



Energy Community Regulatory Board

Analysis of existing grid connection rules and their customer-friendliness

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[Note: information reflecting situation as of collection period 2012; 2011 data]

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1 INTRODUCTION

1.1 The Energy Community

The Energy Community was established in 2005 by signature of the Treaty Establishing the Energy Community (hereafter “Treaty”) between the European Union and the Contracting Parties. The Contracting Parties nowadays comprise Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Moldova, Montenegro, Serbia, Ukraine and United Nations Interim Administration Mission in Kosovo (UNMIK)¹. Armenia, Georgia, Turkey and Norway are Observer Countries..

By signing the Treaty the parties agreed to implement the *acquis communautaire* on electricity, gas, environment, competition and renewables² with a view to realizing the objectives of the Treaty and to create a regional gas and electricity market.

The Energy Community Regulatory Board (ECRB)³ operates based on Article 58 of the Energy Community Treaty. As an institution of the Energy Community the ECRB advises the Energy Community Ministerial Council and Permanent High Level Group on details of statutory, technical and regulatory rules and should make recommendations in the case of cross-border disputes between regulators.

1.2 Background

Grid connection covers a number of customer relevant elements: inappropriately designed rules, complex procedures, in-transparent responsibilities and high costs can create barriers for the realization of new connections, especially to household customers. This also includes the responsibilities for grid connection, the network ownership border including linked maintenance duties and, last but not least, the availability of and responsibility for dispute settlement as well as the level of regulatory powers.

The present report assesses the current grid connection rules and developments in the Energy Community Contracting Parties and Observer countries with a view to identify potential shortcomings, in particular for household customers.

The survey focuses on **electricity household customers’ connection to low voltage (LV) networks (< 1kV)**.

1.3 Methodology

This report is based on answers provided by the regulatory authorities of:

- Albania
- Armenia
- Bosnia and Herzegovina

¹ Pursuant to United Nations Security Council Resolution 1244.

² For details of the relevant *acquis* see:

http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY/Legal/Treaty

³ For details see www.ecrb.eu.

- Bulgaria
- Croatia
- Former Yugoslav Republic of Macedonia
- Georgia
- Greece
- Kosovo*
- Moldova
- Montenegro
- Serbia
- Turkey
- Ukraine

to the questionnaire displayed in the Appendix to the present report.

Where results for Bosnia and Herzegovina differ for the Federation of Bosnia and Herzegovina (FBiH), Republika Srpska (RS) and Brčko District of BiH, they are displayed separately in this survey.

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.

1.4 DEFINITIONS

For the purpose of this report the following definitions apply:

Connection	An assembly of electric power lines and low voltage devices including the charging metering point by which the building of a customer is connected to the grid
Connection authorization	A document in which the distribution system operator defines the technical parameters for connection and usage of the grid
Current load limiter	A device which limits the customer's current load to the level of maximum import capacity specified in the connection authorization
Subscribed power of the connection	The maximum permissible power defined in the connection authorization
Deep approach	The customer in addition to the connection costs also pays part of the network reinforcement.
Shallow approach	Customer pays only the connection costs. The costs of network reinforcement are socialised and paid by all network users via the network fees
Simple connection works	Connection cases: <ul style="list-style-type: none"> - where the customer's house is located not more than 20 m from the LV network - with connection power of 7.4 (32 A) kW for single phase (1P) connection, and - with connection power of 11.07 kW (3x16A) for three phase (3P) connection. - where connection could be built up with a cable or overhead line
Remote areas	Cases where the customer's building is extremely far from the LV network (mobile operators' antennas, remote weekend houses, etc).

Throughout the text the abbreviation "n.a." stands for "not available".

2 GENERAL DATA

With a view to provide a meaningful assessment, understanding on the status quo of the analyzed markets is necessary. Table provides an overview of households' connection characteristics. Data shows that the **analyzed markets differ significantly**, especially related to their size, population and organization.

Table *An overview of households' connections in analyzed markets*

Market	Number of households customers' metering points by end of 2011	Number of connection requests approved in 2011	Guaranteed time ⁴ for issuing of connection authorization in 2011 [days]	Average time for issuing of connection authorization in 2011 [days]	Average time for simple works for connection construction in 2011 ⁵ [days]
Albania	901.336	8.844	According to regulation by the NRA: 30 (2011)	It is related to the moment of payment by the consumer. The whole process did not last more than 30 days in 2011	3 (days) from the moment of issuing the authorization of working orders
Armenia	2.179	2.632 ⁶	- 0,22 kV: for simple connection 10 working days, for other cases 25 working days; - 0,4 kV: ≤30 kVA simple connection 10 working days, for other cases 45 calendar days: > 30 kVA 45 calendar days	0,22 kV: 17 days; 0,4 kV: 35 days	not know ⁷
Bosnia and Herzegovina	1.341.423 (Federation BiH: 816.400; Republika Srpska: 493.423; Brčko District of BiH: 31.600)	14.406 (Federation BiH: 9.064; Republika Srpska: 5.031; Brčko District of BiH: 311)	30	5-8	6-12

⁴ Guaranteed standard or overall standard.

⁵ After signature of contract.

⁶ Number of households customers' metering points by the end of 2011 is smaller than number of new connection requests.

⁷ Armenia replied a timeframe of 0 days which, however, is not realistic. Data could not be verified.

Market	Number of households customers' metering points by end of 2011	Number of connection requests approved in 2011	Guaranteed time ⁸ for issuing of connection authorization in 2011 [days]	Average time for issuing of connection authorization in 2011 [days]	Average time for simple works for connection construction in 2011 ⁹ [days]
Bulgaria	4.358.936	15.469	30	18	43 days for standard works, without procedures; 93 days including permit procedures
FYR of Macedonia	585.346	4.868	15	7,9	23,5
Georgia	1.415.894	38.199	- Household: 35; - non-household up to 200 kW: 45; 200 kW to 500 kW: 60; from 500 kW to 5000 kW: 90 days	- household: 35 - non-household up to 200 kW: 45; 200 kW to 500 kW: 60; 500 kW to 5000 kW: 90	connection works are not divided into <i>simple</i> and <i>complex</i> , time is defined according to the capacities to be connected to (household: 35 days; non-household up to 200 kW: 45 days, from 200 kW to 500 kW: 60 days, from 500 kW to 5000 kW: 90 days)
Greece	not available	not available	15 (working)	not available	not available
Kosovo*	373.735	25.804	30	15	7
Moldova	1.231.156	12.839	15	15	2
Montenegro	331.235	2.330	30	20	DSOs do not perform works for connection constructions
Serbia	3.152.940	52.485	30	not available	not available
Turkey	28.500.000 (approximately)	not available	10-20 ¹⁰	not available	not available
Ukraine	18.973.000	49566	10	7-15 ¹¹	There is no definition for "simple connection works". For connected capacity 160kW it takes about 300 days. For household connection 3-7 kW in the electrified district it takes 5-7 days ¹¹

⁸ Guaranteed standard or overall standard.

⁹ After signature of contract.

¹⁰ If the current situation of the distribution system allows for new connection, the DSO has to inform the applicant within 10 days when the connection can be set up. In case the current situation of the distribution system does not allow for a new connection, the DSO has to inform applicant within 20 days when connection could be realized

¹¹ According to the study performed by World Bank Doing Business.

The following figures provide an illustrative breakdown and detailed assessment of the data summary of Table .

Figure shows the **ratio between number of connection requests approved in 2011** and number of households customers' metering points by end of 2011.

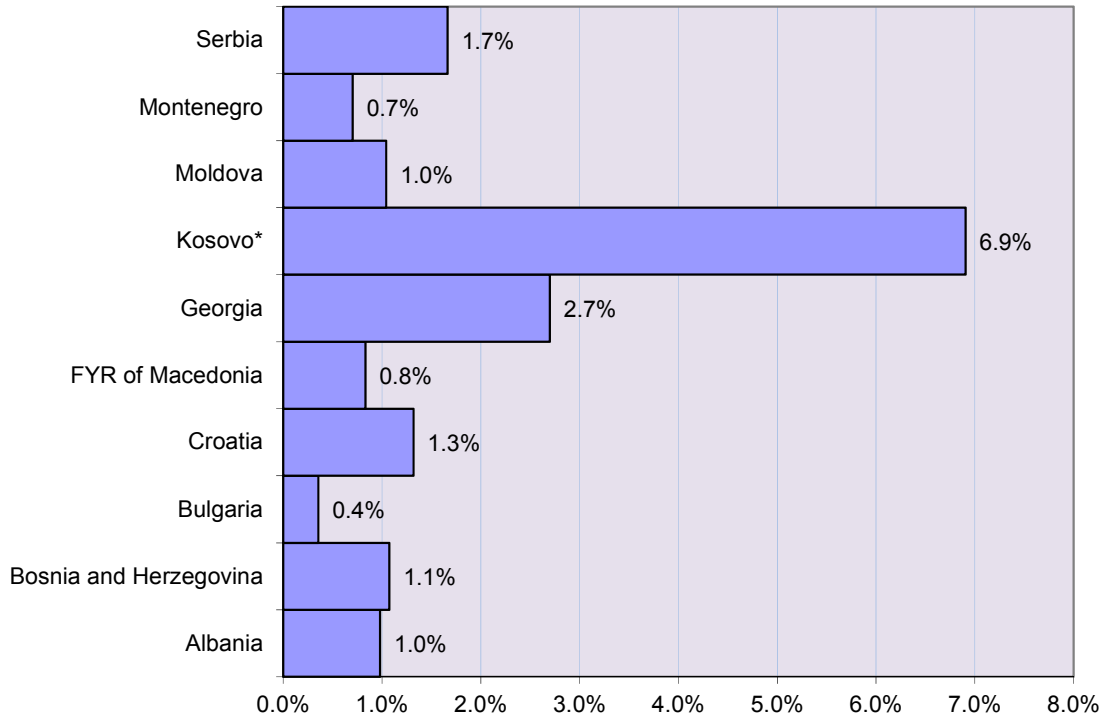


Figure *Ratio between number of connection requests approved in 2011 and number of households customers' metering points by end of 2011*

Armenia is not included in Figure since the submitted data could not be verified. Likewise, Greece is not included in Figure due to lack of data.

