



PROGRAM OVERVIEW: SPP'S WESTERN ENERGY IMBALANCE SERVICE MARKET (WEIS)

By Southwest Power Pool

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REVISION HISTORY

| DATE OR VERSION NUMBER | AUTHOR | CHANGE DESCRIPTION | COMMENTS |
|-----------------------------|-----------------|--|----------|
| Version 1.0 (Jan. 16, 2020) | Derek Wingfield | Initial draft | |
| 1.1 (March 10, 2020) | Derek Wingfield | Addition of link to technical specifications and information regarding public data | |
| 1.2 (March 26, 2020) | Derek Wingfield | Addition of Other Reference Materials section | |
| 1.2.1 (April 2, 2020) | Derek Wingfield | Addition of JOU Examples document listing to Other Reference Materials section | |
| 1.2.2 (May 27, 2020) | Nikki Eason | Addition of technical documentation reference guide and planned public data postings | |
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|-------|-----|--|--|
| | | 8/3/20) and Delivery of WEIS Market Clinic Training (now 7/27/20) | |
| 1.2.6 | SPP | Updated Market Trials – Parallel Ops Go/No-Go from November 19, 2020 to November 30, 2020. Also added January 22, 2021 date for Go/No-Go for Go-Live | |

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WEIS MARKET OVERVIEW

The Western Energy Imbalance Service market (WEIS) will centrally dispatch participating resources' energy on an intra-hour, five-minute basis. This centralized dispatch efficiently ensures the reliability of the transmission system and minimizes production costs to satisfy demand obligations across the market footprint.

RESOURCE REGISTRATION TYPES

The WEIS will accommodate diverse resource types. Fuel diversity helps ensure the market operates as efficiently as possible and can take advantage of the unique capabilities of different resources. SPP will facilitate resource registration as part of the market-participant onboarding process.

GENERATING UNITS AND PLANTS

A registered resource must meet the minimum requirements and functions defined in the WEIS market rules. Individual market participants (MP) will register resources on a nodal basis at unique settlement locations. Resources at the same physical and electrically equivalent injection point to the transmission system may register individually as generating units or collectively as a plant, affording MPs the flexibility to decide which option is best for each resource.

DISPATCHABLE DEMAND RESPONSE RESOURCES

A dispatchable demand response resource is a special type of resource created to model demand reductions associated with controllable load and behind-the-meter generation. They are dispatchable by the market on a five-minute basis.

JOINTLY OWNED UNIT RESOURCES

For the purposes of dispatch, MPs may model each ownership share as a separate resource under the Individual Resource modeling option for jointly-owned unit (JOU) resources. Each resource is offered and cleared independent of other resource shares. A JOU is not required to register under the Individual Resource option and may instead register under a single MP using other appropriate resource-registration types.

DISPATCHABLE VARIABLE ENERGY RESOURCES

A variable-energy resource that the market may incrementally dispatch down may register as a Dispatchable Variable Energy Resource (DVER). DVERs must have a zero-megawatt (MW) minimum economic-operating limit. To ensure the WEIS does not negatively impact the participating balancing authorities' (BA) ability to comply with North American Electric Reliability Corporation (NERC) balancing standards, DVER ramp rates will be limited to reduce interval-to-interval swings in generator output.

For DVERs with a maximum economic-operating limit less than 200 MW, the maximum ramp rate cannot exceed 8 MW/min. For DVERs with a maximum economic-operating limit greater than or equal to 200 MW, the MW ramp rate per minute cannot exceed 4% of the maximum economic-operating limit. For example, a DVER with maximum economic-operating limit of 300 MW cannot exceed 12 MW/min.

EXTERNAL RESOURCES

To participate in the WEIS, external resources must pseudo-tie into a BA already participating in the market in accordance with any agreements and requirements of the participating BA. External resources will be responsible for registering and performing all responsibilities required of a resource registered in the WEIS.

ROLES/RESPONSIBILITIES

This section details SPP's and market participants' roles and responsibilities in the WEIS program.

ONBOARDING PROJECT MANAGER (SPP)

- Act as liaison and facilitator between onboarding companies and SPP.
- Ensure all registration, modeling, training and testing requirements are completed for onboarding.
- Maintain customer contact via request management system (RMS) tickets, regular meetings, etc. to keep customer informed of project status.

MARKET PARTICIPANT

- Company responsible for financial activities in the WEIS.
- Participates in connectivity, market-trials and parallel-operations testing.
- Provides registration updates as needed.
- Responsible for preparedness for future market changes.

LOCAL SECURITY ADMINISTRATOR (LSA)

- Responsible for creation and maintenance of MP user accounts in the portal.
- All LSAs and users must have a valid OATI digital certificate to access the portal.
- Provides individual users access to the portal for their employees and vendors.
- Responsible for adding, terminating, updating and coordinating all information associated with general users.

