ANNEXURE II

पावर सिस्टम ऑपरेशन कारपोरेशन लिमिटेड
(भारतीय ग्रिड प्रणाली प्रचालन निगम लिमिटेड)
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संदर्भ संख्या/Ref No. POSOCO/NGP/ Dated: 24rd June 2010

To,

Executive Director (Engg.-SEF)
POWERGRID
Gurgaon

Chief Engineer (SP&PA)
Central Electricity Authority
New Delhi-110066

Sub: Proposal for Static VAR Compensation (SVC) in SR and NR

Ref: Operational feedback on transmission constraints dated 5th April 2010

Sir,

With the larger footprints of power system and vibrant electricity market, large haulage of power and economy transactions from one part of the country to other distant part of country are taking place. These economy transactions depend on the demand/ availability (which in turn are seasonal and depend on many other natural conditions) scenario in the different part of country. The above factors are a reason for seasonal bidirectional stress (low/ high voltages) on the transmission system in different areas. This also shows up in the form of transmission congestion. With large foot print, the requirement of the reliability (security) of the power system has increased manifold as stakes are much higher as compared to small individual system.

The Northern Region imports heavily during summer/ monsoon and with good monsoon elsewhere and scant/delayed rains in NR (which is generally is the case), the congestion is being experienced for imports towards NR. Similarly, Southern Region (more specifically S2 Bid Area comprising of Tamilnadu, Kerala and Pondichery) imports heavily during winter / spring due to aggressive purchase in short term, resulting in congestion.

The following are some of the typical issues faced in Southern and Northern Regions:

Tamilnadu is endowed with good wind potential and large part of it has been tapped. Intermittency and variability of wind generation causes redistribution of flows which leads to low / high voltage and overloading of lines. Moreover, transfer capability to SR gets limited due to extreme low voltage experienced in Chennai area. It is also observed that due to rotational load shedding which causes load change over in southern region, there is large change in line loadings and over-voltage problem is experienced at many places.

In areas like Western UP, Punjab, Haryana, Rajasthan & Delhi, high demand (low p.f.) along with skewed load-generation balance causes voltages to dip heavily during peak load season (July-September). In non-monsoon period, hydro generating stations in NR provide generation variation due to limited inflow. These stations are mainly connected via long lines and high voltage becomes a constraint during off-peak hours of a day. A number of lightly loaded EHV transmission lines have to be opened as a routine and are again taken into service before the morning peak. This reduces the network reliability to a great extent especially during the foggy winter nights.

The reliability of the grid could be improved by way of controlling the low as well as high voltages and still keeping sufficient dynamic reactive power margin for eventualities like tripping/fault on highly loaded corridors or large load through off. Though fixed switchable capacitors and reactors

can be used to control voltage but they require manual intervention and thus would not be able to provide dynamic support i.e. D-VAr. Further, their usage could also be seasonal. Therefore, the above problem in SR and NR can be alleviated by Static VAR compensation (SVC) though switchable capacitor banks at lower voltage level would still have to be installed by the utilities. The dynamic compensation in the form of SVC not only helps in handling low/ high voltage problem but also enhance the stability of the power system.

At present there is only one sub-station (Kanpur) where two SVCs of ± 140 MVAR of 1992 vintage are installed. The SVCs at Kanpur have been very effective in controlling and compensating reactive power flow during normal and transient conditions. On 6th July 2005, snapping of Y-phase conductor of 400 kV Agra-Muradnagar line resulted into a fault which continued for 63 minutes and SVC at Kanpur provided full MVAR support. Copy of graphs showing response of Kanpur SVC is enclosed. Further on 28.11.2009, when tripping of Bina-Gwalior 765 kV line (charged at 400 kV) led to emergency operating condition, it was seen that the SVC at Kanpur provided crucial dynamic VAR support (Copy enclosed).

In view of above, it is suggested that SVC of suitable capacity may be provided at an existing or new sub-station in Southern Region and Northern Region. Preferred location would be near Chennai, Bangalore & Hosur / Salem in Southern Region and Jalandhar and Hissar in Northern Region. SVC was suggested at Moga / Jalandhar in the Operational feedback sent earlier on 5.4.2010.

This augmentation could be funded through Power System Development Fund which provides for utilization for the purpose permissible under the relevant Regulations. Clause 33(2) of Power Market Regulation, 2010 is quoted below:

"33(2) Congestion Amount Fund shall be utilised in accordance with the directions of the Commission. The Commission may consider utilisation of the fund for the following purposes:-

a) Installation of VAR compensators, series compensators and other reactive energy generators.
b) Additional transmission capacity creation for relieving congestion
c) To undertake technical study of the grid for congestion reduction....."

