

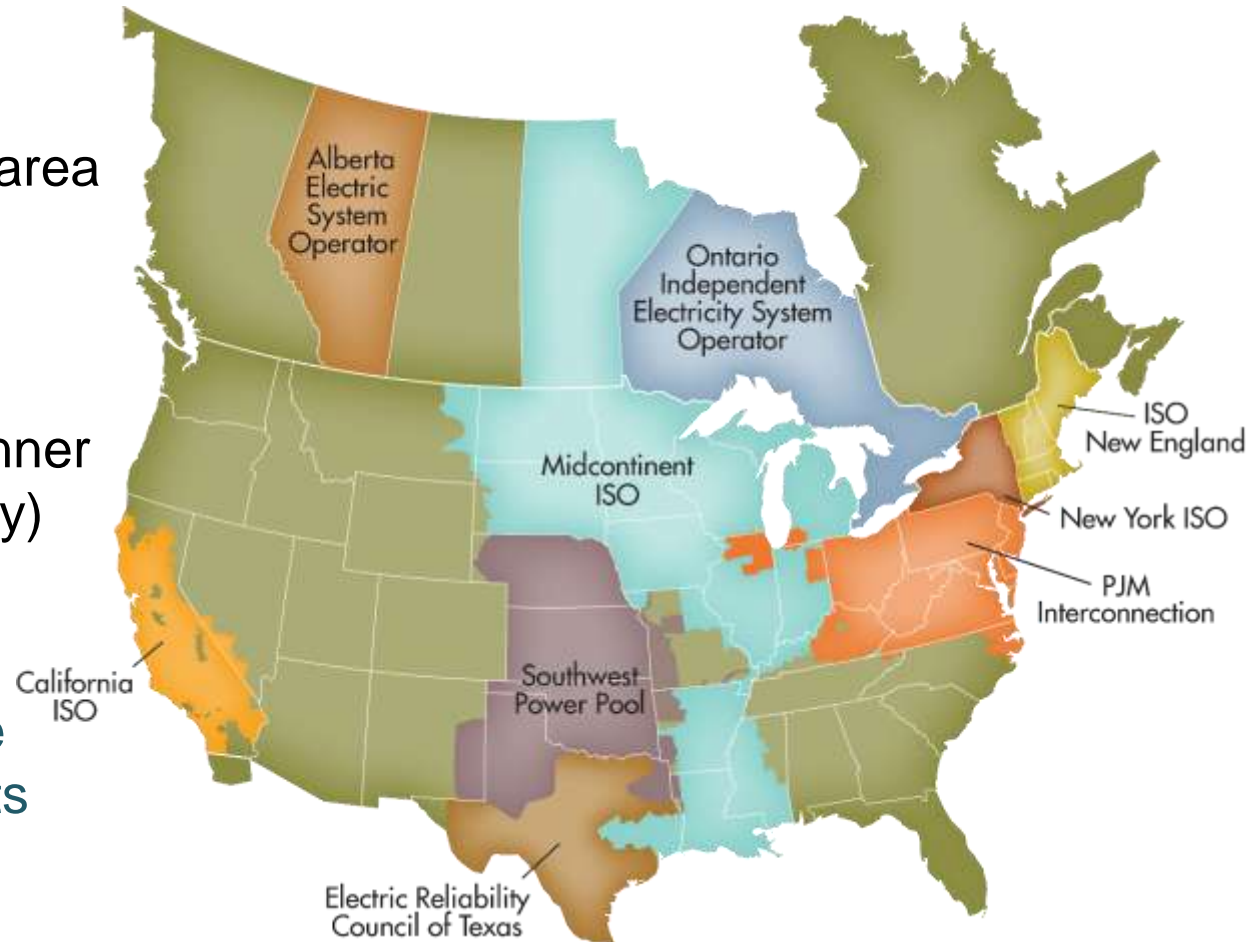


Women in Energy Electricity Pricing Forum

Virginia Thompson, Regional Affairs Manager
December 12, 2016

What is an ISO/RTO?

