




California ISO

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## **EIM Track 3 Overview - Full Network Model**

Document Owner: **Morris, Janet**

 <b>California ISO</b>	<b>Technology</b>	<b>Template Version:</b>	<b>1.0</b>
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## 1 Purpose

The purpose of this document is to provide an entity who is joining the Energy Imbalance Market (EIM) with a summary and timing of key deliverables needed when integrating with the California ISO Full Network Model (FNM).

## 2 Acronyms

Below is a list of acronyms used in this document. Additional acronyms and term definitions are in the [Definitions and Acronyms](#) BPM.

Acronym	Expansion
BA	Balancing Authority
BES	Bulk Electric System
BPM	Business Practice Manual
CAISO	California Independent Systems Operator
CIM	Common Information Model
EIM	Energy Imbalance Market
EMS	Energy Management System
FNM	Full Network Model
GRDT	Generator Resource Data Template
ICCP	Inter-control Center Communications Protocol
IRDT	Intertie Resource Data Template
JOU	Jointly Owned Unit(s)
ISO	Independent Systems Operator
IT	Information Technology
MF	Master File
MVAR	Mega Volt Ampere Reactive
MW	Megawatt
NCL	Non-Conforming Load
NPR	Non-Participating Resource
PR	Participating Resource
RDT	Resource Data Template
SCADA	Supervisory Control and Data Acquisition
SE	State Estimator
SLA	Service Level Agreement
TNA	Transmission Network Applications
UI	User Interface
VER	Variable Energy Resource

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### 3 Track 3 Overview

The ISO models transmission and generation assets in several systems; specifically, the Network Model in the ISO EMS and the Master File.


The EMS is used to monitor the real-time status of the BES and to provide the real-time estimated power system solution necessary to determine the initial condition for real-time market applications. The same network model is also used by the TNA in the Market.

As part of the EIM implementation, the ISO and EIM entity will integrate the EIM entity's EMS model into the ISO EMS model. When these changes are implemented, the ISO will receive real-time data using an ICCP data link from the EIM entity. In Production, the EIM entity will follow the ISO's process to ensure that incremental updates to the EIM entity's Network Model are synchronized between the EIM entity and the ISO EMS systems in accordance with the Full Network Model (FNM) process and schedule, which is updated approximately on a monthly window. Network model submission cutoff dates are posted in advance on the [CAISO website](#) with significant advance notice in the [Full Network Model Schedule](#). Refer to Section 5.1.5 of the [Business Practice Manual for Managing Full Network Model](#) for references related to the production process.

The EIM entity will work with its EMS vendor to export the EIM entity's Network Model to the ISO. This includes exchange of supplemental data including, but not limited to displays, data points, limits, and possible contingencies. This document details all the deliverables in a later section. The EIM entity will work with the ISO to integrate this data into the ISO's Full Network Model. The EIM entity and the ISO will establish an inter-control center communications protocol (ICCP) to be used for transferring real-time data from the EIM entity to the ISO. The EIM entity will work with its EMS vendor to upgrade baseline displays needed for communicating dispatch instructions to generators, EIM entity transmission operations, and the ISO. The EIM entity will develop internal tools within its EMS to be used for communicating dispatch instructions to generators, EIM entity transmission operations, and the ISO.

The Master File specifies many of the properties of the EIM entity's generation and intertie resources for the purposes of scheduling, bidding, and settlement. The EIM entity will communicate these properties to the ISO via the Generator Resource Data Template (GRDT) and the EIM Intertie Resource Data Template (IRDT). The initial Resource Data Templates (RDTs) are provided by the EIM entity to the ISO via the Accellion Kiteworks Secure File Storage site. The generator properties specified in the Master File, such as minimum and maximum operating points, startup times, and ramp rates, have a significant impact on the way units are dispatched. These parameters should, as much as possible, align with the Network Model and meter data (Track 5). In Production, the EIM entity will follow the ISO's process to ensure incremental updates to the EIM entity GRDTs are incorporated in the ISO Master File. Master File modifications have a Service Level Agreement (SLA) of ten business days and most modifications can be made until two weeks prior to the EIM production implementation. If updates to the GRDT are needed, the preferred methodology is to submit through the Master File user interface (UI). If for any reason the entity is unable to submit or access the Master File UI, then the alternative is to submit the request via email to the RDT mailbox ([RDT@caiso.com](mailto:RDT@caiso.com)). If updates to the IRDT are needed, work directly with the CAISO EIM Track 3 Team for delivery method.