At present congestion revenue of Rs. 292 crores is available. It is proposed that the available congestion revenue along with anticipated congestion revenue in next two years may be utilized for providing SVCs of 300-500 MVAR capacity at 6-8 locations in NR and SR. In future SVC in other regions may also be planned as per requirements.

It is expected that the above measures besides helping in secure operation of the grid, would also enhance the transfer capability towards NR and SR. The above suggestions are based on present scenario and situation foreseen in next couple of years. However, based on long term load generation scenario, network development plan and anticipated fault level, CEA /CTU may plan installation of SVCs at other suitable locations.

Thanking You,

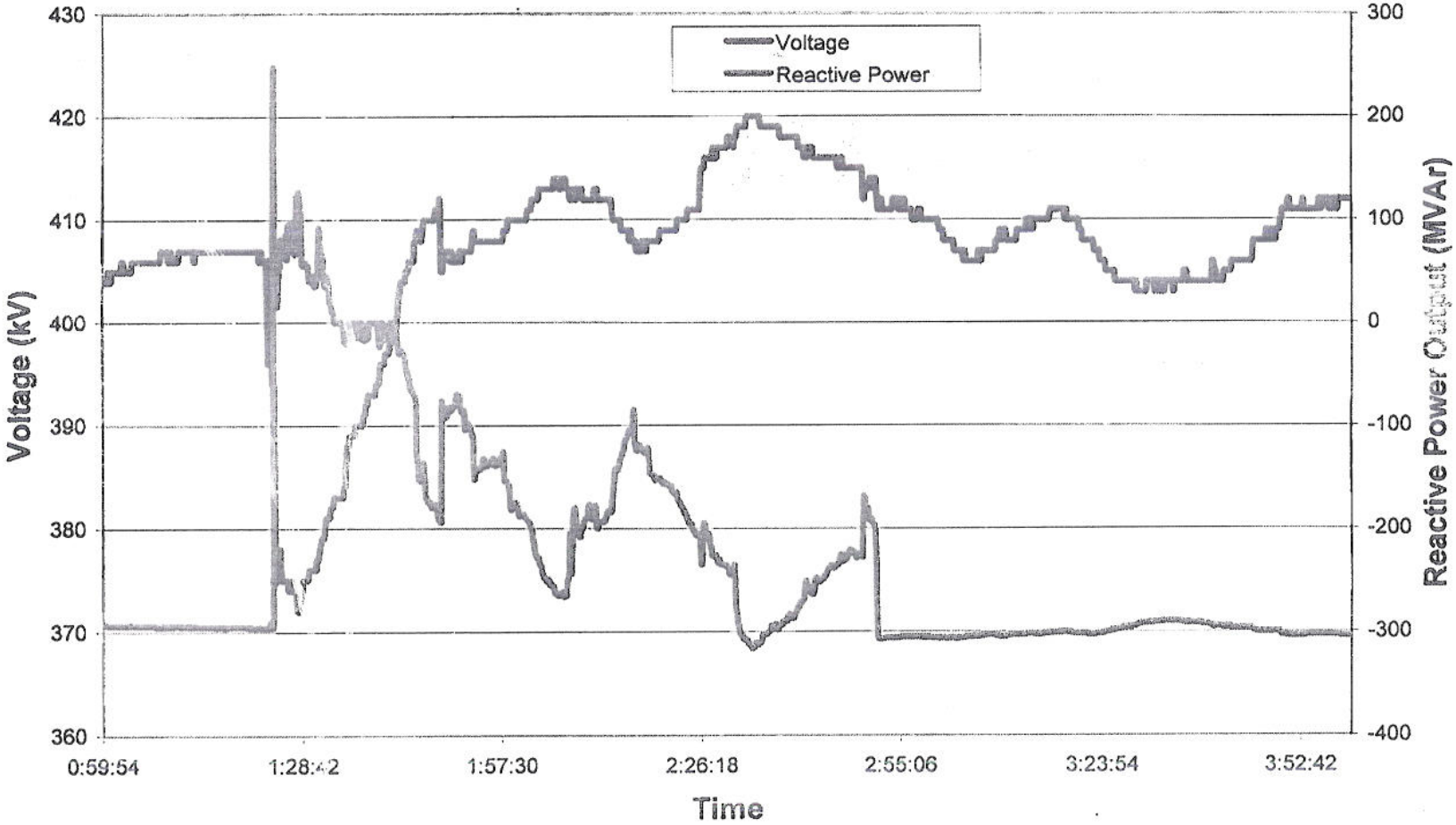
Yours Faithfully

Encl: As above

(S.K.Soonee)
Chief Executive Officer

Copy to: Secretary, CERC, New Delhi

SVC response at Kanpur during the incident on 6th July 2005



SVC Response at Kanpur