Figure shows the **guaranteed time** (guaranteed standard or overall standard) for issuing of connection authorization. This figure gives an important indication for the customer orientation of the authorization process.

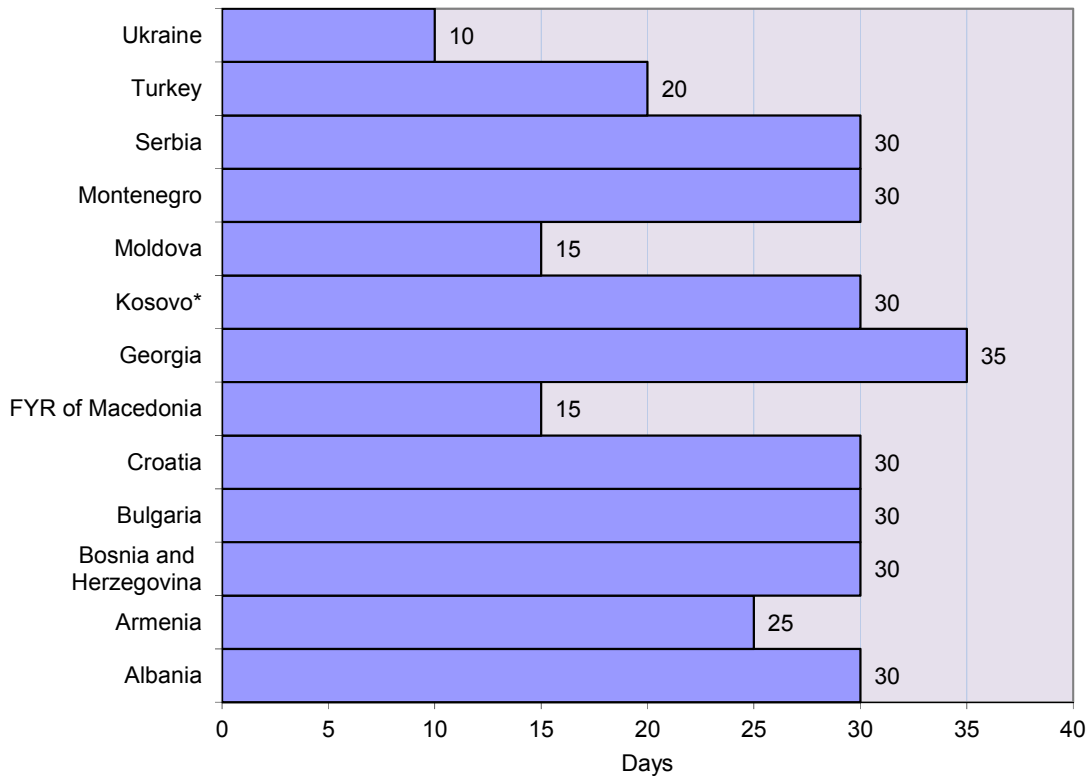


Figure *Guaranteed time (guaranteed standard or overall standard) for issuing of connection authorization*¹²

Most of the markets define a period of 30 days as guaranteed time (guaranteed standard or overall standard) for issuing a connection authorization. This shows a reasonable customer friendliness of the procedures.

For receiving a meaningful picture the figures, however, have to be put in relation to the real term duration of the connection authorization process. Figure shows the average time for issuing a connection authorization in 2011. A comparison between the guaranteed and the in practice applied average time shows that in all cases, for which data was provided, the **average time lays well below the guaranteed time**. The exception is Armenia where the average time for issuing a connection authorization in 2011 exceeded the guaranteed time.

¹² The guaranteed time data for Armenia is defined in working days, not in calendar days, so *in praxi* the duration is longer than the one displayed in Figure .

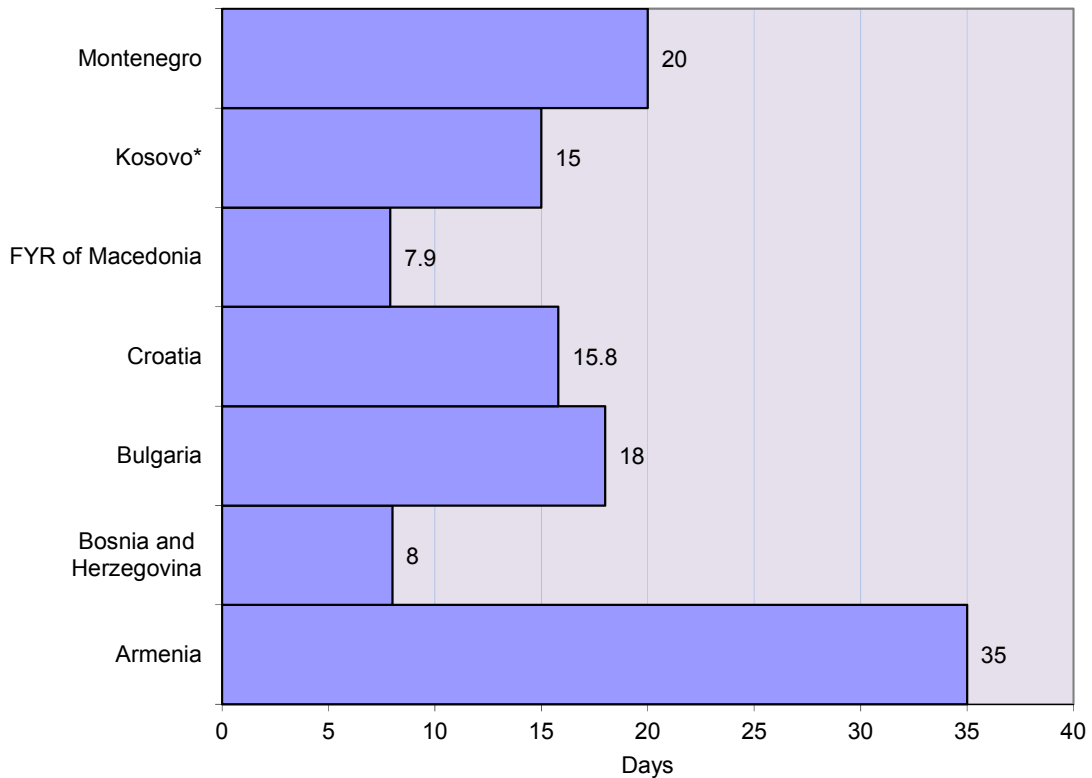


Figure Average time for issuing of connection authorization in 2011

The average time for issuing a connection authorization in 2011 for the observed markets adds up to **17.1 days**. FYR of Macedonia (7.9 days) and Bosnia and Herzegovina (8 days) apply the shortest periods¹³.

In the process of realizing new connections, the authorization by the competent authority is only the first step. For assessing the overall period that household customers face for the realization of a new connection, also the timing for the practical set up of the connection has to be reflected.

¹³ Bosnia and Herzegovina noted an average time between 5-8 days. For the graph the maximum average value is used.

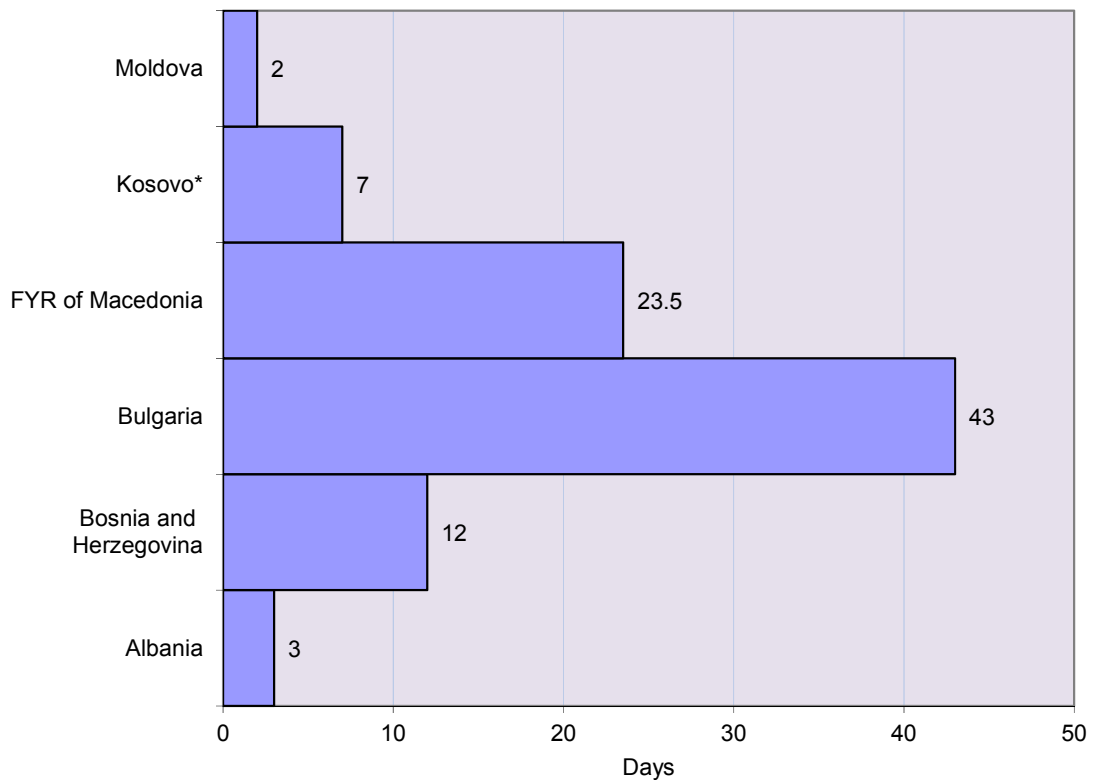


Figure Average time in days for simple works for connection construction¹⁴

Figure shows the **average time in days for simple works for connection**. A comparison shows significant differences between the individual markets. Explanations for these deviations would require further investigations.

