, point 13).
- According to Article 2 of the same Technical Regulation: Requirements of this regulation have to be met when designing and constructing new buildings or designing reconstruction and reconstruction of existing buildings.
- Article 39 of the Technical Regulation:

  (1) Systems of automation and management of the building (BMS) have to be designed in compliance with EN 15232: 2012

  (2) Systems of automation and management of the building are defined in the four categories of efficiency:

  - A: building with a high-performance BMS,
  - B: building with an advanced BMS,
  - C: standard BMS,
  - D: energy inefficient BMS systems.

  (3) In new buildings and when reconstructing existing buildings in which the BMS is designed, it must be designed and constructed in efficiency class A or B or C according to EN 15232: 2012.

According to EN 15232:2012, class A is actually a fully programmable BEMS, class B corresponds to the pre-programmed control devices depending on different internal and external conditions (e.g. occupancy, outside temperature), and class C corresponds to solely the zone controls. Class A (what can be considered under BEMS in the sense of the 3Smart project) is currently not commercially offered, such that only different pilot applications have been performed on isolated buildings.

Czech Republic

Energy Management Act

Germany

No special, but they are more indirectly included in the audit obligation, which can also be fulfilled by Energy Management Systems. In addition there is an obligation to issue a building energy certification for every building when it is new and afterwards every 10 years.

Hungary

Hungary has a governmental decree on the certification of energy performance of buildings. In case of newly built properties during the planning method a conceptual certificate must be done and a minimum classification must be met as a result of the certification.

Montenegro

Law on Energy Efficiency [34][31] ("OG of Montenegro", 29/10)
• Directive 2006/32/EC on energy services (ESD)
• Directive 2002/91/EC on Energy Performance of Buildings (EPBD)
• Energy Labeling Directives (92/75/EEC and subsequent Directives)
The Law on Energy Efficiency provides:

- The energy characteristics of new buildings or buildings to be reconstructed, on the basis of defined and allowed annual specific energy consumption by type and purpose of the building; the characteristics of the building envelope in terms of thermal insulation; energy consumption for hot water preparation and other minimum requirements regarding energy efficiency. The methodology for calculating the energy performance of buildings is determined by the Ministry of Economy with the consent of the competent authority for construction;
- Carrying out energy audits of buildings, for useful surface area greater than 1000 m^2 (used by state bodies, organizations, regulatory bodies, institutions, local government and public enterprises), or building established by the Ministry. The methodology, manner and terms of energy audits are prescribed by the Ministry;
- Auditing boilers with rated power of 20 kW and higher, as well as air conditioning systems with rated power of 12 kW and higher - according to regulations of the Ministry;
- Certification of energy performance of buildings on the basis of the energy audit, as well as the method of displaying the energy certificate - according to regulation of the Ministry (of the economy);
- Keeping a register of authorized persons for energy audits and certification of buildings - according to regulations of the Ministry;
- The conditions for carrying out an energy audit and certification of buildings according to the regulations of the Ministry;
- Other essential requirements of the relevant EU directives for energy efficiency.

Romania

Not.

Serbia

No.

Slovakia

Existing and planned measures at regional and local levels

For new buildings, arrangements shall be made before construction starts to ensure that, where available, the technical, environmental and economic feasibility of alternative systems is considered and taken into account; such systems include:

1. decentralized systems for the supply of energy from renewable sources;
2. cogeneration;
3. block heating or district heating or cooling, especially those systems making full or partial use of energy from renewable sources;
4. heat pumps.

A tightening of requirements under building regulations so that, as of 31 December 2020, all new buildings are nearly-zero-energy buildings, and, after 31 December 2018, so that public authorities housed in and owning a new building ensure that the building is a nearly-zero-energy building.

