Workshop on DSM Regulation

Adani Electricity Mumbai Limited
12th Feb 2019

Peculiarities : Regional Vs State System

Particular	Regional DSM	Proposed Intrastate DSM
Control Area	Entity / SPP : State Demand : Controllable (DISCOM & Generators with B/D capacity of 6GW, Hydro - 1GW)	Entity / SPP : DISCOM Demand : Not Controllable (Embedded with only DISCOM Demand, Only option - load curtailment)
Deviation Limit	250 MW (~ 4% of Schedule ~ 6000 MW Regional Exchange)	250 MW to be shared among DISCOMs: effective limit 1% for each. (AEML ~ 17MW)
RE Settlement	Credit to Buyer – Schedule basis Deviation applicable to Buyer : NIL	Credit to Buyer - Actual basis Deviation applicable to Buyer : Actual RE-Scheduled RE
Partial OA consumer Rev	Implications – NIL	Implications – Increase in DISCOM deviation
Migration of Consumer	NA	Deviation of TPC & AEML - Deviations will get superimposed on TPC & AEML-D
Transmission Loss	Scheduling : Scheduling Loss Billing : Scheduling Loss Implications : NIL	Scheduling : Normative Loss Billing : Actual Loss Implications : Var in loss - Deviations
Scheduled Revision	IEGC - With effect from 4 Time Block	State Grid Code : With effect from 6 Time Block

Mechanism needs customization at State level

AEML Concerns & Suggestions

Sr No	Concern	AEML Suggestion & Rationale
1	**Stringent Deviation Limit** Demand Controllability - NIL Demand Forecasting – Evolving, therefore 99% accuracy difficult to achieve	**To Start with Deviation Limits ~ 5%** (in line with Regional mechanism) – **Rationale** (1)Likelihood of simultaneous OD or UD by all is less (2) Only regional drawl > limits should attract Additional charge, IntraState – at DSM rate (3)SLDC to Manage Grid Operation – Increase generation / Curtail load on same day basis to maintain 250 MW at State boundary
2	**Impact of Uncontrollable Factors**	
	Deviation of RE Generators	RE deviation to be excluded from volume limits **Rationale:** No Control of DISCOM. Total deviation at State level is taken care under F&S regulations.
	Variation in Migrated Consumers demand	Option 1 : Such deviation to be excluded from limits Option 2: Independent settlement rate & process **Rationale:** No impact at State level – deviations gets nullified between TPC & AEML
	Revision in partial OA generation	Schedule deviations to be excluded from volume limits, else mechanism to be developed to pass on this to specific Consumer **Rationale** – To avoid socialization of the impact
	Impact of variation in Transmission Loss	Scheduling - On Normative Loss DSM Billing - On Normative Loss **Rationale :** In line with regional mechanism.

AEML Concerns & Suggestions

Sr No	Concern	AEML Suggestion & Rationale
3	**Grid Operation / Monitoring -** SCADA, **Billing** - ABT Meter data	**online AMR Implementation by STU** – precondition for DSM– data to be shared with all DISCOMs **Operation & Billing** : both on Meter data **Rationale –** Operational(SCADA) & AMR data has error > 2%, wrong decision making etc.
4	**Time required for Schedule Revision** : 6 Time blocks	Revision should be possible from 2nd Time block **Rationale :** For DISCOM Drawl schedule= Generation, hence to work within limits DISCOM will have facility to revise Generation / other sources.
5	**Intraday Power arrangement** **Minimum Time required** ~ 3hours **Realtime Market** - Not available	Stringent conditions under DSM to be brought in phases, as DISCOM don't have flexibility **Rationale :** Contingency buy / sale transactions to control OD/UD – has lead time
6	**Deviation Sign Reversal** - After every 6 Time blocks	DISCOMs need to be excluded from this condition **Rationale :** DISCOM Drawl = Generation availability By & large DISCOM has no control during real time except curtailment – if overdrawing During winter etc if plant operating at tech min – No control with DISCOM
7	**Force Majeure – not defined**	Clear Definition of Force majeure condition & market suspension during such period **Rationale –** To avoid implications of large deviations during Grid disturbances and tripping- uncontrollable.