¹⁴ Georgia is not included in this comparison due to categorisation differences: connection works are not divided into simple and complex, time is defined according to the capacities to be connected to (household: 35 days; non-household up to 200 kW: 45 days, from 200 kW to 500 kW: 60 days, from 500 kW to 5000 kW: 90 days). For all other markets not listed in Figure data on the average time in days for simple works for connection is not available.

3 LEGAL FRAMEWORK

Table provides an overview of the existence of a connection code and the methodology for defining costs of connection

Table *Existence of a connection code and methodology for defining costs of connection*

Market	Is there connection code?			Is there a methodology for defining costs of connection?			If yes, who develops the methodology?			If yes, who approves the methodology?		
	As a standalone document	As a part of other document (which)	No	Yes	No	DSO	Regulator	Ministry	DSO	Regulator ¹⁵	Ministry	
Albania	X			X		X				x		
Armenia		x		X			x					
Bosnia and Herzegovina	X			X			x					
Bulgaria		Regulation №6 of 09.06.2004 for connection of producers and customers of electricity energy to the transmission and distribution grids		X			x					
Croatia	X			X			x					
FYR of Macedonia		Distribution Grid Code		X		X				x		
Georgia		X		X			x					
Greece			X	X		X				x		
Kosovo*		Grid Code & chapter of the DSO Code. The connection charging methodology for TSOs is in placed and approved by ERO. The DSO connection charging methodology is under preparation and it is yet not approved by ERO.		X		X				x		
Moldova		X		X			x					
Montenegro		Part of the Rules for functioning of the distribution system (implemented as of July 2012)		X		X				x		
Serbia		Distribution code		X			x					
Turkey	X			X			x					
Ukraine			X		x							

¹⁵ Approval of the connection cost methodology is not separately indicated for those cases where the regulator already sets the methodology; regulatory approval is inherently assumed for those cases.

- A **connection code**, as a standalone document exists in Albania, Bosnia and Herzegovina, Croatia and Turkey.
- As a part of other documents, connection code rules exists in Armenia, Bulgaria, FYR Macedonia, Georgia, Kosovo*, Moldova and Montenegro.
- A methodology for defining costs of connection exists in most of the monitored markets.
 - In Albania, FYR of Macedonia, Greece, Kosovo*, and Montenegro the DSO proposes and the NRA approves the methodology for defining costs of connection.
 - In Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Moldova, Serbia and Turkey the NRA sets the methodology for defining costs of connection.
 - In Ukraine there is no connection code and methodology for defining costs of connection fee.

The following figures provide an illustrative breakdown and detailed assessment of the data summary of Table . Figure shows who develops and who approves the methodology for calculation of connection costs in analyzed markets.

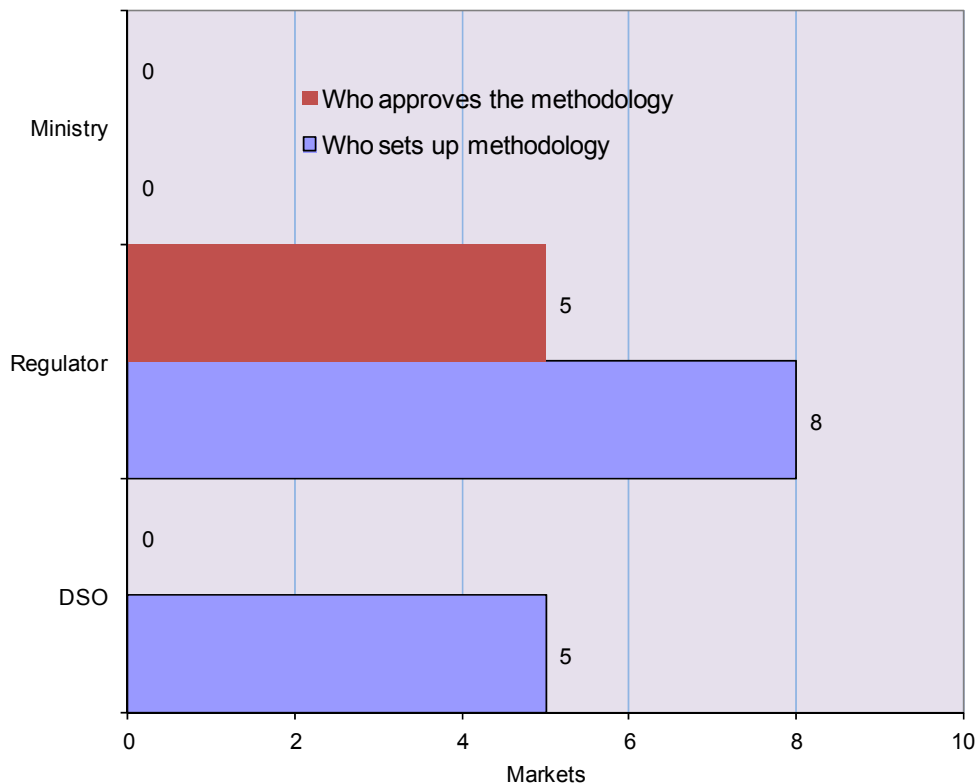


Figure *Who sets and who approves methodology for defining costs of connection*

In most of the markets, the regulator is responsible for developing the methodology for defining connection costs; in some markets DSOs are responsible. In all cases the

methodology is approved by the regulators. These facts provide a positive picture of regulatory powers and independence. Ministries do not have a role in the approval process.

In Ukraine on 22 June 2012 amendments in the Law on Electricity related to the connection rules have been made. According to these amendments the following changes compared to the current situation in the area of connection regulation are foreseen:

- Introduction of Connection Rules and Methodology for calculation of connection fee;
- The connection rules have to be approved by the NRA;
- The methodology for calculation of connection fee has to be approved by the NRA;
- Differentiation between standard connection and non-standard connection;
- The standard connection fee (average connection cost for 1 kW of capacity to be connected) will be calculated on annual basis by the DSOs according to the methodology for calculation of the connection fee and approved by the NRA;
- The payment for non-standard connection will be calculated as a costs of activities for individual connection project realization;
- Applied standard connection fees and information on transformer substations capacity (including rated, utilized and available (reserved) capacity) must be published by DSOs on their websites.

These amendments came into force on 1 January 2013. Accordingly, the Ukraine regulator already started work on developing the connection rules and the methodology for calculation of connection fee.

4 CONNECTION COSTS AND CONNECTION POWER

4.1 Share of connection costs and characteristics of the connection fee

Table provides an overview of the characteristics of the connection fees in place and the models applied in the connection fee methodologies related to sharing of connection costs covered by customer.

Table *Customer's share of connection costs and characteristics of connection fee*

Market	Which approach is applied in the methodology regarding the part of the connection costs that is cover by the customer?			How is the connection fee applied?			
	Deep	Shallow	Other (please describe)	[€/kW]	[€/km]	[€]	Other (please describe)
Albania	x			x		x	Cost of meter verification for the first time is paid by the consumer
Armenia	x			x			
Bosnia and Herzegovina			x ¹⁶	x		x	FBiH (€/kW); RS (€); BD: total costs = connection costs [€] + costs of creating technical conditions of the network [€/kW]
Bulgaria		x		x	x		The connection fee, no VAT included, consists of a fixed price in dependency of power to be connected to the distribution grid and the length of the cable (25 m). The price is altered with respect of each additional cable meter and power to be connected
Croatia	x						Usual price is paid in €/kW, but if real costs of connection are higher than 20% of usual fee, then customer pays the real costs of connection; LV connections are paid in €/kW (if there are no conditions/works in MV network)
FYR of Macedonia	x						Up to 40 kW in urban areas and in the un-urban area up to 40 kW and up to 30 m: fix charge for standard connection
Georgia	x					x	
Greece	x		x ¹⁷	x	x	x	
Kosovo*		x				x	

¹⁶ In the Federation of BiH (FBiH) a hybrid approach is applied involving connection costs and costs of creating technical conditions of the network. In Republika Srpska (RS) and Brčko District of BiH (BD) an all-in total fee is applied consisting of the fee for construction of the connection (NIP) and the fee for providing conditions for connection (NOP). NIP is determined in the tariff proceeding on the basis of the real cost of the material, equipment and works required for construction of the connection while NOP is determined following the principle of the deep-shallow approach to construction of a new unit capacity.

¹⁷ Connection fees approximate the full cost of network expansion used exclusively by the customer (supply cable/line) and also partly cover the cost of upstream network expansion and reinforcement necessary (shallow and deep reinforcement).

Market	Which approach is applied in the methodology regarding the part of the connection costs that is cover by the customer?			How is the connection fee applied?			
	Deep	Shallow	Other (please describe)	[€/kW]	[€/km]	[€]	Other (please describe)
Moldova		x				x	
Montenegro			x ¹⁸			x	
Serbia			x ¹⁹				€/kW for the deep part and € for the shallow part of connection costs
Turkey		x					54 Turkish Lira (0-15 kW)
Ukraine ²⁰							

The following figures provide an illustrative breakdown and detailed assessment of the data summary of Table .

