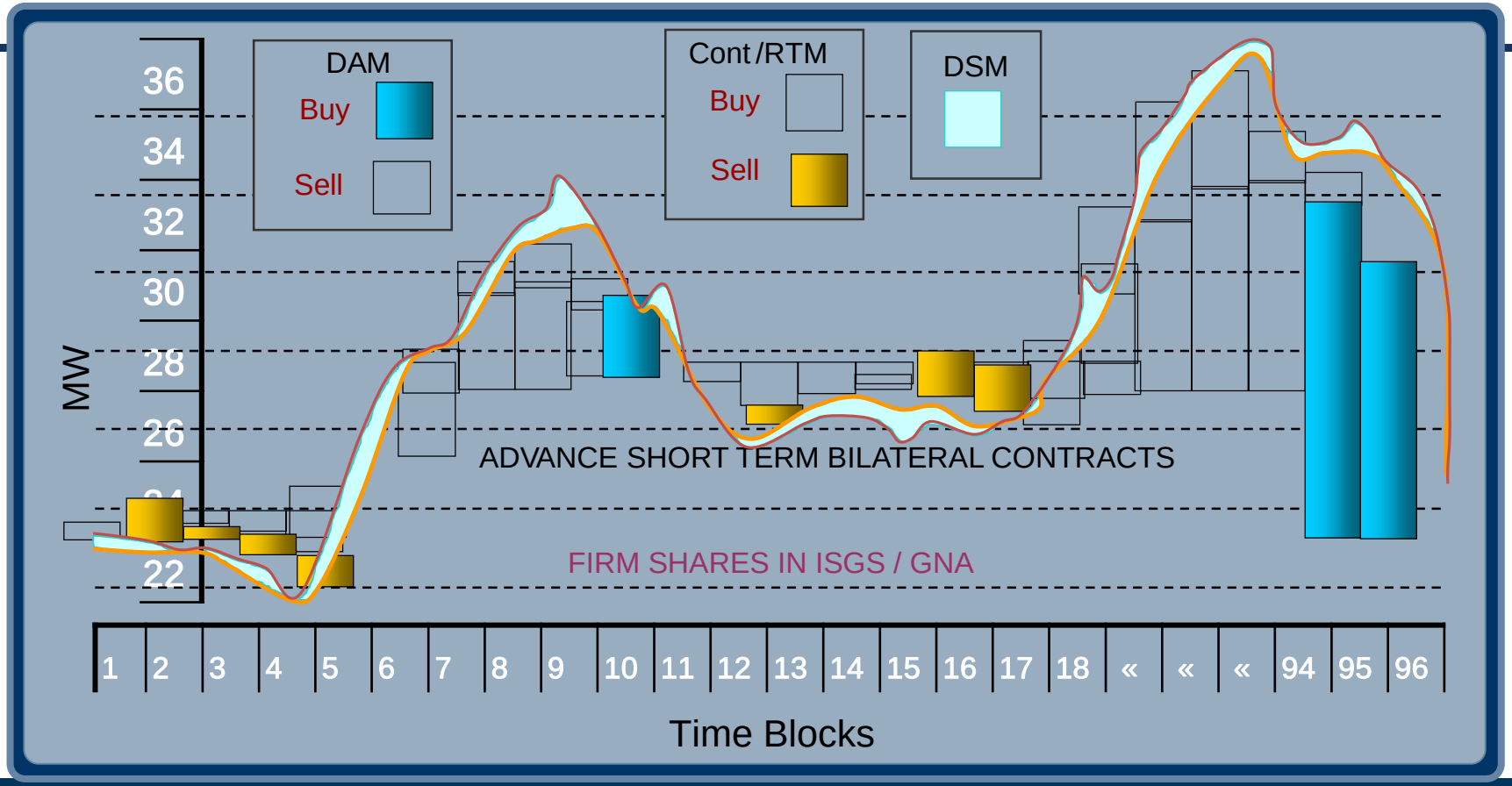
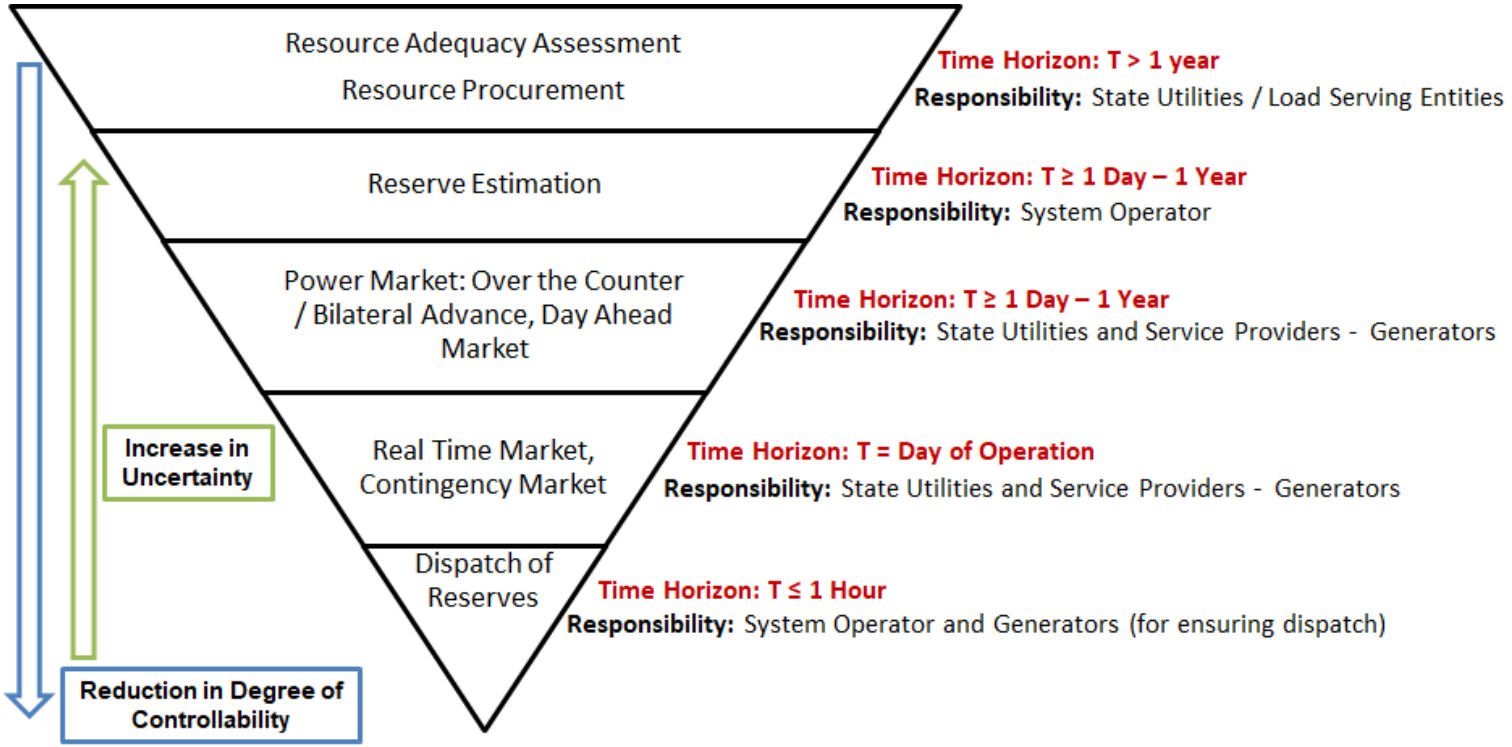
A Typical Despatch



Portfolio Management and Balancing

« 5 H V S R Q V L E L O L W \ 0 D W U L [



Trade-off between Uncertainty and Controllability

Portfolio Management and Balancing

« 7 L P H O L Q H L Q , Q G L D

Any Contract (Long Term / Medium Term / Short Term)

General Network Access (GNA)

Temporary General Network Access (T-GNA)

T > 7 Y (LT)

T > 5 Y - 1 Y (MT)

T > 1 Time Block to 11 Months (ST)

T - 1 Hour

T

Tariff Based Competitive Bidding (PPAs)

Different Products in Bilateral / Power Exchange / DEEP Portal (Advance – TGNA, Exigency - TGNA)

Security Constrained Economic Despatch (SCED)

Delivery

Resource Adequacy Assessment & Demonstration

Term Ahead Market (TAM), Green TAM, High Price TAM

Day Ahead Market (DAM), Green DAM, High Price DAM, RTM

GATE CLOSURE

Operational Reserves, Frequency Control & Balancing

‡ Primary Control (Mandatory)
‡ Secondary (Regulated)
‡ Tertiary (Market Based TRAS)
  ‡ TRAS – DAM
  ‡ TRAS – RTM

Planning Reserves

Reserve Estimation

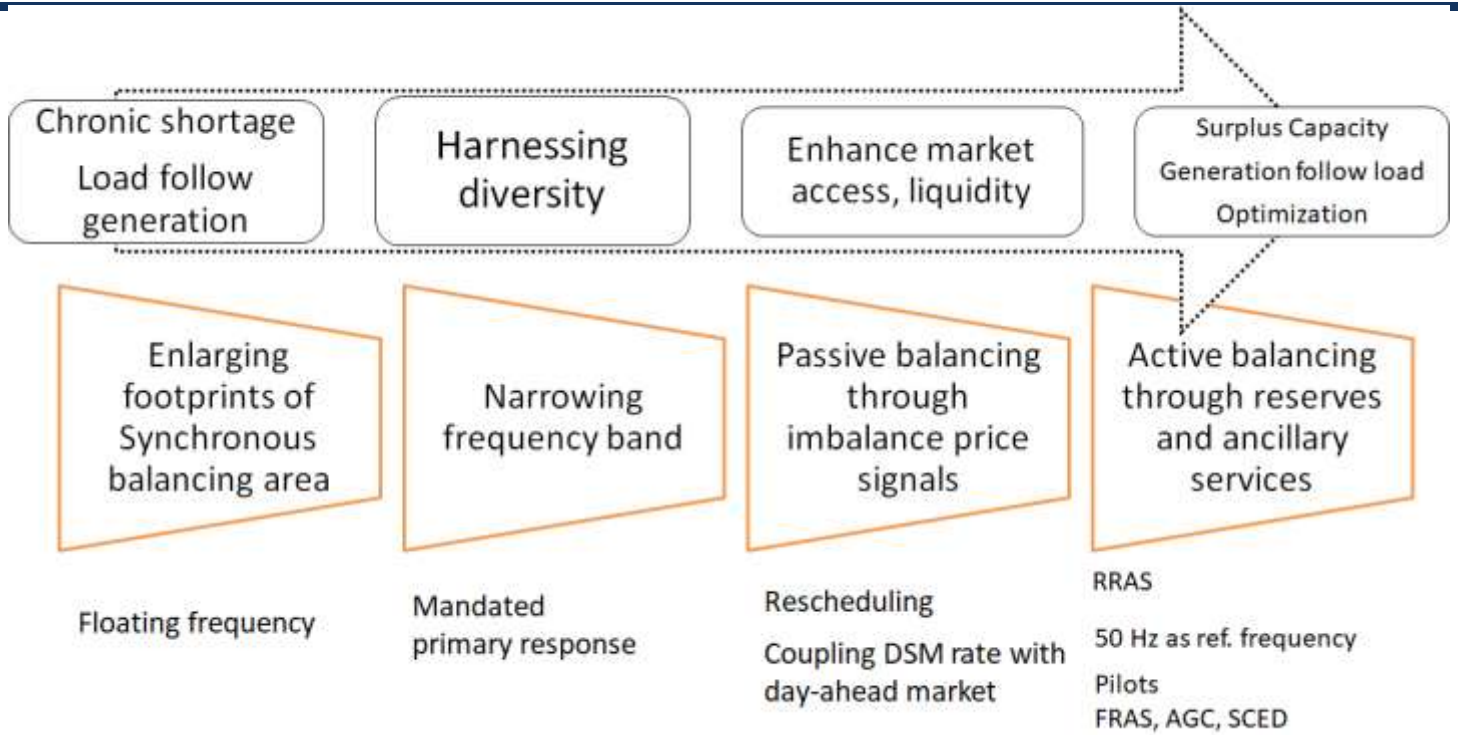
Ancillary Services from RE

Key to Balancing

‡ Resource Adequacy Assessment
‡ Resource Procurement / Capacity Addition
‡ Planning Reserves
‡ Operational Reserves