Suggested Forward Path

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AEML Preparedness

1. **AMR Data @ T<>D :** To be provided by STU (Presently We have online data of our end)
2. **Weather Forecast :** Improvise Forecast accuracy- strong penalty for vendor. Increase number of weather stations
3. **Forecasting Software :** License Renewal / Develop new Vendor
4. **Decision Support System –** modify existing Real Time Monitoring System(RTMS)

State level Implementation

1. **Stringent Limits: In phased manner**
2. **Online AMR, Billing Software & DSS – Precondition for mock Trial / implementation**
3. **Mock Trial – min 3 Months**
4. **Sufficient time between implementation of DSM & F&S mechanism**

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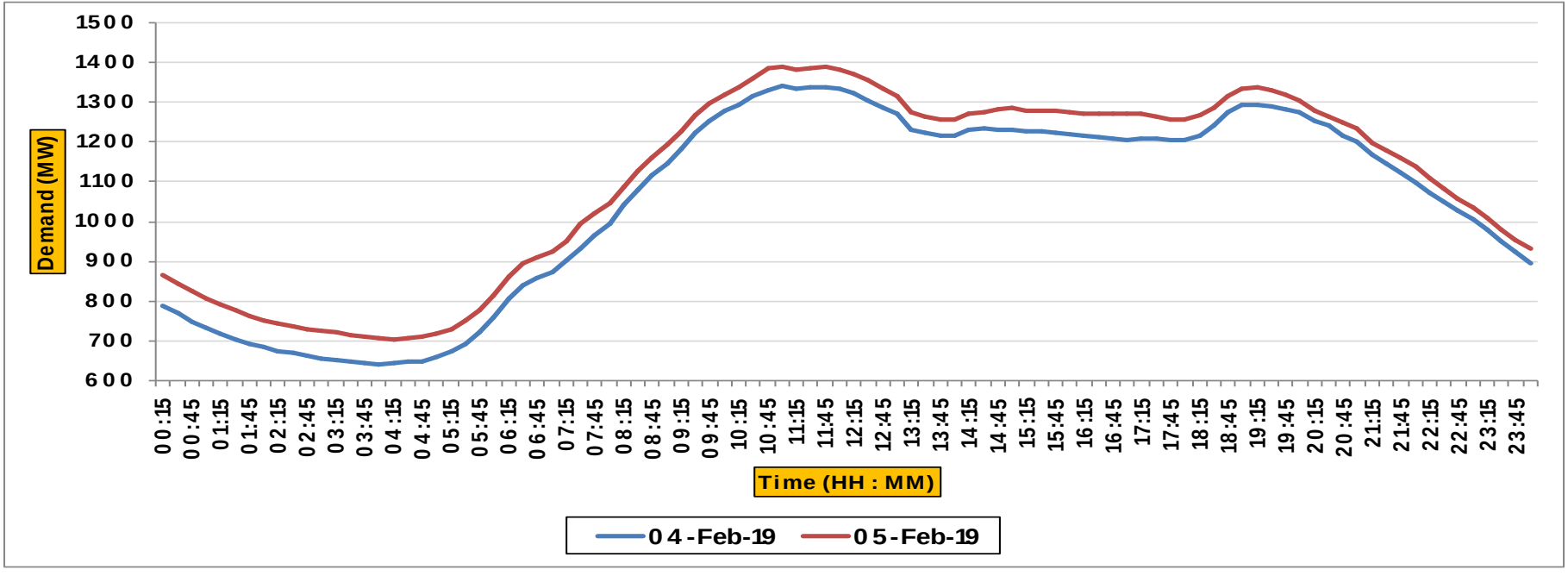
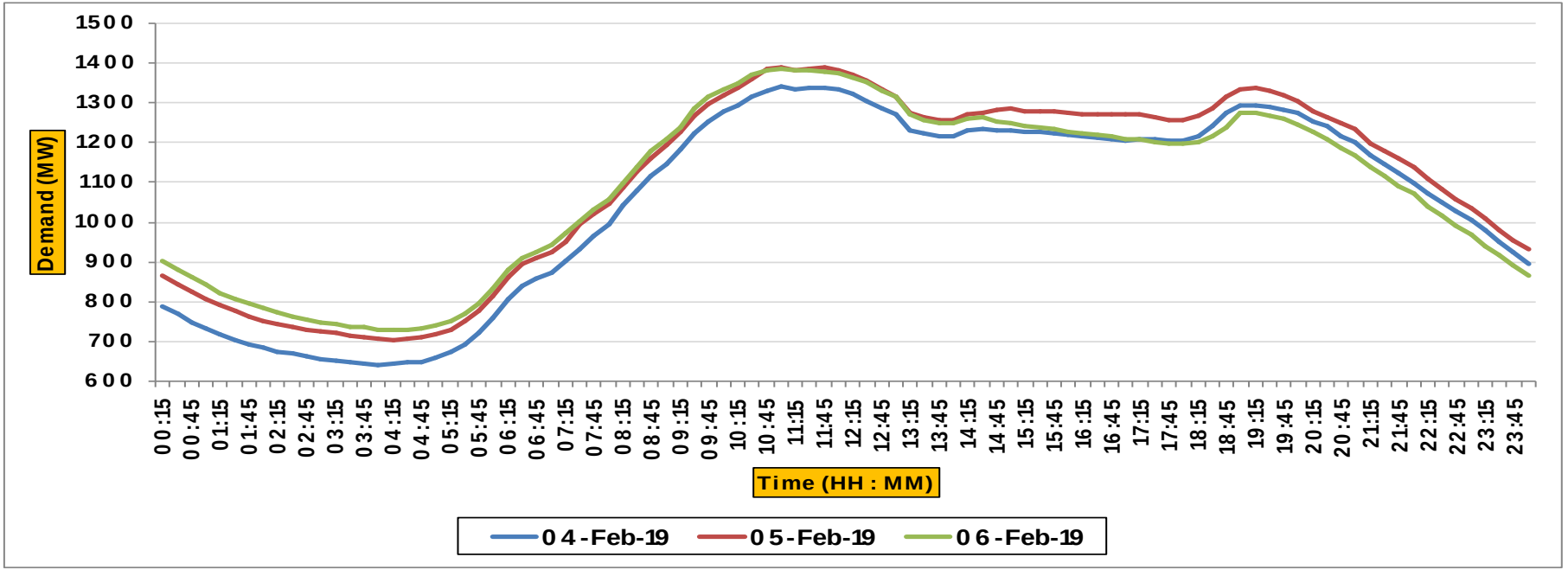
Weather Sensitivity



