



Member Impacting Program Overview

FERC Order 841 – Stored Energy

Version 1.8

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION	COMMENTS
1.0	SPP	Initial version	
1.1	SPP	Updated the table for Data Requested for Market Storage Resource and added information for Market Monitoring	
1.2	SPP	Updated Training section	
1.3	SPP	Update Testing section Updated Program Schedule Updated Member Testing	
1.4	SPP	Updated Member Testing Kick-off Meeting date Updated Market Monitoring Portal (MMP) details	
1.5	SPP	Update to include 3 updates to Market Monitoring Portal (MMP) Added to existing program risks	
1.6	SPP	Updated the Training Section. Updated the Member Testing section to include additional details on test cases and scenarios.	

1.7	Spp	Added web services introduction and retirement dates under Summary of Timeline	
1.8	SPP	Updated Summary of Timeline for web services activation	

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EXECUTIVE SUMMARY

This initiative is being managed as a program, a set of related projects, to obtain visibility and other benefits not available from managing the projects independently. This document will serve as the member-impacting program overview (MIPO) for all projects within the program's scope versus having separate MIPOs for each.

Certain elements of the MIPO will apply across all projects within the program, as described in the [program-level information](#) section below. Other components will be specific to individual projects, as described in the [project-level information](#) section below.

In this document, the term "members" refers to any and all stakeholders, which could include market participants, members, customers, transmission owners, vendors, etc.

ABOUT THIS PROGRAM

FERC is requiring through Order 841 that RTO/ISOs revise their tariffs to establish a participation model for Electric Storage Resources (ESR) consisting of market rules that, recognizing the physical and operational characteristics of ESRs, facilitates the participation of the ESRs in the RTO/ISOs.

Specific RRs implemented with this program are:

RR323 Order 841 Compliance:

On February 15, 2018 FERC issued Order 841 to amend regulations such that barriers to the participation of electric storage resources (ESRs) in the capacity, energy, and ancillary service markets are removed. FERC ordered RTO/ISOs to revise tariffs to establish a participation model consisting of market rules that, recognizing the physical and operational characteristics of ESRs, facilitates their participation in the RTO/ISO markets. FERC defines specific compliance requirements in the following areas: Compliance Timeline, Participation Model, Qualification Criteria, New/Existing Tariff Mechanisms, Eligibility Limited Only by Technical Capability, De-Rating, Capacity, Energy Schedules, Dispatchable and Can Set Wholesale Clearing Price, Preventing Conflicting Offers/Bids from the Same Resource, Hold Harmless/MWP, Accounting, Self-Managed State of Charge, Minimum Size, Wholesale LMP, Direct Metering, and Use of Existing Tariff Rules.

The revision request contains the modifications necessary to comply with FERC Order 841, including the creation of a participation model, Market Storage Resource (MSR), which recognizes the unique physical and operational characteristics of ESRs.

RR425 Order 841 MSR Compliance Settlements Correction:

This revision request makes adjustments to calculations for the Day-Ahead make whole payment charge type. These charge types were updated to include information that was inadvertently missing with the original RR323 (Order 841 Compliance MSR). The Real-Time Out Of Merit charge type needed to be updated to account for recent changes introduced by RRs that went into effect in February 2020 with the implementation of the new settlements system, that were not there when RR323 was originally designed.

The changes to the MWP reduce the energy cost eligible for recovery in the Reliability Unit Commitment (RUC) MWP when a Resource is committed by RUC with limits that indicate it can only inject, but in the Real-Time Balancing Market (RTBM), the Resource has changed its limits to only withdrawal. It will do the same for Resources that are committed by RUC with limits that indicate it can only withdrawal, but in RTBM it has changed its limits to only inject.

PROGRAM-LEVEL INFORMATION

Certain key information is needed at the program level only. Other information may be needed at both the program and project levels. What follows is program-level information that may be beneficial to all participants of the program.

