



California ISO
Your Link to Power

Setting IFM Initial Conditions to Address Cycling of Generating Units

Proposal

WHITE PAPER

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to Address Cycling of Generating Units
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1. Executive Summary

The California ISO Integrated Forward Market (IFM) optimizes unit commitments over a 24 hour time horizon. Would the IFM optimize over a multi-day time horizon, generating units may become economical optimal to remain on-line through the over-night hours to be available for the next day's on-peak energy hours. Under the current design, such generating units may be de-committed in the late hours of the 24-hour time horizon being blind to the next day's opportunities.

The IFM is performed each day after the at 10:00 market close for the next Trade Day (TD), and uses the previous day's (TD-1) Day Ahead Market (DAM) end of time horizon resource commitment pattern for the initial conditions for the next day IFM time horizon optimization. Thus, any resource that is de-committed in the late hours of TD-1 DAM solution is assigned an off-line status for the beginning of the next day's IFM run. In the unit commitment optimization in IFM for TD, the off-line resource must satisfy its Minimum Down Time (MDT) constraint before being re-committed on-line.

In addition to the procedures to commit Extra-Long start resources prior to the next day's IFM market, ISO Operations may Exceptionally Dispatch long start-up resources to "bridge" the hours from the last on-line hour in TD-1 to the end of the TD-1 IFM time horizon in order for the resource to be on-line in the initial conditions for IFM in for day TD (the next day), but only for reliability reasons. Except for these conditions, there exists no means for resources to be economically optimized across the 24-hour DAM time horizons.

The consequence of this behavior is that resources with mid-range MDT parameters, in the 4 to 12 hour range, that economically participating in the DAM may be frequently de-committed in the end of the DAM time horizon and thus have limited ability to economically participate in the next day DAM due to the MDT constraint, even if the resource self commits in the Real Time Market (RTM) to "bridge" the commitment hours in the first 24-hour time horizon.

While the ISO continues to evaluate workable multi-day DAM optimization time horizon concepts, this proposal offers a potential solution to this consequence, under some conditions. The proposal is to have the IFM initial conditions processor first evaluate which resources are de-committed before the end of the 24-hour time horizon, then search SIBR system for any RTM self schedules submitted for the remaining hours of the previous day's DAM time horizon, and if the RTM self schedules bridge the commitment period from the previous day's DAM, then the initial conditions for that resource will be set to on-line for the next day's IFM.

2. Goal of this Proposal

The goal of this proposal is to offer some ability for generating units to bridge the commitment period between DAM runs in the interim period while a more robust multi-day unit commitment proposal continues to be developed. While this proposal is not an economic multi-day optimization, it would provide some ability for generating resources to have an opportunity to avoid being constrained by the MDT parameter over night when the resource would prefer to remain on-line in order to more fully participate in the next day's IFM markets.

3. The Proposal

Generating resource X's commitment period ends at HE22 in the DA market of TD-1 and remains out of commitment for rest of the TD-1. When the DA market setup pre-processes are run to set the initial conditions for running the next DA run (for TD), the unit would get initialized as offline since it was out of commitment at HE24 in TD-1 DA run. The unit would have to satisfy its MDT constraint before it could come online again. This cycling of unit X might be non-optimal if the system conditions for TD make the unit economical to run when it is constrained by its MDT.

With this enhancement, the DA market pre-processes would set a unit's initial condition to online for next DA market run if the unit qualifies as follows:

- A. The unit is economically committed for some hours of TD-1 in the IFM or RUC, but is not committed through the end of TD-1. A partial day self-commitment period will not trigger this criterion.
- B. By one hour prior to the close of the DAM for TD, at 09:00 on TD-1, the unit has self scheduled energy (presumably, but not necessarily at Pmin) submitted in the RTM for TD-1 for each of the remaining hours after the last commitment hour in the DAM for TD-1.

If these two conditions are satisfied, subject to the over-generation provision described below in Section 4, the market pre-processes would set the unit's initial condition to online for the input to the DAM for TD, where it would have otherwise set it to off-line if not for this proposed new process.

The bridging RT Self Schedules would need to be submitted before the closing of the DA market of the current Trade Day, TD for the market pre-process to receive the information and to set the unit's initial conditions to online. If the RT Self Schedules are not received or are received after the close of the DA market for Trade Day, the Self Schedules would not be treated as bridging and the initial condition for the DAM for TD would be set as offline.

4. Over-Generation Provision

Over-generation is a system condition that occurs when there is more Supply that is scheduled and generating than there is Demand to consume the energy. The condition adversely affects system reliability.

This enhancement proposes provision of submitting RT Self Schedule to bridge the time between the last commitment period to the end of the day of the previous Trade Day. Since these Self Schedules are submitted outside the optimization framework, there is a possibility that the total of all the Self Schedules at any time period leading to the end of the previous Trade Day might exceed the total demand for that time period resulting in an over-generation condition.

If an over-generation condition is foreseen for the hours leading to the end of the day, there is a high probability that the self schedules would not be cleared for those hours in the Real Time Market. In such a situation, the ISO reserves the right to not update initial conditions for any of the generating resources in the next day's Day Ahead Market.

5. Long Term Solution: Multi-Day UC

An ideal solution to this issue would be a multi-day optimization period for the DA market as it would be long enough to provide information about the next peak and valley load demands. It would also be long enough to effectively optimize around constraints like Minimum Down Time (MDT), Minimum Up Time (MUT) and Maximum Daily Starts (MDS). The implementation of the multi-day Unit Commitment initiative is a major project and is planned for a later date. The current focus is on exploring potential short-term enhancements to the existing market design. The ISO is also exploring an additional enhancement to achieve some benefits that would ultimately come from a multi-day commitment process by considering extending Residual Unit Commitment (RUC) to consider up to 72 hours. A separate stakeholder discussion will be performed to explore an extended RUC process.