DOCKETED

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RPS Calculator (v6.0+)

RETI 2.0 Plenary Group Meeting

1/29/16

Overview

1. RPS Calculator and Planning Processes at CPUC
2. Overview of RPS Calculator Functionality
3. RPS Calculator Sample Results

RPS CALCULATOR AND PLANNING PROCESSES AT CPUC

RPS Calculator Provides Inputs for the Long Term Procurement Plan Proceeding*

- Annual Assumptions and Scenarios (A&S) document defines parameters to be used in modeling performed to assess long term procurement needs for load under CPUC jurisdiction
- One type of modeling input is the portfolio of renewable resources online in the study year for each defined scenario
- RPS Calculator** is an Excel-based planning tool used to generate a plausible portfolio of renewable resources
- RPS Calculator selection algorithm is based on Least Cost Best Fit framework used to evaluate bids for long term contracts for RPS-eligible resources

*LTPP = Long Term Procurement Plan

**RPS = Renewable Portfolio Standard

Integrated Resource Planning

- SB350 includes a requirement that most types of electric utilities, energy service providers, and community choice aggregators implement integrated resource planning
- These plans must "meet…greenhouse gas emissions reduction targets …that reflect the electricity sector's percentage in achieving the economywide greenhouse gas emissions reductions of 40 percent from 1990 levels by 2030."
- CPUC held public workshop including all five of its commissioners to initiate planning for SB350 including on December 2, 2015
- The Commission is evaluating whether and how IRP will affect or integrate ongoing proceedings for procurement planning, RPS compliance, and other preferred resource programs
- For more information, see: http://www.cpuc.ca.gov/sb350/

Focus of 2016 LTPP is Transition to Integrated Resource Planning (IRP)

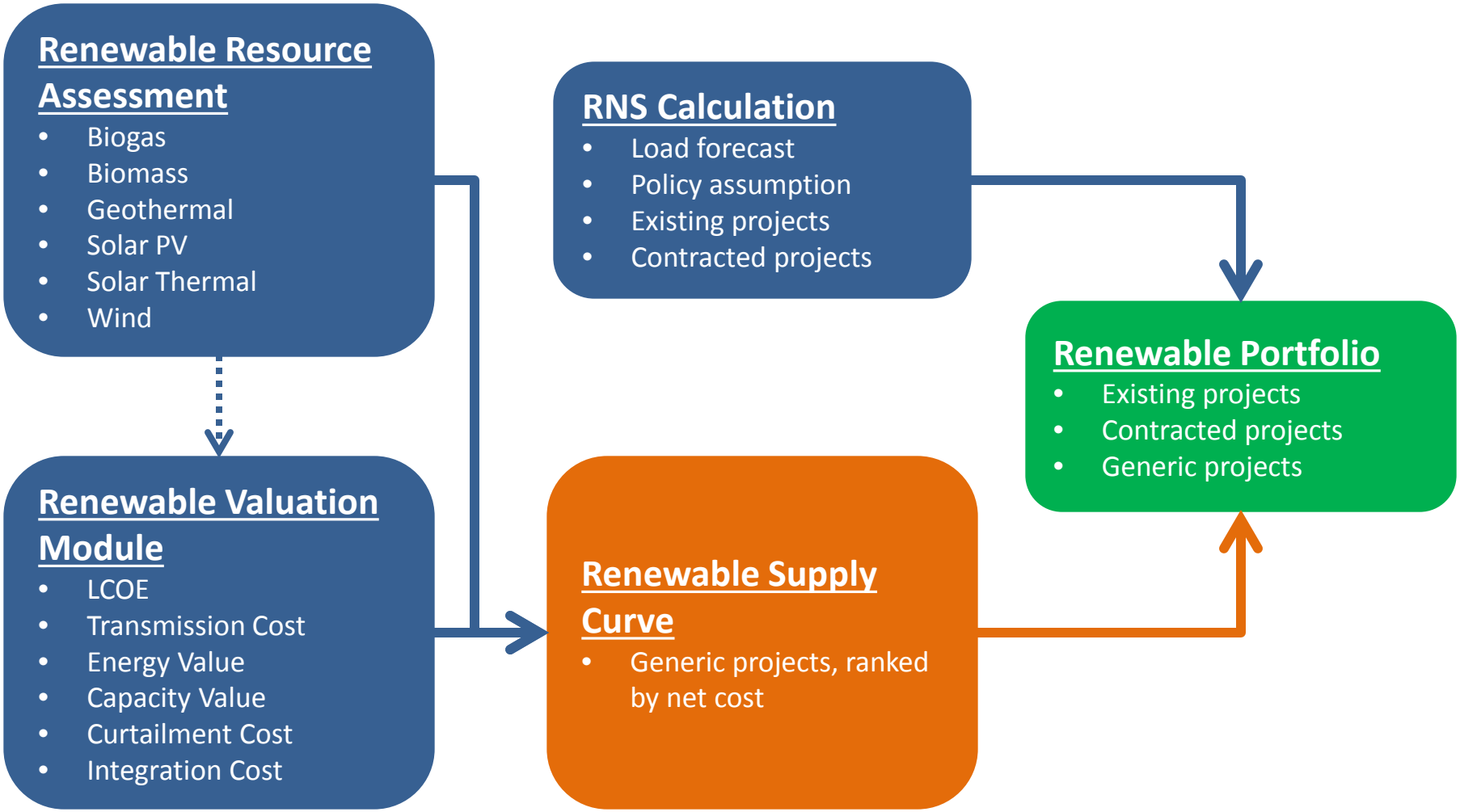
- 2016 LTPP is expected to involve discussion of such questions as:
  - What is meant by IRP?
  - What is appropriate procedural structure for IRP?
  - What modeling tools are needed to perform the optimization of resources envisioned by SB 350?
- The 2016 LTPP proceeding is **not** expecting to
  - develop a need authorization or
  - determine the optimal renewable resource portfolio to achieve SB 350 goals