SERVICE IMPACT

AFFECTED?	SERVICES IMPACTED BY CHANGES
X	Eastern Interconnection (Integrated Marketplace)
	Western Reliability Coordination
	Western Energy Imbalance Services Market

BUSINESS IMPACT

SPP will develop and implement the changes necessary to comply with Order 841 as summarized in the Executive Summary. The SPP Market Storage Resource (MSR) participation model will: 1) ensure eligibility to provide all capacity, energy, and ancillary services MSR are capable of providing, 2) ensure resources using the participation model are dispatchable and able to set wholesale LMPs and MCPs as a wholesale seller and buyer, 3) account for physical and operational characteristics of MSRs through bidding parameters, and 4) maintain SPP's existing minimum size requirement for participation in the RTO/ISO market of 100kW.

All registration information must be provided to SPP by January 15, 2021 in order for the modeling effort to be completed on schedule. If a Market Participant wishes to test the MSR functionality as part of the implementation program, but will not have an ESR that can be registered as a MSR Resource a test MSR can be requested through the registration process. Registration information needs to be submitted via the RMS Quick Pick for Project Inquiries and Subtype 1 Order 841 and Subtype 2 Modeling/Registration.

BUSINESS FUNCTIONS IMPACTED

- Markets
- Settlements

- Registration
- Market Monitoring Portal

COMMUNICATIONS

PROGRAM COMMUNICATION

Monthly updates will be provided via written status report or presentation to CWG.

LIAISONS

Testing liaisons are discussed in the [testing section](#) of this document.

MIPO AND PROGRAM/PROJECT DOCUMENTATION

All project communication and information will be posted to the SPP Change Working Group Project Documentation folder <https://spp.org/spp-documents-filings/?id=243031>.

This MIPO will be updated with any new information. For all updates, a redline version will be posted to the project documentation folder, and the Change Working Group (CWG) will be notified.

FREQUENTLY ASKED QUESTIONS

A list of frequently asked questions (FAQ) can be found in [Appendix A](#) of this document.

MORE INFORMATION

At any time, members can ask questions using SPP's [Request Management System](#) (RMS). Questions can be submitted using the "Project Inquiries" Quick Pick and Subtype 1 Order 841.

RMS link: <https://spprms.issuetrak.com/login.asp>.

If a new user ID is needed for the RMS, click on that link and follow the directions for "Register Now."

My SPP RMS

- Submit Request**
- Search Requests
- Unassigned Requests
- Calendar
- Knowledge Base
- Reports
- Closing Requests
- SPP Website

Submit Request

Submit Request

Quick Pick: Project Inquiries

* Class: PMO

Request Status: Open

This Request is used to submit an inquiry regarding current SPP Projects.

Do NOT change Request Type. Doing so will delay a response to your inquiry.

In **Subtype 1** select the appropriate project. Your selection ensures timely assignment of your inquiry to the appropriate project owner.

* Request Type: Project Inquiries

* Subtype 1: Order 841

Subtype 2:

Severity: 5 Days descriptions

TRAINING

Member training will be coordinated at the program level and subsequent updates to this document will provide details on the content and timing of specific courses.

TRAINING ASSUMPTIONS:

- All member companies will identify personnel to receive project-related training and/or documentation.
- All member companies will use the SPP Learning Center (LMS) to register for any project-related training sessions, if applicable.
- SPP Training will provide learning opportunities that aid understanding, but each entity will be expected to certify performance readiness.

TRAINING APPROACH:

SPP Customer Training has developed and provided a self-study curriculum for the integration of Electric Storage Resources (ESRs) into the SPP footprint. This training will provide:

- an introduction to MSRs,
- registration information,
- an overview of offer parameters and market clearing,
- details on parameter impacts and providing operating reserves,
- market monitoring implications, and
- settlement impacts.

This course is now available in the [SPP Learning Center \(LMS\)](#).

TESTING

SPP will conduct its standard internal test stages for all new logic. There is no market participant involvement in these internal test phases.

