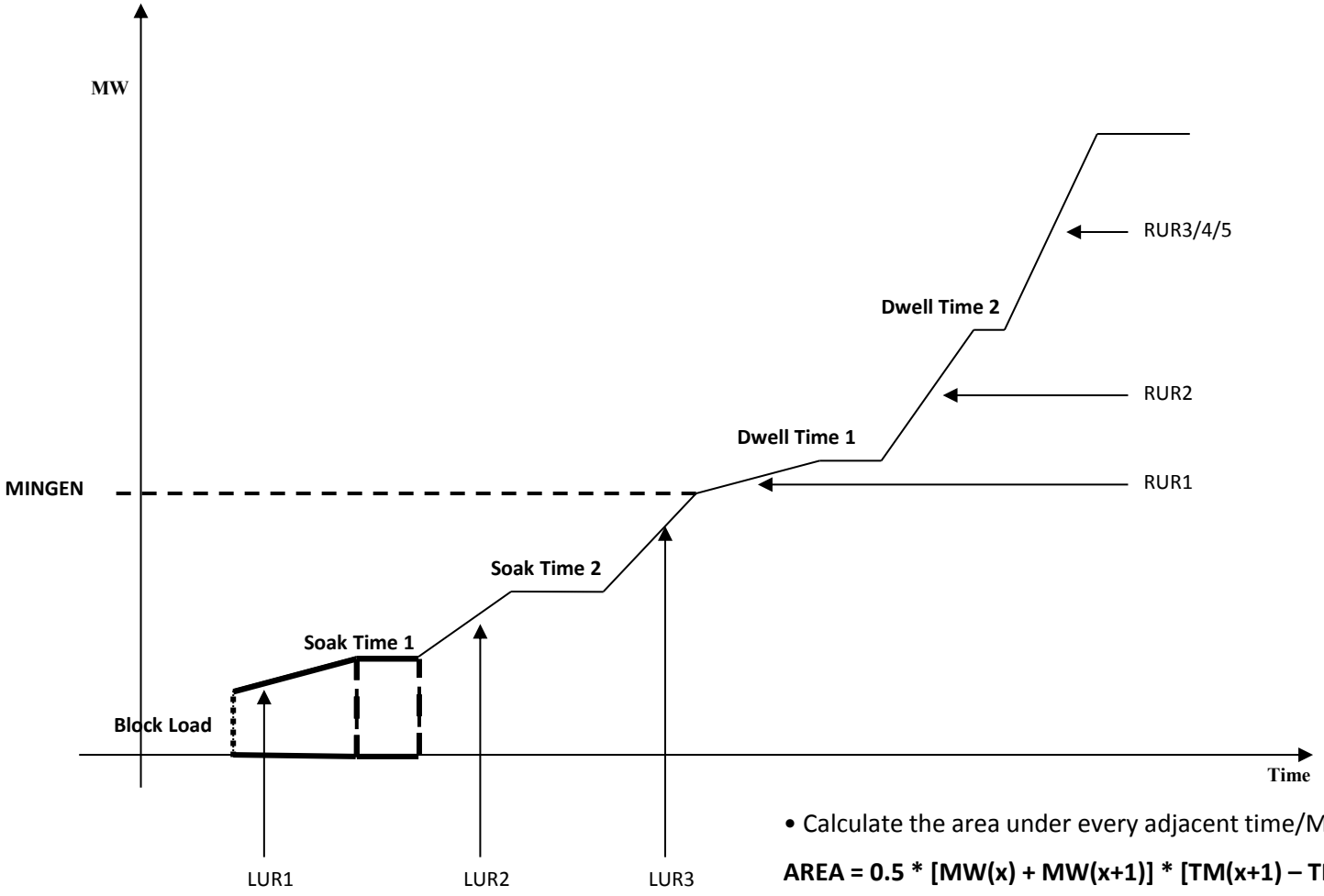
Instruction Profiling

Instruction Profiling – SEM today

- Instruction Profiling in the SEM is the process of converting spot dispatch instructions issued on a per minute basis into half hourly profiles of average output, in order to the determine the expected output of a generator over the settlement period
  - Calculation uses technical characteristics of the generation unit as registered by the owner
  - The rules governing the calculation of instruction profiles are outlined in T&SC Appendix O
  - TSOs provide information in relation to dispatch instructions and the outturn data of all units
  - Instruction profiling is completed by central market systems as part of the pricing run

