Policy & Regulation in the U.S. Energy Market

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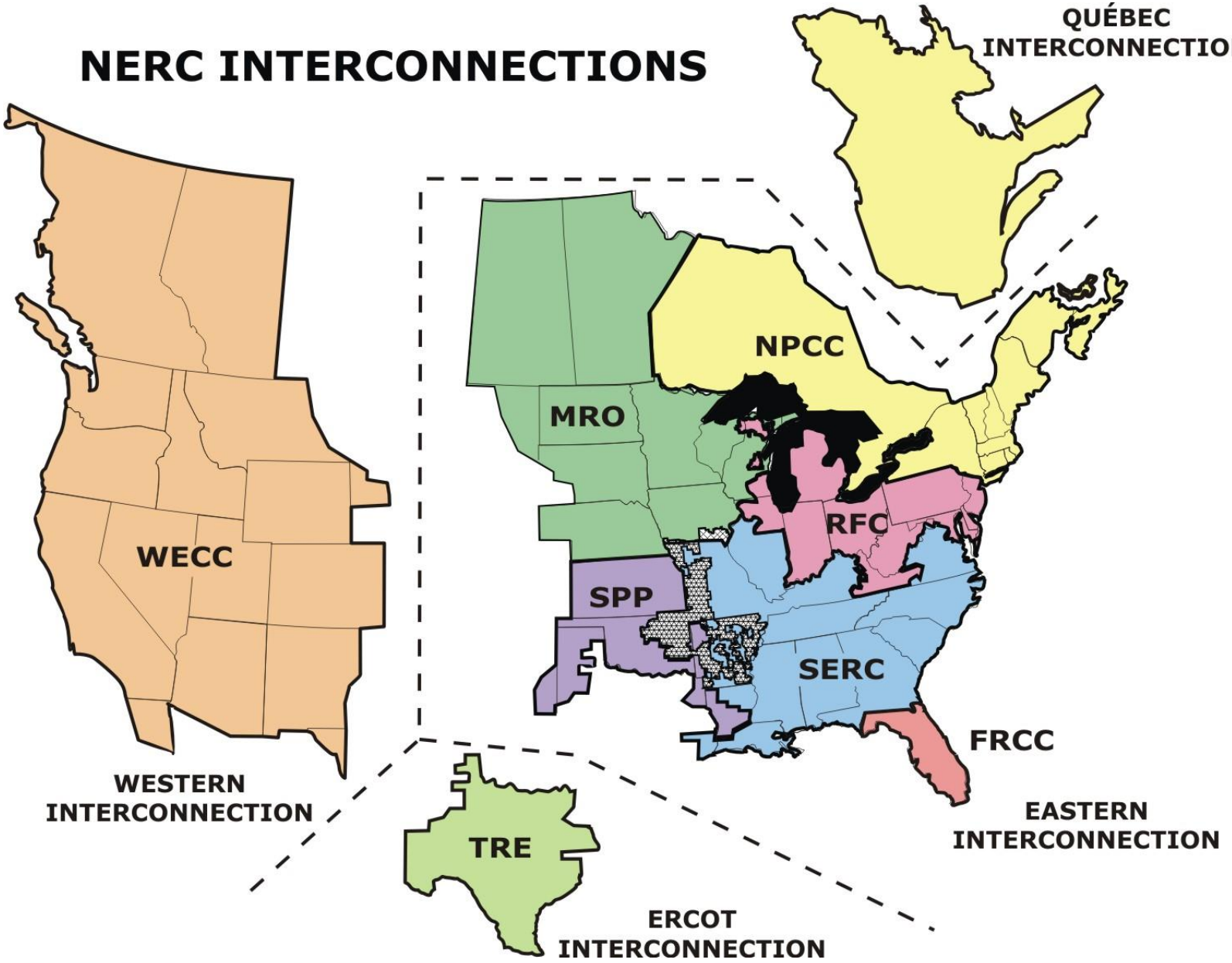
NERC INTERCONNECTIONS



