



ITP ECONOMIC MODEL DATA REQUESTS

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SECTION 1: OVERVIEW

OBJECTIVE

The objective of this ITP document is to formalize the economic model data guidelines and submission process. This document contains details pertaining to all data requests sent out to Stakeholders for feedback during the ITP assessments.

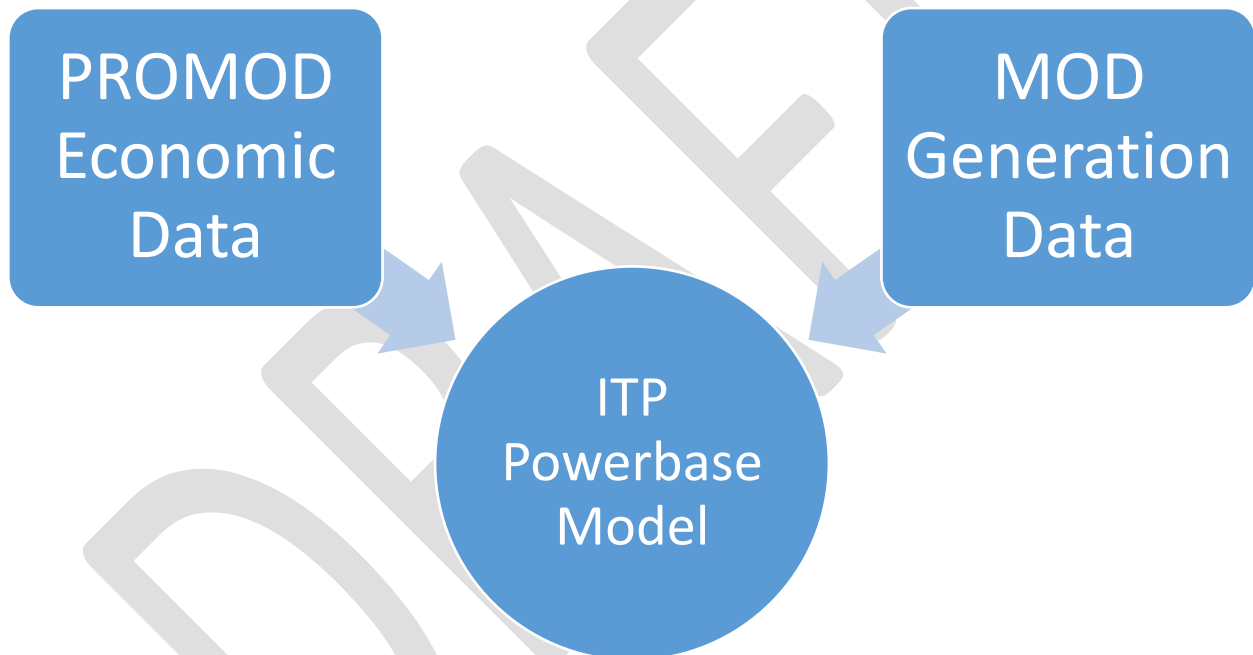
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SECTION 2: ITP DATA REQUESTS

This section details the Economic Model data requests that occur as part of the ITP assessment process.

GENERATION REVIEW

The purpose of the Generation Review is to update the generation data to be used in the current ITP study. The Generation Review begins with the economic modeling data provided in the simulation ready model obtained from the third-party vendor. Stakeholders are given several opportunities throughout the duration of the milestone to review the data in the Generation Review and provide feedback.



Stakeholders are given the opportunity to make updates to various existing generating unit parameters. These parameters are contained within the yellow highlighted tabs in the Generation Review Workbook. Each tab is detailed below:

- **Economic Gen Data:** The generation data contained in the 'Economic Model Gen' tab includes area assignments, maximum capacities for the current study years, commission and retirement dates, and economic generator name to powerflow AC machine mapping for both conventional and renewable generating units.
 - **Area:** The area in this tab is area in which the generating unit is *physically* located, which may or may not be the area that owns and/or operates the generation unit.