SUBJECT MATTER EXPERT (SME)

- This person may be a contractor or SPP stakeholder with proficient knowledge of items being developed in this program.
- Possesses extensive knowledge of SPP systems, business practices and processes and knowledge of high-level requirements of the program's success.
- Participates in data-gathering for SPP inputs.

CUSTOMER TRAINING

- Develop a timeline for training development and delivery in conjunction with the business owner, project manager, and identified SMEs.
- Communicate training timeline via Member-Impacting Project Overview (MIPO) if applicable, Change Working Group, Operations Training Working Group, and other appropriate working groups.
- Deliver training to members and MPs according to the agreed-upon timeline.
- Track member attendance and other metrics to ensure retention of material (if applicable).
- Maintain training material for future updates.

CORPORATE COMMUNICATIONS

- Collaborate with SPP leadership, WEIS program sponsor, business owner and program manager on all external communications.
- Create and publish messages such as press releases, program announcements, web pages and other messages intended for internal and external stakeholders.
- Act as liaison to the media regarding inquiries about the WEIS.

MP PROJECT MANAGER

- Engage MP SMEs to ensure progress on key milestones.
- Provide updates to SPP on milestones as requested.
- Raise issues, risks and concerns regarding MP project status.
- Provide representative to the WEIS project managers meeting.

MP WESTERN MARKETS EXECUTIVE COMMITTEE (WMEC) REPRESENTATIVE

- Provide executive-level program decisions and status.
- Assist in program mitigation discussions.
- Other responsibilities are outlined in the Scope of Activities section of the Western Markets Executive Committee (WMEC) Charter at <https://spp.org/documents/61046/wmec%20charter%2020191121.pdf>.

MP SME

- May be a contractor or MP stakeholder with proficient knowledge of company-specific information.
- Has extensive knowledge of systems, business practices and processes, and high-level requirements needed for the success of the program.
- Participate in data-gathering for MP inputs
- Interface with internal and external staff to ensure task-specific success.

RMS OVERVIEW

SPP uses the Request Management System (RMS) application to track and respond to stakeholder inquiries and manage externally-facing processes such as market registration. RMS submissions have service level agreements (SLA) assigned by the type and scope of work associated with the request. Stakeholders may add notes to requests to ask questions or to request additional information.

To create an RMS account, go to www.spprms.issuetrak.com. Click the "Register Now" option (highlighted in the screenshot below), supply the required information, and choose the "Create My Account" button.

Please Sign In

Don't have an account? Use the "Register Now" link below. **Please use your e-mail address as your User ID.**

Don't remember your Password? **DO NOT** create a new account - you won't have access to your Requests!
Enter your User Id then click the "Forgot your password?" link below.

Please note that RMS should not be used to report real-time operational issues, contact operations directly.

Please note: Quick search now allows subject and request #.

The Quick Pick drop down menu is the only choice on the initial submit request screen, additional fields are available after a Quick Pick is selected. Quick Pick choice may be changed using the drop down menu on the next screen, if it was incorrectly chosen.

Please refrain from modifying the Request Type independent of the Quick Pick menu, this can affect request routing.

User ID:

Password:

Register Now

[Forgot / Reset your password?](#)

[Switch To Mobile View](#)

Figure 1: The RMS login screen allows users to create an account by clicking the highlighted "Register Now" link.

Once an account is created, RMS users can submit a request, where they will be asked to categorize their submission to aid in issue-routing and improve the timeliness of SPP's response.

All accounts will be associated with an organization in the RMS. When an account is created and the user submits a request, outreach is made to the Local Security Administrator (LSA) to confirm that the user should be associated with that organization. Once confirmation is received, the submitter may receive proprietary information for that organization through RMS submissions.

WEIS IMPLEMENTATION TIMELINE

The table below defines milestones leading up to the Feb. 1, 2021 launch of SPP's Western Energy Imbalance Service Market (WEIS).

| DATE | MILESTONE |
|----------------|--|
| Dec. 6, 2019 | Delivery/Completion of WEIS Introduction Virtual Instructor-Led Training (VILT) |
| Dec. 12, 2019 | Western Joint Dispatch Agreement (WJDA) Execution Complete: Deadline for execution of the WJDA by all market participants (MP) and SPP |
| Dec. 13, 2019 | Draft Tariff Approval: MPs approve draft of tariff |
| Dec. 31, 2019 | Deadline for registration of all WEIS MPs with SPP |
| Jan. 6, 2020 | Market Power Study for WEIS Market initiated after necessary information provided. |
| Jan. 15, 2020 | Publication of program level information to assist MPs in resource/project planning |
| Jan. 31, 2020 | FERC Filings: File the WEIS Tariff, Western Markets Executive Committee charter, and WJDA with the Federal Energy Regulatory Commission (FERC) |
| Feb. 3, 2020 | Publish Draft Technical Specifications: Publication of draft technical specifications (WSDLs, XSDs) for data exchange with SPP systems. Note: Draft specifications should be used for initial implementation of systems; specifications could change during SPP system development but changes should be minimal. |
| March 2, 2020 | Publish Final Technical Specifications: Publication of final technical specifications (WSDLs, XSDs) for data exchange with SPP systems. Update ICCP User Guide: Publication of technical documentation regarding ICCP configuration and data exchange |
| March 26, 2020 | Draft Market Protocol Approval: MPs approve draft market protocols |

