एनटीपीसी लिमिटेड
(भारत सरकार का उद्यम)
NTPC Limited
(A Govt. of India Enterprise)

केन्द्रीय कार्यालय/ Corporate Centre

Ref. No. 01.CD.MA-02
Date: 22.10.2021

The Secretary
Central Electricity Regulatory Commission,
3rd & 4th Floor, Chanderlok Building,
36, Janpath,
New Delhi-110001

Sub: Submissions of NTPC on Draft Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related Matters) Regulations, 2021.

Sir,

Hon'ble Commission vide its notification dated 07.09.2021 has published the Draft Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related Matters) Regulations, 2021 and invited views/ comments/ suggestions/ objections from various stakeholders on the proposed Draft Ancillary Services Regulations, 2021.

In this regard, please find enclosed comments/ suggestions of NTPC on the Draft Central Electricity Regulatory Commission (Deviation Settlement Mechanism) Regulations, 2021.

Thanking you,

Yours sincerely,
Anil Nautiyal
22-X-2021
Anil Nautiyal
ED (Commercial)

Comments on

Draft Deviation Settlement Mechanism Regulations 2021

NTPC Limited

Contents

1.0 Summary of the Submissions

a) The proposed Penalty mechanism would be very harsh on the thermal generators. Even for 1 MW deviation in either direction from the Scheduled Generation will lead to heavy penalty on the thermal generators. (detail submissions with calculation on different scenarios are submitted in Section 3 (A), page no. 4)

b) As per the proposed Regulations, the thermal stations are expected to have "No Deviations" from the Scheduled Generation, which is neither technically possible nor operationally feasible; inadvertent and natural deviations are part of operation of thermal power plants. (detail submissions with various factors causing deviations are in Section 3 (B), page no. 6)

c) To take care of the inadvertent and natural deviations, an Operational Margin of +/- 3% may be provided for thermal generators.

d) Within this band of +/-3% all Over-injection and Under-injection should be settled at the rate of ECR of the thermal generators. Also There should not be any penalty within this band.

e) Deviations (over-injection) when beneficiaries' schedules are below technical minimum levels of stations and generators are forced to over-inject should be exempted from DSM penalty. (page no. 11)

f) Fuel Costs incurred for infirm power injections should be reimbursed. (page no. 18)

g) For RE projects, the existing band of +/- 15% should be retained (page no. 20)

2.0 Background

The Draft Deviation Settlement Mechanism Regulations proposed by Hon'ble CERC intends to bring in a paradigm shift in the implementation of balancing mechanism, treatment of deviations and revamp the existing practices of last more than two decades.

The existing practice has been quite successful in resulting in better frequency control, better balancing of demand and supply thus ensuring secure and reliable Grid operation and bringing in discipline by stakeholder to avoid deviations.

Along with the Regulations the practices of the entities i.e. both the Generators and the Utilities have also improved with better technologies, data management practices etc. with these, over the years, the trend of frequency and security of Grid Operations have improved significantly.

The proposed changes have been issued with the objective of further improving the Grid balance. It is submitted that though Grid stability is of paramount importance, the systems proposed for this purpose should be as per the technical capabilities and operational feasibilities of the entities and should not cause undue financial burden on the grid entities.

While analyzing the impact of these changes on the stakeholders and entities, the following aspects are being brought to the notice of Hon'ble Commission for consideration while formulating the final Regulations.

3.0 Impact on Thermal Generators

The basic premise of the Draft DSM Regulations, that thermal generators can operate at a constant load without any deviation ("No Deviations") from the schedules is neither possible nor rational. Thermal Generators are complex systems where the machine output at a particular point of time depends on many factors and most of these factors are beyond the control of the Operators, leading to natural/ inadvertent variations in generation. This causes some variation in generation from the machine set point, even if the command is set at the Scheduled Generation of the unit/ station. Most of the time, these deviations happen due to unforeseen and uncontrollable factors, which are detailed in these submissions

The Draft Regulations also proposes stringent penalty mechanism if the Average Actual Generation levels deviate, even by 1 MW, from the Scheduled generation. The financial burden on the Thermal Generators would be huge due to the proposed Regulations.

A) <u>Impact of the Proposed Penalty Mechanism</u>

1) A very stringent penalty has been proposed for any deviation from the Schedules given to the thermal generators. A look at the summary table of the proposed provisions for any Over and Under- Injections clearly shows that the generators would always be penalized even for the slightest of deviations, over which the thermal generators have little control. (The reasons for not being able to achieve "No Deviations" are highlighted in the next section.)

2) Summary of the proposed Penalty provision for Deviations:

Over-Injection		
Band of Over-Injection	Upto 2%	Beyond 2%
Penalty on account of Fuel Costs (A)	Nothing paid for the additional costs incurred for additional generation	Nothing paid for the additional costs incurred for additional generation
Penalty on account of DSM Penalty (B)	No DSM Penalty	DSM Penalty @ 10% of DSM rate
Net Penalty = A + B	Net Penalty = Fuel Costs not recovered	Net Penalty= Fuel Costs not recovered + DSM Penalty @ DSM rate

Under-Injection		
Band of Under-Injection	Upto 2%	Beyond 2%
Savings on account of fuel saved (A)	Costs saved to the extent of under generation wrt SG	Costs saved to the extent of under generation wrt SG
Penalty on account of DSM Penalty (B)	Penalty @ normal DSM rate	Penalty @ 110% of DSM rate
Net Penalty = B-A	Net Penalty = Penalty @ DSM rate – Savings due to fuel saved	Net Penalty = Penalty @ 110% of DSM rate – Savings due to fuel saved

3) Assessment of the impact of the proposed Penalty provisions on a Thermal Generator under different scenarios.
   a) The Table below indicates the possible penalties on Thermal Generators in one block under various scenarios:

OVER-INJECTION						
Pit-Head Stations				**Non- Pit-Head Stations**		
	within 2% (1 MW)	***> 2% (50 MW)***			***within 2% (1 MW)***	***> 2% (50 MW)***
ECR (Rs/kWh)	1.5	1.5		ECR (Rs/kWh)	2.5	2.5
DSM Rate (Rs/kWh)	2.8	2.8		DSM Rate (Rs/kWh)	2.8	2.8
Scheduled Generation (MW)	1700	1700		Scheduled Generation (MW)	1700	1700
Actual Generation (MW)	1701	1750		Actual Generation (MW)	1701	1750
Over-Injection (MW)	1	50		Over-Injection (MW)	1	50
% of Over-Injection (%)	0.06%	2.9%		% of Over-Injection (%)	0.06%	2.9%
Fuel Cost (not serviced) (Rs)- **A**	375	18750		Fuel Cost (not serviced) (Rs) - **A**	625	31250
Payment to generator (Rs)	0	0		Payment to generator (Rs)	0	0
DSM Penalty Paid to Pool (Rs) - **B**	0	1120		DSM Penalty Paid to Pool (Rs)- **B**	0	1120
Net Penalty on the Generators (Rs)- (A + B) in a block	**375**	**19870**		**Net Penalty on the Generators (Rs)- (A + B) in a block**	**625**	**32370**