- **Commission Date:** The commission date in which the generation unit went in to service. Commission date updates provided by stakeholders in the Generation Review should be consistent with the retirement dates being implemented in the corresponding powerflow models. *It is the responsibility of the stakeholder to ensure the data is consistent between the data submitted in the Generation Review to be used in the economic model and the corresponding powerflow models.*
- **Retirement Date:** The retirement date is expected date in which the generation unit will no longer be in service. Retirement date updates provided by stakeholders in the Generation Review should be consistent with the retirement dates being implemented in the corresponding powerflow models. For example, if a stakeholder submits a unit retirement of 2021 in the 2019 ITP, that unit must also be retired in the 2021 and beyond powerflow models being used in the 2019 ITP. *It is the responsibility of the stakeholder to ensure the data is consistent between the data submitted in the Generation Review to be used in the economic model and the corresponding powerflow models.*

Future specific retirements are determined during the Scope development for the ITP assessment. Study Scope defined Future specific retirement dates will be added to the Generation Review once the Futures have been approved by the appropriate working groups.

- **Annual Maximum Capacity:** The maximum capacities in this tab of the Generation Review are the *net* capacity of each plant as provided in the vendor data reference case. These columns are provided for reference only. Any annual maximum capacity updates should be addressed in the “Annual Operation” tab of the workbook.
- **Powerflow Model Mapping:** Generator AC mappings are based on the latest pass of the ITP powerflow models by year. Bus mapping updates provided by stakeholders in the Generation Review should be consistent with the bus mappings being implemented in the corresponding powerflow models. *It is the responsibility of the stakeholder to ensure the data is consistent between the data submitted in the Generation Review to be used in the economic model and the corresponding powerflow models.*
- **Ownership:** An annual representation of the ownership of each generation unit. Ownership in this tab should reflect all generator owners and unit/plant specific sales to other companies. Unit-specific power purchase agreements (PPAs) are also reflected in this tab. Ownership will not vary within a study year. If a contract or PPA expires during year two (Y2), year 5 (Y5), or year 10 (Y10) for that particular study, the ownership will be reflective of the status at the beginning of the study year. For example, if a stakeholder submits a PPA expiration that occurs in October of Y5, the ownership will not change for that unit until the next calendar year.
 - **Accreditation:** Resource accreditation percentages by owner for both conventional and renewable generation. The default accreditation data is based on stakeholder submissions from previous studies or the SPP criteria accreditation methodology specified for resources without 3 years of historical or site specific measured data.
 - **Renewable PPA:** This column identifies if the ownership information is reflective of unit/plant specific purchase or sale. This will be used to identify wind and solar

- units which have fixed-contract prices, such as PPAs for implementing the Renewable Pricing methodology in section 2.2.1.10 of the ITP Manual.
- **Firm Service** – Firm Service assumptions with PPA unit specific or otherwise. The firm service amount should be in accordance with the firm power definition in SPP Planning Criteria 4.1.2.
 - **Hydro Unit Ownership:** This tab details the monthly allocation of each hydroelectric generation units per demand group. The monthly allocation for each hydroelectric unit is calculated as a monthly ownership per demand group to be applied for all study years. Monthly energy allocations to contract customers are necessary to calculate the hydro fleet ownership.
 - **Fleet PPAs:** Fleet PPA information is also requested during the Generation Review as an input for the Resource Plan milestones. Capacity submitted through this data request will affect the resource planning effort. Capacity Accreditation will result in a decrease in accredited capacity from the Source Zone and an increase in accredited capacity to the Sink Zone. Load Reduction will result in a decrease in load obligations for the Sink Zone and an increase in load obligations for the Source Zone. This information is not provided in the third party vendor data and must be updated by stakeholder submittals.

Stakeholders are also given the opportunity to review existing generation parameters in the vendor reference case. Typically no changes are made to these vendor data items in order to maintain consistent modeling methodology among the SPP footprint and neighboring areas. However, changes necessary for reasonable model behavior will be evaluated and coordinated with stakeholders during the Economic Model Build milestone. These vendor data parameters are contained in the green highlighted tabs in the Generation Review workbook. Each tab is detailed below:

- **Variable O&M:** Any costs (\$/MWh), exclusive of fuel or emissions, which are incurred according to the amount a generator is dispatched.
- **Fixed O&M:** The operating costs (\$/kW-Year) that a generator will incur regardless of how much it is dispatched.
- **Must Run:** This flag is set for any generator which constantly creates energy, regardless of its placement in the energy bid order. This is not used as a reliability must run (RMR) flag. PROMOD will commit any unit assigned must run status for every hour of the year at a least minimum capacity (and potentially higher, based on the SCUC/SCED), unless out for maintenance. Must run status methodology is determined during the Scope development for the ITP assessment. This information is incorporated into the Generation Review once the items have been approved by the appropriate working groups. Exceptions have been allowed in the past; those exceptions would be requested during a specific pass of the Generation Review and presented to the appropriate working groups.
- **Annual Maintenance Hours:** The number of hours a generator must be unavailable each year for maintenance. This information is utilized by PROMOD to create maintenance schedules for generation in the SPP region. Forced outages are not included in this parameter.
- **Minimum Run Times:** The minimum number of hours that a unit must run (operate), excepting cases of forced outage, once the unit has been brought on line.

