

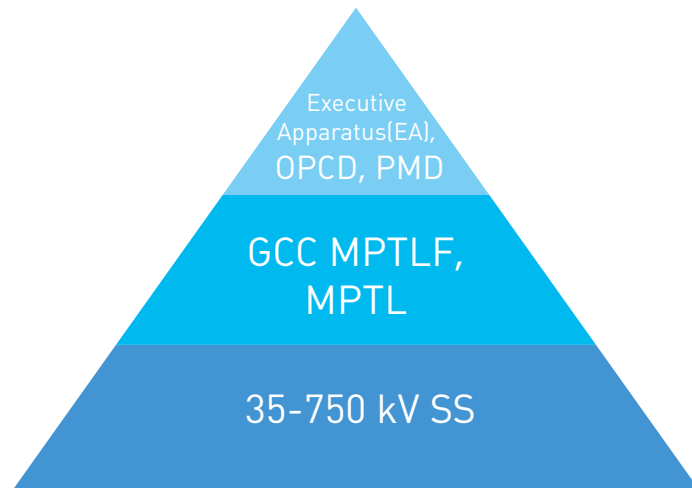
# APPENDIX 1. The UNEG Reliability Provisions

## Reliability System Control

Starting from 2010 Federal Grid Company develops a system of operations and process control in accordance with the UNEG Facilities Operations and Process Control Concept adopted by the Company.

The Company has established an efficient operations and process control hierarchy. The control hierarchy is topped by the Operations and Process Control Division (OPCD) and by the Power Modes Division (PMD) led by the

Deputy Engineer-in-Chief, the Chief Operations Control Officer of Federal Grid Company. The basis of the hierarchy is made of 35-750 kV substations, while the middle part of the hierarchy is composed of the Grid Control Centers (GCC) controlling the operation of the Main Power Transmission Line Facilities (MPTLF) and of the Main Power Transmission Lines (MPTL), with GCC being the first structures of the type in the history of the industry.



The main functions of the Company's operations and process control system are:

- to provide for the reliable operation of the UNEG facilities and to perform in accordance with the performance mode conditions preset by the Systems Operator's control centers;
- to provide for the proper quality and safety of operation of the UNEG facilities;
- to provide for the functioning of the operations personnel training system, etc.

The operations and process control system, its structure and functions are based on the following principles:

- the unification of the structure of the Company's operations and process control divisions, equipped with consistent process hard and software;
- the optimal distribution of functions and responsibilities among the Company's operations and process control divisions;
- the prohibition to assign the operating functions to the divisions not directly responsible for the operation of corresponding facilities, etc.

## General Accident Rate

Federal Grid Company makes every effort to decrease the accident rate. In 4 recent years the Company achieved

considerable results in this field due to the following:

Equipment operation quality improvement  
Production culture improvement  
Accident rate analysis

60.8% decrease in the number of accidents caused by operation defects

Enhancing the responsibility of employees in charge  
Enhancing the responsibility of specialists and managers controlling the progress of the works  
Improving the personnel motivation  
Publication of industry guidelines and information accident prevention materials

32.8% decrease in the number of accidents caused by human factor

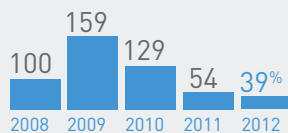
Implementation of the target investment programs involving the replacement of outdated equipment

57.4% decrease in the number of accidents caused by damaged base insulators  
35.2% decrease in the number of accidents caused by damaged high-voltage switches

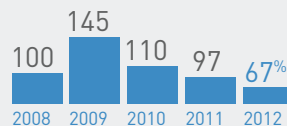
## Electric Power Supply Reliability

### 2008 – 2012 Incident Rate Dynamics Broken Down by Causes

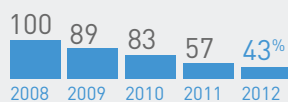
Accidents caused by operation deficiencies



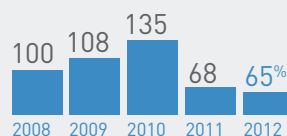
Accidents caused by human factor



Accidents caused by damages base insulators

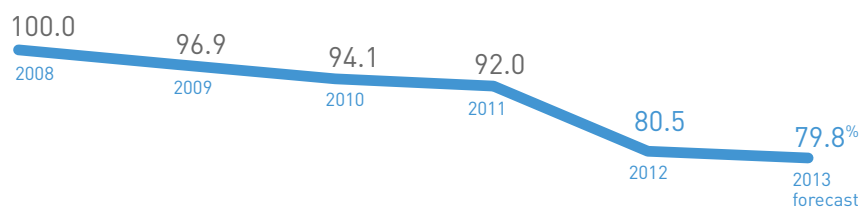


Accidents caused by high-voltage switches



The efforts made by the Company resulted in 19.5% decrease of the specific (per 1,000 conditional units) accident rate, compared with 2008:

2008-2012 Specific (per 1000 conditional units) Accident Rate Dynamics

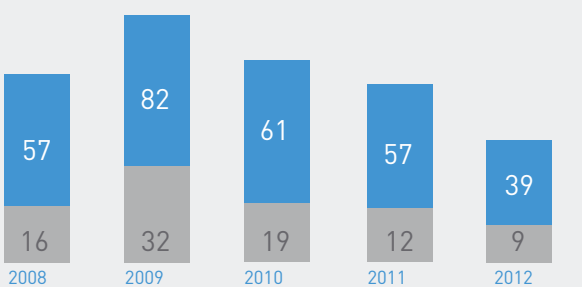


\* The data on specific accident rate for December 2012 are specified on the basis of the statements presented on January 28, 2013 (the data may be updated).