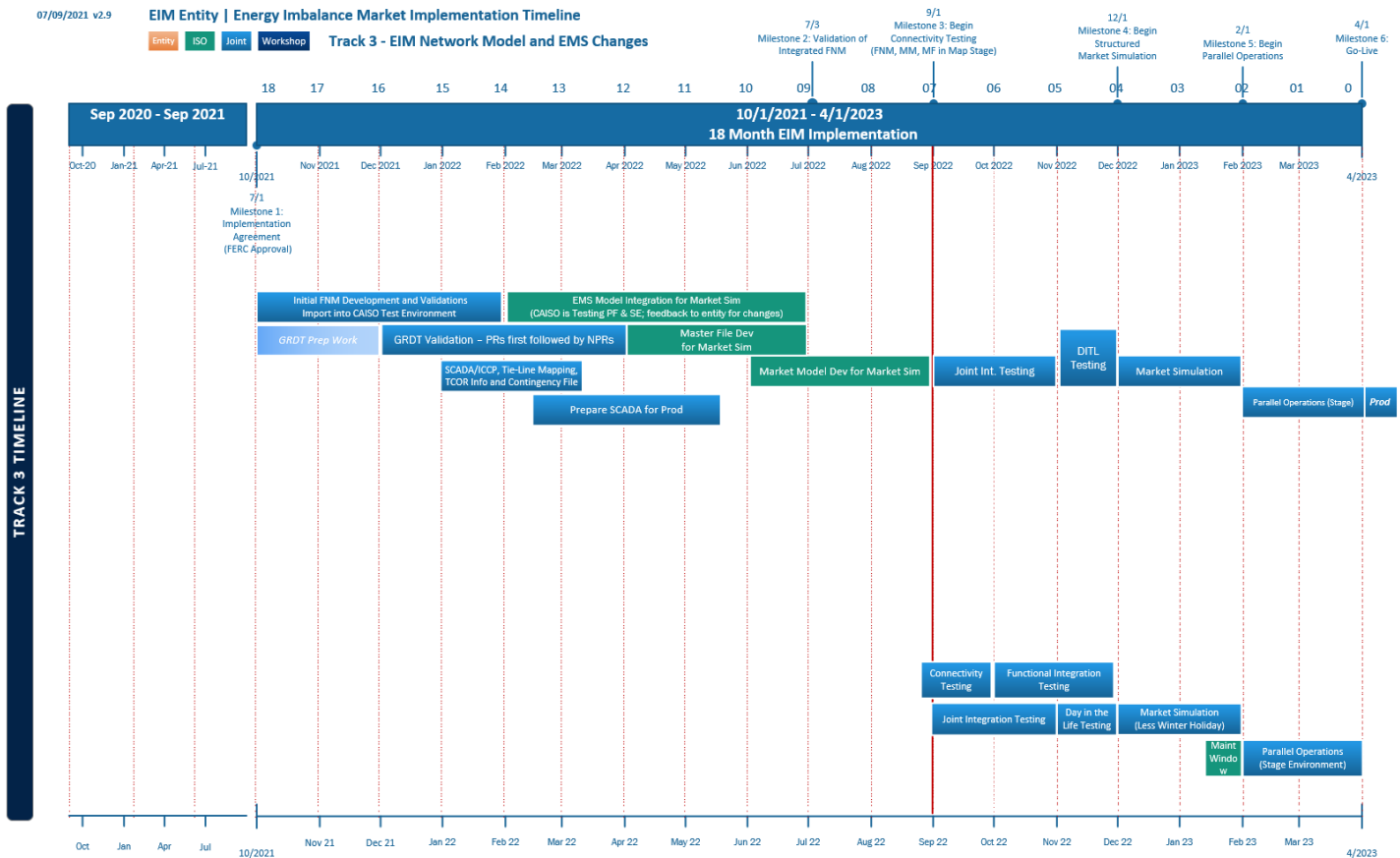
Post-Production, GRDT updates are submitted via Master File UI and IRDT updates are to be submitted via CIDI ticket.


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This document does not supplant the [Business Practice Manual for Managing Full Network Model](#) posted on the ISO public site.

## 4 Track 3 Timeline

The most critical milestone for Track 3 is Milestone 3: successful EIM entity Connectivity Testing in Map Stage. This is the point when the full network model, the market model, and the Master File are all available and validated in the Map Stage environment, allowing joint integration testing to begin between the ISO and the EIM entity. This is a critical milestone as any delays will impact the downstream testing phases, including Mapping Day in the Life testing, Market Simulation, and Parallel Operations. Interim milestones are set to ensure Milestone 3 is met.



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## 5 What to Expect when integrating with the ISO Network Model

Integrating a new EIM entity resource into the ISO FNM takes time, anywhere from eight to ten months, depending on the complexity of the EIM entity's resource configuration, the Common Information Model (CIM) maturity of the EIM entity's model, and resource availability. Below is a summary of how the process works.