- **Minimum Capacity (%):** The lowest capacity at which a generator will operate. The minimum capacity is input as a percentage of the maximum capacity.
- **Effluents:** The emission(s) that a generator might release.
- **Effluents (% Removed):** This input describes the effectiveness of a scrubber or some other mechanism for reducing emissions. A value of 0% would indicate that the scrubber has no impacts while a value of 100% means that the scrubber eliminates all of the effluent.
- **Fuel Forecast Usage:** The data in this tab contains the fuel usage designated in the vendor reference case data for each conventional generator. The fuel category and average heat content are typically provided for reference.
- **Hydro Energy Limits:** This tab contains the annual (MWh) and monthly (%) energy usage for conventional and pumped storage hydroelectric generators. The maximum capacity (MW), annual energy (MWh), and monthly energy limits (%) for conventional hydro units in this tab are from the vendor reference case data. The capacity factor for conventional hydro units is calculated using the maximum capacity and annual energy data from the reference case. The default maximum capacity setting for pumped storage hydro units is the “Energy Reservoir Energy (MWh) parameter from the vendor reference case data.
- **Heat Rates:** The efficiency of a generator to convert chemical energy into electrical energy. This input should represent the average heat rate (MMBtu/MWh) of a generator at its maximum capacity. Additional details are provided in the “Annual Capacity Adjustment Process” section.
- **Capacity Segments:** Capacity segments are utilized in PROMOD to define the operating points between the minimum and maximum capacities. Additional details are provided in the “Annual Capacity Adjustment Process” section.

Annual Capacity Adjustment Process

The “Annual Capacity” tab contains all data necessary to determine the annual maximum capacity of each generating plant. Annual maximum capacity should be representative of the highest rated annual net capacity of the plant, regardless of season and ownership. If the maximum capacity of the generator varies over the course of a year, an annual max cap profile may be specified to modify the monthly values. The values initially provided for the maximum capacity and max cap profiles is from the vendor reference case data.

In order to maintain consistency with the PROMOD implementation of maximum capacities and max cap profiles, any adjustments submitted for these parameters must also include updates to the heat rate, heat rate profiles, and capacity segment parameters. The heat rates and capacity segments are directly correlated to the maximum capacity of each plant, and will need to be adjusted for any proposed changes to maximum capacities and/or max cap profiles.

