



POSOCO Submission ( on behalf of RLDCs/NLDC)  
on  
CERC (Draft) Indian Electricity Grid Code  
Regulations, 2022

**Public Hearing – 19 October, 2022**

# Overview



- **POSOCO welcomes the path breaking initiatives by the Hon'ble Central Commission**
  - Would enhance reliability, security, integrity, economy and resiliency of the system
  - Forward looking and provides a robust foundation for clean energy transition
- **Draft Grid Code endorses most of the recommendations of IEGC Expert Group' 2020**
- **POSOCO suggestions on draft IEGC:**
  - Several rounds of discussions amongst the 5 RLDCs and NLDC
  - Aspects related to practical implementation, timelines and responsibilities
  - Track change version word file (with rationale)
  - Summary and clause-wise suggestions

# Key Focus Areas of Draft Grid Code

**Resource Adequacy Planning**  
(Generation, Transmission)

**Renewables & Storage**  
(Commissioning, Operations, Aggregation & Scheduling)

**Mandate for Reserves**  
(Primary, Secondary, Tertiary)

**Optimization Approaches**  
(SCED, SCUC)

**Protection Code**  
(Philosophy, Compliance and Audit)

**Connection Code**  
(Technical Requirements for First Time Energization)

**Compliance Testing**  
(All grid connected elements to adhere to Standards)

**Model based simulations**  
(Modelling Data)

**Scheduling Code**  
(incorporating DSM/GNA/Ancillary Services and Markets)

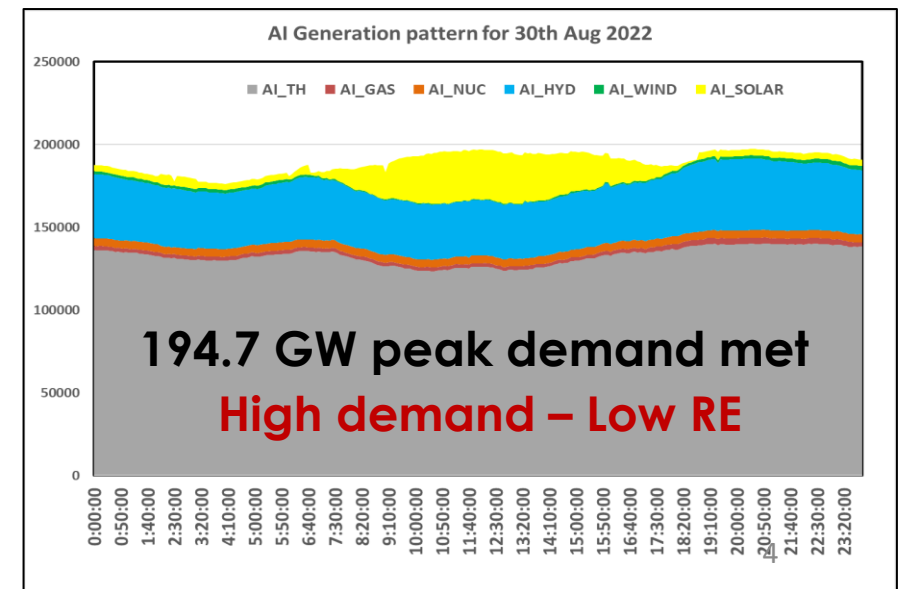
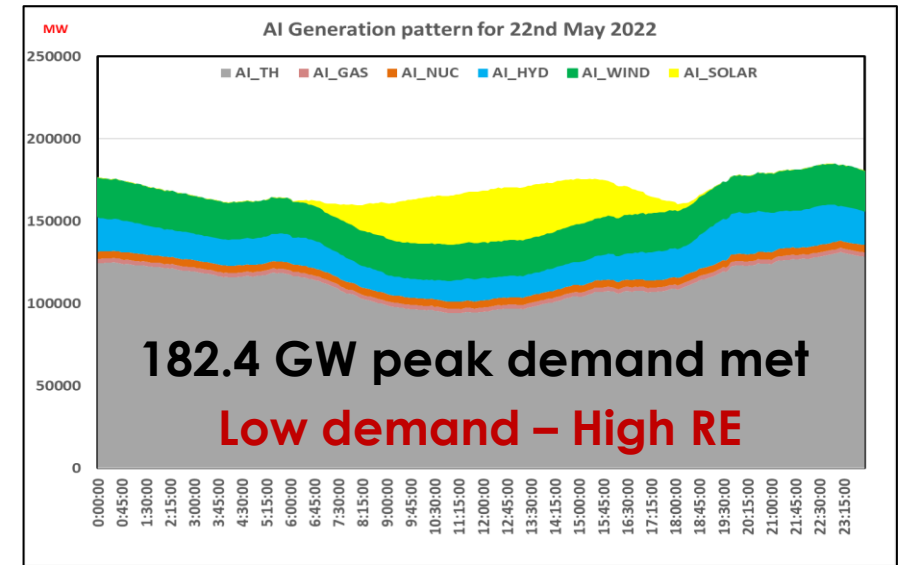
**Flexibility Provisions**  
(enhanced ramping resources e.g. hydro, gas)