The number of disturbances

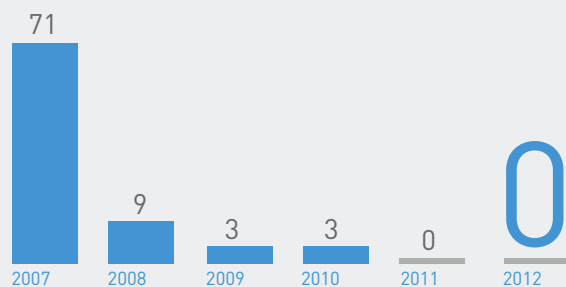
The number of violations of the standard

The Number of Disturbances Caused by Human Factor Has Been Decreased Compared with the Previous Years



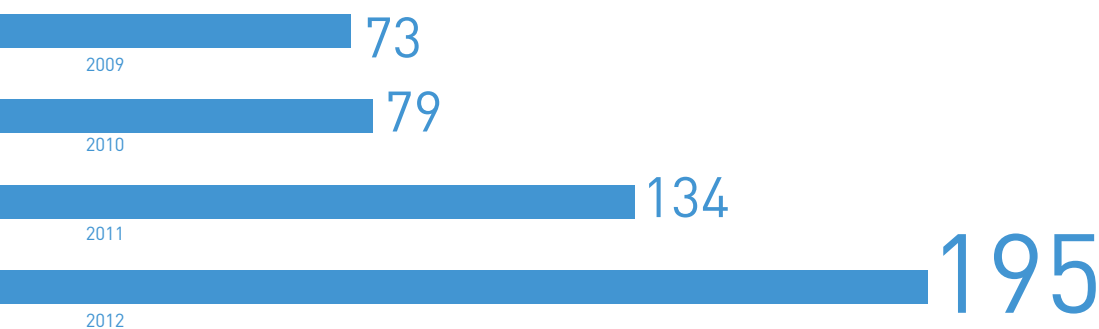
■ The disturbances caused by human factor (meaning all categories of employees)    ■ The disturbances caused by human factor (meaning operating personnel)

The UNEG voltage quality has been improved significantly. No violations of the acceptable voltage level in the UNEG has been registered (such violations amounted to 71 in 2007, decreasing gradually).



The in-depth analysis of the modes of operation of the energy systems resulted in the identification of 195 bottlenecks, limiting the normal and repair mode operation of the grid (134 bottlenecks in 2011, 79 in 2010 and 73 in 2009):

## The Number of Bottlenecks



In 2012 the Company implemented a number of managerial solutions influencing the reliability of power supply directly:

- the operation functions have been assigned to the Grid Control Center of the Primorskoye PMES in accordance with the Operations and Process Control Concept;
- the Company published a standard Policy on the Interaction with the Operating Personnel of Federal Grid Company, a Procedure for the Development and Implementation of Measures to Maintain the Required Voltage Level in the UNEG, and a Company Standard "Instructions on the Calculations to select type, parameters and locations to install the reactive power compensators within the UNEG";
- the Company finished the test operation of the methods to calculate the limiting current loads while preserving the mechanical strength of wires and the acceptable dimensions of overhead lines. The test operation resulted in preparation of the methods of calculation of the limiting current loads for publication.

Also prepared for publication was the procedure for the Company divisions interaction while determining the limiting current loads;

- the Company hosted the IV Interregional Competition with the participation of the operating personnel working at substations and at the GCC of the Company.

The initiatives planned for 2013 include the following:

- Further assignment of operating functions to GCCs of PMESs;
- Publication of standard instructions for performing switching operations at substations of Federal Grid Company, and for the elimination of disturbances at the Company facilities, as well as for the conduct of negotiations and for the execution of documents at substations and at the Company GCCs;
- Preparation of technical and organizational solutions for the transfer of new generation substations under the control of PMES's GCCs, eliminating the need for continuous on-duty personnel at such substations.

## Reliability Provisions and Special Periods

During 2012 autumn-winter period of peak loads the Company provided for 33.3% decrease of the specific accident rate at the UNEG facilities, compared with the same period of 2011. This became possible due to special measures taken by the Company, including two-stage preliminary assessment of the readiness of the power grid facilities for operation during increased loads period.

