

**GOVERNMENT OF INDIA
POWER
LOK SABHA**

STARRED QUESTION NO:107

ANSWERED ON:17.08.2012

FAULTS IN POWER GRIDS

Abdulrahman Shri ;Baitha Shri Kameshwar

Will the Minister of POWER be pleased to state:

- (a) whether the entire Northern, Eastern and North-Eastern States plunged into darkness due to collapse/faults in the grids recently;
- (b) if so, the details thereof and the reasons therefor along with the names of the services affected and losses suffered as a result thereof;
- (c) the details of the inquiry/probe conducted in the matter along with its outcome;
- (d) the steps being taken or proposed to be taken by the Government for bringing reforms in the power sector in order to avoid recurrence of such situation in the future;
- (e) whether the Government had envisaged any scheme including `Islanding`/ `Segregation` to ensure uninterrupted power supply to National Capital Territory of Delhi and other metropolitan cities after the incident of grid failure in 2002 and revisited, in the aftermath of 2012 grid collapse; and
- (f) if so, the details thereof along with the work executed under the scheme so far?

Answer

THE MINISTER OF POWER (DR. M. VEERAPPA MOILY)

(a) to (f) : A Statement is laid on the Table of the House.

STATEMENT

STATEMENT REFERRED TO IN REPLY TO PARTS (a) TO (f) OF STARRED QUESTION NO. 107 TO BE ANSWERED IN THE LOK SABHA ON 17.08.2012 REGARDING FAULTS IN POWER GRIDS.

(a)&(b) : There was a major grid disturbance at 02.33 hours on 30.07.2012 which led to failure of power in the Northern region and also at 13.00 hrs. on 31.07.2012 leading to loss of power supply to Northern, Eastern and North-Eastern grids barring a few islands. In the Northern Region, Badarpur Thermal Power Station and Indraprastha Gas Turbine station islanded from the grid and continued to feed certain essential loads on both the occasions but collapsed afterwards, due to generation - load imbalance. In Eastern Region, Sterlite Energy Ltd., Burla Hydro Power Station and Ib Thermal Power Station survived during the grid disturbance on 31.7.2012. CESC system also islanded itself from the system and around 900 MW load of Kolkata city was not affected. In North-Eastern Region, Namrup Thermal Power Station, Assam survived with part of upper Assam load of around 40 MW on 31.7.2012. On 30th July, 2012, total load affected in Northern Region was of the order of 36,000 MW. In the second incident on 31.7.2012, approximately 48,000 MW load was affected. Essential services like Railways, water supply, mining, etc., were affected due to the grid disturbances.

(c) : An Independent Committee of Experts was constituted under the Chairmanship of the Chairperson of the Central Electricity Authority to enquire into the reasons for the grid disturbances and suggest interalia remedial measures to avoid recurrence, including secure operation of the grid in the future. Other members of the Expert Committee included Shri A. Velayutham, Retd. Member of the Maharashtra Electricity Regulatory Commission and Dr. S.C. Srivastava, Professor of Electrical Engineering of IIT, Kanpur. Following were the Terms of Reference of the Committee:

- I. To analyse the causes and circumstances leading to the grid disturbance affecting power supply in the affected Region;
- II. To suggest remedial measures to avoid recurrence of such disturbance in future;
- III. To review the restoration of system following the disturbances and suggest measures for improvement in this regard, if any; and
- IV. Advice on other relevant issues concerned with safe and secure operation of the Grid.

The Committee has submitted its Report on 16th August, 2012.

Findings of the Committee

The Committee studied in detail technical data inter-alia concerning analysis of data from Disturbance Recorders (DR), Event Loggers (EL), relay indications, Phasor Measurement Units (PMU), Wide Area Frequency Measurement System (WAFMS), SCADA (Supervisory Control and Data Acquisition) data, reports submitted by SLDCs, RLDCs/NLDC, POWERGRID, generation utilities. It also conducted simulation studies, etc., with the help of an expert team. Based on this study and analysis, the Committee has come to the conclusion that no single factor was responsible for the grid disturbances on both the occasions, that is 30th and 31st July, 2012. The study has concluded that the disturbances were caused by a combination of factors, inter-alia :

I. Weak inter-regional corridors due to multiple outages: The system was weakened by multiple outages of transmission lines in the WR-NR interface. Effectively, 400 kV Bina-Gwalior-Agra (one circuit), was the only main AC circuit available between WR-NR interface prior to the grid disturbance;

II. High loading on 400kV Bina-Gwalior-Agra link: The overdrawal by some of the NR utilities, utilizing Unscheduled Interchange (UI), contributed to high loading on this line;

III. Inadequate response by SLDCs to the instructions of RLDCs to reduce overdrawal by the NR utilities and under-drawal/excess generation by the WR utilities;

IV. Loss of 400 kV Bina-Gwalior link: Since the inter-regional interface was very weak, tripping of 400 kV Bina-Gwalior line on Zone-3 protection of distance relay caused the NR system to separate from the WR. This happened due to load encroachment, that is, high loading of the line resulting in high line current and low bus voltage.

V. On 31st July, 2012, apart from above similar reasons, the system was weakened by outages of transmission lines in the ER network near the ER-WR interface. On this day also, effectively 400 kV Bina-Gwalior-Agra (one circuit), was the only main circuit available. Further, although, the real power flow in this line was relatively lower than on 30th July, 2012, the reactive power flow in the line was higher, resulting in lower voltage at Bina end.

The Committee has also observed that on both the occasions, inter-alia, correct operation of defense mechanism which include under-frequency relay and rate of change of frequency relay and proper response of governors of generators assisted by the compliance of the instructions of RLDCs, would have further assured secure and safe operation of the grid.

The Committee has made a number of recommendations, both long-term and short-term to avoid recurrence of such incidents, some of which are :

- 1) Extensive review and audit of the protection systems should be carried out.
- 2) Frequency control through generation reserves/Ancillary services should be adopted and the present UI mechanism should be reviewed in the light of recent disturbances.
- 3) Primary response from generators and operation of defense mechanisms, like under frequency and rate of frequency based relays as well as special protection schemes should be ensured in accordance with the provisions of the grid code.
- 4) Review of Total Transfer Capability should be carried out and revised periodically as per changes in the system.
- 5) Coordinated outage planning of the transmission elements should be carried out.
- 6) Installation of adequate static and dynamic reactive power compensators.
- 7) Penal provisions of the Electricity Act 2003 need to be reviewed to ensure better compliance of instructions of Load Despatch Centres and directions of Central Commissions.
- 8) Synchrophasor based Wide Area Monitoring Systems (WAMS) should be widely employed.
- 9) Load Dispatch Centres should be equipped with dynamic security assessment tools.
- 10) Islanding schemes need to be planned and implemented so as to ensure power supply to essential services and faster recovery in case of grid disruptions.
- 11) Need to grant more autonomy to SLDCs.
- 12) Proper telemetry and communication systems between all constituents.

(d) : The report of the Committee is under examination.

(e) & (f) : The partial grid disturbance in 2002 had affected supply of power in the Northern Region and the Enquiry Committee inter-alia recommended review of Delhi islanding scheme and split bus arrangement. According to information furnished by Delhi Transco Limited, the generating stations of Delhi connected at 220kV level are operating in split bus mode to facilitate islanding of Badarpur TPS and IPGT stations. While, the islanding schemes for Mumbai city and Kolkata city were in operation even prior to 2002, the islanding schemes for Hyderabad city and Chennai city have been implemented thereafter.