Manual 15, Cost Development Guidelines

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Market Implementation Committee
April 8, 2026

Revision 49 (10/01/2026):

All changes are conforming to Regulation Redesign Phase II

- Section 2.8:
  - Revised language and formulas how to calculate regulation maximum allowable cost adder examples to accommodate two new market products, Regulation-Up and Regulation-Down.
  - Removed the fuel cost increase and unit specific heat rate degradation due to operating at lower loads in the Regulation Capability portion for Regulation-Up.
  - Updated Regulation Mileage Costs portion for Regulation Only Resources. Cost Increase in VOM for Regulation Only Resources shall be divided by 2 and Energy Storage Unit Losses shall be divided by 2 for Regulation-Up or Regulation-Down.
  - Updated Margin Risk Adder shall not exceed from $12 to $6 of Regulation Service provided for either Regulation-Up or Regulation-Down.
  - Renamed Regulation Mileage to Regulation-Up Mileage and Regulation-Down Mileage.
  - Updated heat rate loss factor from .35% to .175%.

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- Revised language and formulas how to calculate regulation maximum allowable cost adder examples to accommodate two new market products, Regulation-Up and Regulation-Down.

Regulation is the capability of a specific resource with appropriate telecommunications, control and response capability to increase or decrease its output in response to a regulating control signal to control for frequency deviations. The Regulation signal bifurcates into two products, Regulation-Up (RegUp) and Regulation-Down (RegDn).

- Removed the fuel cost increase and unit specific heat rate degradation due to operating at lower loads in the Regulation Capability portion for Regulation-Up.

For RegUp:

The cost-based regulation offer is split into two portions for RegUp:

- The Regulation Capability portion consists of ~~the fuel cost increase and unit specific heat rate degradation due to operating at lower loads and~~ the RegUp margin risk adder;

$$RegulationCapabilityCosts(\$/MWh) \leq$$

~~(Fuel Cost Increase and UnitSpecific Heat Rate Degradation due to Operating at Lower Loads)~~

~~+~~MarginRisk Adder

~~(a) Heat Rate Adjustment (Operating Range)~~	~~Value~~	~~Units~~
~~Fuel Cost Adder – Operating Range~~	~~$3.50~~	~~$/Hr/MW of Regulation~~

~~Heat Rate Adjustment (Operating Range)~~	~~Value~~	~~Units~~
~~Unit Base Load Heat Rate Fuel Input~~	~~360.0~~	~~MMBtu/Hr~~
~~Unit Reduced Load Heat Rate Fuel Input~~	~~500.0~~	~~MMBtu/Hr~~
~~Difference~~	~~140.0~~	~~MMBtu/Hr~~

~~**Fuel Cost Increase and Unit Specific Heat Rate Degradation due to Operating at lower loads**~~

~~The costs (in $/MWh of Regulation) to provide Regulation Service from units shall not exceed the fuel cost increase due to operating the unit at lower loads than at the optimal economic dispatch level load and the unit specific heat rate degradation from operating at lower loads, resulting from operating the unit at lower MW output incurred from the provision of Regulation over the entire generator MW range of providing Regulation Service.~~

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- Updated Regulation Mileage Costs portion for Regulation Only Resources. Cost Increase in VOM for Regulation Only Resources shall be divided by 2 and Energy Storage Unit Losses shall be divided by 2 for Regulation-Up or Regulation-Down.

For RegUp:

The cost-based regulation offer is split into two portions for RegUp:

- The Regulation Capability portion consists of ~~the fuel cost increase and unit specific heat rate degradation due to operating at lower loads and~~ the RegUp margin risk adder;
- The Regulation Mileage portion consists of the cost increase in VOM for Regulation Only Resources divided by 2 for RegUp, cost increase due to heat rate increase during non-steady state operation and, where applicable, energy losses for energy storage devices divided by 2 for RegUp. The $/MW value determined in the mileage offer will be converted to cost per mileage $/ΔMW by dividing the value by the mileage ΔMW/MW for the applicable signal for that offer as described in Manual 11.

For RegDn:

The cost-based regulation offer is split into two portions for RegDn:

- The Regulation Capability portion consists of the fuel cost increase and unit specific heat rate degradation due to operating at lower loads and the RegDn margin risk adder;
- The Regulation Mileage portion consists of the cost increase in VOM for Regulation Only Resources divided by 2 for RegDn, cost increase due to heat rate increase during non-steady state operation and, where applicable, energy losses for energy storage devices divided by 2 for RegDn. The $/MW value determined in the mileage offer will be converted to cost per mileage $/ΔMW by dividing the value by the mileage ΔMW/MW for the applicable signal for that offer as described in Manual 11.

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- Updated Margin Risk Adder shall not exceed from $12 to $6 of Regulation Service provided for either Regulation-Up or Regulation-Down.

RegUp **Margin ~~/~~Risk Adder**

RegUp Margin Risk Adder shall not exceed $6~~12~~.00 per MWh of Regulation Service provided.