UNDER-INJECTION						
Pit-Head Stations				**Non- Pit-Head Stations**		
	within 2% (1 MW)	***> 2% (50 MW)***			***within 2% (1 MW)***	***> 2% (50 MW)***
ECR (Rs/kWh)	1.5	1.5		ECR (Rs/kWh)	2.5	2.5
DSM Rate (Rs/kWh)	2.8	2.8		DSM Rate (Rs/kWh)	2.8	2.8
Scheduled Generation (MW)	1700	1700		Scheduled Generation (MW)	1700	1700
Actual Generation (MW)	1699	1650		Actual Generation (MW)	1699	1650
Under-Injection (MW)	1	50		Under-Injection (MW)	1	50
% of Under-Injection (%)	0.06%	2.9%		% of Under-Injection (%)	0.06%	2.9%
Fuel Cost (additional recovered) (Rs)-**A**	375	18750		Fuel Cost (additional recovered) (Rs)-**A**	625	31250
Payment to generators from Pool (Rs)	0	0		Payment to generators from Pool (Rs)	0	0
DSM Penalty Paid to Pool (Rs) - **B**	700	36120		DSM Penalty Paid to Pool (Rs) - **B**	700	36120
Net Penalty on the Generators (Rs) – (B-A) in a block	**325**	**17370**		**Net Penalty on the Generators (Rs) – (B-A) in a block**	**75**	**4870**

b) As per the proposed mechanism, for any Over-injection by a thermal generator nothing is payable for the additional energy injected into the grid and there is penalty of 10% of DSM rate beyond the deviations of 2%. Any over-injection, even if inadvertent, incurs some costs as fuel is burnt for generation.

c) From the table given at 3(a) above, it shows that for a station like Singrauli, with Schedule of 1700 MW in a block, if the generation shifts to 1701 MW or 1699 MW, there is penalty to be paid by Singaruli. The practicality of this proposition needs to be seen.

B) <u>Technical and Operational Difficulties to achieve "No Deviations"</u>

Some of the factors having a significant impact on the generation level in case of a thermal generator are listed below:

1) <u>Response of the Control System:</u>

a) Thermal Power stations comprise of a large number equipments and systems running in tandem and as per the desired Load set point at any point of time for generating power. The Control system is designed to ensure proper coordination among various systems so that the deviation from the Set point is

minimum. Though most of the stations are now-a-days equipped with advanced automation and Control and Instrumentation systems, the complexity of the power generation process with Multi-variable control environment makes it difficult to achieve steady and precise control of the Generation levels at all times.

b) In a Power plant, multiple process parameters are to be controlled to operate steam generators (boiler) and turbines safely. In most of our projects, units operate in Coordinated Master Control (CMC) mode in which both boiler and turbine work in synchronism to maintain unit parameters such as main steam pressure and temperatures etc. while maintaining unit load near to scheduled demand.

However, being a multi-variable process, whenever the process parameter varies due to process disturbance (such as coal quality variation, soot blowing and other process parameters including weather conditions), unit load demand is automatically adjusted in CMC mode to keep the process parameter deviations within a stable limit thus ensuring safe operation of unit and equipments. Maintaining unit load at a steady value at all the times, without any deviation is not possible under such circumstances.

c) The control systems in a power plant are typically tuned to operate most efficiently at high loads. At part load operation of the units, the stability of the units gets impacted, affecting the response of the Control Systems. With higher penetration of RE in the system, incidences of part load operation of the units increase affecting the response of the Control System which results in deviations from the Load Set points.

d) In the flexible operation regime, load demand varies frequently. Boiler response time varies from 3 mins to 5 mins. Thus, during load ramping, matching unit load as per scheduled demand without any deviations is not possible.

2) <u>Variation in Process Parameters and Operating Conditions:</u>

a) **Calorific Value of Coal:** Coal fed to the Boilers of a thermal generator is a generally comes from different sources. Moreover, being a heterogenous mixture, the Calorific value of Coal is never constant and varies continuously, which affects the generation level also. With same coal feeding rate of coal to the

Boiler, the output can vary causing deviation between command by the operator and the actual output. In most of the cases, the Operators would not have much control over this factor.

It is observed that at Non-Pit Head stations like Kudgi, where coal comes from various sources, the GCV of Coal ranges from 1850 Kcal/Kg to 5000 Kcal/kg. The variation in the GCV value of Coal received from different sources in a day is seen to be as high as 2000 kCal/kg. With such variation in coal quality, it is difficult to maintain constant generation.

b) **Wet Coal:** Sometimes, especially during the rains, wetness of coal makes it difficult to maintain constant flow of coal through the milling system and affects combustion in Boiler, thus creating variation in generation level.

c) **Load Variations during Soot Blowing:** In thermal power plants, Boiler operation results in deposition of ash and slag (soot) on the boiler internals i.e. water walls and other radiant & convective zones/ heat transfer sections of boilers. This reduces the thermal conductivity of surface deteriorating the boiler efficiency substantially. Accordingly, the soot is dislodged periodically from boiler heat exchanging surfaces by the method of blowing of steam. It may be pertinent to mention that ash and slag deposition on the heat exchanging surfaces is a gradual process, however blowing of steam to dislodge soot results in an abrupt change in local heat transfer capacity. Further, the slags generally falls in the water bath below the furnace. This tends to disturb the fire ball of the boiler furnace. Therefore, during soot blowing there is load fluctuations even though the boiler firing remains the same.

Each soot blowing cycle on an average takes about 45 to 60 minutes (i.e. 3 to 4 blocks). To maintain the Boilers in safe and efficient condition, Soot blowing is carried out periodically (generally once in every shift of 8 hours or as specified by OEM). Load variation during soot blowing cannot be avoided

d) **Changes in Process Parameters:** Power plant operation involves a large number of smaller systems running in coordination through advanced Control Systems. The generation levels depend on quality and condition of various inputs i.e external factors like Coal, Water, Air. Even small change in weather parameters like temperature, humidity etc affect the performance of the systems like condenser efficiency and affect the generation level of the stations.