Day	Date	Avg. HI (Deg. Cel)	Energy (Mus)	% Rise with PD
Monday	04-Feb-19	28.1	25.2	
Tuesday	05-Feb-19	28.2	26.4	4.8%

- With rise in Temp, Avg. Demand increased on 5th w.r.t 4th by ~5%

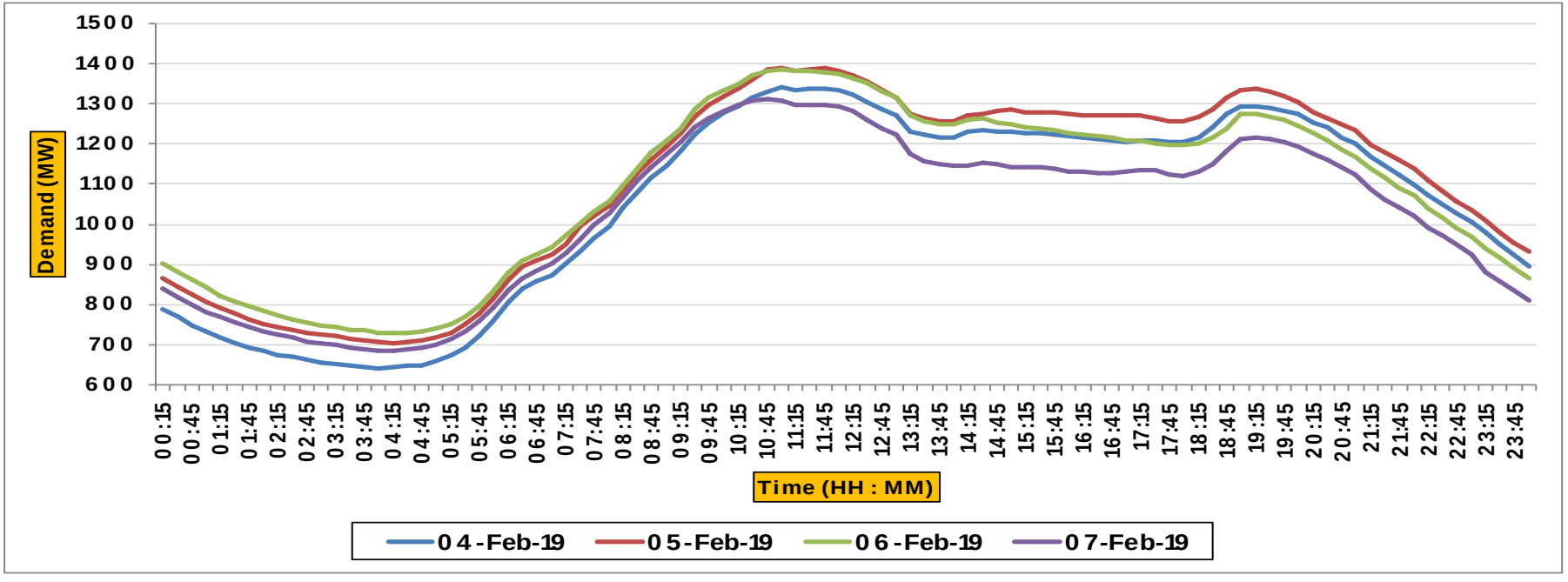
Weather Sensitivity



Day	Date	Avg. HI (Deg. Cel)	Energy (Mus)	% Rise with PD
Monday	04-Feb-19	28.1	25.2	
Tuesday	05-Feb-19	28.2	26.4	4.8%
