Technical Paper
Implementation of Order 755 Market Design

Under the ISO’s Order 755 market design for a regulation performance payment, a resource’s awarded mileage should approximate the resource’s actual mileage in response to an ISO control signal. The ISO will award regulation capacity to resources based on capacity and mileage bids. Awarded mileage, while not financially binding, will seek to approximate the actual mileage for which the ISO may dispatch a resource so that the ISO’s optimization may select the lowest cost resources to meet the ISO’s regulation capacity and mileage requirements. Under the ISO’s proposal that involves separate bids for each component of regulation service (capacity and mileage), a resource with a low regulation capacity bid and a high mileage bid could receive a mileage award even though the market clearing mileage price is below the resource’s mileage bid. If the ISO dispatches the resource at a level greater than anticipated, the resource may obtain bid cost recovery for this mileage. Consistent with the expectation that a resource’s awarded mileage should approximate its actual mileage in response to an ISO control signal, the ISO has incorporated the ability to adjust a resource’s regulation mileage award with the resource’s expected performance in responding to a control signal by making changes to the minimum resource specific mileage multiplier. The purpose of this adjustment is to mitigate instances in which the ISO may dispatch resources for more mileage than the ISO estimated the resource would provide as part of the day-ahead and real-time market optimization. Absent mitigation, these instances could lead to unanticipated bid cost recovery payments for resources providing regulation. Pacific Gas and Electric Company has requested that the ISO produce a technical paper further detailing its methodology for adjusting the mileage awarded to specific resources.

The ISO will adjust the minimum resource specific mileage multiplier only after observing significant variances between mileage awarded to a resource for purposes of establishing a market clearing price and instructed mileage as adjusted for accuracy, and only after discussing the adjustment with the resource’s scheduling coordinator. For purposes of implementing its Order 755, the ISO will initially consider whether to make an adjustment to a resource’s mileage multipliers if the following two conditions occur in 50 percent of the settlement intervals in which the resource provides regulation over the course of a month:

(1) The resource is awarded mileage equal to the awarded regulation capacity; and

(2) The resource’s actual mileage has exceeded the product of the actual system mileage multiplier [a quantity reflecting expected mileage from 1 MW of regulation up and regulation down capacity in a given hour] and the resource’s awarded regulation capacity.
If a resource meets these two criteria, the ISO will discuss adjusting the resource’s mileage multipliers with the resource’s scheduling coordinator before making any adjustments. In addition, as described in tariff section 27.1.3, upon request, the ISO will provide a resource with the historical data used to derive the resource’s mileage multipliers. This information will consist of the resource’s historic regulation performance accuracy in responding to ISO energy management system control signals and the resource’s certified 10-minute ramp capability. A resource’s historic performance accuracy is a monthly calculation based on a thirty (30) day simple average of fifteen (15) minute accuracy measurements. The ISO will also notify market participants through the market and performance planning forum of the number of resources participating in the regulation market that have had their minimum mileage multiplier adjusted. Finally, the ISO will report on the use of these adjustments as part of its informational report that it will file with the Commission based on one year of experience with its market design for Order 755.

The ISO’s optimization will clear awards of regulation mileage within a flexible range that is a function of the regulation capacity award. The methodology constrains a resource’s mileage award between its capacity award or self-provision and a multiple of that award or self-provision. If necessary, the ISO will increase the minimum mileage multiplier from one (1) to an amount closer to the resource’s actual mileage based on the two conditions identified above. The methodology includes a tunable parameter to narrow the mileage award range as follows:

\[ RC \times f \leq RM \leq RC \times m \]
\[ 1 \leq f \leq m \]

Where RC is regulation capacity; RM is regulation mileage; m is the resource specific mileage multiplier and f is the tunable parameter.

The following example helps explain the mechanics of this formula:

**Resource A Mileage Multipliers**

- Minimum – mileage multiplier of 1 per MWh regulation capacity
- Maximum – mileage multiplier of 10 per MWh regulation capacity

If resource A is awarded 10MWh of regulation capacity it can be awarded mileage between 10 and 100. If resource A’s actual mileage per MWh of regulation capacity exceeds the system actual mileage per MWh of regulation capacity, then resource A should have a greater likelihood of setting the marginal mileage clearing price. In order to ensure that awarded mileage (which is not financially binding) reflects expected mileage, the ISO may seek to increase the minimum mileage of Resource A. For example, if resource A’s actual mileage multiplier is consistently 7 and the system
multiplier is 5, then the ISO might seek to increase resource A’s minimum mileage multiplier of the range to 7, thereby creating the following constraint for resource A:

$$RC \times 7 \leq RM \leq RC \times 10.$$