The focus here is on increasing local supply of heat and/or electricity to individual buildings.

a) Reference to existing national legislation and summary of local legislation concerning the increase of the share of energy from renewable sources in the building sector:

· Act No 555/2005 on the energy performance of buildings and amending certain laws, as amended by Act No 17/2007, Section 4(2) (formal requirement with no specification)

· Act No 657/2004 on heat energy, as amended, Sections 12, 31 and 32

· Act No 309/2009 on the promotion of renewable energy sources and high-efficiency cogeneration and amending certain laws

· Decree of the Ministry of the Environment of the Slovak Republic No 532/2002 laying down details on general technical requirements regarding construction and on general technical requirements regarding structures used by persons of limited mobility and orientation

· Concept of Municipal Development in Heat Energy

b) Responsible ministries and authorities:

· Ministry of Economy and Construction of the Slovak Republic,
· Ministry of the Environment of the Slovak Republic,
· Slovak Innovation and Energy Agency (SIEA),
· State Energy Inspectorate (SEI),
· Public Procurement Office,
· Regulatory Office for Network Industries,
· Slovak Standards Institute,
· local and regional government bodies.

c) Revision of rules
Legislation will be amended in the process of transposing Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, and in accordance with the revised text of Directive No 2002/91/EC on the energy performance of buildings.

List of relevant legislation, which needs to be revised:

- Act No 309/2009 on the promotion of RES
- Act No 555/2005
- Building Act
- Act No 25/2006 on public procurement and amending certain laws, as amended
- Decree of the Ministry of the Environment of the Slovak Republic No 532/2002

The revision will also include the incorporation of the following requirements:

- Requirements regarding the use of set minimum levels of energy from RES in new buildings and in buildings subject to major renovation, incorporated into building regulations in appropriate cases by 31 December 2014 (Article 13(4) of Directive 2009/28/EC)
- Requirements regarding the exemplary role to be fulfilled by new public buildings and buildings subject to major renovation from 1 January 2012 onwards (Article 13(5) of Directive 2009/28/EC)
- Requirements regarding the energy efficiency of technical systems for new buildings and renovated or modernized systems in existing buildings in 2012 (Article 8 of Directive 2002/91/EC).

Slovenia

EMS is not mandatory in new buildings. We have subsidies. The government wants to encourage energy efficiency in the industrial sector, service sector and public buildings.

10.2. Is there in your country an authority which is responsible for the building construction quality?

Austria

Yes: Austrian institute of construction engineering (OIB), as coordinating platform of the federal states.

Bosnia and Herzegovina

Inspection supervision, according to this law, above the buildings under the Ministry or buildings for which the Ministry issued zoning and building permits and permits for rehabilitation, conducted by construction inspectors in the Ministry. The implementation of control over the buildings is in

competence of the cantons which perform construction inspectors at the canton, town or municipality, depending on how it regulates the canton or the city cantonal law.

Bulgaria

Ministry of Energy. Energy audit schemes and certified energy auditors exist.

Croatia

Each construction has a supervisory engineer (a certified engineer that is not employed by the construction company). A usage permit for a building cannot be issued without a final report from the supervisory engineer.

Czech Republic

No information available.

Germany

The urban building authorities are responsible to grant the building permit and after completion of the construction measure they approve the compliance with the rules.

Hungary

The urban building authorities are responsible to grant the building permit and after completion of the construction, they approve the compliance with the rules.

Montenegro

Ministry of Economy - Department of Energy.

Romania

Yes. ISC is the institution responsible with quality of the construction. The web address is http://www.isc-web.ro/.

Serbia

- Ministarstvo gradjevinarstva, saobraćaja i infrastrukture
- Ministarstvo rudarstva i energetike

Slovakia

Existing and planned measures at regional and local levels

For new buildings, arrangements shall be made before construction starts to ensure that, where available, the technical, environmental and economic feasibility of alternative systems is considered and taken into account; such systems include:

1. decentralized systems for the supply of energy from renewable sources;
2. cogeneration;
3. block heating or district heating or cooling, especially those systems making full or partial use of energy from renewable sources;
4. heat pumps.

A tightening of requirements under building regulations so that, as of 31 December 2020, all new buildings are nearly-zero-energy buildings, and, after 31 December 2018, so that public authorities housed in and owning a new building ensure that the building is a nearly-zero-energy building.

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· Ministry of Economy and Construction of the Slovak Republic,
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· State Energy Inspectorate (SEI),
· Public Procurement Office,
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· Slovak Standards Institute,
· local and regional government bodies.

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2001/77/EC and 2003/30/EC, and in accordance with the revised text of Directive No 2002/91/EC on the energy performance of buildings.

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· Requirements regarding the energy efficiency of technical systems for new buildings and renovated or modernized systems in existing buildings in 2012 (Article 8 of Directive 2002/91/EC).

Slovenia

Every project has persons, responsible during engineering and persons responsible for construction quality. They are listed in directory of certified engineers.

10.3. If yes, does this authority have any strategy related to energy management systems?

Austria

No.