Introduced in IEGC, 2023

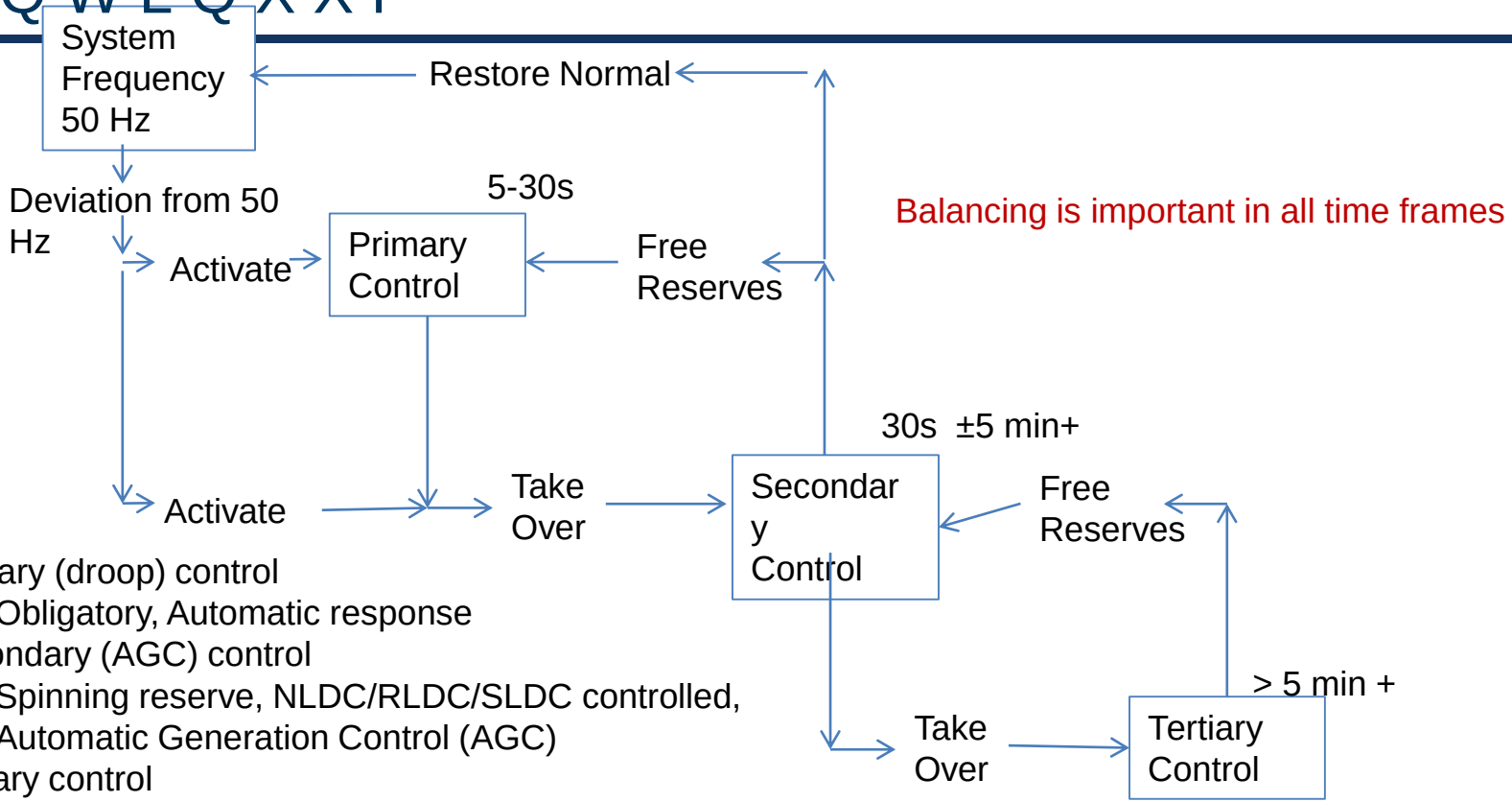
Balancing Paradigms Shift



Reference: Hirth, Lion & Ziegenhagen, Inka, 2015. "Balancing power and variable renewables: Three links," Renewable and Sustainable Energy Reviews, Elsevier, vol. 50(C), pages 1035-1051. https://www.neon-energie.de/Hirth-Ziegenhagen-2015-Balancing-Power-Variable-Renewables-Links.pdf

System Balancing and Frequency Control

« & R Q W L Q X X P



‡ Primary (droop) control
- Obligatory, Automatic response

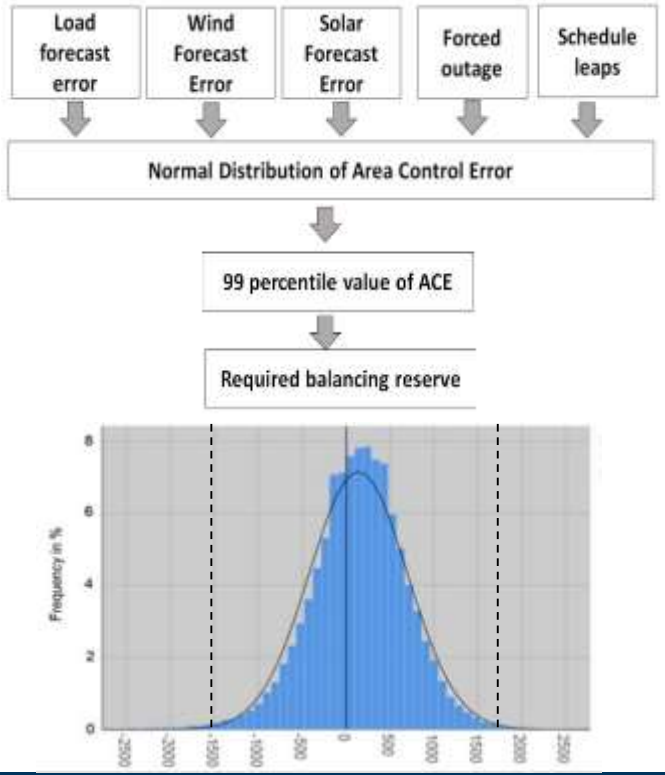
‡ Secondary (AGC) control
- Spinning reserve, NLDC/RLDC/SLDC controlled,
- Automatic Generation Control (AGC)

‡ Tertiary control
- Tertiary Reserve and response from State, Manual

Reserve Estimat ion and Procurement

Basis of Estimation

- Nodal Agency (NLDC) estimates quantum of requirement of SRAS and TRAS at the regional level in coordination with RLDCs and SLDCs and publishes on its website
  - after factoring in the reserves for each state control area
  - based on methodology as specified in the Grid Code
- Requirement of quantum of SRAS and TRAS to re-assessed on day-ahead basis



Planning for Reserves

Year- Ahead	Resource Adequacy/LGBR
Three Day - Ahead	Operational planning/ Unit Commitment

Procurement of Reserves

Day- Ahead	Day Ahead Procurement (DAM - AS)
Intra - Ahead	Incremental Procurement (RTM - AS)

Balancing Reserves Dimensioning (2025 -26)
« $ O ±Ω India level

Type of reserve	Inter -state level (MW)	Intra state level (MW)	Total All India level (MW)
Secondary	6672	4957	11630
Tertiary	6672	10637	17310
Total	13344	15595	28940

‡ All India reserves capture diversity benefit at regional level

‡ Reference contingency for 2024-25 (7000 MW (for Solar hours) / 4500 MW (for non- Solar hours)) published on NLDC website

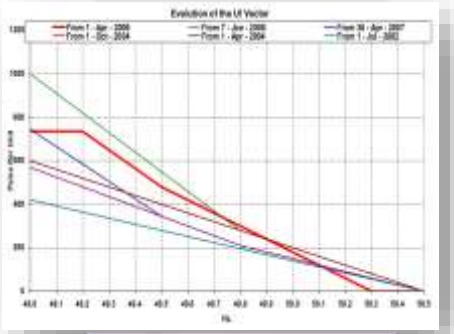
Grid-india.in/en/download/reserves-requirement-of-sras-and-tras-for-2025-26/?wpdmdl=60648

Table 1: Evolution of Deviation Price (erstwhile UI) Vector

Period	Operational Frequency Band	Ceiling Rate (paise/kWh)	Benchmarking of Ceiling Rate	Slope (paise/kWh)	Step size
1st July 2002 – 31st March 2004	49.0 Hz – 50.5 Hz	420	DG set	5.6	0.02 Hz
1st April 2004 – 30th Sept 2004	49.0 Hz – 50.5 Hz	600	DG set	8	
1st October 2004 – 29th April 2007	49.0 Hz – 50.5 Hz	570	DG set	9	
30th April 2007- 6th Jan 2008	49.0 Hz – 50.5 Hz	745	Domestic Naphtha (Liquid Fuel)	6 (50.5-49.8)	
				9 (49.8-49.5)	
				16 (49.5-49.0)	
7th Jan 2008 – 31st March 2009	49.0 Hz – 50.5 Hz	1000	Combined cycle plants -Naphtha/RLNG	8 (50.5-49.8)	
				18 (49.8-49.0)	
1st April 2009 – 2nd May 2010	49.2 Hz – 50.3 Hz	735	RLNG based generating station with variation in fuel prices of around 5%	12 (50.3-49.8)	
				17 (49.8-49.2)	
3rd May 2010 to 16th Sep 2012	49.5 Hz – 50.2 Hz	873	Gas/liquid fuel based thermal generating stations of NTPC & NEEPCO	15.5(50.2-49.7)	
				47 (49.7-49.5)	
17th Sep 2012 to 16th Feb 2014	49.7 Hz – 50.2 Hz	900	Highest cost of generation is 896.02 Paise/kWh @Auraiya CCGT Station	16.5 (50.2-50.0)	
				28.5 (50.0-49.8)	
				28.12 (49.8-49.5)	
17th Feb 2014 onwards	49.90 Hz - 50.05 Hz	824	Highest cost of generation is 8.24 Rs/kWh @ Auraiya Gas Power Station	20.84 (49.70 - 50.00)	0.01 Hz
				35.60 (50.01 - 50.05)	