**Cyber Security Code**  
(adherence to cyber security framework & reporting of events)

**Monitoring & Compliance Code**  
(Self Audit and Third Party Audit)

# Chapter-2: Resource Planning Code (1)

- **Suggestions on implementation of the Resource Adequacy exercise**
  - Need for a reference targets of reliability (LoLP, ENS...)
  - 8760 hours simulation needed
  - Demarcation of responsibilities of the entities
    - Beyond 1 year: Planning agencies
    - Upto 1 year: NLDC
    - RA for bulk consumers at ISTS e.g. Railways, Industries...
  - Data sufficiency (forecast factoring new category of loads such as data centres, electrolysers, EVs, electric cooking etc.)
  - Enabling market mechanisms for capacity procurement
- **FOR Model Regulations may specify:**
  - Role and responsibilities of different agencies
  - Source of inputs, Timelines for submission, Methodology for assessing compliance
  - Dovetailing with CEA Resource Adequacy guidelines



# Chapter-2: Resource Planning Code (2)

- **Expert Group Grid Code, 2020 recommended as follows:**

*“...CTU shall carry out the planning of inter-state transmission system based on the following:*

- *Manual on Transmission Planning Criteria issued by CEA*
- *Central Electricity Authority (Technical Standards for Connectivity to the Grid) 2007*
- *Central Electricity Regulatory Commission (Planning, Coordination and Development of Economic and Efficient Inter-State Transmission System) Regulations, 2017....”*

- **Enabling provisions related to inter-state transmission planning viz.**

- Model sharing process
- Dissemination of information by CTU
- Consultation with stakeholders
- Optimization studies by CTU in collaboration with STU
- Capacity building
- Periodic review of plans

# Chapter-3: Connection Code

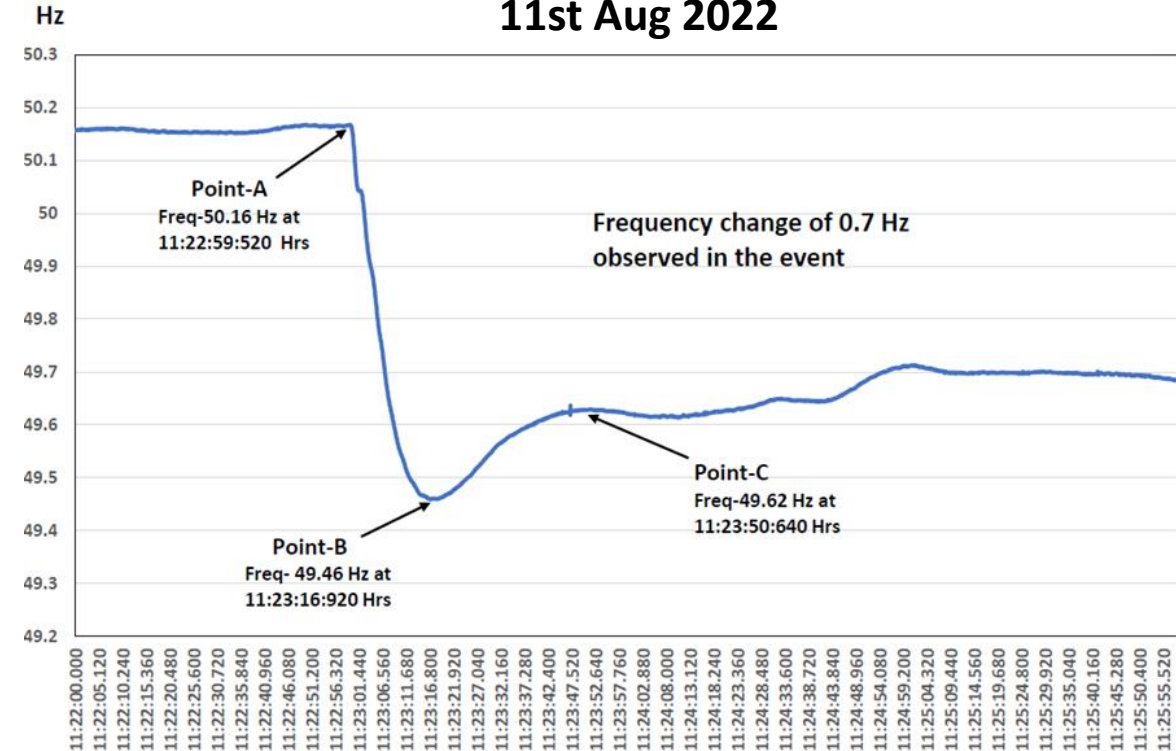
- **Mandate for installation of high-resolution instruments for data reporting and archival for performance monitoring**
  - Inverter-based resources , HVDC, STATCOM and SVC
- **Mandate for CTU/STU to bring out detailed procedure related to interconnection study closer to implementation time**
  - Scope, roles and responsibility, data sharing and compliance monitoring
  - Status review of elements envisaged for concurrent commissioning
  - Evolving suitable measures to overcome mismatches/forecast errors
- **Provisions for submission of ‘as-built’ details post commissioning to concerned LDC**