| DATE | MILESTONE |
|----------------|--|
| April 15, 2020 | Model-freeze for Start of Market Trials: The last day to confirm MP registration details prior to connectivity testing. |
| April 24, 2020 | Delivery/Completion of WEIS Market Overview Training |
| April 30, 2020 | Stakeholder Approval of Engagement Model and Modification Oversight Process: MPs approve structure/adoption of the engagement model and oversight change process. |
| June 3, 2020 | Market Trials – Connectivity-Testing Kickoff Meeting: Meeting inclusive of SPP staff and MPs to discuss the prerequisites for testing connectivity to SPP systems and applications. |
| June 26, 2020 | Inbound ICCP Points from MPs to Production: Deadline to complete testing of data exchange over ICCP from MPs to SPP. |
| June 30, 2020 | MPs effective in portal: Local Security Administrator (LSA) user administration of MPs begins. |
| July 1, 2020 | Market Trials Connectivity Testing w/SPP Starts Transmission Service Providers File Their Tariff Changes with FERC |
| July 20, 2020 | Market Trials – Structured/Unstructured Testing Kickoff Meeting: Meeting inclusive of SPP staff and market participants to discuss the process and test scripts for completion of market trials |
| July 27, 2020 | Market Trials – Market Trials Testing Go/No-Go: Decision-point to move into market trials. Delivery of WEIS Market Clinic Training |
| Aug. 3, 2020 | Market Trials – Connectivity Testing w/SPP Ends, Structured/Unstructured Testing Begins Frequently Constrained Area Study Begins MPs submit mitigated offer methodology to SPP Market Monitoring Unit (MMU): Deadline for MP submission of mitigated offer methodology. |

| DATE | MILESTONE |
|---------------|--|
| Aug. 10, 2020 | Market Trials – Weekly Status Calls Begin: Beginning of weekly calls with subject matter experts to ask questions and receive updates on the status of market trials testing. |
| Aug. 27, 2020 | Market Power Study Ends |
| Aug. 28, 2020 | Outbound ICCP Points to MPs in Production: Deadline to complete testing of data exchange over ICCP from SPP to MPs. |
| Aug. 31, 2020 | MPs submit resource physical parameters in Market Monitoring Portal (MMP): Submission of resource specific information via the MMP begins |
| Nov. 20, 2020 | Delivery/Completion of WEIS Ad-Hoc Training (if needed) |
| Nov. 23, 2020 | Market Trials – Structured/Unstructured Testing Ends |
| Nov. 30, 2020 | Market Trials – Parallel Ops Go/No-Go: Decision-point to move into parallel operations. |
| Dec. 10, 2020 | Market Trials – Parallel Operations Begins |
| Jan. 14, 2021 | Market Trials – Parallel Operations Ends |
| Jan 22, 2021 | Go/No-Go for Go-Live: Decision-point to go live |
| Jan. 28, 2021 | Frequently Constrained Area Study Ends |
| Feb. 1, 2021 | WEIS Go-Live: Results of the market become financially binding. |

GOVERNANCE STRUCTURE

WESTERN JOINT DISPATCH AGREEMENT

SPP will administer the WEIS as a contract service separate and distinct from its role as a regional transmission organization (RTO). To participate in the WEIS, entities must execute a pro-forma Western Joint Dispatch Agreement (WJDA). The WJDA establishes a legal relationship between SPP and customers taking WEIS market administration services. The WJDA describes the administration of the WEIS by SPP and the payment obligations of customers to fund the administrative costs of WEIS implementation and operation. The WJDA is posted on the SPP website at <https://spp.org/weis>.

ROLE OF THE WESTERN MARKETS EXECUTIVE COMMITTEE AND SPP BOARD OF DIRECTORS

Participants of the WEIS will have significant input and authority over its administration. SPP has established a Western Markets Executive Committee (WMEC) comprising representatives of each non-affiliated signatory to the WJDA. Initially, the WMEC will provide a forum in which SPP and market participants can collaborate to finalize market rules for the WEIS's implementation. After market go-live, the WMEC will have authority to:

- Approve or reject proposed amendments to the WEIS Tariff.
- Establish detailed WEIS Market Protocols to support the filed tariff.
- Provide consultation to SPP in determining the administrative rate charged to participants of the WEIS market.
- Recommend proposed amendments to the WJDA.

The WMEC may establish working groups and task forces as needed to facilitate its authorities under its charter, a copy of which is posted on the SPP website at <https://spp.org/weis>.