Wednesday	06-Feb-19	26.4	26.0	-1.3%

- With drop in Temp, Avg. Demand reduced on 6th w.r.t 5th by ~1.3%

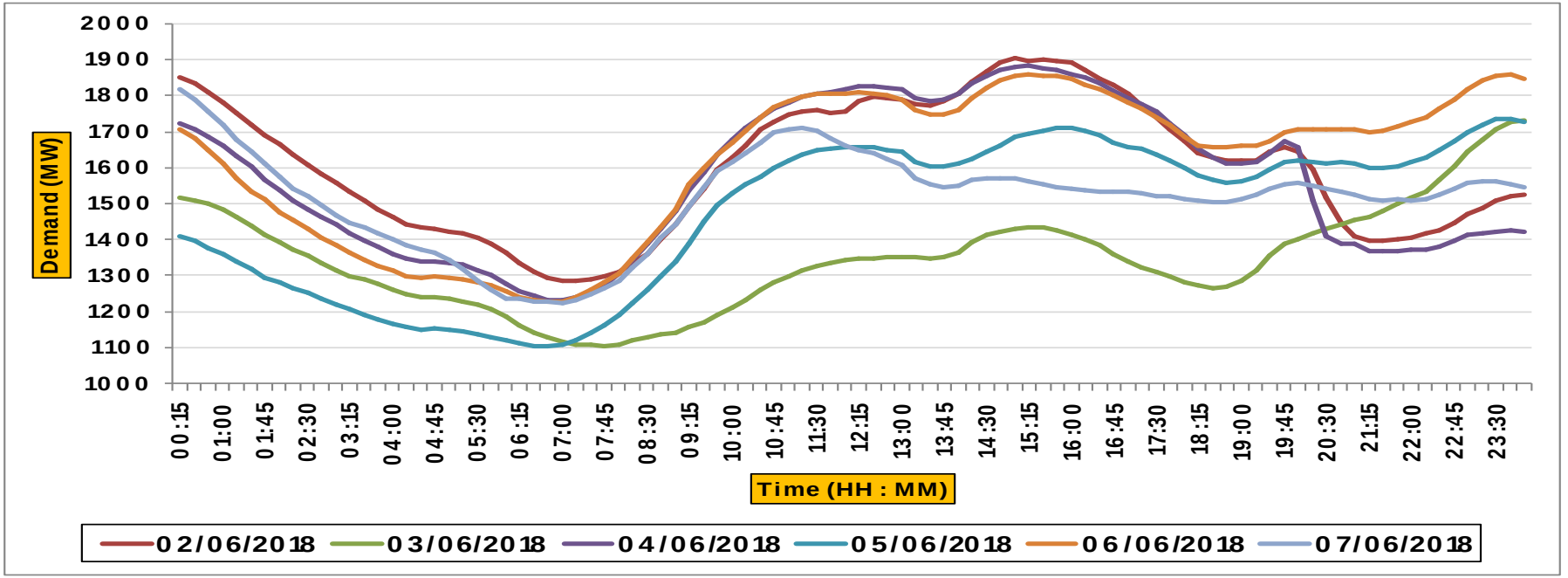
Weather Sensitivity



Day	Date	Avg. HI (Deg. Cel)	Energy (Mus)	% Rise with PD
Monday	04-Feb-19	28.1	25.2	
Tuesday	05-Feb-19	28.2	26.4	4.8%
Wednesday	06-Feb-19	26.4	26.0	-1.3%
Thursday	07-Feb-19	24.1	24.6	-5.6%