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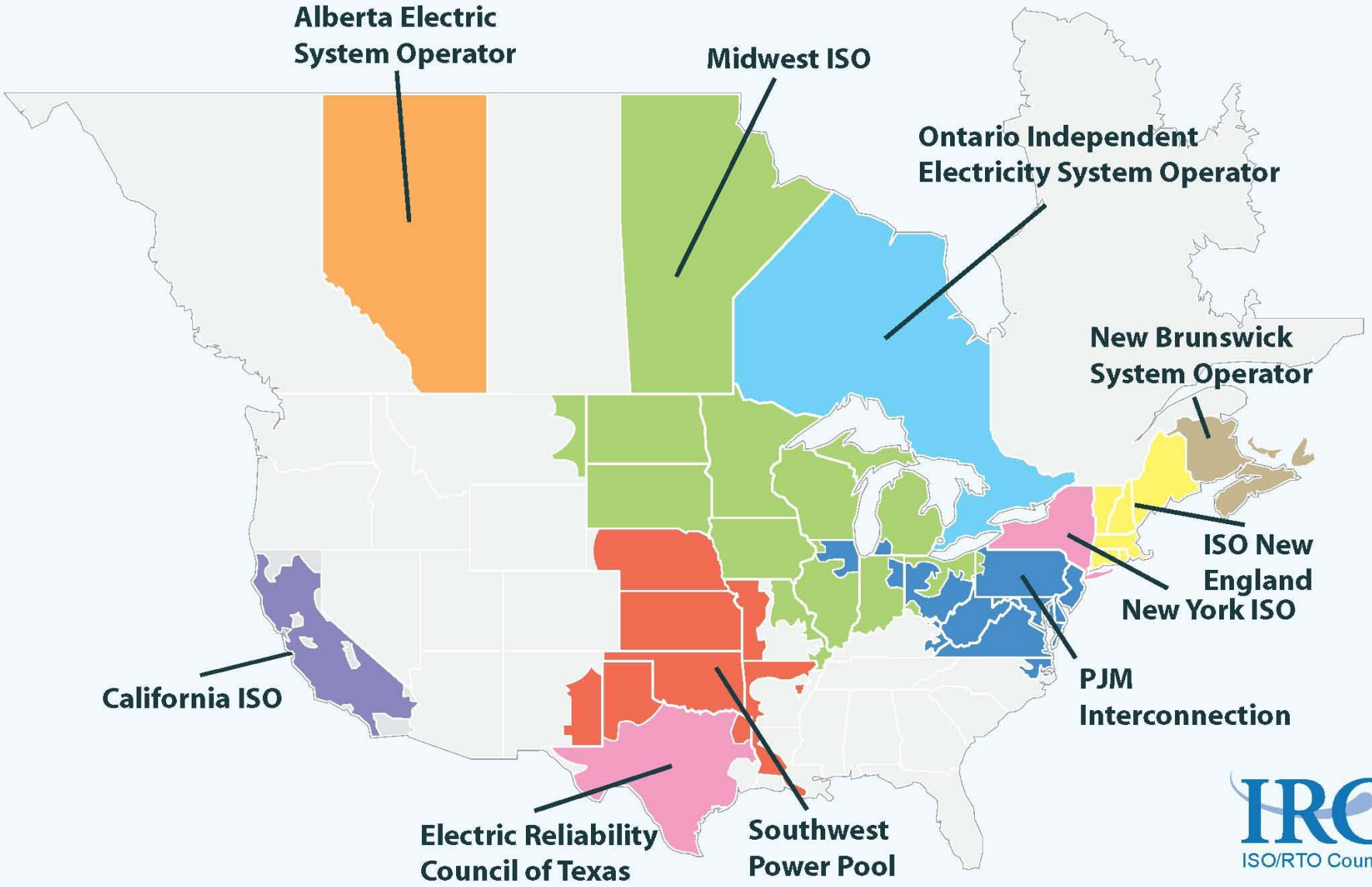

