



Quality of Electricity Supply

Ukrainian National Report

by

National Electricity Regulatory Commission (NERC)

National Legal Framework

National Legal Framework Regarding Quality of Service

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);
- NERC Ordinance №200-p of 17 December, 2009 (the Ordinance) obliges the distribution companies to submit related information on supply service quality to the NERC according to the Service quality monitoring Form.

Institutional Actors/Responsibilities

NERC as a regulator in the electricity sector is responsible for quality of transmission, distribution and supply service control in order to meet consumer's rights.

National Regulatory Framework

Methodology of Tariff Regulation

There are about 44 local distribution companies in Ukraine. Currently, a cost-based tariff regulation model is mostly used by NERC for distribution tariff setting.

There are two methodologies of distribution tariff regulation applied for distribution companies in Ukraine:

- based on reported or projected costs including a profit component – for most of the companies;
- based on principles of rate of return regulation with some additional incentive elements – for five privatised companies.

Quality Regulation as a part of Tariff Regulation

Currently, the quality regulation element is not considered as a part of distribution tariff regulation methodology.

Type of Quality Regulation Standards (Overall, Guaranteed)

There are no Quality Regulation Standards currently in force.



Operator Responsibilities and Penalties

According to the Law of Ukraine “On Electricity”:

- suppliers are obliged to ensure reliable electricity supply in accordance to Licence conditions and Contracts;
- in case of electricity supply interruption through suppliers fault the Supplier is obliged to pay compensation to the customer at the rate of double price of unsupplied electricity (according to the Electricity Usage Contract conditions).
- in case of improper parameters of electricity supplied (compared to a mentioned one in the Contract) Supplier is obliged to pay 25% of the electricity price to the consumer.

General Data of the Electricity Grid

Network voltage levels

Currently in Ukraine the following voltage levels are in use for electricity distribution:

- 27kV; 35kV; 110kV; 150kV – 1st class
- 0.4kV; 6kV; 10 kV; 27.5kV – 2nd class

General information about power network and electricity consumers is shown in Table1.

Table 1: General data on the electricity grid

Parameters	Voltage Level			
	110-154kV	27-35kV	3-10kV	0.4kV
Distributed Energy, MWh	32,207,534	12,081,584	25,564,003	50,198,464
Number of Customers	1,944	3,162	241,366	19,589,516
Length of Overhead Power Lines, km	46,818	70,802	311,413	453,073
Length of Cable Power Lines, km	80	431	48,829	34,980

Continuity of Supply

Definition of Force Majeure

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

For continuity of supply quality assessment the values of System Average Interruption Frequency Index (SAIFI) and the System Average Interruption Duration Index (SAIDI) and energy not supplied (ENS) are used. Formulas for their calculation are the following:

$$SAIDI = \frac{\sum_{i=1}^k n_i \times t_i}{N}, \text{ min}$$



$$SAIFI(MAIFI) = \frac{\sum_{i=1}^k n_i}{N}$$

$$ENS = \frac{\sum_{i=1}^k \sum_{j=1}^V n_i^j \times D_i \times \Delta Q^j}{525600}$$

k – number of interruptions of supply

n – number of users disconnected

N – total number of users

D – duration of interruption

ΔQ – consumption over the previous year

V – index of interruption origin, taking into account different areas

Target/Typical Values

As the process of statistic data gathering is still running the standard values of SAIFI and SAIFI have not been determined and set as a target for distribution companies yet. There are 2009 annual Indexes for long interruptions in Ukraine.

Table 2: Indexes for long interruptions for 2009

		SAIDI urban					SAIDI rural					SAIDI Total				
		110 - 154kV	27,5 - 35kV	6 - 20kV	0,4kV	Total	110 - 154kV	27,5 - 35kV	6 - 20kV	0,4kV	Total	110 - 154kV	27,5 - 35kV	6 - 20kV	0,4kV	Total
Planned with warning		1,1	3,2	288,8	85,5	378,5	1,0	22,2	677,6	139,9	840,7	1,1	9,6	420,4	103,9	535,0
Planned without warning		0,0	0,0	72,1	32,1	104,2	0,0	4,5	239,4	52,6	296,5	0,0	1,5	128,7	39,0	169,3
unplanned	Fault of other licensees or customers	0,4	0,1	16,4	2,9	19,8	0,6	1,1	22,9	1,5	26,1	0,5	0,4	18,6	2,4	21,9
	Force majeure	3,5	1,9	102,5	12,4	120,3	41,0	12,4	320,0	16,6	390,0	16,2	5,5	176,1	13,9	211,6
	on third-party fault	0,4	0,2	17,7	2,1	20,3	5,5	4,1	22,8	2,2	34,6	2,1	1,5	19,4	2,1	25,2
	other	2,0	3,5	244,2	41,4	291,1	1,3	10,7	376,9	31,5	420,4	1,7	5,9	289,1	38,1	334,9
Total		7,3	8,8	741,6	176,5	934,2	49,5	55,0	1659,5	244,4	2008,4	21,6	24,5	1052,4	199,5	1297,9
		SAIFI urban					SAIFI rural					SAIFI Total				
		110 - 154kV	27,5 - 35kV	6 - 20kV	0,4kV	Total	110 - 154kV	27,5 - 35kV	6 - 20kV	0,4kV	Total	110 - 154kV	27,5 - 35kV	6 - 20kV	0,4kV	Total
Planned with warning		0,01	0,01	1,39	0,45	1,87	0,01	0,09	2,97	0,56	3,63	0,01	0,04	1,93	0,49	2,46
Planned without warning		0,00	0,00	0,52	0,17	0,70	0,00	0,02	1,27	0,23	1,53	0,00	0,01	0,78	0,19	0,98
unplanned	Fault of other licensees or customers	0,01	0,00	0,09	0,02	0,12	0,03	0,01	0,06	0,01	0,11	0,02	0,00	0,08	0,02	0,12
	Force majeure	0,01	0,01	0,38	0,06	0,46	0,03	0,06	0,97	0,06	1,12	0,02	0,03	0,58	0,06	0,68
	on third-party fault	0,01	0,00	0,11	0,01	0,13	0,01	0,01	0,10	0,01	0,13	0,01	0,01	0,11	0,01	0,13
	other	0,02	0,04	1,51	0,25	1,82	0,03	0,10	1,78	0,17	2,07	0,03	0,06	1,60	0,22	1,91
Total		0,05	0,08	4,01	0,97	5,11	0,11	0,29	7,16	1,04	8,60	0,07	0,15	5,07	0,99	6,29

