Northwest **Power** and **Conservation** Council

April 30, 2019

MEMORANDUM

TO: **Council Members**

FROM: **Mike Starrett**

SUBJECT: **Example resource dispatch in a centralized market**

BACKGROUND:

Presenter: Mike Starrett

Summary: Utilities operating in the region primarily transact for energy and transmission through bilateral negotiations. This can limit the fleet of resources available for economic dispatch and can have an outsized impact on resource procurement decisions and transmission utilization.

In contrast to a bilateral market, a centralized market with a single market operator can create a security constrained economic dispatch of resources across a broad footprint and use congestion pricing as a lever to respect transmission constraints. The end result of congestion pricing is similar to the recently piloted South of Allston non-wires relief pilot where resources above the constraint were paid to turn down and resources below the constraint were paid to turn up during the small handful of hours where the flowgate is actually physically constrained.

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This presentation will review how resources are bid and subsequently dispatched in a centralized market. A comparison of merchant activity in a bilateral market will be provided. The presentation will conclude with a description of how additional transmission products could lead to better transmission utilization even without a centralized market.

Workplan: Prepare for 2021 Power Plan

Example resource dispatch in a centralized market

Mike Starrett

April 7, 2019

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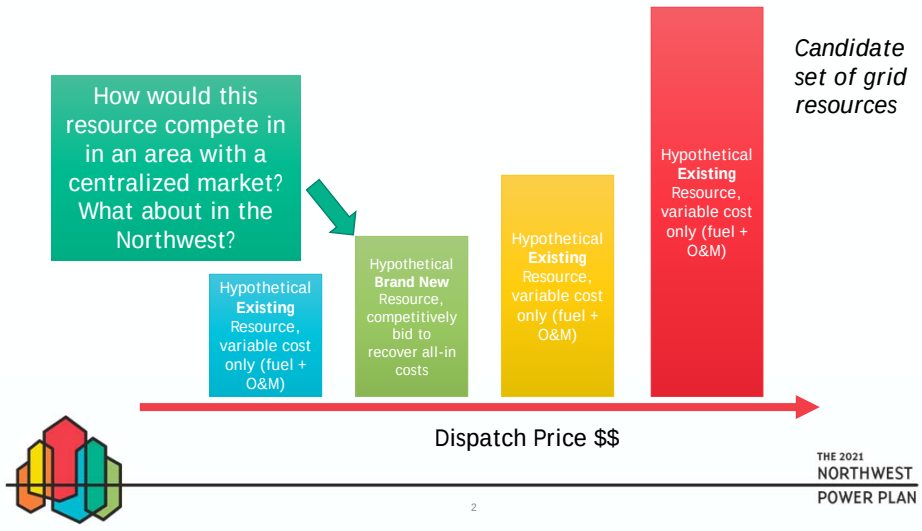
FOR A SECURE & AFFORDABLE ENERGY FUTURE

Planning as a centralized market but procuring as a bilateral market



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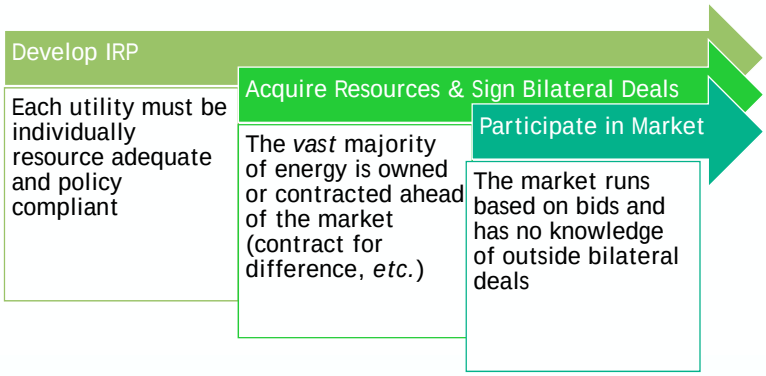
Utility Function in Centralized Markets



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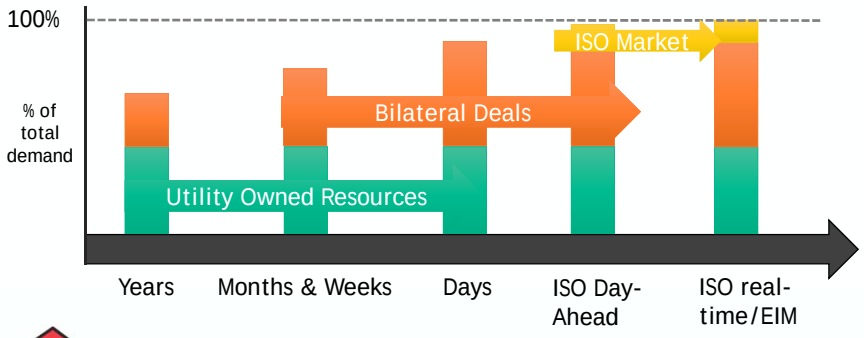
Price Hedging in Advance of Market

Pre-market activity is for price hedging and reflects market price exposure, but does not influence market dispatch!