- Factory acceptance test (FAT)
- Site acceptance test (SAT)
- System integration test (SIT)
- Functional integration test (FIT)
- Performance

SPP will conduct market participant (MP) testing during the MP Testing phase of the project. Market participants will participate in testing the changes that are MP facing or impacting. These systems will include markets and settlements. Project documentation is located in the [FERC Order 841](#) project folder on SPP.org.

TESTING ASSUMPTIONS

- Participants will verify access to the appropriate test environments before testing in that environment begins.
- Member company staff who are participating in the testing will have been trained on the systems they are testing before testing begins.
- Testing liaisons will be responsible for coordinating testing and reporting progress and issues to SPP.
- SPP will provide scenarios/test scripts/documentation to assist the MPs in development of test strategies and specific test plans.

MEMBER TESTING

SPP will schedule member testing for FERC Order 841, and regression testing that includes markets and shadow settlements. SPP will conduct member testing in its member test environment (MTE). Member testing, Unstructured and Structured is planned for May 17 through July 20.

Bid-to-bill testing will include operating dates 06/02/2021 through 07/13/2021. Market Participants will need to ensure their MSRs and non MSRs are available for commitment in both DAMKT and RUC. Market Participants should submit/update data (bids/offer for markets, meter/bilateral schedules for settlements) in order to test specific scenarios. Otherwise, markets will use the last submitted data for offers and bids, and settlements will use state estimator for meter. A scorecard will be utilized to track scenario progress. Scorecards will be updated and published for the project weekly.

TESTING PHASE	DATE	OBJECTIVE
Markets Unstructured/Structured API Testing	May 17 – July 20	Market Participants with MSR will have the ability to perform unstructured testing in MTE
MSR Bid to Bill	June 02 – July 20	Bid to Bill testing with Market Participants with MSR. This testing includes Market Participants with MSRs to submit offer data for use in Market studies and to be settled. Shadow settlements can also be performed if you do shadow settlements.
Non MSR Bid to Bill	June 02 – July 20	Bid to Bill testing with Market Participants with non MSRs. This testing is to allow MPs that do not have a MSR to test their shadow settlements systems with updated calculation changes.

The following data will be provided in support of this testing:

- Settlement reports will be posted for Operating Dates 06/02/2021 – 07/13/2021.
 - The first operating day (06/02/2021) will post on Tuesday, 06/09/2021.
 - The last operating day (07/13/2021) will post on Tuesday, 07/20/2021.
- An accelerated calendar will be used in MTE so that the S53 posts 21 days after the operating date, and the S120 posts 35 days after the operating date with the last settlement posting in MTE occurring on 07/20/2021 for the following:
 - S7 posting for Operating Date 07/13/2021
 - S53 posting for Operating Date 06/29/2021
 - S120 posting for Operating Date 06/15/2021
- As a result of the accelerated calendar, BSS and Meter Data due dates are also shifted up for the S53 and S120. All due dates are listed on the settlement calendar posted to the MTE Portal.
- Market invoices will be posted weekly starting on 06/17/2021 and continuing through 07/22/2021.

For complete details on member submission due dates and settlement posting dates, reference the Order 841 Settlement Calendar posted to the MTE Portal here: <https://marketplace-mte.itespp.org/pages/settlement-calendars#%2F2021>.

SETTLEMENT SCENARIOS

The following scenarios have been identified for testing of the changes associated with FERC Order 841:

- Unstructured / Base Settlement Calculations
- Day-Ahead MWP Calculations
 - Demand Response
 - MCR Transition
- RUC MWP Calculations
- Out-of-Merit Energy Calculations

The scenario calendar below can be used to identify operating dates for each scenario:

JUNE

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

First OD: 6/2/21 (posts on 6/9/21)
 Last OD: 7/13/21 (posts on 7/20/21)

