



Energy Community Regulatory Board

**Report on the
Quality of Electricity Service**

Standards and Incentives in Quality Regulation



Table of Content

1	Introduction	3
1.1	Background and Mandate.....	3
1.2	Objective and Outlook.....	3
1.3	Methodology and Scope	4
1.4	Organization of Work	5
2	The Basis of Service Quality Regulation	5
3	CEER Benchmarking Reports on Quality of Electricity Supply	5
4	Analysis of National Reports.....	5
4.1	National Legal Framework.....	5
4.2	National Regulatory Framework	5
4.3	General Electricity Grid Data	5
4.4	Continuity of Supply	5
4.5	Voltage Quality.....	5
4.6	Commercial Quality.....	5
4.7	Customer Support.....	5
5	Conclusions.....	5
	Annex 1 – Summary of National Reports	5
	Annex 2 – Reference Documents.....	5

1 Introduction

This report represents a first step in investigation of the regulatory and legal framework and current practices concerning quality of electricity service in the EnC region. The main reason for this investigation is to give an overview of the current situation regarding the quality of electricity service standards in the Energy Community in respect to quality regulation. The report consists of three main parts. The first one comprises the basis of service quality regulation. The second part of report represents the CEER benchmarking reports on quality of electricity supply. The third part is short analysis of national reports. In the appendix summary of national reports is given.

1.1 Background and Mandate

According to the minutes of the 3rd ECRB Customers Working Group (CWG) meeting¹ the topics of the ECRB Work Program 2008-2009, CWG2 - Quality of Supply and Commercial Service; Standards and Incentives in Quality Regulation, was introduced as a part of the CWG activities. While the CWG TF2 members (Croatia, UNMIK and Italy) were assumed to have a leading role in this activity, all CWG members were invited to actively participate in all tasks deriving from the Work Program.

At the 4th CWG meeting² it was concluded that a structure should be prepared, which would serve as a basis for a benchmarking report on Quality of Supply (herein after QoS). The benchmarking report should reflect the current situation and determine approaches to quality standards in the Region.

The contributions from some Contracting Parties, Observers and Participants³ were presented during the 5th CWG meeting⁴. This present report is based on these contributions.

1.2 Objective and Outlook

The present report provides an analysis on current practices with regard to quality of electricity service - standards and incentives in quality regulation - in the Energy Community. The data that used as basis of this report has been provided on a voluntary

¹ Vienna, February 20, 2008.

² Vienna, May 26, 2008.

³ Albania, UNMIK, Croatia, Serbia, Bosnia and Herzegovina, Italy, Romania and Ukraine.

⁴ Vienna, September 18, 2008.

basis by several Contracting Parties⁵, Participants⁶ and Observers⁷ of the Treaty establishing the Energy Community (EnC Treaty), namely: Albania, Bosnia and Herzegovina, Croatia, Serbia, the United Nations Interim Administration Mission in Kosovo (UNMIK), Italy, Romania and Ukraine.

1.3 Methodology and Scope

The information provided by the CWG Members followed the proposed structure:

National Legal Framework

- National Legal Framework Regarding Quality of Service
- Institutional Actors/Responsibilities

National Regulatory Framework

- Methodology of Tariff Regulation
- Quality Regulation as a Part of Tariff Regulation
- Type of Quality Standards (Overall, Guaranteed)
- Operator Responsibilities and Penalties

General data of the Electricity Grid

- Network Voltage Levels
- Distributed Energy to HV Customers
- Distributed Energy to MV Customers
- Distributed Energy to LV Customers
- Number of HV Customers
- Number of MV Customers
- Number of LV Customers
- Length of HV Lines
- Length of MV Lines
- Length of LV Lines
- Length or Share of Overhead HV Lines
- Length or Share of Overhead MV Lines
- Length or Share of Overhead LV Lines

Continuity of Supply

- Definition of Force Majeure
- Used Standards and Indices
- Target/Typical Values
- Methods of data collection

⁵ The Contracting Parties of the EnC Treaty are: Albania, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia, Montenegro, Serbia and the United Nations Interim Administration Mission in Kosovo (UNMIK).

⁶ The Participants within the EnC Treaty are Austria, Bulgaria, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Italy, the Netherlands, Romania, Slovakia, Slovenia, and the United Kingdom.

⁷ Georgia, Moldova, Norway, Turkey and Ukraine have the status of Observers.



Voltage Quality

- Used Standards and Indices
- National wide measuring
- Target/Typical Values

Commercial Quality

- Used Standards and Indices
- Target/Typical Values
- Methods of data collection

Customer Support

- Types of Disputes
- Resolving Disputes

Other Relevant Comments

1.4 Organization of Work

Most CWG members sent their contributions for this report. Some information was received in form of a power point presentation, some as a written report and some both as a presentation and as a report.

This report presents the collected information through several chapters, summarizing national information with remarks in the context of benchmarking. Tables are used for comparison where appropriate. Whenever it was not possible to find relevant information, the corresponding table cell was filled with a hyphen (-).

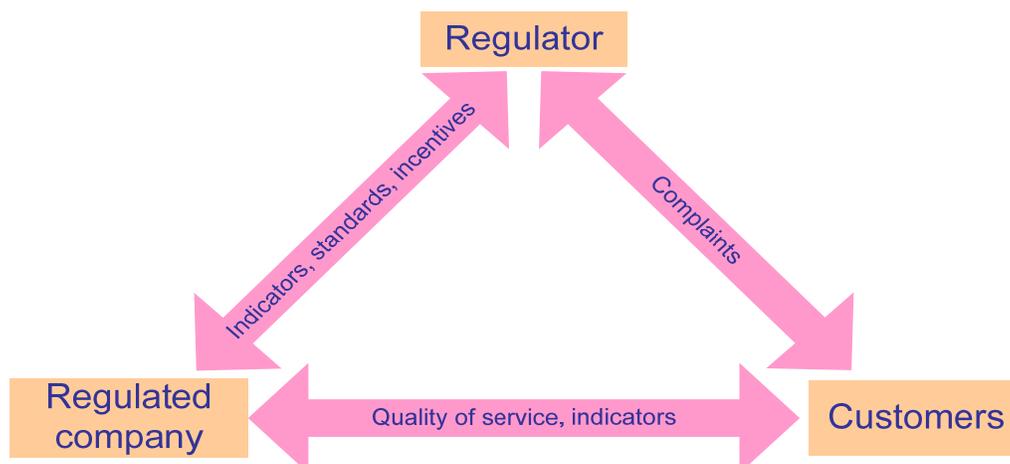
2 The Basis of Service Quality Regulation

Service quality is an important issue in the electricity distribution and retail sectors. Experience so far shows when a regulator chooses to regulate prices using price or revenue caps, a service level tends to drop. On the other hand, rate of return method could lead to over investments into the network. For that reason, all types of regulation must be supplemented by some kind of service quality regulation. In the case of price or revenue caps regulation, service quality regulation will protect the quality of service level, which could drop because of cutting the network investments. In the case of rate of return regulation, service quality regulation serves for approving network development and investment plans.