3) Changes in Schedule can lead to deviations:

a) Deviations from Scheduled Generation (SG) are more likely when there is a change in schedule of the units/ station. The rotating mass of the machines has an inherent inertia, which clubbed with ramping signals causes variations with respect to schedule. Similarly, for maintaining Grid frequency, frequent AGC / SRAS signals are given to Generators by Grid operator and these signals cause consistent ramping, both up and down of machines.

b) During ramping up or ramping down only 50% of the scheduled change is being achieved in the first ramping block by generators.

Illustration:

- A generation stations with capacity of 1000 MW might get a schedule of 600 MW in one block (block-n) and 750 MW Schedule in the next block (block-n+1). Considering ramp rate of 1%/ minute for the station (1%/minute x 1000 MW x 15 minute = 150 MW), it would appear to be within the capability the station.
- With the feasible ramping capability, the station would be able to achieve 750 MW only at the end of block (n+1). The Average Generation for this (n+1) block would be 675 MW and the station would fail on the ramping assessment front and at the same time would also get penalized due to Deviation in Actual Generation from Scheduled Generation.
- This matter has been accepted by POSOCO and the same has been incorporated in the Detailed Guidelines for Assessment of Ramping Capability issued by POSOCO.
- As this issue has not yet been incorporated in the scheduling software of RLDCs, this would reflect in Deviation in AG wrt SG and will cause penalty for the generator.
- This issue may be considered for implementation of DSM Penalty mechanism and exemptions similar to the Ramping Assessment Process would need to be extended for the generators.

c) Similarly, during activation of AGC signals, on an average, a 1000 MW station gets 5% ~50 MW AGC signal, up or down in a time block. Typical performance of AGC response is expected to be 70-80% only. So, there'd be an unavoidable deviation of 10-15 MW in a time block for each AGC command.

d) After implementation of RTM, it is observed that the total no of revisions in schedule for a station in a day can go upto as high as 200 times.

e) **To summarize, it is submitted that Deviations from schedules are much more likely whenever there is a change in schedule and ramp up/ ramp down operation.**

4) <u>RGMO Operations:</u>

a) PRAS (Primary Reserve Ancillary Services) is provided through governing action of generator and not in control of the generators as the Regulations requires that the Governing system of the Generators has to be kept in services at all time. This can cause machines to deviate from the schedule.

b) PRAS quantum depends upon the Realtime frequency and the dynamic condition of steam parameters before turbine control valve and delivered quantum varies as per the machine droop ~ 3% to 6%. For a 1000 MW station with 5% droop and 0.03 Hz change in frequency, PRAS quantum would vary by 12 MW, resulting in a deviation with respect to schedule.

5) <u>Metering and Measurement Accuracy:</u>

a) There is a limit to Metering and Measurement Accuracy (0.2 class for instrument transformer, 0.2 class for meters), which produces inherent error on account of usage of different meters/Instrument transformer with respect to measurements of deviation and operation of Unit. Further, accounting of deviations is done based on SEM meters and Unit is operated on ABT/SCADA meters and this can result in accounting deviations.

b) While dealing with the issue of sign change issue in the CERC (DSM and related matters) (5^{th} Amendment Regulations) 2019, Hon'ble Commission took cognizance of the difference in SEM and SCADA data and increased the tolerance band from +/- 10 MW to +/- 20 MW, as captured in the Statement of Reasons of the CERC (DSM and related matters) (5^{th} Amendment Regulations) 2019. Relevant extracts are captured below:

Quote:

(Page 5, 2nd paragraph)

However, the Commission, while recognizing the current operational constraints, has decided to allow a tolerance band of +/- 20 MW from schedule (as against the proposed tolerance band of +/- 10 MW), which would be a subset of the existing deviation flexibility of 150 MW/200MW/250MW as provided under Regulation 7(1) &7(2). It is felt that this tolerance band would be sufficient to subsume various inadvertent deviations including those arising out of SCADA-SEM metering inaccuracies.

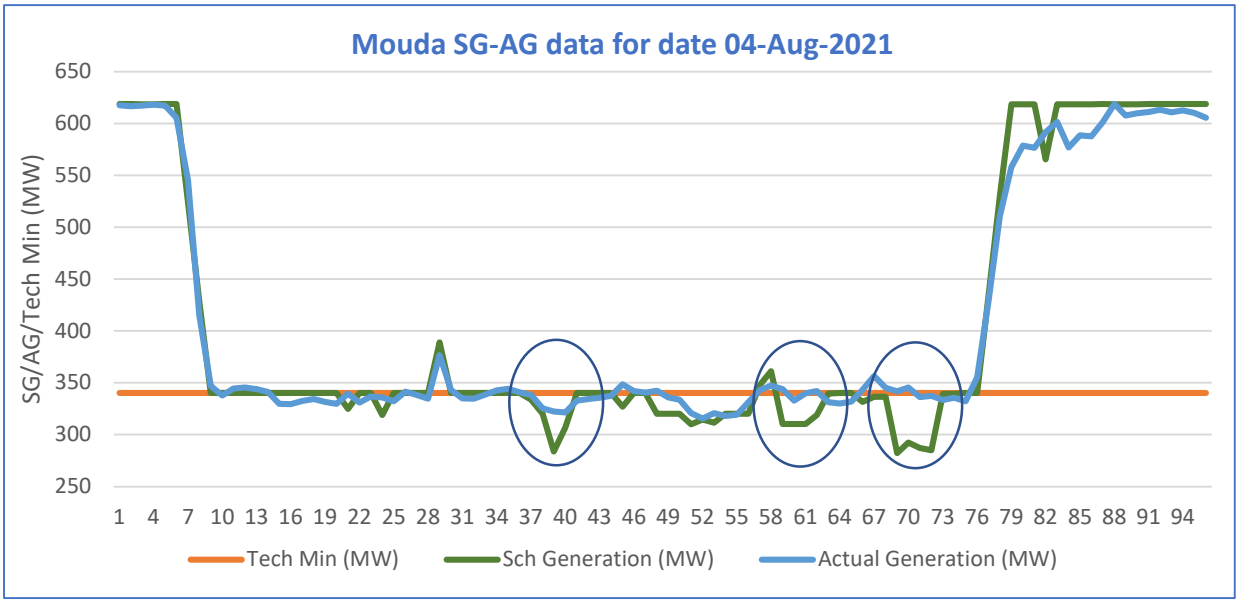
Unquote

6) Deviations in cases when Schedule is less than Technical Minimum level:

   a) Many a times machines are scheduled below the technical minimum capability, and the generator, due to technical reasons, is forced to deviate (over-inject) from the schedule to maintain the technical minimum.

   b) As per the Procedure laid down for Reserve Shut Down, the generator might be having an option to go for RSD whenever schedules are given below their technical minimum levels, but practically it is not possible as the stations are given low schedules only for a short period of time (few blocks) and the generator is expected to ramp up to higher schedules (many time full schedules) during other blocks. The station has to be kept On-bar to meet the peak demands.