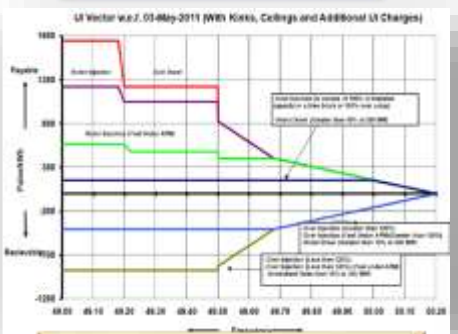
Evolution of Imbalance Handling Mechanism

2002-2010

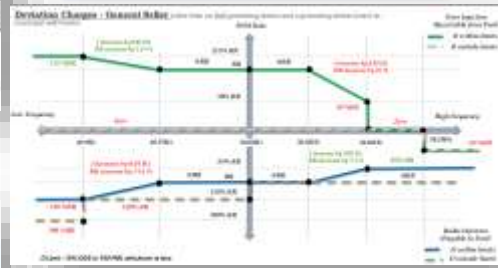


2010-2011

2011-2012

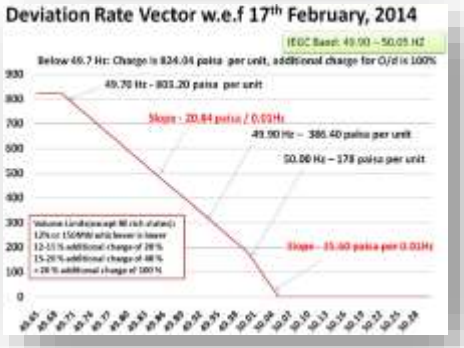


2024 onwards

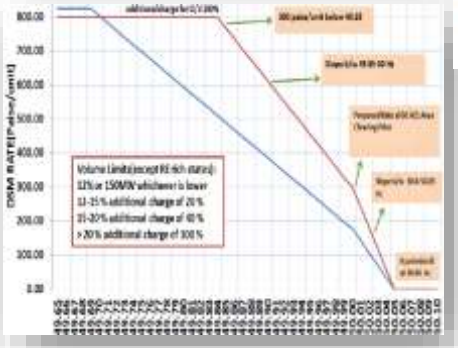


2012-2014

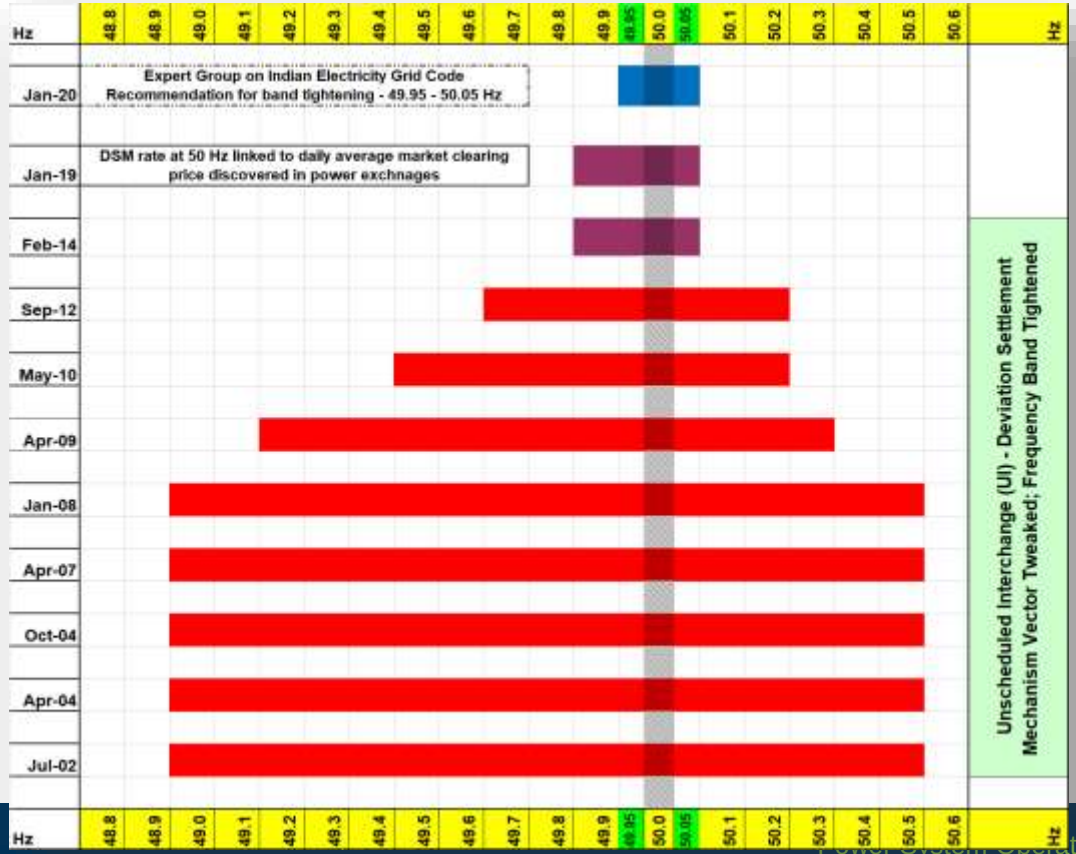
2014-2019

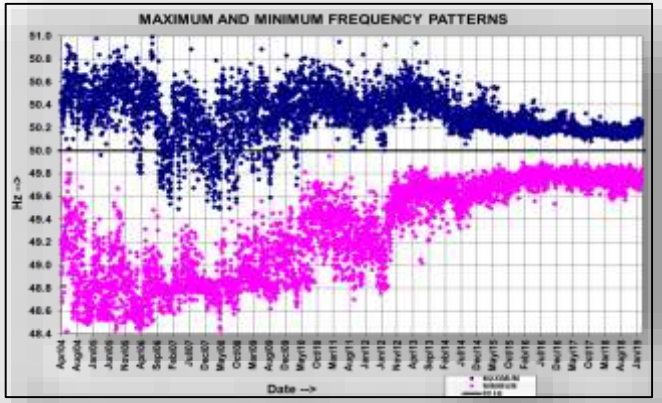


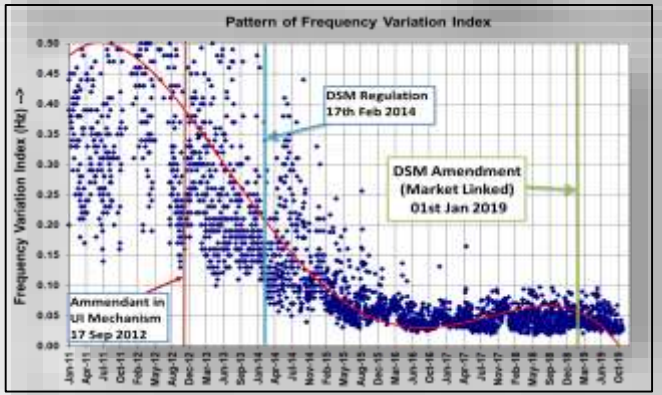
2019-2024



Frequency Band Tightening over the years







Pre- 0 D U N H W / L Q N H G , P E D O D Q F H 3 U L F L Q

‡Pros

- ‡ Real Time Imbalance Pricing
- ‡ Promotes Efficiency and Merit Order Despatch
- ‡ Perfect Information
- ‡ Known ex ante to everyone
- ‡ Provides a negative feedback for automatic correction
- ‡ Facilitates achieving marginal cost despatch
- ‡ Diffusion of market power and choice to buyers & sellers
- ‡ Hysteresis to disincentive possible misuse
- ‡ Simple to calculate
- ‡ No post facto adjustment
- ‡ Discourages advertent deviations
- ‡ Highest priority in payment

‡Cons

- ‡ Regulated Price Vector
- ‡ Not Factoring Value of Lost Load (VOLL)
- ‡ Interplay of Prices in various market segments
- ‡ Not Factoring Time value of Electricity
- ‡ Not Factoring Geographical Location and Transmission Congestion
- ‡ Inadequate Market Opportunities for Balancing
- ‡ Absence of Gate Closure

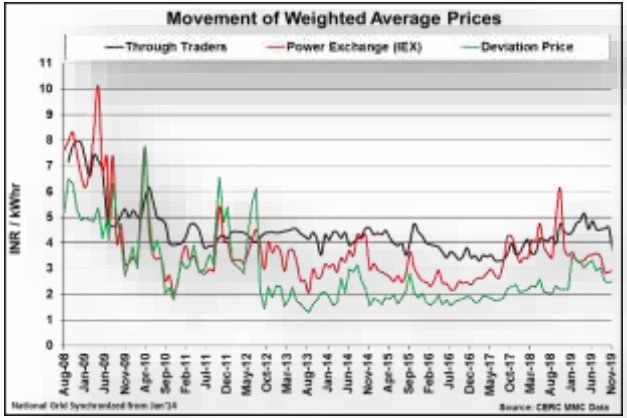
Central Commission Expert Group to Review of the principles of Deviation Settlement Mechanism (DSM) ±2017

http://www.cercind.gov.in/2018/Reports/ASB.pdf

Drivers for Transition to Market linked Imbalance Pricing

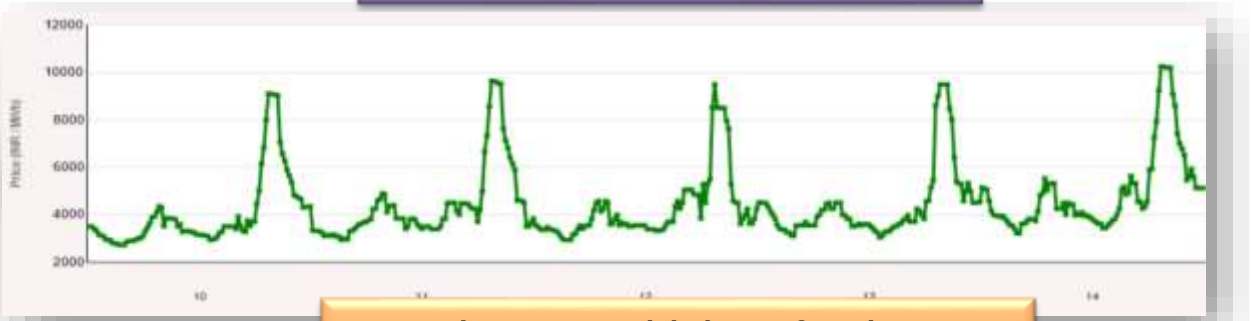
Various Factors affecting Deviation Rate

