



Transmission Constraint Penalty Factor Adjustment Guidelines

7/25/2018

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PJM adjusts an internal¹ constraint's penalty factor (also known as Marginal Value Limit (MVL)) in order to reflect system operational needs and the cost of controlling actions with an effective resource to relieve congestion. When real-time personnel identify that the cost of controlling actions are not being properly reflected in pricing, the penalty factor will be increased or decreased as explained in examples detailed below. Once it has been identified that an adjustment is required, PJM dispatchers and real-time markets support engineers make real-time evaluations of the appropriate penalty factor adjustments based on an effective resource's cost to control a constraint (expressed in \$/MW as defined below):

$$\frac{\$}{MW} = \frac{(\text{Resource Offer Price} - \text{System Energy Price})}{dfax}$$

When not enough relief can be provided by resources at a cost below the default penalty factor, PJM retains the ability to increase the penalty factor (or willingness to pay for control) for a constraint when congestion flow is over or approaching the controlled limit and additional available resources have a \$/MW cost above the default penalty factor. Conditions requiring increasing the penalty factor for a constraint include, but are not limited to:

- a) An effective resource with a raise-help $dfax$ is required, but the system energy price has decreased such that the resource's \$/MW cost exceeds the default penalty factor.
- b) An effective resource with a lower-help $dfax$ is required, but the system energy price has increased such that the resource's \$/MW cost exceeds the default penalty factor.
- c) Additional relief for a constraint is required from a resource with a \$/MW cost above the default penalty factor based on the resource's Offer Price and/or $dfax$.

When the congestion flow is within the controlled limit, PJM also retains the ability to lower the penalty factor for a constraint in order to prevent a high cost resource that cannot provide material relief on the constraint from inappropriately setting price. Conditions requiring lowering the shadow price limit for a constraint include, but are not limited to:

- a) A thermal surrogate is used to set price for a resource called for voltage control and the resource's \$/MW is lower than the default penalty factor.
- b) A constraint with many low $dfax$, high cost resources where the available control is sufficient and over controlling the constraint by allowing ineffective resources to artificially raise the price would result in ACE deviations and/or other system controlling issues.

PJM incorporates a buffer typically of 25% above the effective resource's \$/MW cost when setting the adjusted penalty factor. This buffer accounts for any fluctuation in the system energy price that would increase a resource's \$/MW cost.

¹ Market to Market constraints will only be adjusted in coordination with neighboring partners