- A balancing authority area (reliability)
- A transmission & infrastructure grid planner and operator (reliability)
- A facilitator of a competitive wholesale power market (markets operations)



Suppliers/Purchasers and the ISO

Buyers or Sellers of bulk electricity, electricity commodities, and services:

- Utilities / IOUs
- Public and Municipal entities
- Energy Service Providers
- Community Choice Aggregators
- Demand Response providers/aggregators
- Combined Heat & Power resources/QFs
- Independent generators
- Marketers

Non buyer/seller:

- Transmission/infrastructure owners (PTOs)



Energy procurement

Renewables Portfolio Standard (RPS) and other legislative mandates

requires investor-owned utilities (IOUs), electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 50% of total procurement by EOY 2030

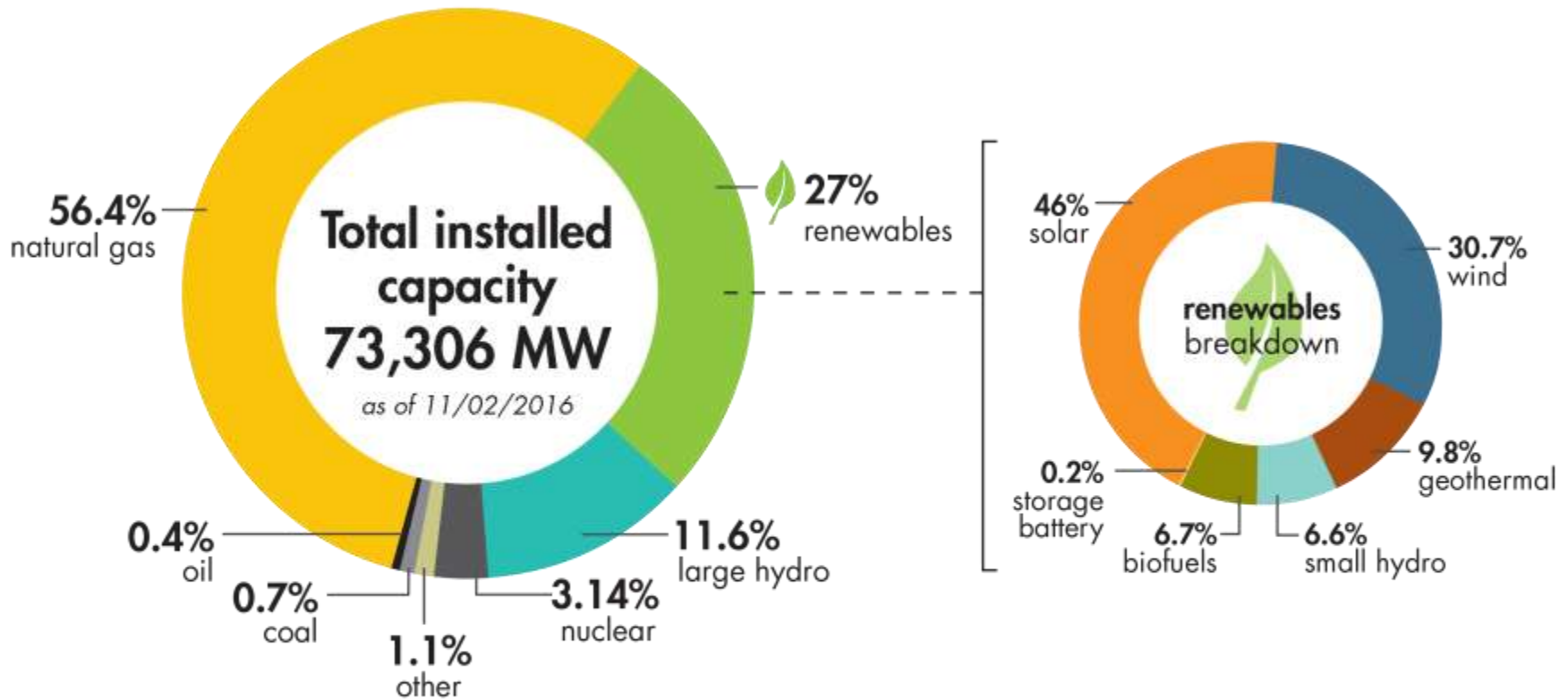
Long Term Procurement & Integrated Resource Plans

10-year look ahead “umbrella” planning proceeding to consider all of the Commission’s electric procurement policies and programs and ensure California has a safe, reliable, and cost-effective electricity supply

Resource Adequacy

CPUC adopted policy framework to ensure the reliability of electric service in California; applicable to all Load Serving Entities (LSEs) within the CPUC’s jurisdiction