OVERVIEW OF RPS CALCULATOR FUNCTIONALITY

Model Specification

- Model developed to provide *plausible portfolios* to CPUC LTPP and CAISO TPP to facilitate planning efforts under future RPS goals
- Three types of projects are included in the portfolios:
  - **Existing:** resources currently in operations
  - **Contracted:** planned resources under contract to utilities that have not yet come online
  - **Generic:** possible future renewable projects identified through an assessment of statewide renewable potential
- The RPS Calculator selects **generic** projects to fill the **renewable net short:** the difference between the utilities' compliance obligation and existing/contracted resources

Model Flow Chart

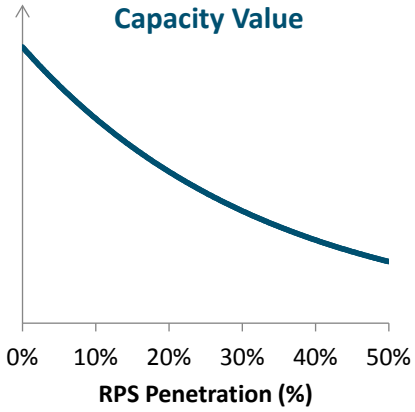


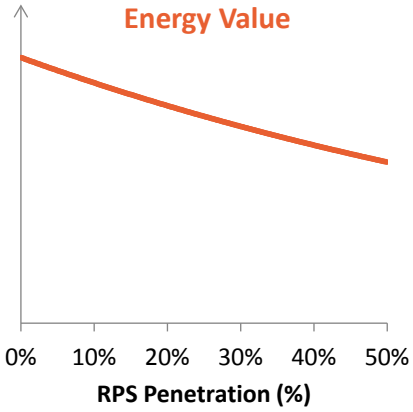
Developing a Cost-Based Supply Curve

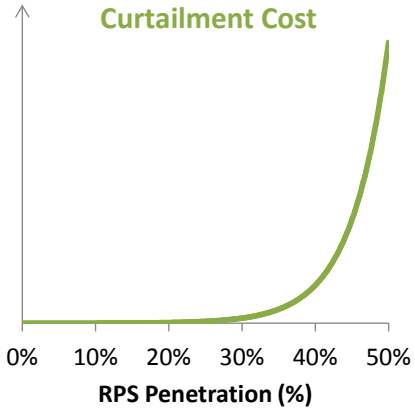
- Framework used to develop order of resources in the supply curve closely mirrors **Net Market Value** calculation used in Least Cost, Best Fit
  - Intended to capture all cost impacts on utility ratepayers
- Net resource cost is calculated for all possible generic resources in the model to enable the choice of the least cost resources for the portfolio

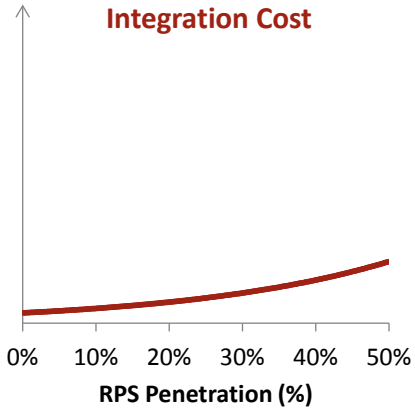
Dynamic Valuation

- Cost & value of renewable generation changes over time due to:
  - Technological innovation
  - Financing and tax policies
  - Portfolio saturation effects
  - Avoided costs of energy & capacity
- Unlike prior versions of the RPS Calculator, v.6.0 considers how each of these factors will impact the supply curve of renewables over time