JULY

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Unstructured / Base Calculations
Day-Ahead Make-Whole-Payments - Includes Demand Response - Includes MCR Transition
RUC Make-Whole-Payment
Out-of-Merit Energy - Span entire testing period
Re-Test Scenarios As Needed

Market participants are responsible for reviewing the results of each scenario to understand the impacts to their organization prior to production implementation. There will be a period of time reserved for any scenario retesting that may be needed. **Market participants should notify SPP via RMS of any additional scenario testing desired as soon as possible to ensure it can be completed prior to the end of member testing.**

MARKETS TEST CASES

In addition to verification of settlement results, Market Participants can submit a MSR offer parameter for either daily, hourly or both for the Day-Ahead Market (DA) and/or the Real-Time Balancing Market (RTBM). Markets Test Cases for the MUI and API can be found in the [project folder](#) and should be completed and submitted via RMS to the project quick pick and subtype 2 of 'Markets' no later than July 13th, 2021.

ISSUE REPORTING

For errors or unexpected results during test execution which require SPP support, please provide error steps and details as soon as possible using the 'Project Inquires' Quick Pick and Subtype 1 of 'Order 841'. **SPP asks that participants report issues as soon as possible so they may be resolved in a timely manner.** Any issues identified will be listed and tracked in the Known Issue Log posted to the [project folder](#).

MEMBER TESTING KICKOFF

The member testing kickoff call will be held on Wednesday, May 19th, at 2:00PM Central Time to review the scenarios being tested with this project. Registration for the net conference is available on the SPP calendar at the following link: <https://www.spp.org/events/calendar/ferc-order-841-member-testing-kick-off-call/>.

PROGRAM ASSUMPTIONS

None identified at this time.

PROGRAM RISKS

Inadequate MSR stakeholder testing could impact the ability of SPP to verify the system changes were implemented correctly unless we have MSRs modeled and the MPs participate in testing.

Vendor resource availability may impact delivery of releases and resolution of defects.

The tight timeframe for the project coupled with other competing priority projects could impact project go live.

SUMMARY OF TIMELINE

DATE	RESPONSIBLE PARTY	ACTION
May 18, 2020 – January 1, 2021	SPP	Requirements, design, build
December 4, 2020	SPP	Publish MP requirements via MIPO revision
January 15, 2021	Member	Deadline to submit registration information
March 5, 2021	SPP	Publish draft MP technical specifications
March 26, 2021	SPP	Publish final MP technical specifications
May 19, 2021	SPP	Publish MP testing details via MIPO revision
May 19, 2021	SPP	MP testing kick off meeting
May 19, 2021	SPP / Member	MP training; see training section above
May 17 – July 13, 2021	Member	Markets API Testing – See testing section above
June 02, 2021	Member	Bid to Bill testing for MSR and non-MSR starts
June 09, 2021	SPP / Member	First Settlement Posting for OD 06/02/2021
July 20, 2021	SPP	Final Settlement Posting
July 23, 2021		Web services introduced: EnergyWebServiceV18 , EnergyNotifyServiceV18 , MarketWebServiceV10 , MarketNotifyServiceV10 , ReserveWebServiceV10 , ReserveNotifyServiceV10
August 5, 2021	SPP / Member	FERC Order 841 effective date in Production

DATE	RESPONSIBLE PARTY	ACTION
September 20, 2021	SPP	Web services retired: Energy Web Service V17, Energy Notify Web Service V17, Reserve Web Service V9, Reserve Notify Web Service V9, Market Web Service V9, Market Notify Web Service V9

PROJECT-LEVEL INFORMATION

Market Participants that choose to model a Market Storage Resource (MSR) should complete and submit registration material by January 15, 2021 to be included in the model for MP testing in April. Please submit your project request via RMS using the **Project Inquiries** Quick Pick, with a Subtype 1 of **Order 841** and Subtype 2 of **Modeling/Registration**. Model Coordination will review and assist in entering your projects. All supporting documents and requirements should be attached to the ticket and any approvals will be requested and approved in RMS.