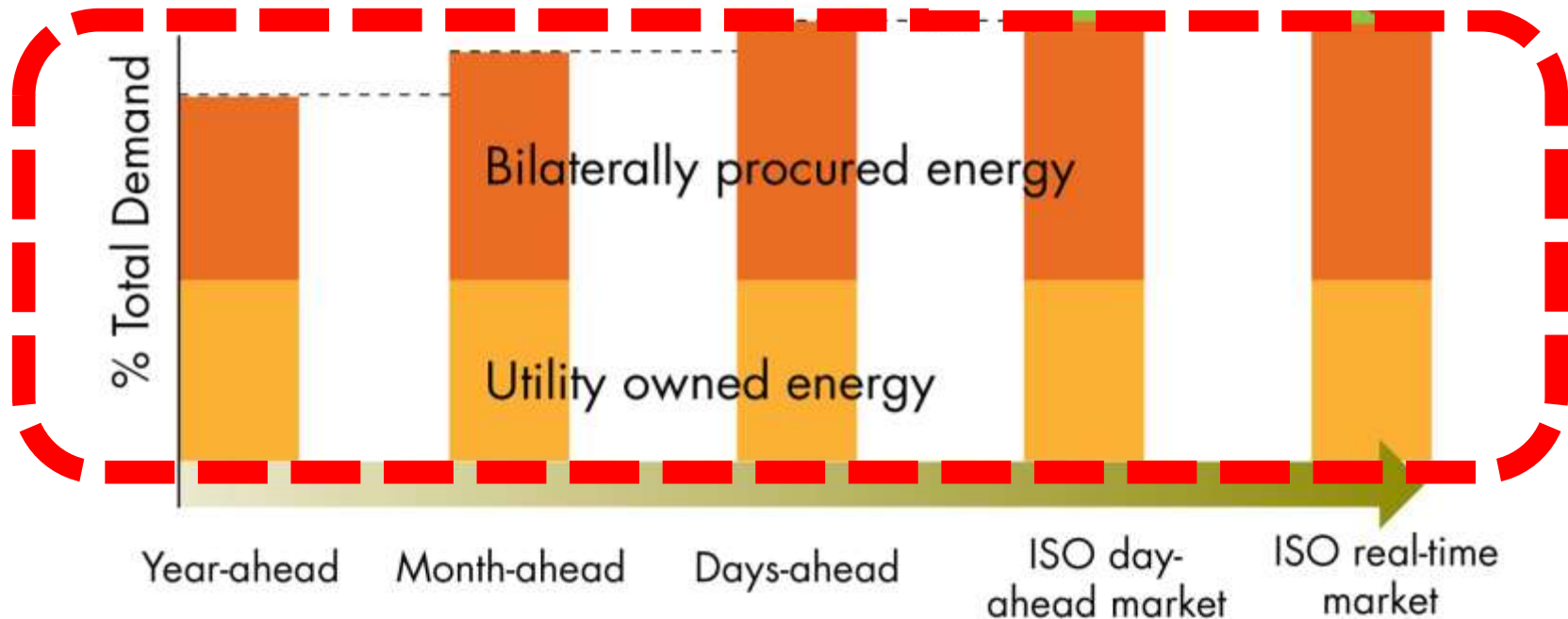
Resource mix and cost of production



15,755 MW = Maximum import capacity at summer peak for the ISO

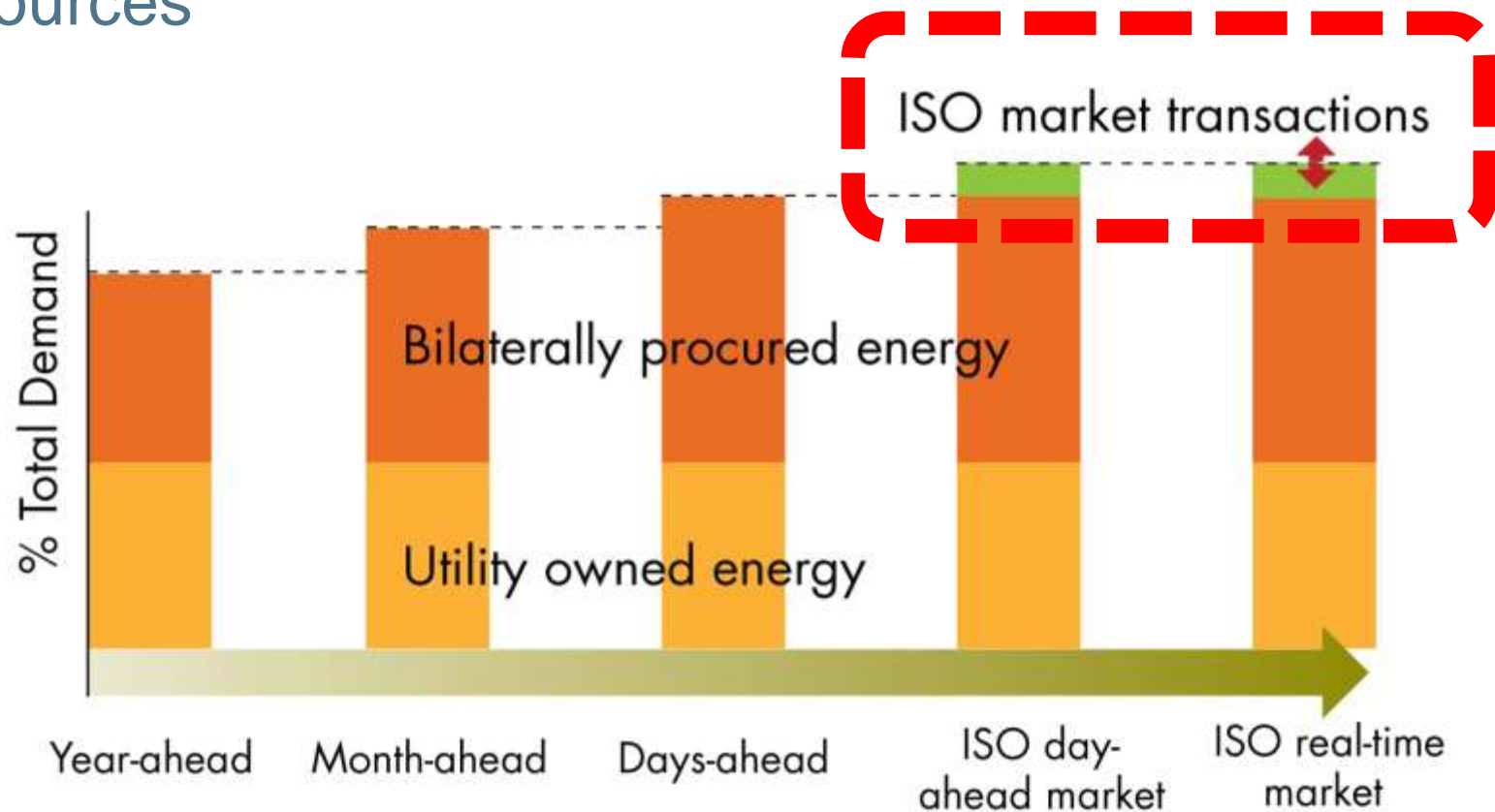
Energy Procurement, cont.

Majority of the ISO's electricity demand is met in advance of the market through utility-owned or bilaterally procured resources



Energy Procurement, cont.

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The ISO has two markets

Day-Ahead Energy Market

- Enables:
 - parties to schedule contracted supply/demand
 - suppliers to offload excess supply in the form of energy or ancillary services
