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Question 2.7 How are the roles and functions of supra-national, national and sub-national operations centres evolving to support the energy transition?

Structure of Indian Electricity Sector

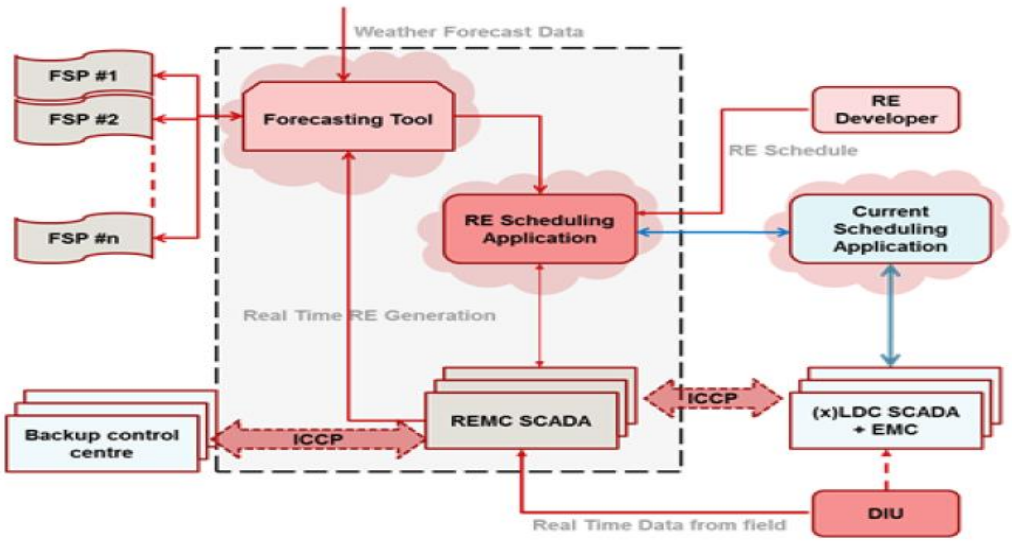
Policy for the energy sector are formed by CEA and Central/State government in India. Regulations based on the policy are notified by Central Electricity Regulatory Commission and State Electricity Regulatory Commission. Roles & responsibilities of various organisations are mentioned in regulations notified by CERC & SERC and amended from time to time. System operators (NLDC/RLDC/SLDC) are apex bodies at National/Regional/State level for monitoring the grid operations, outage planning and optimum scheduling of generations under their control area. Merit order despatch of state owned generating stations are done by SLDC and that of Regional entities/Central generating stations are done by RLDC. Cross-border energy transactions are monitored and scheduled by NLDC.

Hierarchy of load despatch centres

Data flow from SLDC → RLDC→ NLDC for both conventional and renewable energy Management centre. NLDC will montior and regulate inter- control area transactions and RLDC will monitor and regulate intra-State transactions and flows.

Renewable energy management centre

Variability of RE generation in a high penetration is a critical challenge for system operator to manage power system balance, for this, Renewable generation forecasting is an important tool to address variability & ramping aspect of the renewable integration. State of the art forecasting helps grid operator to better manage power system balance for economic, reliable & secured operation of the grid. Dedicated control centre for renewable energy (REMC) established in 12 locations co-located with conventional control centres. The main functions of the REMC are SCADA, Forecasting & Scheduling these functions are compartmentalized into functional blocks (subsystems). REMCs catering to renewables at state level (RE rich states), regional level & National level.



Separate Forecasting and scheduling modules for RE included in REMC at Regional & State level. Renewable energy scheduling module have interface with the scheduling program for conventional generators. Day ahead/Intraday forecasts available at state REMCs used for operational planning by SLDCs. In REMC module, week ahead, Day ahead & Intraday RE forecasts are published and scheduling entity/RE developer can enter their schedule based on this forecast. Revision of forecast of RE generation happens for every 6-time blocks (1 time block=15 minutes) along with the revision of generation schedule. This helps the developer/scheduling entity to enter their schedule with accuracy. Schedules from REMC module is having interface with existing scheduling tool so that SLDC will be able to view the consolidated schedule for any time block. RE developer / RE scheduling entity can sell the surplus power through Power exchange or green day ahead market or real time market.

Support available for system operators

System operators have ancillary support, Security Constraint Economic Despatch (SCED), Automatic Generation Control (AGC) at National level for frequency regulation. Physical regulatory measures are defined at regional level for controlling corridor violations and schedule deviations of State.