Figure shows the methodology used for covering the connection costs in the analyzed markets. A **deep approach is used in six of the observed markets and a shallow approach in four of them.**

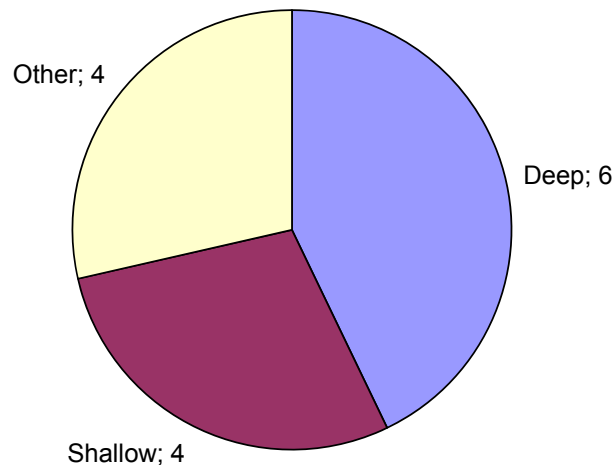


Figure Approach in the methodology regarding part of the connection costs that is covered by the customer

¹⁸ Consumer covers its own real costs for the construction development.

¹⁹ Partly deep - part of the system costs only for 10(20) kV network, depending on the allowed power. Shallow for costs of equipment, devices and materials, costs of the works and costs of design preparation, gathering of required documentation, permits and securing of other conditions for building the connection.

²⁰ The methodology is under development.

Table 2 illustrated which body is responsible for developing and/or approving the methodology for calculation of connection fees: while the development of the methodology is in some cases task of the DSO, in all cases the regulator is in charge of its approval. Also the **calculation of concrete fees based on the defined methodology in most cases is the responsibility of the regulator**. In Montenegro and Serbia the connection fee is developed by the DSO, only in Croatia the Ministry determines prices for connection. Special cases are Greece, where the fee is set by the DSO together with the regulator and Bosnia and Herzegovina, where in FBiH and BD the fee is developed by the DSO (in BD approved by Regulator), while in RS the fee is set by the regulator only.

Connection fees can include different parameters and depend on the contracted power, the distance from the already existing network and other²¹ costs that can be allocated for building connection. The approaches used in the analyzed markets are explained hereinafter.

- In Albania and Bosnia and Herzegovina customers have to pay a connection fee that consists of [€/kW] and [€] components.
- Bosnia and Herzegovina knows three different approaches: in FBiH fees are based on [€/kW], while in RS on [€] and in BD on total costs which are made of connection costs [€] plus costs of creating technical conditions of the network [€/kW].
- In Bulgaria the connection fee does not include VAT and consists of a fixed price dependent on the connection power and the length of the connection cable of 25 m. The price is altered with respect to each additional cable meter and power to be connected.
- Georgia, Moldova, Montenegro, Kosovo* and Turkey have fees based only on costs of connection.
- In Greece the connection fee includes all three parameters: the contracted demand, the distance from the existing network and fixed charges.
- In Croatia the usual price refers to the contracted consumption level (€/kW) but in case that real costs of connection exceed the usual fee by more than 20% the customer pays the real costs of connection. LV connections are paid in €/kW if there are no works in MV network requires.
- In FYR of Macedonia costs for connecting to the distribution system are defined in the pricing methodology that is part of the grid code and include:
 - connection's construction, depending on the type and scope of works necessary, shall be comprised of equipment, devices and materials, project development, obtaining the necessary documents and creation of other conditions for the connection's construction costs, and
 - creation of technical conditions in the distribution system comprised of the necessary costs for upgrading the distribution system depending on the approved maximum simultaneous capacity for securing required distribution system capacity in light of reliable, continuous and high-quality electricity delivery for users to be connected without causing negative consequences for existing system users.

In FYR of Macedonia the regulatory authority in June 2012 approved a new grid code for distribution of electricity²². The connection rules and the connection charge-setting methodology are part of the

²¹ Costs depend on type of terrain, needed network reinforcement etc.

grid code, and entered into force on 1st of August 2012. The new grid code imposed new criteria for standard and non-standard connections, introduced templates for connection agreements and a new connection methodology, as well as a €/kW related pricing. Also the deadlines for DSO activities are shortened and penalty provisions for non-compliance are included. Standard connection is connection of the object which is in accordance with the detailed urban plans and up to 400kW, as well as all residential and business buildings. Non-standard connection is connection of the object which is in accordance with the detailed urban plans and above 400kW.

The grid connection charge is comprised of the connection construction charge, as well as users' share in the costs incurred for the provision of technical conditions in the system to which new users are to be connected. The user may submit an objection to the costs of connection to the DSO and disputes related to these issues are handled by the regulator. The regulatory authority approved the following costs for technical conditions given in the table:

Table *FYR of Macedonia – changed rules 2012*

New Provisions	
Standard connections	Costs for technical conditions (€/kW)
Medium voltage	34,5
Low voltage (>40 kW, < 400 kW)	64,9
Low voltage (< 40 kW)	41,7
Resolution for approval of connections	Deadlines²³
Standard connections with Ped≤40kW	15 days
Standard connections with Ped > 40 kW and Ped ≤ 400kW	15 days
Non - standard connections	40 days
Producers	40 days
Realization of connections	Deadlines²⁴
Standard connection with Ped≤40kW	30 days
Standard connection with Ped > 40 kW and Ped ≤ 400kW	50 days
Non-standard connection	50 days
Penalties	Calculation
Penalty for noncompliance with the deadlines for connection for every day delay	Fee calculated as penalty rate according to law for every day delay of the paid amount for realization of connection.

²² Official Gazette no. 87/2012.

²³ According to Electricity Distribution Grid Code (Official Gazette no. 87/2012).

²⁴ According to Electricity Distribution Grid Code (Official Gazette no. 87/2012).

In Serbia €/kW related pricing is used for the deep part and € related pricing for the shallow part of connection costs.

4.2 Load limiters and ownership of connection

Current load limiters are used for avoiding consumers' consumption to exceed the contracted power level: in case the customer's power level raises above the contracted limit, the limiter is triggered and the customer is switched off. The implementation of this device is typically part of the contract for network usage. Table provides an overview of the use of load limiters and ownership of the connection in the analysed markets.

Table Usage of load limiter and ownership of the connection

Market	Is current load limiter used?			Who is the owner of the connection?		
	Yes	No	Other (please describe)	DSO	Customer	Other (please describe)
Albania	x			x		x ²⁵
Armenia	x			x		
Bosnia and Herzegovina	x	x	mainly (FBiH and RS)	x		F BiH: The DSO is the owner of all new connections. As for the old connections, some connections are owned by customers and some by DSOs. RS and BD: DSO
Bulgaria	x			x	x	
Croatia	x			x		
FYR of Macedonia			fuses is used as current limiter			The customer is the owner of the indoor connection (from the object to metering point), the DSO is owner of outdoor connection (from metering point to the grid)
Georgia	x			x		
Greece		x		x		
Kosovo*		x		x		
Moldova	x				x	
Montenegro	x			x		
Serbia	x			x		
Turkey		x	fuses are not regarded as CLLs, when answering this question	x	x	From indoor network to connection point: customer (meter included). From connection point to distribution network: DSO. After 31/12/2013, meters will be owned by DSO (only meter, remaining ownership will not change)
Ukraine	x			x	x	

There is widespread use of current load limiter in the observed markets: almost all markets use current load limiters for connections of households, except of Greece and Kosovo*. In Bosnia and Herzegovina current load limiters are installed in the entities Federation of Bosnia and Herzegovina and Republika Srpska but not in Brcko District. In FYR of Macedonia fuses are used as current limiter. It is, however, questionable whether fuses can be considered as current load limiter since is there is no common definition of current load limiter.

²⁵ For non-household cases ownership ambiguity is very common in Albania. Having an ownership right is therefore difficult since it is, e.g., not clear to whom the cost of the cabin are paid.

4.3 Costs of the connection and average connection power

Table provides an overview of the average connection costs in case of simple connection works and the average connection power. The related cost level is an important indicator for customer orientation of the connection process.

Table *Average costs for the connection in case of simple connection works and average connection power*

Market	Average cost for the connection in case of simple connection works?					Average connection power?				
	1p ²⁶ cable [€]	1p overhead [€]	3p ²⁷ cable [€]	3p overhead [€]	Explanation	1p cable [kW]	1p overhead [kW]	3p cable [kW]	3p overhead [kW]	Explanation
Albania	about 20 000 leke - 50 000 leke				Up to 50 m cable covered by the DSO. Cables exceeding 50 meters covered by the consumer	up to 3		3-20		
Armenia	114	114	534.5	534.5		9.15	9.15	30.1	30.1	
Bosnia and Herzegovina	875 FBIH; 527.6 RS; 472 BD	875 FBIH; 250.4 RS; 287 BD	1250 FBIH; 663.2 RS; 814 BD	1250 FBIH; 363.7 RS; 310 BD		7 FBIH; 8.1 RS; 8.1 BD	7 FBIH; 8.1 RS; 8.1 BD	10.5 FBIH; 17.3 RS; 17.3 BD	10.5 FBIH; 17.3 RS; 17.3 BD	
Bulgaria	300	150	350	200		15	6	15	15	
Croatia	1075	1075	2672	2672	Price for simple connection is paid in €/kW	6,05	6,05	15,04	15,04	Average connection power for connections <30kW, n have separate information for cable/overhead
FYR of Macedonia	500	500	500	500	For households up to 40 kW in urban areas the charge is fixed	18,2	18,2	18,2	18,2	Average connection power is calculated approximately for all type of connection 1p and 3p, cable and overhead
Georgia	200	200	600	600	Costs are for 1p and 3p connections on 0.22 kV and 0.38 kV voltage for 1-10 kW capacity	10	10	1-1000	1-1000	These costs are for connections on 1p 0.22 kV and 3p 0.38 kV; on 6-10 kV it is 500-5000 kW
Greece										

²⁶ Single phase.