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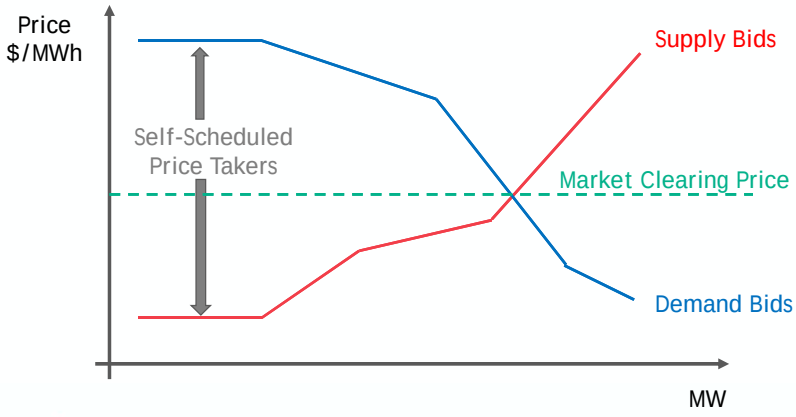
Market Clearing Price



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Market Timesteps Overview

Day-Ahead Market

ALL resources in ISO footprint bid their cost to operate (even those with energy or RA capacity contacts)*

Parties outside the ISO (i.e. "imports") submit a MW schedule (E-Tag) as a self-scheduled price taker or act as an intertie resource and bid a price curve aggregating a fleet of resources

Day ahead market process creates "Base Schedule" of least-cost resource dispatch to serve forecast load across ISO footprint.
Note: Day-Ahead covers almost all energy demand for next day. Limited price volatility due to liquidity and lack of forecast error. Real-time is just for deviations.

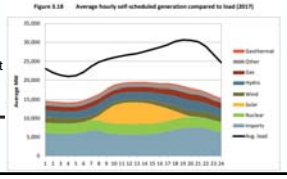
Real Time (aka 5 minute market, aka EIM)

Resources can "Self-Schedule" by carrying over their day-ahead schedule. They'll be price takers, but only to the extent that the 5-minute market changes their dispatch away from the day-ahead schedule.

Resources can also competitively bid. Roughly 1/3 of all energy capacity in real time does this and it is mostly gas plants.

Real-Time Market is less liquid since it's physical and since the majority of energy has self-scheduled. However, the EIM has added additional depth and has led to imports (which by definition are not full market participants) to redispatch to look more like ISO load shape

Most participants carry their schedule from day-ahead forward to real time where it becomes a self-schedule (shaded area in figure)



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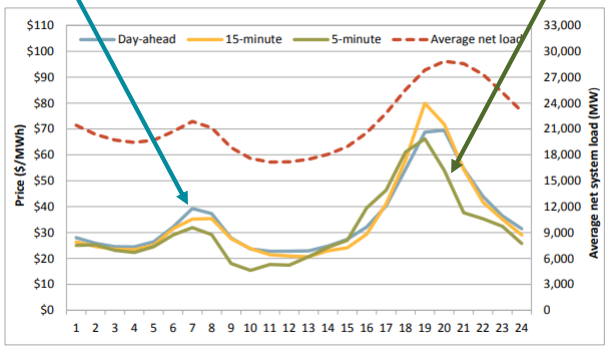
*This is idealized. Parties could use other bidding strategies.

Market Prices

Majority of energy clears at day ahead price

Deviations from day-ahead schedule clear at real time price

Figure E.3 Hourly system energy prices (2017)



Things to note

- Actual price is **LMP**, which is energy + congestion
  - High energy component implies scarcity, low energy price implies system wide oversupply
  - High congestion price implies local congestion
- Real time/EIM balances system across substantial resource base (instead of just a single BA!)

Comparison to Bilateral Deals

- In bilateral market, merchant arm at each utility tries to make deals from intra-day to months/years in advance
  - Savings are shared between customer and utility; extra costs are held on utility
- Merchant will transact for energy, and must separately ensure that they can piece together transmission to deliver it
  - This can be done by re-directing their own P2P rights, finding and using non-firm or hourly firm, or through a bilateral deal on secondary market
  - All of this is manual and done via OASIS

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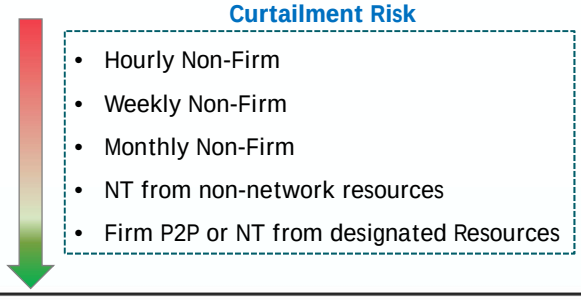
Bilateral Transmission

- Non-firm is rarely curtailed
- Conditional firm can be "firmed up" ahead of time
- Limited set of products in tariff (no term firm, no conditional firm with longer certainty, *etc.*)



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Summary & Conclusions (1/2)

- In a centralized market, participants voluntarily submit bids and the market operator clears supply and demand
  - All transmission constraints are taken into account and the congestion component of the LMP is the economic lever to adjust dispatch to respect constraints
- Real-time/EIM provides balancing using resources across the entire footprint

Summary & Conclusions (2/2)

- In a bilateral market, the utility merchant function works to strike deals for energy and transmission
- Only have products available to them in tariff
- Local congestion may prevent long-term firm offers, but may be available non-firm 99-100% of the time
  - This is probably not financeable for new resources without a change in procurement norms