Usually there are three stakeholders included in the process of service quality regulation. Dialogs work in triangle: regulatory body, regulated company and customers are necessary for satisfactory implementation of service quality regulation.



Figure 1 Dialog in triangle: regulator-regulated company-customers

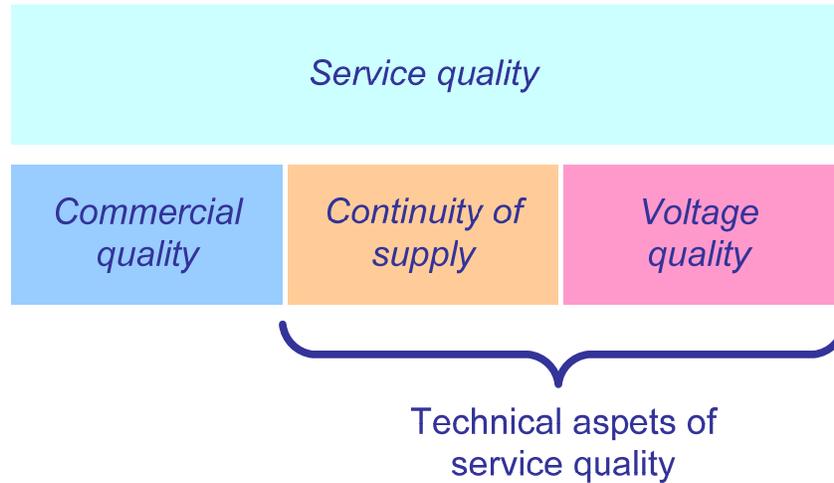


Successfully implemented regulatory schemes have the following features in common, [1]:

1. **Fairness and simplicity.** Clear rules on data measurement and collection should be defined. Existing and successful regulatory schemes are built upon a relatively small number of quality indicators.
2. **Different approaches** in different markets are possible as long as the effects of the quality regulation are satisfactory.
3. **The process of gradual implementation** of regulatory instruments is common to all successfully implemented regulatory schemes. Such approach allows regulators to deal with the inherent multi-dimensional nature of quality in an efficient way.
4. **Periodical revision** of gradually implemented regulatory instruments. Quality regulation is rather a process than a permanent solution to all quality issues. This allows regulators to learn from practical results and to gradually implement the next instrument or to improve the existing scheme.
5. **Permanent dialog** in triangle: regulator-regulated company-customers.

Generally spoken, service quality has three aspects, one commercial and two technical. The following graph illustrates these aspects:

Figure 2 Aspects of service quality



Commercial quality covers the quality of a number of services, such as the provision of a new connection, meter reading, billing, handling of customers’ requests and complaints.

Technical aspects of service quality generally refer to power quality issues which could be grouped in two main fields of power quality:

- **Continuity of supply**, related to interruptions of supply, is generally described by two quality dimensions: the number of interruptions and their duration. On system level, most common continuity indices related to long interruptions are:

- SAIFI - System Average Interruption Frequency Index which is defined as:

$$SAIFI = \frac{\sum_{i=1}^K N_i}{N_{tot}}$$

Where:

N_{tot} is total number of customers served by utility

K is number of outages in the system

i is index of interruption

N_i is number of customers affected by interruption i

- SAIDI - System Average Interruption Duration Index which is defined as:

$$SAIDI = \frac{\sum_{i=1}^K N_i D_i}{N_{tot}}$$

Where D_i is duration of interruption i in minutes

- **Voltage quality** covers a subset of possible variation of voltage characteristics from the desired values such as:
 - Supply voltage variations;
 - Rapid voltage change;
 - Voltage swells;
 - Flickers;
 - Voltage unbalance;
 - Harmonic voltage distortions;
 - Transient overvoltage;
 - Mains signaling voltage.

There are basically four instruments that regulator may employ in introducing quality regulation:

- Publication of data on company performance.
- Setting the minimum quality standard
- Introduction of reward and penalty schemes
- The promotion of premium quality contracts

The basic elements of the service quality regulation instruments are:

- **Quality indicators** which describe actual performance of the regulated company.
- **Performance standards** which specify the level of quality that company is expected to supply.
- **Financial incentives** for penalization the performance below the standard.

Quality indicators measure the corresponding dimensions of service quality. This information is sufficient to make effective the simplest instrument of quality regulation which is data publication.

Performance standards in the case of minimum quality standards represent a lower limit of service quality delivered to the individual customer. In the case of reward and penalty schemes, performance standards are an average level of service quality.

In principle, a regulated company performing below the performance standard will be penalized and the one performing above the performance standard will be rewarded. In

the case of applied minimum quality standards and premium quality contracts, financial penalties are in the form of money compensation paid to the affected customers. For the incentive/penalty schemes there is structure with defined functional relationships between quality of service and price.

A general framework for service quality is represented in **Table 1**.

Table 1 A General framework of service quality regulation, [1]

Aspect of service quality	Collecting information and making it available	Protecting the worst-served customers	Delivering an efficient level of quality	Favouring market-like mechanisms and competition
Commercial quality	Regulatory instruction for recording customer requests	Guaranteed standards on making and keeping appointments	Reward and penalty schemes on the quality of call centres	Competition in providing connections
Continuity of supply	Regulatory instruction for recording interruptions	Guaranteed standards on duration of an unplanned interruption	Reward and penalty schemes on the average interruption duration	Premium quality contracts on the number of unplanned interruptions
Voltage quality	Measuring campaigns	Voltage quality standards		Premium quality contracts on supply voltage variations

The complexities that arise in regulating quality suggest a gradual approach, [1]. It is good enough to introduce only one or a few of the relevant aspects of service quality regulation. It is suitable to start with the simplest instruments and subsequently introduce new regulatory instruments.

The introduction of quality regulation is a complex process that generally expands over period of years. The regulatory framework is a series of following activities:

- Introduction of instructions and guidance on data collection as a precondition for any regulatory intervention. These instructions will ensure that measuring, registration and reporting requirements are consistent with the regulatory objectives.
- Interaction with the all interested parties through consultation process and customer surveys which will ensure that decision will be taken in open manner.

- Assessing whether regulatory instruments actually delivers the desired results.

The key suggestion in [1] for the regulators approaching the quality regulation for the first time is to explore the regulatory and legal background.

This investigation may take several different directions:

- Exploring existing regulatory and legal framework: supply contracts, licenses, secondary legislation, share of responsibility between ministries and regulator.
- Exploring experiences from other more developed sectors like telecommunication regulation.
- Exploring international experience from ERGEG and CEER reports.

In this respect, the present report represents a first step in investigation of the regulatory and legal framework and current practices concerning quality of electricity service in the EnC region.

3 CEER Benchmarking Reports on Quality of Electricity Supply

The Council of European Energy Regulators (CEER) periodically surveys and analyses the quality of electricity supply in its member countries in the form of CEER benchmarking Reports on Quality of Electricity Supply. The first report was issued in 2001, followed by the second and third editions in 2003 and 2005, respectively. The last report, issued in 2008, is publicly available at www.energy-regulators.eu.