Instruction Profiling



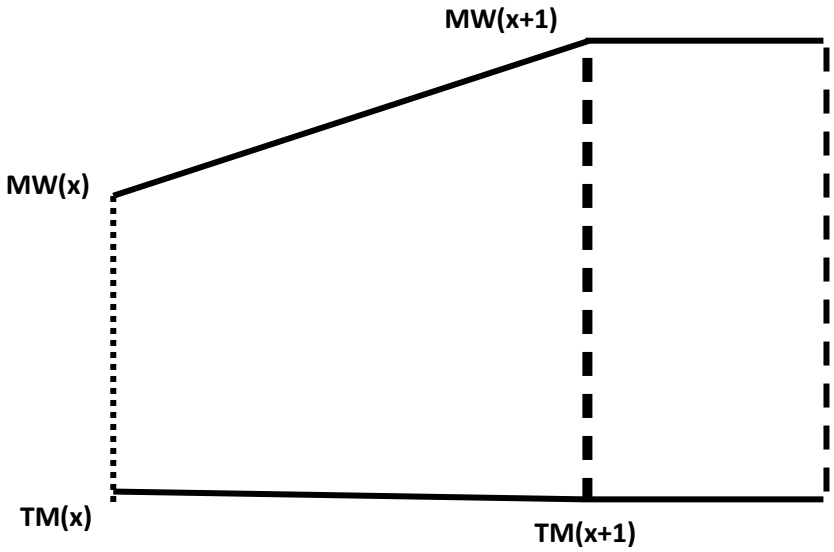
• Calculate the area under every adjacent time/MW pair.

AREA = 0.5 * [MW(x) + MW(x+1)] * [TM(x+1) – TM(x)]

• Calculate the Time-Weighted Average MW value for each Trading Period

Sum over all areas in each Trading Period, and then divide by 30

Instruction Profiling Area calculation



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Instruction Profiling Example

RES_NAME	XXXX
MIN_STABLE_GEN	90
MAX_GEN_CAP	250
BLOCK_LOADS_HOT	6
LOADING_RATE_HOT_1	1
LOADING_RATE_HOT_2	3
LOADING_UP_BREAK_PT_HOT_1	25
SOAK_TIME_HOT_1	10
TRIGGER_PT_HOT_1	30
RAMP_UP_RATE_1	4
RAMP_UP_RATE_2	6
RAMP_DOWN_RATE_1	5
RAMP_UP_BREAK_PT_1	130
DWELL_TIMES_3	10
DWELL_TIMES_TRIGGER_PT_1	150
DELOADING_RATE_1	7

INSTR_TIMESTAMP	DI	INSTR_CODE
07:00	200	MWOF
07:00	0	SYNC
14:20	0	MWOF
14:20	0	DSYNC

- Calculate the area under every adjacent time/MW pair.

AREA = 0.5 * [MW(I) + MW(I+1)] * [TM(I+1) – TM(I)]

- Calculate the Time-Weighted Average MW value for each Trading Period

Sum over all areas in each Trading Period, and then divide by 30

Instruction Profiling Example

Load and ramp up

RES_NAME	XXXX
MIN_STABLE_GEN	90
MAX_GEN_CAP	250
BLOCK_LOADS_HOT	6
LOADING_RATE_HOT_1	1
LOADING_RATE_HOT_2	3
LOADING_UP_BREAK_PT_HOT_1	25
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Sum over all areas in each Trading Period, and then divide by 30

=(25-6)/1

=0.5*(6+25)*19

TP	Duration(mins)	MW target	Area	Final DQ
07:00	1	6	6	
	19	25	294.5	

Instruction Profiling Example

Load and ramp up

RES_NAME	XXXX
MIN_STABLE_GEN	90
MAX_GEN_CAP	250
BLOCK_LOADS_HOT	6
LOADING_RATE_HOT_1	1
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AREA = 0.5 * [MW(I) + MW(I+1)] * [TM(I+1) – TM(I)]

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Sum over all areas in each Trading Period, and then divide by 30

=30-(2+19+1)

=(30-25)/3

=0.5*(25+30)*2

=0.5*(30+30)*8

=(6+294.5+55+240)/30

TP	Duration(mins)	MW target	Area	Final DQ
07:00	2	6	6	
	19	25	294.5	
	1.666666667	30	55	
	8	30	240	**19.85**

Instruction Profiling Example

Load and ramp up

RES_NAME	XXXX
MIN_STABLE_GEN	90
MAX_GEN_CAP	250
BLOCK_LOADS_HOT	6
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TP	Duration(mins)	MW target	Area	Final DQ
07:00	1	6	6	
	19	25	294.5	
	1.666666667	30	55	
	8	30	240	**19.85**
07:30	2	30	60	
	20	90	1200	
	8	122	848	**70.26667**

