

Flexible Ramping Product Settlement Examples

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Critical thinking at the critical time™

EXAMPLE DATA

This example is intended to provide a concrete context for discussing the intended operation of the California ISO settlement rules for flexi-ramp in both the fifteen minute market (FMM) and the real-time dispatch (RTD).

Unit A Characteristics:

200 megawatt upper limit

1 megawatt per minute ramp rate

40 megawatt minimum load

SCENARIO I AND II

Hypothetical IFM (Day-Ahead Market) Schedules:

	HB12	HB13	HB14
Flexiramp Up (FRU)	60	60	60
Energy	100	110	120
Flexiramp Down (FRD)	60	60	60

SCENARIO I

IFM-FMM Settlements HB 13- Because FMM Intervals are 1/4th the length of IFM intervals, the FMM ramp settlement obligation is 1/4th the IFM schedule. ¹

FMM Intervals

IFM	1	2	3	4
FRU 60/4	15	15	15	15
Energy	110	110	110	110
FRD 60/4	15	15	15	15
FMM				
FRU	15	15	15	15
Energy	110	120	135	150
FRD	15	15	15	15
FMM Deviations				
FRU	0	0	0	0
Energy	0	+10	+25	+40
FRD	0	0	0	0

¹) Draft Final proposal Section 4.2, p.12.

SCENARIO I

FMM-RTD Settlements HB 13- Because RTD intervals are 1/3rd the length of FMM intervals, the FMM ramp settlement obligation is 1/3 the FMM schedule. ²

FMM Intervals

FMM Intervals												
FMM												
FRU		5			5			5			5	
Energy		110			120			135			150	
FRD		5			5			5			5	
RTD	1	2	3	4	5	6	7	8	9	10	11	12
FRU	5	5	5	5	5	5	5	5	5	5	5	5
Energy	105	110	115	120	125	125	130	130	135	140	145	150
FRD	5	s	5	5	5	5	5	5	5	5	5	5
RTD Deviations												
FRU	0	0	0	0	0	0	0	0	0	0	0	0
Energy	-5	0	+5	0	+5	+5	-5	-5	0	-10	-5	0
FRD	0	0	0	0	0	0	0	0	0	0	0	0

²) Draft Final proposal Section 4.2, p.12.

SCENARIO II

IFM-FMM Settlements HB 13

FMM Intervals

IFM	1	2	3	4
FRU	15	15	15	15
Energy	110	110	110	110
FRD	15	15	15	15
FMM				
FRU	15	15	15	10
Energy	150	160	175	190
FRD	15	15	15	15
FMM Deviations				
FRU	0	0	0	-5
Energy	+40	+50	+65	+80
FRD	0	0	0	0

SCENARIO II

FMM-RTD Settlements HB 13

FMM	1			2			3			4		
FRU		5			5			5			3 1/3	
Energy		150			160			175			190	
FRD		5			5			5			5	
RTD	1	2	3	4	5	6	7	8	9	10	11	12
FRU	5	5	5	5	5	5	5	5	5	5	5	5
Energy	145	150	155	155	160	165	170	175	180	185	190	195
FRD	5	5	5	5	5	5	5	5	5	5	5	5
RTD Deviations												
FRU	0	0	0	0	0	0	0	0	0	0	+1 2/3	+1 2/3
Energy	-5	0	+5	-5	0	+5	-5	0	+5	-5	0	+5
FRD	0	0	0	0	0	0	0	0	0	0	0	0

SCENARIO III

Hypothetical IFM Schedules:

	HB12	HB13	HB14
Flexiramp Up (FRU)	50	50	50
10 Minute Spin	10	10	10
Energy	100	110	120
Flexiramp Down (FRD)	60	60	60

SCENARIO III

FMM-RTD Settlements HB 13

FMM Intervals

IFM	1	2	3	4
FRU 50/4	12.5	12.5	12.5	12.5
Spin	10	10	10	10
Energy	110	110	110	110
FRD 60/4	15	15	15	15
FMM				
FRU	5	5	5	5
Spin	10	10	10	10
Energy	110	125	135	150
FRD	15	15	15	15
FMM Deviations				
FRU	-7.5	-7.5	-7.5	-7.5
Spin	0	0	0	0
Energy	0	0	0	0
FRD	0	0	0	0

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