As with other contract services, SPP's independent board of directors will provide ultimate oversight of SPP's administration of the WEIS under the WJDA. The board will give significant recognition to the WMEC's decision-making role. Action taken by the WMEC under the authorities defined in its charter will be deemed to be approved by the board, and SPP will be authorized to submit requisite regulatory filings to implement the WMEC's decision. Any action or inaction taken by the WMEC may be appealed to the SPP board of directors for final resolution.

STATE COMMISSION LIAISONS TO THE WMEC

Each state in which a WEIS participant or MP under the WEIS tariff has either generation or load participating in the WEIS may appoint one commissioner to serve as a state liaison to the WMEC. State liaisons will not have a voting role on the WMEC but participate in an advisory capacity. State liaisons will advise the WMEC on all matters pertinent to participation in the WEIS under the WEIS Tariff. State liaisons are to provide direction and input in the context of WMEC meetings. SPP staff will assist liaisons by providing information and support relevant to the WEIS.

WEIS TARIFF AND MARKET PARTICIPANT AGREEMENT

SPP will file with FERC a tariff defining the rates, terms and conditions for the WEIS and will administer the WEIS Tariff separate from its Open Access Transmission Tariff. The WEIS Tariff defines the market's rules and obligations for market participants and for SPP as the market operator. The WEIS Tariff will include a Market Participant Agreement that will be effective on the date each market participant begins participating in the WEIS. The Market Participant Agreement obligates each market participant to adhere to the rules and requirements of the WEIS Tariff. A draft of the WEIS Tariff is posted in the SPP.org Document Library the folder: Western Energy Services/Western Energy Imbalance Service Market/[WEIS Governing Documents](#).

REGISTRATION

Registration in the WEIS encompasses both technical and contractual components, both of which are facilitated by SPP's customer relations and model coordination staff. In conjunction with an MP applicant, these teams provide guidance regarding resource-registration options as described in the market protocols, help MPs understand contractual needs pertinent to the chosen registration, and ensure telecommunications structures are in place to facilitate real-time data transfer.

The first step in registration is to identify the company accepting financial responsibility of the market settlements associated with market activities. This ensures the right legal entity executes the documentation required for market participation. Once the company is confirmed, an assessment of data-transfer abilities via ICCP can be reviewed. All MPs registering load or generation as physical resources must either establish an ICCP connection with SPP via our two telecommunications vendors or contract with an organization that has already established this connectivity. Should the MP applicant need to establish a new ICCP connection, contractual documentation regarding payment is required. Setup of new connections will take a minimum of six months.

In parallel, SPP's model coordination staff will contact the MP applicant to assess the physical resources being registered and provide guidance regarding the information required for the commercial model. This information includes resource parameter data, physical location information, registration options based on the resource's characteristics, and more. While model coordination staff can discuss specific resources and provide options for registration, it cannot provide guidance regarding market optimization.

Model coordination staff also ensures accurate and complete information is entered in and propagates through SPP's environment stack appropriately. This enables connectivity and technical data submission and receipt-testing as part of market trials, positions MPs for future testing, provides SPP quality assurance for future implementations, and designates an environment for disaster recovery.

Contractually, MP applicants are required to execute documents obligating them financially, show evidence of creditworthiness for participation, and designate a meter agent to submit after-the-fact data for settlement calculations. SPP customer relations staff will assist in confirming all required documents are received. Required documents are listed in the WEIS Tariff and Protocols and include the Market Participant Agreement, Meter Agent Agreement, Credit Assessment forms, Bank Information form, W-9 information, Local Security Administrator form and other information that may be deemed necessary.

READINESS APPROACH

To ensure the success of WEIS implementation efforts through timely reporting of accurate and useful program information, SPP will communicate regarding progress toward key program milestones via the readiness dashboard.

Milestone statuses will be listed as green, yellow or red. Green means progress is tracking appropriately for completion by the due date. Yellow means completion of the milestone is in jeopardy and requires further planning and/or mitigation. Red means insufficient progress has been made to date, requiring collaboration on a mitigation plan.

Statuses for external milestones will be discussed at project managers meetings which will include key subject matter experts as needed. An executive summary will be provided to the WMEC on a monthly basis which will include the progress of external milestones and key internal milestones that have critical impacts to the overall health of the program. If mitigation plans are required, discussions inclusive of SPP and participant project management staff and subject matter experts will occur in conjunction with the WMEC.

TRAINING DATES

SPP's WEIS training program is designed to provide MPs opportunities to acquire knowledge to not only become efficient and confident participants, but also to increase effective participation in the WEIS. Dates listed below are subject to change.

CUSTOMER TRAINING DELIVERABLES

WEIS INTRODUCTION

Format: Originally delivered as a virtual instructor-led training (VILT), now available as a recording on the SPP Learning Center.

Audience: Those interested in understanding the components of an energy imbalance market.