To better assist Model Coordination in identifying and responding to your request in a timely manner, please use the following format for the Subject:

Month/Year effective project: Description of project (e.g. Month Year of effective project: MSR Registration)

In addition to the information normally provided in the Appendix B, please include the MSR specific information as defined in the protocols 6.1.15 Market Storage Resource (MSR). A new tab (MSR) has been added to the workbook for that information.

Register auxiliary load as described under Section 6.1.12(1)(2)

MODELING AND DATA INTEGRITY

BUSINESS IMPACT

Market Participants may register an ESR as a MSRs. When registering, new ICCP points will be required from the MP. In addition, there will be additional ICCP points made available by SPP for the MP to read.

USERS IMPACTED

Any MP with an MSR.

All Integrated Marketplace participants registering an MSR.

BUSINESS FUNCTIONS IMPACTED

Market Registration

ICCP Modeling

REGISTRATION

BUSINESS IMPACT

New ICCP points required from MP to SPP for an MSR.

USERS IMPACTED

All Integrated Marketplace participants registering an MSR.

BUSINESS FUNCTIONS IMPACTED

- Registration Packets
- MP will have to send outgoing ICCP points to SPP :
 - State of Charge (SOC) ICCP point. This value represents a percentage of the maximum capacity that the MSR has stored. A value between 0 and 100 should be indicated.
 - MWH ICCP points
 - MW ICCP points
 - MVAR ICCP points
 - CMOD ICCP points

DOCUMENT	LOCATION	DESCRIPTION
<u>ICCP HANDBOOK v1.19</u>	SPP Documents > Org Group Documents > Change Working Group > Reference Documents > Technical Reference Documents > ICCP Handbook	ICCP update for MSR

MARKETS

BUSINESS IMPACT

USERS IMPACTED

Market Participants registering an MSR will see the majority of impacts. However, all Integrated Marketplace participants will be impacted through new MUI/API versioning.

BUSINESS FUNCTIONS IMPACTED

- Offer submission
- Market notifications

TECHNICAL IMPACT

FERC Order No. 841 requires the removal of barriers to the participation of electric storage resources ("MSRs") in the capacity, energy, and ancillary markets operated by Regional Transmission Organizations ("RTO") and Independent System Operators ("ISO").

SPP will create a new Resource registration type, Market Storage Resource ("MSR"). The MSR registration type allows Market Participants with MSRs to participate in the SPP Energy and Operating Reserve Markets while recognizing the physical and operational characteristics of the various types of electric storage technologies. As part of the design, SPP adds resource offer parameters for MSR characteristics representing the State of Charge, Minimum and Maximum State of Charge Limits, and Minimum and Maximum Charge Limits by Market Participants. For the Order 841 implementation, the SPP design has a one-to-one correspondence between a registered MSR and a storage facility with a State of Charge.

MSRs need to be able to represent the charging range in other areas of their resource offer, including the ramp rate curves and offer curve breakpoints. MSRs will have the ability to offer their charging capability, their discharging capability, or the capability to charge or discharge continuously. To be continuously dispatchable means that the MSR is able to move freely from a charging state to a discharging state without any limitation or deadband besides ramp rate. It may be possible for an MSR to have a small limitation but model this through a slow ramp rate across 0 so that the market is not aware. To be non-continuously dispatchable would be the flipside, where the MSR is unable to freely move to or from a charge state or discharge state. An example of this type of facility would be a pumped storage hydro.

An MSR can only offer one dispatchable range for a given market interval; either the charge range, the discharge range, or the continuous range. The operating range will be determined by the offered maximum charge and maximum discharge limits.

MSRs can be committed into the market the same as other resources with the ability to self-commit their resource or to be economically committed by SPP using the same commitment statuses available to other types of resources. For existing commitment parameters, the resource will be considered online without regard for charge/discharge/continuous mode.

