

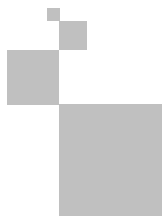


## **OUTLINE OF THE 1<sup>st</sup> WORKSHOP**

**Assistance to regulators in introducing and improving  
service quality regulation in the Energy Community**

**Energy Community Study – Intermediate Report**

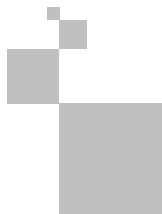
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# 1. BRIEF OVERVIEW OF THE STUDY OBJECTIVES

## ***What is the objective of the Study?***

The overall objective of the Study is to start up the activities on introduction and improvement of the quality of electricity service within the Energy Community Regulatory Board (namely its Customer WG) and other Energy Community institutions. The Study will enable regulators, primarily, to ensure that liberalisation of the electricity market is achieved without any worsening of the quality of service.

The Study will evaluate and adopt recommendations and measures of the ECRB and the CEER on the quality of service regulation. The basis for the Study is in the application of the best experiences of the European Union Member States to the markets of the Energy Community including necessary adjustments to (national) market specificities of the region's markets.

## ***What is the purpose of the Study?***

The purpose of the Study is to assist the regulatory authorities of the Contracting Parties on the introduction of a programme aimed at improving the quality of electricity service, with regard to:

- Continuity of supply;
- Voltage quality;
- Commercial quality.

This will consist of development of quality improvement programmes, training of regulatory staff, and assessment of results achieved.

## ***What is the scope of the Study?***

The Study will cover seven Contracting Parties to the Energy Community and four Observer countries subject to formal application and actual participation by concerned regulatory authorities.

The main relevant issues will be provided in accordance with the references given in Table 1.

Table 1. List of the most essential literature in the quality of service regulation under the scope of work

Source	Title	Reference	Date	Web
ECRB	Report on the Quality of Electricity Service Standards and Incentives in Quality Regulation	Ref: R09-GA-11-06	July 2009	<a href="#">link</a>
CEER	4th Benchmarking Report on Quality of Electricity Supply 2008	Ref: C08-EQS-24-04	December 2008	<a href="#">link</a>
CEER	Energy regulators' pledge to ensuring good quality of electricity supply – A FactSheet on the 4 <sup>th</sup> Report	Ref: FS-09-01	June 2009	<a href="#">link</a>
Fumagalli, E., Lo Schiavo, L., Dalestre, F.	Service Quality Regulation in Electricity Distribution and Retail	Springer ISBN 978-3-540-73442-0	2007	<a href="#">link</a>
EURELECTRIC	Views on Quality of Electricity Distribution Network Services	2006-233-0012	2006	<a href="#">link</a>



### ***What is the role of the consultant in the Study?***

The role of the consultant, EIHP, is to:

- Hold two workshops outlining the main programmes that have been carried out in the EU for the improvement of the quality of electricity supply;
- Foresee, if appropriate, participation by experienced staff of ERGEG and its participating regulatory authorities;
- Discuss and agree on a common programme to be pursued by the participants;
- Prepare proposals on the contents of preparatory work to be performed and related reports to be drafted by participants after each workshop;
- Assist participants between workshops by clarifying remaining issues and providing operational suggestions;
- Assess results achieved by each regulator, as reported by them; discuss results achieved in the following workshop and propose next steps.

### ***What are the deliverables of the Study?***

The consultant will draft an Inception Report, outlining:

- Preliminary identification of issues and methods;
- Draft agenda of the two workshops;
- Proposals of the activities to be performed by concerned regulatory authorities between the workshops.

The Intermediate Report will be drafted after the first two-day workshop, outlining:

- Participation level;
- Brief description of topics addressed during the workshop with the lists of lectures, presentations and other contributions given by the consultant and other participants;
- Proposals agreed to be developed by concerned regulatory authorities.

A draft Final Report will be submitted to the Energy Community Secretariat (ECS) after the second workshop, outlining:

- Participation of the Contracting Parties to the project;
- Results achieved;
- Suggestions for the next steps.

### ***What is the duration of the Study?***

The tasks will last for no more than nine months.

Desk work and preparation of the Intermediate and Final Reports, as well as assessment of the Reports produced will be performed on the consultant's premises.

Total working days are estimated between 15 and 20, including 2 two-day workshops. The workshops will be hosted by the Energy Community Secretariat.

## 2. PRELIMINARY IDENTIFICATION OF ISSUES AND METHODS

### ***What are the basic instruments in the quality of service regulation?***

There are four instruments, which the regulatory authority may employ in introducing the quality of service regulation:

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

The basic elements of the quality of service regulation instruments are:

- Quality indicators:
  - To describe actual performance of the regulated company;
  - To measure the corresponding dimensions of the quality of service;
  - To make effective the simplest instrument of the quality of service regulation, which is data publication.
- Performance standards:
  - To specify the level of quality, which the company is expected to supply;
  - To represent a lower limit of the quality of service delivered to the individual customer in case of minimum quality standards;
  - In case of reward and penalty schemes, performance standards are an average level of the quality of service.
- Financial incentives:
  - To offer a regulated company rewards/penalties for the performance above/below the performance standard;
  - To establish a structure with defined functional relationships between the quality of service and price in the reward/penalty schemes;
  - To establish financial penalties in the form of money compensation paid to the affected customers in the case of applied minimum quality standards and premium quality contracts.

Therefore, the quality of service is regulated by:

- developing a system for monitoring the quality of service;
- identifying the preferred level of the quality of service and enforcing the standards;
- designing a system for providing the company incentive to offer the quality of service.

### ***What are the underlying reasons for offering incentives for the quality of service?***

The quality of service is usually incentivised within the price regulation. Without quality of service regulation, unintended and misleading incentives can be given to quality levels. For example, within the rate of return regulation there is an inherent incentive to over-investment. From the other side, within the price cap regulation the quality-related expenditures can be

reduced to cut costs and increase profits. In the cost+ regulation based on justified costs of vertically integrated monopolies, less regulatory action appeared on quality control.

As soon as energy activities become separated, active involvement of the regulatory authority is needed, especially in case of the price cap regulation and performance based tariff setting. The regulatory authorities have to measure the quality of supply since the investors are incentivised to improve efficiency and reduce costs; cost reduction may result in less reliable supply with negative effect on the quality of supply.

Therefore, the regulation should explicitly include quality targets and baselines set consistently within quality expectations, especially after privatisation of utilities. The impact of private capital involvement (profit orientation) on efficient operation and maintenance, and cost reduction should not be underestimated. Incentive price regulation and/or privatisation without the quality of supply standards could negatively affect the interests of consumers.

The descriptions of the issues and methods within the three quality of service fields – the continuity of supply, the voltage quality, and the commercial quality – that follow hereafter are admittedly incomplete and only for reference purposes in preparation for the workshops. For details, an interested reader should refer to the latest versions of the various documents provided under each subchapter.

## 2.1 CONTINUITY OF SUPPLY

### *What is the continuity of supply?*

The continuity of supply is related to the availability of electricity. It can be followed according to regions (urban/rural), customers (industrial/domestic), voltage levels (HV/MV/LV), or cause (planned/unplanned).

### *How is the continuity of supply measured?*

There are various indicators measuring the continuity of supply, mainly reflecting situation either in distribution networks or in transmission ones. They are related to the following:

- Average interruption duration, restoration time and availability (SAIDI type);
- Number of interruptions and average frequency of events (SAIFI type);
- Interruption severity and costs (ENS type).

In distribution networks, the main indicators are the following three:

- SAIDI or the System Average Interruption Duration Index;
  - It is the average amount of time per year that the supply to a customer is interrupted, and as such expressed in minutes per customer per year and calculated as

$$SAIDI = \frac{\sum_i N_i \times r_i}{N_T},$$

where  $r_i$  gives the restoration time for each incident  $i$ ,  $N_i$  the number of customers interrupted by each incident, and  $N_T$  the total number of customers in the system for which the index is calculated.

- SAIFI or the System Average Interruption Frequency Index;
  - It is the average number of times per year that the supply to a customer is interrupted, and as such expressed in interruptions per customer per year and calculated as

$$SAIFI = \frac{\sum_i N_i}{N_T}$$

- CAIDI or the Customer Average Interruption Duration Index;
  - It is the average duration of an interruption, and as such expressed in minutes per interruption and calculated as

$$CAIDI = \frac{\sum_i N_i \times r_i}{\sum_i N_i},$$

- It can also be obtained as the ratio of SAIDI and SAIFI.