Description: This hour-long introduction to SPP's WEIS market provides an overview of the fundamental concepts for operating and participating in an energy market including key concepts, outcomes and defined roles and responsibilities.

WEIS UP! AN IN-DEPTH GUIDE

Format: Virtual Instructor-led training (VILT) course, available Spring 2020.

Audience: Those interested in understanding the components of an energy imbalance market and those tasked with performing or supporting market activities.

Description: This training series will focus on the foundational concepts and deliverables related to functioning in the WEIS. These sessions will cover a more robust discussion about market execution, congestion management methodology, settlement concepts and charge types, and market monitoring procedures and required data.

WEIS MARKET FUNDAMENTALS CLINIC

Format: Instructor-led course hosted in Denver, CO in Summer 2020.

Audience: Those tasked with performing or supporting market activities.

Description: This 12-hour course details the specific functions, tasks and features of market operations that ensure effective participation in SPP's WEIS.

AD HOC TRAINING

Format: VILT or performance support materials, available late Summer 2020 through go-live in Feb. 2021.

Topics: Identified based on MP needs and test results from market trials.

Audience: Market-support staff.

Description: These courses and materials will cover specific topics determined based on stakeholder need and test results from market trials.

POST GO-LIVE TRAINING

SPP provides ongoing education after WEIS go-live in Feb. 2021 based on market enhancements, NERC/FERC orders and stakeholder-identified needs.

The following dates are subject to change based on market timeline and deliverable changes:

| TRAINING COURSE | START DATE | END DATE |
|--|----------------|----------------|
| WEIS Introduction (VILT) | Dec. 2, 2019 | Dec. 5, 2019 |
| WEIS Introduction (recording) | Dec. 17, 2019 | None |
| WEIS Introduction (computer-based training or CBT) | TBD | TBD |
| WEIS Up! (VILT) | April 13, 2020 | April 24, 2020 |
| WEIS Up! (recording) | TBD | TBD |
| WEIS Up! (CBT) | TBD | TBD |
| WEIS Market Fundamentals Clinic | July 13, 2020 | July 17, 2020 |

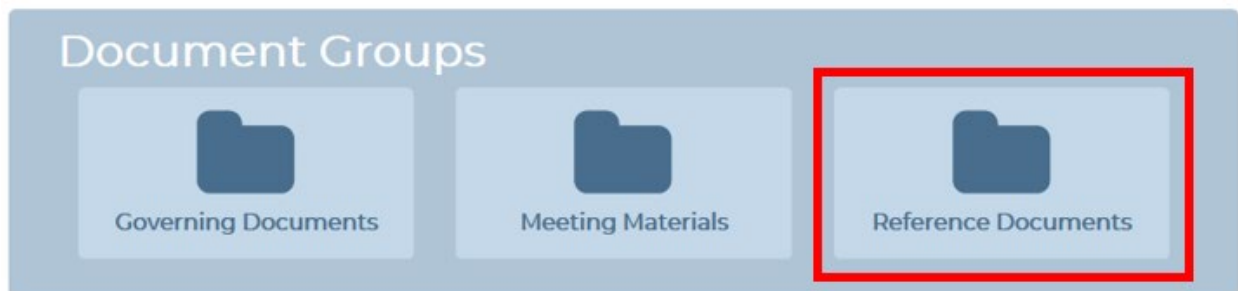
TECHNICAL IMPLEMENTATION DOCUMENTATION

TECHNICAL IMPLEMENTATION REPOSITORY

The purpose of this section is to provide a reference for WEIS Market Participants, software vendors and external stakeholders seeking technical information regarding the implementation of the WEIS software solution. In this section, SPP has provided a table of relevant technical documents published on SPP.org with the corresponding link and breadcrumb for easy access. SPP will publish additional technical documentation for the WEIS program on SPP.org as it becomes available and provide references to the locations of these newly published documents in this section in future updates to the document.

FINDING THE DOCUMENTS

You can find technical documents in the **Reference Documents** section of the Change Working Group page on SPP.org, found by browsing to *SPP.org > Organizational Groups > Change Working Group > Reference Documents*



The **Reference Documents** folder and associated subfolders contain a variety of documentation. SPP technical documentation is located within the **Technical Reference Documents** subfolder, found by browsing to *SPP.org > Organizational Groups > Change Working Group > Reference Documents > Technical Reference Documents*.

TYPES OF TECHNICAL DOCUMENTATION AVAILABLE ON SPP.ORG

There are several documents published on SPP.org in this folder, including:

SPP CONNECTIVITY SPECIFICATIONS

This document provides external users with environment-specific technical information about how to interface with two externally-facing SPP environments: the Member Testing Environment and production environment. Contents include information such as certificate information, URLs, etc.

TECHNICAL SPECIFICATIONS

See the SPP External Technical Documents Inventory for information on how the **Technical Specifications** and **Technical Specifications for Public Data** folder structures are organized.