- LSEs the ability to secure pricing for load due to:
 - *changes in load forecasts or*
 - *incremental changes in demand*

Real-Time Energy Market

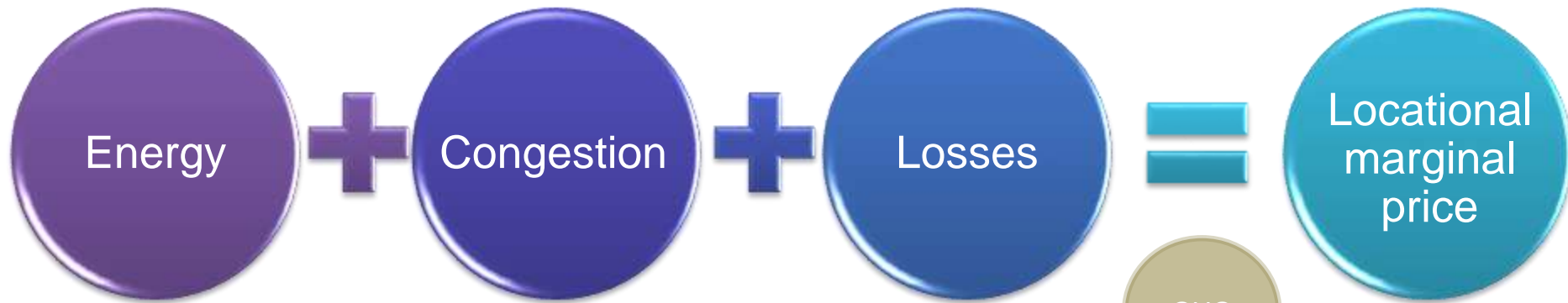
- Hour-ahead scheduling for intertie resources
- 15-min market supports renewable integration
- 5-min market intended to meet instantaneous demand
- Includes:
 - ISO Balancing Authority Area
 - EIM Balancing Authority Areas



- Locational Marginal Price (LMP)

The marginal cost (\$/MWh) of serving the next increment of Demand at that PNode consistent with existing Transmission Constraints and the performance characteristics of resources.