The audit showed that these data had been underestimated by approximately 20%.

Methods of data collection

As an Appendix to the NERC Ordinance №200-p the uniform tables for data (related to the continuity of supply) collection have been designed:

- Electricity Supply Interruption Registration Form – to be filled in by each regional power network subdivisions of distribution companies and sent to the NERC each month (Table 1.1, Appendix 1);
- Indexes of electricity supply service quality Monitoring Form – to be filled in by each distribution company and sent to the NERC each quarter (Table 1.2, Appendix 1)



Voltage Quality

Used standards and Indices values

The quality of voltage supplied to the consumers is standardised in the Interstate Standard “On electricity quality” (ГОСТ-13109-87) and assessed, basing on compliance with following parameters and their values:

- Frequency
 - frequency error – (± 0.2)Hz
 - frequency fluctuations
- Voltage
 - voltage error – ($\pm 5\%$) of U_{rating}
 - voltage fluctuations
 - asymmetry index (for negative and zero phase-sequence)
 - non-sinusoidal shape index - 5%

Moreover, the specific parameters of voltage required by each consumer are specified in the Electricity Usage Contract.

Commercial Quality

Used Standards and Indices. Methods of data collection

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. Those parameters are applied to pre-contract services (e.g. connection to the network) as well as services, provided by distribution companies during the time of contract being in force (e.g. bills checking, restoration of supply). In compliance with NERC Ordinance each distribution company is obliged to realize the **uniform** registration of all related parameters (See Appendix 2).

Target/Typical Values

Distribution companies are obliged to provide a number of specified services to the consumers within predefined time limits (See Appendix 2). In spite of particular standards existence, there has been no monitoring of their fulfilment by distribution companies so far.

Customer support

Types of disputes

Currently, there is a monitoring of a number of consumer's:

- complaints on quality of electricity supply and those of them been satisfied in favour of consumers with compensation payments;
- applications on bills checking;
- complaints on breach of the Contract conditions

Resolving disputes

No data available so far.



Other relevant comments

The work in sphere of supply service quality regulation in Ukraine has been started in 2006, when the first NERC Ordinance №146-p was issued in order to initiate the process of appropriate information collection from the distribution companies and form the first statistic data. Since then there have been issued several similar Ordinances, each with some amendments and improvements compared to the previous one. The main problem NERC faced with was the different types of data and methods of their registration and submitting by distribution companies. That is why the last NERC Ordinance have introduced the uniform way of data collection and submitting: the standard e-registers in a form of Excel-tables have been designed.

Appendix 1

Table 1.1: Electricity Supply Interruption Registration Form

1	2	3	Voltage level				a cause of interruption		14	15	16	17	disconnected consumers on 0.4kV				disconnected consumers on 6 - 20 kV		24	25	26					
			4	5	6	7	8	9					10	11	12	13	18	19				20	21	22	23	
																										planned
			110 - 154 kV	27,5 - 35 kV	6 - 20 kV	0,4 kV	Notified	Without notification					Force majeure	on third-party fault	other	date and time of interruption beginning	date and time of interruption end	duration of interruption, min.				type of interruption	Number of disconnected transformers 35-6/0,4 kV or lines 0.4 kV	Number of disconnected electricity trade point	Number of disconnected transformers 35-6/0,4 kV or lines 0.4 kV	Number of disconnected electricity trade point
Total: 128 interruption			0	0	56	72	4	80	0	0	0	44			28	181	ln-128/sh-0	2	231	294	24	328	0	72	0	0
1	05	TS376			x			x					01.12.2009 09:10	01.12.2009 16:00	410	long			1	73						
2	05	TS166 L1				x		x					01.12.2009 09:05	01.12.2009 14:00	295	long			[1]	40						
3	05	TS339 L3				x		x					01.12.2009 09:30	01.12.2009 16:40	430	long			[1]	40						
4	05	TS321			x							x	01.12.2009 15:20	01.12.2009 16:45	85	long			1	73						
5	05	TS213			x			x					02.12.2009 08:50	02.12.2009 15:20	390	long			1	73						
6	05	TS65			X			X					02.12.2009 09:10	02.12.2009 16:30	440	long			1	73						
7	05	TS70			X			X					02.12.2009 09:40	02.12.2009 14:00	260	long			1	73						
8	05	TS116			x			x					02.12.2009 14:10	02.12.2009 16:40	150	long			1	73						
9	05	L-47-05			x			x					03.12.2009 10:55	03.12.2009 13:15	140	long			8	586						
10	05	TS230 L1				x		x					03.12.2009 10:00	03.12.2009 15:45	345	long			[1]	40						