SPP MEMBER FACING TECHNOLOGY STACK

Information on member-facing portions of SPP's technology stack.

SPP USER INTERFACE GUIDE INVENTORY

This document provides a list of user interface (UI) guides for Integrated Marketplace, Western Reliability Coordination Service (West RC), and Western Energy Imbalance Services (WEIS) UIs.

SPP EXTERNAL TECHNICAL DOCUMENTS INVENTORY

This document provides information on external-facing technical documentation available to participants.

WEIS EXTERNAL STAKEHOLDER DATA POINTS

External stakeholders interacting with Southwest Power Pool's (SPP) Western Energy Imbalance Service (WEIS) market are required to provide data to and accept data from SPP systems. This document provides an inventory of data points per system and information on the methods used for the exchange of data.

SPP WEIS PROGRAM TECHNICAL DOCUMENTATION REFERENCE GUIDE:

| DOCUMENT TITLE | BREADCRUMB |
|---|--|
| SPP Connectivity Specifications: | SPP Documents/ Org Group Documents / Change Working Group / Reference Documents / Technical Reference Documents / SPP Environments |
| SPP Public Data Guide and Sample Files (archived, current, and future) | SPP Documents / Org Group Documents / Change Working Group / Reference Documents / Technical Reference Documents / Technical Specifications / Public Data |
| SPP Tech Specs | SPP Documents / Org Group Documents / Change Working Group / Reference Documents / Technical Reference Documents / Technical Specifications / Tech Specs / Future Tech Specs |
| SPP Member Facing Technology Stack | SPP Documents / Org Group Documents / Change Working Group / Reference Documents / Technical Reference Documents |
| SPP UI Guide Inventory | SPP Documents / Org Group Documents / Change Working Group / Reference Documents / Technical Reference Documents |
| SPP External Technical Documents Inventory | SPP Documents / Org Group Documents / Change Working Group / Reference Documents / Technical Reference Documents |
| WEIS External Stakeholder Data Points | SPP Documents / Org Group Documents / Change Working Group / Reference Documents / Technical Reference Documents |

MARKET TRIALS

Market trials are intended to validate that SPP's and participants' systems, processes and staff are able to operate in alignment with SPP's WEIS Marketplace Protocols. Market trials test specific business processes and system functions in a controlled manner and provide MPs an opportunity to test their own end-to-end systems.

Market trials serve as the program's participant integration test stage using the following participant-test sub-stages:

- Connectivity testing
- Structured/unstructured testing
- Deployment testing
- Parallel operations

Market trials will last from July 1, 2020 thru Jan. 14, 2021 and will be conducted in SPP's Member Test Environment (MTE), with parallel operations testing occurring in the production environment.

CONNECTIVITY TESTING

Connectivity testing ensures new WEIS MPs and meter agents can:

- Initiate local security administrator (LSA) and user/application certificate setup
- Access the Integrated Marketplace Portal
- Access and submit to the Markets User Interface
- Locate and retrieve settlements reports and data
- Subscribe to and receive settlements notifications
- Verify technical connectivity between SPP and participants including digital certificates, XML listeners and firewall access

Successful completion of connectivity testing provides a measure of SPP's and participants' readiness for the structured test sub-stage of market trials. Connectivity testing will take place in SPP's MTE July 1-31, 2020. There will be a connectivity test kick-off meeting in early to mid-June.

STRUCTURED/UNSTRUCTURED TESTING

Structured/unstructured testing starts August 3, 2020 and ends Nov. 20, 2020. Testing will take place in SPP's MTE and will consist of the following:

- Real-time balancing market (RTBM) base-case runs
- Settlements base-case runs
- Operational test scenarios
- Deployment tests

From Aug. 3, 2020 through Nov. 20, 2020, the RTBM will be running and generating dispatch basepoints that will be communicated to automated generation control (AGC) applications. AGC applications will then create setpoints to be sent to MPs. These setpoints will be informational only, and MPs should not follow them at this time.

From Aug. 17 until Nov. 20:

- Meter agents and MPs will be responsible for creating and submitting their own meter data.
- Settlement results for each operating day cleared by the Market Clearing Engine (MCE) will be posted to test MPs' ability to process and download statements and invoices. Settlement results will be accurate but may be based on unrealistic input data.
- SPP will test various operational scenarios with MPs on the structured days. As much as possible, scenarios will be constructed to impact the RTBM to simulate production.
- SPP will schedule a series of deployment tests to demonstrate that MPs can follow setpoints sent by SPP through inter-control center communication protocol (ICCP). During the scheduled deployment test, SPP may need to make overrides to force a change in deployment for the resource being tested.

REAL-TIME BALANCING MARKET BASE CASE RUNS

SPP plans to execute the RTBM persistently except during communicated maintenance windows to generate dispatch instructions and locational marginal prices (LMP) using market ICCP inputs from the SPP energy management system (EMS) and market-submission inputs from the Markets UI/API.