In transmission networks, the main indicators are the following two:

- ENS or the Energy Not Supplied;
  - It is the total amount of energy that would have been supplied to the interrupted customers if there would not have been any interruptions, and as such expressed in MWh per year and calculated as

$$ENS = \sum_i E_i,$$

where  $E_i$  denotes energy in MWh not supplied due to each incident  $i$ .

- AIT or the Average Interruption Time;
  - It is a measure for the amount of time that the supply is interrupted, and as such expressed in minutes per year and calculated as

$$AIT = \frac{60 \times \sum_i E_i}{P_T},$$

where  $E_i$  denotes non-supplied energy in MWh for each incident  $i$ , and  $P_T$  the average power supplied by the total system in MW.

- Many other variants of this indicator are also used, often in the form of AID or the Average Interruption Duration and AIF or the Average Interruption Frequency, calculated as

$$AID = \frac{60 \times \sum_i E_i}{\sum_i P_i} \quad \text{and} \quad AIF = \frac{\sum_i P_i}{P_T}$$

where additionally  $P_i$  denotes non-supplied power in MW for each incident  $i$ .

The quality of service information has to be accurate and as consistent as possible across utilities. Standard definitions and guidance should be put in place, as well as minimum levels of accuracy for reporting interruptions and annual audits of data.

To measure properly the continuity of supply, the following should be paid attention to: information collection, data storage, associated information to each interruption, criteria to determine number and duration of the interruptions, disintegration of interruption data, associated information to each consumer and each installation, methodology to calculate indices, evaluation of individual quality, calculation of compensation payments, computer systems, template report, etc.

### ***What are the most important activities to be undertaken in the continuity of supply?***

The following activities should be undertaken when addressing the continuity of supply:

- First, put in place monitoring schemes for the continuity of supply relating to long interruptions, controlled by an independent entity;
- Later on, in the second phase, work on putting in place some type of monitoring of short interruptions (regard costs for transient ones);
- Collect and analyse information on the causes of interruptions;
- Collect and analyse information on the voltage level at which incidents took place;
- Consider incidents at all voltage levels in the statistics (the absence of incidents at low voltage is seen as a serious limitation);
- Where not monitoring incidents at low voltage, investigate the use of electronic energy meters ('smart meters') in an automated scheme for logging interruptions;
- Make comparison of the continuity of supply indices in different jurisdictions;
- Identify any improvements in the continuity of supply after a number of years.

### ***What are the most important references related to the continuity of supply?***

The most important references relating to the continuity of supply are given in Table 2.

Table 2. List of the most essential literature in the continuity of supply under the scope of work

Source	Title	Reference	Date	Web
CEER	4th Benchmarking Report on Quality of Electricity Supply 2008	Ref: C08-EQS-24-04	December 2008	<a href="#">link</a>
Cigré/Cired	Power Quality Indices and Objectives	Brochure 261	2004	<a href="#">link</a>
ORNL/USDOE	Measurement Practices for Reliability and Power Quality	ORNL/TM-2004/91	June 2004	<a href="#">link</a>
UNIPEDA / EURELECTRIC	Availability of Supply Indices	Ref: 05005Ren9733	May 1997	<a href="#">link</a>
IEEE	IEEE Guide for Electric Power Distribution Reliability Indices	IEEE Standard 1366/2003	2003	<a href="#">link</a>
PUC Texas	Electric Reliability Standards	Project # 21076	May 2003	<a href="#">link</a>

## **2.2 VOLTAGE QUALITY**

### ***What is the voltage quality?***

The voltage quality relates to technical properties of electricity, revealing its usefulness when there it is available. In other words, the voltage quality is the usefulness of the electricity for final customers, when there are no interruptions. It can be followed according to deviations from nominal values of voltage frequency and voltage magnitude, and distortion of waveform.

### ***How is the voltage quality measured?***

The voltage quality problem has appeared due to move from the traditional heavy industries to industries with more sophisticated production methods with a high penetration of frequency controlled motors, IT equipment, distributed microcontrollers etc. To resolve the situation, the most important norms regarding voltage characteristics of electricity supplied by public distribution networks are contained in EN 50160:2007 and IEC 61000-4-30:2003.

The following is to be measured: power frequency, magnitude of the supply voltage, supply voltage variations, flicker, voltage dips, voltage swells, transient overvoltages, voltage unbalance, harmonic voltage, interharmonic voltage, mains signalling voltage, single rapid voltage change.

Where it is possible to evaluate performance against voltage variations or a harmonic, flicker or unbalance index over a short time period (e.g. one week), voltage dip/swell performance must be evaluated over a longer period of time (at least one year).

For example, among the few enforceable limits set by EN 50160, supply voltage variations shall for 95% of the time during one week be within  $\pm 10\%$  of the nominal voltage  $U_n$  for low voltage (or declared voltage  $U_c$  for medium voltage) measured as 10-minute mean values. Only for low voltage, 100% of the 10-minute mean values during 1 week shall be within the  $+10\%$  /  $-15\%$  of the nominal voltage.

As seen previously, the following aspects, generally, should be evaluated: percentage of time, deviation from nominal voltage, interval of time for integration of the rms values, and use of contractual voltage.

The system should be designed (planned) for a better quality than stated by minimum requirements from the norms, to ensure being able to fulfil the minimum requirements. Such planning levels may form internal quality objectives, aimed at managing customer emissions levels and system characteristics, in order for the minimum requirements to be met.

### ***How is the voltage quality defined by EN 50160?***

**Voltage dip** is an event or a sudden reduction of the supply voltage to a retained voltage value between 90% and 1% of the declared voltage level and duration between 0.5 cycle and 1 minute (the objectives are the same for low and medium voltage). Number of voltage dips per year may be from up to few 10s to up to 1000.

**Voltage swell** is an overvoltage at a given location of relatively long duration (temporary power frequency overvoltage).

**Rapid voltage change** is a single rapid variation of the rms value of a voltage between two consecutive levels, which is sustained for definite but unspecified durations.

The **harmonic** quality index is the 95% of the 10-minute mean rms value ( $U_{h,sh}$ ) of each individual harmonic voltage to be compared to the relevant voltage characteristic during each period of one week (applies to low and medium voltage; THD=8%;  $h \leq 25$ ).

**Flicker** is the degree of unsteadiness of human visual sensation via a lamp, which is strictly related to the fluctuation of the voltage supplying the lamp, the characteristics of the lamp and the physiology of the eye-brain of the person involved. From the 10-minute short-term flicker severity ( $P_{st}$ ), a 2-hour long-term flicker severity  $P_{lt}$  is calculated. The measurement period is one week, and for flicker, the index to be used is the weekly  $P_{lt}$  for 95% of the time. Flicker severity exceeding unity will feel disturbing for majority of individuals.

**Voltage unbalance** is a condition in a poly-phase system in which the rms values of the line voltages and/or the phase angles between consecutive line voltages are not equal. The degree of inequality is expressed as the ratios of the negative- and zero-sequence components to the positive-sequence component. The unbalance index is the 95% of the 10-minute mean rms values of the negative phase sequence ( $U_{neg,sh}$ ) component of the supply

voltage to be assessed during each period of one week (applies to low and medium voltage;  $U_{neg,sh} < 2\%$  or up to 3% in some areas).

### ***How can the voltage quality be customised?***

From one side, contractual conditions within customised contracts relating to the voltage quality can be entered into between operator and customer (France and Italy). From the other, the voltage quality shall be a part of the network contract between the network companies and their customers with minimum requirements introduced (Norway).

Generally, in the power quality contract the customers can negotiate with the DSO to get a higher level of quality (both the voltage quality and the continuity of supply). These contracts are rarely monitored by the regulators. For customised contractual levels (these are better than the normal ones), a monitoring recorder shall be installed.

Minimum quality levels have to be achieved for all customers regardless of the contracts. The contracts require that customers requiring better voltage quality have a clear willingness to pay for it. Therefore, the contracts should contain at least contractual level of the quality, yearly premium, and penalty for non-compliance.

### ***What are the most important activities to be undertaken in the voltage quality?***

The following activities should be undertaken when addressing the voltage quality:

- Account the impacts to the voltage quality of all parties connected to the system;
- Divide the voltage quality into several different voltage disturbances – voltage events and continuous phenomena;
- Regulate continuous phenomena by implementing European norms or national regulations by way of minimum requirements;
- Introduce monitoring schemes for regulatory interventions and publish data;
- Divide purposes of monitoring the voltage quality into statistical and contractual ones.