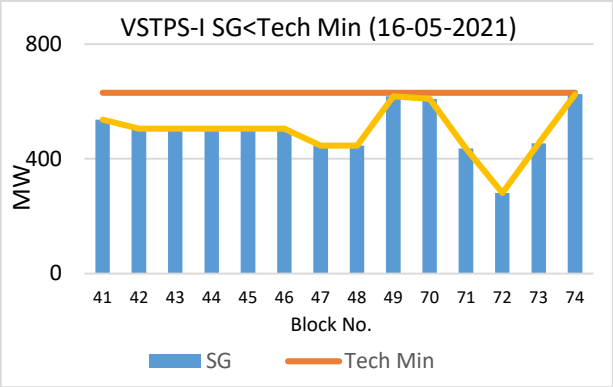
c) A case of Mouda Stage-2 for the date 4th August 2021 is attached for reference, where the station was scheduled below the Technical minimum level in 27 blocks in the day, in some blocks the difference was more than 50 MW, and the station had to over-inject during these blocks to keep it in stable running condition.

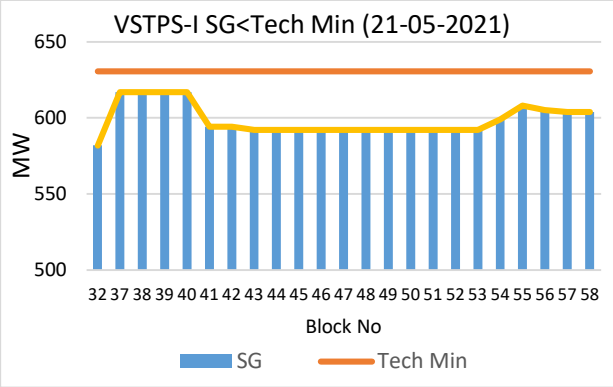


d) Even in case of a Pit-head station like Vindhyachal with ECR in the range of Rs 1.52 – Rs 1.61 /KwH, there are scheduling below Technical minimum levels. In FY'22 up to August, no. of blocks with schedule below Tech Min are as follows:

Station	VSTPP-I	VSTPP-II	VSTPP-III	VSTPP-IV	VSTPP-V	Total (for all the stages)
No of blocks below TM	367	163	40	18	160	748
% of Block	2.5%	1.1%	0.3%	0.12%	1.1%	5.09%

e) Scheduling pattern on a few sample dates for Vindhyachal is attached below, which shows the extent of scheduling below Technical Minimum level, particularly during the Solar hours.





f) Similarly, in case of Khargone in FY'22 up to August, no. of blocks with schedule below TM are as follows:

Month	APRIL	MAY	JUNE	JULY	AUGUST	TOTAL
No of blocks below TM	254	716	--	1056	301	2327
% of block	9%	24%	0%	35%	10%	16%

g) **Any deviations arising due to scheduling below Technical Minimum limits by beneficiaries need to be exempted for the purpose of DSM. It is submitted that while calculating the deviations in such cases, SG (Scheduled generation) should be taken as TM (Technical Minimum) for those blocks while calculating deviations, else the generators will be unduly penalized on account of grid conditions. It would be pertinent to mention that taking the unit on RSD is not a solution, as scheduling below technical minimum is generally only for a few blocks in a day.**

7) <u>SCED Command comes in the previous block:</u>

a) The stations which are under SCED, get the final schedule (variation over original schedule due to SCED optimization) in just the last block before delivery block. Effectively they have less time to adjust to the new schedule through ramping up or down. As compared to the stations which are operating under steady schedules, these stations have a varying schedule most of the time, except when they are continuously getting full schedule or technical minimum

schedule. Hence it becomes all the more difficult for them to generate without any deviation.

The penalty for every deviation will compel the station to get out of SCED, resulting in reduced benefit of optimization and leading to higher power purchase cost of the states.

8) Deviations due to Unit Outage

a) With introduction of Real Time Market, the timelines for revision of schedule have been increased from 4 time-blocks to 7 and 8 time-blocks for odd and even time blocks respectively.

b) At the time of tripping of a unit due to Forced Outages, the proposed penalty mechanism would be applicable for period of 5/6 blocks which would be huge.

It is submitted that the penalty provisions may not be made applicable in case of Unit tripping.

9) Gas Stations:

a) In gas stations operating on Combined Cycle operation mode, the steam turbine performance is affected by exhaust temperature of gas turbine. In case of AGC triggers of 30 MW, GT may deliver 20 MW and ST may deliver in range of 08 MW to 15 MW depending upon the real time operating condition of GT exhaust temperature, resulting in a deviation from SG.

b) In Gas stations, for the purpose of NoX Control, sometimes Water/ Steam injection is done, causing deviations in Generation.