# Chapter-4: Protection Code

Enabling provisions needed for:

- **Coordination between multiple transmission licensees at S/S**
  - Site responsibility schedule including coordination of protection settings
- **To create a platform for reviewing protection related operational matters in respect of RE and emerging technologies**
  - Several users in the grid may not be members of the RPC fora, they often are unaware of the evolving requirements and recommendations.
- **To ensure availability of protection system to avoid bypassing of protection system by utilities during real time operations**
- **For mandating uniform philosophy in Disturbance Recorder configuration as recommended by RPC**
- **For mandating Integration of Sequence of Events with SCADA**
- **For installation of voice recorder at all control centres**

**6000 MW RE Generation Loss Event in Rajasthan –  
11st Aug 2022**



Preliminary findings based on several meetings held with RE developers, inverter OEMs and PPC controller OEMs at RPC/RLDC/NLDC level

- Non-availability of disturbance records desired for analysis
- Interpretation of CEA standards
- Protection coordination issues
- Coordination between multiple agencies

# Chapter- 5: Commissioning and Commercial Operation Code

- **Infirm injection from a generating unit (before COD) should be scheduled.**
  - Views of the Hon'ble CERC expressed in statement of reasons of Deviation Settlement Mechanism Regulations, 2022
- **Enabling provisions** required to facilitate scheduling of in-firm injection/drawal and mandating responsibility of generators to arrange schedule for any compliance tests after COD
- **Handling of cases of RE entities with only part capacity commissioned**
  - Segregation of firm and infirm injection of power becomes difficult.
  - Suitable provisions for **incremental** commissioning and declaration of commercial operation of RE



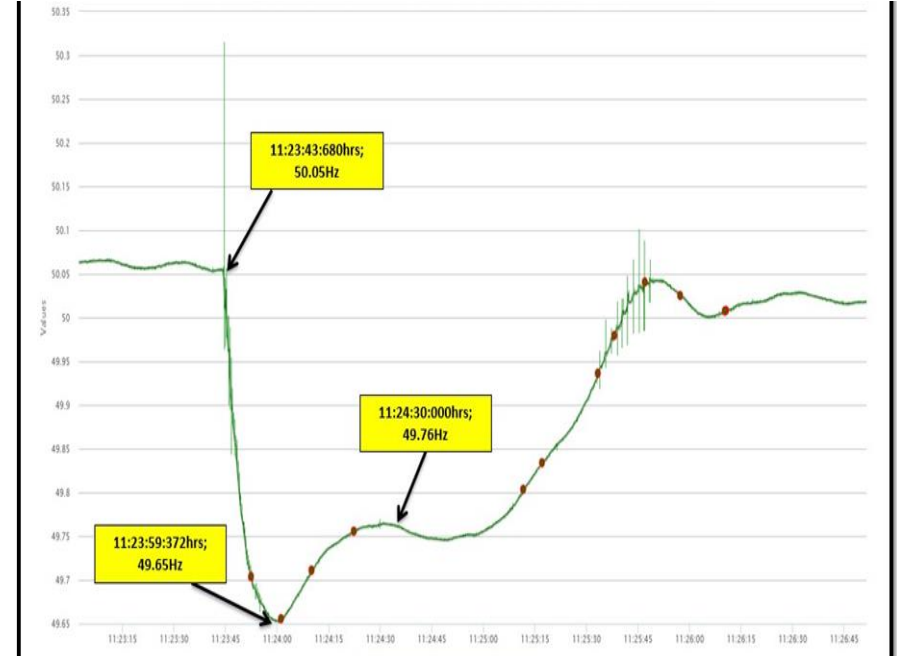
# Chapter-6: Operating Code (1)

