

ESF PARAMETERS: Cause & Effect



Parameters stemming from 2026 implementation of FERC Order 841

Energy Storage Facility (ESF) Characteristics









Day-ahead SOC and efficiency parameters, introduced as part of the compliance filing for FERC Order 841, complement the traditional limits (economic, regulation, and consumption) already in use. Unique operational and physical characteristics directly affect the day-ahead (DA) clearing process by allowing the Market Clearing Engines (MCEs) to model the resource's duration and energy limitations.

PRO

Entering these unique parameters achieves optimal and visible commitment of the ESF by the ISO, integrating the resource efficiently into the wholesale energy market. This detailed modeling results in the resource being awarded appropriately (for market optimization) in the DA market. Participants gain visibility into how their resource was scheduled.

CON

If a participant submits invalid or overly restrictive parameters, it could lead to data rejection or scheduling violations by the MCE, resulting in a failure to receive a commitment.

Specific Parameters	Submission Frequency		eMarket Display
	Daily Default	Hourly Updates	
Activate_SOC_Constraint_Offer_Daily The critical decision parameter. If checked, the Market Clearing Engines (MCEs) honor the SOC constraints, and the ISO manages the resource's optimization within those constraints (making the SOC parameters below required). If unchecked, the SOC parameters are ignored, and the participant manages storage independently. A resource is optimized for the market, not for any individual strategy or other incentive.	 (Switch)		ESF Default Parameters display
Initial State of Charge (Initial SOC) The amount of energy the ESF expects to have at the start of the operating day is important for forecasts and fulfilling DA awards. Required if the SOC constraint is active.			ESF Default Parameters display
Minimum State of Charge (Min SOC) The lowest amount of stored energy (MWh) the resource can reach during discharge while staying within its technical limits. This parameter (or the Default Min SOC) is required if the SOC constraint is active.			Daily Default (on ESF Default Parameters display) OR Hourly Update (on Hourly Updates display)
Maximum State of Charge (Max SOC) The highest amount of stored energy (MWh) the ISO is permitted to replenish during charging operations. This parameter (or the Default Max SOC) is required if the SOC constraint is active.			Daily Default (on ESF Default Parameters display) OR Hourly Update (on Hourly Updates display)
Round Trip Efficiency (RTE) A percentage representing the energy injected onto the grid per megawatt-hour received. It accounts for energy loss during charging and discharging and influences the MCE's efficiency calculations. RTE must be ≥1 and <100.			Daily Default (on ESF Default Parameters display) OR Hourly Update (on Hourly Updates display)

Energy Offers/Bids (Financial)



The financial parameters entered by participants generally relate to the prices at which they are willing to supply or consume energy (MW/Price pairs for offers and bids), and the costs associated with starting up or running their units (Startup Costs, No Load Costs, Interruption Costs).

PRO

Submitting effective financial parameters can lead to successful clearing, commitment, or dispatch of the resource in the day-ahead (DA) market, resulting in an awarded position and corresponding financial compensation or transaction fulfillment.

CON

Possible negative outcomes resulting from submitted financial parameters is the rejection, capping, or mitigation of offers/bids due to violating market rules or exceeding predefined cost thresholds.

Specific Parameters	Submission Frequency		eMarket Display
	Daily Default	Hourly Updates	
MW/Price Pairs (Incremental Energy Offers) Energy Offers/Bids define the economic terms under which the ESF is willing to transact energy. Offers specify the MW output blocks and the minimum price per MWh at which the ESF is willing to inject energy (discharge) into the grid. Bids specify the MW consumption blocks and the maximum price per MWh that the ESF is willing to pay to withdraw energy (charge) from the grid. MCE uses these incremental energy offers to determine if and how much to commit and dispatch the generating component of the ESF. The MCE uses these bids to commit and dispatch the DARD component for consumption.			Submitted via Schedule Offers Default and Hourly Updates screens for the generation component (for discharge/supply) and the ARD component (for charge/consumption)

Operational Limits









Operational limits define the physical and economic boundaries of the resource.

PRO

Submitting appropriate operational limits enables the resource to be committed and dispatched successfully and accurately, while managing its physical constraints over time, which often leads to compensation or fulfillment of bids.

CON

Poorly set operational limits can lead to the rejection of submitted data due to validation failures, improper modeling by the MCE, or the resource being deemed ineligible or uneconomical for scheduling.

Specific Parameters	Submission Frequency		eMarket Display
	Daily Default	Hourly Updates	
Economic Minimum (ecomin) / Emergency Minimum (Emergency Min) The highest MW level at which the resource can be economically dispatched for discharge. For continuous storage facility (CSF) generators, the emergency minimum limit (Emergency Min) and economic minimum (ecomin) must be set to zero. This mandates that the unit operates in a continuous range above zero or can be committed down to 0 MW.			Schedule Detail Defaults Display and Unit Hourly Updates Display
Economic Maximum (ecomax) Economic maximum (ecomax) is the highest MW level at which the unit can be economically dispatched. This imposes an upper physical boundary on discharge capability.			Schedule Detail Defaults Display and Unit Hourly Updates Display
Real-Time High Operating Limit (RTHOL) Real-time high operating limit (RTHOL) is the maximum MW output that can be achieved in response to an ISO request. This imposes an upper physical boundary on discharge capability.			Schedule Detail Defaults Display and Unit Hourly Updates Display
Max Consumption (MW) / Min Consumption (MW) Max/min is the highest/lowest MW level the resource [dispatchable asset-related demand (DARD) asset] can be economically dispatched to consume. It imposes an upper physical boundary on charging capability. For CSF DARDs, min consumption must be set to zero. This value represents the lowest non-economically dispatched consumption.			ARD Schedule Detail Defaults Display and ARD Hourly Updates Display

Daily Constraints





Daily constraints impose total energy and event limits over the entire operating day. They're the financial and operational rules governing resource behavior established through daily constraints submitted by participants. These constraints define the energy limits (MWh), the number of events allowed per day, and the critical time restrictions (such as minimum run times) that the Market Clearing Engines (MCEs) must honor when scheduling a resource.