Interplay of Prices in Different Market Segments



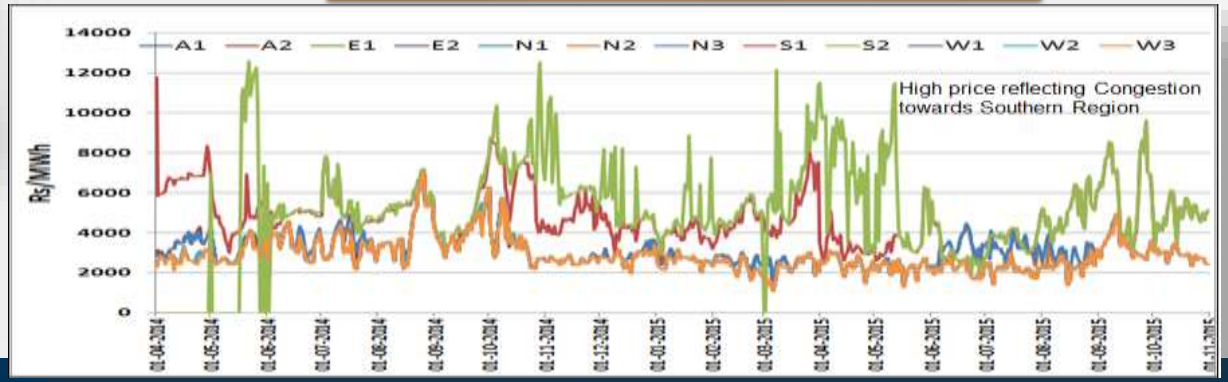
Source: CERC MMC Report

Time Sensitivity of Prices



Source: IEX

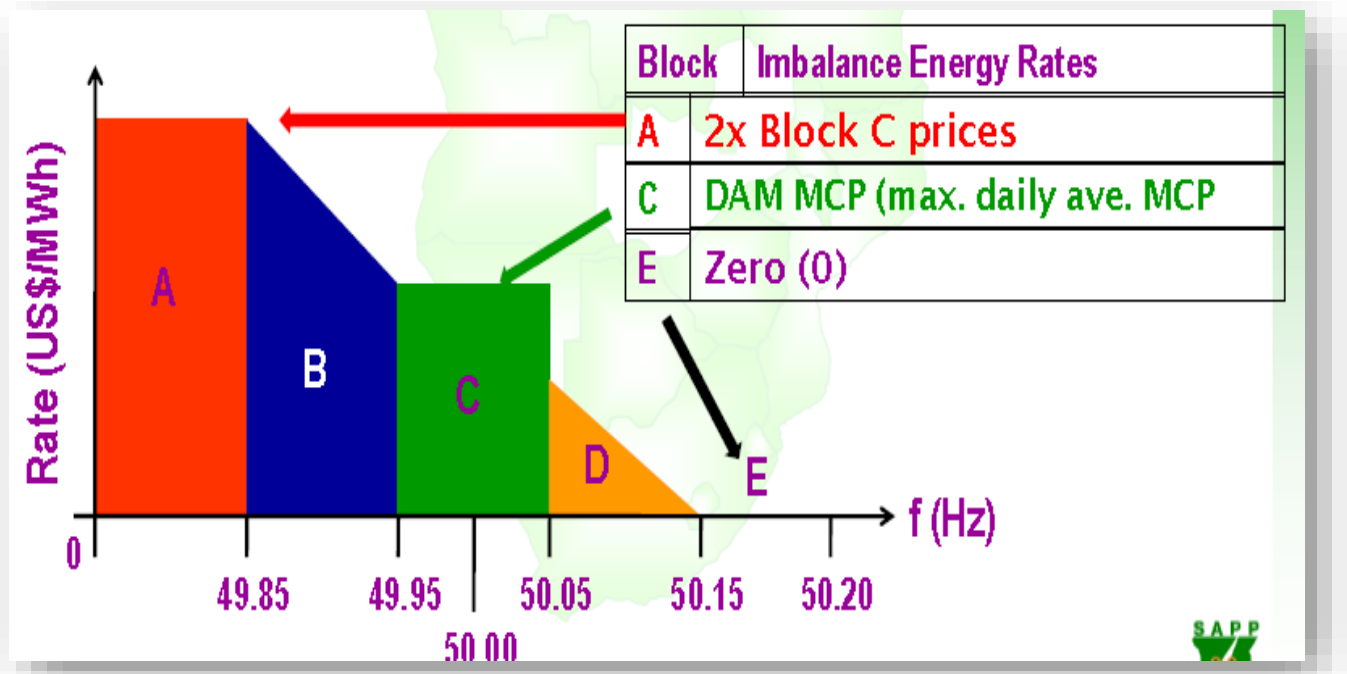
Location Sensitivity of Prices



Source: IEX

International Experience

South African Power Pool (SAPP)



Proposed SAPP Imbalance Energy Rates Calculation

SAPP is reviewing the energy imbalance charges prices in order to link them to market prices.

Source: https://sari-energy.org/wp-content/uploads/2016/03/Session-3-Mr-Musara-BETA-SAPP.pdf

Weakness and the strengths of the present DSM mechanism

- Real Time Imbalance Pricing
- Promotes Efficiency and Merit Order Despatch
- Perfect Information
- Known ex ante to everyone
- Provides a negative feedback for correction
- Facilitates achieving marginal cost despatch
- Diffusion of market power and choice
- Simple to calculate
- No post facto adjustment
- Discourages advertent deviations
- Highest priority in payment
- Hysteresis - disincentive possible misuse

The features lacking in the present mechanism are as follows:

- SMP linked Price Vector
- Factoring Value of Lost Load (VOLL)
- Interplay of Prices in various segments
- Time value of Electricity
- Geographical Location

Transmission Congestion

Sufficiency of Funds for Ancillary Services through Differential DSM Rates

‡ Worldwide, the system balancing costs

± ~ 1-2% of the energy costs

‡ Annual Cost of power procurement in India

± a ` & U R U H

‡ Expected All-India Ancillary Services Costs

± a ` -10000 Crore in the medium to long term

‡ Grid-India scheduling & despatch of ISGS covers

± a R I , Q G L D ¶ V J H Q H U D W L R Q

‡ Grid-India would need

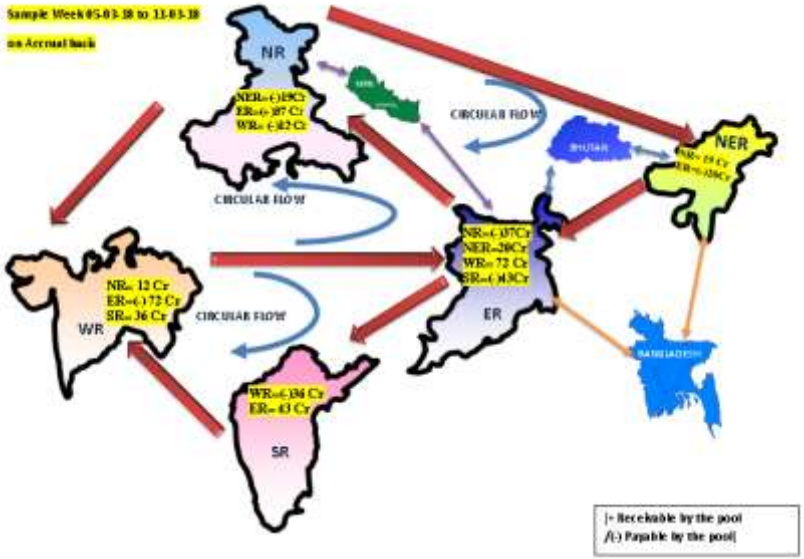
± a ` -5000 Crores annually for ancillary services

‡ Need to ensure regulatory pool account to have sufficient funds

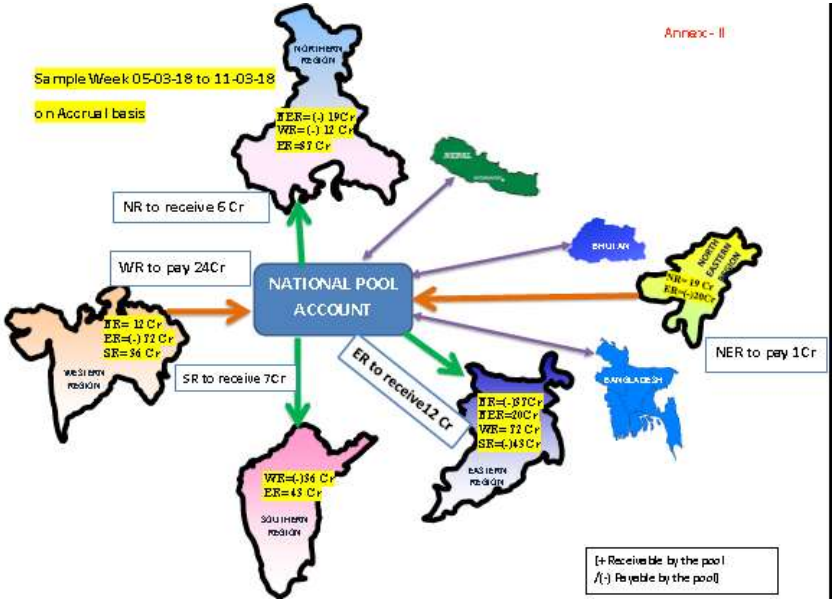
± Differential DSM rates would be needed to capture this aspect

Need for a National Deviation Pool Account

Circular Flow of Funds amongst DSM Accounts Pan -India



Flow of Funds amongst DSM Accounts Pan -India and Proposed National Pool Account



There is a need of national pool account to avoid transfer of fund to deficit region from surplus region while making payment to the recipients of Deviation Pool Account.

NERC Joint Inadvertent Interchange Task Force (JIITF)

White Paper, Recommendations for the Wholesale Electric Industry America, May 2002

Inadvertent Interchange consisted of three components.

Š7KH ILUVW FRPSRQHQW WKH (QHUJ\ &RPSRQHQW UHSU
in the Inadvertent Interchange and is represented in the energy price.

Š7KH VHFRQG FRPSRQHQW WKH 7UDQVPLVVLRQ &RPSRQH
transmission congestion and in present markets this is also included in the energy price.

Š7KH WKLUG FRPSRQHQW WKH)UHTXHQF\ &RQWUROO &RP
response and underlying reserves used to deliver the balancing energy necessary to offset unscheduled energy....

The proposed standard addressing frequency control contribution will have incentives and penalties that will reward good control and penalize poor control. The incentives and penalties need to be sufficient to promote good performance....

...Zero UI/ Deviation is a coincidence rather than expectation....

