

National Load Despatch Centre (NLDC)/RLDCs shall refer the output of the day-ahead SCED to assess the availability of reserves for the next day.

#### **Day-ahead Energy Market (DAM)**

The day-ahead energy market shall be cleared [by 1300 hrs] and Power Exchanges would convey DAM results to NLDC after clearing of market.

#### **Day-ahead Ancillary Services Market (AS-DAM)**

NLDC shall decide the time block wise requirement of tertiary reserves to be procured from AS-DAM, and the analysis obtained from the output of day-ahead SCED would be one of the inputs. The bids for Tertiary Reserve Ancillary Services (TRAS)-Up and TRAS-Down collected by the power exchanges shall be consolidated and cleared by NLDC [by 1300 hrs]. The time blocks, where the total cleared MW quantum is less than the reserve requirement, shall be identified along with the quantum of shortfall ("X" MW). The quantum of reserves shortfall shall be compared with the indicative reserves from day-ahead SCED run.

#### **Unit Commitment to ensure Adequate Reserves**

The injection and drawal schedules by the regional entities and the results of the Day-ahead market would be available with NLDC [by 1700 hrs]. The above inputs shall be incorporated in the second run of day-ahead SCED for 96 time blocks shall be done at NLDC by 1730 hrs. The available up and down reserves ("Y" MW) in ISGS shall be re-assessed based on the SCED schedules for next day [D] and the committed reserve capacity available through DAM-AS.

In case the available reserves are more than shortfall quantum during all time blocks ( $Y > X$ ), no action is required to commit additional unit. In case available reserves are less ( $Y < X$ ), additional unit(s) would be instructed to come on bar. Additional up reserve would be committed from units under reserve shutdown [by 1800 hrs], in merit order of variable cost. Grid security, ramp rates and likely impact on tie line flows would be considered.

#### **Day-ahead SCED**

The newly committed units shall now be included in the third run of day-ahead SCED for 96 time blocks to be done at NLDC [at 2200 hrs]. SCED shall ensure that the stations committed for reserve adequacy are scheduled upto minimum turndown level. To maintain load generation balance, commensurate reduction shall be done in generation from the on-bar generating station(s) under SCED stack, subject to technical constraints, following merit order. The resulting increase and decrease in schedule quantum would be marked and maintained under a separate head in the scheduling software.

The day-ahead SCED schedules would provide a look-ahead visibility to the power stations about their expected schedule over 96 time blocks, thereby enabling them to be better prepared to handle ramping up or down when required by schedules in the real-time.

The Un-requisitioned surplus power could be traded by the generators in the RTM Real-time Energy and Ancillary markets. Likewise, the states can rebalance their portfolio through RTM. The SCED run in real-time (2-time blocks ahead) would further optimize the schedules after incorporating RTM results subject to security constraints.

#### **Settlement for Day-ahead SCED**

Payments to and from the generating stations on account of SCED schedules shall flow from the National SCED Pool Account.

Payments for the stations where incremental power is scheduled and beneficiaries of those stations to ensure Resource Adequacy, shall be made to/from the Deviation and Ancillary Services Pool Account. Any deployment of Ancillary services from the additionally committed generating station under SRAS or TRAS shall be settled in accordance with the CERC Ancillary Services Regulations-2022.

The generating station from which incremental energy has been scheduled shall be paid their equivalent energy charge from the Deviation and Ancillary Services Pool Account. The generating station where decremental energy has been scheduled to balance the additional energy above, shall pay back the equivalent energy charge to the Deviation and Ancillary Services Pool Account.

#### **Key benefits of SCED**

1. Helps in maintaining resource adequacy in an optimal manner, even in cases when the reserve situation even after the day-ahead markets does not guarantee minimum reserves in the system.
2. Provides a look-ahead visibility to the power stations about their expected schedule over 96 time blocks, thereby enabling them to be better prepared to handle ramping up or down when required by schedules in the real-time.
3. Transparent and simple settlement process for maintaining additional reserves, in line with the Draft IEGC-2022.
4. It builds upon the existing Real time SCED dispatch that takes place on a block-by-block basis, running 2 blocks before the actual time of operation. Gains out of the SCED process would be accumulated into the National SCED Pool Account and those benefits are shared with generating stations and their beneficiary states.

#### **Required enablers for day-ahead SCED**

1. Operationalizing suitable regulatory mechanism for Cl. 46 of Draft Indian Electricity Grid Code (IEGC) 2022 would be needed for a streamlined implementation.
2. Operationalizing day-ahead SCED would require a customized software at NLDC. The same would be developed in-house like Real-time SCED pilot.

The algorithm would solve an optimization problem consisting of the technical parameters and the merit order of energy charges/compensation charges.

3. Minimal hardware and interfacing requirements must be assembled. Changes in web-based energy scheduling software (WBES) and website/APIs would be needed for information dissemination.
4. Technical norms for unit commitment viz., start-up time, shut-down time, minimum up time, minimum down time, ramp rates, etc., have to be submitted by the power plants under SCED as per the format by NLDC.
5. Presently, a vintage system (of 2015 design) is operating at 6 RLDCs/NLDC pan India updated by applying a patch for SCED in 2019. A robust system is needed by upgrading the legacy scheduling software with all the recent developments.

#### **Enablers for incorporating intra-state generation under SCED**

Changes/improvements would be needed at SLDCs and intra-state generators for implementing SCED at intra-state level. This would include improving/streamlining the scheduling, metering, accounting, and settlement system at the state level in line with the Scheduling, Accounting, Metering, and Settlement of Transactions in electricity (SAMAST) recommendations. SLDCs also must adhere to the scheduling timelines like the inter-state power plants. Automation at SLDCs is a must for efficient and quick data exchange.

#### **Implementation Timeline**

A minimum of 3 months post notification of revised IEGC might be needed for the implementation of the above activities.