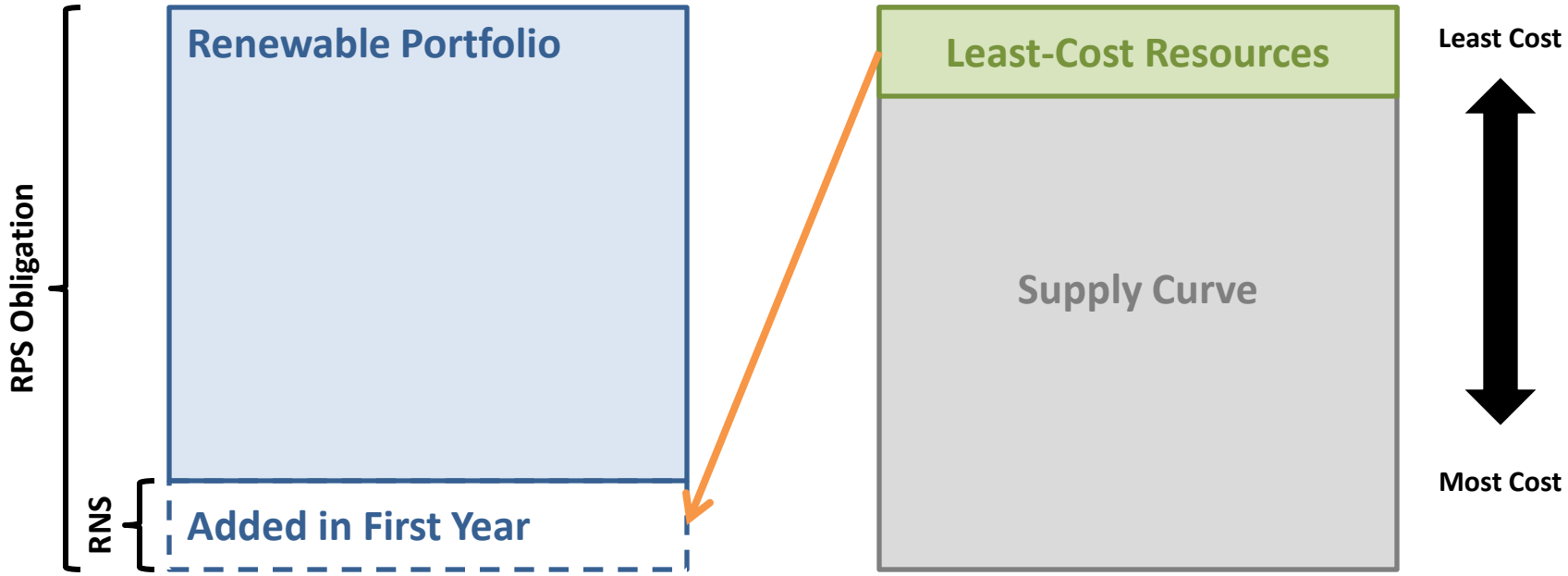




Charts are generic and are shown for illustrative purposes

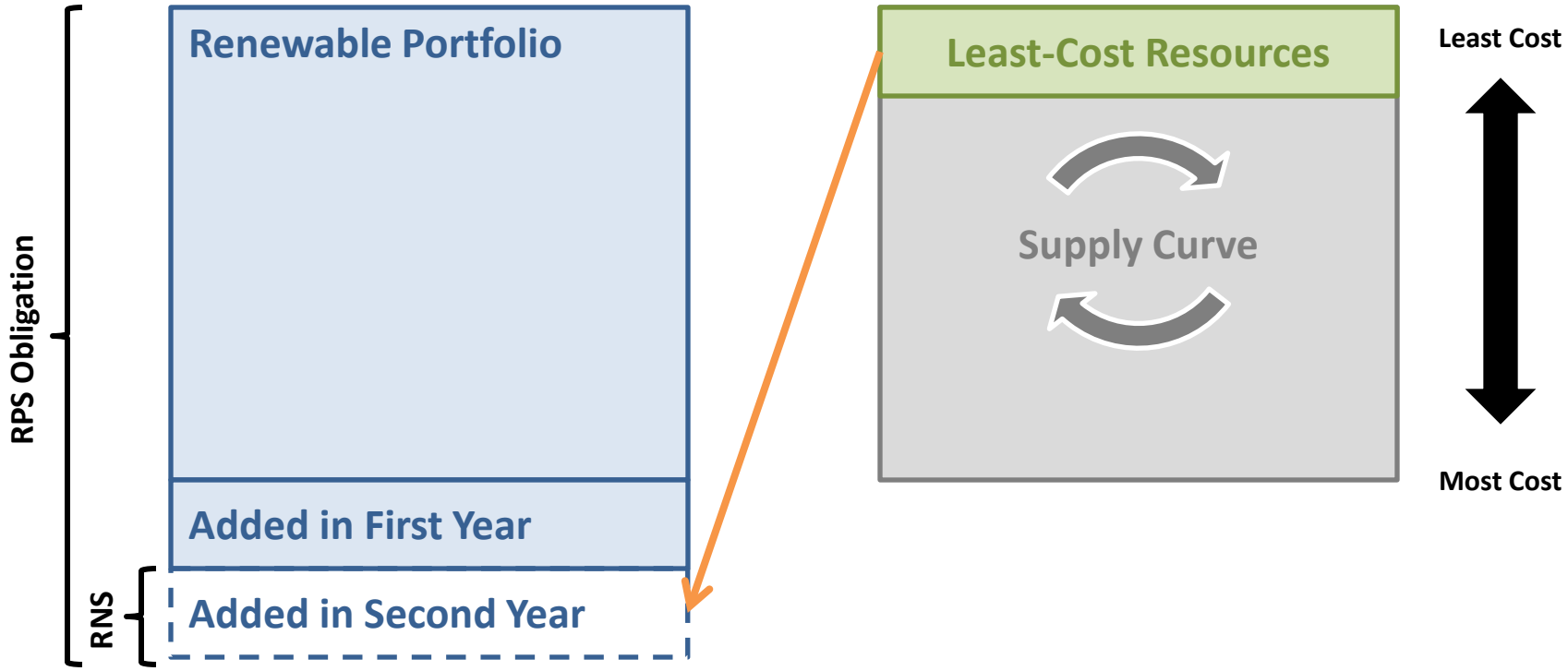
Resource Selection

- In each year, least-cost resources are selected from the supply curve to fill the renewable net short



