

MA SMART Program: Ceiling Price Analysis

Prepared for:

Department of Energy Resources

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Auction Ceiling Analysis: 2 MW (AC) - QF

		Clearing Price Analysis (Project IRR for Auction-Eligible Project)											
EPC Cost as % of 2017 Estimated C&I Cost	EPC Price	\$ 0.20	\$ 0.19	\$ 0.18	\$ 0.17	\$ 0.16	\$ 0.15	\$ 0.14	\$ 0.13	\$ 0.12	\$ 0.11		
100%	\$ 2.00	9.22%	8.34%	7.44%	6.53%	5.60%	4.65%	3.69%	2.71%	1.71%	0.69%		
93%	\$ 1.87	10.01%	9.09%	8.15%	7.20%	6.24%	5.25%	4.25%	3.23%	2.18%	1.13%		
87%	\$ 1.75	10.82%	9.86%	8.89%	7.90%	6.89%	5.86%	4.82%	3.76%	2.67%	1.57%		
82%	\$ 1.63	11.66%	10.66%	9.64%	8.61%	7.56%	6.49%	5.40%	4.30%	3.17%	2.03%		
76%	\$ 1.52	12.52%	11.47%	10.41%	9.34%	8.25%	7.13%	6.00%	4.85%	3.68%	2.49%		

- Notes, Conclusions:**
- Only projects able to build at prices well below current market would participate in the auction at current **ceiling** rates.
 - To allow for robust auction participation, ceiling price must be set closer to ~**\$0.175/kWh**.
 - Assumed Target IRR: 8.00% ("viable" projects shown in green).
 - **NOTE:** Assumes interconnection costs consistent with 2017 weighted average (~\$0.175/W), 30 year project life, QF energy rate of \$0.06/kWh in year 1 escalating at 2% annually, all-in project costs of \$2.30/W)

SMART Program Example: 2 MW (AC) - CSS

Project IRR Analysis by Block @ \$0.15/kWh BASE RATE: Project IRR, 30 Year Project, 14.6% Capacity Factor											
EPC Cost as % of 2017 Estimated C&I Cost	EPC Cost	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	Block 7	Block 8	Block 9	Block 10
100%	\$ 2.00	5.95%	5.26%	4.60%	3.95%	3.32%	2.72%	2.14%	1.63%	1.18%	0.80%
93%	\$ 1.87	6.57%	5.85%	5.15%	4.47%	3.82%	3.20%	2.59%	2.05%	1.59%	1.19%
87%	\$ 1.75	7.19%	6.44%	5.71%	5.01%	4.33%	3.68%	3.05%	2.49%	2.00%	1.58%
82%	\$ 1.63	7.83%	7.05%	6.29%	5.56%	4.85%	4.17%	3.52%	2.93%	2.41%	1.97%
76%	\$ 1.52	8.49%	7.67%	6.88%	6.12%	5.38%	4.67%	3.99%	3.37%	2.83%	2.37%
71%	\$ 1.42	9.16%	8.31%	7.48%	6.69%	5.92%	5.18%	4.47%	3.82%	3.26%	2.77%
67%	\$ 1.33	9.84%	8.95%	8.10%	7.27%	6.47%	5.69%	4.96%	4.28%	3.69%	3.18%
62%	\$ 1.24	10.54%	9.62%	8.72%	7.86%	7.02%	6.22%	5.45%	4.75%	4.13%	3.59%
58%	\$ 1.16	11.25%	10.29%	9.36%	8.46%	7.59%	6.75%	5.95%	5.22%	4.57%	4.01%
54%	\$ 1.08	11.98%	10.98%	10.01%	9.07%	8.17%	7.30%	6.46%	5.69%	5.01%	4.42%
51%	\$ 1.01	12.72%	11.68%	10.67%	9.69%	8.75%	7.84%	6.98%	6.18%	5.46%	4.85%
47%	\$ 0.95	13.47%	12.39%	11.34%	10.32%	9.35%	8.40%	7.50%	6.66%	5.92%	5.27%

Conclusion:

- Current **ceiling** price unlikely to support market-representative projects; auction clearing at the **ceiling** will likely result in very few viable projects (resulting impacts cascade through program)

Notes:

- Assumptions: NGRID, Market Net Metering Credits, 14.6% Capacity Factor, 30-Year Project Life, \$0.17/W Interconnection Cost
- Average estimated 2017 costs: **\$1.99/W**
- Current **ceiling** price unlikely to support market-representative projects
- Auction clearing at the **ceiling** will likely result in very few viable projects (resulting impacts cascade through program)
- Assumed Target ROE: 8.00% (cells in red fail to meet threshold)

SMART Program Example: 2 MW (AC) – CSS (EPC/IX Analysis)

Ceiling: \$0.15		EPC vs. Interconnection Cost Sensitivity Analysis @ \$0.15/kWh Ceiling, Block 1										
		I/C vs. 2017 Avg	74%	88%	103%	118%	132%	147%	162%	176%	191%	206%
EPC vs. 2017 Average			\$ 0.125	\$ 0.150	\$ 0.175	\$ 0.200	\$ 0.225	\$ 0.250	\$ 0.275	\$ 0.300	\$ 0.325	\$ 0.350
100%	\$ 2.00		6.22%	6.07%	5.92%	5.77%	5.62%	5.48%	5.34%	5.21%	5.08%	4.95%
93%	\$ 1.87		6.86%	6.70%	6.53%	6.37%	6.21%	6.06%	5.91%	5.76%	5.61%	5.47%
87%	\$ 1.75		7.53%	7.34%	7.16%	6.98%	6.81%	6.64%	6.48%	6.32%	6.16%	6.01%
82%	\$ 1.63		8.20%	8.00%	7.80%	7.61%	7.42%	7.23%	7.06%	6.88%	6.71%	6.55%
76%	\$ 1.52		8.90%	8.68%	8.46%	8.25%	8.04%	7.84%	7.65%	7.46%	7.27%	7.09%

— Expected range of EPC and Interconnection costs, Auction/Block 1

Ceiling: \$0.175			EPC vs. Interconnection Cost Sensitivity Analysis @ \$0.17/kWh Ceiling, Block 1									
		I/C vs. 2017 Avg	74%	88%	103%	118%	132%	147%	162%	176%	191%	206%
EPC vs. 2017 Estimated			\$ 0.125	\$ 0.150	\$ 0.175	\$ 0.200	\$ 0.225	\$ 0.250	\$ 0.275	\$ 0.300	\$ 0.325	\$ 0.350
100%	\$ 2.00		7.96%	7.79%	7.62%	7.45%	7.29%	7.14%	6.98%	6.83%	6.68%	6.54%
93%	\$ 1.87		8.68%	8.49%	8.31%	8.12%	7.95%	7.78%	7.61%	7.44%	7.28%	7.12%
87%	\$ 1.75		9.42%	9.21%	9.01%	8.81%	8.62%	8.43%	8.25%	8.07%	7.89%	7.72%
82%	\$ 1.63		10.19%	9.96%	9.73%	9.52%	9.30%	9.10%	8.90%	8.70%	8.51%	8.32%
76%	\$ 1.52		10.97%	10.72%	10.47%	10.24%	10.00%	9.78%	9.56%	9.35%	9.14%	8.94%

Conclusion:

- Current **ceiling** price of \$0.15/kWh unlikely to support market-representative projects: Within reasonable expected range of EPC and interconnection costs for 2017 (blue box), only about ½ of projects can meet an 8% IRR even at a Base Compensation Rate of \$0.175/kWh