- The terms '**integrity**' and '**resilience**' may be included as one of the objectives
- **Requirement of dedicated control centres for coordination with LDCs**
  - Storage, Bulk Consumer, Electrolyser Plant, Lift Irrigation Pumping Stations etc.
- **Enabling provision for allowing simulation-based review of system security aspects like islanding schemes**
  - Field trials of system recovery procedure and islanding schemes is a challenging exercise. It may involve interruption of loads during mock drills.
- **Provision to mandate the User to seek permission from respective LDC in case of temporary disarming of**
  - **Defence mechanism** -islanding schemes, UFR, df/dt relays and SPS.
  - AGC, Protection system

# Chapter-6: Operating Code (2)

- **Standard for bring frequency within band in case of excursion**
  - 15 minutes as recommended by Report of Expert Group
- **Maintaining Adequacy of Inertia**
  - Enabling provision for committing synchronous generation on bar to meet inertia requirements
- **Suggestion provided to remove ambiguity in interpretation of primary response**
  - Primary response is required both during frequency fall and rise events.
  - The term “Frequency falls suddenly” may be misinterpreted;
  - Gradual decline of frequency is also a candidate event
  - Forbidden zones, response beyond technical minimum etc.

Event of solar generation loss of approx. 3729 MW at Rajasthan RE generation complex (3579 MW ISTS RE generation in Rajasthan & 150 MW Rajasthan State Solar generation) of Northern Region



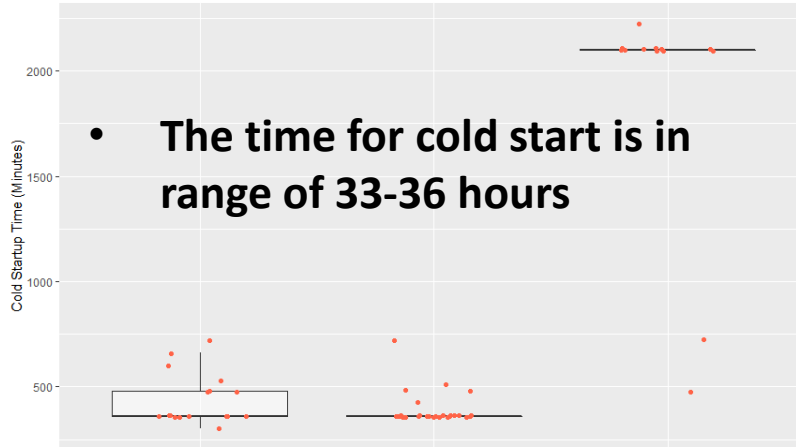
# Chapter-6: Operating Code (3)

- Enabling provision for high resolution sampling & archival of the data as follows:

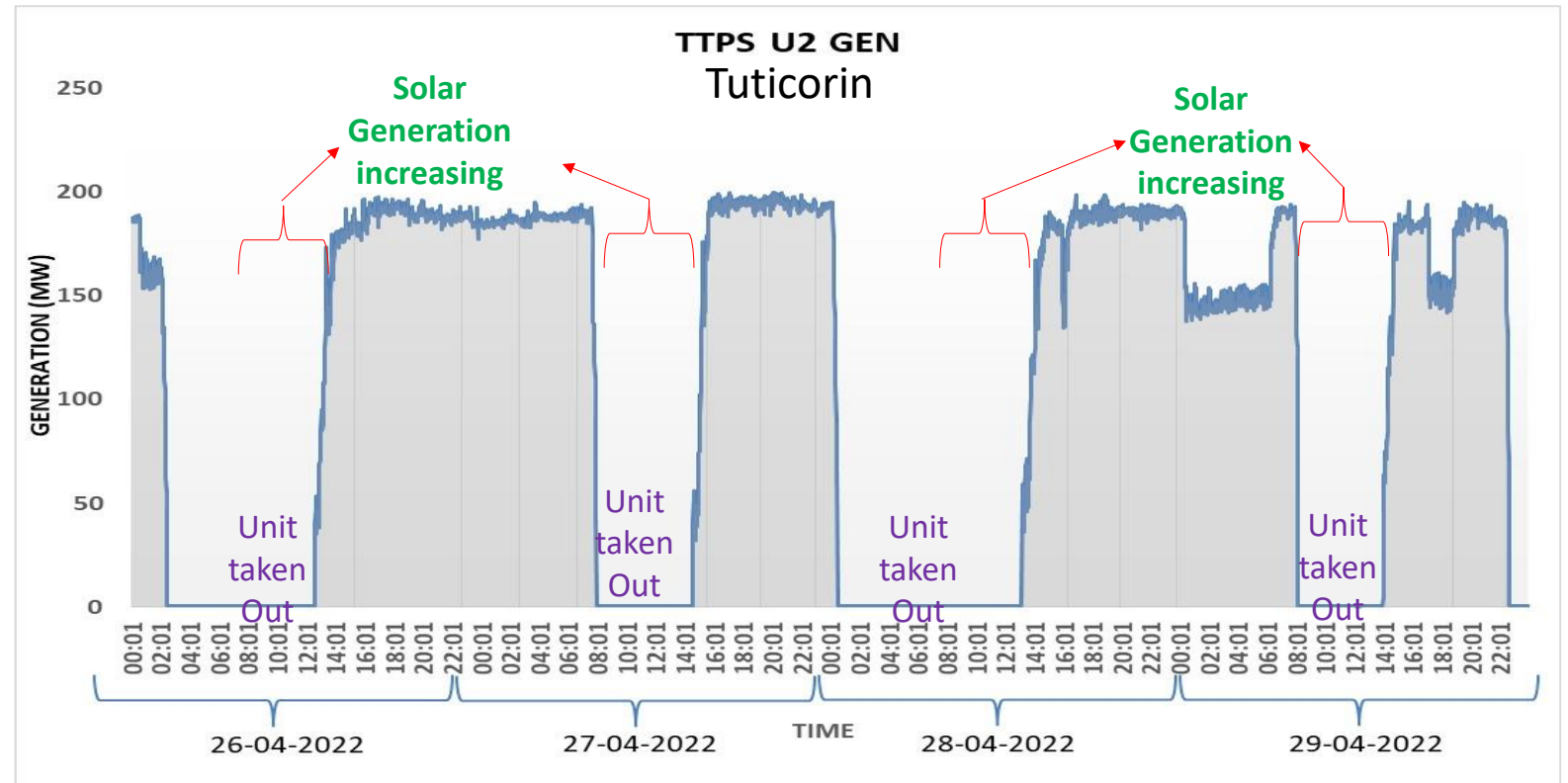
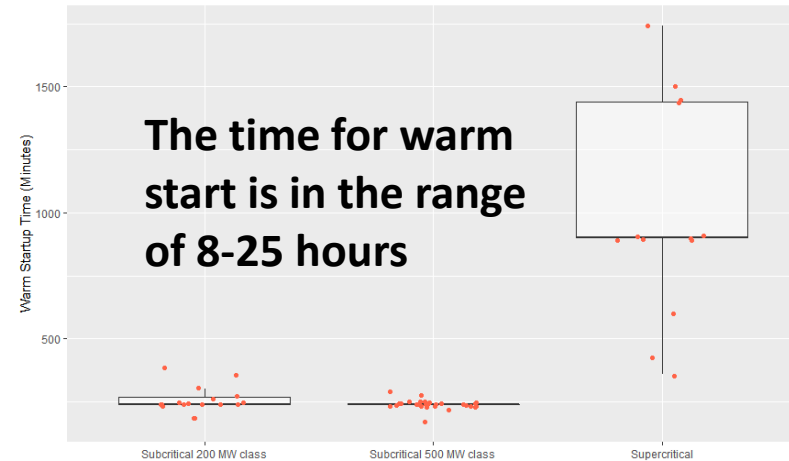
	Parameter	Minimum Sampling Resolution	Minimum Archival Duration	Responsible Entities
1	Frequency	100 milli-seconds	1 year	Generating stations, SLDCs/RLDCs/NLDC
2	Area Control Error (ACE)	10 seconds or lower	1 year	NLDC, RLDCs, SLDCs, Regional and State Control Areas
3	Primary Response input to the Governor or Frequency Controllers	1 second	1 year	Generating Stations
4	Active Power and Reactive Power (with direction: +ve for injection)	1 second	1 year	Generating Stations, HVDCs.
5	Voltage (at Point of Injection for Generating Stations)	1 second	1 year	Transmission Owners, SLDCs, RLDCs, NLDC, Generating Stations.
6	Power Order, Alpha, Voltage, Active and Reactive Power.	20 milli seconds	7 days	Transmission Asset owners of HVDC and FACTS devices
7	Voltage, Reactive Power, Active Power at Point of Injection (for analysis of events involving LVRT and HVRT).	1 milli seconds	7 days	RE Generating Stations, BESS, Inverter Based Resources (IBR).