³ %HFDXVH IUHTXHQF\ LQGLFDWHV WKH supply and demand, frequency is the right guide for interconnection-wide price adjustment. When frequency is high price should be reduced; when frequency is low price should be raised. This is the classical adjustment process for keeping VXSSO\ HTXDO WR GHPDQG ´

³ ,Q D FRPSHWLWLYH PDUNHW WKH UHF FRVW SULFHV DQG WKH IRUZDUG SUL

Arthur Berger & F.C Schweppe:
Real time pricing to assist in load frequency control

IEEE Transactions on Power Systems, Vol.4, No. 3, August 1989

³ $ N H \ I H D W X U H R I W K L V S U L F L Q J V F K power plants can themselves monitor the frequency deviations and thus no real time signal needs to be sent by the electric utility. This eliminates the problem of how the utility could compute and transmit the price faster than the W L P H V F D O H W R E H F R Q W U R O O H G ³

Howard F. Illian
Defining Good and Bad Inadvertent Jan 2002

³ $ P D U N H W U H T X L U H V
determination of
* R R G D Q G % D G , Q D G Y

Sally Hunt & Graham Shuttleworth
Competition & Choice in Electricity

- The market for imbalances competes with longer- term transactions as a means for trading electricity.
- The imbalances must be settled as if they were instantaneous spot transactions i.e. sales of electricity arranged at (infinitesimally) short notice for immediate delivery.
- There must be some pricing rules for imbalances...These pricing rules become central to the character of the whole electricity market
- The main tool available to the Market Operator to encourage efficiency is the price charged or paid for imbalances between contracts and actual flows.
- If these imbalances are priced at punitive rates, generators may be reluctant to offer any flexibility of output. The task of maintaining system security would then be rendered difficult, if not impossible.

LDK Consultants ±Report ±January 2013 Recommendations for Imbalance Settlement

‡ Gross model for energy imbalance settlement.

‡ Single Imbalance price.

‡ Average price of accepted bids in system imbalance direction but long term aim to move o a marginal price.

‡ Weight activated reserve bids by reservation fee.

‡ Remove Transmission constraint resolving bids, make TSO pay for them.

‡ Non Delivery Rule for high price Offers and low price accepted Bids.

‡ RES to be exposed to imbalance settlement on an equal basis to other system users.

Imbalance Rate Design Considerations

- Prices available for use as a reference for DSM
- Size of Market Segments proposed to be linked
- Multiple Power Exchange Prices
- Unconstrained Market Clearing Price or Area Clearing Price
- Granularity/periodicity of prices to be linked
- Frequency Band
- Point of linking DSM Vector and DAM prices
- Slope of the DSM Rate Vector along with the Ceiling and Floor
- Volume limits & Cap Rates
- Single or Dual Imbalance Pricing: Different rates for drawl/injection
- Establishment of truly inadvertent deviations

Deficit in DAS Pool

‡ In case of deficit in the Deviation and Ancillary Service Pool Account of a region, the surplus amount available in the Deviation and Ancillary Service Pool Accounts of other regions shall be used for settlement of payment

‡ in case the surplus amount in the Deviation and Ancillary Service Pool Accounts of all other regions is not sufficient to meet such deficit, the balance amount shall be recovered from the drawee DICs

(i) for the period from the date of effect of these regulations till 31.03.2026, in the ratio of [50% in proportion to their drawal at the regional periphery] and [50% in proportion to their GNA]; and

(ii) from 01.04.2026, in the ratio of the shortfall of reserves allocated by NLDC to such DICs

Provided further that the NLDC shall prepare, with the approval of the Commission, a detailed procedure for recovery of charges in case of deficit in the Deviation and Ancillary Service Pool Accounts, and for the methodology of computation of shortfall of reserves and allocation of deficit amongst DICs.

Payment security

‡ The defaulting regional entity will have open a Letter of Credit (LC) equal to 110% of their average payable weekly liability for deviations in the previous financial year in favour of the concerned Regional Load Despatch Centre within a fortnight from the start of the current financial year.

E.g: If any entity defaulted for one week in 2022-23, then they have to open LC equivalent to 110% of their average payable weekly liability by 1st April 2023 for the FY 2023-24

‡ RLDC shall be entitled to encash LC if the payment is not received within 10 days of issue of statement by RPC & fresh LC shall be recoup within 3 days of encashment.

µ ' H Y L D W L R Q ¶ D Q G ± Need for Integrated Approach

- DSM, per-se, does not balance the system;
- DSM is simply an ex-post mechanism for defraying the costs of balancing
- At the same time incentivizing good contracting and portfolio management behaviour on the part of grid entities.

Deviation
(physical µreal time ¶ manifestation in grid having impact on grid security and reliability)

Two different yet complementary aspects

Settlement
(commercial impact of deviation whether helping the grid or otherwise with incentive/dis-incentive)

DSM is an Integral part of Grid Code

Commercial Mechanism

‡Part of Commercial Mechanism in Grid Code since 2000

‡Part of Terms and Conditions of Tariff Regulations for some period

Standalone Regulations

‡First time in 2009

‡Limitations in revisions of tariff on dynamic basis

‡Enabling provisions related to UI/DSM have been suitably incorporated in the Grid Code for past two decades

‡ Grid Code is the foundation on which the entire electricity market edifice stands

‡ Essential building blocks like Resource Adequacy, Reserves (primary, secondary and tertiary both at inter state and intra state level) and compliance monitoring incorporated in Grid Code in 2023

Implications on the Grid Security and Behaviour

Collectively Distributed Responsibility

‡To maintain Integrated Grid Security and Reliability

‡Clean Energy Transition

Delinkage of deviation with frequency

‡Would lead to deterioration of the primary response

‡Case Study of Maharashtra ±Imbalance Pricing delinked with frequency a non-starter

‡Would delay intra-state ABT implementation pan-India

‡Would be impacted with uncertainty of Ancillary Services Despatch

Resource Adequacy in all time horizons

‡ Need for systematic resource adequacy framework for balancing

‡ (Q H U J \ P D U N H W V G R Q ¶ W E U L Q J D G H T X D F \

‡ Globally, capacity adequacy studies are conducted by the perspective planners

‡ Need to publish rolling 7-10 yearly adequacy statement

  ± Generation (basket of resources) & Transmission on a rolling basis.

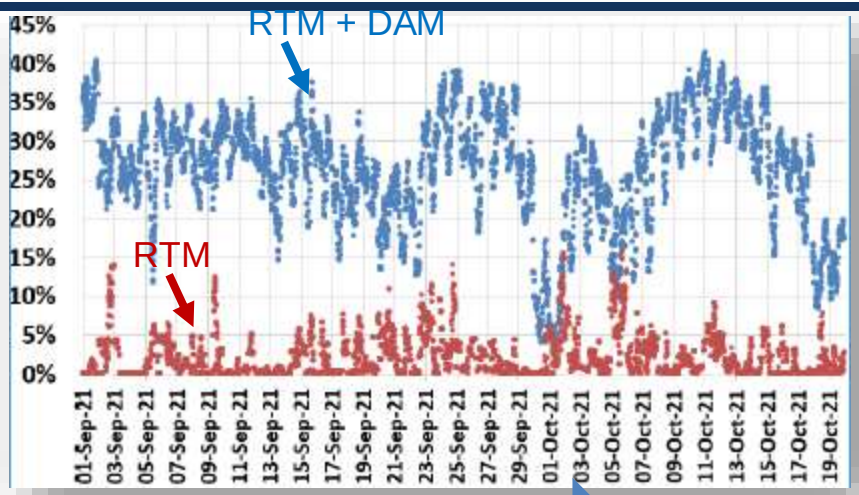
  ± Need to consider reasonable reserve margins to take care of contingencies

‡ Determination of resource adequacy guidelines for each region is important

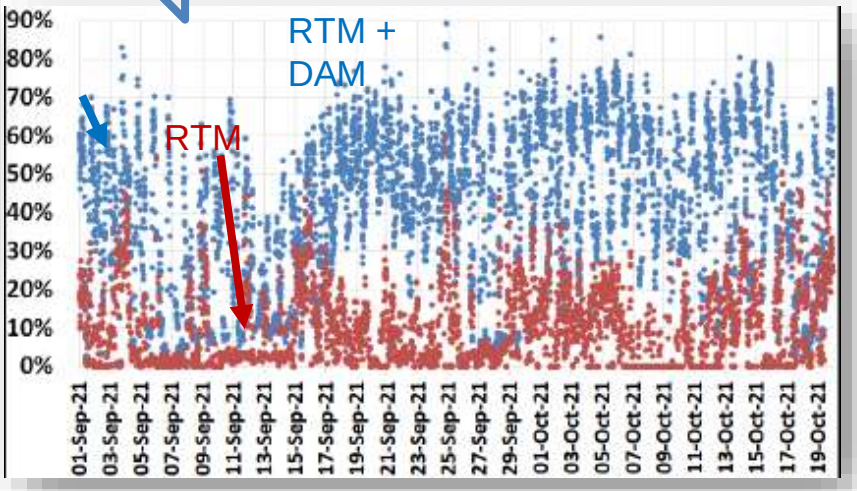
  ± LoLP (Loss of Load Probability), VoLL (Value of Lost Load) and Optimal Reserve Margin.

  ± These provisions need to be strengthened through the National Electricity Policy and the Indian Electricity Grid Code and implementation enforced through the SERCs.