The Company general managers, meaning the MES directors and SDCs of

IDGC Holding have developed and approved a combined operation scheme for the power grid facilities and optimized the allocation of resources. These successful measures resulted in the obtainment by the Company of the certificate of preparedness for 2012-2013 autumn-winter period. The certificate confirming the timely and properly fulfilled set of measures to improve the reliability of consumer power supply was obtained on November 9.

## Renovation of the Company' Fixed Assets

An increase of capital investments in new construction and reconstruction, and the implementation of special reliability improvement programs resulted in changing the trend for ageing the Company facilities and equipment.

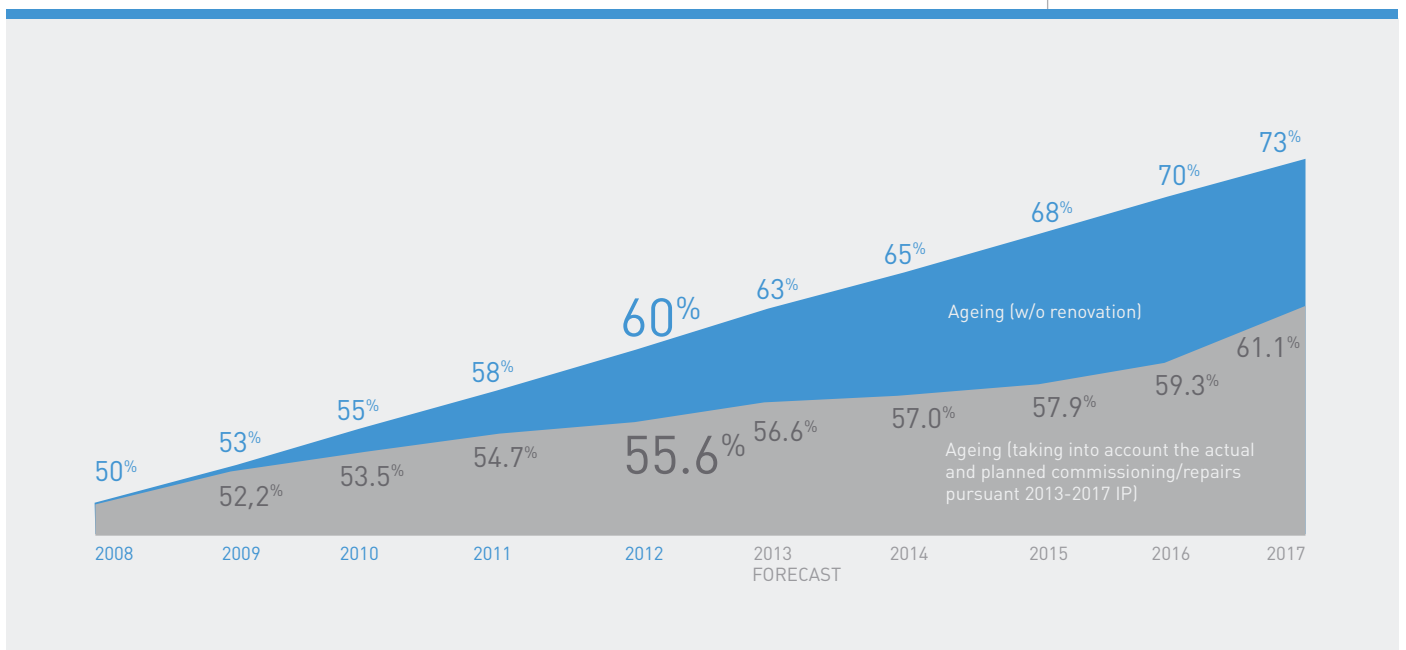
The program for the renovation of the Company's fixed assets as part of the 2013-2017 Investment Program of the Company was approved by the Ministry of Energy of the Russian Federation on October 31, 2012. The renovation program intended to provide for the reliable and efficient operation of the power grid complex implies the commissioning of 31 357 MVA and the reconstruction of 1 231 km of power transmission lines.

The total amount of the Program financing in the period from 2013 to 2017 comprises RUR 194,703 million. The planned complex reconstruction will cover 154 substations and 95 power transmission lines.

In 2012 the implementation of the Company's renovation program resulted in energizing 23 key facilities under complex reconstruction and 20 key facilities under non-complex reconstruction. The most vital facilities under renovation include 220 kV SS Irtysh, 220 kV SS Taksimo and 500 kV SS Arzamasskaya.

## Design and Forecasted Ageing of Power Lines, Taking into Account the Changes in the Stable Operation of the Energy System\*

(the expected renovation of the power lines, taking into account the new construction is 40 years, with the length exceeding 120,000 km)



In 2013 Federal Grid Company plans to invest RUR 41,208.76 million in the renovation of fixed assets pursuant the Renovation Program. The volume of power commissioned at the facilities under complex renovation will comprise 8,170 MVA.

\* During the implementation of the Company's 2013-2017 Investment Program, as approved by the Order No 531 of the Ministry of Energy of the Russian Federation on 31.10.12.2012.