Components of the locational marginal price



The price at which supply and demand curves meet

A situation in which the lowest-priced electricity can't flow freely to a specific area due to heavy use of the transmission system

Caused by: Lack of transmission capacity, Outages

Energy lost in transmission

GHG

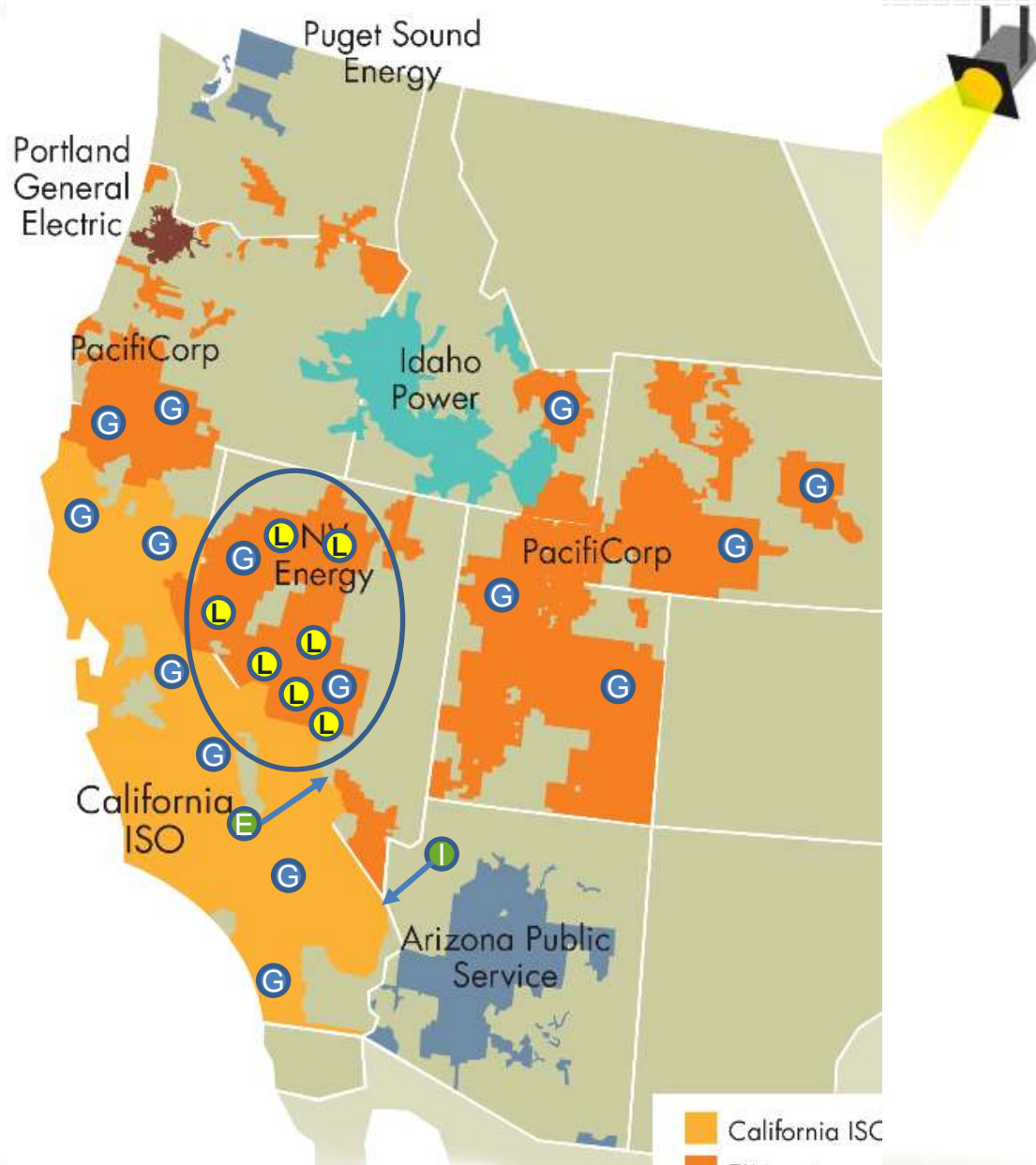
* LMP for EIM entities also contains a GHG component