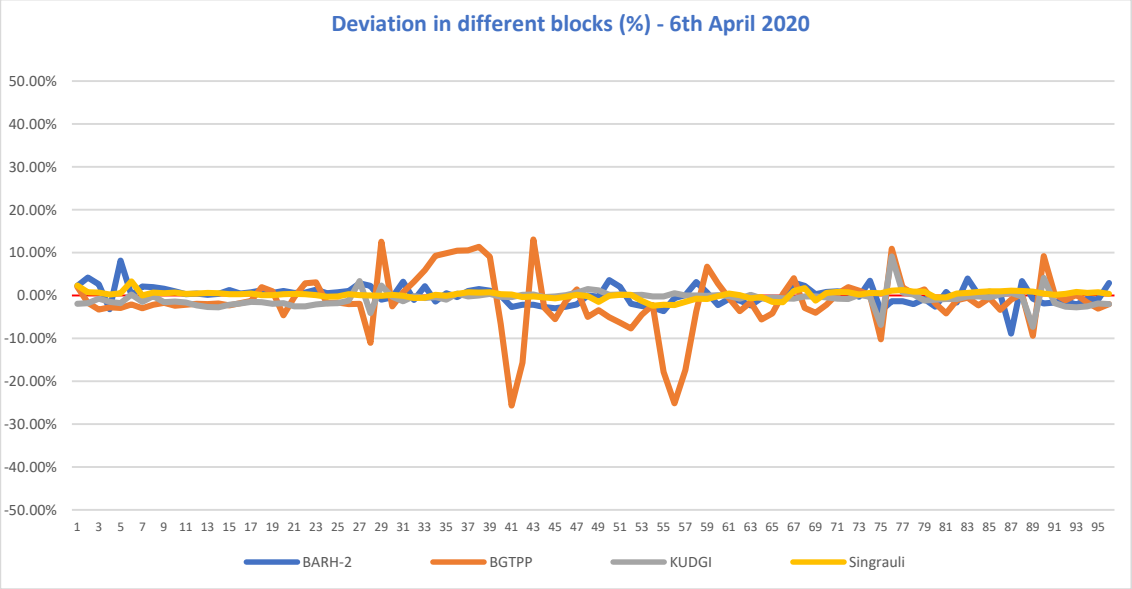
c) Similarly, during fuel change-overs, Generation is likely to deviate from the Schedule Generation value.

10) The factors as cited above are the reasons for providing margins for operational flexibility in the existing DSM Regulations so far without any penalty. The volume limits of 12% was incorporated in the operating frequency zone in the existing DSM framework on account these aspects only.

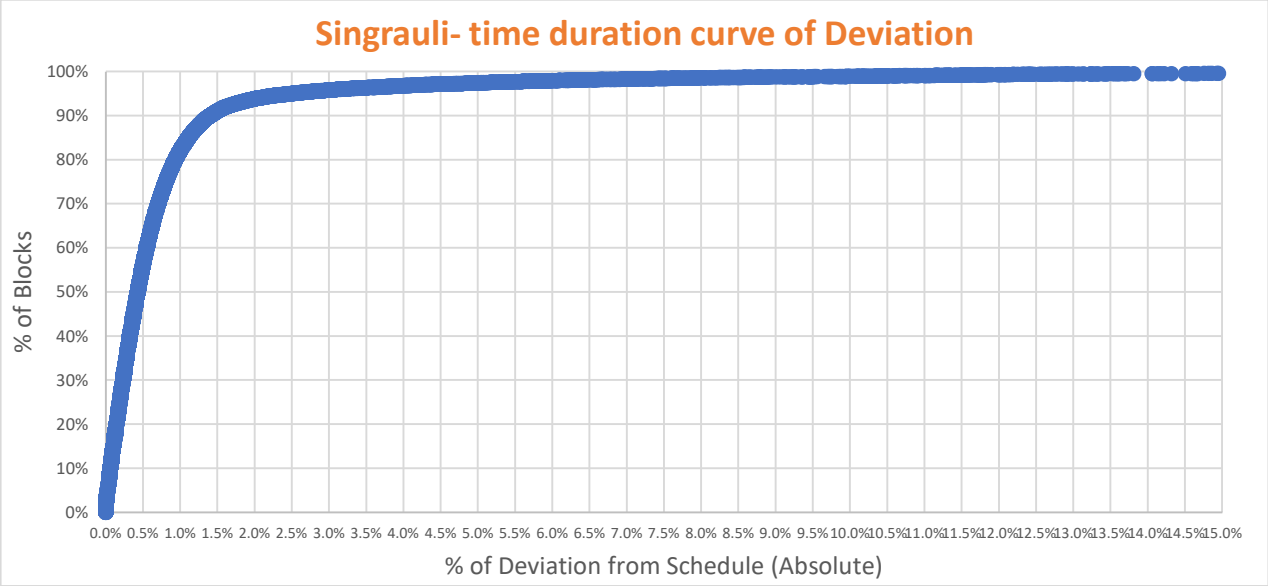
11) ***It is submitted that thermal generatoring stations are not designed for constant generation exactly mathcing to the command by the Operators at all the times.*** The factors as highligted above can result in deviation in actual generation from the schedule generation level, which is natural and inadvertent. The DSM

settlement mechanism should provide an Operational Margin to take care of these operational aspects and provide adequate flexibility to the operators.

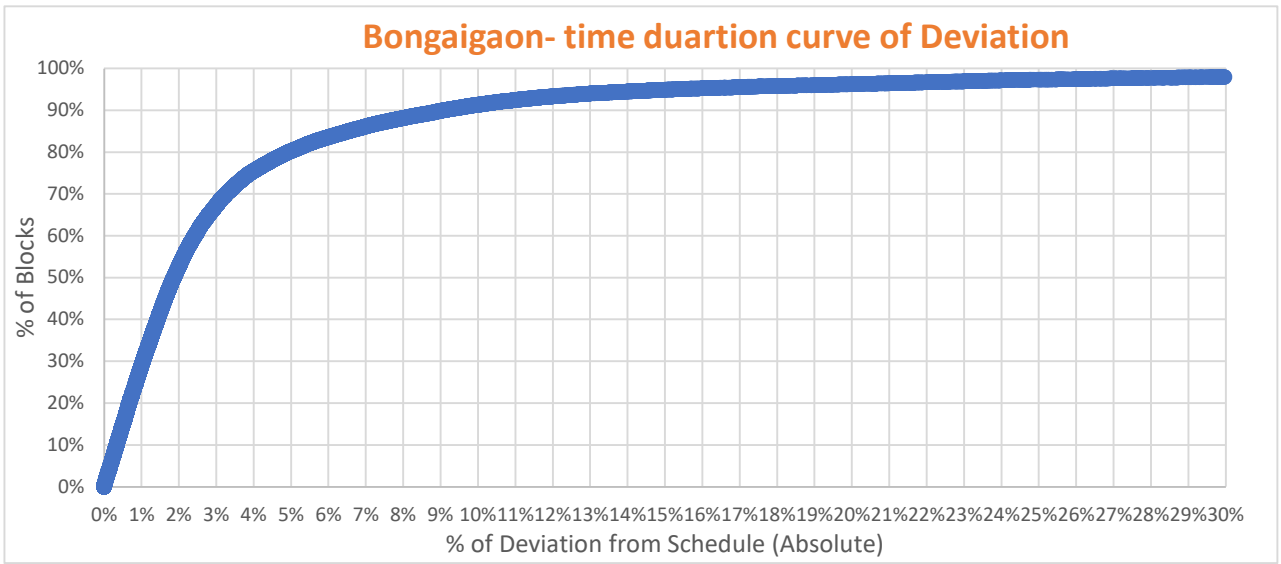
a) The typical deviation of actual generation from the Scheduled Generation at some of the thermal stations of NTPC (Barh-2, Bingaigaaon, Kudgi and Singrauli) is captured in the figures below.