Bosnia and Herzegovina

According to the Act of Energy Efficiency in Federation of Bosnia and Herzegovina the governments of cantons in Federation of Bosnia and Herzegovina are in charge for making energy efficiency plans in their jurisdiction. Energy efficiency strategy should be part of “Energy strategy of Federation of Bosnia and Herzegovina till 2035.”.
In document “Framework energy strategy of Federation of Bosnia and Herzegovina till 2035.” (“Okvirna enegretska strategija Federacije Bosne I Hercegovine do 2035.godine”) implementation of

energy management systems in public buildings, industry facilities and in small and medium companies are proposed as one of energy efficiency measures.

Bulgaria

Energy Strategy of the Republic of Bulgaria till 2020 for Reliable, Efficient and Cleaner Energy. The main priorities in The Energy Strategy can be summarized in the following five directions: to guarantee the security of energy supply; to attain the targets for renewable energy; to increase the energy efficiency; to develop a competitive energy market and policy for the purpose of meeting the energy needs, and to protect the interests of the consumers. In National Energy Efficiency Action Plan of the Republic of Bulgaria 2014-2020, 2014 demand response is stipulated and corresponding systems on the side of end-consumers need to be present to support it. A clear request is on simplicity of the BEMS for end-users.

Croatia

The legal basis for achieving and tracking goals is the Act on Energy Efficiency. This Act expresses commitment of the Republic of Croatia towards the accomplishment of objectives and it states who the obligated parties of the energy efficiency planning are. Plans are important because through them the local community is included in achieving the goals by national plans including wishes and needs of local authorities, rather than the State itself imposing the solutions. Center for Monitoring Business Activities in the Energy Sector and Investments – CEI in its work coordinates with more than 180 institutions and has included their plans to improve energy efficiency in the third National Action Plan for Energy Efficiency (NEEAP). It is a three-year plan whose progress will be reported every year through the Report on the Implementation of NEEAP. The third NEEAP was brought for the period 2014-2016. Unfortunately, strategic and planning activities in the area of energy efficiency seem to be stalled, part of the reason being also rather instable political situation for the last two years in Croatia. One of its reflections is also the movement of the energy sector responsibility from the Ministry of Economy towards the Ministry of Environment Protection. The energy strategy until 2030 is stated to be delivered by the end of 2018.

Czech Republic

No information available

Germany

Not known.

Hungary

No such strategy was published.

Montenegro

Action Plan for Energy Efficiency of Montenegro for the period 2016. -2018. (Third action plan for energy efficiency) was prepared at the request of the Law on the efficient use of energy and the EU Directive 2012/27 / EU on energy efficiency, tailored to the needs of its implementation in the signatory countries of the Energy Community Treaty. The obligation of Montenegro, according to the Energy Community Treaty, is the achievement of the indicative target of energy efficiency, which represents a saving in the amount of 9% of the average final energy consumption in the country for a period of 5 years. The determined period to achieve the indicative target under the Directive from 2010 to 2018.
The main objectives of the third EEAP based on the priorities of the Law on Efficient Use of Energy:

- Implementation of the Law on the efficient use of energy by completing and improving the regulatory framework and improving the institutional framework;
- Raising public awareness and increase of understanding, knowledge and capacity in the new legal requirements and good practices in the field of energy efficiency in public sector institutions, local authorities, big consumers, professional organizations and other stakeholders;
- Improving the statistical and monitoring system in the field of energy efficiency;
- Implementation of energy saving measures with recognizable results. In order to achieve the indicative target, it is necessary to mobilize significant financial resources, which means that the State, ministries, municipalities and other interested parties should commit the necessary human and financial resources. It is necessary that the energy market is further liberalized, especially in terms of providing energy services. In this sense, it is necessary to further develop public-private partnerships in the field of energy efficiency.

Romania

No information available

Serbia

There is a strategy [46] on the introduction of energy management in the public, commercial and industrial sectors. According to this strategy it is enacted that obligations of preparing energy balances at the level of local governments and other entities in the system of energy management will be taken, and the ministry in charge of energy affairs will establish quality information system for monitoring the functioning of the energy management system and evaluation and verification of energy savings achieved [46].

Slovakia

No information available

Slovenia

No information available

10.4. Do you have a national plan to meet the requirement of the Nearly zero-energy buildings (by European Commission)?

Austria

Yes

Bosnia and Herzegovina

There is no national plan to meet the requirements of the Nearly zero-energy buildings.