### ***What are the most important references related to the voltage quality?***

The most important references relating to the voltage quality are given in Table 3.

Table 3. List of the most essential literature in the voltage quality under the scope of work

Source	Title	Reference	Date	Web
Cigré/Cired	Power Quality Indices and Objectives	Brochure 261	2004	<a href="#">link</a>
ERGEG	Towards Voltage Quality Regulation in Europe – An ERGEG Conclusions Paper	Ref: E07-EQS-15-03	July 2007	<a href="#">link</a>
ERGEG	Towards Voltage Quality Regulation in Europe – An ERGEG Public Consultation Paper	Ref: E06-EQS-09-03	December 2006	<a href="#">link</a>
ERGEG	Towards Voltage Quality Regulation in Europe – Evaluation of the Comments Received	Ref: E07-EQS-15-04	July 2007	<a href="#">link</a>
CENELEC	Voltage Characteristics of Electricity Supplied by Public Distribution Networks	EN 50160:2007	2007	<a href="#">link</a>
IEC	Electromagnetic Compatibility (EMC) – Part 4-30: Testing and measurement techniques – Power quality measurement methods	IEC 61000-4-30	2008	<a href="#">link</a>

Source	Title	Reference	Date	Web
EURELECTRIC	Measurement Guide for Voltage Characteristics	23002Ren9531	1995	<a href="#">link</a>
EURELECTRIC	Application Guide to the EN 50160 on 'Voltage Characteristics of Electricity Supplied by Public Distribution Systems'	23002Ren9530	1995	<a href="#">link</a>
DOE/EPRI	National Database Repository of Power System Events	Database	2009	<a href="#">link</a>

## 2.3 COMMERCIAL QUALITY

### *What is the commercial quality?*

The commercial quality relates to speed and accuracy in handling customers requests, reflecting nature and quality of customer services, i.e. customer satisfaction. It can be followed according to timeliness of services requested by customers as per provisions of the contracts between customers and service providers. The services asked by customers are, among others, new connections, starting and terminating supply, and meter verification.

### *How is the commercial quality measured?*

The commercial quality is an important issue in both cases – when customer concludes either a single contract with the supplier or separate contracts with the supplier and the DSO. It is directly associated with transactions between companies (DSO or supplier, or both) and customers, covering not only the supply and sale of electricity but also various forms of contacts established between them.

There are two types of quality standards for the commercial quality:

- Guaranteed standards:
  - These are individualised standards. If a company fails to provide the level of service required by guaranteed standards, it must compensate the customer affected, subject to certain exemptions. Compensation can be automatic, upon customer's request, or by agreement.
- Overall standards:
  - These are area-wise standards. The minimum percentile of transactions (90 and/or 95%) must be carried out within a certain time limit. The regulator can take measures against a company which systematically fails to apply overall standards.

There are four groups of the commercial quality aspects:

- Connection:
  - Time for response to customer claims for network connection,
  - Time for cost estimation,
  - Time between signing contract and the start of supply,
  - Time for connecting new low voltage customer.
- Customer care:
  - Response time to customer queries in writing,
  - Response time to customer complaints in writing,
  - Response time to queries on costs and payments,

- Punctualities of appointments with customer.
- Technical service:
  - Time for giving information on a planned interruption,
  - Time until restoration following failure of DSO fuse,
  - Time for answering a voltage complaint.
- Metering and billing:
  - Time for meter inspection in case of meter failure,
  - Yearly number of meter readings by the designated company,
  - Time from notice-to-pay until disconnection.

Full market opening is also one of the commercial quality points of view, as the standards need to be described for routine procedures to switch supplier or to amend a contract. Requirements related to market opening upon DSOs and/or suppliers are the following: standards applied, response time and notice, non-payment patience, debt handling, information transfer, tariff options, tariff publication, termination time, termination day, and meter reading.

***What are the most important activities to be undertaken in the commercial quality?***

The following activities should be undertaken when addressing the commercial quality:

- Analyse appropriateness of different ways of regulating commercial quality – through overall standards, guaranteed standards, or other;
- Establish commercial quality regulations and define and follow content of indicators;
- Ensure the availability of the service with the aim to maximise it;
- Explore new fields of regulation upon technological development (to have accurate billing based on the actual measured consumption);
- Follow effects of unbundling (division between DSO, supply provider, and universal service/supply provider);
- Define exact conditions of supplier switching by way of drafting regulations for market opening and switching.

***What are the most important references related to the commercial quality?***

The most important references relating to the commercial quality are given in Table 4.

Table 4. List of the most essential literature in the commercial quality under the scope of work

Source	Title	Reference	Date	Web
ERGEG	Public Consultation on Draft Advice on Customer Complaint Handling, Reporting and Classification	Ref: E09-CEM-26-03	September 2009	<a href="#">link</a>
ERGEG	Best Practice Propositions on: Supplier Switching, Transparency of Prices and Customer Protection - Evaluation of Comments to the Public Consultation	Ref: E05-CFG-03/E06-PC-07-16	June 2006	<a href="#">link</a>

Source	Title	Reference	Date	Web
ERGEG	Best Practice Propositions on: Supplier Switching, Transparency of Prices and Customer Protection – Cover Note	Ref: E06-CFG-05-04/E06-PC-07-01	2006	<a href="#">link</a>
ERGEG	Transparency of Prices - An ERGEG Best Practice Proposition for Public Consultation	Ref: E05-CFG-03-04	February 2006	<a href="#">link</a>
ERGEG	Supplier Switching Process - An ERGEG Best Practice Proposition for Public Consultation	Ref: E05-CFG-03-05	February 2006	<a href="#">link</a>
ERGEG	Customer Protection - An ERGEG Best Practice Proposition for Public Consultation	Ref: E05-CFG-03-06	February 2006	<a href="#">link</a>
ERGEG	Status Review of End-User Price Regulation as of 1 July 2008	Ref: E08-CPR-21-05	March 2009	<a href="#">link</a>
ERGEG	Status Review of the Definitions of Vulnerable Customer, Default Supplier and Supplier of Last Resort	Ref: E09-CEM-26-04	July 2009	<a href="#">link</a>

## 2.4 REFERENCES

### *What are the most important references related to the next steps?*

The most important European NRA regulations in the quality of service fields are given in Table 5.

Table 5. List of the European NRA regulations in the quality of service regulation under the scope of work

Source	Title	Reference	Date	Web
AEEG, Italy	The Code for the Quality of Electricity and Natural Gas Sales Service, and Related Changes and Additions	ARG 164/08; ARG 170/09; ARG 168/08; ARG 76/09; ARG 151/09	Nov 2008; Nov 2009; Nov 2008; June 2009	<a href="#">link</a> <a href="#">link</a> <a href="#">link</a> <a href="#">link</a> <a href="#">link</a>
	Unified Code of the AEEG Regulations Concerning the Continuity of the Electricity Distribution Service	Decision no. 155/02	2002	<a href="#">link</a>
	Data Bank on the Quality of Electricity		2009	<a href="#">link</a>
	Statistical Data Reports on the Quality		2009	<a href="#">link</a>
	QUEEN – Quality of Electrical Energy (by CESI Ricerca)	Ver. 1.4	2009	<a href="#">link</a>
	MONIQUE – System for Voltage Quality Monitoring (by Terna)	Ver. 1.0.3	2009	<a href="#">link</a>
	ANRE, Romania	Performance Standards of the Electricity Supply Service for Regulated Tariffs	Dec. 34/1999	1999
Performance Standards of the Electricity Transmission Service		Dec. 17/2007	2007	
Performance Standards of the Electricity Distribution		Dec. 28/2007	2007	