# Present start up times as per RRAS data submitted

Cold startup time of machines under RRAS



Warm startup time of machines under RRAS

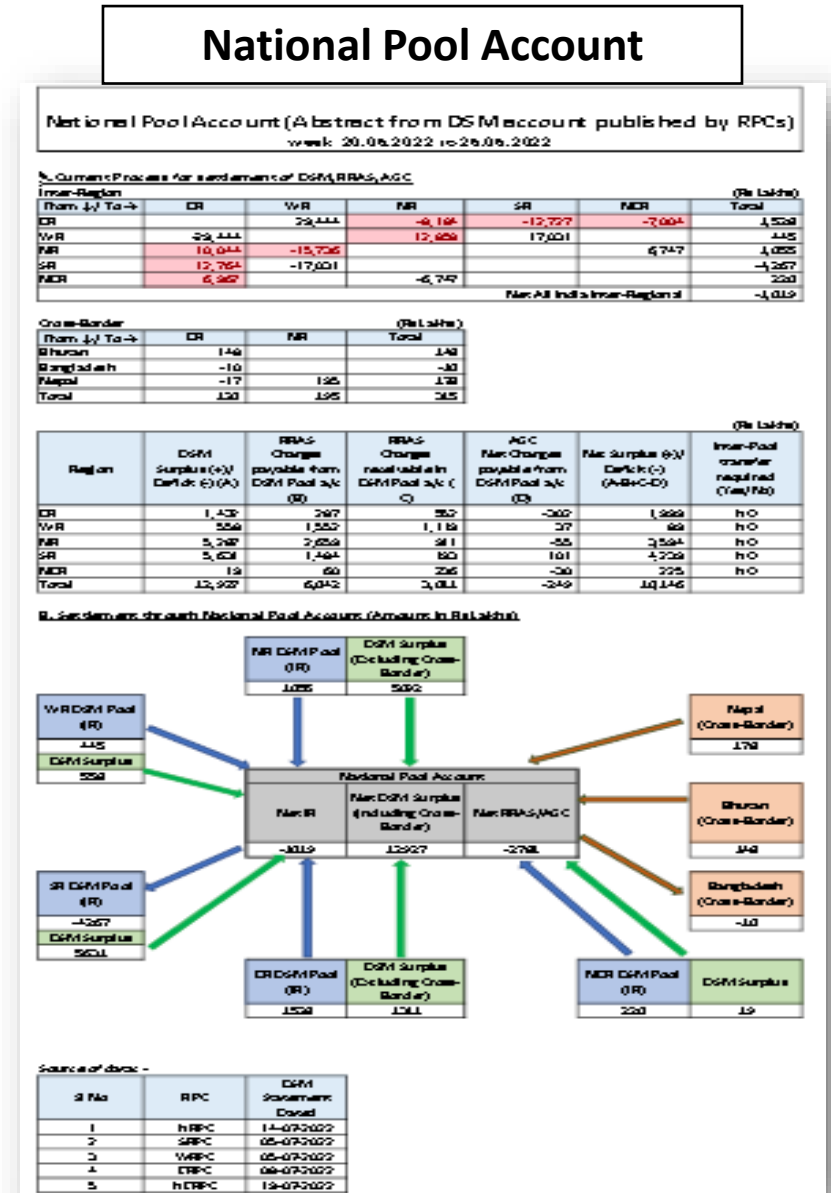


**210 MW Sub-Critical Unit Commissioned in 1980**

- Two shifting operation of thermal power plants would be challenging
- Technical norms required for two shifting and other flexibility services

# Chapter-7: Scheduling and Despatch Code (1)

- In the draft code, the responsibility of scheduling has been decoupled from concept of share allocation and has been linked with connectivity.
  - Prospective application of these provisions in the scheduling jurisdiction of generators and shifting of control area jurisdiction process of settled cases
    - Cases of generating stations embedded within intra-state e.g. MAPS, NNTPP, RGPPPL...
- Enabling provision for monitoring of reserve in power stations participating in short term market
  - Such plants may also participate in SRAS
  - In case of any emergency condition, these plant can be despatched under emergency condition through ancillary services.
  - Enabling provisions required for submission of block wise DC
- Scheduling and settlement of generating stations during DC testing may be specified in the Grid code.
- Penal provisions for failure to demonstrate the DC for merchant generating stations (other than section 62) may also be specified
- Need for incorporation in the regulations of additional roles and responsibilities for NLDC/RLDCs
  - Incorporation of schedules under Ancillary services regulations.
  - Incorporation of schedules under new market products as per CERC orders and amendments.
  - National Pool Account – Mock exercises underway



# Chapter-7: Scheduling and Despatch Code (2)

- **Provision to demarcate responsibility of various agencies ( RPC/RLDC/CTU) for maintaining registry of different contracts (Share allocation/GNA/T-GNA)**
  - **Essential for scheduling, transmission charge sharing, market monitoring, accounting and settlement**