- With further drop in Temp, Avg. Demand reduced further on 7th w.r.t 6th by ~6%

Weather Sensitivity (Monsoon)

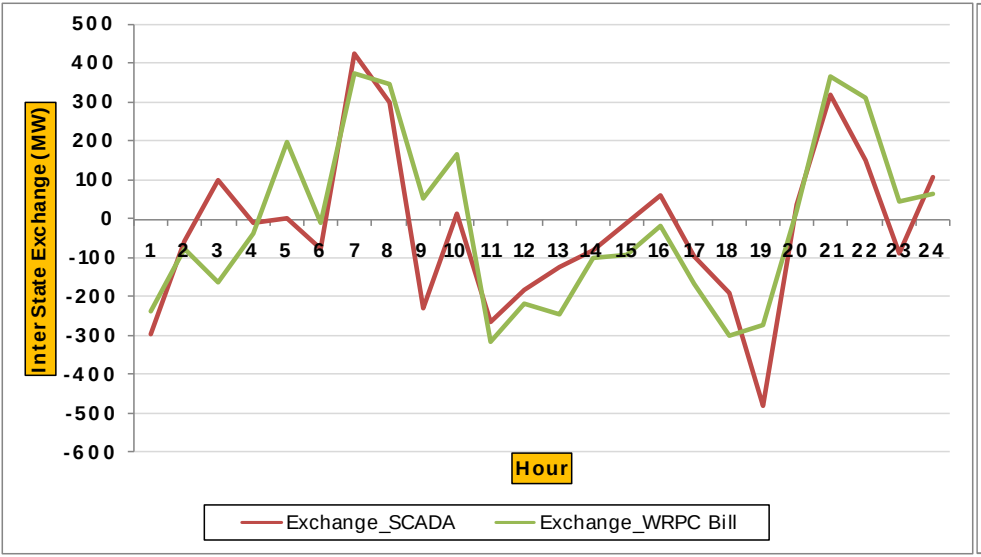


Day	Date	Avg. HI (Deg. Cel)	Rain (mm)	Energy (Mus)	%Rise with PD
Saturday	02-Jun-18	40.8	37	38.5	
Sunday	03-Jun-18	37.3	2	32.3	
Monday	04-Jun-18	39.8	30	37.7	
Tuesday	05-Jun-18	35.3	0	35.4	**-6.1%**
Wednesday	06-Jun-18	42.7	0	38.8	**9.6%**
Thursday	07-Jun-18	35.0	70	36.3	**-6.3%**

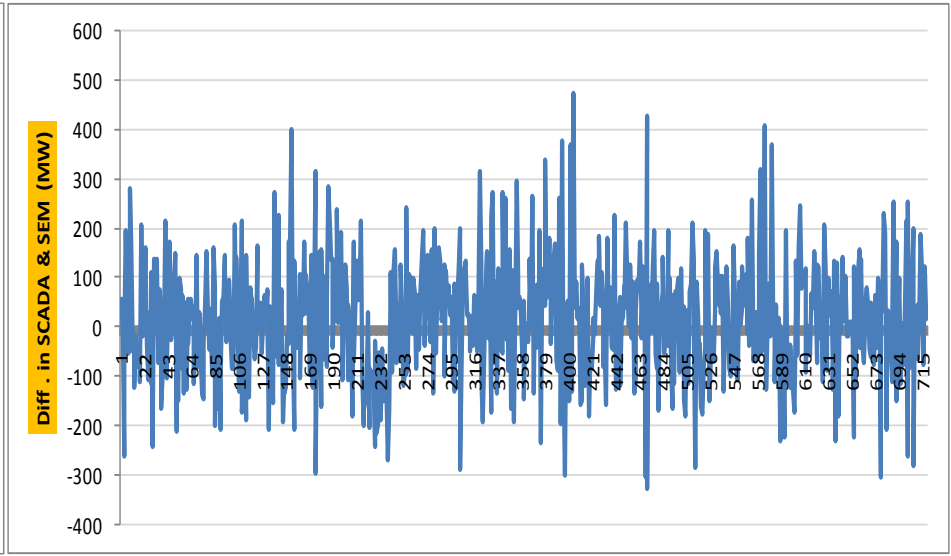
- Due to sudden rainfall demand crashed by @ 300 MW
- Whereas for no rain day – Demand again shot up again by 200 to 300 MW