²⁷ Three phase.

Market	Average cost for the connection in case of simple connection works?					Average connection power?				
	1p ²⁶ cable [€/]	1p overhead [€/]	3p ²⁷ cable [€/]	3p overhead [€/]	Explanation	1p cable [kW]	1p overhead [kW]	3p cable [kW]	3p overhead [kW]	Explanation
Kosovo*	75	75	100	100	Without VAT	3	3	5	5	
Moldova										3,5 kW
Montenegro ²⁸	1079	1032	1158	1061		4	3	8	6,5	Data are based on the assessment
Serbia	670	490	850	670		5	4,86	11,64	13,13	Data of realized connection in 2011.
Turkey								6	6	
Ukraine	n.a.	n.a.	n.a.	n.a.	The costs for the connection are covered by a customer and not available for the NRA	5.03	6	13.43	39	Data for 2011

Average costs in the case of simple connection works differ significantly between the analyzed markets. In Bosnia and Herzegovina separated data is provided for the Federation of Bosnia and Herzegovina, Republika Srpska and Brčko District. For each of them a weighting factor referring to the number of households customers' metering points is used. In following graphs data for Bosnia and Herzegovina is calculated using the relevant mentioned weighting factors.

The following figures provide an illustrative breakdown and detailed assessment of the data summary of Table .

²⁸ Prices in Montenegro as of 14 February 2013.

Figure shows average costs for 1 p cable connection in the case of simple connection works.

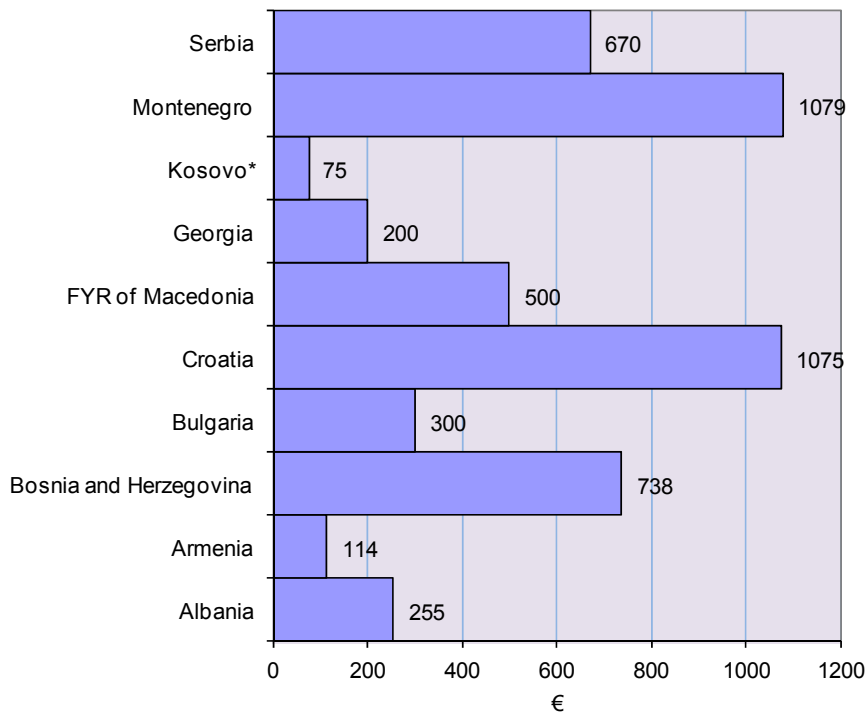


Figure Average costs for 1 p cable connection in the case of simple connection works

Figure shows average costs for 1 p overhead connection in the case of simple connection works

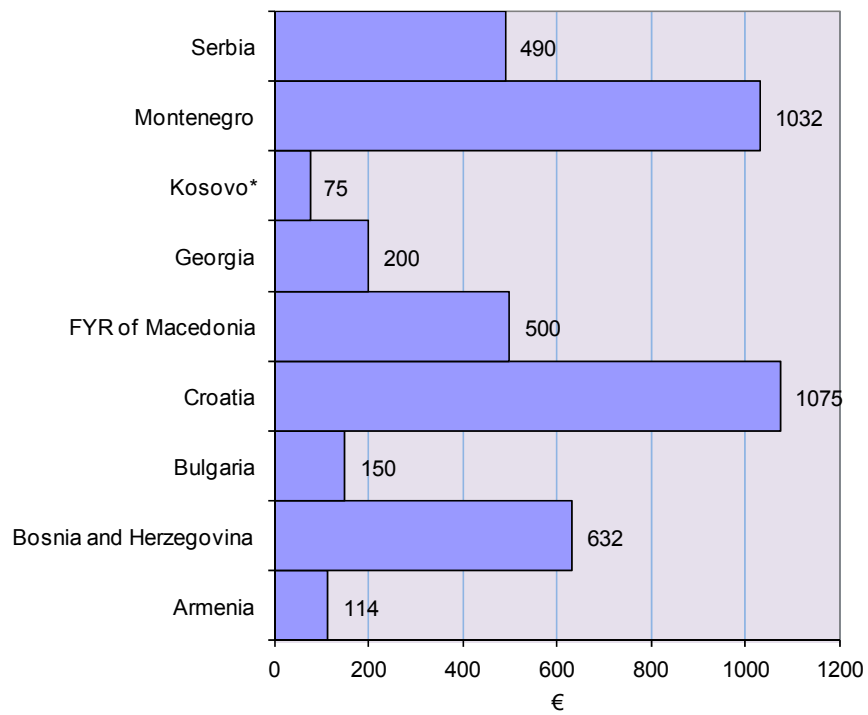


Figure Average costs for 1 p overhead connection in the case of simple connection works

Figure shows average costs for 3 p cable connection in the case of simple connection works.

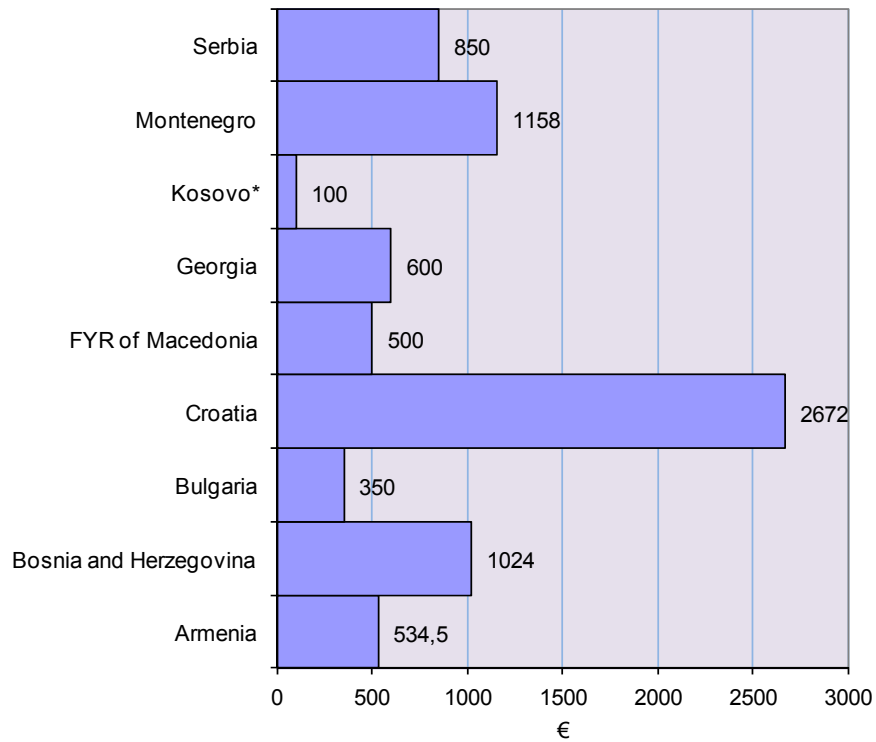


Figure Average costs for 3 p cable connections in the case of simple connection works

Figure shows average costs for 3 p overhead connections in the case of simple connection works.

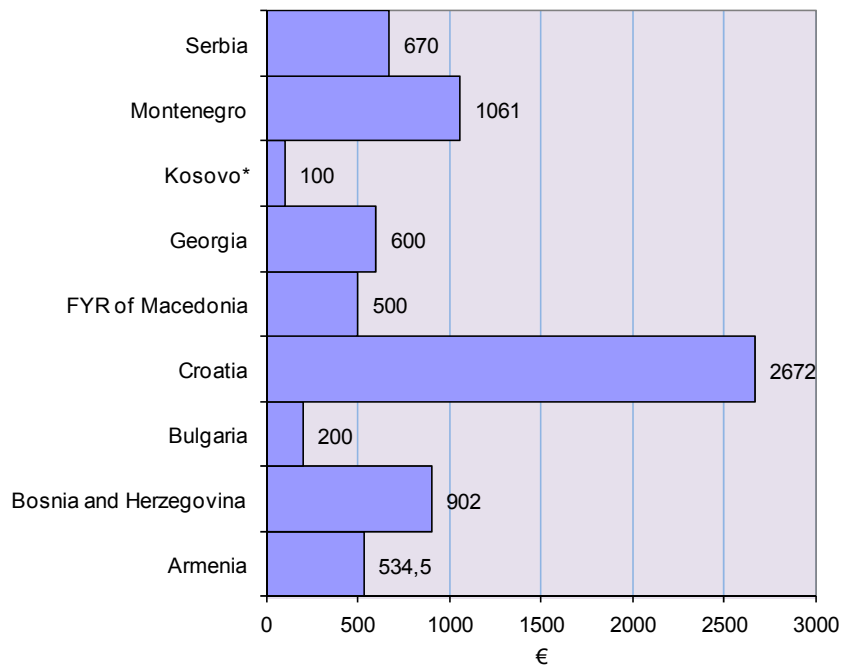


Figure Average costs for 3 p overhead connections in the case of simple connection works

In addition to the differences of average connection costs, the analyzed markets also show **specificities concerning the determination of the average connection power**.