### 1. Initial FNM Development and Validation

**Deliverable:** EIM entity model conforms to the CIM schema and data attributes.

**Prerequisite:** EIM entity and, if applicable, its EMS vendor, must understand the CIM 15 or CIM 10 format requirements and the ISO FNM Requirements. It is the responsibility of the EIM entity to understand the CIM format requirements. The ISO FNM Requirements are provided to all entities and are located on the Accellion Kiteworks secure file exchange site and/or RIMS.

**Process:** The EIM entity provides an export of their network model in the standard CIM 15 or CIM 10 format. The requirements that the export must meet are detailed in the EIM CIM Model Requirements document. If a new tool is required to create that extract, the EIM entity is responsible for creating it.


- The ISO modeling team completes an initial validation to ensure that the format is correct and basic requirements are followed before attempting to import it into the ISO test system. The validation is performed with standalone software packages specializing in CIMXML models.
- The ISO will provide written feedback via e-mail. Errors may be export errors, requiring modifications to the export, or data errors.
- The EIM entity team will correct the errors and re-submit for review.
- This could take several iterations depending on the EIM entity's and their vendor's level of familiarity with the CIM 15 format and the ISO requirements.

### 2. Prepare SCADA data file aligning with the CIM Model.

**Deliverable:** SCADA data from the EIM entity that aligns with the validated network model.

**Prerequisite:** The network model has been validated and is frozen.

**Process:** The SCADA file is considered a part of the overall FNM delivery of the model data package which primarily consists of the CIMXML and the SCADA file. The CIMXML file does not contain any ICCP object ID information. This creates a need of getting this data in a separate file which is referred to as the SCADA file. The SCADA file corresponds to the network model (CIMXML file) using the identified columns which must align with the data in the CIM file. The Substation Name, Measurement Name, Unit and the Measurement RDFID data must match with what is presented in the CIMXML file.

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The ISO reviews the SCADA data provided by the EIM entity to validate that the SCADA data conforms to the stated requirements. The measurement associated with the network model should be provided as a SCADA point. If issues are found, they are communicated back to the EIM entity to be resolved.

### 3. Import the EIM entity model into the ISO sandbox environment.

**Deliverable:** The EIM entity model is successfully imported into the ISO test environment without errors and therefore approved by the ISO network model team. This is due in the month T-15.

**Prerequisite:** The CIM model has been validated and the ISO modeling team believes it is ready for the first import into their model and includes individual unit resource ids and aggregation information. The measurement data in the network model must align with the EIM entity's SCADA data associated with the model.

**Process:** The ISO modeling team attempts to import the EIM entity model into their test environment. This process requires processing the model through modeling tools associated with the ISO's EMS and Market systems. This process usually uncovers additional model-related issues and the model is being conformed to stricter validation requirements.

- When errors are identified, the ISO modeling team will provide the EIM entity modeling team with a list of errors and, if known, some insights into what may be causing the problem.
- The EIM entity team will correct the errors and re-submit for review.
- This could take several iterations.
- Once the model is processed through the ISO's modeling tools, the model is considered to be ready for downstream application and processes. This is also the model which will be used during the Market Simulation efforts.


### 4. Track Milestone: ISO approves EIM Entity FNM for Market Simulation (T-15, January of the year before go-live year).

At this point, the Market Simulation model is considered frozen by the ISO as the ISO deployment to MAP Stage begins and changes will likely require re-work on the ISO side. While situations may arise where changes are requested in order to ensure the best Market Simulation testing for the EIM entity, at this point in the process, any requests for changes to the FNM for Market Simulation must be discussed between both the ISO and the EIM entity to determine if the change is reasonable and feasible. This is due to the high potential for rework that may be required by the ISO. The ISO is committed to ensuring a robust and valid Market Simulation.

### 5. Create GRDT.

**Deliverable:** The EIM entity populates the GRDT with the required EIM required data. The resources definitions in the GRDT match the definitions in the Network Model (i.e., the aggregations and names are the same).



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**Prerequisite:** The ISO must approve the FNM for Market Simulation before the GRDT can be completed. However, work on gathering the resource parameters for the GRDT should begin well before the ISO approval of the Network Model.

**Process:** Completion of the GRDT is an iterative process.

- Complete the GRDT computer-based training.
- EIM entity creates a draft GRDT for Participating Resources (PRs), coordinating with the Network Model development, and reviews and iterates with the ISO.
- EIM entity adds Non-Participating Resources (NPRs) to the GRDT, coordinating with the Network Model development, and reviews and iterates with the ISO.

