

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Petition No. 03/SM/2021 (Suo-Motu)

Coram:

**Shri P.K. Pujari, Chairperson
Shri I.S. Jha, Member
Shri Arun Goyal, Member
Shri Pravas Kumar Singh, Member**

Date of Order: 31st of March 2021

In the matter of:

Extension of Pilot on Security Constrained Economic Dispatch (SCED)

ORDER

The Commission vide its suo motu Order dated 31st January 2019 in Petition No. 02/SM/2019, directed Power System Operation Corporation (POSOCO) to implement a pilot on Security Constrained Economic Dispatch (SCED) w.e.f. 01.04.2019, for thermal Inter-State Generating Stations.

2. Subsequently, the Commission extended the pilot on SCED up to 31st March 2020 vide its order dated 11th September 2019 in Petition No. 08/SM/2019; up to 31st May, 2020 vide order 23rd March, 2020 in Petition No. 01/SM/2020; and up to 31st March, 2021 vide order dated 18th April 2020 in



Petition No. 08/SM/2020.

3. The salient features of the SCED framework applicable till 31st March 2021 are as under:

a. SCED pilot shall be open to all generating stations that are willing to participate, including the generating stations owned by the State and having capabilities to communicate with Regional Load Despatch Centers (RLDCs)/ National Load Despatch Center (NLDC); generating stations whose scheduling is done by RLDCs; and State-embedded generating stations whose scheduling, metering, accounting, and settlement is in place and whose scheduling related information exchange can be enabled through the SLDC interfacing with the concerned RLDC/ NLDC. Scheduling for those generators that are done through SLDC, shall continue to be done by the respective SLDC while increment/ decrement instructions under SCED shall be communicated from NLDC/ RLDCs to the respective SLDC.

b. The schedules of the States/ beneficiaries shall not be changed on account of SCED and the discoms/beneficiaries shall continue to pay the charges for the scheduled energy directly to the generator as per the existing practice. For any increment in the injection schedule of a generator due to SCED, the generator shall be paid from the National Pool Account (SCED) for the incremental generation at the rate of its variable charge. For any decrement in the schedule of a generator due to SCED, the generator shall pay to the aforesaid National Pool Account (SCED) for the decremental generation at the rate of its variable charge after discounting heat rate compensation due to part-load operation as certified by respective Regional Power Committees (RPCs) in case of regional entities and appropriate authority in case of other generators



c. Any incremental change in schedule on account of optimization shall not be considered for incentive computation for the generating stations; deviation in respect of such generators shall be settled with reference to their revised schedule, and any increment or decrement of generation under the SCED shall not form part of RRAS.

d. Generators already participating in the SCED pilot shall continue to participate in the pilot. Other generators willing to participate in the extended period shall be required to provide a one-time consent for participation in the SCED pilot. Once the consent is communicated to POSOCO, it will be mandatory for the generator to participate in the SCED pilot for a minimum period of one month. Such generators shall declare their variable charge upfront, similar to the existing SCED generators participating in the pilot.

e. The generators shall declare their variable charge upfront to POSOCO, along with the technical, operational, and other parameters as required by NLDC/ RLDC/ RPCs.

f. Variable charge of generators other than the ISGS whose tariff is determined by the Commission shall be considered as under:

i. For generators having full capacity tied in multiple PPAs, the variable charge shall be considered as the weighted average of the variable charges, as determined or adopted by the Appropriate Commission.

ii. For generators having only part capacity tied in PPA(s), variable charge shall be considered as the weighted average of the variable charges, as determined or adopted by the Appropriate Commission for the contracted portion of the capacity. This variable charge

determined for the contracted capacity shall be considered for the untied portion of the capacity as well.

iii. For generators with no tied capacity (merchant generator), the variable charge shall be considered as intimated by such generator at least one week in advance to POSOCO. The generators shall be required to declare the variable charge on monthly basis.

g. The net savings after adjusting the compensation for part-load operation to the generators shall be shared among the beneficiaries and the participating generators as follows:

i. As a first step, the share towards 'untied capacity' of merchant generators as well as generators with part capacity tied shall be segregated from the net benefits, in the ratio of contribution of such generators to SCED, for every time block.