- In Croatia the average connection power for all connections <30 kW is given and DSO does not differentiate between cable and overhead line connections. The situation is similar in FYR of Macedonia where the average connection power is approximately calculated for all types of connection 1p and 3p regardless of cable or overhead lines.
- For Bosnia and Herzegovina an average connection power for the whole territory is used.

The figures hereinafter provide information on the average connection power for 1p and 3p connections. Data for Serbia is based on the connection realized in 2011.

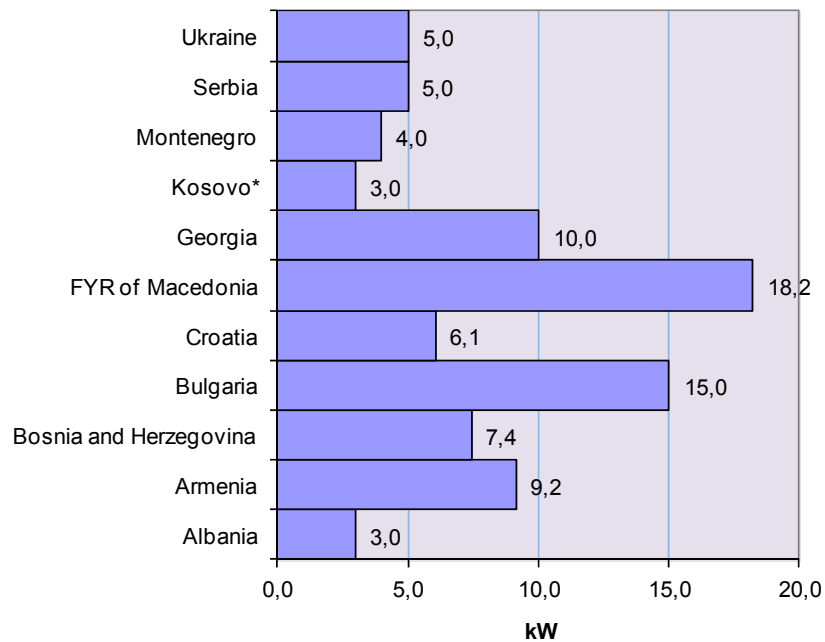


Figure Average connection power for 1 p cable connection

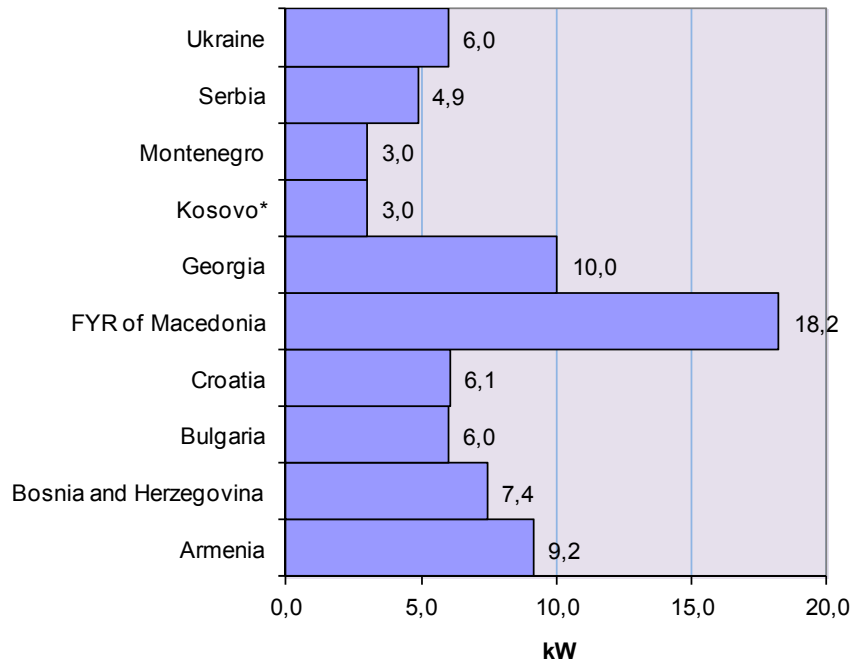


Figure Average connection power for 1 p overhead connection

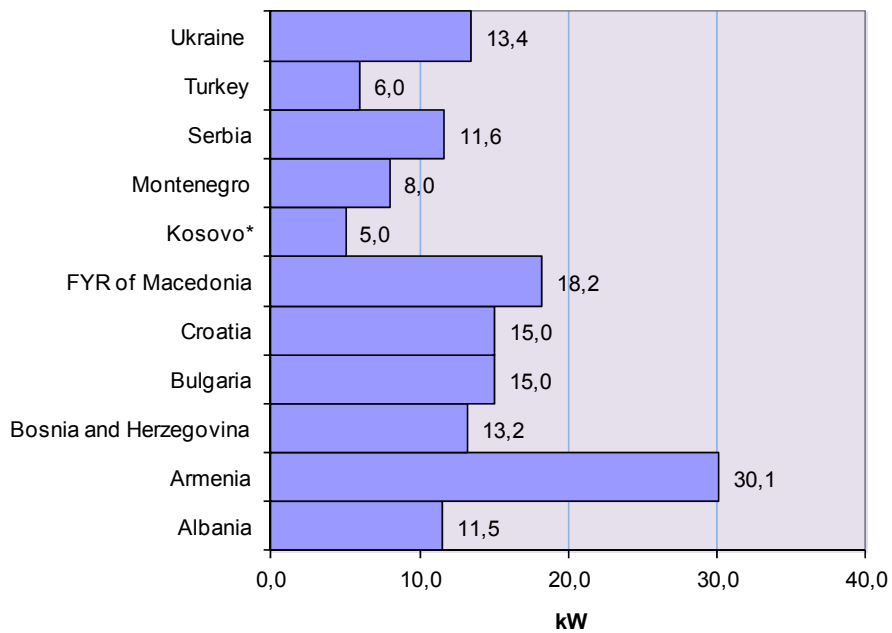


Figure Average connection power for 3 p cable connection

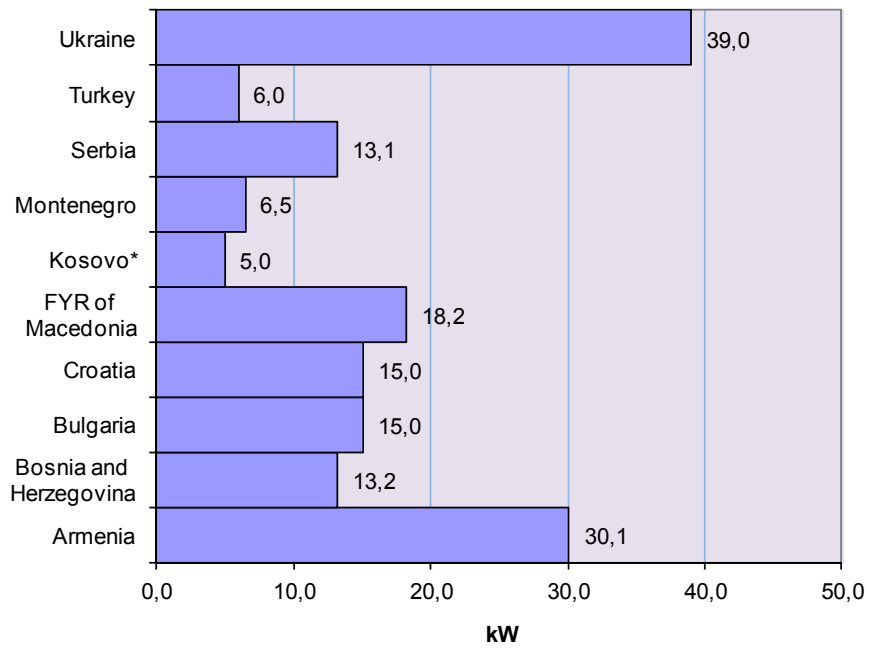


Figure Average connection power for 3 p overhead connection

4.4 Responsibility for connection construction

In particular for household customers, the question who is responsible for connection constructions is relevant. In addition to the related costs discussed in chapters 4.1 and 4.3, responsibility for complex construction works can be a barrier for the realization of new network connections.

Table provides an overview of responsibility for connection construction in analyzed markets.

Table *Responsibility for connection construction*

Market	Who is responsible for connection construction?		
	DSO	Customer	Other / Comment
Albania	x		Generally DSO. if the cable is longer than 50 meters, the cost of cable above 50 m is covered by the consumer
Armenia	x		
Bosnia and Herzegovina	x		In F BiH: DSO is the investor and owner of all new connections on low voltage. In some special zones, an investor is responsible for connection construction; a contract with the DSO regulates the mutual relations. RS and BD: DSO
Bulgaria			The DSO and the person, responsible for construction supervision.
Croatia	x		
FYR of Macedonia	x		If the connection is used only for one customer, the customer builds the connection
Georgia	x		
Greece	x		
Kosovo*	x	x	
Moldova		x	
Montenegro	x		
Serbia	x		
Turkey		x	From the indoor network to connection point: customer. From the connection point to the distribution network: DSO. After 31/12/2013, meters will be in DSO responsibility, other responsibilities will not change.
Ukraine		x	

In 10 markets (including Bulgaria) the DSO is responsible for the connection construction. In Moldova, Turkey and Ukraine the customer is responsible for building up the connection and in Kosovo* responsibility is shared between the customer and DSO.