CEER has included quality of supply in its main activities. This 4th Benchmarking Report on Quality of Electricity Supply aims to contribute to a better understanding of quality of supply levels and policies in place in Europe, clarifying several aspects which are essential to the electricity sector as well as making information available and contributing to well-balanced rules on quality of supply.

The 4th Benchmarking Report on Quality of Electricity Supply addresses the three major aspects of electricity quality, namely continuity of supply, voltage quality and commercial quality. Chapter 2 of this report deals with continuity of supply, which concerns the availability of electricity. It contains information about continuity of supply in general as well as monitoring, indicators, analysis of interruption data received from the CEER member countries and information about on-site audits carried out in each country. Chapter 2 also contains information about existing definitions and, where available,

regulations in use in various European countries as regard the concept of “Exceptional Events”.

Chapter 3 concerns voltage quality, which refers to the usefulness of electricity when there are no interruptions. It contains information about voltage quality in general; work done by CEER in this area, results from national surveys on costs related to poor voltage quality and information about existing and planned monitoring systems and data.

Chapter 4 focuses on commercial quality, which relates to the nature and quality of customer services provided to electricity consumers. It contains information about commercial quality and how it can be regulated, the main results of benchmarking commercial quality standards and the challenges for commercial quality following full electricity market opening.

Overall, the report aims to present an overview and analysis of current practices in CEER member countries, as well as an assessment of areas where a move towards harmonisation could further improve quality of service and consequently electricity markets in Europe as a whole. In this context, it is important to note that quality of supply is an important element of market regulation as a whole and the regulator’s role in ensuring the proper functioning of the market, including making information available, protecting worst-served customers and promoting quality improvements. Quality of supply is also closely linked to security of supply. In a climate where investment and market decisions are based on economic priorities, it is important to ensure that the quality of the product, electricity, is not negatively affected by the economic decisions taken by market participants.

4 Analysis of National Reports

4.1 National Legal Framework

In all Contracting Parties, Participants and Observers quality of service is part of primary or secondary legislation, but in general, only the Italian and Romanian regulator has clear and straightforward competences regarding quality of service.

4.2 National Regulatory Framework

The approaches in tariff methodology vary throughout the investigated region. There is incentive base, revenue cap, rate of return and price cap regulation or combination of price cap regulation + incentive/penalty regime (Italy). Only in Italy and Romania quality regulation is part of tariff regulation.



Quality standards are set in Italy and Romania. In other country, quality standards are under preparation or are defined partly in other secondary legislation.

In most markets there is some kind of financial penalties for not achieving a certain level of quality of service. An incentive/penalty regime exists in Italy.

4.3 General Electricity Grid Data

The general electricity grid data is presented on the following figures, Figure 3 Number of Customers,

Figure 4 Distributed Energy,

Figure 5 Length of Network.

Figure 3 Number of Customers (2007)

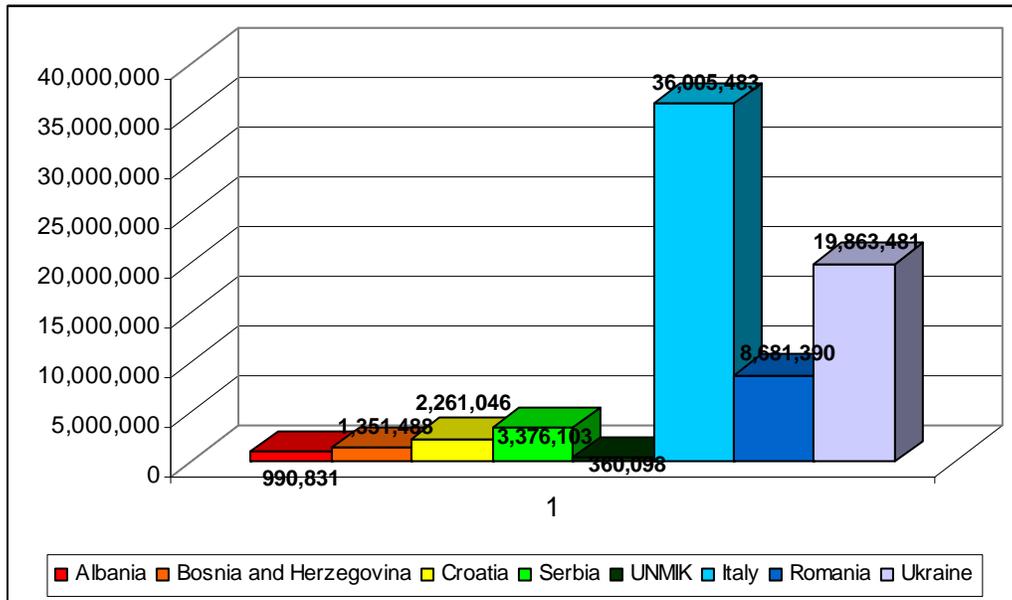


Figure 4 Distributed Energy (2007)

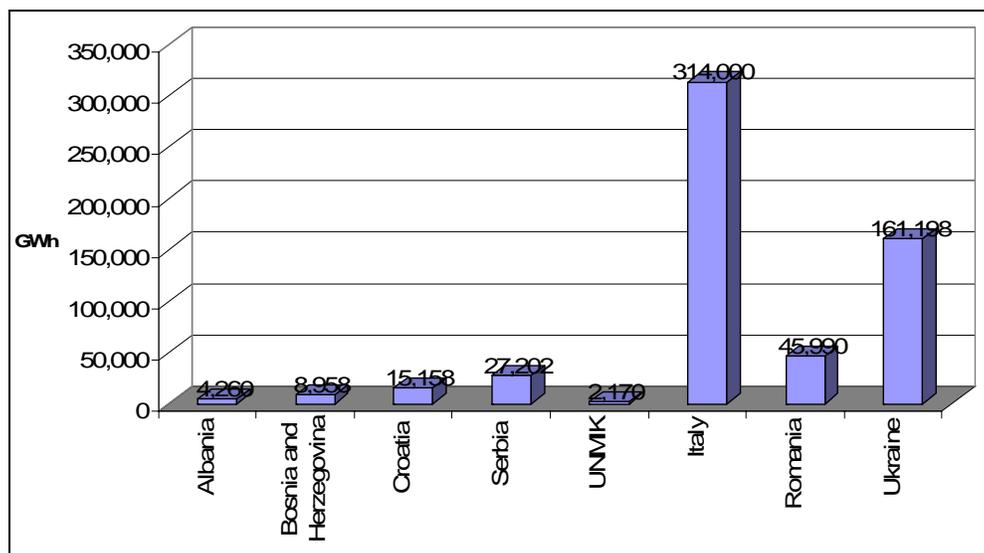
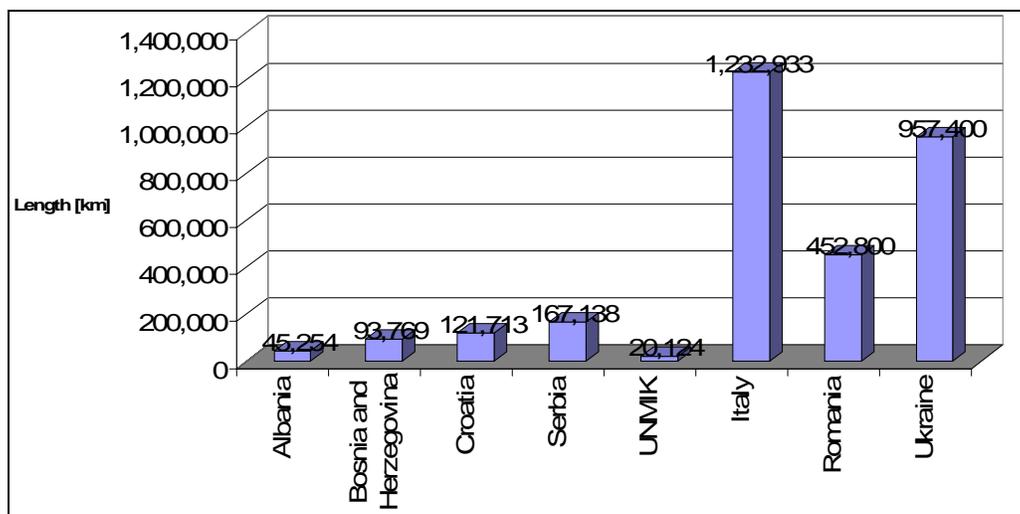


