

# Future Power Products

Rob Gramlich

UVIG Forecasting Workshop

June 22, 2017



Grid  
Strategies

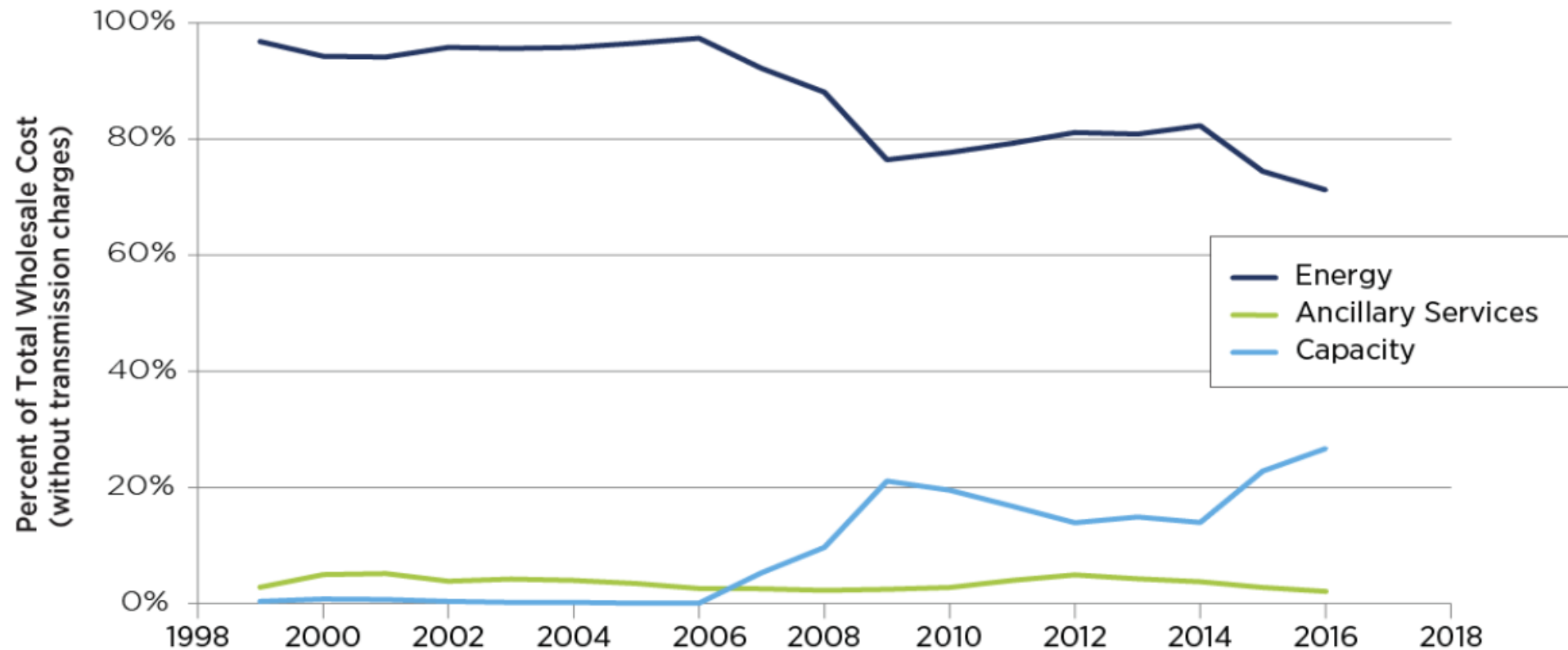
# Drivers of product evolution

- High penetration of zero marginal cost resources
  - Higher variability of supply mix, and resulting greater demand for flexibility and ramping
  - Retirement of conventional sources and loss of their inertia
  - Failures of capacity markets due to common mode failures
- ➔ Customers of forecasting may have different needs as they participate in different markets



# How to Attract & Retain Supplies of Peak Energy & Flexibility

- More reliance on capacity markets, or less? PJM % of cost:



Reliability  
Product  
Unbundling

Grid operator should  
define products  
according to need and  
allow all sources to bid

Services	Components
<b>Voltage Support</b>	<i>Voltage Control</i>
	<i>Voltage Disturbance Performance</i>
<b>Frequency Management</b>	Regulation
	Load Following
	<i>Operating Reserves</i>
	Reserves
<b>Frequency Management</b>	<i>Inertia</i>
	<i>Frequency Disturbance Performance</i>
	Active Power Control
	Frequency Control
	Ramping (Curtailment) Capability



# Carbon pricing

- More efficient way to keep nuclear plants operating than state bailouts
- Creates higher energy prices, helping to attract and retain other resources
- Political challenges but possible



# Northeast capacity market re-design

- State policies adding supplies into glutted markets
- Concerns from gas IPPs that do not receive nuclear or renewable incentives from the states, and are facing record low gas-driven energy prices
- Proposals to raise bids of subsidized resources, or “re-price” capacity markets to provide higher prices to unsubsidized resources



# Do we need capacity markets at all?

- Now we have demand response and storage that can be quickly deployed, are very scalable, and can provide peak energy cost-competitively with conventional plants
- We can rely on long term bilateral contracting more
- Capacity markets are failing to procure flexibility



# Energy-only markets

- An energy-only market with scarcity pricing and co-optimized reserves would provide better price signals
  - Investment costs of flexible resources and providers of peak energy would need to recover costs from occasional price spikes, or long-term bilateral contracts
- ➔ Market volatility would rise compared to markets with capacity obligations and capacity markets





# Markets for Flexibility/ramp

- More variable sources increases demand for flexibility/ramp
- Could be hourly energy product with scarcity pricing
  - Price could be high at 5 pm when the sun sets and only flexible resources are able to quickly ramp up
- Or, could be an explicit flexibility product as in California and MISO



# Co-optimization

- Reserves are more scarce, will have increasing prices, their procurement should be the first objective, not an after-thought
- RTO needs energy, regulation, and reserves simultaneously
- Co-optimization would put each supply source in its highest and best use, which only the grid operator with its software can determine quickly for the spot market.
- If co-optimization does not happen, market participants will need to guess which market to be in...and they will need good forecasts



# Price Formation

- Many ways to provide better, more accurate price signals
- Avoid side payments that are out of market
- Have needed resources set prices
- Scarcity pricing



# Key Role of Forecasting

- Markets likely to be more volatile so factors influencing prices will be more valuable to predict accurately
- More wind and solar to forecast
- More importance of reserves and reliability services
- More congestion and curtailment, so locational forecasts important