ii. The remaining benefits (after segregation as at step 'i' above) shall then be shared in the ratio of 50:50 between the generators (with tied capacity, participating in SCED) and the concerned beneficiaries/ Discoms, aggregated on a monthly basis as per Regional Energy Account (REA) and weekly SCED accounts. The benefits (50% of the remaining benefits after segregation as at step 'i' above) corresponding to the beneficiaries/ Discoms shall be shared in proportion to their final schedule from the generating stations covered under the SCED pilot.

iii. The benefit of generators with tied capacity (i.e. 50% of the remaining benefits after segregation as at step 'i' above) shall be shared between SCED Up and SCED Down generators in the ratio of 60:40 for respective time blocks. In other words, 60% of the

generator's benefit in a time block shall be shared among all the participating generators with tied capacity receiving SCED up signals in proportion to their SCED schedule. Similarly, 40% of the generator's benefit shall be shared among the participating generators with tied capacity receiving SCED down signals in proportion to their SCED schedule.

- iv. Based on the above, if a generator's share exceeds 7 paise/kWh the same shall be restricted to a ceiling of 7 paise/kWh and the gains over and above 7 paise/kWh shall be shared among Discoms in the same manner as at clause 'ii' above.
- v. Accordingly, the benefits for each time block shall be summed monthly for each generator participating in the SCED pilot, as per the Regional Energy Account (REA). This shall require that all accounts including heat rate compensation for part load operation are issued in a timely manner so as to facilitate smooth disbursement and settlement.
- vi. The cap of 7 paise/kWh shall, however, not be applicable in respect of 'untied capacity' of merchant generators as well as generators with part capacity tied for its untied capacity. The share of savings from SCED for generators with part capacity tied, shall be first settled in proportion to their contribution from tied capacity and then from untied capacities. The share in savings as segregated at step 'i' above in respect of such generators shall be the same for SCED up and SCED down i.e. the ratio of 60:40 as in the case of generators with tied up capacity will not be applicable in this case. Hence, the allocations for merchant generators as segregated in the step at 'i' above, shall accrue to such generators as their final share. Similarly,



for generators with part capacity tied, the allocation, as segregated in the first step 'i' above, proportionate to the untied capacity, shall accrue to such generators as their final share for the untied capacity.

h. The sharing mechanism explained in clause (g) shall apply subject to the following:

i. For Inter-State Generating Stations (ISGS) that are regional entities and whose tariff is determined or adopted by the Commission, the heat rate compensation for part-load operation shall be provided as per CERC (Indian Electricity Grid Code) Regulations, 2010 as amended from time to time.

ii. For generators with part capacity tied (whose PPAs have been approved by the Appropriate Commission), the heat rate compensation for part-load operation shall be provided as per CERC (Indian Electricity Grid Code) Regulations, 2010 as amended from time to time. The Station Heat Rate (SHR) to be used as a reference for this purpose shall be according to the provisions in the respective PPA(s) read with the relevant regulations of the Appropriate Commission.

iii. Generators with no tied capacities (merchant generators) shall not be eligible for any heat rate compensation for part-load operation.

i. Benefits received by the SCED generators would be summed every month to estimate the cumulative benefit for each generator in a month. RPCs while preparing REA shall provide and settle monthly benefits for each generator participating in the SCED pilot based on inputs from NLDC/RLDC. Further, POSOCO shall ensure the settlement of accounts as per the methodology with the help of RPCs and RLDCs.

4. In compliance with the above directions, POSOCO implemented the SCED pilot and also submitted a detailed Feedback Report on Expanded SCED pilot to the Commission on 19th March 2021.

5. According to the Report, 1000 MW of additional generation capacity viz. Farakka-III (500 MW) and Korba-III (500 MW) were added on 16th June 2020. Besides these, Jhabua generating station also participated in the extended SCED pilot for two months with 600 MW capacity.

6. With the implementation of RTM (real-time market) in the power exchanges, dispatch under SCED pilot takes place after RTM and the URS (un-requisitioned surplus) available with generating stations post-RTM is used for SCED. The Report stated that faster dissemination of schedule data for bidding decisions in RTM has been facilitated through a secure API shared with generators and constituents.

7. It was reported that during January-December 2020, the total saving in variable cost of generation due to SCED was ₹ 752 crores. SCED resulted in ₹ 1624 crores worth of cumulative savings in generation cost on an all-India basis from the start of the SCED pilot in April 2019 till January 2021.