Source	Title	Reference	Date	Web
	Service			
	Ordinance on Annual Reports by Licensees	Ord. 51/2005	2005	<a href="#">link</a>
CER, Ireland	Distribution System Security and Planning Standard		September 2003	<a href="#">link</a>
	Quality of Customer Service Incentive Mechanisms		March 2006	<a href="#">link</a>
	DSO Performance Criteria and Annual Reports		November 2008	<a href="#">link</a>
	TSO System Performance Incentives for 2009 and 2010		January 2009	<a href="#">link</a>
CNE, Spain	Procedure to Meter and Control Electricity Supply Continuity	Order ECO 797/2002	March 2002	<a href="#">link</a>
	Regulation on Transmission, Distribution, Trading and Supply Activities and Authorisation Procedures for Electric Power Installations	Royal Decree 1955/2000	December 2000	<a href="#">link</a>
DTe/NMa, The Netherlands	Network Code (as of 4 September 2007)		September 2007	<a href="#">link</a>
	Decision in relation to the method determining the quality term	102282-21	June 2006	<a href="#">link</a>
	Addendum A to the Method Decision – Description of the method for determining the Q factor	102282-21	June 2006	<a href="#">link</a>
	Addendum B to the Method Decision – Technical description of the method determining the Q factor	102282-21	June 2006	<a href="#">link</a>
	Addendum C to the Method Decision – Response of the Board of Directors of the Netherlands Competition Authority to the opinions submitted in relation to the draft method decision of 8 March 2006	102282-21	June 2006	<a href="#">link</a>
	The introduction of quality regulation of electricity distribution in The Netherlands (NMa)	Paper	May 2007	<a href="#">link</a>
	Yardstick Competition: Regional Electricity Network Companies, Second Regulatory Period	Information & consultation document	November 2002	<a href="#">link</a>
E-control, Austria	Ordinance on the Electricity Statistics (by BMWA)	284	2007	<a href="#">link</a>
	The Statistics on the Quality of Electricity Supply		2009	<a href="#">link</a>
	Study of the PQ Monitoring in Austria	Study	December 2005	<a href="#">link</a>
	E-control Conciliation Activity Report 2008	Report	2009	<a href="#">link</a>
	E-control Activity Report 2008	Report	2009	<a href="#">link</a>
EA, Slovenia	The Act Regarding the Provision of Data About the Quality of Electricity Supply	33/09	2009	<a href="#">link</a>
	2008 Report on the Quality of Electricity Supply		July 2009	<a href="#">link</a>

Source	Title	Reference	Date	Web
	Act determining the methodology for charging for the network charge, the methodology for setting the network charge, and the criteria for establishing eligible costs for electricity networks	ULRS 121/2005	2005	<a href="#">link</a>
	Ordinance regarding the operating mode of the public service of operating the electricity distribution network, and the public service of supplying electricity to tariff customers	ULRS 117/2004	2004	<a href="#">link</a>
	Changes and additions of the Ordinance regarding the operating mode of the public service of operating the electricity distribution network, and the public service of supplying electricity to tariff customers	ULRS 23/2007	2007	<a href="#">link</a>
ERSE, Portugal	2007 Report on the Quality of Electricity Service	Main Report	December 2008	<a href="#">link</a>
	2007 Report on the Quality of Electricity Service	Annexes	December 2008	<a href="#">link</a>
	Regulation on the Quality of Electricity Service – Mainland Portugal	Despacho No. 5255/2006	March 2006	<a href="#">link</a>
ERU/ERO, Czech Republic	Updated Report of the Energy Regulatory Office on the regulatory methodology for the third regulatory period, including the key parameters of the regulatory formula and pricing in the electricity and gas industries		April 2009	<a href="#">link</a>
	Reports on the level achieved in observing the standard of electricity transmission and distribution continuity of supply		2009	<a href="#">link</a>
MEH/HEO, Hungary	First Results of Performance Based Regulation of Supply Quality in Hungary	Paper published at CIRED 2005 Conference	2005	<a href="#">link</a>
	Methods and Procedures Requirements for Monitoring and Improvement of Supply Quality in Hungary	Paper published at CIGRE-IEEE Symposium	2003	<a href="#">link</a>
	Results of Customer Satisfaction Survey in Relation with Electricity Supply in 2008		December 2008	<a href="#">link</a>
	Determining Minimum Requirements	Resolution: 99-101-103- 105-107- 109/2004	2004	<a href="#">link</a>
	Resolution on the Standards of Supply	Resolution 26/2004	2004	<a href="#">link</a>
NCC, Lithuania	Methodology for setting the prices for electricity transmission and distribution services and their respective price caps	Resolution No 03-85	August 2004	<a href="#">link</a>
	Price setting methodology of public electricity prices, price of public supply service and their respective price caps	Resolution No 03-85	August 2004	<a href="#">link</a>

Source	Title	Reference	Date	Web
NVE, Norway	Regulations relating to the quality of supply in the Norwegian power system	Reg. No. 1557	November 2004	<a href="#">link</a>
	Fasit – The Norwegian Standard for Collection, Calculation and Reporting of Reliability Data (SINTEF Energy Research)	Paper	2008	<a href="#">link</a>
Ofgem, UK	Quality of Service (Customer Service Reward Scheme; Guaranteed Standards; Quality of Service Incentives; Quality of Service Working Group)	Web page	2009	<a href="#">link</a>
	The Electricity (Standards of Performance) Regulations 2005 (by DTI)	Statutory Instrument 2005 No. 1019	2005	<a href="#">link</a>
	Guaranteed Standards: OFGEM Guidance on Proposals and Best Practice	Comm	April 2006	<a href="#">link</a>
	Guaranteed Standards of Performance	Table A2.1	April 2007	<a href="#">link</a>
	Guaranteed and Overall Standards of Performance – Final Proposals	Consultation paper	2001	<a href="#">link</a>
	2007/2008 Electricity Distribution Quality of Service Report	166/08	December 2008	<a href="#">link</a>
	Quality of Service Regulatory Instructions and Guidance version 5	94/05	March 2005	<a href="#">link</a>
	Electricity Distribution Price Control Review - Price control cost reporting Rules: Instructions and Guidance		April 2009	<a href="#">link</a>
SERC, Bulgaria	Electricity Distribution Price Control Review Policy Paper	159/08	December 2008	<a href="#">link</a>
	SERC Directions For Electric Distribution Company Tariff Setting Under Revenue Cap Method			<a href="#">link</a>
	Indicators for the Quality of Electricity Supply	04/05/2004	2004	<a href="#">link</a>
	Methodology for determination of the Indicators for the Quality of Electricity Supply		2007	<a href="#">link</a>
URSO/RONI, Slovak Republic	Quality Standards for Electricity	315/2008	2008	<a href="#">link</a>

The most important Energy Community Contracting Parties/Observers NRA regulations, which are at least marginally related to the quality of service field are given in Table 6.

Table 6. List of the Energy Community Contracting Parties NRA regulations in the quality of service regulation under the scope of work

Source	Title	Reference	Date	Web
ERE, Albania	Law on Power Sector	No. 9072	May 2003	<a href="#">link</a>

Source	Title	Reference	Date	Web
	Transmission Code (General Code; Planning Code; Operation and Dispatch Code; Interconnection Code)		December 2004	<a href="#">link</a>
	Metering Code (General Requirements; Technical Requirements; Technical Requirements for Final Customers)		2009	<a href="#">link</a>
	License for Distribution of Electric Energy		June 2008	<a href="#">link</a>
	License for Transmission Activity		June 2008	<a href="#">link</a>
	License for the Activity of Retail Public Supply of Electric Energy		June 2008	<a href="#">link</a>
	License of Qualified Supplier for Eligible Customers Supply		November 2005	<a href="#">link</a>
	Tariff Calculation Methodology for Electricity Distribution System Operator		June 2008	<a href="#">link</a>
	Tariff Calculation Methodology for Electricity Transmission		June 2008	<a href="#">link</a>
	Tariff Calculation Methodology for Retail Sales to Regulated Tariff Customers		June 2008	<a href="#">link</a>
	Regulatory Statement		March 2009	<a href="#">link</a>
	Annual Report: Situation of Energy Sector and Activity of ERE for 2008		2009	<a href="#">link</a>
SERC, Bosnia and Herzegovina (State level regulatory authority)	Law on Transmission of Electric Power, Regulator and System Operator of Bosnia and Herzegovina	OG BiH 07/02	2002	<a href="#">link</a>
	Law on Amendments to the Law on Transmission of Electric Power, Regulator and System Operator of Bosnia and Herzegovina	OG BiH 76/09	2009	<a href="#">link</a>
	Grid Code ISO BiH (Planning and Development Code; Terms for Connection; Operational Planning Codes; Operational Codes; Code of Measures in Unexpected Situations; Metering Code)		2006	<a href="#">link</a>
	Market Rules ISO BiH		2006	<a href="#">link</a>
	Connection Rules	OG BiH 95/08	2008	<a href="#">link</a>
	Rules of Third Party Access to the Transmission System		2006	<a href="#">link</a>
	Licensing Rule	OG BiH 38/05	2005	<a href="#">link</a>
	Tariff Pricing Methodology for Services of Electricity Transmission, Operation of Independent System Operator and Ancillary Services	OG BiH 46/05	2005	<a href="#">link</a>
	Decision on Modifications and Amendments to the Tariff Pricing Methodology for Services of Electricity Transmission, Operation of Independent System Operator and Ancillary Services	OG BiH 17/07	2007	<a href="#">link</a>