Table 1.2: Example of DSOs report to NERC

Voltage level		SAIDI							SAIFI							ENS							MAIFI							Total number of electricity trade point	Annual consumption for the previous year
		planned			unplanned				Total	planned			unplanned				Total	planned			unplanned				Total						
		Notified	Without notification	Fault of other licensees or customers	Force majeure	on third-party fault	other	Notified		Without notification	Fault of other licensees or customers	Force majeure	on third-party fault	other	Notified	Without notification		Fault of other licensees or customers	Force majeure	on third-party fault	other	Notified	Without notification	Fault of other licensees or customers		Force majeure	on third-party fault	other	Total		
A	Б	010	020	030	040	050	060	065	070	080	090	100	110	120	125	130	140	150	160	170	180	185	190	200	210	220	230	240	245	250	260
110 / 154 kV	005	-	-	-	-	-	-	0	-	-	-	-	-	-	0,0	-	-	-	-	-	-	0,0	-	-	-	-	-	-	0,0	5	70000
27,5 - 35 kV	010	-	-	-	-	-	-	0	-	-	-	-	-	-	0,0	-	-	-	-	-	-	0,0	-	-	-	-	-	-	0,0	10	20000
6 - 20 kV	015	20	58	-	-	-	122	200	0,1	0,4	-	-	-	0,5	1,1	2,4	4,4	-	-	-	10,0	16,9	-	-	-	-	-	-	0,0	300	160000
- urban	020	-	3	-	-	-	-	3	-	0,0	-	-	-	-	0,0	-	0,1	-	-	-	-	0,1	-	-	-	-	-	-	0,0	200	100000
- rural	025	26	72	-	-	-	154	252	0,2	0,5	-	-	-	0,7	1,3	2,4	4,3	-	-	-	10,0	16,8	-	-	-	-	-	-	0,0	100	60000
0,4 kВ	030	-	23	-	-	-	6	29	-	0,1	-	-	-	0,1	0,1	-	0,9	-	-	-	0,2	1,1	-	-	-	-	-	-	0,0	20 000	29000
- urban	035	-	4	-	-	-	-	4	-	0,0	-	-	-	-	0,0	-	0,1	-	-	-	-	0,1	-	-	-	-	-	-	0,0	4 000	15000
- rural	040	-	28	-	-	-	8	36	-	0,1	-	-	-	0,1	0,2	-	0,7	-	-	-	0,2	1,0	-	-	-	-	-	-	0,0	16 000	14000
Total	045	20	81	0	0	0	128	229	0,1	0,5	0,0	0,0	0,0	0,6	1,2	2,4	5,3	0,0	0,0	0,0	10,2	17,9	0,0	0,0	0,0	0,0	0,0	0,0	20 315	279000	

Appendix 2

Table 2.1: Information about Indicators of Commercial QoS

List of accounting services companies			due date
Providing access to the distribution network	Delivery of technical specifications		15 days
	Connection of the application equipment to the network	that does not require interruption of other customers	
		that requires interruption of other customers	
	Connection of consumer's equipments to the distribution network after disconnection		5 work days
	Renewal of electricity supply for a customer after removal of a violation and payment of arrears, costs of connection and damage of the distribution company	urban	3 days
rural		7 days	
Provision of the draft contract for electricity supply	For customers (except households) with the connected capacity of up to 150 kW		7 work days
	For customers (except households) with the connected capacity of 150 kW and over		14 work days
Examination of bills for electricity	Examination of electricity bills with verification of metering equipment (except households)	Examination of electricity bills for customers (except households)	5 work days
		Examination of electricity bills and verification of metering equipment (except households)	20 days
	Examination of electricity bills for the population with verification of metering equipment	Examination of electricity bills for households	5 days
		Examination of electricity bills with verification of metering equipment (for households)	20 days
Measurement, analyze quality of electric energy. If there is deviation from the contractual value, then execution of bilateral act about quality of electric energy			2 days
Preparation of the claim on violation of contract terms	Arrival of a company's representative for making up a claim on violation of contract terms	urban	3 days
		rural	7 days
Elimination of drawbacks specified in the claim or a justified denial			10 days
Reply to a written appeal (claim) from a customer)			month