**The EIM GRDT Template:** Available on the [Western EIM site](#).

#### **6. The ISO will integrate the EIM entity’s model for Market Simulation**


Solve power flow using the EIM entity’s model and the rest of the Western Interconnection Model and integrate with the market application, in an open loop fashion. Critical validation of the State Estimator during this time ensures the solution is robust for production. It is anticipated that the ISO and EIM entity will discover issues and need to make changes during this time.

- The Market Simulation testing is “open loop” testing and the ISO will not be executing State Estimator as part of Market Simulation.
- To simulate the starting values which would otherwise be provided by the State Estimator in production, the ISO will need to achieve a reasonable quality power flow and State Estimator solution prior to Market Simulation. If model changes are required to achieve this, the ISO will coordinate with EIM entity and make changes to the EIM entity model. This work will occur around the May of the year before go-live year (T-11) when map stage is being prepared for EIM testing.
- The ISO will notify the EIM entity of model changes (if any) that the ISO modeler had to implement to achieve a robust PF solution. Prior to delivery of the EIM entity cutover Model by the EIM entity, the ISO will export its version of the model, after any changes, perform a compare on the EIM entity area, and provide the EIM entity the updated model in CIM format, similar to what the EIM entity provides to the ISO. This will help ensure that any changes the ISO makes get reflected in the Dry Run and Cutover Models which the EIM entity will later provide.

#### **7. EIM Milestone 2: Validation of integrated FNM in a test environment (T-9, July of the year before go-live year)**


- ISO will develop the Master File based on GRDT for Market Simulation
- ISO will develop the Market Model for Market Simulation

#### **8. EIM Milestone 3: Begin Integration Testing (T-7, September of the year before go-live year)**

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At this point, joint integration testing can begin as the full network model, master file, and market model are available in the Map Stage environment. These are prerequisites for testing most ISO/EIM entity integrations. Before this, only connectivity testing can be conducted.

The ISO will conduct a Contingency Workshop for the EIM entity. Purpose of the Workshop is to identify and address any contingencies that the EIM entity might want enforced in the EIM market for congestion management. Those that may have an impact on the pricing, so the EIM entity can choose to include in the market run. The contingencies are defined only by using switching elements. The switching elements should exist in the CIM model.

 A note about integrating CIM model from the EIM entity into ISO production systems:

Once the ISO team has validated the entity's CIM model and ICCP data, the ISO team discusses with the EIM entity the plans to include the model data into the ISO production systems by merging it with the Western Interconnection Model. The ISO and the EIM entity jointly agree on the schedule of integrating this data into ISO production systems. This date can fall in the T-16 to T-1 month range of the EIM go-live. The merging of the model data into the production systems is dependent on the readiness of the CIM file, ICCP data, EIM modeling considerations and ISO production track testing and readiness.


1. The EIM entity prepares export for Production (cutover model).

At this point, the Parallel Operations and initial Go-Live Production cutover model is considered frozen by the ISO as the deployment process begins to the Stage (Parallel Operations) and Production environments. Any proposed changes could impact the overall production deployment dates and thereby impact the EIM Go-Live. Therefore, any changes requested by the EIM entity must be evaluated at the executive level. The ISO is committed to ensuring a successful Go-Live.

2. The ISO moves the production cutover model to the stage environment for use during parallel operations.
3. The ISO develops EMS model for production (cutover model).

## 6 Cross Team Communication

- The ISO and the EIM entity Track 3 teams will have at least a weekly Track 3 meeting to work through track implementation issues.
- For the EIM entity's implementation, a list of known Network Modeling issues will be maintained by both parties and stored on the Accellion Kiteworks secure file site.

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## 7 Track 3 Key Deliverables

The following are key deliverables that the EIM entity will need to provide the ISO and the expected due dates that have been set to ensure Milestone 3 is met on time.


EIM Track 3 key deliverables checklist:


- CIM File
- Historic load data
  - Weather Stations
  - Historic Load Data - Complete
  - Historical Bad Days - Complete
  - Historical Pumping Stations
  - ICCP Data Points for Load Forecast
  - Daily Forecasts Available (CAISO Deliverable)
- Conforming and non-conforming load for load forecast
- Resource data template (GRDT)
- Intertie resource data template (IRDT)
- SCADA data/ICCP
- JOU / Pseudo Tie template
- Aggregated resource to child mapping
- Aggregate resource breaker status and resource output telemetry
- Contingency file
- TCOR information
- Pnode Coordinates