b) Based on the data of the FY 2020-21 (365 x 96 no of blocks) for Singrauli, the % deviation in a block has been plotted against the cumulative % of total blocks. From this plot, it is clear that for a very tiny fraction of the blocks, the actual deviation from Scheduled Generation is Zero. This is the position in a very low cost, pit-head stations where there is hardly any ramp up/ down in schedules. The fraction of blocks with Zero deviation from scheduled is extremely low in a non-pit head station.



c) To illustrate this point further, similar plot for Bongaigaon station for the FY 2020-21 is attached below. Similar plot for other Pit-head and non-pithead stations of NTPC is attached at ***Annexure***.



d) Based on the actual data of SG and AG of different stations, it is observed that the percentage of time a station is generally able to generate with 0% deviation is actually very small, close to zero (0), based on the data for all the blocks in FY 2020-21. This data for some of the stations of NTPC is given below:

Sl. No.	Name of the Stations	% of blocks with No (0%) Deviations
1	Singrauli	0.017% (6 blocks)
2	Sipat	0.006% (2 blocks)
3	Farakka 1&2	0.017% (6 blocks)
4	Barh-2	0.017% (6 blocks)
5	Bongaigaon	0.029% (10 blocks)

C) Considering all these factors, the following is submitted:

i) It is submitted that an Operational Margin of +/- 3% may be provided for thermal generators to provide them with Operational flexibility.

ii) Within this Margin of +/-3%, any over-injection and over-injection should be settled at the rate of ECR of the stations and there should not be any penalty.

(1) For any over-injection, the generator should be paid @ ECR

(2) For any under-injection, the generator should return @ ECR

(3) No penalty should be applicable within the margin of +/-3%

iii) Penalty should be applicable only beyond the Band of +/-3%

iv) Penalty provision should not be there in cases of Forced Outages

v) In cases of scheduling below Tech Minimum, for the purpose of calculation of deviations, the Tech Minimum value should be considered.

4.0 Treatment of Infirm Power Injection:

A) Regulation 8 (3) (a) - The charges for deviation for injection of infirm power shall be zero.

Submissions:

The CERC (Terms and Conditions of Tariff) Regulations 2019 stipulates the following wrt the Capital Cost of Project

Quote

19(2). The Capital Cost of a new project shall include the following:

xxx

(g) Adjustment of revenue due to sale of infirm power in excess of fuel cost prior to the date of commercial operation as specified under Regulation 7 of these regulations;

Unquote

The proposed provision of draft DSM Regulations would mean no payment/ fuel reimbursement to the generator on account of injection of infirm power into the grid. This will lead to capitalization of the entire fuel cost used during commissioning activities, which will push up the total capacity cost of a project and increase the AFC burden on the beneficiary states.

From the available data of Fuel cost before COD (infirm injection), it is estimated that in case of 800 MW stations, the impact on Normative FC could be around 6-8 Paise/ Unit.

It is submitted that, the fuel costs incurred for injection of power may be reimbursed to the generator from the Pool.

5.0 Methodology of determination of Normal rate of Charges for Deviation

A) ***Regulation 7: Normal Rate of Charges for Deviations***

(1) The normal rate of charges for deviation for a time block shall be equal to the Weighted Average Ancillary Service Charge (in paise/kWh) computed based on the total quantum of Ancillary Services deployed and the total charges payable to the Ancillary Service Providers for all the Regions for that time block:

Provided that for a period of one year from the date of effect of these regulations or such further period as may be notified by the Commission, the normal rate of charges for deviation for a time block shall be equal to the highest of [the weighted average ACP of the Day Ahead Market segments of all the Power Exchanges; or the weighted average ACP of the Real Time Market segments of all the Power Exchanges; or the Weighted Average Ancillary Service Charge of all the regions] for that time block:

Provided further 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:

B) Submissions:

i) DSM charges are to be calculated on the basis of Weighted Average Ancillary Service Charges, which will consist of both the UP and Down services. As there is payment to the Pool during Ancillary Down Services, it is possible that in some blocks the Weighted Average Costs may turn out to be Negative (-ve) or zero (0). This aspect may be considered while framing the final Regulations.

ii) Deviation Charges are designed to be a centralized concept i.e. same rate would apply to Deviations happening in all the Region, whereas the Ancillary Mechanism is essentially a Regional concept though procurement is proposed to be done at a centralized market. Hence it is not clear how the Regional Charges would be made applicable for Deviations happening across all the Regions.

6.0 Impact on RE Generators

RE sources are very intermittent in nature having high variation in output depending upon the weather condition making it very difficult to have accurate forecasts for generation. Hence, keeping in view the commercial viability of the RE projects it is submitted that the provisions for charge for deviation for WS sellers may be made as follows:

a) Charges for deviation payable to Deviation and Ancillary Service Pool account for Under injection should be Zero up to 15 % Deviation in case of WS sellers.

   Provided that such seller shall pay back to the Deviation and Ancillary Service Pool Account for the total shortfall in energy against its schedule in any time block due to under injection, (a) at the contract rate at which it has been paid based on schedule, or (b) in the absence of a contract rate at the rate of the Area Clearing Price of the Day Ahead Market for the respective time block.

b) Also, in case of over injection, for deviation up to 15%, it should be paid from the pool account (a) at the contract rate at which it has been paid based on schedule, or (b) in the absence of a contract rate at the rate of the Area Clearing Price of the Day Ahead Market for the respective time block, similar to the case where WS seller are required to pay to the pool account for under injection

7.0 Schedule of Payment of Charges for Deviation

A) Regulation 10 (1) : The payment of charges for deviation shall have a high priority and the concerned regional entity shall pay the due amounts within 7 (seven) days of the issue of statement of charges for deviation by the Regional Power Committee, failing which late payment surcharge @0.04% shall be payable for each day of delay.