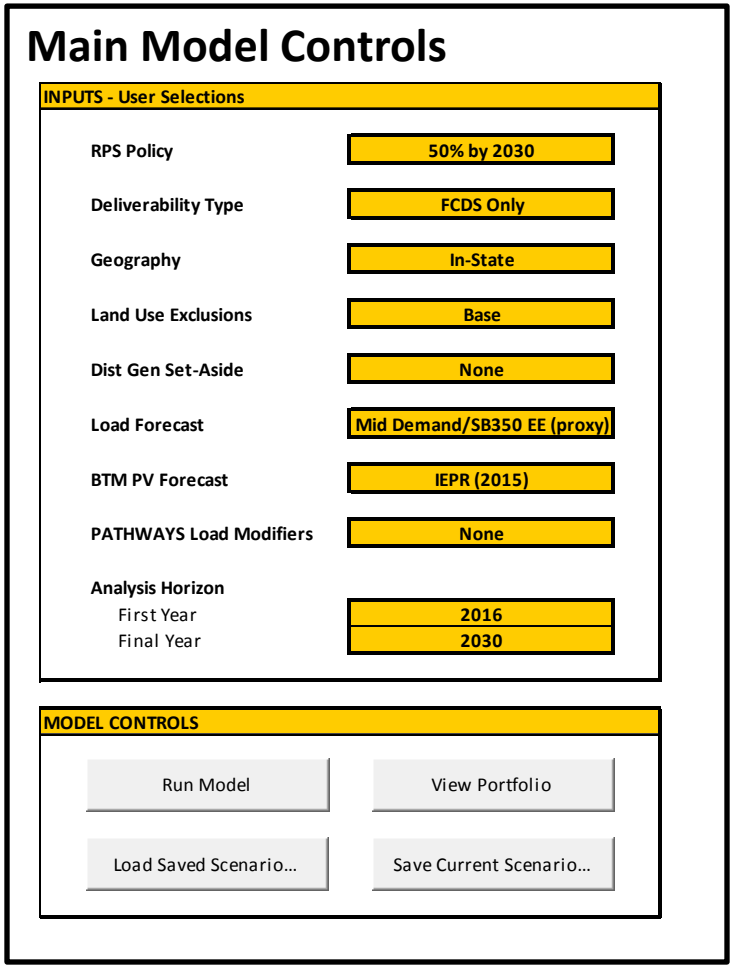
Iterative Framework

- The order of resources in the supply curve adjusts each year as a function of the changing resource mix in the portfolio



Model Control

- User may select a number of inputs to specify preferences for portfolio development:
  - RPS policy
  - Deliverability type
  - In-state/OOS availability
  - Land use exclusions
  - Load & EE forecast
  - BTM PV forecast
  - PATHWAYS Load Modifiers
  - Analysis horizon



RPS CALCULATOR SAMPLE RESULTS

How Much New Renewable Energy Needed to Reach 50% RPS by 2030 in CAISO Area?

- Energy needed for 50% RPS depends on load, by definition
- Many factors could affect the size of the load in 2030
  - Energy Efficiency (EE)
  - Behind-the-Meter PV (BTM PV)
  - Battery Electric Vehicle Adoption (BEV)
- Can estimate range of need using RPS Calculator

New Renewable Energy Needed for CAISO Load Between 2016 and 2030

- Illustrative results based on a pre-release version of RPS Calculator (6.1x, assuming FCDS and In-State Procurement)
- Values may vary in RPS portfolios produced with v6.2

#	Case	EE Assumption	BTM PV Assumption	BEV Assumption	TWh Generic Renewables 2016-2030
1	Reference	2014 AAEE	2014 IEPR	None	44
2	High EE	2 X 2014 AAEE	2014 IEPR	None	30
3	Higher BTM PV	2014 AAEE	2015 IEPR	None	42
4	High BEV	2014 AAEE	2014 IEPR	PATHWAYS	53
5	EE & BTM PV	2 X 2014 AAEE	2015 IEPR	None	27