EIM Entity Deliverable	Timing	Description of Deliverable	Format
<b>Initial Network Model CIM File</b>	T-18 (Oct)	First submission of the EIM entity's network model for ISO review.	XML
<b>Full Network Model for Market Simulation</b>	T-15 (Jan)	<p>Internal EIM entity Model plus pseudo-tied in resources, not including resources in external BAAs that can be uploaded successfully into the ISO system without errors. Market Simulation FNM should include the best representation possible of all currently active and known future resources expected to be registered as participating or non-participating resources within the Balancing Authority and the best known representation of the transmission topology in order to appropriately support robust testing through Market Sim. EIM entity feels will appropriately support their testing through Market Simulation.</p> <p>Resource IDs should be included with the model submissions. If not, then it can be provided as a separate spreadsheet for the ISO to update.</p>	XML

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<b>EIM Entity Deliverable</b>	<b>Timing</b>	<b>Description of Deliverable</b>	<b>Format</b>
<b>Actual Historical Load Data</b>	T-15 (Jan) and after creation of ICCP point	Actual Historical load data to support the ISO load forecasting. This should be 5 years of data at 5-minute granularity. Data to be submitted as interval beginning and in either time zone: Pacific Prevailing Time or Greenwich Mean Time. Non-conforming loads, which are at least 5% of the EIM load, should be removed from the total load calculation. This data should be submitted after the ICCP point has been created with correct calculation. Send to: <a href="mailto:ShortTermForecasting@caiso.com">ShortTermForecasting@caiso.com</a>	Excel
<b>Actual Load Data ICCP Data Points</b>	T-15 (Jan)	Creation of ICCP data point should include correct EIM load calculation, with any non-conforming loads removed from the calculation. Non-conforming load, which is at least 5% of the EIM load, should be removed from the total load calculation.	Excel/XML
<b>Historical Bad Days</b>	T-15 (Jan)	Historical information on Bad Days to support the ISO load forecasting. A day is considered a “Bad Day” when the load behavior acts extremely out of the ordinary and may need to be marked as bad in the historical training. Load behavior affected by sudden changes in weather should not be considered as bad. Format for deliverable is a list of days within the historical data submission which are to be noted once inside the ISO system.	Excel
<b>Historical Demand Response</b>	T-15 (Jan)	Historical information demand response called is requested ensure the load actuals are accurate in absence of demand response event. Please provide in similar format as and alongside historical load data file submission.	
<b>Historical actual pumping loads</b>	T-15 (Jan)	Historical actual pumping loads to support the ISO load forecasting.	Excel
<b>Behind the Meter PV estimation</b>	T-15 (Jan)	Estimation of maximum Behind the Meter solar (rooftop solar) penetration; any outlook on growth for the next couple of years is also welcome.	
<b>Weather Stations</b>	T-15 (Jan)	Weather station information to support the ISO load forecasting. If multiple stations, please provide the weighting for each.	Excel
<b>Non-Conforming Loads</b>	T-15 (Jan)	Remove all NCLs from Historical load dataset and submit individual NCLs to ISO.  See the <a href="#">CAISO EIM Non-Conforming Load FAQ</a> .	
<b>Pseudo-Ties</b>	T-15 (Jan)	Identification of the Pseudo-Tie generation and load scenarios for modeling consideration in the FNM	Excel

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EIM Entity Deliverable	Timing	Description of Deliverable	Format
<b>JOU Units</b>	T-15 (Jan)	Identification of the Jointly Owned Units (JOU) scenarios for modeling consideration in the FNM	Excel
<b>Aggregated resource breaker status and resource output telemetry</b>	T-14 (Feb)	Aggregated resource breaker status and resource output telemetry is required as supplemental information when the SCADA is delivered.	Excel
<b>SCADA associated with FNM (for Market Sim)</b>	T-14 (Feb)	<p>SCADA is to be provided along with the network model submissions starting when the model is approved. A SCADA template has been provided and can be found on the Accellion site.</p> <p>💡 If a few SCADA points can be provided earlier to “operationally test” the ICCP link, that would be helpful, and the EIM entity will work to provide these.</p>	Excel
<b>Contingency File</b>	T-13 (Mar)	This is the list of Contingencies that the EIM entity might want enforced in the EIM market for congestion management. Those that may have an impact on the pricing, so the EIM entity can choose to include in the market run. The contingencies are defined only by using switching elements. The switching elements should exist in the CIM model. The contingencies should not drop any load or generation (see examples below). Contingencies will be identified and addressed during the Contingency Workshop.	Excel
<b>TCOR Information Sheet</b>	T-13 (Mar)	<p>TCOR (Transmission Corridors) a.k.a. Branch Groups: These are the physical Transmission Corridors that the EIM entity might want enforced in the EIM market for congestion management. A transmission corridor is a group of flowgates grouped together for aggregate flow monitoring. A familiar example would be WECC paths.</p> <p>💡 See deliverable examples in <a href="#">section 8</a> of this document.</p>	Excel
<b>Initial Resource Data Template (for Market Sim) - Approval</b>	T-13 (Mar)	Initial GRDT (Generation Resource Data Template) for expected participating resources for Market Simulation. Iterations will be worked in parallel with the development of the Network Model. Can be submitted once the Network Model is clean and close to being approved. Submit to <a href="mailto:mrtu_rdt@caiso.com">mrtu_rdt@caiso.com</a> .	Excel