Figure 5 Length of Network for the Year 2007



4.4 Continuity of Supply

Force Majeure is defined in most of the investigated markets. The most frequent used indices for continuity of supply are SAIFI and SAIDI. In some markets, CAIDI and ENS are also used.

Target values of quality indices are defined only in Italy and Romania.

Quality standards are defined only in Italy and Romania, while in other markets quality standards are partly defined in secondary legislation (general rules, grid code, license, etc.).

Typical values of indices have not been provided in most of the national reports.

In most markets the methods of data collection is under development. DSO and TSO have an obligation to inform their regulator on the yearly basis, in some markets, on the monthly and quarterly basis.

4.5 Voltage Quality

Regarding voltage characteristics, there are standards in the region present which define voltage variation, asymmetry, frequency and waveform.

Used international standards are EN 50160, IEC 60038, IEC 60196, and IEC 61000-3-7.

4.6 Commercial Quality

Minimum commercial quality standards are already defined in Italy and Romania.

In Bosnia and Herzegovina, Croatia and Serbia the definition of standards is in development.

In Ukraine, there are definitions of commercial quality in the Rules of Electricity Usage (for legal entities and households) and Rules of connection.

In Albania and UNMIK there are no standards approved related to commercial qualities of service. In these markets this issue is part of the licenses regime.

Commercial quality standards are principally alike those used in the rest of the Europe (



Table 2. provides an overview on the most frequently used standards in [2]).

Table 2 The most frequently used commercial quality standards

Connections of the customers	Estimating charge (simple work) Execution of simple works Execution of complex works Connection (supply and meter)
Restoration in case of fault related to single customer	Responding to failure of distributor's fuse
Solving problems related with voltage or meter	Voltage complaints Meter problems
Customer contact in person, in writing or by phone	Notice on interruption of supply Queries on charges and payments Response to customers letters Response to customers claims Appointments scheduling
Meter reading and billing	Number of meter readings within a year Reconnection following repayment of debts

Some target or typical values are defined in Bosnia and Herzegovina and Romania.

Targets and penalties for some commercial quality standards (such as connection) are also defined in Serbian secondary legislation.

The most common method of data collection is via DSOs which are obliged to report to the national regulators.

4.7 Customer Support

In almost all of the investigated markets the national regulator is obliged to resolve the disputes between customers and operator(s). In some markets (Croatia, UNMIK) complaints from customers are firstly handled by the service provider through a specially established Board for complaints.

The types of disputes are common throughout the investigated region.

5 Conclusions

The main reason for this investigation is to give an overview of the current situation regarding the quality of electricity service standards in the Energy Community in respect to quality regulation.

This report shows that development and approaches are very different in each country. The reason for this comes from different position regarding the implementation of the EU legislation and, of course, the country's economic situation and development.



The most developed countries in quality regulation are Italy and Romania. In other markets quality regulation and the introduction of quality standards is in its early stage.

Some guidelines could be found in [1], [1][2] and [1][3]. Existing experience available in national reports should also be accounted for.

It is obvious that EnC markets need some help and guidelines in order to ensure the best common approach, thus avoiding possible mistakes in implementing quality regulation. Several regulators have therefore asked for assistance for the introduction and improvement of the quality of electricity services. The 2009 Work Programme of the ECRB Customers Working Group (CWG) includes the development of a “Project on the introduction and improvement of the quality of electricity service”. This study has been assigned high priority among activities of the ECRB CWG, and is expected to start in 2009.

Annex 1 – Summary of National Reports

1. National Legal Framework

Table 3 National Legal Framework - summary of answers from contracting parties (Albania, Bosnia and Herzegovina, Croatia and Serbia)

National Legal Framework	Albania	Bosnia and Herzegovina	Croatia	Serbia
<p>– National Legal Framework Regarding Quality of Service</p>	<p>ERE has the responsibility and competences to promote electric energy efficiency and improvements in the quality of service in electric power sector; to monitor and control, contracts and the operation of services by licensees, with powers of inspection, access, acquisition of documentation, and relevant information; to control whether the licensee providing electric power service to customers is respecting the terms of the contract or is providing services consistently with standards established by the terms of license or any regulation approved by the ERE; etc.</p>	<p>Regulation of the electricity sector of BIH is carried out at two different levels (national and entity) and involves three regulatory commissions.</p> <ul style="list-style-type: none"> – The State Electricity Regulatory Commission in Bosnia and Herzegovina (SERC) has jurisdiction and responsibility over transmission of electricity, transmission system operations and foreign trade. – The Regulatory Commission for Electricity in the Federation Bosnia and Herzegovina (FERC). – The Regulatory Commission for Energy of Republika Srpska (RERS). <p>The entity regulatory commissions are responsible for electricity generation, distribution and supply activities. The secondary legislation adopted by the entity commissions includes provisions concerning quality of service.</p>	<p>General conditions of Electricity Supply instruct the TSO and DSO to submit to the Ministry of economy, labor and entrepreneurship a proposal on standard quality levels of electricity supply by consumption area, depending on consumption density and the state of the grid. After receiving an opinion from the regulator, the Minister is obliged to propose standard quality levels of electricity supply to the Government which will officially pass standard quality levels of electricity supply.</p>	<p>Documents regulating quality of service: Energy Law, Decree on Conditions for Power delivery Grid Code (came into force in June 2008), Distribution Code (under preparation)</p>
<p>– Institutional Actors/Responsibilities</p>	<p>The ERE determines the conditions for every license. In imposing and enforcing licensees' public service obligations, the ERE may consider obligations in relation to: security of supply; regularity, quality and price of supplies; use of indigenous energy sources; efficient utilization of fuels and energy;</p>	<p>SERC is responsible for: establishing, monitoring and enforcing quality standards for electricity transmission and ancillary services; coordinating and approving investment plans of the company for transmission of electric energy, including those plans related to the transmission network and the quality of electricity transmission and</p>	<p>The Government passes General Conditions of Electricity supply.</p> <p>The Government passes standard levels of quality of supply based on proposals submitted by the Ministry upon receiving an opinion from the regulator (all based on a proposal to the Ministry from the operators).</p>	<p>Electric power inspector monitors quality.</p> <p>AERS monitors the implementation of regulations and energy system operation codes, collects and processes data on energy entities with reference to performing energy activities.</p> <p>Harmonizes activities of energy</p>