<b>Contract type</b>	<b>Responsible entity</b>
Share allocation	RPC
GNA(LTA/MTOA):	CTU
T-GNA/STOA	Nodal RLDCs/NLDC

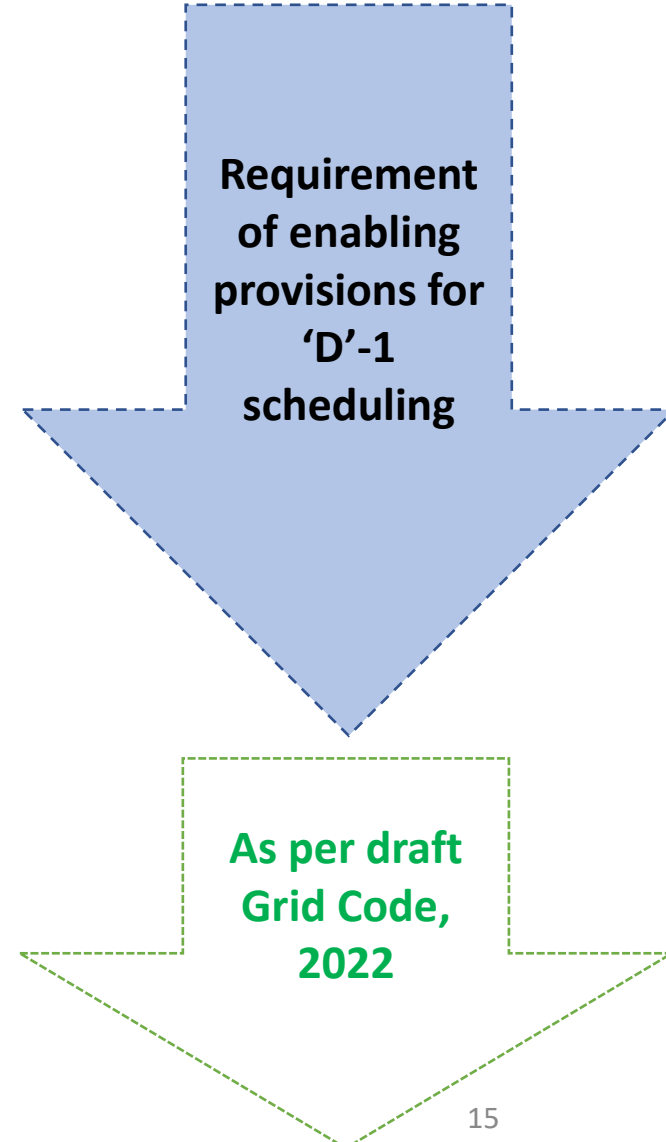
- **Definition of DC**

- In case of DC declared at a lower value than normative, the generator has to be mandated to ensure adequate margins for primary response @ 5 % of MCR

# Need for incorporation of contracts before the 'D'-1

Day	Time (Hrs)	Activity
D-4	23:59	COD Declaration
D-3	23:59	Share Allocation intimation from RPCs
D-3	23:59	GNA/T-GNA grantee shall submit their PPA details mentioning details of the injection & drawee entity
D-2	23:59	Confirmation from PRAPTI portal for curtailment of Open Access
D-1	06:00	<ol style="list-style-type: none"> <li>1) Generating stations to declare DC for "D day"</li> <li>2) Submission of PSM Status by Gencos</li> <li>3) Tentative plant for RE bundling/flexibility</li> </ol>
D-1	07:00	RLDC to publish entitlement for each beneficiary

POSO - Public hearing submissions



# Chapter-7: Scheduling and Despatch Code (3)

- **Enabling provisions regarding scheduling and settlement of energy during the DC testing**
  - Testing may be done on the capacity declared at the time of instructions issued by concerned RLDCs for future block.
  - Practical difficulty for once in a year; may consider testing by exception
- **Clarity of scheduling by QCA of different pooling stations**
  - QCA could represent RE stations connected at different ISTS pooling stations
  - However, QCA should aggregate schedules for ISTS stations connected at same pooling station and not at multiple geographically separated pooling stations.
- **Scheduling provisions for generating stations other than thermal/hydro**
  - Enabling provisions for scheduling of Nuclear/BESS/pump storage stations are required.
- **Scheduling of Gas stations in open cycle/closed cycle**
  - Need for bifurcation of DC for Combined cycle and Open cycle Gas Plants



# Scheduling and Despatch Code (4)

- **Submission of requisition**

- Requisition can be submitted by only one entity to RLDCs for scheduling.
- In order to avoid any dispute “mutually agreed” term may be added

- **Cross border scheduling**

- Entitlements are prepared by 7 AM, it may be difficult for cross-border entity to give requisition by 7 AM
- The proposed time may be changed to 8 AM in line with other beneficiaries.