Need for Metrics for Measuring Portfolio Management Diligence



6 W D W H ³ ; ´ P H H W L Q J X S W
its demand from RTM and DAM



6 W D W H ³ < ´ K D Y L Q J X S W R
portion of its drawal schedule
from RTM and DAM

Threat to Grid Security, High Probability of Deviations, Resource Adequacy, Maintaining Reserves at State level

Need for Declaration of Transfer Capability by State Control Areas

- Need for assessment of transfer capability on a state-wise basis in advance.
- Many states have started declaring the TTC/ATC; others also to do so.
- Need to configure each state as a bid area in Power Exchanges

National Load Despatch Centre, New Delhi
Import Capability between S5 for November 2021

Date	Time Period in IST (hrs)	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	Long Term Access (LTA)/ Medium Term Open Access (MTOA)	Margin Available for Short Term Open Access (STOA)	Changes in TTC w.r.t. Last Revision	Comments
1st November 2021	00-24	3300	90	3210	2596	614		
2nd November 2021	00-24	3300	90	3210	2574	636		
3rd November 2021 to 4th November 2021	00-24	3300	90	3210	2671	539		
5th November 2021	00 - 08	3300	90			539		
	08 -24	3000		2910		239		
6th November 2021	00-24	3300	90	3210	2704	506		
[illegible]	00-09	3300	[illegible]	3210	[illegible]	484		

National Load Despatch Centre
Import of Punjab Transfer Capability for November 2021

Issue Date: 30th October 2021 Issue Time: 1700 hrs Revision No. 1

Date	Time Period in IST (hrs)	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) #	Margin Available for Short Term Open Access (STOA)	Changes in TTC w.r.t. Last Revision	Comments
1st November 2021 to 30th November 2021	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

National Load Despatch Centre
Import of DNH Transfer Capability for Feb 2022

Issue Date: 26th Oct 2021 Issue Time: 1500 hrs Revision No. 0

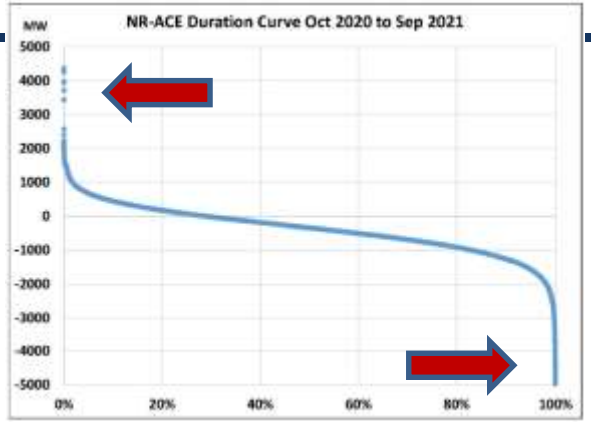
Date	Time Period in IST (hrs)	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) #	Margin Available for Short Term Open Access (STOA)	Changes in TTC w.r.t. Last Revision	Comments
1st Feb 2022 to 28th Feb 2022	00-24	840	15	825	1201	-376		Allocated LTA is more than ATC

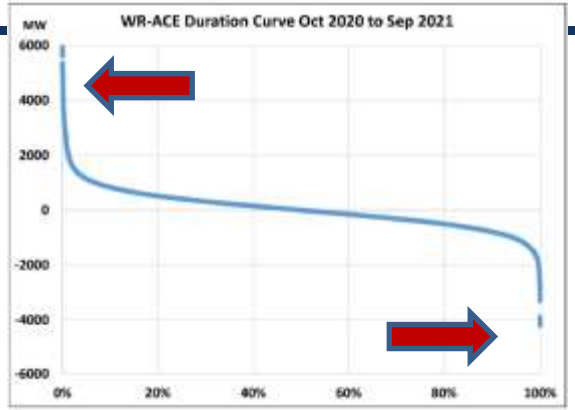
National Load Despatch Centre
Import of Gujarat Transfer Capability for Nov 2021

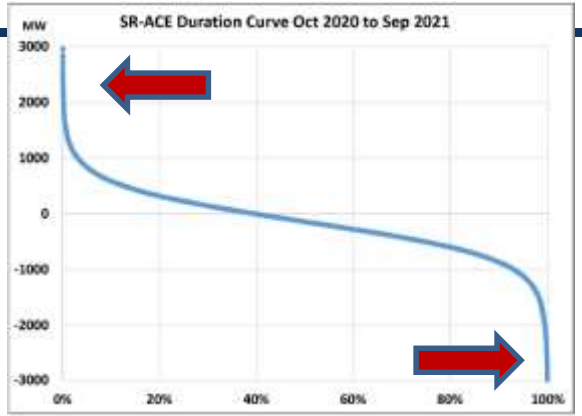
Issue Date: 12th Nov 2021 Issue Time: 2100 hrs Revision No. 2

With SSP Generation								
Date	Time Period in IST (hrs)	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) #	Margin Available for Short Term Open Access (STOA)	Changes in TTC w.r.t. Last Revision	Comments
01st Nov to 30th Nov'21	00-09	10200	100	[illegible]	[illegible]	1016		

Need for Monitoring and Tight Control of Area Control Error (ACE)







Region	Range of ACE (+ve and -ve) MW
NR	4500 to (-) 5000
WR	6000 to (-) 4000
SR	3000 to (-) 3000
ER	3000 to (-) 2000
NER	700 to (-) 800

Distribution curve of ACE of a control area for assessment of reserves as per draft IEGC recommended by CERC Expert Group

‡ Impact on Frequency, Skewed Load Generation Balance leading to Grid Security and Reliability Issues

There is a need for a paradigm change from monitoring of simple deviations to monitoring of "Area Control Error (ACE)".

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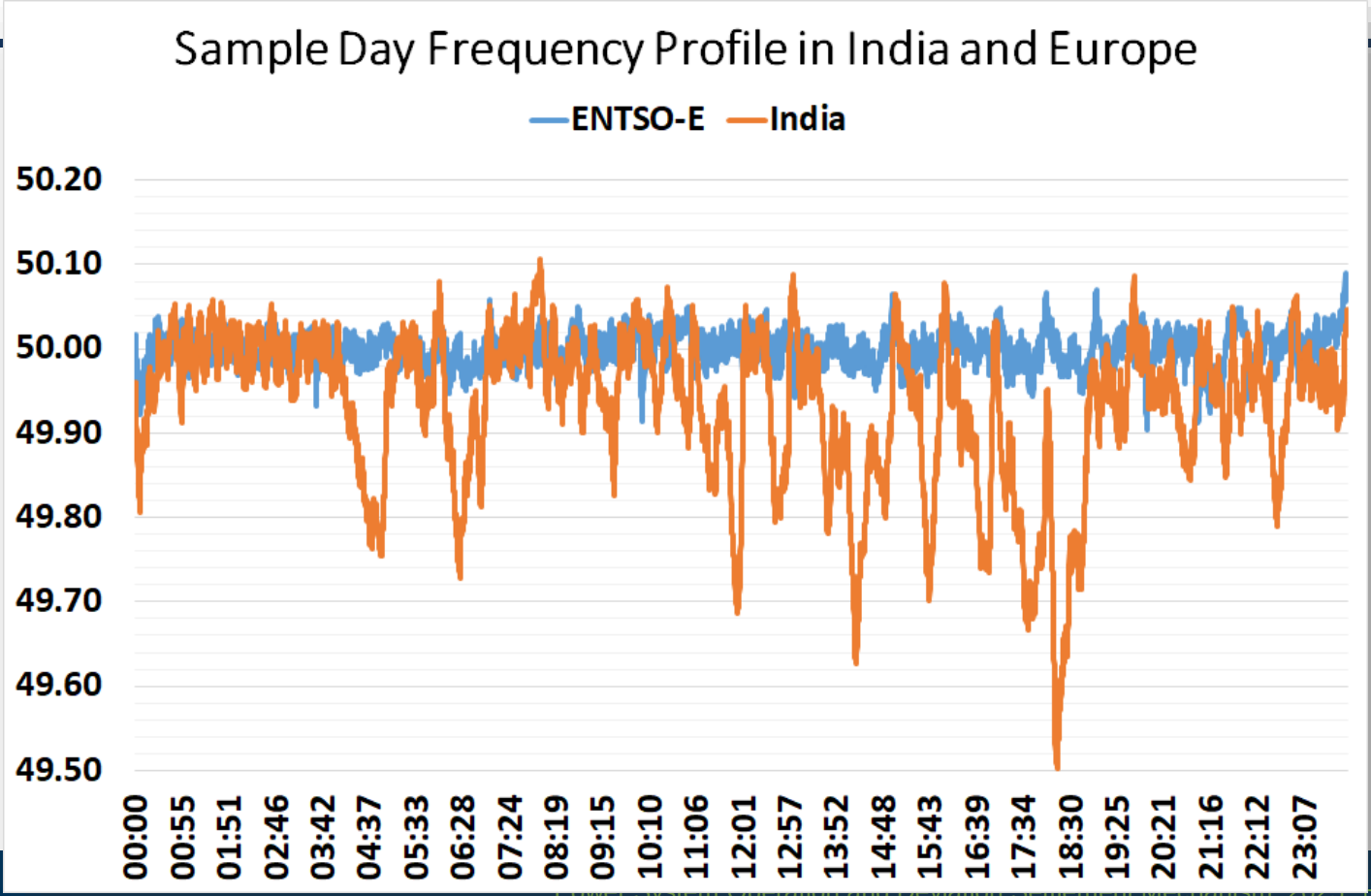
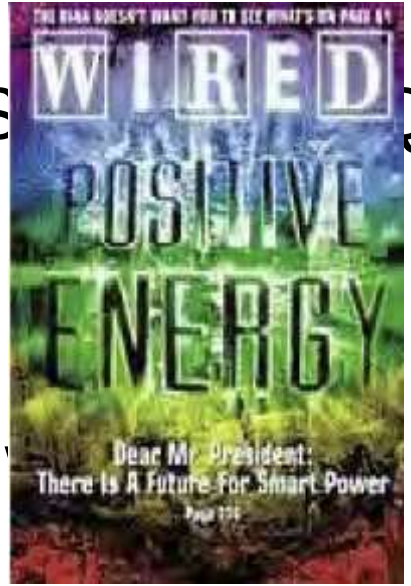


(PEUDFH &KDQJH WR 3RZHU 3URJUHVV

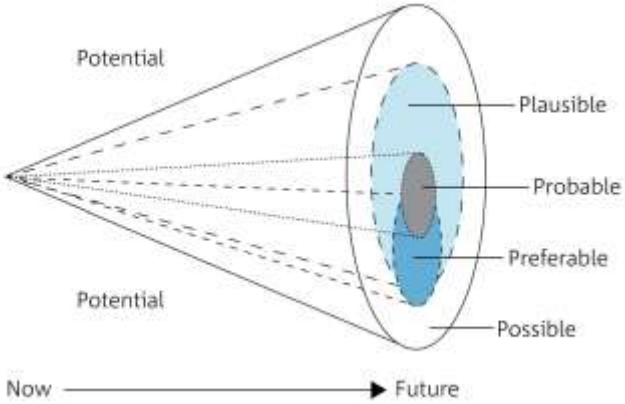
³(YHU\ QRGH LQ WKH S QHW
the future will be awake, responsive,
adaptive, price smart, eco-sensitive,
real-time, flexible, humming - and
LQWHUFRQQHFWHG ZL U\W



-- The Energy Web, Wired Magazine, July 2001
http://www.wired.com/wired/archive/9.07/juice.html

Thank You!

Difficult to see. Always in motion is the future.
±Yoda, Jedi master in Star Wars



The Future Cone

sksoonee@gmail.com

Voros J (2003) A generic foresight process framework. Foresight, 5(3): 10-21.
Hancock T, Bezold C (1994) Possible futures, preferable futures. The Healthcare Forum journal, 37(2): 23-29.