90+32 (8mins left in the TP * RUR1

Instruction Profiling Example

Load and ramp up

RES_NAME	XXXX
MIN_STABLE_GEN	90
MAX_GEN_CAP	250
BLOCK_LOADS_HOT	6
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	19	25	294.5	
	1.666666667	30	55	
	8	30	240	**19.85**
07:30	2	30	60	
	20	90	1200	
	8	122	848	**70.26667**
08:00	2	130	252	
	3.333333333	150	420	
	10	150	1500	
	8.333333333	200	1400	
	7	200	1400	**165.7333**

=(150-130)/6

=(200-150)/6

(252+420+1500+1400+1400)/30

Instruction Profiling – I-SEM

- Integration of spot dispatch instructions over a settlement periods will be required in the I-SEM to determine expected output and BM inc/dec acceptance volumes

- These calculations will be dependent on:

  1. The form of TSO instructions

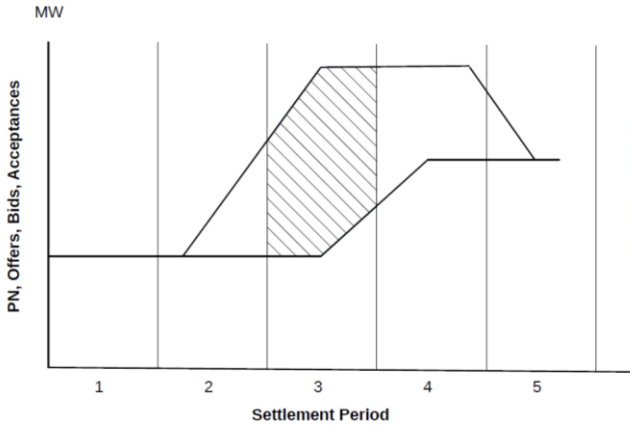
  2. The format of BM incs and decs

1. Form of TSO instructions

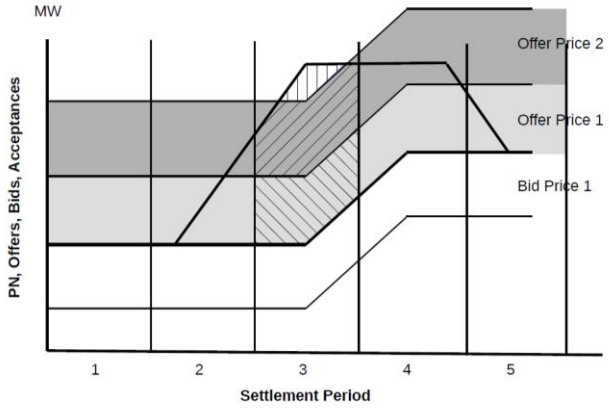
- SEM currently uses open instructions, except for cross-border actions with GB
- GB BM uses closed instructions
  - Each instruction returns to PN or previous BM position
  - Locks in price and volume at time of instruction
- In both cases, BM Inc/Dec acceptances can be inferred from the delta between PN and instructed quantities
- Cross-border balancing actions will require closed form, even if open instructions retained in I-SEM

2. BM Inc/Dec Format

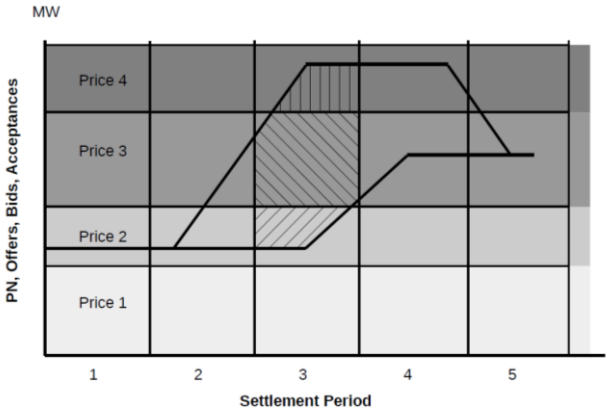
- Alternative Inc/Dec formats were discussed in workshop 2.2:



Simple MWh



Relative MW



Absolute MW

- Simple MWh format implies Inc/Dec quantities settled half-hourly:

$(\Sigma_t Q_t)$*Price

- MW formats can support minute-by-minute settlement:

$\Sigma_t (Q_t$*Price)