8. The report highlighted that during January-December, 2020, a significant portion of the generation capacity went under reserve shutdown (RSD), resulting in corresponding reduction in DC (declared capacity) on-bar as well as reduction



in the net schedule of generators participating in the SCED pilot.

9. The Report highlighted that new features were added during the extended period such as modular integration with Reserves Regulation Ancillary Service (RRAS) to improve the reliability of spinning reserves, incorporation of import as well as export Available Transfer Capability (ATC) constraints on inter-regional schedules for all regions, splitting SCED stop functionality into scheduled stop and emergency stop depending on the nature of the event causing the same, incorporation of evacuation limit to ensure reliability during contingency.

10. The Report mentioned that a look-ahead SCED algorithm was developed by POSOCO, the operation and results of which were simulated for one week (viz. 18-24 January 2021). The key driver for a look-ahead SCED algorithm, the Report said, was the reduction of potential infeasibilities as the model had longer term visibility.

11. The Report suggested inter alia that going forward the declaration of variable charges by the generators may be considered on fortnightly basis or weekly basis instead of monthly basis; incremental heat rate curve for each generator may be insisted; minimum turn down level for generator may be brought down; optimisation may be undertaken considering full transmission network; and SCED may be undertaken at intra-State level through SLDC.



12. POSOCO, in its Report recommended that SCED pilot may be continued and Security Constrained Unit Commitment (SCUC) with reserves may be considered for ensuring security and economy in the Indian Power System.

Analysis & Decision

13. The prime driver behind the pilot was to explore the scope of optimisation and, therefore, the possibility of minimising the system cost without major structural changes in the existing system. It is evident that SCED has helped gain experience in the scope of optimisation at the ISGS level and has proved to be an important tool in optimising the available resources in the power system to reduce system cost.

14. The Commission notes that pan-India lockdown for containment of COVID-19 had an impact on SCED pilot as a significant portion of generation capacity went under reserve shut down due to demand reduction. The Commission observes that cost saving in SCED pilot has reduced in 2020 as compared to 2019. However, the cumulative savings of Rs 1624 crores in generation cost from start of the SCED pilot in April 2019 up to January 2021 is significant.

15. The Commission appreciates the efforts taken by POSOCO for adding new features such as modular integration with RRAS, incorporation of import as well as export ATC constraints, splitting SCED stop functionality into scheduled

stop and emergency stop, incorporation of evacuation limit, methodology of handling ramping capabilities of thermal stations etc.

16. The Commission notes the look-ahead algorithm implemented for a week by POSOCO and its advantage such as reduction of potential infeasibilities encountered in the SCED algorithm and ease of generator operations. The Commission believes that the approach based on look-ahead algorithm suggested in the Report can be explored as long as it does not infringe upon the flexibility of the market participants in exercising their choice for any specific market product and consequent scheduling and despatch timelines.

17. The Commission has perused the way forward as suggested by POSOCO in its detailed feedback report. Most of the suggestions besides the extension of the SCED pilot, for instance, the suggestions for consideration of variable charge declaration by the generator on fortnightly basis or weekly basis instead of monthly basis; requirement of incremental heat rate curve for each generator; need to bring down minimum turn down level for generator; optimisation considering full transmission network; need to create a framework for SCUC; replicating the SCED at intra-State level through SLDC etc., need detailed consultation with stakeholders and, in some cases, amendments to relevant regulations. The Commission is already in the process of addressing some of these issues and would take suitable action at an appropriate time by following the due regulatory process.



18. The Commission recognises the challenges faced in implementation of the expanded SCED pilot as a result of COVID-19 pandemic and feels that it would be prudent to further extend the SCED pilot and gain more insights on different aspects related to optimal scheduling and despatch across multiple market avenues.

Summary of Decisions:

19. In light of the above discussion, the Commission decides to extend the implementation of the SCED pilot till 30th September, 2021, on the same terms as contained in the order dated 18th April 2020 in Petition No. 08/SM/2020.

20. POSOCO is directed to apprise the Commission on the operation of the SCED on the monthly basis so that the Commission can carry out any modification, as required. The Commission also directs POSOCO to submit periodic detailed feedback report covering all the aspects.

21. The Petition No. 03/SM/2021 is disposed of in terms of the above directions.

Sd/-

[P. K. Singh]
MEMBER

Sd/-

[Arun Goyal]
MEMBER

Sd/-

[I. S. Jha]
MEMBER

Sd/-

[P.K Pujari]
CHAIRPERSON