RegDn **Margin ~~/~~Risk Adder**

RegDn Margin Risk Adder shall not exceed $6~~12~~.00 per MWh of Regulation Service provided.

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- Renamed Reg. Mileage to RegUp Reg. Mileage of Regulation Service provided for Regulation-Up.

Historic Mileage	Value
RegUp Reg. Mileage	5

- Renamed Reg. Mileage to RegDn Reg. Mileage of Regulation Service provided for Regulation-Down.

Historic Mileage	Value
RegDn Reg. Mileage	5

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- Updated heat rate loss factor from .35% to .175%

Cost Increase due to Heat Rate increase during non-steady state

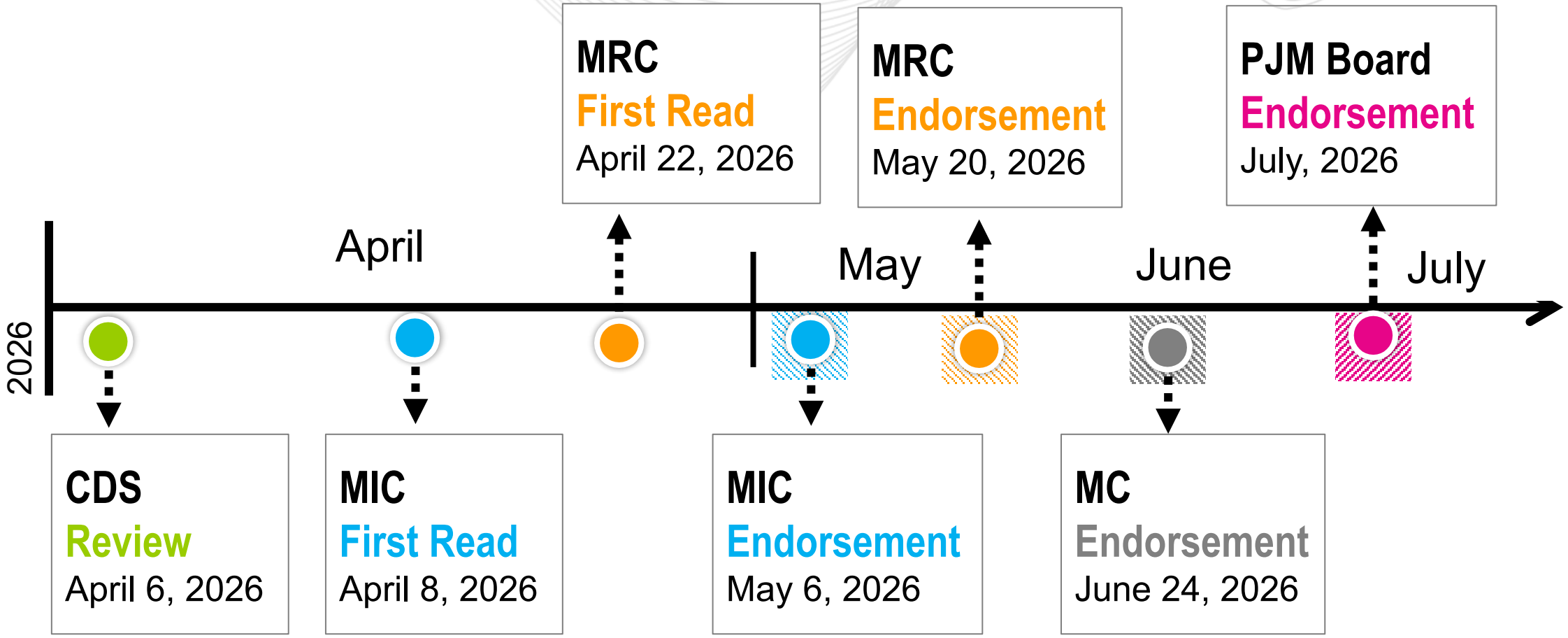
The cost (in $/MWh of Regulation) increase due to the heat rate increase resulting from operating the unit at a non-steady-state condition. This heat rate loss factor rate shall not exceed 0.175~~35~~% of the top Regulation load MW heat rate value.

Heat Rate Adjustment (Non-Steady State Operation)	Value	Units
Total Operating Point Heat Rate	9,000.0	Btu/kWh
Heat Rate Loss Factor (Max per M15)	0.175~~35~~%	
Heat Rate Loss	3.15	MMBtu/Hr

$$HeatRateLoss = (EconomicMaximumHeatRate * 0.175\%) * 1MMBtu / 1{,}000{,}000Btu * 1{,}000kW / MW * EconomicMaximumMW$$

$$Heat\ Rate\ Loss = (9{,}000Btu / kWh * 0.175\%) * 1MMBtu / 1{,}000{,}000Btu * 1{,}000kW / MW * 100MW = 3.15\ MMBtu / Hr$$

Review/Endorsement Timeline



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Manual 15, Rev 49 – Regulation Redesign Phase 2

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