PRO

The successful submission of appropriate daily constraints ensures the resource is correctly integrated into the day-ahead (DA) clearing process, maximizing operational efficiency and compensation while respecting physical limitations.

CON

Submitting insufficient, incorrect, or overly restrictive daily constraints can lead to resource disqualification, data rejection, or warnings indicating potential reliability or market rule violations. Opting not to populate these values may subject a participant to unintended risk.

Specific Parameters	Submission Frequency		eMarket Display
	Daily Default	Hourly Updates	
Max Daily Energy (MWh) Applicable to generation, this value sets the maximum amount of (total) energy the ESF can produce (discharge) in one operating day. If supplied, the ESF is treated as a limited energy generation (LEG) resource, and the MCE must ensure the total scheduled output does not exceed this physical limit. If left blank, the value is unlimited. If a very low Max Daily Energy value is submitted, the MCE cannot commit it to generate high amounts of energy even if the price is extremely high for every hour of the day, as doing so would violate the daily energy constraint.			Schedule daily defaults display
Max Daily Consumption (MWh) Applicable to DARDs, this value sets the maximum amount of (total) energy the ESF can consume (charge) in one operating day. If supplied, the ESF is treated as a limited energy generation (LEG) resource, and the MCE must ensure the total scheduled consumption does not exceed this physical limit. If left blank, the value is unlimited.			Schedule daily defaults display
Max Daily Award Limit (MWh) Puts a limit on total MWh of energy, Operating Reserves, and Energy Imbalance Reserve (EIR) awarded in the DAM for the day. This serves as a constraint on the total compensation/obligation the ESF can receive in the DAM.			Schedule daily defaults display
Max Daily Starts This parameter sets the maximum number of times (events) the resource can be scheduled to start (or be reduced, in the case of DRRs) in one operating day. For DARDs, this is primarily intended for assets like pumps in a storage facility. CSFs do not use Max Daily Starts. If left blank, the value is unlimited. These constraints are critical because they affect the market's long-term optimization strategy for the resource over the entire 24-hour period (or across multiple days for inter-temporal constraints).			Schedule daily defaults display

Inter-Temporal Constraints





Affects the MCE's ability to schedule the resource across consecutive hours, impacting system reliability and flexibility, and impacts the resource's eligibility for 10-minute and 30-minute off-line reserve designations. Parameters that affect the MCE's ability to schedule and optimize a resource across consecutive hours or over the entire operating day. They include time-based and cumulative energy limits.

PRO

Accurate, reliable, and profitable scheduling comes from providing the MCEs with a complete temporal profile of the resource's physical limitations.

CON

When the submitted constraints are physically impossible, conflict with self-scheduling, or are too restrictive, they can hamper market clearance or dispatch.

Specific Parameters	Submission Frequency		eMarket Display
	Daily Default	Hourly Updates	
Min Run Time (Min Reduction Time) Dictates the minimum hours the unit must remain online after reaching its minimum economic limit. For CSF generators, these parameters must be set to zero. When declaring a unit unavailable or self-scheduled hourly, these values dictate warning messages if violated.			Schedule daily defaults display
Min Down Time (Min Time Between Reductions) Dictates the minimum hours required between shutdown and being released for dispatch. For CSF generators, these parameters must be set to zero. When declaring a unit unavailable or self-scheduled hourly, these values determine the warning messages that are displayed if the conditions are violated.			Schedule daily defaults display
Startup and Notification Times (Hot, Intermediate, Cold) Define the time needed to start the BSF unit up. For CSF generators, these must be set to zero because CSFs are always online when available, and operate in a continuous range.			Schedule Detail Defaults Display or Schedule Times Hourly Updates Display

Ramp Rates



Define how quickly a resource can physically change its output (or consumption) in MW per minute. It can be defined as a single MW/Min value or as a ramp rate curve (where the rate varies based on the MW output level). If a ramp rate curve is defined, it overrides the simple single ramp rate specified on the default display.

PRO

Accurate dispatch and participation in Ancillary Services

CON

When the submitted ramp rates violate demonstrated capability limits or conflict with the MCE's physical modeling constraints, it can lead to data rejection and capability capping.

Specific Parameters	Submission Frequency		eMarket Display
	Daily Default	Hourly Updates	
Daily Ramp Rate (MW/Min) or Ramp Rate Curve The ramp rate constrains the rate at which the MCE can dispatch the resource between scheduled output levels in sequential hours. The CSF generator and DARD components must have a ramp rate high enough to switch between maximum generation and maximum consumption in 10 minutes or less.			Four displays depending upon single or curve and generator or DARD and default or hourly