5 REMOTE AREAS – REFUSAL – DISPUTE SETTLEMENT

In general, the costs and number of steps involved in the process of realizing new connections is relevant in particular for household customers. High costs and complex procedures are likely to create barriers. The status quo and approaches of these aspects have been discussed in the previous chapters.

Specifically for household customers also the rules applicable for the realization of new connections in remote areas and the treatment of connection refusals are of importance. In this context, dispute settlement is a crucial element for ensuring customer friendliness of the process. The following chapters provide an overview on how these aspects are treated in the analyzed markets.

5.1 Connection in remote areas and refusal of connection authorization

Table explains the approaches for connection in remote areas and refusal of connection authorization in the analyzed markets.

Table *Connection in remote areas and refusal of connection authorization*

Market	Approach for connection in remote areas	Is for DSO allowed to refuse a connection authorization?		If yes, is DSO obliged to justify a refusal?	
		Yes	No	Yes	No
Albania	Deep approach		x		
Armenia	In remote areas the connection fee includes a standard component of the electrical grid connection fee plus electric line construction cost which is 200 meters above the electrical grid connection point. If construction of high voltage lines and substations are needed, the connection fee also includes those construction costs		x		
Bosnia and Herzegovina	<ul style="list-style-type: none"> FBiH: the same conditions as in urban areas apply RS and BD: the same conditions as in urban areas apply, the only difference is in the definition of the standard connection: for urban area it is up to 50 m of distance from the distribution network, while in the rural area it is up to 300 m; 	only if there are no technical and network conditions to authorize the connection	x	x	

Market	Approach for connection in remote areas	Is for DSO allowed to refuse a connection authorization?		If yes, is DSO obliged to justify a refusal?	
		Yes	No	Yes	No
Bulgaria	The current Bulgarian legislation allows the DSO to calculate the expenses accordingly to an individual project for connection to the distribution grid			x	
Croatia	According to connection code there is no difference between consumers with different distance from the existing network. In Croatia if real costs of connection are higher more than 20% from fee which is based on [€/kW], customers pay the value of real costs necessary to connect remote household			x	
FYR of Macedonia	The household connection in remote areas is nonstandard. The calculation is based on real costs for construction, customer contribute to the total costs adequately to their capacity (kW)			x	
Georgia	connection fee binds DSO to connect a consumer on 0.4 kv within 800m and on 6-10kv within 6km from his network	X		x	
Greece	Connection fee equals the full cost of network expansion/reinforcement necessary	X		x	
Moldova	deep approach			x	
Montenegro	if the investment is not in the DSO investment plan, the connection has to be made by a consumer			x	
Serbia	The same approach as for connection in urban areas apply			x	
Turkey	Customer pays in return of netting from long run distribution fee			x	
Ukraine	Development and implementation of connection project is a customers' responsibility		x		
Kosovo*	If a customer builds a building (in remote areas) far from LV network, the customer can request from the company to built the network until the connection point, but the customer needs to pay the cost of the work. Alternatively a customer can built the network until the connection point and request form the DSO to connect to the DSO network			x	

There are different approaches for connecting households in remote areas:

- In Albania, Moldova and Greece a deep approach²⁹ is applied.
- In Bosnia and Herzegovina the same conditions as in urban areas apply. However, in Republika Srpska and Brčko District of BIH the only difference is in the definition of the standard connection: for urban area it is up to 50 m of distance from the distribution network, while in the rural area it is up to 300 m.
- In Bulgaria customers pay the real costs of connection. The same approach is applied in Kosovo* where customer may pay to the DSO for the network extension or can, alternatively, build the connection.
- In Croatia and Serbia there is no difference between consumers with different distance from the existing network. In Croatia, if real costs of connection are more than 20% higher than the usual connection fee – which is based on [€/kW], customers pay the value of real costs necessary to connect remote household.
- The household connection in remote areas is nonstandard in FYR of Macedonia. The calculation is based on real costs for construction. Customers contribute to the total costs adequately to their capacity (kW).
- An interesting approach is applied in Georgia where the connection rules binds DSO to connect a consumer on 0.4 kV within 800 m and on 6-10 kV within 6 km from existing network.
- In Montenegro if the investment is not in the DSO plan for expanding network, the connection has to be made by the consumer.
- In Turkey customers pay in return of netting from long run distribution fee.

In all markets it is possible to refuse a connection authorization by the DSO. The Exceptions are Ukraine and Armenia. Inappropriate technical and network conditions are the main reason for justified refusal. Reasons can be nontechnical as, e.g, unpaid bills in FYR of Macedonia.

DSOs in all analyzed markets have to justify the reasons for refusal of connection.

²⁹ The “deep approach” is defined as approach where customers in addition to the connection costs also pay for part of the network reinforcement. Compared to this, the “shallow approach” is defined as approach where customers only pay connection costs. In this model, costs of network reinforcement are paid by all network users via the network fees (see also table 3).

5.2 Dispute settlement

The availability of dispute settlement procedures is a key parameter for the customer friendliness of connection processes. Table provides an overview of the approaches applied in analyzed markets.

Table *Connection disputes*

Market	Who resolves connections' disputes?							Number of disputes in 2011
	DSO	Regulator	Ministry	Court	Ombudsman	Other	Comment if necessary	
Albania	x	x		x				as ERE, about 20 cases
Armenia		x		x				6
Bosnia and Herzegovina	x	x		x			<ul style="list-style-type: none"> FBIH: Regulator or Court; RS: DSO or Regulator; BD: Court 	172
Bulgaria		x		x				570
Croatia	x	x		x				13 total - 11 refused, 2 approved
FYR of Macedonia		x		x				69
Georgia		x						about 8% (150) from the total number of disputes
Greece		x		x				n/a
Kosovo*	x	x		x			According to the rules, customer needs first to submit the dispute to DSO; if the customers are not satisfied with the respond, they can address the dispute to the regulator	129 disputes registered in DSO
Moldova		x		x				16
Montenegro	x	x		x			DSO first instance, regulator second instance and court (administrative) third instance	55
Serbia	x ³⁰	x		x				111
Turkey	x	x		x			Disputes are usually solved by DSOs. Regulator mostly handles unsolved disputes.	210 (Handled by regulator), DSO's not known
Ukraine	x	x	x	x				350 (285 of which are submitted to the Informational-Consultative Centers; from 60 to 70 – submitted to the Regulator

In all markets regulator is responsible for solving connections' disputes. In most markets the regulator, however, has to cooperate with other bodies:

³⁰ The filing is made to the regulator via the DSO, which has a certain role in the procedure in accordance with the Law on General Administrative Procedure (including the possibility to alter its own decision to the satisfaction of the customer). Otherwise, it shall forward the dossier to the regulator.

- In Albania, Bosnia and Herzegovina, Croatia, Kosovo*, Montenegro, Turkey and Ukraine dispute settlement is executed by the regulator together with the DSO. Dispute settlement activities of the regulator typically are only the second step after failure of dispute settlement by the DSO.
- In Armenia, Bulgaria, FYR of Macedonia, Georgia, Greece, Moldova and Serbia³¹ DSOs do not have a dispute settlement function, this is executed only by the regulator.
- In Ukraine 4 authorities are responsible for dispute settlement.
- The dispute settlement decision taken by the regulator can be challenged in court in almost all cases. In this context it is important to know which elements of the regulator's decision can be subject to court review. Table 10 provides an overview of the applicable procedures³².

Table *Court powers on regulatory dispute settlement decisions*

Market	Which elements of the regulator's dispute settlement decision can be subject to court review?	
	Procedures, not content	Content
Albania	n.k.	n.k.
Armenia	n.k.	n.k.
Bosnia and Herzegovina	SERC decisions: Court of Bosnia and Herzegovina FERK / RERS decisions: entity court	No
Bulgaria	By administrative Supreme Court	no
Croatia	By administrative Supreme Court	By administrative Supreme Court
FYR of Macedonia	By administrative/Senior administrative Court	By administrative/Senior administrative Court
Georgia	n.k.	n.k.
Greece	n.k.	n.k.
Kosovo*	By administrative and/or constitutional Supreme Court	no
Moldova	By first level courts	no
Montenegro	By administrative/ Supreme Court	By constitutional Supreme Court on compliance with constitution
Serbia	By Administrative Court	By Administrative Court
Turkey	no	By civil law courts, namely by the Consumer Courts and general consumer commissions handling disputes between consumers and customers
Ukraine	By administrative court	By administrative court

³¹ See fn .

³² Comparability of the listed courts is subject to comparability of the individual national court systems. A detailed analysis of these, however, goes beyond the scope of this report. Where the table refers to "n.k." (not known), answers have not been provided by the national regulators.

Figure 5 shows the responsible authorities for connection related disputes settlement in the analyzed markets.