National Legal Framework	Albania	Bosnia and Herzegovina	Croatia	Serbia
	<p>environmental protection, protection of the citizens' health, life and property.</p>	<p>consumer protection. The FERC's and RERS responsibilities include: supervision and regulating the relations between electricity generation, distribution and electricity customers including electricity traders; issuing and revocation of licenses for generation, distribution and tariffs for non-eligible customers; defining General Conditions for Electricity of Electricity.</p>	<p>The Government also passes reimbursements for failing to comply with standard levels of quality of supply.</p> <p>HERA provides opinion to the Ministry on general conditions of energy supply; supervises energy undertakings particular energy activities; collects data related to the activities of energy operators; supervises quality of services provided by energy undertakings; protects the customer.</p>	<p>entities on providing regular supply of energy and services to the customers, protects the customer but doesn't have clear competences regarding quality of service monitoring and regulation.</p>

Table 4 National Legal Framework - summary of answers from contracting parties, participants and observers (UNMIK, Italy, Romania and Ukraine)

TOPICS National Legal Framework	UNMIK	Italy	Romania	Ukraine
<p>– National Legal Framework Regarding Quality of Service</p>	<p>Energy Regulatory Office has power to prescribe the general conditions of energy supply and the standards of services to be met by licensees (Law on Energy Regulator)</p> <p>In licenses issued by ERO to: TSO, DSO, and PS, are set the obligations of licensees for Overall and Minimum Standards:</p>	<p>The Italian Regulatory Authority for Electricity and gas establishes guidelines for the production and the distribution of services, as well as specific (or guaranteed) and overall service standards and automatic refund mechanisms for users and consumers in case standards are not met.</p> <p>AEEG establishes the overall standards for the entire complex of services and the specific standards to be guaranteed to consumers. Quality standards may refer to both the terms and conditions of contracts (e.g. the time taken to respond to calls or complaints) and technical aspects of the service (e.g. service continuity and safety).</p> <p>After the birth of AEEG, service quality regulation is no longer established by each company</p> <p>Since 2000 minimum quality standards about commercial quality and zonal standards about continuity of supply have been set.</p> <p>Generally speaking, AEEG applies service level indicators to the whole electric system in order to induce regulated companies to deliver desirable levels of service quality.</p>	<p>Electricity Law establishes the main principles of services quality.</p> <p>At the secondary legislation level, ANRE issues a set of regulations regarding quality of services: electricity distribution performance standard; electricity transmission performance standard; electricity supply performance standard; distribution framework contract; transmission framework contract; supply framework contract;</p>	<p>Considering three types of services: Continuity of supply, Voltage control and Commercial service: there is no single common regulation for all types of services; there is a separate standard on voltage quality control; some elements of Continuity of supply and Commercial quality services are regulated through the Rules of Electricity Usage (for legal entities and households);</p> <p>NERC Ordinance obliges the distribution companies to submit related information on supply service quality to the NERC according to the Service quality monitoring Form.</p>
<p>– Institutional Actors/Responsibilities</p>	<p>The main Institutional Actors are ERO, TSO, DSO and PS.</p> <p>ERO is mandated to prescribe the</p>	<p>AEEG issues and enforces regulation about quality of service.</p> <p>TERNA (TSO) is responsible for the</p>	<p>The main institutional actor in the electricity and natural gas sector is ANRE, which issues, sets up and monitors mandatory regulations to</p>	<p>NERC as a regulator is electricity sector is responsible for quality of transmission, distribution and supply service control in order to</p>

TOPICS National Legal Framework	UNMIK	Italy	Romania	Ukraine
	<p>standards of services to be met by licensees and to approve the submitted standards by Licensees (TSO, DSO, and PS).</p>	<p>quality of service on the transmission grid (the service must be compliant with rules issued by AEEG).</p> <p>Local Distributor (DSO) is responsible for the quality of service on the distribution grid (the service must be compliant with rules issued by AEEG), having to meet overall and guaranteed standards.</p> <p>Supplier (SPO) is the service supplier, part to a supply contract. It is responsible for the quality of service about commercial quality service, having to meet overall and guaranteed standards.</p>	<p>be implemented at national level with a view to ensuring the proper functioning of the market in terms of efficiency, competition, and transparency and consumer protection.</p>	<p>meet consumer's rights.</p>

2. National Regulatory Framework

Table 5 National Regulatory Framework - summary of answers from contracting parties (Albania, Bosnia and Herzegovina, Croatia and Serbia)

National Regulatory Framework	Albania	Bosnia and Herzegovina	Croatia	Serbia
– Methodology of Tariff Regulation	Incentive based regulation	Cost based regulation	Rate of return	Rate of Return
– Quality Regulation as a Part of Tariff Regulation	No	No	No	No
– Type of Quality Standards (Overall, Guaranteed)	Quality standards are not yet defined. License contains certain minimum provision regarding the service quality of supply	Licensing Rules contain some provisions on QoS: e.g. FERC General Conditions for Electricity of Supply define the quality of electricity in line with EN 50160	Quality standards are not yet defined, except for voltage quality (Grid Code, Rulebook on standardized voltage levels for low-voltage distribution network and electrical equipment); Line Ministry is in charge of approval of quality standards upon proposal of TSO/DSO; Regulator only gives the opinion on the proposal of quality standards.	Quality standards are going to be defined through secondary legislation. Some standards have been already defined such as: 1. voltage quality (Decree on Conditions for Power Delivery and Grid and Distribution Code); 2. several standards for commercial quality (Energy Law and Decree on Conditions for Power Delivery).
– Operator Responsibilities and Penalties	Operator's responsibilities are defined in the license. Operator should propose quality standards together with penalties and rewards; ERE should approve proposal. This procedure has not been put into practice yet.	General condition prescribe that a customer is entitled to the compensation for damage if customer suffers damage because prescribed guaranteed quality is not achieved	At present there are no penalties; ODS and OPS are required to provide service according to General rules on supply and the Grid Code; Customers are according to General rules entitled to compensation for damage caused by the TSO or DSO	Financial penalties for not meeting commercial quality standards related to the connection process (€130-1300)

Table 6 National Regulatory Framework - summary of answers from contracting parties, participants and observers (UNMIK, Italy, Romania and Ukraine)