CERC DSM REGULATIONS, 2024 SECTION I:

General Seller

DSM Rate for General Seller (other than an Run -of-river hydroelectricity (RoR) generating station and a generating station based on municipal solid waste)

Reference Charge Rate (RR) : means

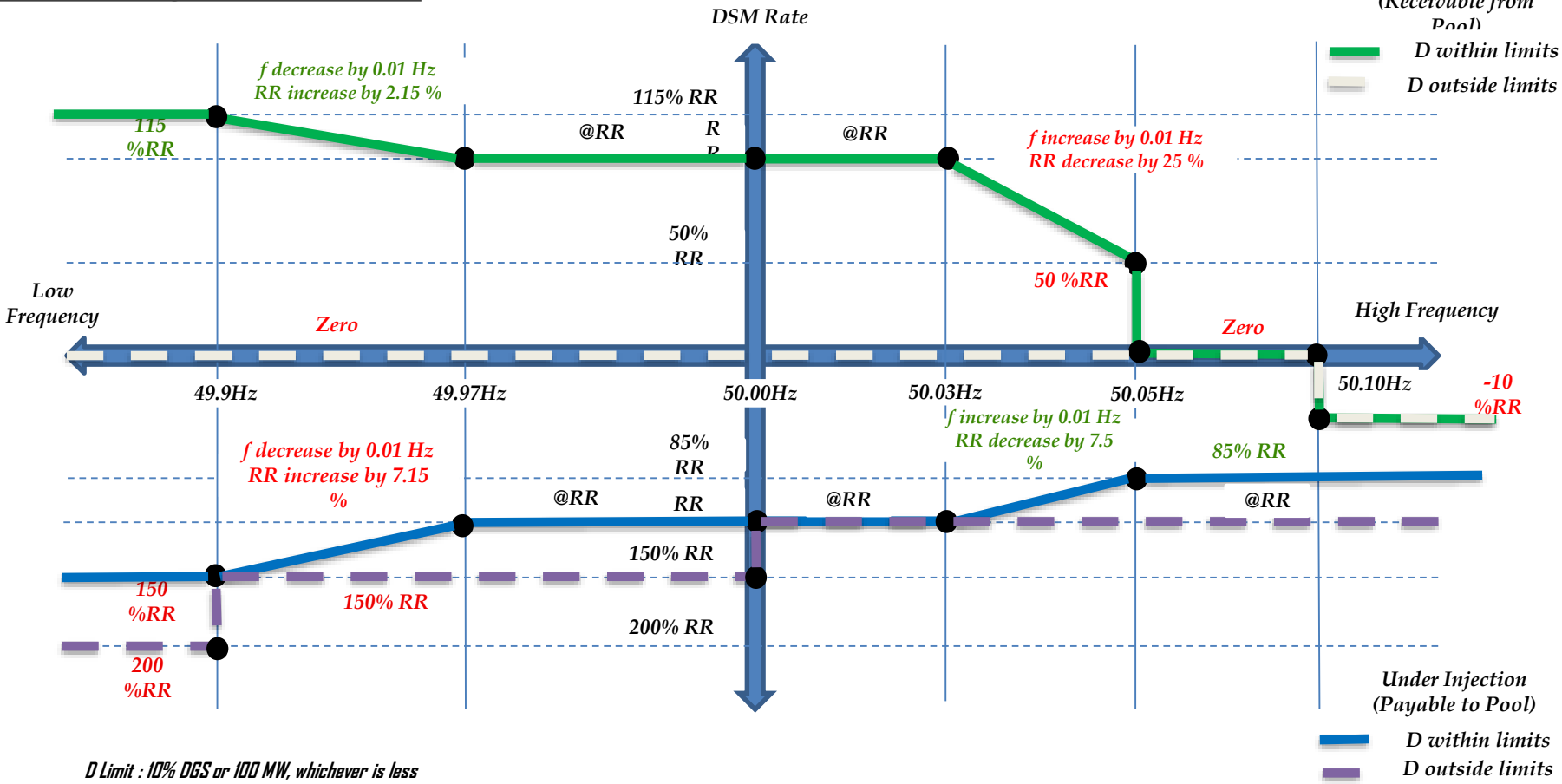
(i) in respect of a general seller whose tariff is determined or adopted or approved under Section 62 (Appropriate Commission (CERC) determines the tariff) or Section 63(Determination of tariff by bidding process) or Section 86(1)(b) (Appropriate Commission (SERC) determines the tariff) of the Act , Rs/ kWh energy charge as determined or adopted or approved by the Appropriate Commission, or

(ii) in respect of a general seller whose tariff is not determined or adopted or approved under Section 62 or Section 63 or Section 86(1) (b) of the Act, and selling power through power exchange(s), the price as discovered in the power exchange for the respective transaction; or

(iii) in case of captive consumption of a captive generating plant based on resources other than renewable energy sources, the weighted average ACP of the Integrated-Day Ahead Market segments of all the Power Exchanges for the respective time block; or

(iv) in case of multiple contracts or transactions including captive consumption, the weighted average of the reference rates of all such contracts or transactions.

Deviation Charges - General Seller (other than an RoR generating station and a generating station based on municipal solid waste)



D Limit : 10% DGS or 100 MW, whichever is less

1. In case of forced outage or partial outage of a seller, the charges for deviation shall be @ the reference charge rate for a maximum duration of eight time blocks or until the revision of its schedule, whichever is earlier.
2. For a Seller whose bids are cleared in the HP-DAM, the reference charge rate ¶ I R U G H Y L D W L R Q- E \ Z D \ L Q M H F W L R Q ¶ I R U W K H T X D Q W X D P R I S R Z shall be equal to the weighted average ACP of the HP - DAM Market segments of all the Power Exchanges for that time block;

CERC DSM REGULATIONS, 2024 SECTION II

WS Seller

DSM Rate for WS Seller

Contract Rate (CR) : means

(i) in respect of a WS seller or a MSW Seller or such other entity as applicable, whose tariff is determined or adopted or approved under Section 62 or Section 63 or Section 86(1)(b) of the Act, Rs/kWh tariff as determined or adopted or approved by the Appropriate Commission; or

(ii) in respect of a WS seller or a MSW Seller or such other entity as applicable, whose tariff is not determined or adopted or approved under Section 62 or Section 63 or Section 86(1)(b) of the Act, and selling power through power exchange(s), the price as discovered in the Power Exchange for the respective transaction; or

(iii) in case of captive consumption of a captive generating plant based on renewable energy sources, the weighted average ACP of the Integrated-Day Ahead Market segments of all Power Exchanges for the respective time block;

(iv) in case of multiple contracts or transactions including captive consumption, the weighted average of the contract rates of all such contracts or transactions, as the case may be

Deviation Calculation for WS Seller

a) For the period from the date of commencement of these regulations to 31.03.2026

   a) Deviation-WS seller (DWS) (in MWh) = [(Actual Injection in MWh) ±(Scheduled generation in MWh)];

   b) Deviation-WS seller (DWS) (in %) =

$$\frac{[\ >\ \$\ F\ W,\ X\ Q\ D\ M\ H\ F\ L\ W\ Q\ L\ :\ R\ Q\ \pm\ 6\ F\ K\ H\ G\ X\ O\ H\ G\ G\ H\ U\ D\ W\ L\ R\ Q\ :\ L\ R\ Q\ @}{>\ \$\ Y\ D\ L\ &\ D\ S\ D\ F\ L\ W\ \backslash\ @}$$

b) For the period from 01.04.2026 onwards

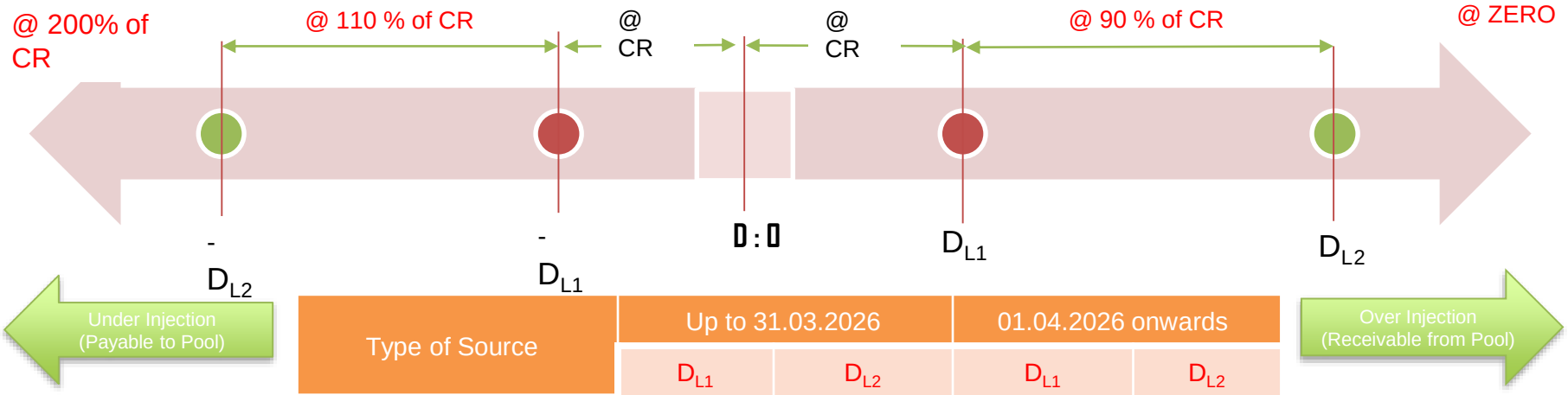
   a) Deviation-WS seller (DWS) (in MWh) = [(Actual Injection in MWh) ±(Scheduled generation in MWh)];

   b) Deviation-WS seller (DWS) (in %) =

$$\frac{100 * >\ \$\ F\ W,\ X\ Q\ D\ M\ H\ F\ L\ W\ Q\ L\ :\ R\ Q\ \pm\ 6\ F\ K\ H\ G\ X\ O\ H\ G\ G\ H\ U\ D\ W\ L\ R\ Q\ :\ L\ R\ Q\ @}{>\ ;\ R\ I\ \$\ Y\ D\ L\ O\ D\ E\ O\ H\ &\ D\ S\ D\ F\ L\ W\ \backslash\ \acute{\imath}\ ;\ R\ I\ 6\ F\ K\ H\ G\ X\ O\ H\ G\ G\ H\ U\ D\ W\ L\ R\ Q}$$

3 U R Y L G H G µ ; ¶ V K D O O E H V W L S X O D W H G E \ W K H & R P P L V public consultation.

Deviation Charges for WS Seller



Type of Source	Up to 31.03.2026		01.04.2026 onwards	
	D_{L1}	D_{L2}	D_{L1}	D_{L2}
solar or a hybrid of wind ± solar resources	10%	15%	5%	10%
wind resource	15%	20%	10%	15%

WS sellers at a pooling station through QCA

In case of aggregation of WS sellers at a pooling station through QCA,

(a) the contract rate for the purpose of deviation shall be equal to the weighted average of the contract rates of all individual WS seller(s) opting for aggregation at the pooling station;

(b) Available Capacity shall be equal to the cumulative capacity rating of wind turbines or solar inverters that are capable of generating power in a given time block;

(c) de-pooling of deviation charges for WS seller(s) connected to the pooling station shall be as per the methodology mutually agreed upon between the QCA and such individual WS seller(s).

CERC DSM REGULATIONS, 2024 SECTION III

ESS

Deviation Charges for Standalone Energy Storage System (ESS)

1. Standalone Energy Storage System (ESS) applicable as per General Seller (other than an RoR generating station and a generating station based on municipal solid waste)

Provided that in the charging mode, deviation by way of over drawal shall be treated as under injection and deviation by way of under drawal shall be treated as over injection and the charges for deviation shall be settled accordingly.