Source	Title	Reference	Date	Web
	Report on Activities of the State Electricity Regulatory Commission in 2008		2009	<a href="#">link</a>
FERC, Bosnia and Herzegovina (FBiH entity level regulatory authority)	Electric Power Law of FBiH	OG FBiH 41/02	2002	<a href="#">link</a>
	General Conditions for Electricity Supply		2008	<a href="#">link</a>
	Distribution Network Code (JP EP HZHB d.d.)		2008	<a href="#">link</a>
	Distribution Network Code (JP EP BiH d.d.)		2008	<a href="#">link</a>
	Connection Rulebook (JP EP HZHB d.d.)		2009	<a href="#">link</a>
	Connection Rulebook (JP EP BiH d.d.)		2009	<a href="#">link</a>
	Licensing Rule		2005	<a href="#">link</a>
	License for Performance of the Activity of Power Distribution (JP EP HZHB d.d.; symmetrical for JP EP BiH d.d.)		2007	<a href="#">link</a>
	License for Performance of the Activity Power Supply I Tier (JP EP HZHB d.d.; symmetrical for JP EP BiH d.d.)		2007	<a href="#">link</a>
	License for Performance of the Activity Power Supply II Tier (JP EP HZHB d.d.; symmetrical for JP EP BiH d.d.)		2007	<a href="#">link</a>
RERS, Bosnia and Herzegovina (RS entity level regulatory authority)	Draft Rulebook on Reporting		2009	<a href="#">link</a>
	Rules on Tariff Methodology and Tariff Proceedings		2005	<a href="#">link</a>
	Law on Electricity		2002	<a href="#">link</a>
	Rulebook on Methodology for Determination of the Fee for Connection to the Distribution Network		2008	<a href="#">link</a>
	General Conditions for Delivery and Supply of Electricity		2008	<a href="#">link</a>
	Annex 1 to the General Conditions – Indicators for Quality of Electricity Supply		2008	<a href="#">link</a>
	Rulebook on Reporting		2007	<a href="#">link</a>
	Forms from the Rulebook on Reporting			<a href="#">link</a>
	Rulebook for Issuance of Licenses		2007	<a href="#">link</a>
	License to Conduct Activity of Power Distribution		2007	<a href="#">link</a>
License to Conduct Activity of Power Supply of Tariff Customers		2007	<a href="#">link</a>	
License to Conduct Activity of Trade and Power Supply on the Territory of Bosnia and Herzegovina		2007	<a href="#">link</a>	
Tariff Methodology and Tariff Procedure Rulebook		2005	<a href="#">link</a>	
Annual Report for 2008		2009	<a href="#">link</a>	

Source	Title	Reference	Date	Web
HERA, Croatia	Law on the Electricity Market	NN 177/04; NN 76/07; NN 152/08	2004; 2007; 2008	<a href="#">link</a> <a href="#">link</a> <a href="#">link</a>
	Law on the Regulation of Energy Activities	NN 177/04; NN 76/07	2004; 2007	<a href="#">link</a> <a href="#">link</a>
	Grid Code of the Power System	NN 36/06	2006	<a href="#">link</a>
	General Conditions for Supply of Electrical Energy	NN 14/06	2006	<a href="#">link</a>
	Rulebook on the Fee for Connection to the Electricity Network and Increase of Connecting Power	NN 28/06	2006	<a href="#">link</a>
	Rulebook on Licenses to Conduct Energy Activities	NN 118/07; NN 107/09	2007; 2009	<a href="#">link</a> <a href="#">link</a>
	Tariff System for Distribution of Electricity	NN 143/06	2006	<a href="#">link</a>
	Annual Report for 2008		2009	<a href="#">link</a>
ERC, The former Yugoslav Republic of Macedonia	Law on Energy	SVRM 63/06	2006	<a href="#">link</a>
	Grid Code for Transmission of Electricity	SVRM 95/06	2006	<a href="#">link</a>
	General Conditions for Power Supply	SVRM 6/01	2001	<a href="#">link</a>
	Rulebook on the Conditions, Method and Procedure on Issuing, Altering, Extending and Withdrawing Energy Activity Licenses		2009	<a href="#">link</a>
	Rulebook on the Method and Conditions for Electricity Price Regulation		2008	<a href="#">link</a>
	Annual Report for 2008		2009	<a href="#">link</a>
RAE, Montenegro	Law on Energy		2003	<a href="#">link</a>
	Temporary Grid Code		2005	<a href="#">link</a>
	Temporary Distribution Code		2005	<a href="#">link</a>
	Rules on Electricity Supply		2009	<a href="#">link</a>
	Rulebook on Licenses in Energy Sector		2004	<a href="#">link</a>
	License to Conduct Activity of Electricity Distribution and Distribution Network Operator		2006	<a href="#">link</a>
	License to Conduct Activity of Transmission Network Operator		2006	<a href="#">link</a>
	License to Conduct Activity of Electricity Supply		2006	<a href="#">link</a>
	Annual Report for 2008		2009	<a href="#">link</a>
AERS, Serbia	Energy Law			<a href="#">link</a>
	Rules on Operation of Transmission System		2008	<a href="#">link</a>

Source	Title	Reference	Date	Web
	Methodology for the Criteria and Manner of Setting Costs of Connection to the Electricity Transmission and Distribution System		2006; 2007	<a href="#">link</a> <a href="#">link</a> <a href="#">link</a> <a href="#">link</a>
	Methodology for Setting Tariff Elements for Calculating Prices for Access to and Use of System for Electricity Distribution		2006; 2007	<a href="#">link</a> <a href="#">link</a>
	Information Rules – Data Forms on Distribution Quality – Monthly			<a href="#">link</a>
	Information Rules – Data Forms on Distribution Quality – Quarterly			<a href="#">link</a>
	Information Rules – Data Forms on Transmission Quality – Monthly			<a href="#">link</a>
	Information Rules – Data Forms on Transmission Quality – Annually			<a href="#">link</a>
ERO, UNMIK	Law on Electricity	Reg. No. 2004/22	2004	<a href="#">link</a>
	DSO Distribution Code and DSO Metering Code		2008	<a href="#">link</a>
	Rule on General Conditions of Energy Supply		2009	<a href="#">link</a>
	Rule on Licensing of Energy Activities		2006	<a href="#">link</a>
	Transmission System Operator License		2006	<a href="#">link</a>
	Distribution System Operator License		2006	<a href="#">link</a>
	Electricity Public Supply License		2006	<a href="#">link</a>
	Electricity Supply/Trade License		2006	<a href="#">link</a>
	Draft Reporting Manual for the Energy Sector		2007	<a href="#">link</a>
	Monitoring Report 2008		2008	<a href="#">link</a>
	Tariff Methodology for the Electricity Sector		2005	<a href="#">link</a>
	Annual Report for 2008		2009	<a href="#">link</a>
ANRE, Moldova	Activity Report 2008		2009	<a href="#">link</a>
EMRA, Turkey	Electricity Market Law	No. 4628	2001	<a href="#">link</a>
	Electricity Market Licensing Regulation		2005	<a href="#">link</a>
	Electricity Market Grid Regulation	OG No. 25001	2003	<a href="#">link</a>
	Electricity Transmission System Supply Reliability and Quality Regulation			<a href="#">link</a>
	Electricity Market Distribution Regulation	OG No.	2003	<a href="#">link</a>

Source	Title	Reference	Date	Web
		25025		
	Electricity Market Customer Services Regulation			<a href="#">link</a>
	Electricity Market Tariffs Regulation			<a href="#">link</a>
	Communique Regarding Regulation of Distribution System Revenue			<a href="#">link</a>
	Communique Regarding Determination Transmission and Distribution Connection Charges			<a href="#">link</a>
	Annual Report 2007		2009	<a href="#">link</a>

Additionally, a number of scholarly works have been published in various journals and at conferences, having the quality of service as main topic. Table 7 references to some of them.