Bulgaria

The Energy Efficiency Act sets out the type of buildings which should be certified within a certain period. All public buildings in operation with a total built-up area of 500 m^2, and from 9 July 2015 with a total built-up area of over 250 m^2, are subject to mandatory certification. Owners of such buildings are obliged to implement the measures prescribed by the energy audit, within three years for existing buildings, and within six years for new buildings, from the date the audit results are accepted.
BEMS are not very often found within these prescribed measures. Inspection of different building renovation projects co-funded by the Energy Efficiency and Renewable Sources Fund available on the web pages of the Fund (http://www.bgeef.com/display.aspx?page=buildings) reveals that fairly less than 10% of building renovation cases include also an improvement of the building automation system. An introduction of a BEMS that would go beyond data acquisition and storing is not evidenced in these projects.

Croatia

Technical regulations in place require introduction of BMS (Building Management System) when doing retrofit of existing buildings. BMS are split in 4 classes with respect to the energy-efficiency induced, and class A corresponds to BEMS (high performance BMS). Class A is currently not commercially offered, such that only different pilot applications have been performed on isolated buildings.
There is also a tendency to ensure compliance with the technical regulation while the actual performance is of secondary importance. Long-term maintenance of BEMS is pointed out as

an important issue; maintenance of even currently fairly complex systems in buildings is problematic which finally leads to the fact that the BMS or, in future BEMS, is installed for the needs of getting appropriate certificates, but indeed is not operational due to poor maintenance.
The part of strategic planning deficiencies is also answered in the previous question.

Czech Republic

National Energy Efficiency Action Plan of the Czech Republic

Germany

This is included also in the energy efficiency strategy for buildings and is included in an actual draft of the "Building Energy Law". The Nearly zero-energy building standard is set at a value of about 40 kWh/m^2/year for public buildings newly built by 2019 and thereafter.

Hungary

Yes, Hungary has a National Building Energy Strategy. One of the main goals is to meet the requirement of the nearly zero energy buildings.

Montenegro

The issue of Nearly zero-energy buildings construction has not elaborated in the above-mentioned Action Plan for Energy Efficiency of Montenegro for the period 2016-2018., because still conditions are not created for the development of an appropriate strategy and the associated action plan. This is primarily related to the provision of the necessary input data to perform the appropriate analyzes. The implementation of activities for establishing an inventory of buildings in Montenegro and a framework for the certification of the energy performance of buildings, (described in Section 3.2. EEAP document (EE measures B.1)), is the first step towards the creation of conditions for the development of a strategy to increase the number of buildings with nearly zero consumption of energy.

Romania

No information available.

Serbia

Not existing or not available at this moment.

Slovakia

No information available

Slovenia

Energy Act (Energetski zakon (Uradni list RS, št. 17/14 in 81/15)): Article 330 is defining the requirement that all new buildings are nearly zero-energy. Requirements shall apply from 31 December 2020 for all new buildings. The new building, owned by the Republic of Slovenia or local communities and used by public sector entities, the Article 330 of this Law becomes effective on 31 December 2018, respectively.
We also have national plan: Nacionalni akcijski načrt za skoraj nič-energijske stavbe za obdobje do leta 2020 (AN sNES).

10.5. If yes, please give a short overview on this.

Austria

It is a graduate scheme from 2014 to 2020, defining energy relevant key figures by respective building year, in order to reach the requirements of 2010/31/EU for new buildings and refurbishment.

Bosnia and Herzegovina

There are no precise statistics on the percentage of main heating types in Bosnia and Herzegovina.

Bulgaria

Elaborated in the answer to the previous question.

Croatia

Elaborated in the answer to the previous questions.

Czech Republic

Article 7 of the Directive establishes a binding end-use energy savings target by 2020 equivalent to achieving new savings of 1.5% of the annual energy sales to final customers. After converting this

information to absolute figures and factoring in all rebates established by the Directive, the target stands at 47.94 PJ new annual savings by 2020.

Germany

See answer 1.4.

Hungary

In Hungary the criteria of the nearly zero energy buildings will be implemented in 2 phases based on the regulation of 2010/31/EU directive (Energy Performance of Buildings Directive, EPBD):

-new public institution buildings: after December 31, 2018
-every other new building: after December 31, 2020

During this temporary period:

-the support system will be adapted to the new requirements due to expected additional costs,
-demonstration projects, providing information and awareness projects will help the builders in the orientation among the opportunities.