# Limited time for action for beneficiary to revise their requisitions

Day	Time(Hrs)	Activity
D-1	08:00	GNA grantee to give requisition within GNA
D-1	08:15	Intimation to GNA grantees in case of Tr Constraint by RLDC
D-1	08:30	GNA grantees shall revise their requisition for drawl schedule based on availability of transmission corridors
D-1	09:00	1) In case demand of corridors is more than availability, RLDC to intimate pro-rata corridor allocation to GNA grantee to enable it to place revised scheduling request 2) RLDC to confirm schedules(R-0) for GNA grantees 3) RLDC to release balance corridor for scheduling TGNA requests under Advance Application

**Since no time for revision of schedule by beneficiary, enabling provision for suo-motu curtailment of schedules by RLDCs**

# Chapter-7: Scheduling and Despatch Code (5)

## Change in timelines of exigency application

Day	Time(Hrs)	Activity
D-1	13:00	<ol style="list-style-type: none"> <li>1) The power exchange shall submit the final trade schedules to NLDC for regional entities and to SLDC for intra-State entities</li> <li>2) RLDC to issue schedule (R-2) for collective transactions based on final market clearing by exchanges</li> <li>3) <del>RLDC to release balance corridor for Exigency applications received till 13:00 hours</del></li> </ol>
D-1	13:30	NLDC in coordination with RLDCs shall publish a tentative list of generating stations or units thereof, which are likely to be scheduled below the minimum turn down level of the respective stations for some or all the time blocks of the D day, based on beneficiary requisitions and initial unconstrained bid results of DAM in power exchanges
D-1	14:00	<del>RLDC to process Exigency applications received till 13:00 hours</del>
D-1	14:00	RLDC to release balance corridor for schedule revision by GNA grantees, Exigency Applications, RTM
D-1	16:30	<ol style="list-style-type: none"> <li>1) Beneficiaries of such stations, whose units are likely to be scheduled below minimum turndown level for some or all time blocks of the D day, shall be permitted to revise their requisitions from such stations by 1630 Hrs of D-1 day, in order to enable such units to be on bar.</li> <li>2) The revised requisition from the said generating stations, once confirmed by the beneficiaries by 1630 Hrs of D-1 day, <u>shall be final and binding after 1630 Hrs of D-1 day and further reduction in drawal schedule shall not be allowed from such stations for such time blocks.</u></li> </ol>
D-1	17:30	RLDC to process Exigency applications received till 17:30 hours

# Chapter-7: Scheduling and Despatch Code (6)

- **Calculation of SCED benefits**

- Calculation of net benefit considering each plant tariff regulation/PPA. – Practical implementation difficulty and complexity of settlement
- Need to retain the existing framework for pilot SCED benefits computation

- **Need for consideration of events GD-3 and above for treatment of scheduling**

- Grid disturbance (GD) are categorized based on their severity i.e. load/generation loss
- Present provisions only for GD-5.
- With large interconnected grid and increasing system size, GD-3 itself has band 20 to 30 % which is quite large in case of Indian grid.

- **Inspection of records**

- The number of years for which the operational logs and records to be maintained may be mentioned.

# Chapter-8: Cyber Security

- **Need to include latest provisions on cyber security framework alongwith their amendments issued time to time**
  - Definitions of Cyber Security and Cyber Incidents
- **Need for adherence to CEA (Cyber Security in Power Sector) Guidelines, 2021**
  - Need for the entities to certify their business functions including IT & OT for ISO 27001 Standard
  - Need for entities to confirm to the sectoral CERT regarding compliance to guidelines
  - Need for a detailed procedure indicating timelines, reporting formats and compliance requirement to be prepared by the respective Sectoral CERT
- **Need for Cyber Security Coordination Forum**
  - The appropriate sectoral CERT needs to form a Cyber Security Coordination Forum with members from all concerned utilities and other statutory agencies to coordinate and deliberate on the cyber security challenges and gaps at appropriate level.

# Other minor suggestions

- Retaining the existing chapter on Roles & Responsibility of various agencies for ease of understanding
- Inclusion of an index for easy comprehension
- AUFLS implementation stages and quantum as considered in Report of Expert Group may be included

## Default UFR settings

Sr. No.	Stage of UFR Operation	Frequency (Hz)	Default Settings for Load Shedding
1	Stage-1	49.4	6%
2	Stage-2	49.2	6%
3	Stage-3	49	6%
4	Stage-4	48.8	7%

Note 2: Pumped storage hydro plants operating in pumping mode or ESS operating in charging mode shall be automatically disconnected before the first stage of UFR.

Thank You | Discussions