National Regulatory Framework	UNMIK	Italy	Romania	Ukraine
– Methodology of Tariff Regulation	Revenue Cap Regulation	Price cap regulation + incentive/penalty regime in order to reduce number of interruptions (Q factor – net difference between incentive and penalties)	Price cap regulation (on tariff basket)	RoR regulation
– Quality Regulation as a Part of Tariff Regulation	No	Service quality regulation is partially implemented into tariff regulation (tariff known as UC6)	Yes	No
– Type of Quality Standards (Overall, Guaranteed)	In the preoperational phase of introduction. The Quality standard regulation should be prepared by the regulator	Overall and Guaranteed standards are set for commercial quality (supplier and DSO have their own standards to comply with); AEEG's guidelines regulate continuity of supply	The Romanian report does not provide clear picture what is the current situation in this respect in Romania but it rather discuss theoretical background of QoS (Performance publication, Minimum standards, Incentive scheme)	There are no Quality regulation standards currently in force
– Operator Responsibilities and Penalties	Operators should operate according to license and approved investment plans	Incentive/penalty regime; operators have to comply with set level of quality standards	Penalties for DOS which does not meet minimum standards (amount from 4 to 200€)	Operators' responsibilities are defined in the Law on electricity

3. General Data of the Electricity Grid for the Year 2007

Table 7 Number of HV, MV and LV customers – summary of answers

Country	HV	MV	LV	All levels
Albania	1	4,710	986,120	990,831
Bosnia and Herzegovina	15	1,286	1,350,187	1,351,488
Croatia	40	2,015	2,258,991	2,261,046
Serbia	20	3,759	3,372,324	3,376,103
UNMIK	2	231	359,865	360,098
Italy	-	98,199	35,907,284	36,005,483
Romania	260	21,830	8,659,300	8,681,390
Ukraine	-	183,481	19,680,000	19,863,481

"-" Unknown or information not delivered

Table 8 Length of power lines and share of overhead lines – summary of answers

Country	HV				MV				LV				Total
	Overhead km	Cable Km	Share %	Total km	Overhead Km	Cable km	Share %	Total km	Overhead km	Cable km	Share %	Total km	All levels Im
Albania	2,486	0	100.0%	2,486	13,301	1,004	93.0%	14,305	18,775	9,688	66.0%	28,463	45,254
Bosnia and Herzegovina	6,279	31	99.5%	6,310	20,508	3,709	84.7%	24,218	59,184	4,057	93.6%	63,241	93,769
Croatia	7,388	23	99.7%	7,411	25,696	13,350	65.8%	39,046	61,056	14,200	81.1%	75,256	121,713
Serbia	10,252	30	99.7%	10,282	40,556	10,785	79.0%	51,341	93,987	11,528	89.1%	105,515	167,138
UNMIK	1,187	0	100.0%	1,187	6,271	885	87.6%	7,156	11,313	468	96.0%	11,781	20,124
Italy	-	-	-	68,063	205,932	163,865	55.7%	369,797	-	-	0.0%	795,073	1,232,933
Romania	18300	9,200	66.5%	27500	90400	27,800	76.5%	118200	239200	67,900	77.9%	307100	452,800
Ukraine	18,100	0	100.0%	18,100	287,900	98,000	74.6%	385,900	533,000	20,400	96.3%	553,400	957,400

" Unknown or information not delivered

Table 9 Distributed energy to HV, MV and LV customers in GWH/year – summary of answers

Country	HV	MV	LV	All levels
Albania	180	1,052	3,028	4,260
Bosnia and Herzegovina	2,098	1,476	5,384	8,958
Croatia	625	2,992	10,622	14,239
Serbia	243	5,248	19,524	25,015
UNMIK	77	189	1,904	2170
Italy	72,000	242,000		314,000
Romania	11,095	13,286	17,426	41,807
Ukraine	-	102,686	94,436	197,122

"-" Unknown or information not delivered

4. Continuity of supply

Table 10 Continuity of supply - summary of answers from contracting parties (Albania, Bosnia and Herzegovina, Croatia and Serbia)

Continuity of Supply	Albania	Bosnia and Herzegovina	Croatia	Serbia
<p>– Definition of Force Majeure</p>	<p>“Force Majeure” is an natural or social act or event occurred in the country as earthquakes, lightning, cyclones, floods, volcanic eruptions, fires or wars, armed conflict, insurrection, terrorist or military action, which prevent the licensee from performing its obligations under the license or other acts or events that are beyond the reasonable control and not arising out of the fault of the licensee, and the licensee has been unable to overcome such act or event by the exercise of due diligence and reasonable efforts, skill and care.</p>	<p>In the Licensing Rule, FERC defined force majeure as any situation which does not depend on the licensee and which the licensee cannot control, making the licensee unable to perform its licensed activity (outage, bad weather conditions etc.). RERS General Conditions for Delivery and Supply define force majeure as unpredicted natural events which have the character of natural disasters (floods, earthquakes, fire, thunderstorm, wind, hail etc.) as well as indirect war danger and war declared by the relevant state body.</p>	<p><i>Force Majeure</i> are all events and conditions that (even foreseen) could not have been prevented, influenced, alleviated, circumvented or their after effects could not have been eradicated. These events and conditions are principally: natural disasters (earthquakes, floods, lightning strikes, storms, droughts, extreme ice conditions and other);explosions, other than those caused by improper or careless handling, which are not foreseeable and are not due to wear-out of materials or equipment, explosions that have not resulted from incorrect handling or neglect and could not have been foreseen (and also are not a consequence of equipment or material wear-out), war, riots and sabotage; governmental decisions permitted by the Energy Act involving disturbances on the domestic energy market caused by: energy shortages or disruptions in energy supply, imminent threat on the independence and integrity of the State, huge natural disasters, technological</p>	<p>-</p>

			atastrophes (crises), all other events or conditions for which a special arbitrage may determine as <i>Force Majeure</i> .	
- Used Standards and Indices	-	SAIFI, SAIDI	By the DSO: SAIDI, SAIFI, CAIDI, ENS	SAIFI, SAIDI
- Target Values	None (Distribution code provides minimum standard, but not standard or indices have been defined. Licensee must propose targets to the Regulator for approval)	None	None (Minimum standard is envisaged by secondary legislation, but until now no standard has been set. Licensee proposes targets to the Ministry. The Ministry passes the min. standards with opinion from the Regulator).	-
- Typical Values	-	-	See national report	-
- Methods of data collection	-	DSO is obliged to keep records on interruptions and report quarterly to the Regulator	System wide collection by the DSO for registering outages over 3 min. from monitoring equipment and manual input for areas without monitoring/control	Registration of HV and MV interruptions

Table 11 Continuity of supply - summary of answers from contracting parties, participants and observers (UNMIK, Italy, Romania and Ukraine)

Continuity of Supply	UNMIK	Italy	Romania	Ukraine
– Definition of Force Majeure	There is no definition of Force Majeure but the Government may introduce restrictive measures for the supply of energy to consumers or impose special obligations on energy enterprises in the event of any force majeure	<i>Force Majeure</i> is defined as severe weather conditions or natural disaster only if network design requirements are over passed. Distribution companies have to prove the exceptional nature of the event classified as “ <i>Force majeure</i> ” collecting written technical or administrative evidence.	Force majeure means an event or circumstance beyond the reasonable control of an operator that results in, or causes, an inability by that operator to perform any of its obligations under the regulations or the rules. It is established by an independent entity set by Law: Trade and Industry Chamber.	There is no separate definition of Force Majeure in Ukrainian Legislation. A list of events, considered in the Ordinance as a force majeure (for instance, critical climatic conditions, earthquake, etc), is specified in the “Methodical guidelines for measuring and analysis of technical condition of power networks with overhead power lines of 0.38 – 20kV” issued by Ministry of Fuel and Coal of Ukraine.
– Used Standards and Indices	To be established.	SAIDI, SAIFI, MAIFI	SAIDI, SAIFI, ENS, AIT	SAIDI, SAIFI,
– Target Values	To be determined.	Part of Quality regulation	Minimal standards and/or Quality incentive scheme	To be determined.
– Typical Values	-	-	-	-
– Methods of data collection	DSO is developing system.	-	System wide system for collection of data in development	-