Market Participants with an MSR registered as an MSR will be required to communicate State of Charge limits through a Resource Offer parameter, State of Charge Forecast, and actual State of Charge in Real-Time via telemetry. Forward-looking studies, such as Day-Ahead Market and Day-Ahead Reliability Unit Commitment, will use the State of Charge Forecast offer parameter to determine the MSR State of Charge at the start of the Dispatch Interval. For the RTBM, SPP will receive and use a telemetered value representing the current, instantaneous State of Charge of the MSR.

The State of Charge and the State of Charge limits will be considered the most limiting factor. When the SOC falls outside for the SOC limits, the MSR is unavailable for market activity or responding to dispatch.

MSRs will submit a new set of offer parameters that will include some of the current offer parameters other resources use and some that are specific to MSRs. Market Participants are required to submit Resource Offer parameters representing the minimum and maximum charge and discharge limits for normal and emergency market operations in place of the economic and emergency operating limits that other generators submit. SPP named these Offer parameters Minimum Charge Limit, Minimum Discharge Limit, Minimum Emergency Charge Limit, Minimum Emergency Discharge Limit, Maximum Charge Limit, Maximum Discharge Limit, Maximum Emergency Charge Limit and Maximum Emergency Discharge Limit.

The market participant technical impacts for the market comprise three broad categories:

- Application programming interface (API) — Market participants and their IT vendors will develop APIs to allow their individual software solutions to interface with SPP's market. Market participants and their IT vendors will use the SPP Market WSDL and XSD provided in the reference table below for development of systems; additionally, developers will need the data exchange guide and business validation documents provided in the reference table below.
- User interface (UI) — Market participants may choose to use the SPP Market User Interface in addition to or as replacement for custom developed application programming interface. The SPP Market User Interface guide provides helpful information to users on how to submit, query and filter data.

SPP SYSTEMS/PROCESSES IMPACTED

Market Clearing Engine (SCUC and SCED)

MDB

Markets UI/API

Operations Processes and Procedures

EMS/ICCP

RTGEN

Market Monitoring Portal

ANTICIPATED MEMBER SYSTEMS/PROCESSES IMPACTED

Vendor or internally developed markets interface for submissions, queries and notifications.

MEMBER REQUIREMENTS

Market participants will need to implement business processes and, if applicable, application systems to exchange data with the SPP Market Operations System. To aid in the development of those processes and system changes, the following documentation is published with details on how to exchange data (e.g., offers, bids) with SPP.

DOCUMENT	LOCATION	DESCRIPTION
Markets WSDLs & XSDs	SPP Documents > Org Group Documents > Change Working Group > Reference Documents > Technical Reference Documents > Technical Specifications > Tech Specs > Future Tech Specs	Technical specifications for Market APIs
SPP Markets Data Exchange (UI/API) Validations	SPP Documents > Org Group Documents > Change Working Group > Reference Documents > Technical Reference Documents > Business Rule Guides	A reference document to provide participants a list of validations that the Market Operating system (MOS) will perform upon submission or query of market data.
SPP Markets UI Guide	SPP Documents > Org Group Documents > Change Working Group > Reference Documents > Technical Reference Documents > User Interface Guides	A reference document to provide participants a guide for submitting and viewing data through the Markets User Interface.

SETTLEMENTS

BUSINESS IMPACT

USERS IMPACTED

All Market participants and shadow settlement vendors

BUSINESS FUNCTIONS IMPACTED

There are changes to the *existing* settlement calculations in the Integrated Marketplace Protocols per RR323 and RR425, as well as new bill determinant and charge types for market participants that chose to register an MSR (Market Storage Resource). These changes will impact all market participants that perform shadow settlements, in addition to any market participant that registers an MSR.

TECHNICAL IMPACT

SPP SYSTEMS/PROCESSES IMPACTED

Bill determinant and charge type calculations will be added and modified in the Settlement Management System to support the changes in the revision request.