Waiver and Resource Addition Request (RAR) Process

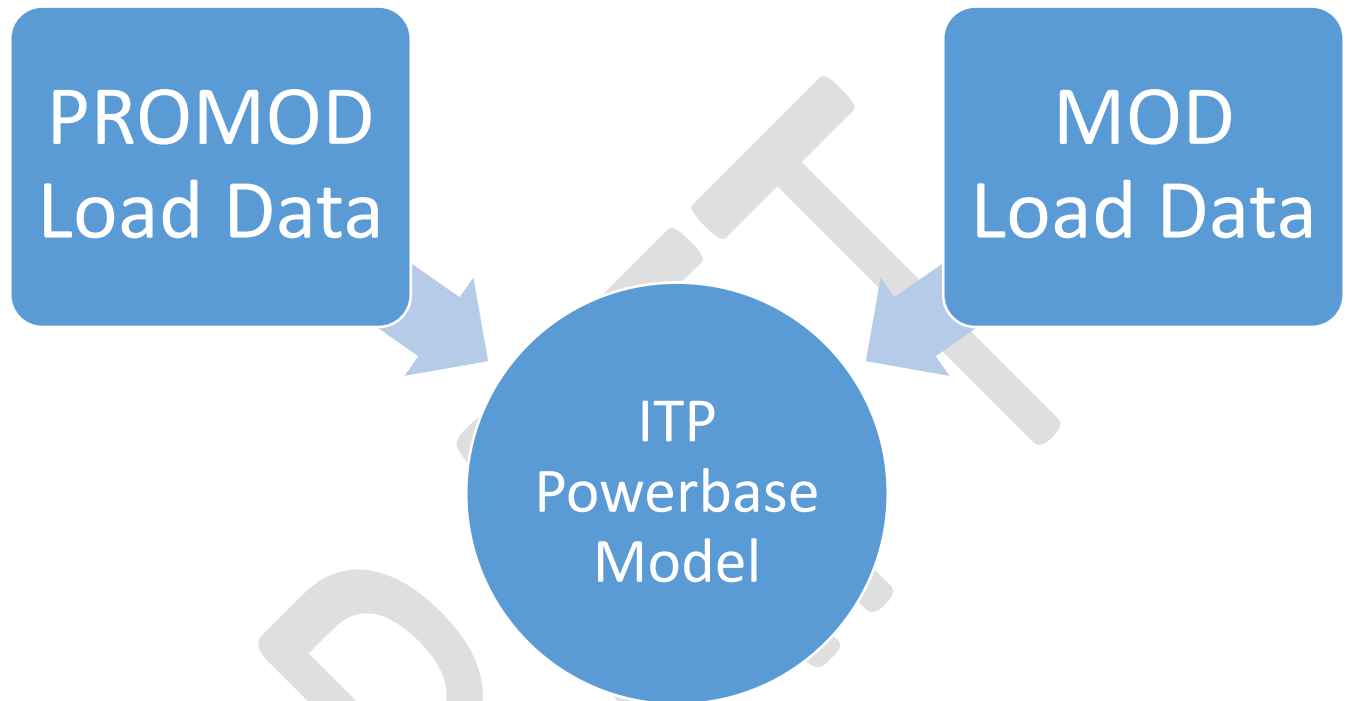
Stakeholders and other interested parties (i.e. developers) may request the addition of generation resources that do not meet the inclusion criteria as outlined in the ITP Manual. In order for resources to be considered for inclusion, a request must be made to SPP. There are two different types of requests for inclusion: the waiver process for the base reliability powerflow models, and the Resource Addition Request (RAR) process for the economic models.

- **Base Reliability Models:** To be included in the base reliability powerflow models, generation resources submitted as part of the waiver request process must meet the criteria outlined in the ITP Manual Section 2.1.1.1. Waiver requests meeting this criteria will, by definition, be automatically approved for inclusion. If a waiver request does not meet this criteria, additional data must be provided as part of the Waiver request. The member or interested party must also seek TWG approval of the Waiver request.
- **Economic Models:** To be included in the economic models, generation resources submitted as part of the RAR process must meet the criteria outline in the ITP Manual Section 2.2.1.4. RARs meeting this criteria will, by definition, be automatically approved for inclusion. If a RAR does not meet this criteria, additional data must be provided as part of the RAR. The member or interested party must also seek ESWG approval of the RAR.

SPP Staff will send a Waiver and RAR request template to stakeholders and other interested parties during the Generation Review milestone to solicit for inclusion submissions. The data submitted in this request will be used to determine the generation resource inclusion requests to be added to the appropriate model(s). *It is expected that stakeholders or interested parties will present any requests not meeting the “automatic” inclusion criteria to the appropriate working groups for approval.*

LOAD REVIEW

The purpose of the Load Review is to update the load data to be used in the latest ITP study. The Load Review begins with the most readily available ITP powerflow model. Stakeholders are given several opportunities throughout the duration of the milestone to review the data in the Load Review and provide feedback.



The green tabs in the Load Review workbook contain load information derived from either the latest ITP powerflow models, or the vendor data reference case. Any stakeholder updates provided to the information in the green tabs that would necessitate a powerflow model change should also be submitted as an update to the ITP powerflow models. Typically no changes are made to vendor data items in order to maintain consistent modeling methodology among the SPP footprint and neighboring areas. However, changes necessary for reasonable model behavior will be evaluated and coordinated with stakeholders during the Economic Model Build milestone. . Each tab in the Load Review workbook is detailed below:

- **Economic Load Ownership Legend:** This tab details the load characteristics in the powerflow (i.e. owner number) that identify which demand group in which to assign each individual bus loads in the powerflow. This legend is typically updated by SPP staff prior to the initial posting of the Load Review. *Any stakeholder updates provided to the information in this tab that would necessitate a powerflow model change should also be submitted as an update to the ITP powerflow models.*
 - **Demand Groups:** A demand group is a group of loads with a unique hourly load curve profile and annual energy requirements (non-conforming loads do not follow hourly profile, e.g. generator station service loads) that are “owned” by a common

company or companies. Demand groups are utilized by PROMOD to map loads that utilize a specific hourly load shape to a PROMOD Area. Demand Groups do not necessarily have to be a PROMOD Area and PROMOD Areas can have more than one Demand Group. Demand Groups modeled in PROMOD will have losses applied.

