Electric Storage Facility (ESF)

Market Participation with FERC Order No. 841: Day-Ahead State of Charge

Welcome! In this video, you'll learn about how the unique characteristics of electric storage facilities are supported by FERC Order No. 841's new *day-ahead state of charge* requirement.

An electric storage facility, or ESF, is a resource that's capable of receiving electric energy from the grid and storing it for later injection of electric energy back onto the grid. It's a unique kind of asset because it serves as both supply and demand. An electric storage facility can either be binary or continuous.

A storage facility that operates in binary fashion is either charging, meaning it's receiving energy from the system, or discharging, meaning it's providing energy to the grid. Newer storage technologies operate in continuous fashion. Batteries and similar technologies can move between charging and discharging continuously and nearly instantaneously in a continuous range of generation and consumption.

Whether the ESF is a binary or continuous storage facility, it faces unique challenges when making bids and offers into the day-ahead (DA) energy market. FERC Order 841 was created to remove barriers to market participation for existing and emerging storage technologies. The focus of the Order is on the physical and operational characteristics of ESFs rather than the specific technology.

Let's take a look at how this all came to pass:

- The market received FERC's Order 841 in February of 2018.
- ISO New England submitted an initial compliance filing response on December 3, 2018, which included the need to account for day-ahead state of charge characteristics in the day-ahead market.
- In August of 2020, FERC found that proposal partially compliant, asking ISO New England to propose how those characteristics would be accounted for.
- On December 7, 2020, ISO introduced four new parameters for participants to specify in day-ahead offers: day-ahead state of charge and round-trip efficiency.
- A couple months later, FERC accepted ISO's revised compliance filing with an effective date of January 1, 2026, for the day-ahead state of charge characteristics.

Order 841 ushered in big changes, creating a participation model that recognizes the unique characteristics of ESFs, allowing them the opportunity to offer all the energy they're capable of providing, enabling them to set the price in the market and be dispatched, according to a unique set of parameters, and adjusted the minimum size requirement for participation. All these changes took effect in 2018. The parameters included in the original filing focused on limits. The 2020 compliance filing ruling honed in right here on the unique operational and physical characteristics of ESFs.

The limits (regulation, economic and consumption) were parameters that were enacted as part of the original Order and are already in effect. The addition, resulting from the compliance filing, are four new parameters indicating the characteristics of an asset's day-ahead state of charge requirements, and its round-trip efficiency.

The initial, minimum and maximum state of charge values are optional while the "Activate SOC Constraint" is not checked. If they are entered and the "Activate SOC Constraint" is not checked, they don't mean anything. If a market participant chooses to, they can "Activate SOC Constraint." If so, they are exercising the option to have the ISO manage their resource. And in that case, the day-ahead state of charge initial, minimum, and maximum values are required.

"Activate SOC Constraint" is an option a market participant can specify on a daily basis as to whether they want the ISO to manage their SOC or not. If the activate SOC box is checked, then their state of charge parameters are required. When that occurs, those values are sent to the market clearing engine. And that's how a market participant tells us to optimize their storage for the grid. If the "Activate SOC Constraint" box is off or unchecked, then the SOC parameters are not considered, and it's up to the participant to manage the storage on their own.

"Activate SOC Constraint" checked communicates to the ISO to manage their state of charge.

"Activate SOC Constraint" unchecked means the state of charge values are not used by the ISO.

State of charge or SOC describes how much energy an ESF has available at any given time – and how much more it can store or discharge. Managing SOC correctly is critical to making sure an ESF can deliver or absorb energy when it's needed to balance the grid and avoid consequences of not performing in real-time (RT) as offered in day-ahead (DA). Order 841 makes state of charge visible in the day-ahead market – here's how.

For each eligible ESF they're offering in the day-ahead market, market participants must submit three new parameters indicating the asset's state of charge requirements. When clearing the day-ahead energy market, the market clearing engine will respect electric

storage facilities' initial state of charge, maximum state of charge, minimum state of charge, and round-trip efficiency and award accordingly.

A participant's initial SOC is how much energy the resource expects to have at the start of the operating day. This is by nature an estimate, but an important one to get right for plans and forecasts and to be able to fulfill the DA award in RT.

A participant's minimum SOC is the lowest amount of stored energy (per ESF and market hour) that the resource can get to during discharge, while staying within their technical limits. When it provides (or discharges) energy, an ESF is acting as supply (or generation), and can expect to be compensated.

A participant's maximum SOC indicates the highest amount of stored energy (per ESF and market hour) that the ISO is permitted to replenish. When it receives energy, an ESF is acting as demand (or a DARD), and can expect to be charged.

In plain language, the SOC parameters indicate: "my asset will be starting at this level, and you can leverage it as long as you don't get higher than this or lower than this amount of stored energy per market hour."

Let's explore round-trip efficiency, which is the fourth new parameter introduced in the compliance filing. Round-trip efficiency is a percentage expressing the megawatt-hours of energy that an ESF injects onto the grid per megawatt-hour of energy it receives from the grid (kind of like mpg). Because it takes more energy to charge than to discharge a resource, you can think of it as an hourly parameter that tells the ISO how much energy is lost from charging and discharging.

Taken as a whole, the four new characteristics - initial, minimum and maximum state of charge and round-trip efficiency - together with the regulation, economic and consumption limits are the unique ESF parameters addressed by FERC Order 841.

In summary, the state of charge communicates the total quantity of megawatt-hours available to be discharged by an ESF in any market hour.

So, what's next?

- The eMarket sandbox environment opens in October 2025. It's a safe, isolated version of the real system where participants can test scripts for programmatic offers & explore features. It uses mock data so there's no impact on live operation.
- The eMarket software changes will go live in the production environment in November 2025. Participants will use the new screens to submit their DA SOC and RTE values. The system will reject ESF data submittals for SOC parameters dated prior to Jan 2, 2026.

- The new functionality for these parameters becomes effective January 1, 2026.
- For operating day January 2, 2026.

This change to Order 841 affects market participants that want to allow ISO New England to leverage their ESFs. It means the option of activating a constraint and submitting four new parameters for eligible ESFs, in the day-ahead energy market.

In subsequent training modules, participants can learn how day-ahead SOC parameters affect their:

- Offers and bids in eMarket (or programmatically) including where they can review ESF portfolios and updates in eMarket—as well as how to take advantage of sandbox testing before go-live
- How DA SOC parameters affect eligibility and scheduling,
- And how the use of these parameters affects outcomes.

This short explainer isn't just for today – it's designed to stay useful as market participants manage their ESF assets. To stay tuned, visit the project page linked here on ISO-New England's website.

After the video, you can download the timeline with key dates and deadlines, and the full script of this explainer for quick reference whenever you need it. Keep these handy as you go through the learning curve, test in the sandbox, and get ready for January 2026.

Thanks for watching!