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EIM Entity Deliverable	Timing	Description of Deliverable	Format
<b>EIM interchange definition</b>	T-13 (Mar)	All data elements related to interchange, including Tie, ETSRs, Ghost resources, Mirror resources, and ITCs (if any).	Excel
<b>Aggregated resource to child resource mapping</b>	T-12 (Apr)	The ISO requires a mapping of any aggregated resources to the child resources ideally when the initial GRDT is delivered.	Excel
<b>AC Line segment – From/To substation list</b>	T-12 (Apr)	AC Line segment information is required before the ISO starts building the EMS database and before the SCADA goes into Production.	Excel
<b>GRDT – all participating and non-participating resources (for Market Sim) - Final</b>	T-12 (Apr)	Final version of the GRDT ( <a href="#">Generation Resource Data Template</a> ) with all participating and non-participating resources expected to be available for Market Simulation Testing.  At this point, configuration and parameter changes will be allowed up to 2 weeks before Map Stage is available. No changes to parent/child relationships, or any changes that will not align with the model or submitted SCADA.	Excel
<b>IRDT - Intertie Resource Data Template</b>	TBD	The EIM entity will provide the following information in the <a href="#">Energy Imbalance Market Interchange Definition Template</a> (IRDT Template): <ul style="list-style-type: none"> <li>• EIM interchange definition including:</li> <li>• Tie and scheduling points mapping</li> <li>• EIM Transfer</li> <li>• Mirror Resources</li> <li>• ITC for ETSRs</li> </ul>	Excel
<b>Pnode Coordinates</b>	T-10	When the final cutover model is submitted, the ISO need the coordinates of the Pnodes for the ISO Today interactive mobile application that includes expanded price maps for the EIM territory and fifteen minute market. If Pnode coordinates are not available, then the coordinates of the substations will suffice.	Excel

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EIM Entity Deliverable	Timing	Description of Deliverable	Format
<b>Full Network Model for Production</b>	T-5 (Nov)	Full Network model submission that will be the final production model for parallel operations and go-live. This model must include all facilities that will be in-service at the time of Go-Live through the next scheduled FNM update in Production. The EIM entity is expected to provide ongoing Network Model updates beyond this Network Model in accordance with the Network Model schedule as described on the CAISO website: caiso.com > Market Operations > Network and Resource Modeling. <a href="http://www.caiso.com/market/Pages/NetworkandResourceModeling/Default.aspx">http://www.caiso.com/market/Pages/NetworkandResourceModeling/Default.aspx</a> .	XML

## 8 Track 3 Deliverable Examples

### TCOR data:

- The TCOR are directional elements with a defined FROM\_END designated by the FROM\_STATION. In addition, there is also From and To limit data for the TCOR.

The Company, Zone, Station and Equipment names provided to the ISO should align with the names in the model file.

BG_NAME	EQTYP	From Company	From Zone	From Station	Voltage	EQNAME
PathName	XFMR	BPAT	BPA-43	CLATSOP	230	XFMR1
PathName	LINE	BPAT	BPA-43	TILLAMOK	115	LINE1
PathName	LINE	PACW	PACW-67	ASTOTAP	115	LINE2
PathName	LINE	BPAT	BPA-43	ALLSTON	500	LINE3
PathName	LINE	PACW	PACW-67	MERWIN	115	LINE4

### Contingency data:


The Station and Equipment names provided to the ISO should align with the names in the model file.

Contingency Title	Station	Equipment Type	Voltage	Action	Description
Contingency 1	SubName	CB	500	CL	Switch1
Contingency 1	SubName	CB	500	OP	Switch2

Owner: Morris, Janet

Program Management Office



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Contingency Title	Station	Equipment Type	Voltage	Action	Description
Contingency 1	SubName	DIS	500	OP	Switch3
Contingency 1	SubName	CB	500	OP	Switch4
Contingency 1	SubName	CB	500	OP	Switch5
Contingency 1	SubName	DIS	500	OP	Switch6
Contingency 1	SubName	CB	500	OP	Switch7

**Historical Load Data:**

- Date (Interval beginning) – where 0:00 represents the interval 0:00 to 0:05)
- Historical Load - Average 5 minute Load
- DR MW - Demand Response MW called for that interval, if any