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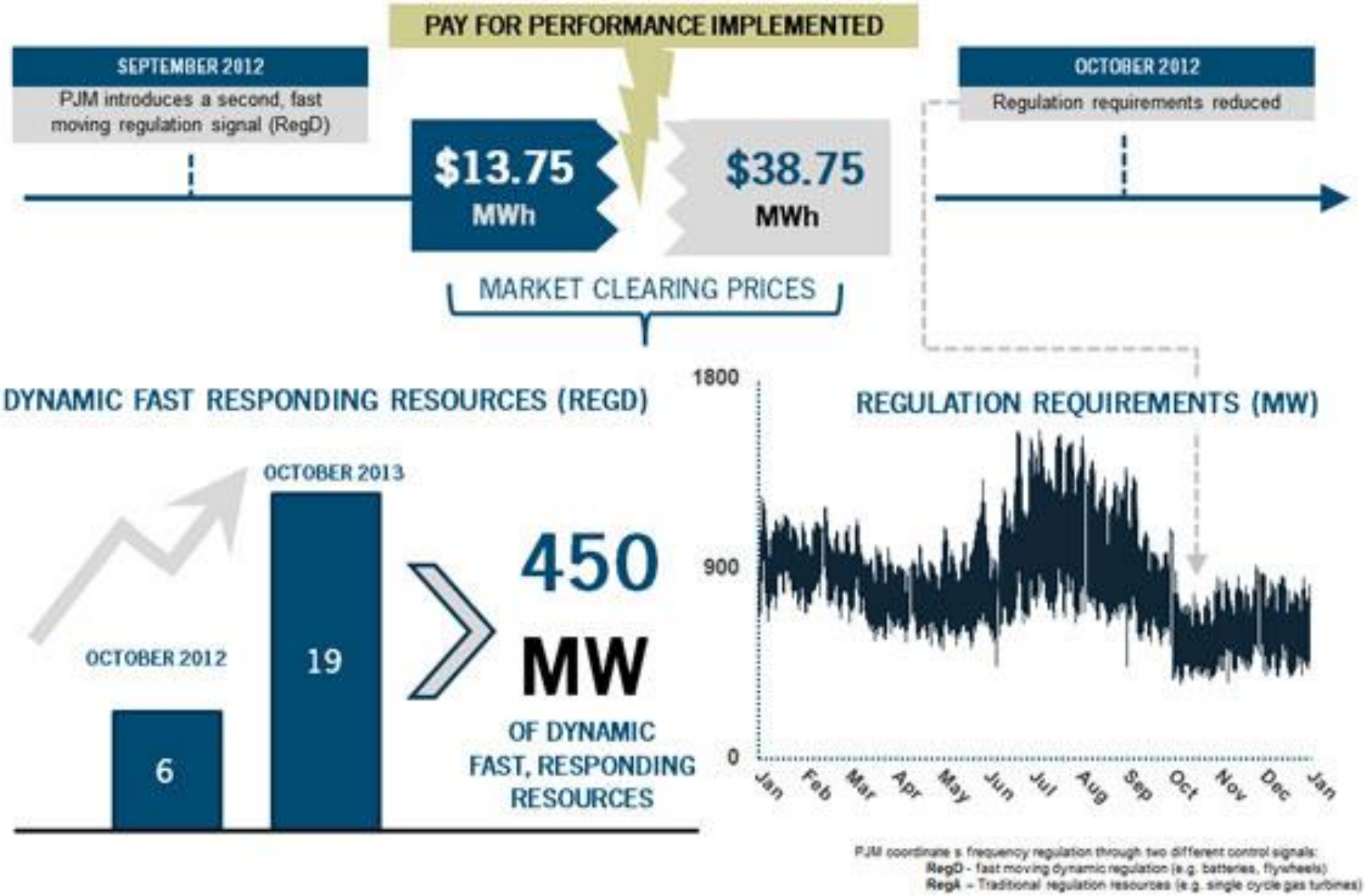
If the price of grid-scale energy storage fell to zero dollars per megawatt-hour, regulators and utilities would still be puzzled in how to deploy the boon of energy storage.