Nodal Pricing

Resources are paid the nodal price

Load pays the weighted average price of all load nodes in the service territory

Imports and Exports are paid or pay the price at the scheduling point

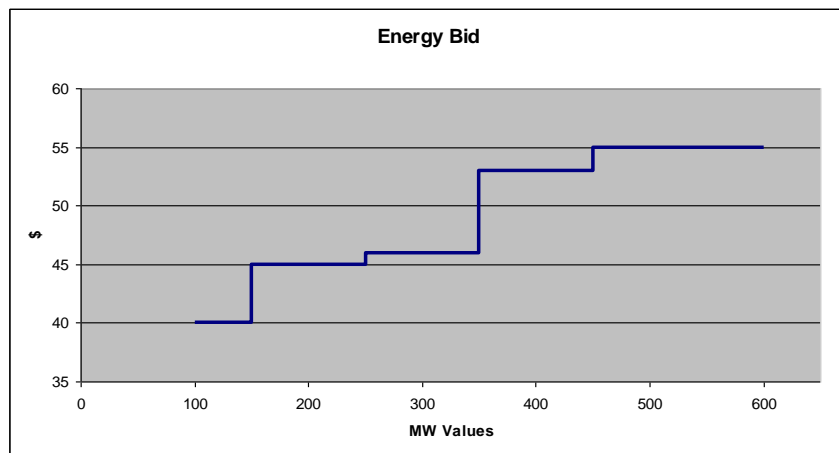


Bidding in the day-ahead market

Provides an economic signal of what a participant is willing to accept or pay for energy in the day-ahead market

SUPPLY

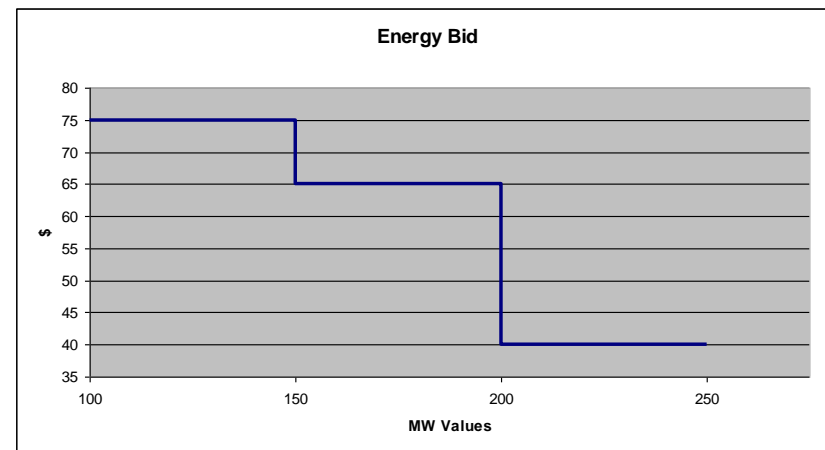
Up to 10 segments,
monotonically
NON-DECREASING



supply resource
(generators and imports)