Montenegro

Not available.

Romania

No information available

Serbia

n.a.

Slovakia

No information available

Slovenia

If yes, please give a short overview on this.

Type of building	The maximum permissible value of primary energy (kWh/m^2a)		RES share (%)
	New building	Mayor renovation	RER**
Dwelling building	75	95	50
Multi-dwelling	80	90	50
Non-residential	55	65	50

Table A.10.5.1.

10.6. Do you have any statistics on the topic of the main heating types in your country?

Austria

Yes

Bosnia and Herzegovina

On EPHZHB's territory there is no alternative heating type and most of end customers use electrical energy for heating.

Bulgaria

See D3.1.1.

Croatia

See D3.1.1

Czech Republic

No

Germany

BDEW study"Wie heizt Deutschland" enclosed and https://www.bdew.de/internet.nsf/id/heizungsmarktstudie--wie-heizt-deutschland-de?open (in German only)

Hungary

Yes.

Montenegro

Census of population, households and apartments in 2011 collected the data on the equipment housing plumbing, sewage, electricity, air conditioning and central heating. The Census also collected data on the type of fuel used for heating as well as on access to the Internet in the apartment. In Montenegro there are 247,354 apartments for living. This number also includes apartments that were at the time of the census used only for housing, for housing and activities, temporarily unoccupied and abandoned apartments.

Romania

No information available

Serbia

Yes.

Slovakia

No information available

Slovenia

In few last years (from 2008), almost all heating/cooling devices are bought with subsidy. Evidences are not public available in tabular form but rather on maps.
Fuel types and consumption data are easily available on Statistical Office web page. Main document is The energy balance of the Republic of Slovenia, which is published every year. Handy and usable publication is Stat'o'book statistical overview of Slovenia 2016, also.

10.7. Do you have any national standard related to building energy management systems?

Austria

No

Bosnia and Herzegovina

Institute for Standardization of Bosnia and Herzegovina (BAS) adopted, among others, the following standards related to energy efficiency of buildings:

- BAS EN 15232: 2013 Energy performance of buildings - Impact of building automation, controls and building management
- BAS EN 15500: 2009, Control for heating, ventilation and air conditioning - Electronic equipment for individual zone control
- BAS ISO 13153: 2013, Guidelines for the design of energy savings for family houses and small businesses
- BAS ISO 23045: 2010, Building environmental design - Guidelines for assessing energy performance of new buildings
- BAS EN ISO 13790: 2008 Energy performance of buildings - Calculation of energy required for heating and cooling
- BAS ISO 18292: 2012 Energy performance of fenestration systems for residential buildings Procedure for the budget [47]

Bulgaria

No information available

Croatia

Please see the answers on 10.4 and 10.1

Czech Republic

No information available

Germany

The German standard for energy audits is the DIN EN 16247 set of rules. Part 1 gives general audit requirements, part 2 is for energy audits in buildings. Energy management systems are standarized by

DIN ISO 50001, which can also be applied for buildings. For certain exemptions from energy or power taxes or from renewable energy duties an energy management system is obliged for energy intensive SMEs (small and medium sized enterprises). The state authority BAFA gives financial support for the introduction of Energy Management Systems.

Hungary

In the governmental decree a classification can be found to the energy certifications. (Answer 1.10.1.) Energy management systems are standardized by DIN ISO 50001, which can also be applied for buildings.

Montenegro

Law on Energy Efficiency [34].

Romania

No information available

Serbia

There is a Law on the efficient use of energy, adopted in 2013 0.

Slovakia

No information available

Slovenia

No

Appendix B: Tasks of TSO and DSO

Each transmission system operator shall be responsible for (according to directive 2009/72/EC):

(a) ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity, operating, maintaining and developing under economic conditions secure, reliable and efficient transmission systems with due regard to the environment;

(b) ensuring adequate means to meet service obligations;

(c) contributing to security of supply through adequate transmission capacity and system reliability;

(d) managing electricity flows on the system, taking into account exchanges with other interconnected systems. To that end, the transmission system operator shall be responsible for ensuring a secure, reliable and efficient electricity system and, in that context, for ensuring the availability of all necessary ancillary services, including those provided by demand response, insofar as such availability is independent from any other transmission system with which its system is interconnected;

(e) providing to the operator of any other system with which its system is interconnected sufficient information to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system;

(f) ensuring non-discrimination as between system users or classes of system users, particularly in favour of its related undertakings;

(g) providing system users with the information they need for efficient access to the system; and

(h) collecting congestion rents and payments under the inter-transmission system operator compensation mechanism, in compliance with Article 13 of Regulation (EC)No 714/2009, granting and managing third-party access and giving reasoned explanations when it denies such access, which shall be monitored by the national regulatory authorities; in carrying out their tasks under this Article transmission system operators shall primarily facilitate market integration.

