Regulation Update

Operating Committee

February 6, 2018

Regulation Market Clearing Price

Year	Month	Reg MCP	Reg CCP	Reg PCP
2017	Jan	$ 13.62	$ 12.49	$ 1.12
2017	Feb	$ 10.64	$ 9.31	$ 1.33
2017	Mar	$ 15.28	$ 12.89	$ 2.40
2017	Apr	$ 15.58	$ 12.38	$ 3.20
2017	May	$ 17.85	$ 15.65	$ 2.19
2017	Jun	$ 13.42	$ 10.45	$ 2.96
2017	Jul	$ 15.08	$ 12.64	$ 2.44
2017	Aug	$ 13.24	$ 9.76	$ 3.48
2017	Sep	$ 21.33	$ 18.10	$ 3.23
2017	Oct	$ 16.11	$ 12.96	$ 3.14
2017	Nov	$ 15.62	$ 13.39	$ 2.22
2017	Dec	$ 25.13	$ 23.05	$ 2.08
2018	Jan	$ 123.09	$ 121.44	$ 1.64

*Data up to Jan 18, 2018

Mileage Ratio

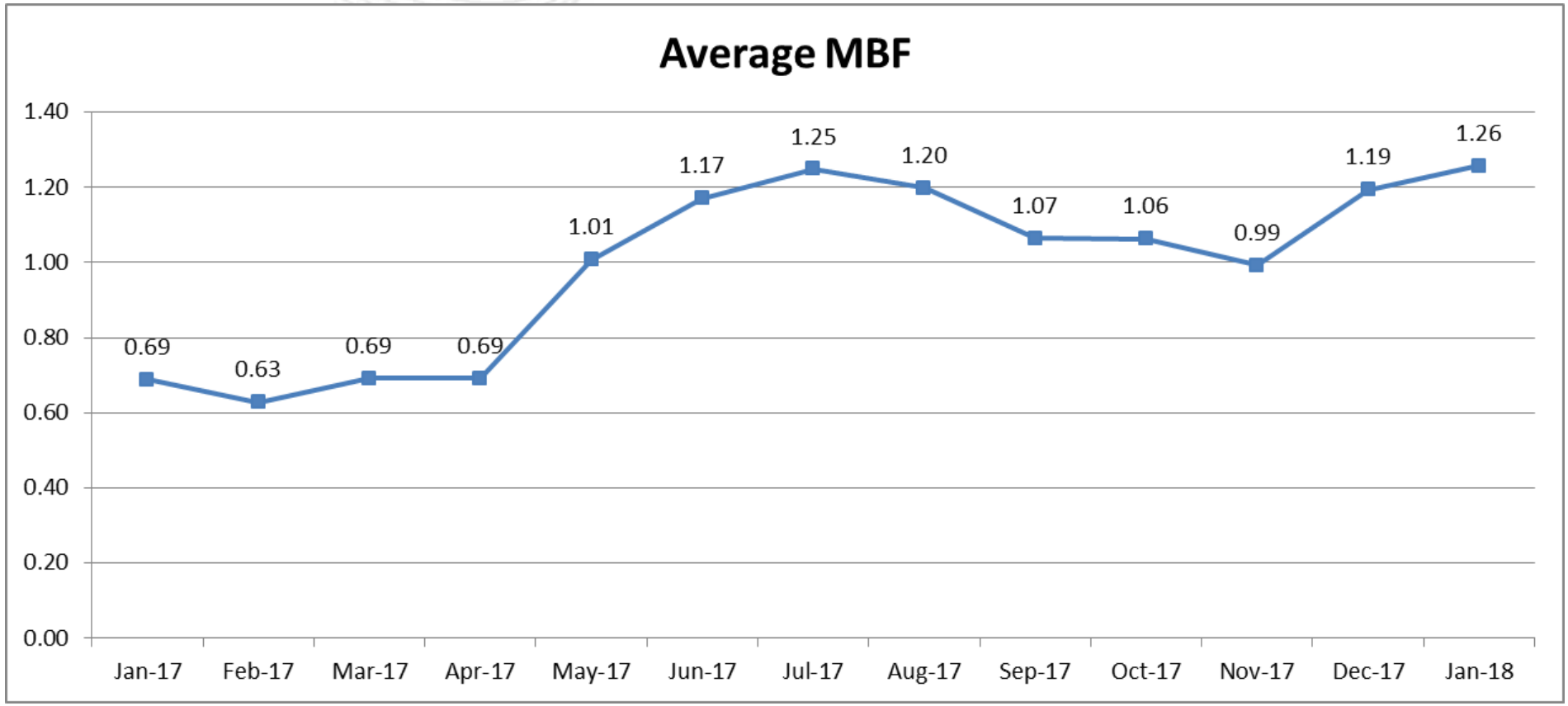
- Mileage Ratio has been pretty consistent since the new signal implementation
  - Larger Utilization of Regulation D resources
  - Regulation A signal better aligned with unit ramp