Submissions :

Payment processing and remittance, every time within 7 days of issue of accounts is a very stringent timeline, specifically when the statements are issued in late evening or when there are intervening holidays. It is submitted that the payment period should be made 10 days as earlier allowed. Alternatively, this is proposed to be made seven working days (One week - 5 working days).

B) Regulation 10 (2): Any regional entity which at any time during the previous financial year fails to make payment of charges for deviation within the time specified in these regulations, shall be required to 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.

Submissions:

This is proposed to be revised as under:

"Any regional entity which, on two consecutive occasions, during the previous quarter fails to make payment of charges for deviation within the time specified in these regulations, shall be required to open a Letter of Credit (LC) equal to 105% of their average payable weekly liability for deviations in the previous financial year in favour of the concerned Regional Load Despatch Centre within a month from the date of issue of such communication by the concerned RLDC."

Further, there should be a provision to incentivize/reward the regional entity that maintains an immaculate record of payments (not through LC) made within the allowed time against all deviation accounts issued in last two quarters.

8.0 Global Experiences

Based on the study of DSM process of various international Markets, the following summary is submitted. Form the practices followed globally, it is understood that in almost all the Markets, there is always payments made during Over-injection by generators. The rate of payment is determined based on different process in different Markets.

A brief summary of the practices followed in the USA and European Markets is given below.

Deviation Settlement Mechanism in USA (PJM)[1]

The Deviation Settlement Mechanism in United States of America has been classified into two aspects:

a) **Deviations on account of Imbalance Settlement:** The PJM operates a Spot Energy Market where prices are determined on real time basis. In this mechanism, PJM considers an hourly load and generation schedule profile and flat profiles this value for every five-minute interval. Then, the balancing spot energy is calculated for every market participant is calculated as a difference between withdrawal charges and injection credits.

The injection credit is calculated as follows: Difference between the sum of the Market Participant's real-time five-minute energy injections and the day-ahead five-minute scheduled energy injections and multiplying this difference by the five-minute Real-time System Energy Price divided by 12.

The Withdrawal Charges are calculated as follows: Difference between the sum of the Market Participant's real-time five-minute energy withdrawals and the day-ahead five-minute scheduled energy withdrawals and multiplying this difference by the Real-time Five-minute System Energy Price divided by 12.

b) **Deviations on account of Inadvertent Interchange:** Inadvertent interchange is the hourly difference between the net actual energy flow and the net energy scheduled

[1] Manual 28 of PJM (https://www.pjm.com/-/media/documents/manuals/m28.ashx)

flow into or out of the PJM control area in that hour on account of combined effects of all the generation and loads in the system such as Data Recording Errors, Metering Errors, Scheduling Errors etc. In order to manage the inadvertent interchange process, the following process is followed:

PJM calculates the inadvertent interchange in MWh. The price is calculated based on the hourly load weighted-average real-time LMP for the PJM RTO. The hourly value of inadvertent interchange by multiplying the inadvertent interchange MWh by the load weighted-average LMP. Inadvertent Interchange charges (+/-) are allocated to all participants in proportion to their hourly real-time load (excluding losses).

Deviation Settlement Mechanism in Europe[2]

In the European Model, the imbalance price is linked with the system state as well as the position of the BRP. The payment to TSO or receipt of credit from TSO is based on the following table:

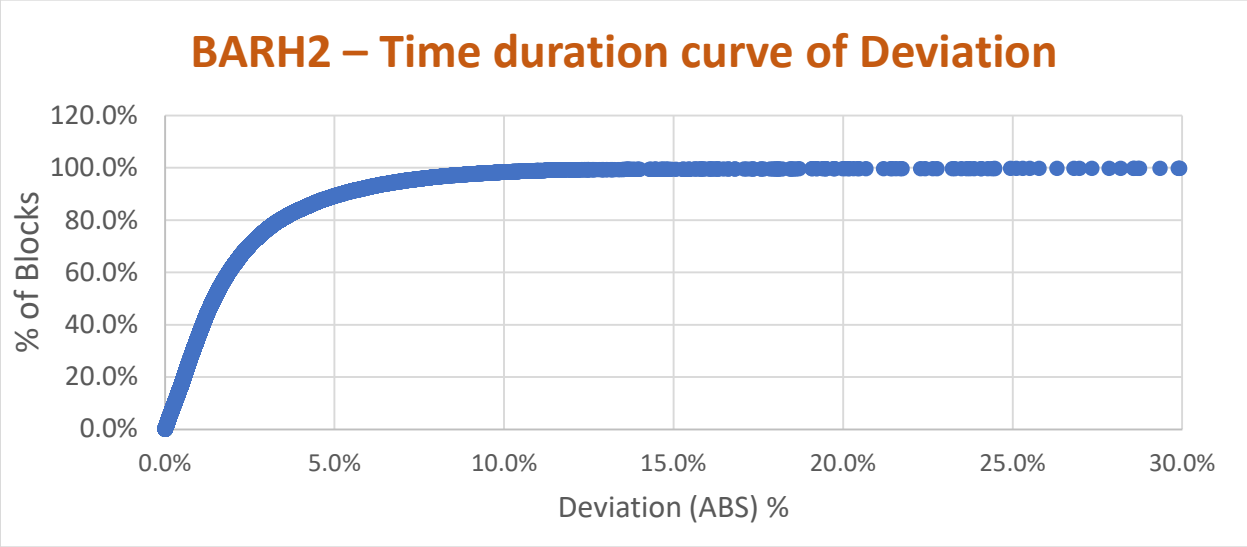
	Imbalance price positive	Imbalance price negative
Positive imbalance	Payment from TSO to BRP	Payment from BRP to TSO
Negative imbalance	Payment from BRP to TSO	Payment from TSO to BRP