Table 7. List of other works in the area of quality service regulation (university and other scholar papers)

Source	Title	Reference	Date	Web
Ajodhia and Hakvoort (TU Delft)	Economic regulation of quality in electricity distribution networks	Utilities Policy 13 (3), 211-221	2005	<a href="#">link</a>
Fumagali, Garrone and Grilli (Poli Milano)	Service quality in the electricity industry: The role of privatization and managerial behavior	Energy Policy 35 (12), 6212-6224	December 2007	<a href="#">link</a>
Lo Schiavo and Vailati (AEEG)	The Italian Incentive Regulation for Improving the Continuity of Electricity Transmission	AAEE, IAEE	2009	<a href="#">link</a>
Lo Schiavo et al. (AEEG)	Continuity of Electricity Supply Regulation Driven by Economic Incentives: Does it Work? The Italian Experience	CIREN 2005	2005	<a href="#">link</a>
Bertazzi, Fumagali and Lo Schiavo (AEEG, Poli Milano)	The Use of Customer Outage Cost Surveys in Policy Decision-Making: The Italian Experience in Regulating Quality of Electricity Supply	CIREN 2005	2005	<a href="#">link</a>
Yang and Bollen (STRI)	Power quality and reliability in distribution networks with increased levels of distributed generation	ELFORSK Report	2008	<a href="#">link</a>
Heggset et al. (SINTEF)	Common Guidelines for Reliability Data Collection in Scandinavia	CIREN 2007	2005	<a href="#">link</a>
Kjoelle et al. (SINTEF)	Trends in Quality of Supply in a Liberalized Electricity Market	CIREN 2007	2007	<a href="#">link</a>
Nilsson (Vattenfall)	Quality Control in the Swedish Regulation and Balance Between Network Charges and Quality	CIREN 2005	2005	<a href="#">link</a>
Rivier and Gomez (Comillas)	Critical Analysis of Spanish Power Quality Regulation Design	Market Design Conference Paper	2003	<a href="#">link</a>

Source	Title	Reference	Date	Web
Samdal et al. (SINTEF)	Customers' Interruption Costs - What's the Problem?	CIREC 2003	2003	<a href="#">link</a>
Sappington (Uni Florida)	Regulating Service Quality: A Survey	Journal of Regulatory Economics; 27:2 123–154	2005	<a href="#">link</a>
Seljeseth et al. (SINTEF)	Quality of Supply Regulation in Norway: Going Beyond EN 50160	CIREC 2005	2005	<a href="#">link</a>
Weisman (Kansas State Uni)	Price regulation and quality	Information Economics and Policy, 17 (2), 165-174	2005	<a href="#">link</a>
Williamson (NERA)	Incentives for Service Quality: Getting the Framework Right	The Electricity Journal, 14 (5), 62-70	2001	<a href="#">link</a>

There were several events held so far which are identified as having similar disseminating experiences and views exchanged between the regulators and other stakeholders on the topics of interest for the service quality regulation. These are referenced in Table 8.

Table 8. List of the workshops in the quality of service regulation under the scope of work

Source	Title	Reference	Date	Web
ERGEG	Workshop on Continuity of Supply Regulation by Incentives - Willingness to Pay and Accept	Ref: C08-EQS-22-06	September 2008	<a href="#">link</a>
WFER IV	Track A – Session 13: Quality of Electricity Supply and its Regulation	WFER IV	Wednesday 21 October 2009	<a href="#">link</a>
ERRA	EU Accession WG Meeting on the Quality of Supply	ERRA	November 2003	<a href="#">link</a>
TAIEX	Workshop on Setting and Monitoring the Quality of Supply Level After Privatisation of Electricity Distribution Regions in Turkey	EU TAIEX Programme	October 2009	<a href="#">link</a>
CEER	Workshop on Smartgrids	Ref: C09-EWG-50-10	June 2009	<a href="#">link</a>
FSR	Smart Metering Workshop	EUI/RSCAS/FSR	February 2009	<a href="#">link</a>
ERGEG	Workshop on Supplier Switching in Electricity and Gas Retail Markets	ERGEG	September 2008	<a href="#">link</a>
FSR	Retail Competition and Customer Switching Workshop	EUI/RSCAS/FSR	June 2007	<a href="#">link</a>
FSR	Incentive Regulation Workshop	EUI/RSCAS/FSR	November 2006	<a href="#">link</a>

### 3. THE FIRST WORKSHOP

#### ***What were the objectives of the first workshop?***

The aim of the first workshop was to reach recommendations regarding how to perform (harmonised) continuous quality of service regulation in the Contracting Parties and Observers to the Energy Community.

Its objective was to transmit the key fundamental technical and commercial principles on the quality of service regulation, explain different methodologies available to tackle it, and to present experiences on the application of different methods applied in transmission and distribution system operators.

#### ***What was the participation level of the first workshop?***

The first workshop was targeted towards the Energy Community regulators staff engaged with the preparation of the quality of service regulation to the system operators, including the members of Customer WG as primary initiators of the study.

The emphasis was on the Energy Community Contracting Parties and Observers, where data availability and technical capacity is quite low. Therefore, the first workshop emphasized the methods and practices in the quality of service regulation, which are relevant to situations where the system operators have little to no information on their operational conditions.

Representatives of national regulatory authorities from all 7 Contracting Parties (Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Montenegro, Serbia, and UNMIK) and 4 Observers (Georgia, Moldova, Ukraine, and Turkey) took active participation in the workshop. Due to distributed responsibility for the service quality regulation among regulators in Bosnia and Herzegovina, all three regulatory authorities actively participated – the state one for transmission and the entity ones for distribution. Moreover, the regulator from Slovenia, as the only Participant in the workshop, provided valuable inputs on experiences in introducing and developing the service quality regulation.

The first workshop provided an opportunity for disseminating experiences and views on the continuity of supply, the voltage quality and the commercial quality. The regulators discussed these topics in parts of the agenda reserved for questions and answers, tour de tables, and conclusions. In one way additional information on technical matters were provided per regulators' questions, and in the other the regulators informed the audience on situation in their jurisdictions.

#### ***What was the content of the first workshop?***

The first workshop was organized around six sessions.

The opening session, apart from welcoming words from the organizers, contained the introductory presentation on legal and technical bases of the service quality regulation given by Mr Roland Matous from the ECRB Section of the Energy Community Secretariat.

This was followed by the three main presentations from the EIHP under the items of the continuity of supply (by Mr Tomislav Baricevic), the voltage quality (by Ms Minea Skok) and the commercial quality (by Mr Nijaz Dizdarevic).

After this formal review of the major items the case study was presented by Mr Lahorko Wagmann from the Croatian Energy Regulatory Agency on national experience in publication of data relating to the performance indicators.

The closing session served as an opportunity to draw conclusions and agree on the next steps under the study.

Table 9 shows the workshop's details, with links to materials presented under the sessions.

Table 9. Details of the first workshop on the quality of service regulation under the scope of work

Workshop	Date	Place	Web
The 1 <sup>st</sup> Workshop on the Quality of Service Regulation in the Energy Community	27-28 January 2010	Energy Community Secretariat, Vienna, Austria	<a href="#">link</a>
	Agenda of the 1 <sup>st</sup> Workshop		<a href="#">link</a>
Title	Author	Institution	Web
Regulation and Monitoring of Quality of Supply	Mr Roland Matous	Energy Community Secretariat	<a href="#">link</a>
Continuity of Supply	Mr Tomislav Baricevic	Energy Institute Hrvoje Požar	<a href="#">link</a>
Voltage Quality	Ms Minea Skok	Energy Institute Hrvoje Požar	<a href="#">link</a>
Commercial Quality	Mr Nijaz Dizdarevic	Energy Institute Hrvoje Požar	<a href="#">link</a>
The Quality of Supply as a Part of the National Report (presentation and report)	Mr Lahorko Wagmann	Croatian Energy Regulatory Agency	<a href="#">link1</a> <a href="#">link2</a>

Within the workshop the information and guidance was provided on the following topics:

- Introduction of principles for collection of data and regulatory reporting;
- Introduction of publication of data on the performance indicators;
- Introduction of standard levels for the performance indicators;
- Formulation of penalties in case of deviations from standard values;
- Formulation of rewards in case of services supplied over standard levels;
- Introduction of duties in improvement of the performance indicators;
- Introduction of auditing activities for supply companies;
- Increase of data accuracy and penalisation for the wrong data supply;
- Introduction of price-quality correlation through Q-factor in the price cap formula.