5. Voltage Quality

Table 12 Summary of answers regarding voltage variations

Country	Voltage variations					
	HV		MV			LV
	P 110 kV	110 kV	27 - 35 kV	20 kV	O 10 kV	0,4 kV
Albania	-	+12%, -10%	+12%, -12%	+20%, variable lowest voltage	+7,5%, variable lowest voltage	+10%, -15%
Bosnia and Herzegovina	+5%, -5%	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+5%, -10%
Croatia	400kV: -10%, +5% 200kV: +10%, +10%	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 10% (with provisions for transition from 220/380V to 230/400V)
Serbia	400 kV (380-420 kV) 220 kV (200-240 kV) 110 kV (99-121 kV)	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 10%
UNMIK	To be determined					
Italy	-	-	-	-	-	-
Romania	+/- 5%		+/- 5%			+/- 5%
Ukraine	+/- 5%					

Table 13 Summary of answers regarding frequency

Country	Frequency	
	normal operation	during disturbances
Albania	50Hz +/-0.2Hz	50Hz +/-2.0Hz
Bosnia and Herzegovina	50Hz +/-0.05Hz	47.5 - 51.5 Hz
Croatia	50Hz +/-0.05Hz (without interconnections +/- 0.5Hz)	47.5 - 51.5 Hz
Serbia	50Hz +/-0.5Hz	-
UNMIK	To be determined	
Italy	-	
Romania	47-52 Hz 100% per year, 49.5 - 50.5 Hz 99,5% per year	-
Ukraine	50Hz +/-0.2Hz	-

Table 14 Summary of answers regarding voltage waveform

Country	Waveform characteristic		
	International standards	Limited by Grid code or other sec.legislation	Addition criteria or guidelines
Albania	-	-	-
Bosnia and Herzegovina	Partially EN 50160, IEC 60038	YES	NO
Croatia	Partially IEC 60038, IEC 60196, EN 50160, IEC 61000-3-7	YES	NO
Serbia	-	YES	-
UNMIK	-	YES	To be determined
Italy	-	NO	YES
Romania	Adopted EN standards SR EN 50160, SR EN 61000-4-30	YES	-
Ukraine	NO (National Standard)	YES	-

6. Commercial Quality

Table 15 Commercial Quality - summary of answers from contracting parties (Albania, Bosnia and Herzegovina, Croatia and Serbia)

Commercial Quality	Albania	Bosnia and Herzegovina	Croatia	Serbia
<p>– Used Standards and Indices</p>	<p>There is no any standard approved on commercial quality of service. Some provisions exist in License as well as in the supply contract between tariff customers and the public supplier. However this is to be proposed by the Licensee and to be approved by the Regulator.</p>	<ul style="list-style-type: none"> – Estimation of material and service costs (LV) – Estimation of complex activity costs (MV) – Connection <ul style="list-style-type: none"> - No. of LV onnections - Average connection time - No. of MV connections - Average connection time – Re-connection after disconnection due to non-payment – Intervention upon the end-customer's main fuse failure – Complaint resolutions regarding voltage quality – Reaction to measurement problems – Notification on supply interruptions 	<p>Quality of services related to electricity distribution</p> <ul style="list-style-type: none"> – response to users for repairs and replacements, – response to questions and complaints – issuing connection permits <p>Quality of services related to metering</p> <ul style="list-style-type: none"> – meter reading, – complaints on meter data, <p>Quality of services related to electricity supply</p> <ul style="list-style-type: none"> – billing, – response to questions and complaints, – non-standard billing, – non-standard collection of debt, <p>Quality of services related to business conduct</p> <ul style="list-style-type: none"> – Timely service, – Changes on connections. 	<p>Request for connection has to be decided within 30 days. Connection to the network has to be done within 15 days following conclusion of supply contract and fulfillment of the customer's obligations. Financial penalties are approx. €130-1300 in case that these standards are not met by network companies.</p> <p>Technical or other disruption of power delivery caused by customers facility or customer's failure to fulfill contractual obligation to be remedied by the customer within period not shorter then 3 days from the written warning</p> <p>Unjustifiable suspension of power delivery to be decided within 3 days from the customer's complaint. Supply to be restored within 24 h from the moment of determining that the suspension of delivery was unjustified.</p> <p>Meter check-up to take place within 10 days from the customer's request. If the meter proves not to be faulty, customer pays full costs of verification</p> <p>Meter problems to be handled within 2 days from receipt of customer's complaint</p>
– Target/Typical Values	Not available	See the report	Not available	Not available
Commercial Quality	Albania	Bosnia and Herzegovina	Croatia	Serbia

<p>– Methods of data collection</p>	<p>Not available</p>	<p>In the RS, in accordance with the Reporting Rule.</p>	<p>DSO – National level</p>	<p>Some standards are introduced, monitoring system in plan for 2009. Only connection process has been monitored through the Regulatory activities in the process of deciding upon customer's appeal on the connection to the network refusal or failure to pass a decision upon an application for connection.</p>
--	----------------------	--	-----------------------------	---

Table 16 Commercial Quality - summary of answers from contracting parties, participants and observers (UNMIK, Italy, Romania and Ukraine)

Commercial Quality	UNMIK	Italy	Romania	Ukraine
<p>– Used Standards and Indices</p>	<p>-</p>	<p>Since 2000 minimum quality standards about commercial quality:</p> <ul style="list-style-type: none"> – maximum time for estimating charges for execution of work on LV network; – maximum time for execution of simple works; – maximum time for activation of supply; – maximum time for closing supply at customer's request; – maximum time for reconnection of the customer to the network after the payment of debt. 	<p>The Guaranteed Standards are used for commercial quality. The following indices are used:</p> <ul style="list-style-type: none"> – Connection to the network; – Contracting the electricity supply; – Metering; – Billing and collecting; – Accidental disconnection; – Restoring connection after the payment of the bill; – Complains answering. 	<p>A number of parameters, which may be used for commercial quality of service assessment, are determined in Rules of Electricity Usage (for legal entities and households) and Rules of connection to the network. See the report of Ukraine.</p>
<p>– Target/Typical Values</p>	<p>-</p>	<p>-</p>	<p>See the report</p>	<p>No data available so far.</p>
<p>– Methods of data collection</p>	<p>There is system data collection used by system operators covering most of customers, this system will be updated to met the needs for monitoring the quality supply and service standards.</p>	<p>-</p>	<p>The main method of data collection is the annual report which has to be fulfilled and sent to ANRE. Other methods consist by individual letter for data collection and questionnaires.</p>	<p>Distribution companies are obliged to provide a number of specified services to the consumers within predefined time limits. In spite of particular standards existence, there has been no monitoring of their fulfillment by distribution companies so far.</p>