Average Mileage Ratio	
Jan-17	5.17
Feb-17	5.94
Mar-17	6.38
Apr-17	6.22
May-17	6.12
Jun-17	6.19
Jul-17	6.44
Aug-17	6.31
Sep-17	6.12
Oct-17	6.34
Nov-17	6.13
Dec-17	6.56
Jan-18	6.57

*Data up to Jan 18, 2018

Benefits Factor (RTS)

- Average MBF has increased since implementation of new signal in Jan 2017
  - Mainly driven by capability adjustments from RegD resources



*Data up to Jan 18, 2018

Requirement

Season	Dates	Off-Ramp	On-Ramp	Excursion	Effective MW Requirement
Winter	**Dec 1 – Feb 29**	**HE1 – HE4, HE10 – HE16**	**HE5 – HE9, HE17 – HE24**	**HE7 – HE8, HE18 – HE21**	**Non-Ramp = 525MW Ramp = 800MW**
Spring	Mar 1– May 31	HE1 – HE5 HE9 – HE17	HE6 – HE8 HE18- HE24	HE7 – HE8, HE18 – HE21	Non-Ramp = 525MW Ramp = 800MW
Summer	Jun 1- Aug 31	HE1 – HE5 HE15 – HE18	HE6 – HE14 HE19- HE24	HE7 – HE8, HE18 – HE21	Non-Ramp = 525MW Ramp = 800MW
Fall	Sep 1– Nov 30	HE1 – HE5 HE9 – HE17	HE6 – HE8 HE18- HE24	HE7 – HE8, HE18 – HE21	Non-Ramp = 525MW Ramp = 800MW

Regulation A Performance

MW	Steam	Hydro	CT	DSR
Regulation A				
Avg. Performance Score (1/2017)	75%	86%	84%	85%
Avg. Performance Score (8/2017)	76%	87%	89%	85%
Avg. Performance Score (1/2018)	78%	87%	84%	84%
Regulation A Qualified MW (1/18)	3907.5	1060.0	1217.4	11.4

Regulation D Performance

MW	Hydro	CT	Energy Storage	DSR
Regulation D				
Avg. Performance Score (1/2017)	77%	90%	96%	85%
Avg. Performance Score (8/2017)	78%	92%	90%	82%
Avg. Performance Score (1/2018)	77%	92%	92%	84%
Regulation D Qualified MW (1/18)	420.0	105.4	262.4	29.3

How long the signal in pegged -RegD

- For the majority, RegD signal is pegged for only small durations of time, which is to be expected for ACE control
  - Occasional longer pegged due to system conditions
  - Less RegD pegging observed with signal tuning
  - Increased pegging with cold weather
  - Peg = 99% of TREG

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
20-30 minute duration	8	11	20	13	12	6	10	4	4	4	11	3	13
>30 minute duration	3	2	4	1	2	0	0	1	1	0	1	0	3

*Data up to Jan 18

How long the signal in pegged- RegA

- RegA is pegged more often than RegD – RegA resources typically do not have an energy duration limitation
  - Pegged for system conditions, no limitations built into regulation signal to minimize pegging
  - Will be pegged longer on occasion for conditional neutrality
  - Peg = 99% of TREG

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
20-30 minute duration	86	96	129	93	89	40	56	50	54	50	49	41	47
>30 minute duration	55	53	93	63	30	14	14	13	11	26	26	11	19

*Data up to Jan 18