SCADA vs Metered

Typical day comparison of SCADA (DSR) and SEM (WRPC Bill)



Plot of Diff of SCADA (DSR) and SEM (WRPC Bill) in MW – For Nov-18



Very high difference between SCADA and Metered (-300 to 450 MW)

Impact of RE Deviations

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- Day Ahead Position – Scheduled basis

Particular		DA Scheduled (MW)
Demand Forecast	A	1500
Long Term Scheduled	B	1000
RE Wind Scheduled	C	400
Short Term Purchase	D	100
Drawal Schedule	E = B + C+D	1500

- Actual Position – RE Deviation < 15%,

Particular		DA Scheduled (MW)	Remark
Actual Demand	F	1510	OD of 10MW
Long Term Scheduled	B	1000	Scheduled
RE Wind Actual	C1	340	Credit to DISCOM = Actual
Short Term Scheduled	D	100	Scheduled
Drawal Schedule	E1 = B + C1+D	1440	LGBR

Particular		Deviation	Remark
Billing Deviation	G =E1 – F	70	Actual - Schedule
Deviations due to DISCOM Drawal	F - A	10	
Deviations due to RE Deviation	C - C1	60	RE Dev < 15% - No impact to Gen

Particular		Deviation	Remark
Deviaion Limit	L	17	Normal Charges
Normal Dev Charges	L	17	Within Limit
Additional Charges for Dev	G - L	53	Due to RE Deviations

- With increased RE Tie up, these charges will be very high
- AEML Suggestion : RE deviations to be excluded from Deviation Limit

Regional DSM – Sample Performance

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- WRPC Bill Summary (1st Jan-19 to 20th Jan-19)

Particular	Energy	UI Charges	MSCAP	Addl UI	Sign Rev. Violations	Total	Net Rate
UoM	Mus	Rs. Cr	Rs. Cr	Rs. Cr	Rs. Cr	Rs. Cr	Rs/Unit
O/D	-36	13	0	1		15	-4.16
U/D	43	-15	2	2		-11	-2.55
Net	**8**	**-2**	**2**	**3**	**6 (87 No.s)**	**9**	**12.4**

- Energy Distribution w.r.t DL = 250 MW

	U/D < DL	U/D > DL	O/D < DL	O/D > DL
Energy (Mus)	21	23	21	15
% Energy	48%	52%	58%	42%
Count	747	247	755	171
% Count	75%	25%	82%	18%

- Energy Distribution w.r.t Frequency

Frequency Range	Count	%	O/D		U/D	
			Energy (Mus)	Count	Energy (Mus)	Count
f > 50.05	116	6%	-1	45	3	71
50.05 to 50	593	31%	-11	280	15	313
49.85 to 50	1165	61%	-23	583	24	582
f < 49.85	46	2%	-1	18	1	28
Total	**1920**	100%	**-36**	**926**	**43**	**994**
%			**45%**	**48%**	**55%**	**52%**

Charges under – Proposed DSM regulations

Frequency Range	Deviation Volume	Deviation Charge (DC) Rs/Unit	Additional Charge
f > 50.05	Overinjection / Under Drawal	0	1.78 Rs/Unit
f > 50.05	Underinjection / Over Drawal	0	0
49.7 < f < 50.05	Within Limit (L)	As per Deviation Vector (0 to 8.24)	0
49.7 < f < 50.05 (Over Drawal / Under Injection)	D > L but D < L + 10	0 to 8.24	20% of DC
	D > L + 10 but D < L + 20	0 to 8.24	40% of DC
	D > L+20	0 to 8.24	100% of DC
49.7 < f < 50.05 (Under Drawal / Over injection)	D < L	0 to 8.24	0
	D > L	0	0
f < 49.7	No Over drawal or Under injection permissible		
	Under Drawal / Over Injection	8.24	0
Additional Condition	Deviation sign reversal once every 12 time blocks	As per Deviation Vector (0 to 8.24)	10% of DC

D – Deviation , L- Limit , DC - Deviation Charge , F - Frequency