Such topics provided the regulators an opportunity to start up the following activities:

- Benchmark and publish periodically the quality of supply in terms of its levels and regulation across the Energy Community;
- Spread best practice on the quality of supply regulation including incentive/penalty regimes;
- Drive forward improvements in existing quality of service standards in order to achieve standards, which are satisfactory from a regulatory point of view.

### ***What was noted as important in discussions relating to the continuity of supply?***

Within discussions on the continuity of supply, the following additional remarks were noted:

- *On the legal framework:*
  - Attention is to be paid to the provisions from the EU Directives (the Internal Market and the Security of Electricity Supply ones) as relating to setting and meeting quality of supply and network security performance objectives;
- *On the collection of data:*
  - The data is collected in some form and generally sufficient for calculation of basic performance indicators (SAIDI and SAIFI);
  - The experience varies. In some jurisdictions the SCADA systems are mostly installed at MV level or there is an obligation to install them soon, whereas in other ones the data are still collected manually;
  - There are still no audits of the data conducted by the regulators, thus it is quite possible that the data are not entirely accurate or complete;
  - Related to previous, the question was raised what to do in cases of missing data. The reaction would probably depend on the amount and types of the data;
    - For example, Slovenia intentionally works on about 90% of all types of the data, which corresponds to SCADA network coverage;
  - The necessity for harmonisation of rules for data collection with respect to definitions of terms such as customer, interruption, duration of interruption, types of interruption, causes of interruption, number of customers affected, way of calculating quality indicators, among Contracting Parties and Observers, was emphasized;
  - Next steps should include setting of guidelines, definition of formats, introduction of data exchange procedures
- *On the exceptional events:*
  - Generally there is a lack of information with regard to this very important topic;
  - The necessity for harmonisation of rules with respect to definition of exceptional events among Contracting Parties and Observers was highlighted;
  - The experience shows a significantly higher share of exceptional events in the Contracting Parties and Observers than usually in EU Member States;
- *On the reporting from regulated company to regulator:*
  - The experience varies significantly;
    - There are cases where the data are neither analysed nor reported, although there is a good history of the collected data;
    - In other cases, there are periodical reports (on daily, monthly, or yearly basis) at various levels;
  - Generally, there are no audits;
- *On the publication of data:*
  - In some cases, a lot of interesting data is published in annual regulatory reports;
  - Including some comments, it should not be a problem for any of the Contracting Parties and Observers to provide a list of relevant legislation and perhaps values of indicators from annual reports;



- *On the standards regarding continuity of supply:*
  - Some to most of the standards exist;
  - Some minimum quality standards are in the process of drafting;
  - Significant differences are noted in current performance, leading to different goals and therefore different levels of defined standards;
- *On some specific remarks:*
  - Albania: The Quality Statement is being drafted. The minimum quality standards will be in place by May 2010. When having unplanned interruptions, electricity supply is to be restored as soon as possible, and if it is considered as lasting too long than it is necessary to report on progress. Planned interruptions must be announced at least 24 hours in advance. Until 2007 there was a load shedding scheme in place due to shortages in electricity production/import;
  - ⊖ Bosnia and Herzegovina: There is a register in place for two years now (RS entity, long and short interruptions, voltage level, responsibility, SAIDI, SAIFI, MAIFI). Rulebook for reporting is also in place in the RS entity. Distribution companies send their reports to the regulator on the quarterly and yearly basis. General conditions for delivery and supply have been adopted in 2006. Later on, in 2008, the document was amended according to the primary legislation and two years of experience in practice. However, there are no performance standards accepted yet.
  - Croatia: DISPO software acts as the register, with manual feeding. SAIDI and SAIFI are calculated from DISPO. There is no format for data exchange specified yet. No audits as well. Next steps: to draft the Guidelines for data exchange, to elaborate a position paper on the quality of supply, and to decide on reward/penalty scheme;
  - The former Yugoslav Republic of Macedonia: SCADA system becomes obligatory. No format for data exchange is specified yet. Soon, a new rulebook on the quality of supply will appear;
  - Serbia: As of January 1, 2009 the Energy Agency has introduced information rules for the registration of data and calculation of continuity of supply indicators in the activities of transmission and distribution of electricity including rules for registration of interruption and calculation of continuity of supply indicators. Rules for registering interruption define which data on interruption have to be registered and by which criteria. Based on that, for any interruption that lasts longer than three minutes a company has to register the date and the starting and ending time, duration of interruption, the number of customers without supply (for each voltage level), type of interruption depending on whether the interruption is planned (notified to customers) or unplanned (not notified to customers), and the cause of interruption. For interruptions in the transmission network, continuity indicators AIT and ENS, while for interruptions in the distribution network, continuity indicators SAIDI, SAIFI and CAIDI are envisaged to be calculated. Planned activities in the coming period comprise calculation of indicators, monitoring quality performance of network companies and consequently setting minimum standards;
  - UNMIK: According to the Law on the Energy Regulator, the Energy Regulatory Office (ERO) has the power to prescribe the standards of service, to be met by licensees. In the Licences there are provisions regarding the quality standards by which Licensees, approved by ERO, will propose overall and minimum standards of performance. The working group has been established with representatives of the ERO, DSO, TSO, Public supplier and MEM, with the task to propose

standards that are going to be met by Licensees. This working group will prepare the Quality Standards document with quality measures, which ERO will hopefully approve until May 2010;

- Turkey: 5-year data are available, but no analyses have been conducted so far.
- Ukraine: 2006-2008 data are available. SAIDI, SAIFI and ENS are calculated. There is an automatic standardised collection from DSOs (Excel-based). There is a standardised format of reporting. Data validation is in process;

### ***What was noted as important in discussions relating to the voltage quality?***

- *On the legal framework:*
  - In all Contracting Parties and Observers the quality of service is part of primary or secondary legislation, primarily the General Conditions of Electricity Supply (case of Croatia), the Grid Codes (case of Montenegro) or both (UNMIK). Somewhere (case of Serbia) all legislation is completed, and some requirements regarding voltage characteristics (magnitude, frequency deviations, flickers, harmonics, etc.) are prescribed in the Energy Law, Decree on Conditions for Electricity Delivery, Grid and Distribution Codes, but direct obligation to comply with EN 50160 has not been transposed to the legislation for the time being. As a result, there is no direct obligation for distribution companies to comply with EN 50160.
  - There are insufficient guidelines of all kinds;
- *On the competences of regulators:*
  - Predominantly, the regulators do not have a clear and straightforward competences regarding the voltage quality;
    - In Croatia, for example, system operators submit their proposals on standard quality levels to the Ministry and the regulator only gives an opinion, and then the Ministry proposes the standard;
    - In Albania, the operator will propose quality standards which are then approved by the regulator;
    - In Serbia, according to the Energy Law in force the regulator also does not have clear competences with regard to monitoring and regulation of the service quality. However, direct role of the regulator in quality of service monitoring is envisaged by the amendments to the Energy Law that are under preparation;
- *On the commitments:*
  - Mostly, the Grid Codes comprise some commitments with regard to the voltage quality and also commitments applying to customers in order to limit their contribution to voltage quality deterioration;
  - Limits with regard to voltage supply variations are equal mainly to binding limits from EN 50160. Some differences can be observed for LV networks;
  - Also, in some countries (e.g. Croatia), there are provisions for transition from 220/380V to 230/400V;
- *On the international standards:*
  - International standards, especially EN 50160, have been adopted in Croatia. In the near future EN 50160 will be adopted in the former Yugoslav Republic of Macedonia (110 kV and above +/- 5%; MV +/- 10%; LV +5/-10%; the state inspectorate controlling the voltage quality) and probably in Serbia. In Moldova and Ukraine the old pre-transition National Standard on Quality is still employed,

containing cost reimbursement for damaged customer appliances. In Bosnia and Herzegovina RS entity the deadline for final adoption of EN 50160 and IEC 60038 as standards is January 1st 2015, but only regarding the deviation from the nominal voltage;