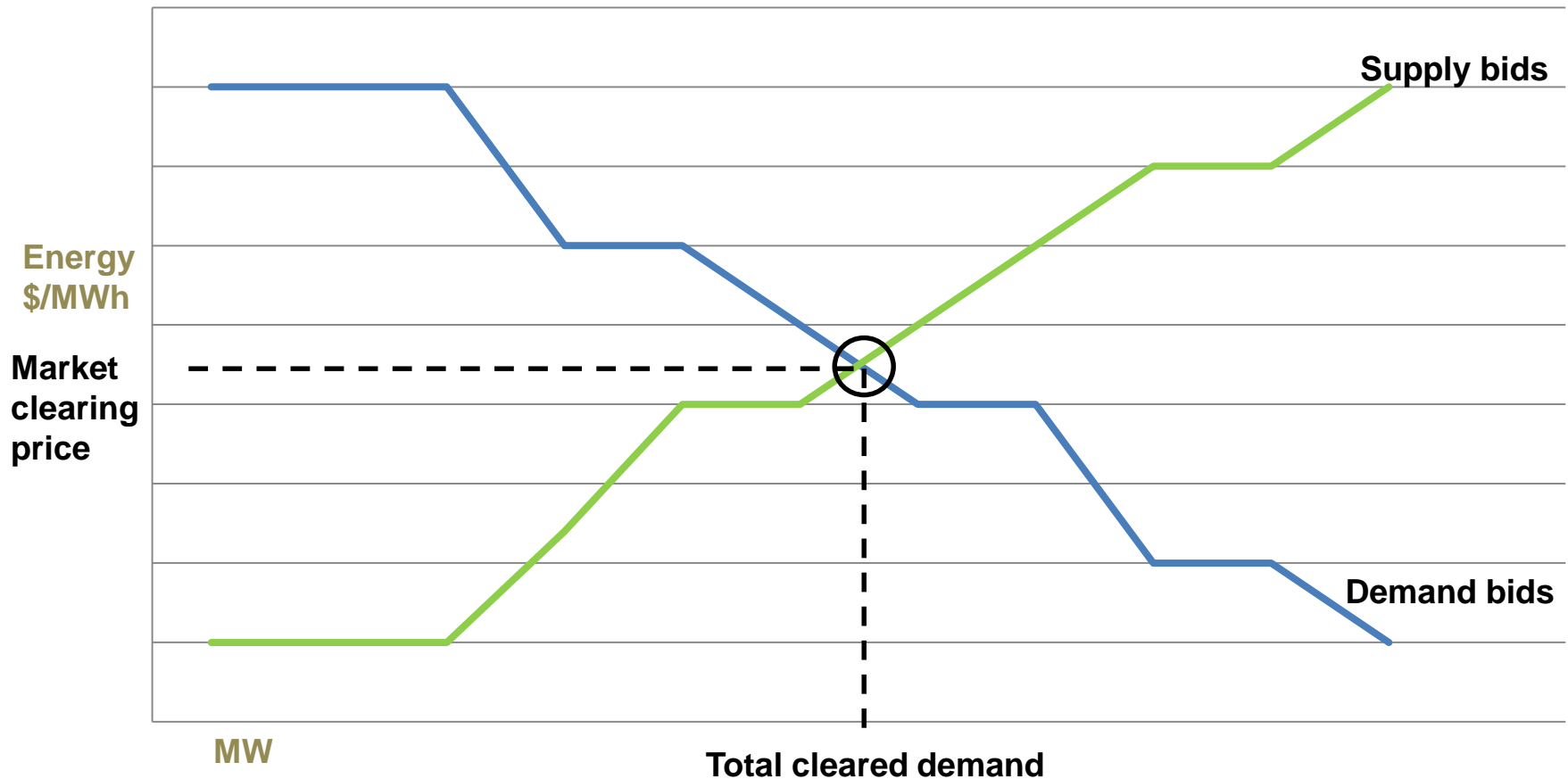
DEMAND

Up to 10 segments, monotonically
DECREASING

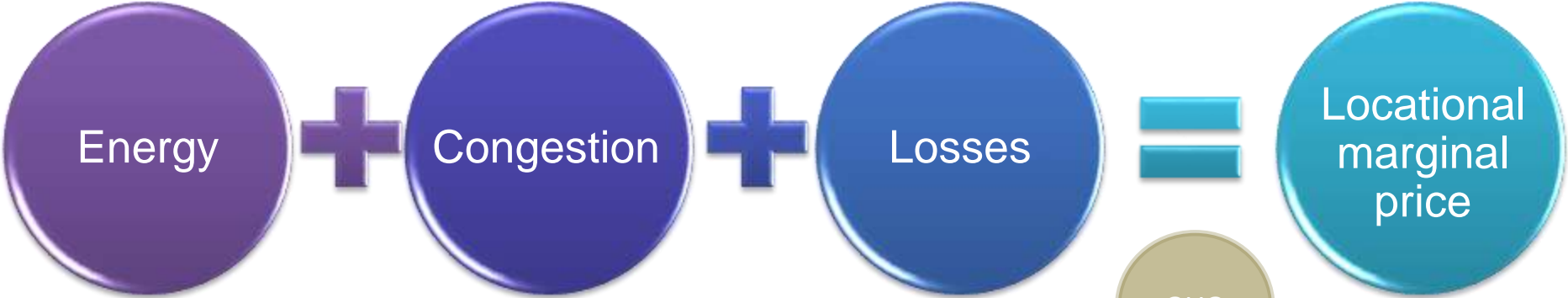


demand resource
(load and export)