ANTICIPATED MEMBER SYSTEMS/PROCESSES IMPACTED

Asset Owners / Market Participants

Asset owner's with settlement locations that are registered as MSRs will receive new bill determinants as defined in revision request on the settlement determinant reports and new charge types on settlement statements.

Shadow Settlement Systems

Members (or vendors) that perform shadow settlements will need to update their processes and/or systems as a result of the settlement calculation changes included in RR323 and RR425. Changes to the existing settlement calculations will impact ALL market participants.

Additionally, members (or vendors) that plan to shadow the new charge types related to MSRs will need to update their processes to consume the new bill determinants and calculate the new charge types as defined in revision request.

MEMBER REQUIREMENTS

Settlements UIs/APIs

There are no WSDL/XSD changes associated with this project. However, the reports available via the Settlement Results UIs and APIs will include new MSR charge types and/or bill determinants.

New bill determinants:

- UI – AO Determinant Report
-
- API – GetDeterminantReport
-
- API – GetSettlementData

New charge types:

- UI – AO Statement
- UI – MP Statement
- API – GetStatement
- API – GetSettlementData

MARKET MONITORING PORTAL

BUSINESS IMPACT

There are three components to the Market Monitoring Portal (MMP) release:

- Order 841 changes for Market Storage Resources (MSR)
- Additional range validations for numeric/time fields
- Additional content validations and enhanced error messages for Policy submissions

ORDER 841 CHANGES (INTEGRATED MARKETPLACE ONLY)

Several new resource parameter fields (listed below) have been exposed within the MMP. These fields are necessary for the SPP Market Monitoring Unit to perform their role in establishing reference levels for the offer parameters submitted for MSRs within the Integrated Marketplace.

USER INTERFACE ACCESS

These fields can be accessed within the MMP on the IM Generator Parameters page in a new tab titled "Market Storage Resource". This tab is visible in the UI for all Integrated Marketplace resources. Only asset owners of MSR identified resources will need to enter information for these fields.

IMPORT/EXPORT FUNCTIONALITY

Additionally, there is a new Excel spreadsheet tab on all of the IM Generator Parameter export files. It is also titled "Market Storage Resource" and only MSR identified resource owners will need to enter information on this tab.

No other changes have been made to the way current entities interact with the system.

RANGE VALIDATIONS

Additional validations on numeric ranges were added to the application interface and upload functionality to better inform a user submitting a value that is too large for the database field being updated. This will provide better error messages during the submission of data and provide more assurances with the data quality.

POLICY CONTENT VALIDATIONS AND ENHANCED ERROR MESSAGES

There is a scenario in the UI that allows a user to attempt to upload a file or add a generator without first selecting a policy. This action has been disabled until a policy is selected. The

change prevents users from performing this action by graying out the FILE and GENERATOR sections of the policy page if a parent policy is not chosen first.

DUE TO A SYSTEM LIMIT OF 10MB FOR ANY POLICY FILES UPLOADED THROUGH THIS PAGE, ANY USER THAT SUBMITTED A FILE GREATER THAN 10MB WOULD RECEIVE AN ERROR MESSAGE THAT WAS VAGUE IN NATURE. THE ERROR MESSAGE HAS BEEN ADJUSTED TO PROVIDE SPECIFIC INFORMATION ON THE ERROR. USERS IMPACTED

The Order 841 changes will only impact those that have registered market storage resources within the Integrated Marketplace. Existing resources will see two new tabs where this information can be entered, but they can be ignored. WEIS members are not impacted by this change and will see no changes to their interfaces.

The additional range validations and policy content changes impact all users, IM and WEIS.

BUSINESS FUNCTIONS IMPACTED (INTEGRATED MARKETPLACE)

IM market participants with a registered MSR will need to implement business processes to exchange the necessary Generator Parameter data with the SPP Market Monitoring unit via the Market Monitoring Portal.

BUSINESS FUNCTIONS IMPACTED (WEIS)

No WEIS business functions are expected to be impacted.