- *On the reporting from regulated company to regulator:*
  - Different experiences – from no reports to quarterly or yearly ones;
    - Usually only on a number of customer complaints together with shares of justified ones;
    - For example, in Bosnia and Herzegovina there are quarterly and annual reports containing customer complaints and network improvements related to them (if needed) For example, in Bosnia and Herzegovina RS entity there are quarterly and annual reports containing customer complaints and network improvements related to them (if needed). Besides, DSO is obliged to submit to regulator a list of MV/LV substation areas scheduled for reconstruction and improvement due to unacceptably high deviations from the nominal voltage. In UNMIK, there is no obligation on DSO to inform the regulator regarding the complaints for voltage quality;
    - Consequent actions are many. In Albania, there are some interventions in cities, but none in rural areas. Significant breach of all international standards appears at all voltage levels. The process of voltage control just started at 220 kV level with intention to scale it down all the way to low voltage in the future. In Bosnia and Herzegovina the network reconstruction is a continuous process (replacement of conductors, making larger cross sections, can be carried out on customer's request and evaluation of DSO).
- *On the premium quality contracts:*
  - Although, generally, there is a possibility to enter into premium quality contracts, it could be observed that no such contracts have been signed yet;
  - Despite the fact that this is a very valuable option, for its wider diffusion it is necessary to have customers with a clear willingness to pay for higher quality;
  - The issue of “free riding” is possible with the premium contracts – one pays and the others along the feeder get better quality for free;
  - In Slovenia, there was one failed attempt to arrange the premium contract (Revoz automobile industry producing for Renault). Slovene regulatory authority is not aware of any other failed case neither on existence of any premium quality contract.
- *On dealing with constant problems:*
  - In almost all jurisdictions, there are supply areas with constant problems with the voltage quality;
  - Typically, network operator is in charge of measuring voltage quality upon customer's request;
  - Complaints are observed, analyzed and then reported at least annually by the regulator (Croatia, Bosnia and Herzegovina, Ukraine, etc.);
  - There are some exceptions though, such as UNMIK for example, where complaints are very frequent but the operator is not obliged to report these to the regulator. Even though DSO has identified some areas that have problems with voltage quality and has started to improve them gradually;

- In the former Yugoslav Republic of Macedonia and Serbia the measurement of voltage quality is under the jurisdiction of the power inspectorates, who report their findings to the regulators in cases of results of inspections directly related to regulator obligations and activities;
- *On the measuring:*
  - The impression is that there is insufficient measuring at the system level in all jurisdictions. Generally, the measurements should be based on some criteria or statistical selection of measurement points to cover a good statistical sample;
  - Generally, measurements of the voltage quality are carried out on customer's request – the costs are covered by the network operator if voltage quality standards were not met, otherwise by the customer;
  - Practices vary. In Croatia, 7-day measurements on customer's request; costs on DSO if the complaint is justified; 3-year period to improve situation. In the former Yugoslav Republic of Macedonia, 7-day measurements are carried out on customer's request and costs are put on DSO if complaint is justified. In Serbia, with respect to customer complaint on technical or other disruptions in delivery not caused by the customer's facility, the Energy Law stipulates that the energy entity is obliged to resolve the disruption in delivery within 24 hours or in two days at the latest after receiving notice. A shortage of measurement devices in order to respond to customer complaint within prescribed time frames as well as to conduct continuous measurement and monitoring of voltage might appear.

***What was noted as important in discussions relating to the commercial quality?***

- *On the current status in general:*
  - The legislation exists to some extent;
  - The most common and in the same time the most important indicators are those related to disconnection or reconnection
    - Those are generally regulated with the standards in place
    - Penalties are applied in some cases
  - Regarding the rest of indicators, even if they are specified by the legislation, what is needed furthermore is the application in practice;
  - A lot of practical issues arise in day-to-day practice;
- *On the legislation covering the issue of the commercial quality:*
  - A number of documents covering to some extent the field of commercial quality is in place in different jurisdictions, such as Energy Law, General Conditions for Electricity Supply, Connection Rules, Licences for network companies, Internal network operator rules, and many others;
- *On the collection of data:*
  - In most cases, the data is collected for past several years. However, in most of the Contracting Parties and Observers there is no standard format defined by the regulator yet;
  - Practices vary. For example, in Albania there is no collection of data started yet. In Bosnia and Herzegovina there is a 3-year history of data in the RS entity, but with different quality of data among 5 DSOs. No data in the FBiH entity is collected yet.
- *On the reporting to regulator by regulated company:*



- Different experiences – from no reports to quarterly or yearly ones;
- The most common indicators regard disconnection and reconnection;
- In some cases there is a Complaint Commission established within the network operator to resolve the complaints;
- Sometimes there are joint ‘network operator + regulator’ Complaint Commissions;
- *On the standards and penalties:*
  - Standards exist – from basic to very detailed ones;
  - Penalties differ – from none to almost none to sufficient enough for network operators to act according to regulatory requirements;
  - In some cases the state inspectorate has the authority to issue charges, whereas in others it is automatically done and paid to customers;
    - Albania: Some standards are given. Significant expectations are put in front of CEZ to propose and implement the standards (there is a provision in the privatisation contract/the regulatory statement on this topic);
    - Bosnia and Herzegovina: Some standards are given in the Connection Rules and the General Conditions. However, no separate documents exist on the commercial quality solely. There are no penalties in the RS entity and only insignificant ones in the FBiH entity;
    - Croatia: The General Conditions and DSO internal rules contain a number of relevant provisions. There is a Customer Complaint Commission established within DSO (in 21 distribution areas and 1 in Zagreb headquarters);
    - The former Yugoslav Republic of Macedonia: Some standards are provided in the Rules and Conditions of Supply;
    - Montenegro: Some standards are comprised in the General Rules and in Licence.
    - Serbia: The legislation exists. Fines for non-compliance with standards regarding deciding application for connection and connection are defined as well. However, only the state inspectorate can issue penalties;
    - UNMIK: Some standards are comprised in the Rule on General Conditions, the Rule on Disconnection and Reconnection in the energy Sector and the Rule on Dispute Settlement Procedure. The commercial standards are comprised in the secondary legislation and include: warning notice to disconnections, reconnections, new connections, frequent meter reading, complaints, etc. In the Rule on Dispute Settlement Procedure it is specified that customers initially address their complaints to the Customer Care Department within the Public Supplier, and after that, if they are not satisfied, to the Regulator. Energy Regulatory Office based on the Primary law has the authority to penalise the company if it does not fulfil the obligation prescribed in the Licences;
    - Moldova: Standards and penalties exist. Payments to final customers as well. The experience so far shows that only standards that are tied to penalties are addressed by DSOs;
    - Ukraine: Some standards are comprised in the General Conditions. Joint ‘Regulator+DSO’ Customer Complaint Commissions are established within DSOs;

### ***What kind of agreement was achieved for the next steps?***

On general principles, the participants in this workshop have agreed about the importance of a continued exchange of information on actual quality levels, standards, regulatory mechanisms and strategies. This is going to be particularly important once the *Performance Based Regulation* will come to the regulatory agenda.

Therefore, the following will be conducted:

- Compare strategies, existing practices and experiences in designing and implementing the quality of service regulation;
- Identify the quality of service indicators and select possible standards as mutual comparators;
- Draft a national report on the quality of service, if possible as per structure of one of already existing reports;
- Perform a benchmarking study on the quality of service among interested parties, if possible as per ERGEG/CEER latest template or its shorter version;
- Compare results at regional level and identify possible recommendations at individual one about the quality of supply as arising from the quality of service benchmarking (address in particular setting required levels and establishing baselines).

It was highlighted minimum level of harmonization of rules for data collecting and calculating quality indicators is necessary in order to conduct relevant benchmarking study on the quality of service among Contracting Parties and Observers. Comparing indicators of different or unknown origin could lead to misleading interpretation of results and consequently incorrect conclusions. In order to avoid that, it was proposed to all the Contracting Parties and Observers to include additional comments and explanations on figures and results given in the submitted national reports.

More practically, it was agreed that in the period between the two workshops:

- Each participating regulatory authority will draft its national report on the quality of supply in its jurisdiction by 11 April 2010 (EIHP will closely follow and support);
- Taking stocks of the national reports, each participating regulatory authority will provide inputs needed for a region-wise benchmarking report on the quality of service (EIHP will elaborate the questionnaire and provide explanations).

Consequently, the 2<sup>nd</sup> workshop will be an occasion to present both, each of the national reports and a benchmarking report, preferably in front of audience which would include distribution network operators as well (subject to further discussions). Experiences from the Slovenian regulatory authority will also be thoroughly explored.