- **PSEE-PROMOD Load Mapping:** This tab contains the individual bus loads without losses in the latest ITP powerflow, and their corresponding demand group assignments based on the information in the “Economic Load Ownership Legend.”
 - **Scalable Loads:** Included in this tab are scalable and non-scalable flags based on the latest ITP powerflow models; loads marked with a "1" are scalable (conforming) and loads marked with a "0" are non-scalable (non-conforming).
 - **Station Service Loads:** Also included are station service load flags based on the latest powerflow models; loads marked with a "1" are station service loads and loads marked with a "0" are not station service loads. All station service loads should be set to “0” or “Off,” and are not included as part of the peak load totals for demand groups. Station service loads will be turned on during DC/AC conversion for units online in BA Economic Dispatch. Dispatch amounts will be increased by the applicable station service load amount in the BA models.

Any stakeholder updates provided to the information in this tab that would necessitate a powerflow model change should also be submitted as an update to the ITP powerflow models.

- **Peak Load:** Peak load totals in this tab are a sum of the individual loads within a demand group for each study year, and are without losses. Each demand group is identified as a winter- or summer-peaking system, and the peak load totals for each demand group are reflective of that season. The non-study year peak totals are interpolated between each study year. The peak load value for the last year, typically year twenty (20) is calculated using a trend of the years from the first powerflow to the last powerflow. The remaining years (years eleven (11) through nineteen (19)) are interpolated between the last year of powerflow data and the final trended year data. Peak load values for years 11-20 are used in the Resource Planning milestone. *Any stakeholder updates provided to the information in this tab that would necessitate a powerflow model change should also be submitted as an update to the ITP powerflow models.*
- **Monthly Peak and Energy:** The monthly peak values should represent a typical percentage of annual peak load that is reached in each month. These values are used as a multiplier for each month. The monthly energy values should represent the percentage of the annual energy that would be expected to be consumed during each month. These values should sum to 1 for the year. These numbers are based on demand group data provided in the vendor data reference case, and will not be adjusted unless properly justified.
- **Annual Load Factor:** The annual load factor is used to calculate annual energy requirements for each demand group as an input into PROMOD. The typical formula to determine annual load factor is as follows:

$$\text{Annual Load Factor} = \frac{\sum \text{Hourly Loads (MWh)}}{\text{Hours in Year (h)} \times \text{Peak Load (MW)}}$$

If updated data is not provided to SPP staff, the default value will be used. This default value for each demand group is calculated using the hourly profiles provided in the vendor data reference case.

- **Annual Loss Factor:** The annual loss factor is used to calculate the peak load with losses for each demand group as an input into PROMOD. These load totals are used for all annual hourly simulations. If updated data is not provided to SPP staff, the default value will be used. This default value for each demand group is based on information provided by stakeholders in previous studies.

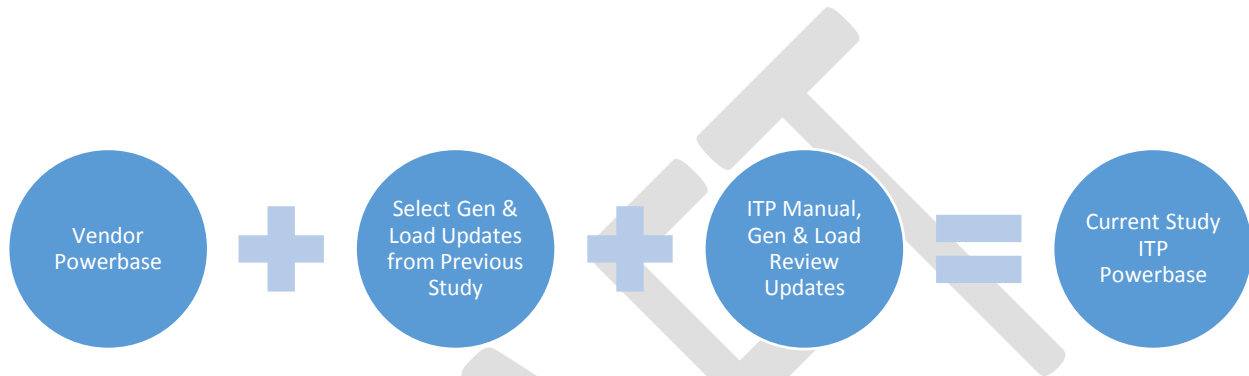
Resource Plan Load Forecasts

SPP staff recognizes that stakeholders may implement an alternative load forecast for resource planning purposes. If approved by the ESWG, SPP staff will request no-loss aggregate busload projections for controllable, curtailable load as part of the Load Review milestone. This alternative forecast will be used only during the Resource Plan milestone of the ITP Study.