TECHNICAL IMPACT

INTEGRATED MARKETPLACE ONLY CHANGES

Integrated Marketplace users will see changes in the following area:

- A new tab titled "Market Storage Resource" on the Generator Parameters screen.
- A new tab titled "Market Storage Resource" on the exported Excel file for the Generator Parameters screen.
- The new tabs will contain the following fields (only MSRs should enter values for these)

Field Name	Display Name	Short Description
max_state_of_charge	Max State of Charge	(MW) The maximum State of Charge that should not be exceeded.
min_state_of_charge	Min State of Charge	(MW) The minimum State of Charge that should be maintained.

max_charge_limit	Max Charge Limit	(MW) The maximum MW level that an MSR is able to withdraw from the grid used during normal operating conditions.
min_charge_limit	Min Charge Limit	(MW) The minimum MW level an MSR is able to withdraw from the grid during normal operating conditions
max_discharge_limit	Max Discharge Limit	(MW) The maximum MW level that an MSR is able to inject into the grid used during normal operating conditions.
min_discharge_limit	Min Discharge Limit	(MW) The minimum level that an MSR is able to inject into the grid during normal operating conditions
max_charge_time	Max Charge Time	(hh:mm) The maximum duration of time that an MSR is able to withdraw from the grid.
min_charge_time	Min Charge Time	(hh:mm) The minimum duration of time an MSR is able to withdraw from the grid.
max_discharge_time	Max Discharge Time	(hh:mm) The maximum duration of time that an MSR is able to inject into the grid.
min_discharge_time	Min Discharge Time	(hh:mm) The minimum duration of time that an MSR is able to inject into the grid.
msr_loss_factor	Loss Factor	The factor that represents round-trip efficiency related to the amount of energy an ESR loses from charge to discharge.
max_emergency_charge_limit	Max Emergency Charge Limit	(MW) The maximum MW level that an MSR is able to withdraw from the grid during an emergency condition.
min_emergency_charge_limit	Min Emergency Charge Limit	(MW) The minimum MW level that an MSR is able to inject into the grid during an Emergency Condition.
max_emergency_discharge_limit	Max Emergency Discharge Limit	(MW) The maximum MW level than an MSR is able to inject into the grid during an Emergency Condition.
min_emergency_discharge_limit	Min Emergency Discharge Limit	(MW) The minimum MW level that an MSR is able to inject into the grid during an Emergency Condition.

WEIS AND INTEGRATED MARKETPLACE IMPACTS

- Range validations have been improved for all numeric input fields; the maximum value limits were previously enforced on the database but not in the application interface, leading to ambiguous errors when those limits were exceeded. The application interface will now be enforcing these limits for more informative error handling. In addition, numeric data fields that should not have negative values will now be checked for negative values.
- Policy content validations have been enhanced to provide a better user experience. The application interface will now prevent the user from attempting to upload files or relate generators without first choosing a parent policy. This scenario only happened in a specific situation within the system and resulted in no changes to the system data, while causing confusion for the users that encountered it. We have enhanced the error messaging to provide more information to the user during this process to allow them to better understand the expectations and limitations of the data they are submitting.

MEMBER REQUIREMENTS

IM market participants with registered MSRs will need to implement business processes to exchange data with the SPP Market Monitoring unit via the Market Monitoring Portal. To aid in the development of those processes, the following documentation is published with details on how to exchange data, and the format required, with SPP.

Integrated Marketplace participants will need to make any necessary changes to take into consideration the impacting changes outlined above, if applicable.

DOCUMENT	LOCATION	DESCRIPTION
Training documents	Integrated Marketplace Portal under Market Monitoring Portal	Includes slide deck with directions of where to enter various information

APPENDIX A

Here is a list of frequently asked questions, grouped according to functional area. NOTE: This section will be developed during member testing.

QUESTION	ANSWER
<FUNCTIONAL AREA 1>	
<FUNCTIONAL AREA 2>	
<FUNCTIONAL AREA 3>	