To support RTBM execution and reasonability analysis, MPs will provide all ICCP data feeds on a continuous basis and submit resource offers through the Markets UI/API seven days a week. RTBM notifications will be active per SPP Market Protocols. It is expected that SPP will provide IT

and operational support Monday-Friday from 8:00 AM – 5:00 PM unless it is a communicated systems upgrade period or SPP holiday.

MPs are expected to review their dispatch instructions with the resource parameters, control status and RTBM offers for consistency.

SETTLEMENTS BASE CASE RUNS

Settlements will also be integrated during market trials. Whenever possible, SPP will tie specific scenarios to settlements testing to provide a full view of the impacts of scenarios on settlements and billing.

SPP plans to settle each operating day cleared by the MCE beginning Aug. 17, 2020. An accelerated posting schedule will be used during market trials: S7 (OD+7), S53 (OD+21), S120 (OD+28), R (# of Days after OD), etc. SPP will post a settlements calendar to the MTE portal that reflects the accelerated schedule, and it will be updated throughout market trials when resettlements are scheduled.

SPP will post settlement results for each operating day cleared by the MCE to test MPs' ability to process and download statements and invoices. It is expected that input data to the settlements process could be intermittent. Settlement results will be accurate but may be based on unrealistic input data.

Meter agents and MPs will be responsible for creating and submitting their own meter data. Because data entered into the settlements system will improve throughout testing the expectation is that the shadow settlement systems will not be able to be fully validated.

OPERATIONAL TEST SCENARIOS

SPP will run various operational scenarios to simulate events on structured days (Tuesdays and Thursdays) beginning the third week of August and continuing until the end of structured/unstructured market trials on Nov. 20, 2020. A detailed list of operational scenarios will be included in the Market Trials Test Approach document.

DEPLOYMENT TESTS

WEIS deployment tests are intended to validate that WEIS MPs' systems, processes and staff are able to operate in alignment with the SPP WEIS Market Protocols. The tests are conducted in the MTE which is separate but mirrors SPP's production system.

Deployment tests are intended to verify that resources are capable of receiving setpoint instructions from SPP via ICCP or XML. SPP will configure its ICCP systems to utilize production

ICCP links and object IDs to limit changes that would be required to switch from testing to go-live on the participants' systems.

During every deployment test SPP will open a call for the BA operator, SPP RC, MP and SPP testing staff. This call will be opened at least 15 minutes prior to the start of each deployment test and stay open during the test and up to 15 minutes after the test's end. These open calls will allow for immediate communication of any issues experienced during the test and, if needed, early termination of the deployment test by any party on the call.

Deployment tests will be scheduled on the unstructured days (Monday, Wednesday and Friday) beginning the third week of August and continuing until the end of structured/unstructured market trials on Nov. 20, 2020.

PARALLEL OPERATIONS

The goal of parallel operations is to exercise all SPP systems with full use of all policies and procedures as developed and tested during earlier phases of market trials.

During parallel operations:

- Every day of the week is treated as an official operating day.
- RTBM and settlements run daily.
- SPP will send WEIS dispatch and setpoint instructions to MPs for informational purposes only.
- Offer curves should be consistent with what MPs plan to use in the production environment.

Successful completion of parallel operations must demonstrate the robustness of the WEIS software, processes and systems, both from a technical and commercial perspective within compliance standards. Additionally, prior to exiting parallel operations, successful execution of WEIS bid-to-bill functionality consistently for seven consecutive operating days must be demonstrated.

MARKET TRIALS TEST DOCUMENTS

SPP will publish WEIS market trials test documentation on SPP.org for review. This documentation will be made available to MPs late in 2Q 2020.

WEIS MARKET TRIALS TEST APPROACH

The WEIS Market Trials Test Approach provides the logistical plan and details to assist MPs in understanding their expectations and processes involved in MTE market trials.

WEIS CONNECTIVITY TEST CHECKLIST

The WEIS Market Trials Connectivity Test Checklist tests WEIS MPs' ability to access SPP's Market Portal, access and submit to the Market User Interface, locate and retrieve settlements reports and data, and subscribe and receive market and settlements notifications

WEIS DEPLOYMENT TEST MP GUIDE

The WEIS Deployment Test MP Guide provides a logistical plan and details to assist MPs in understanding their expectations and processes involved in WEIS deployment tests.

MARKET TRIALS CALENDAR

SPP will produce a calendar for MPs and SPP to follow during market trials. The calendar will be separated by month. It will be a living document and will be updated periodically during testing.