Date (interval beginning)	Historical Load	DR MW
1/1/2013 0:00	1121.32	0
1/1/2013 0:05	1090.12	0
1/1/2013 0:10	1100.12	0
1/1/2013 0:15	1071.32	0
1/1/2013 0:20	1081.32	0
1/1/2013 0:25	1050.12	0
1/1/2013 0:30	1060.12	0
1/1/2013 0:35	1031.32	8
1/1/2013 0:40	1000.12	15
1/1/2013 0:45	1010.12	4
1/1/2013 0:50	981.32	0
1/1/2013 0:55	950.12	0
1/1/2013 1:00	960.12	0



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## 9 Things to Consider

### Track 3 general considerations

1. Determine the EIM entity’s overall resource and modeling strategy and the implications on the market. This should include a strategy meetings/discussion with the ISO subject matter experts.

### Full Network Model

2. Model only the EIM entity resources, not external resources.
3. The EIM entity is responsible for including the Resource ID in the FNM in the correct format.

#### Resource ID naming (24 characters max)

The resource ID naming convention is based on substation name, voltage code and Unit name.

**SSSSSSSS\_V\_UUUUUUUUUUUUU**

Where:

SSSSSSSS => Maximum 8 character station name.

One underscore

V => Voltage code (1 character)

One underscore

UUUUUUUUUUUUUUUU => Maximum 13 Character Unit name.

Voltage Codes at the point of delivery (high side of XFMR)

D DC

5 500 - 400 (e.g. 500)

3 399 - 300 (e.g. 345)

2 299 - 200 (e.g. 230, 220)

1 199 - 100 (e.g. 161)

6 99 - 60 (e.g. 69, 66)

7 59 and below

X Devices with no voltage


Individual resources ID:

HARQUA\_5\_CTG1

HARQUA\_5\_CTG2

HARQUA\_5\_CTG3

HARQUA\_5\_STG1

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HARQUA\_5\_STG2

HARQUA\_5\_STG3

Aggregate resource ID if SC choose to bid in as an aggregate:

HARQUA\_5\_UNITS

4. For Aggregated resources, Resource IDs must be provided for both aggregated and child resources.
5. The Market results are sensitive to the BA (Balancing Area) boundaries. Ensure that equipment (loads, gens, tie lines) are represented correctly in the BA they belong for the EIM entity's BA model.
6. Provide as much information regarding any Jointly Owned Units as possible (i.e. Shares, Resource ID for the Share, Telemetry data for the share, etc.). Shared resources may need special modeling considerations and are usually discussed in detail.
7. Model tie-lines accurately. The tie lines (including spanning transformers that span two BAs) act as boundaries between BAs.
8. The Market Simulation Model should be as close to production as is possible this early in the process. Some changes are expected for the cutover model (new or removed resources, aggregation adjustments, etc.). The Market Simulation model should, however, include a representation of all possible types of resources that can be expected in production, to ensure validation is thorough. This is the model that is being approved by **Track Milestone: ISO approves EIM Entity FNM for Market Simulation.**
9. Modeling changes after **Track Milestone: ISO approves EIM Entity FNM for Market Simulation** has been met must be made collaboratively between the EIM entity and the ISO FNM team.
10. The ISO highly recommends that the EIM entity have some kind of tool to help evaluate and validate their FNM submissions. The ISO uses CIMSpy, but the EIM entity can use whatever tool they choose.
11. Once the ISO accepts the EIM entity's model, the ISO integration process begins to import the model into the ISO tools, integrate the model into the ISO systems and aligned with the SCADA.
  - Topology changes may not be made to the model at this point.
  - Further EIM entity exports will not be imported into the ISO tools. (The EIM entity will provide monthly updates for validation purposes.)
  - Issues may be identified during this integration process. The ISO may opt to make manual data type changes to reduce turnaround time. The EIM entity will be responsible for ensuring these changes are incorporated into the final cutover model and future model submissions.
    - The ISO will track observed issues and changes and communicate them to the EIM entity for incorporation into the cutover model.


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- Prior to the SCADA going into production, the ISO will conduct initial validation of the full network model and import the model into the ISO system. After that, stitching and validation with the EMS will be conducted.