Tasks of distribution system operators (according to directive 2009/72/EC):

1. The distribution system operator shall be responsible for ensuring the long-term ability of the system to meet reason able demands for the distribution of electricity, for operating, maintaining and developing under economic conditions a secure, reliable and efficient electricity distribution system in its area with due regard for the environment and energy efficiency.

2. In any event, it must not discriminate between system users or classes of system users, particularly in favour of its related undertakings.

3. The distribution system operator shall provide system users with the information they need for efficient access to, including use of, the system.

4. A Member State may require the distribution system operator, when dispatching generating installations, to give priority to generating installations using renewable energy sources or waste or producing combined heat and power.

5. Each distribution system operator shall procure the energy it uses to cover energy losses and reserve capacity in its system according to transparent, non-discriminatory and market based procedures, whenever it has such a function. That requirement shall be without prejudice to using electricity acquired under contracts concluded before 1 January 2002.

6. Where a distribution system operator is responsible for balancing the distribution system, rules adopted by it for that purpose shall be objective, transparent and non-discriminatory, including rules for the charging of system users of their networks for energy imbalance. Terms and conditions, including rules and tariffs, for the provision of such services by distribution system operators shall be established in accordance with Article 37(6) in a non-discriminatory and cost-reflective way and shall be published.

7. When planning the development of the distribution network, energy efficiency/demand-side management measures or distributed generation that might supplant the need to upgrade or replace electricity capacity shall be considered by the distribution system operator.

Appendix C: Acronyms

Acronyms	Meaning
DSO	Distribution System Operator
TSO	Transmission System Operator
ACER	Agency for the Cooperation of Energy Regulators
NRA	National Regulatory Authority
DER	Distributed Energy Resources
BRP	Balance Responsible Party
DR	Demand Response
RES	Renewable Energy Sources
IT	Information Technology
PV	Photo Voltaic
SME	Small and Medium Enterprise
DAM	Data Access-point Manager
NGV	Natural Gas Vehicle
CBA	Cost Benefit Analyses or C/B
CHP	Combined Heat and Power
AMI	Advanced Metering Infrastructure
DSM	Demand Side Management
EC	European Commission
CACM	Framework Guidelines on Capacity Allocation and Congestion Management
Commission	EU Commission – B (Executive organization)
Council	EU Council – T (Representation of governments)
Parliament	EU Parliament – P (Elected representatives)
CACM	Capacity Allocation and Congestion Model
prosumer	Generate and consume electricity
prosumers	those who both produce and consume electricity
consumers	those who have connection contracts
aggregators	a firm that brings together a large group of consumers on whose behalf it negotiates reduced rates for goods or services,
MC	Maintenance Cost
SPX	Slovak Power Exchange
PCR	Price Coupling of Regions
MCR	Multi Regional Coupling
DERK	State Electricity Regulatory Commission
FERK	Regulatory Commission for Energy in Federation of Bosnia and Herzegovina
RERS	Regulatory Commission for Energy of Republic of Srpska
NOSBiH	Independent System Operator in Bosnia and Herzegovina
OIEiEK	Operator for Renewable Energy Sources and Efficient Cogeneration
ESO	Electricity System Operator
IBEX	Independent Bulgarian Energy Exchange
EXAA	Energy Exchange Austria
EEX	European Energy Exchange
BRP	Balance Responsible Party

SEEPEX	Southeastern Europe power exchange
NTC	Net transmission capacity
ATC	Available transmission capacity
EEA	Bulgarian Energy Efficiency Act
SIEA	Slovak Innovation and Energy Agency
SEI	State Energy Inspectorate
BEMS	Building Energy Management System
EMS	Energy Management System
DR	Danube Region
IEM	Internal Energy Market
WP	Work Package