The calendar will track market-trials milestones. Events listed on the calendar will include:

- Daily submission of settlements, meter and other data and bilateral schedules
- Operational test scenarios
- Deployment tests
- MP testing-status conference calls
- Go/no go checkpoints
- SPP company holidays

MARKET TRIALS COMMUNICATION MEETINGS

Weekly market trials communication meetings provide a mechanism to collaboratively address MP questions regarding testing. SPP expects to schedule these meetings by the end of May 2020 for the period July 2020 through Jan. 2021. Meeting participants will review testing results, and SPP will inform MPs of upcoming action items. The meetings also will be used as an open forum in which MPs can follow up on open questions.

PUBLIC DATA

SPP will post WEIS-related public data in a sub-section of the [SPP Portal's](#) Public Data folder. Documentation for public data is posted on SPP.org at <https://www.spp.org/spp-documents-filings/?id=21075>.

Public Data Tech Specs will be updated with specific details as coding requirements are defined and completed. Reports may be added or removed over time.

Public data related to WEIS Parallel Operations will be removed from production after go-live.

PLANNED WEIS PUBLIC DATA POSTINGS

| REPORT | SUMMARY OF REPORT |
|---|--|
| RTBM Energy Offers | Historical real-time balancing market (RTBM) energy offers by resource with all price/MW pairs |
| Binding Constraints | Constraints as calculated by the RTBM |
| Fuel On Margin | Report on each fuel type that was marginal, created at the end of each day for the previous day |
| LMP by Settlement Location | Locational marginal price (LMP) data (MEC and MCC) as calculated by RTBM, organized by settlement location |
| LMP by Settlement Location (Annual Files) | Annual LMP data roll-up (MEC and MCC components) as calculated by RTBM, organized by settlement location |
| LMP by Bus | LMP by bus data (MEC and MCC components) as calculated by RTBM, organized by bus |
| LMP by Bus (Annual Files) | Annual LMP data roll-up (MEC and MCC components) as calculated by RTBM, organized by bus |
| Forecast Summary | Actual wind, solar and load, updated every five minutes and represented as an integrated five-minute average. This display shows SPP's latest forecast data at a given time. |

| REPORT | SUMMARY OF REPORT |
|--|--|
| Gen Mix 2 Hour | Generation mix files showing percentage generation by fuel type in use |
| Hourly Gen Capacity By Fuel Type | Previous day (24hrs) generation capacity by fuel type, based on EcoMax used in real time |
| Hourly Load | Historical load data rolled up at an hourly level and grouped by balancing authority area |
| System-Wide Short-term Load Forecast (STLF) vs. Actual | Five-minute load forecast data for the system-wide WEIS footprint for +/- ten minutes |
| System-Wide Hourly Load Forecast (MTLF) vs. Actual | Hourly load forecast data for the system-wide WEIS footprint plus seven days. Actual real-time load shown is averaged by hour. |
| Mid Term Resource Forecast (MTRF) | System-wide wind and solar forecast data for +144 hours, organized by interval. |
| Short-term Resource Forecast (STRF) | System-wide wind and solar forecast data for +4 hours, including actual wind and solar resource totals from previous intervals |
| Variable Energy Resource (VER) Curtailments | <p>Five-minute interval for WEIS total data (not per resource)</p> <ul style="list-style-type: none"> • Wind re-dispatch curtailments • Wind manual curtailments |
| WEIS Rampable Flexibility | Represents the forecasted dispatchable range of resources in the WEIS |
| Energy Imbalance Interchange Trend | Graphic view of BA-to-BA energy imbalance interchange between participating BAs in the WEIS |
| Settlement Calendar | The Settlement Calendar provides dates for data submission windows, statement postings and invoice publications. |
| Zonal Uplift Report | The Zonal Uplift Report is a monthly report of the total Real-Time uplift paid in dollars for each Settlement Area and Operating Day by Uplift charge type. This report provides granular information about location, timing and causes of uplift. |

| REPORT | SUMMARY OF REPORT |
|--|--|
| Resource Uplift Report | The Resource Specific Uplift Report is a report of the total monthly Real-Time uplift payments in dollars for each Settlement Location by Uplift charge type. |
| Revenue Neutrality Uplift (RNU) Report | The Revenue Neutrality Uplift (RNU) report is designed to provide users major market level bill determinants and charge types used in the calculation of RNU totals for the SPP footprint. |

OTHER REFERENCE MATERIALS

- **[WEIS Frequently Asked Questions](#)**: SPP periodically publishes responses to frequently asked questions in this document in an effort to maintain transparency and expand knowledge. Questions are grouped into four categories: Market Operations, Settlements, Regulatory Concerns and Stakeholder Engagement.
- **[WEIS Market Participant Data](#)**: As needed, SPP publishes technical materials related to key market concepts and data required for market participation. These materials include documents, examples, and presentations that address questions from across the WEIS participant base.
- **[JOU Examples and Contingency Reserve Options](#)**: Included in this document are examples of jointly-owned unit (JOU) registration options for electrically equivalent resources and the native load hedging (NLH) impacts for each option. Also included are options for communicating deployment of contingency reserves in the WEIS footprint with NLH impacts from tagging.