7. Customer Support

Table 17 Customer support - summary of answers from contracting parties (Albania, Bosnia and Herzegovina, Croatia and Serbia)

Customer support	Albania	Bosnia and Herzegovina	Croatia	Serbia
<p>– Types of Disputes</p>	<p>Types of disputes occurring between the Licensee and the customer, or between licensees are related mostly to the meter reading (billing over the meter reading, or billing based on estimations). Around 90% of the complaints are related to the meter reading and billing accuracy.</p>	<p>SERC shall accept any written request to resolve a dispute arising directly or indirectly out of non-transparent and discriminatory behavior of parties active in the electricity sector and which the SERC is authorized by the Law to resolve.</p> <p>The FERC General Conditions for Electricity Supply stipulate that the supplier and the distribution company are obligated to develop procedures to deal with end-customers' complaints and to provide end-customers with information, which will also be applicable to complaints of other networker users.</p> <p>RERS concerning dispute resolution of cases related to:</p> <ul style="list-style-type: none"> – right to electricity supply, – right to distribution network access, – obligation of electricity supply, – tariffs for electricity supply, – interruptions in electricity supply, – rejection to deliver electricity and – quality of electricity supply. 	<p>Disputes related to billing and using electricity.</p> <ul style="list-style-type: none"> – illegal use of electricity – exceeding power engagement limits; – illegal use of electricity – use of energy; – billing. <p>Complaints on voltage quality,</p> <p>Disputes related to connections</p> <ul style="list-style-type: none"> – connection refusals, – conditions established by the preliminary connection permit, – terms of contracts for constructing connections, – costs in contracts for constructing connections, – conditions established by the (final) connection permit, <p>Disputes and complaints related to disconnections,</p> <ul style="list-style-type: none"> – disconnections, – interruptions in supply, <p>Disputes or complaints caused by other reasons.</p>	<p>AERS decides upon lodged appeal on the access refusal by a transmission or. distribution system operator, decides upon lodged appeal on the connection refusal by an energy entity, i.e. failure to pass a decision upon submitted application for connection to the system;</p>

Customer support	Albania	Bosnia and Herzegovina	Croatia	Serbia
<ul style="list-style-type: none"> Resolving Disputes 	<p>The ERE has established an office to deal with the customer complaints.</p>	<p>SERC may solve the requests for solution of a dispute at an internal meeting with applicants for resolving of a dispute on an informal basis, without the need for pleadings.</p> <p>FERC conducts procedures upon requests related to the above mentioned issues at an internal meeting in accordance with the Rules of Procedure, FERC Rules of Public Hearings and Resolution of Applications and Complaints in which case the applicant files an application with FERC for the resolution of a dispute no later than 15 days upon the receipt of a response from the supplier/distribution company.</p>	<p>Complaints from customers are firstly handled by the service provider (in most cases HEP-DSO) through a specially established Board for complaints. If consumers/network users are not satisfied with the outcome, they can protect their rights at the Croatian Energy Regulatory Agency by submitting appeals, complaints, claims and other written queries with respect to the work of energy undertakings. The rights are established by legislation in the energy sector, while the actual process and procedure is governed by the Act on Act on the General Administrative Procedure.</p> <p>The Agency's decision on disputes the settlement procedure is final, but a dissatisfied party can appeal against it at the Administrative Court of the Republic of Croatia.</p>	<p>The first instance in dispute resolution process is transmission or distribution system operator. In the second instance AERS may change, annual TSO/DSO decision (completely/partially), or reject appeal. Decision of AERS is final and it can be challenged before Supreme Court.</p>

Table 18 Customer support - summary of answers from contracting parties, participants and observers (UNMIK, Italy, Romania and Ukraine)

Customer support	UNMIK	Italy	Romania	Ukraine
<ul style="list-style-type: none"> Types of Disputes 	<ul style="list-style-type: none"> Meter reading, Poor quality of services Incorrect bills Flat rate billing Ownership problems with owner of the meters Unauthorized use of electricity, theft, and tampering with electric meters 	-	<p>A.N.R.E. deals with the following types of issues raised by stakeholders (generation, transport, distribution, supply, measuring operators; consumers; certified companies etc):</p> <ul style="list-style-type: none"> petitions; disputes, including any disagreement occurred before the conclusion of agreements, 	<p>Currently, there is a monitoring of a number of consumer's:</p> <ul style="list-style-type: none"> complaints on quality of electricity supply and those of them been satisfied in favor of consumers with compensation payments; applications on bills checking; complaints on breach of the Contract conditions

			<p>irrespective of their nature; – phone calls.</p> <p>For further explanation see the report.</p>	
<p>– Resolving Disputes</p>	<p>Customer can first complaint to supplier and after, to regulatory body.</p>	<p>AEEG assesses complaints from customers (consumers, undertakings). In case the company does not comply with the rules issued by the AEEG, AEEG itself will give binding instructions to the supplier, asking to respect the violated rules. AEEG is not competent about claims for damages. Every customer is entitled to complain about the supply. He is due to write to the company before writing to AEEG. An exception is represented by the case the client risks sudden and irreparable damages. If the reply does not satisfy the complainer, he may write to AEEG. After received a complaint about continuity of supply, Consumers Department provides the complainer with a chart. This document outlines the most important information about the regulation of continuity of supply (the existence of the register, what has been done, compensations established, what else to do).</p>	<p>As part of A.N.R.E., the Service for Petitions and Disputes Resolution in the Electricity field (SSPDE) deals with the petitions addressed by any of the players in electricity market, including electricity consumers, as well as with any disputes.</p>	<p>-</p>

Annex 2 – Reference Documents

Reference Documents
[1] Fumagalli, E., Lo Schiavo, L., Dalestre, F. <i>Service Quality Regulation in Electricity Distribution and Retail</i> , Springer-Verlag Berlin Heidelberg, 2007
[2] CEER, 4 th Benchmarking Report on Quality of Electricity Supply, Bruxelles 2008
[3] CIGRE C4.07/CIRED, Power Quality Indices and Objectives, 2004
[4] Quality of Electricity Service - Standards and Incentives in Quality Regulation – Energy Regulatory Authority of Albania
[5] Quality of Electricity Service - Standards and Incentives in Quality Regulation – Bosnia and Herzegovina
[6] Quality of Electricity Service - Standards and Incentives in Quality Regulation – Croatia
[7] Quality of Electricity Service in Serbia
[8] Quality of Electricity Service - Standards and Incentives in Quality Regulation – UNMIK
[9] Quality of Electricity Service - Standards and Incentives in Quality Regulation – The Italian Regulatory Authority for Electricity and Gas
[10] Quality of Electricity Service - Standards and Incentives in Quality Regulation – Romanian Energy Regulatory Authority
[11] Quality of Electricity Service - Standards and Incentives in Quality Regulation – Ukraine