### SCADA data

12. ICCP connection can be established early in the process to ensure there are no issues.
13. Once an IT validation of the ICCP feed is established, an operational verification is desirable. The ISO would like the following SCADA points prior to the delivery of the complete list:
  - Total Solar, Total Wind, Total Dynamic schedule, Net Schedule Interchange, Area Control Error, BA generation, BA Interchange, BA Load. The EIM entity will work to provide these along with the Network Model.
  - SE Values – BA SE generation, BA SE Interchange, BA SE Load, BA SE Loss, BA SE negative generation, BA SE negative load, and BA SE pump load. The EIM entity does not currently have SE running so cannot provide these at this time.
14. The timing of the first submission of the entire list of SCADA points should be after the complete full network model has been submitted and the model is fairly clean.
15. An initial draft SCADA data file can be submitted earlier if file format validation is required by the ISO or requested by the EIM entity. Specific data points are helpful for this early submission, including: System load, Generation, Interchange, SE calculated load and generation for example. The EIM entity does not currently have SE running so cannot provide these at this time.
16. The SCADA (subname/pointname/engineeringunit combination) must match those that are in the Model.
17. SCADA data provided to the ISO should only include the SCADA that is linked in the EIM entity model.
18. Duplicate Measurements (subname/pointname/engineeringunit) in the SCADA file will throw errors in the ISO processes and will need to be corrected. Duplicate measurements can occur if the ISO has a model already in our network model from another source.
19. ICCP object id should not contain any characters that are not valid See the EIM Network Model Requirements documents for a complete list of invalid characters.
20. If possible, provide a “Before” and “After” file showing any rename or relinking – any combination subname change point name change Engineering Unit change and or ICCP ID change.
21. MW and MVAR telemetry on all generating units in the EIM entity’s BA are expected to be linked in the network model if it impacts the solution quality.
22. Full telemetry is required for all VER resources.

### Resource Data Template and Master File

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23. The EIM entity team responsible for submitting GRDT are required to take the associated GRDT Computer Based Training before their first submission.
24. The timing of the first GRDT submission should be after the complete full network model has been submitted and the model is fairly clean.

**Forecast Data**

25. Before submitting the load forecast deliverable, a joint meeting will be held to ensure the EIM entity is aware of what is required. The dataset should cover five years, indicate BA Load, EIM Load, and aggregate NCL. Below is an example of how the data should be organized. The data should be compiled in Excel format and delivered to the ISO via upload to the EIM entity’s Kiteworks secure file sharing site in the Track 3 folder.


region_load	interval_begin	interval_end	Total Load (MWs)	EIM load (MWs)	Non-conforming load
Utility XYZ	1/1/2016 0:00	1/1/2016 0:05	1000	900	100
Utility XYZ	1/1/2016 0:05	1/1/2016 0:10	1000	900	100
Utility XYZ	1/1/2016 0:10	1/1/2016 0:15	1000	900	100
Utility XYZ	1/1/2016 0:15	1/1/2016 0:20	1000	900	100

Additional points to consider when compiling the historical load dataset:

- Historical data should start on January 1st to the current date (after ICCP point is developed)
- EIM load column represents the load that the EIM entity plans to include in its load forecast
- Total load should be the sum of the EIM load and non-conforming load
- The submission should be in Excel format where each sheet represents one year of data
- A list of dates for bad data dates should be provided (not individual intervals)

26. When submitting the load data submission, be sure to include the following:

- Which are conforming versus non-conforming loads
  - ☛ See the [CAISO EIM Non-Conforming Load FAQ](#).
- Demand Response information
- Who you intend to use as your VER Forecast provider

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## 10 Production: Moving to the Full Network Model Process

After the integration of the EIM entity’s model into the ISO FNM production model, the EIM entity is expected to follow the scheduled network model processes and timelines discussed in the [Managing Full Network Model BPM](#) and posted in the FNM Schedule to provide timely updates for the model to the ISO. Network model updates occur approximately monthly, but the timing may vary.

The updates include, but are not limited to:

- New and incremental transmission topology updates
- Implementation of new, changes to existing, or removal of retired generation
- Corrections to the model

**Production Process Review:** When the model is close to being implemented in Production prior to EIM Go-Live, the ISO will schedule a transition meeting, which includes both the ISO and EIM entity team members who will be responsible for processing updates after model for EIM Go Live is implemented into production. This session is intended to review the process, and create a handoff from onboarding to regular Production processes. The processes have been put in place to support consistency in communications of changes between the EIM entity and the ISO, and the EIM entity should evaluate and make adjustments to their processes to meet the timelines and requirements.

At this point:

- Changes should be submitted following the production processes and timelines:
  - Leverage resources found on Western EIM Site > [Resources](#) under “Integrate with ISO Full Network Model”:
    - Full Network Model Schedule
    - Model Submission Checklist (CIM Model Tab & EIM Gen Checklist for model and resource setup)
    - NPR/PR Onboarding Procedure (SC setup for new or transferred resources)
- All changes submitted into RIMS should have a partner Network Scope document which describes the changes to the ISO Team for clarity (i.e. adding new Sunny Gen, or double modeling new X-Y 500kV transmission line).