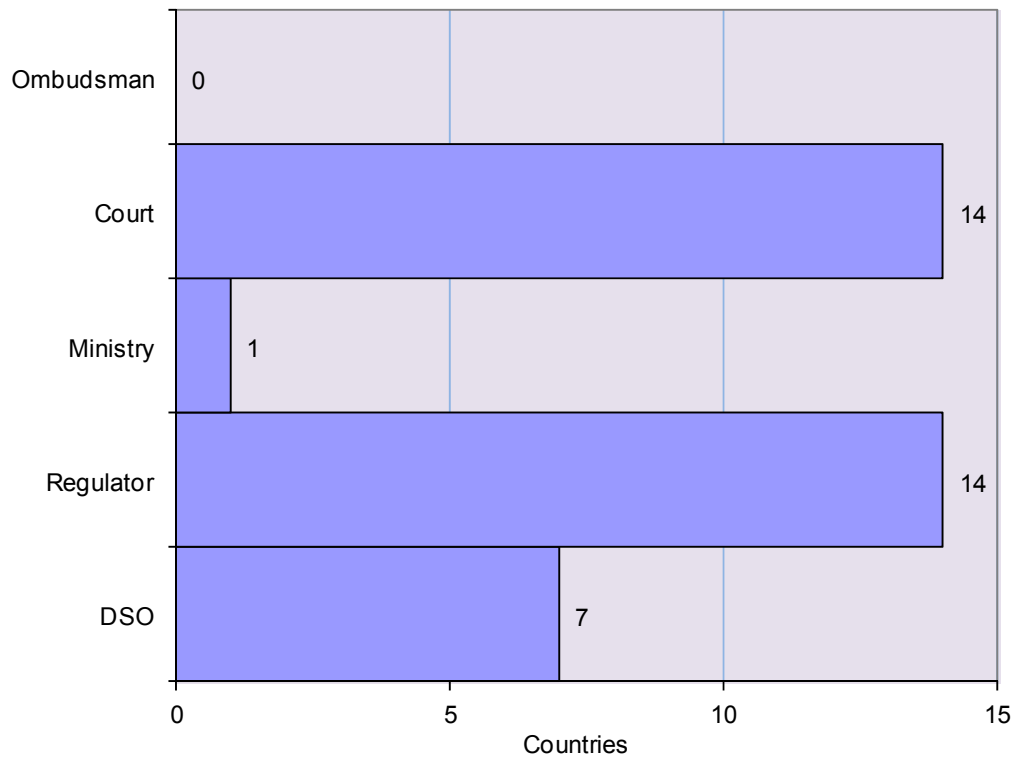


Figure *Responsible authorities for connection related disputes settlement*

6 SUMMARY AND CONCLUSIONS

6.1 Main findings

Grid connection covers a number of customer relevant elements: inappropriately designed rules, complex procedures, non-transparent responsibilities and high costs which can create barriers for the realization of new connections, especially to household customers. This also includes the responsibilities for grid connection, the network ownership border including linked maintenance duties and, last but not least, the availability of and responsibility for dispute settlement as well as the level of regulatory involvement.

The present survey focuses on the existing grid connection rules for household customers electricity connection to LV networks (< 1kV) and their customer-friendliness). The analysis shows the following main findings:

1. The **analyzed markets differ significantly**, especially related to their size, population and organizational characteristics. For example Turkey has almost 29 million households metering points, Montenegro only 331 000.
2. The **guaranteed time** (guaranteed standard or overall standard) for issuing of connection authorization in most of the markets is 30 days. This shows a reasonable customer friendliness of the procedure.
3. For receiving a meaningful picture the analysis of the guaranteed time standards was put in relation to the real term duration of the connection authorization process. The average time for issuing connection authorization in observed markets is between 7.9 days in FYR of Macedonia and 35 days in Armenia. The comparison shows that – with the exception of Armenia – in all cases, for which data was provided, the **average time lays well below the guaranteed time**, adding up to an average of 17.1 days in 2011. This finding confirms the practical customer friendliness of the applied authorization processes.
4. In the process of realizing new connections, the authorization by the competent authority is only the first step. Therefore, the present survey also assessed the **timing for the practical set up of a new connection**: a comparison shows significant differences between the individual markets reaching from 2 days in Moldova and 43 days in Bulgaria.
5. Customer friendliness also requires the availability of standard rules and fees applicable for setting up new connections:
 - A **connection code**, as a standalone document, exists in four markets: Albania, Bosnia and Herzegovina, Croatia and Turkey. The other seven markets have provisions on connection included in other documents. In Greece there is a methodology for defining costs of connection, developed by a DSO and approved by the regulator. In Ukraine there are neither connection rules nor fee methodologies set or approved by the regulator or the Ministry (however they are currently under development by the regulator). Albania does not have a regulated methodology for defining connection fee costs.

- While the development of the methodology is in some cases task of the DSO, in all cases the regulator is in charge of its approval. Also the **calculation of concrete fees based on the defined methodology in most cases is the responsibility of the regulator**. For defining the **customer's contribution to connection costs** a deep approach is used in 5 markets while a shallow approach is used in 4 markets.
6. There is widespread use of **current load limiter** in observed markets. It is, however, questionable whether fuses can be considered as current load limiter since there is no common definition of current load limiter
 7. In almost all of the markets the DSO is the **owner of the connection**.
 8. **Connection costs** are an important indicator for customer orientation of the connection process. The analysis shows that average costs for the connection in the case of simple connection works significantly vary among the markets. In addition, the analyzed markets also show **specificities concerning the determination of the average connection power**.
 9. In particular for household customers, the question who is **responsible for connection constructions** is relevant. Responsibility for complex construction works can be a barrier for the realization of new network connections. In 10 markets DSO is responsible for connection construction. These results provide a positive picture of customer friendliness of the process.
 10. Specifically for household customers also the rules applicable for the realization of new **connections in remote areas** are of importance. The assessment shows different approaches.
 11. Customer orientation of the authorization process also calls for clear definition of the cases for refusing connection requests and justifications in case of refusal.
 - **In all markets it is possible to refuse a connection authorization by the DSO**. The exceptions are Republika Srpska, Ukraine and Armenia. Inappropriate technical and network conditions are the main reason for justified refusal. Reasons can be nontechnical as, e.g, unpaid bills in FYR of Macedonia.
 - DSOs in all analyzed markets have to **justify the reasons for refusal of connection**.
 12. Finally, the availability of **dispute settlement** procedures is a key parameter for the customer friendliness of connection processes. In all markets regulator is responsible for solving connection related disputes; in some cases this responsibility is executed as a step-wise approach together with the DSO and/or Court.

6.2 Conclusions

The present survey provides a generally positive picture of the customer orientation of network connection procedures. Rules, procedures, timing and responsibilities are to a predominant extent well defined and transparent. Also, the strong and independent competences of regulators in the authorization process provide a positive picture of regulatory powers.

Significant differences between the individual markets have, however, been identified related to the real term period for realizing new connections. Also, average costs for the connection in the case of

simple connection works and the rules for determination of the average connection power significantly vary among the markets. Explanations for these deviations would require further investigations.

**Questionnaire
Analysis of the existing grid connection rules and their customer-friendliness
(survey)**

NO	Question	Answer
1.	NRA, Name, Phone, e-mail	
2.	Number of households customers' metering points by: the end 2011.	
3.	Number of connection requests approved in 2011. ¹	
4.	Guaranteed time (guaranteed standard or overall standard) for issuing of connection authorization in 2011.	[days]
5.	Average time for issuing of connection authorization in 2011.	[days]
6.	Average time for simple works for connection construction in 2011 (after signing the contract).	[days]
7.	Is there connection code?	<input type="checkbox"/> As a standalone document <input type="checkbox"/> As a part of other document (which): <input type="checkbox"/> No
8.	Is there methodology for defining costs of connection fee?	<input type="checkbox"/> Yes <input type="checkbox"/> No
9.	If yes, who sets up the methodology?	<input type="checkbox"/> DSO <input type="checkbox"/> Regulator <input type="checkbox"/> Ministry
10.	If yes, who approves the methodology?	<input type="checkbox"/> DSO <input type="checkbox"/> Regulator <input type="checkbox"/> Ministry
11.	Which approach is applied in the methodology regarding the part of the connection costs that is cover by the customer?	<input type="checkbox"/> Deep <input type="checkbox"/> Shallow <input type="checkbox"/> other (please describe)

NO	Question	Answer
12.	Who defines the connection fee? [€/kW], [€/km], [€]	<input type="checkbox"/> DSO <input type="checkbox"/> Regulator <input type="checkbox"/> Ministry
13.	How is the connection fee applied?	<input type="checkbox"/> [€/kW] <input type="checkbox"/> [€/km] <input type="checkbox"/> [€] <input type="checkbox"/> other (please describe)
14.	Is current load limiter used?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> other (please describe)
15.	Who is the owner of the connection?	<input type="checkbox"/> DSO <input type="checkbox"/> Customer <input type="checkbox"/> other (please describe)
16.	Which is an average cost for the connection in the case of simple connection works?	1p cable: [€] 1p overhead: [€] 3p cable: [€] 3p overhead: [€] explanation:
17.	Average connection power:	1p cable: [kW] 1p overhead: [kW] 3p cable: [kW] 3p overhead: [kW] explanation:
18.	Who is responsible for connection construction?	<input type="checkbox"/> DSO <input type="checkbox"/> Customer <input type="checkbox"/> other (please describe)
19.	Please describe an approach for connection in remote areas?	
20.	Is it possible for DSO to refuse a connection authorization?	<input type="checkbox"/> Yes If, yes please describe <input type="checkbox"/> No
21.	If yes, is DSO obliged to elaborate refusal of connection authorization?	<input type="checkbox"/> Yes <input type="checkbox"/> No
22.	Who resolves connections' disputes?	<input type="checkbox"/> DSO <input type="checkbox"/> Regulator <input type="checkbox"/> Ministry <input type="checkbox"/> Court <input type="checkbox"/> Ombudsman <input type="checkbox"/> Other Comment if necessary
23.	Number of disputes in 2011.	