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ECONOMIC MODEL BUILD

The purpose of the Economic Model Build is to produce simulating models that represent the Economic Model details outlined in the ITP Manual and ITP study-specific scope. The Economic Model Build begins with the latest simulation ready model obtained from the third-party vendor, and incorporates applicable updates from the ITP Manual as well as the Scope, Load Review, Generation Review, Resource Plan, and Siting milestones.



Stakeholders are given multiple opportunities throughout the duration of the milestone to review the data in the Economic Model(s) and provide feedback. Each posting of the Economic Model Build incorporates updates from stakeholder feedback, SPP staff quality assurance and model validation, approved powerflow changes and/or updates, and completed milestones. Each pass includes any necessary workbooks with corresponding data (i.e. Load Review workbook), a detailed summary of changes/updates since the previous pass, and any applicable PROMOD input files (i.e. .lib file). Stakeholders are asked to provide feedback on the PROMOD implementation and/or application of approved methodologies, accuracy of changes implemented between passes, and any potential errors in the PROMOD scenario(s). The typical review period for providing feedback for each posting of the Economic Model Build is two (2) weeks.

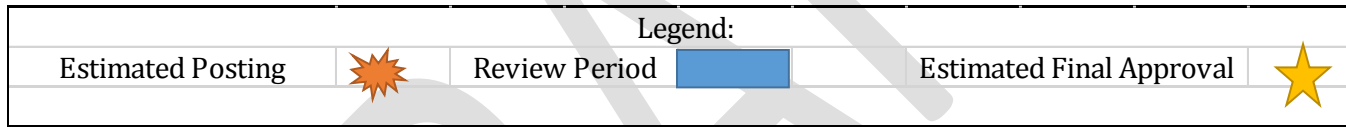
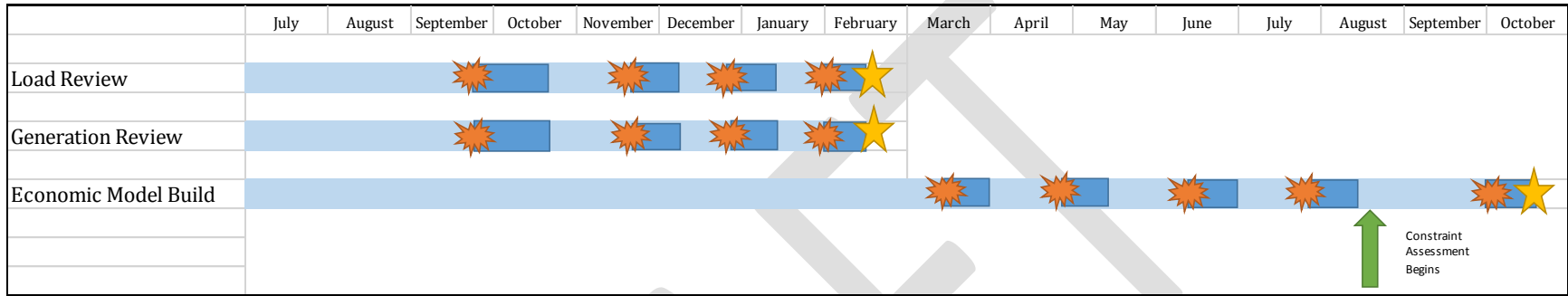
SECTION 3: FEEDBACK PROCESS

Data requests will be posted to the appropriate folder(s) GlobalScape for stakeholder review. An email providing the details of the data request will be sent to each company's central point of contact (CPOC). The CPOC should then pass along any data requests to the appropriate personnel within their company. All stakeholder feedback is to be submitted to SPP via the Request Management System (RMS). SPP staff will also correspond and/or coordinate with any stakeholder providing feedback through RMS.

Any updates or changes requested after milestone approval will be subject to Section 9.3 of the ITP Manual.

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SECTION 4: SCHEDULE



All dates are subject to change based on schedules developed during each ITP study.