2. Standalone ESS being pumped hydro storage plant : the charges for deviation including the formula for computation of Deviation shall be the same as applicable to a WS seller being a generating station based on solar resources , for the period from the date of commencement of these regulations to 31.03.2026.

Deviation Charges for WS Seller with ESS

Charges for Deviation including the formula for computation of Deviation, in respect of a WS Seller with ESS connected at the same interconnection point shall be the same

(i) as applicable to a WS seller of respective category during the period solar or wind or hybrid generating station is injecting power,

(ii) as applicable to a standalone ESS, when only ESS is injecting power, and

(iii) as applicable to a standalone ESS for drawl by ESS based on drawal schedule from the grid.

Note : Each generator and ESS shall be metered with Special Energy Meter (SEM) so that individual actual injection/drawal can be captured.

CERC DSM REGULATIONS, 2024 SECTION IV

BUYER

DSM Rate for Buyer

Normal Rate of Charges for Deviation (NR) : means

(A)	(B)	(C)
the weighted average ACP (in Paise /kWh) of the Integrated-Day Ahead Market segments of all the Power Exchanges	the weighted average ACP (in Paise /kWh) of the Real Time Market segments of all the Power Exchanges	the sum of: (a) 1/3 [Weighted average ACP (in paise/kWh) of the Integrated - Day Ahead Market segments of all the Power Exchanges]; (b) 1/3 [Weighted average ACP (in paise/kWh) of the Real-Time Market segments of all the Power Exchanges]; and (c) 1/3 [Ancillary Service Charge (in paise/kWh) computed based on the total quantum of Ancillary Services (SRAS UP and TRAS UP) deployed and the net charges payable to the Ancillary Service Providers for all the Regions]:

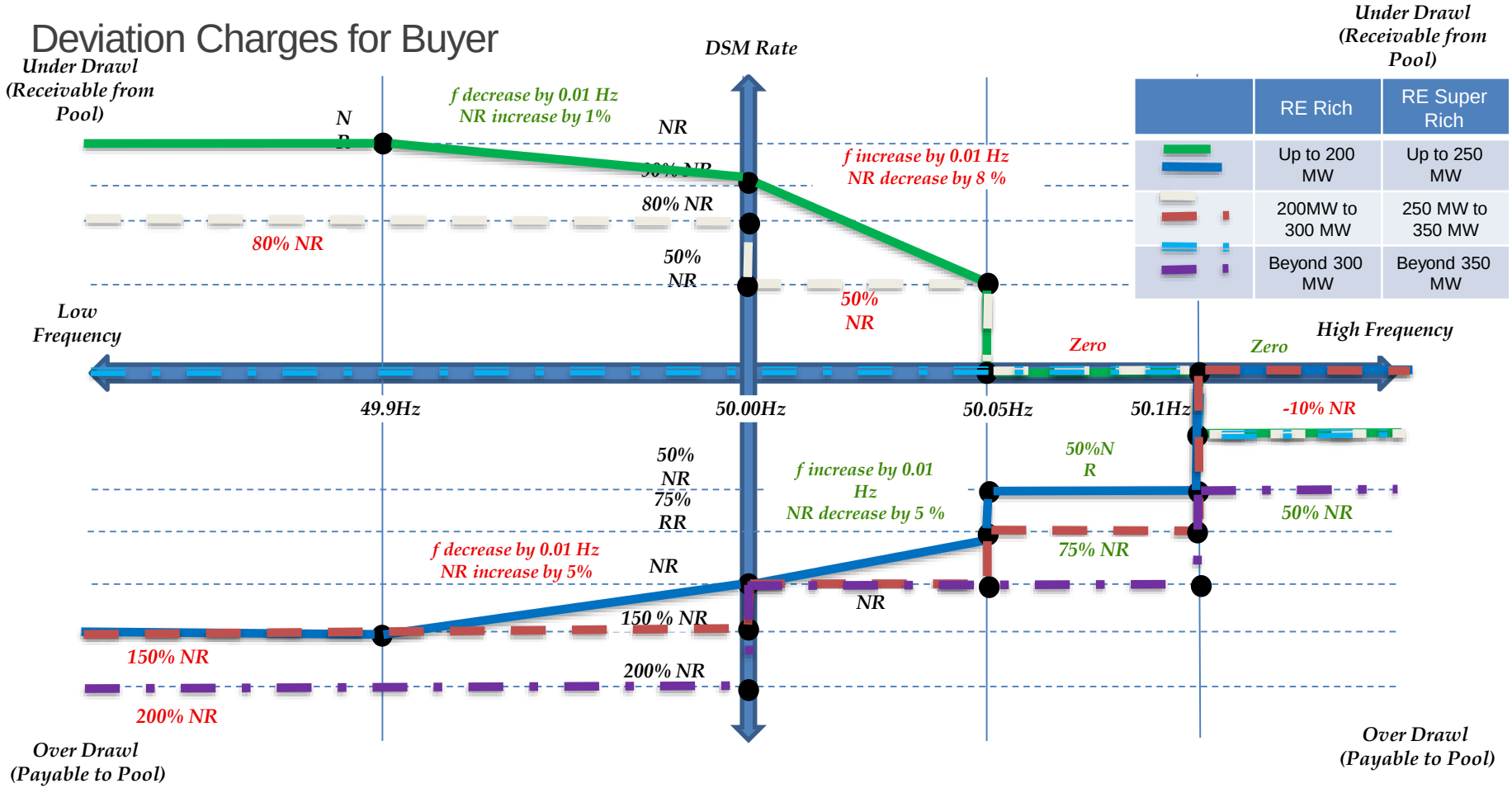
Provided that in case of non- availability of ACP for any time block on a given day, ACP for the corresponding time block of the last available day shall be considered

Definitions

Y µ5HQHZDEOH 5LFKU6WDWH¶ means a State whose combined installed capacity of solar and wind generating stations under the control area of the State is 1000 MW or more but less than 5000 MW ;

(w) µ5HQHZDEOH 6XSHU 5LFK 6WDWH¶ means a State whose combined installed capacity of solar and wind generating stations under the control area of the State is 5000 MW or more ;

Deviation Charges for Buyer



	RE Rich	RE Super Rich
	Up to 200 MW	Up to 250 MW
	200MW to 300 MW	250 MW to 350 MW
	Beyond 300 MW	Beyond 350 MW

Deviation Charges for Buyer

‡In case of a State having net injection at the regional periphery, the deviation charges for such State shall be as applicable to a buyer .

CERC DSM REGULATIONS, 2024 SECTION V

Inter -regional, Infirm & Start Up

Inter -Regional

‡The inter-regional deviation caused by way of over drawal or under drawal or over injection

‡or under-injection shall be computed notionally @ normal rate of charges for deviation.

Infirm Power

‡(a) The charges for deviation for injection of infirm power shall be zero:

‡Provided that if infirm power is scheduled after trial run as specified in the Grid Code, the charges for deviation over the scheduled infirm power shall be as applicable for a general seller or WS seller , as the case may be.

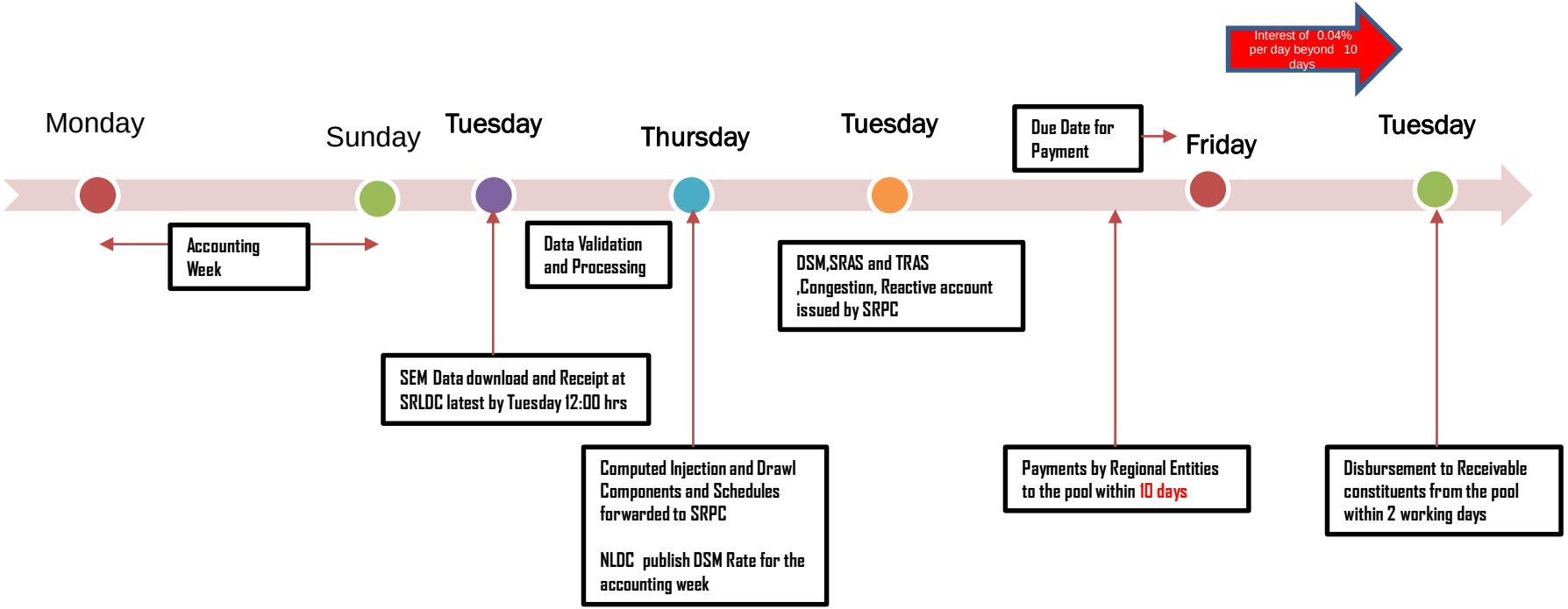
Startup Power

‡The charges for deviation for drawal of start -up power before the COD of a generating unit or for drawal of power to run the auxiliaries during the shut-down of a generating station shall be payable at the reference charge rate or contract rate or in the absence of reference charge rate or contract rate, the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block, as the case may be.

CERC DSM REGULATIONS, 2024 SECTION VI

Accounting and settlement

Timeline for accounting and settlement



Accounting and settlement

- There shall be a Deviation and Ancillary Service Pool Account to be maintained and operated by the Regional Load Despatch Centre for the respective region:
- Provided that the National Load Despatch Centre (NLDC) shall formulate detailed procedure for implementation, maintenance and operation of the National Deviation and Ancillary Services Pool account after due consultation with stakeholders within 1 (one) year from the date of commencement