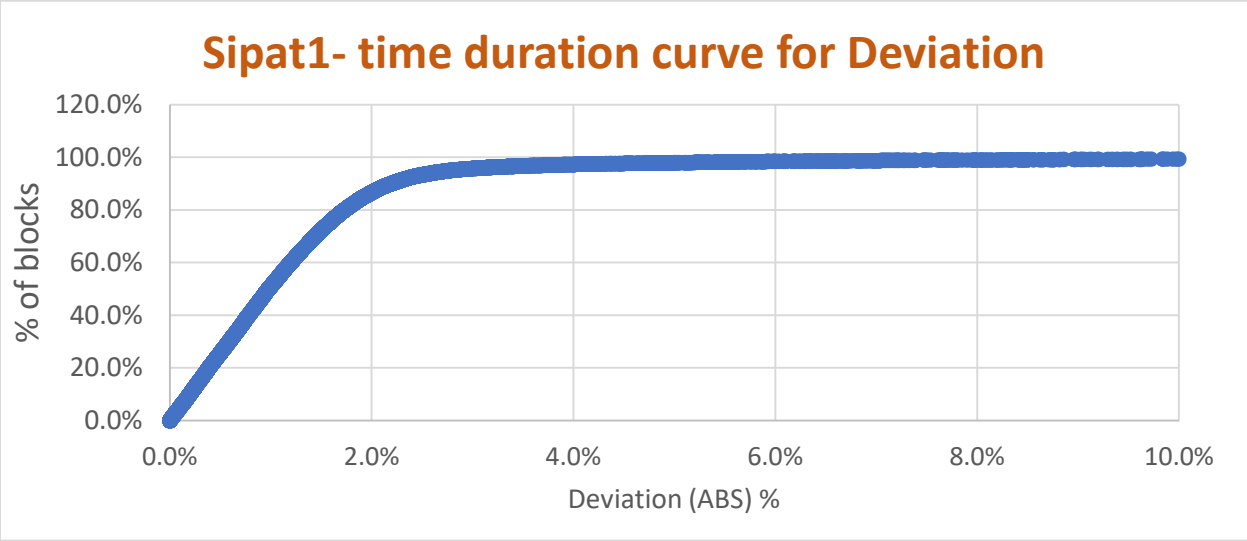
wherein a negative imbalance implies shortage while a positive imbalance implies surplus.

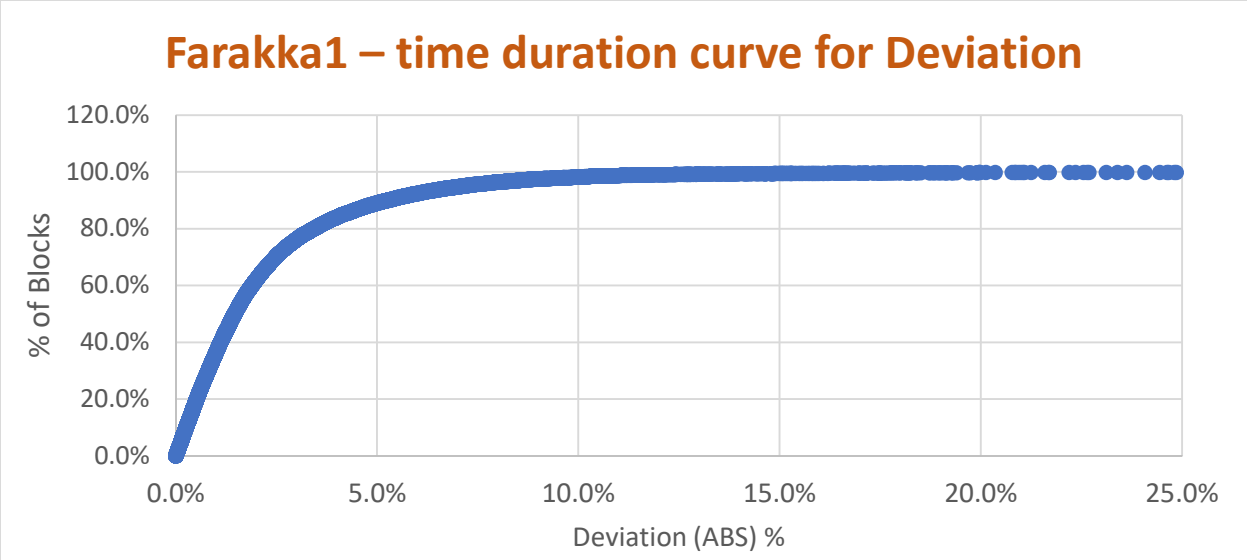
Entso-E further recommends that the imbalance pricing is based on two aspects i.e. Value of Lost Load Principle or weighted average price of activated balancing energy from Frequency Restoration Reserves or Regulation Reserves.

[2] ENTSOE (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R2195)

9.0 Annexures






Farakka1 – time duration curve for Deviation
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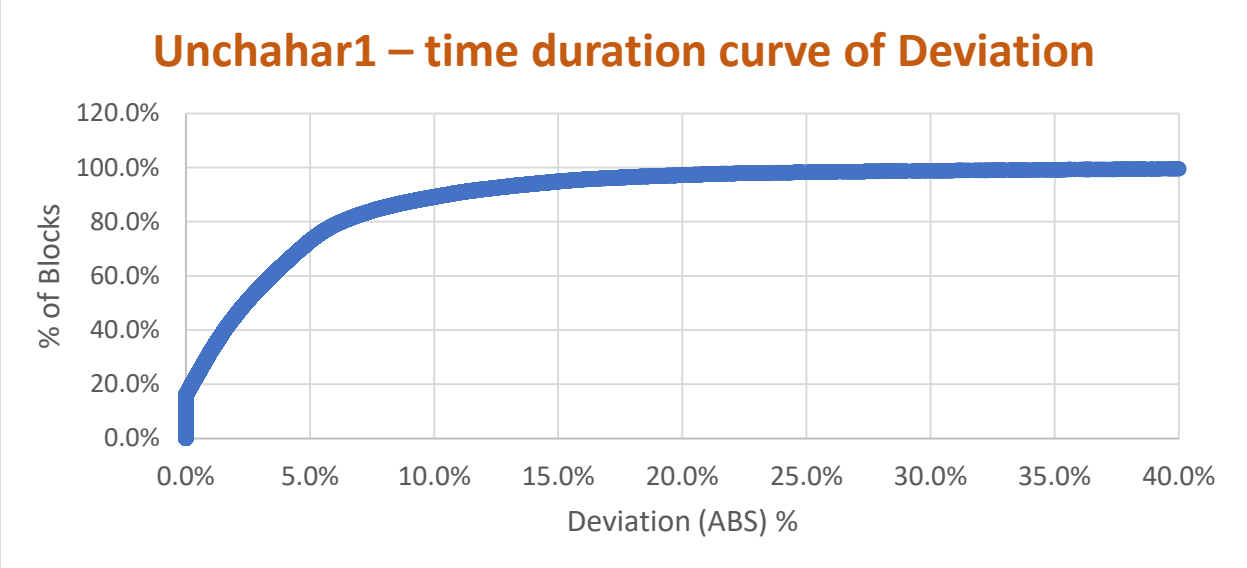
Deviation (ABS) %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