Market Clearing – marginal cost of energy



Components of the locational marginal price



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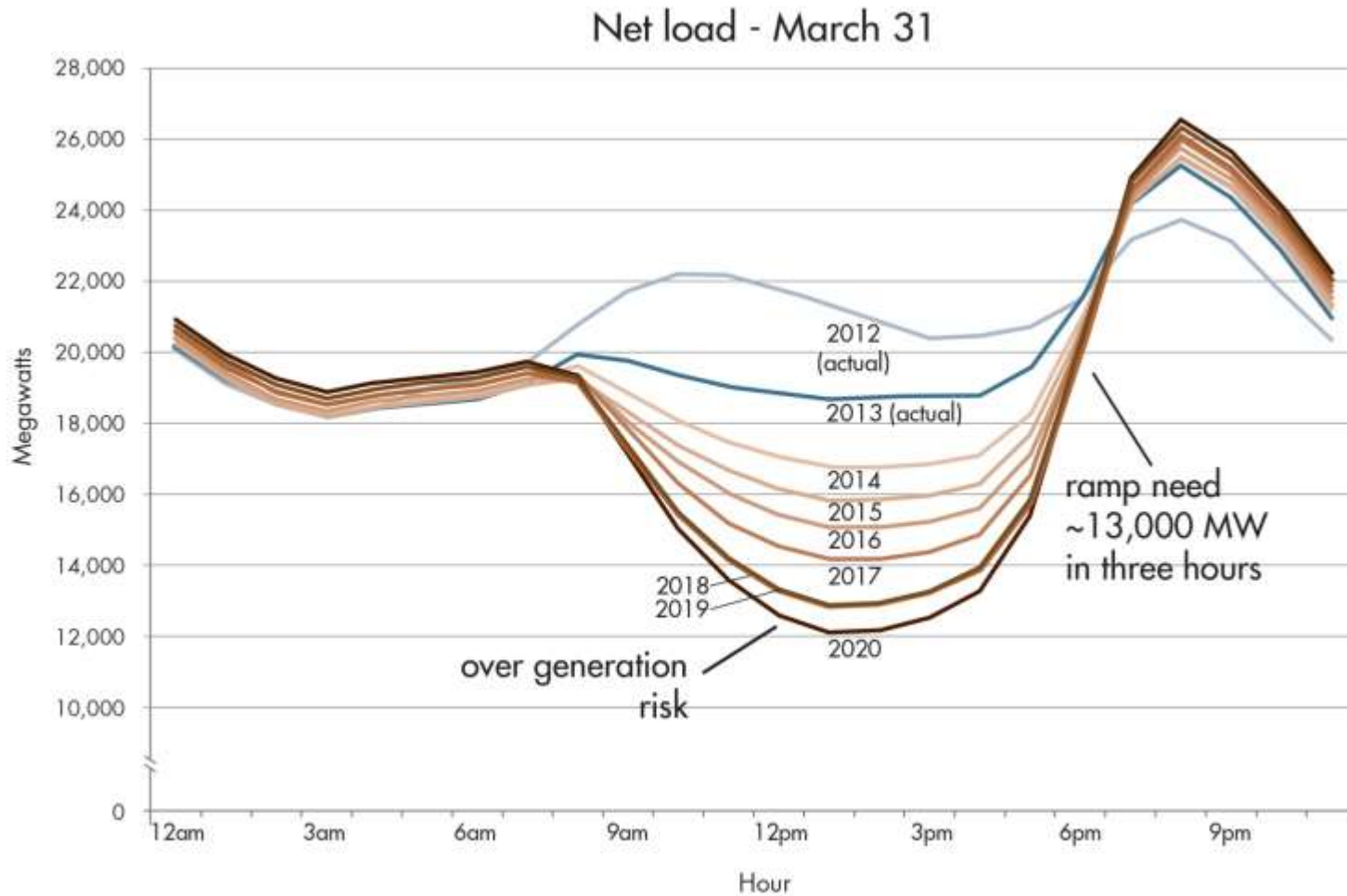
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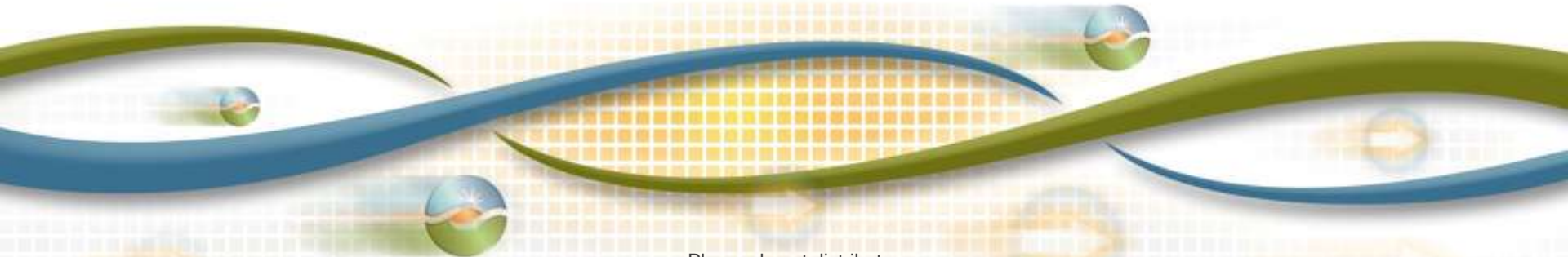
Energy lost in transmission

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The Duck Curve





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