FERC Orders

- Order 755 - increased the pay for fast-ramping products
- Order 784 - requires utility transmission providers to factor two more parameters – speed and accuracy
- Order 792 - adds energy storage as a power source that is eligible to connect to the grid

Ancillary Services Policies

- **PJM:** implemented pay-for-performance
- **MISO:** current AGC is too slow for significant P4P benefits
- **ERCOT:** Overhauling ancillary service product (no P4P yet).
- **SPP:** Starting P4P in March of 2015
- **ISO-NE:** "Franken-tariff" – addressing P4P in capacity markets



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PJM New Capacity Market Proposal

- Storage included
- Breaks the capacity market up into **four** tiers:
  1. Capacity Performance: 16 hrs/day. High penalties for non-performance.
     - **Storage valued based on the level of discharge it can sustain for 16 hours on three consecutive days**
  2. Base Capacity: Current capacity product. Must be able to run 10 hrs/day
     - **Storage must be able to run for at least 10 hours per operating day at the annual capacity output. Can be split into two 5 hour blocks, but no recharge in between.**
     - *"If storage resources could be dispatched with perfect foresight in actual operations such that they are operated in an optimal manner, then there could be a basis for qualifying storage resources to provide a greater level of capacity than for which they would otherwise qualify under the above calculation[s]"*
  3. Summer Extended DR: Curtail up to 10 hours/day during the summer
  4. Summer Limited: Legacy DR with 6 hours/day summer obligations.
- Top tier will account for 85% - 90% of capacity purchased, with the remaining 10-15% (15,000 – 25,000 MW) allocated to the other tiers based on reliability

NY-REV Process

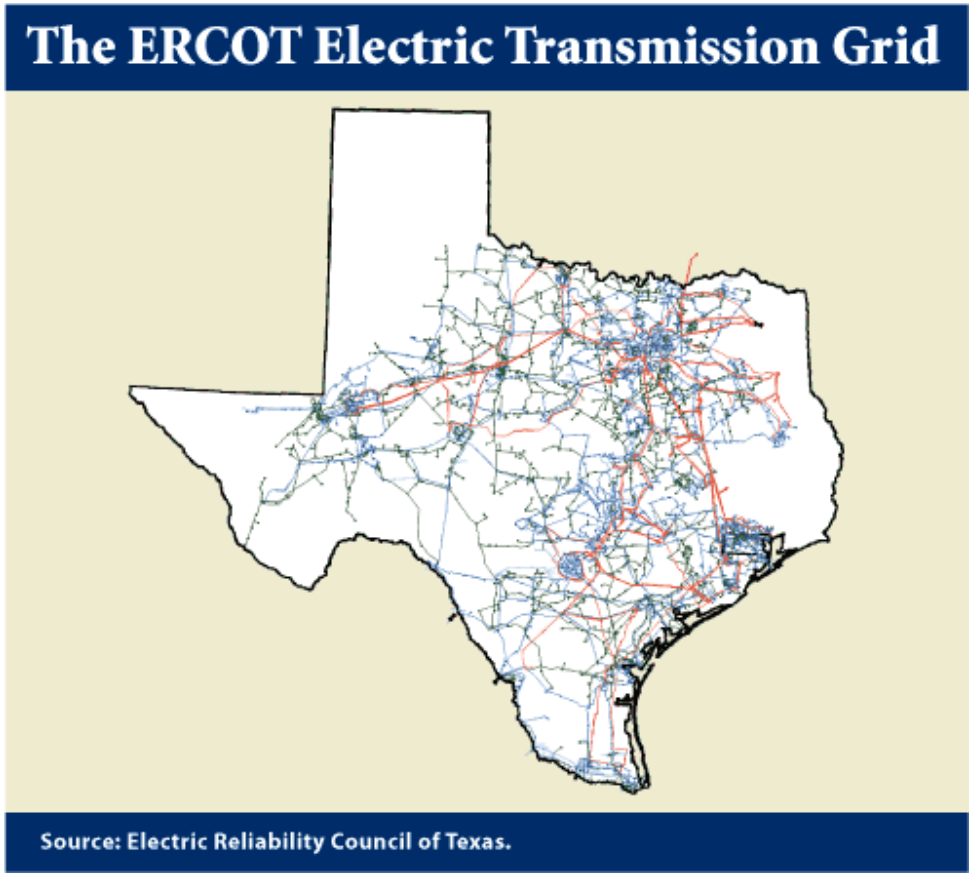
- Redefining how energy is generated and consumed in the state
- Trying to create an integrated platform where all resources can compete
- Attempting to establish a distribution-level market

Discussions currently are on two tracks:

- 1). Examines the role of distribution utilities in enabling market-based deployment of distributed resources
- 2) Evaluates changes in current policy, tariff and incentive structure needed to motivate customers

Oncor (T&D) / Brattle Study

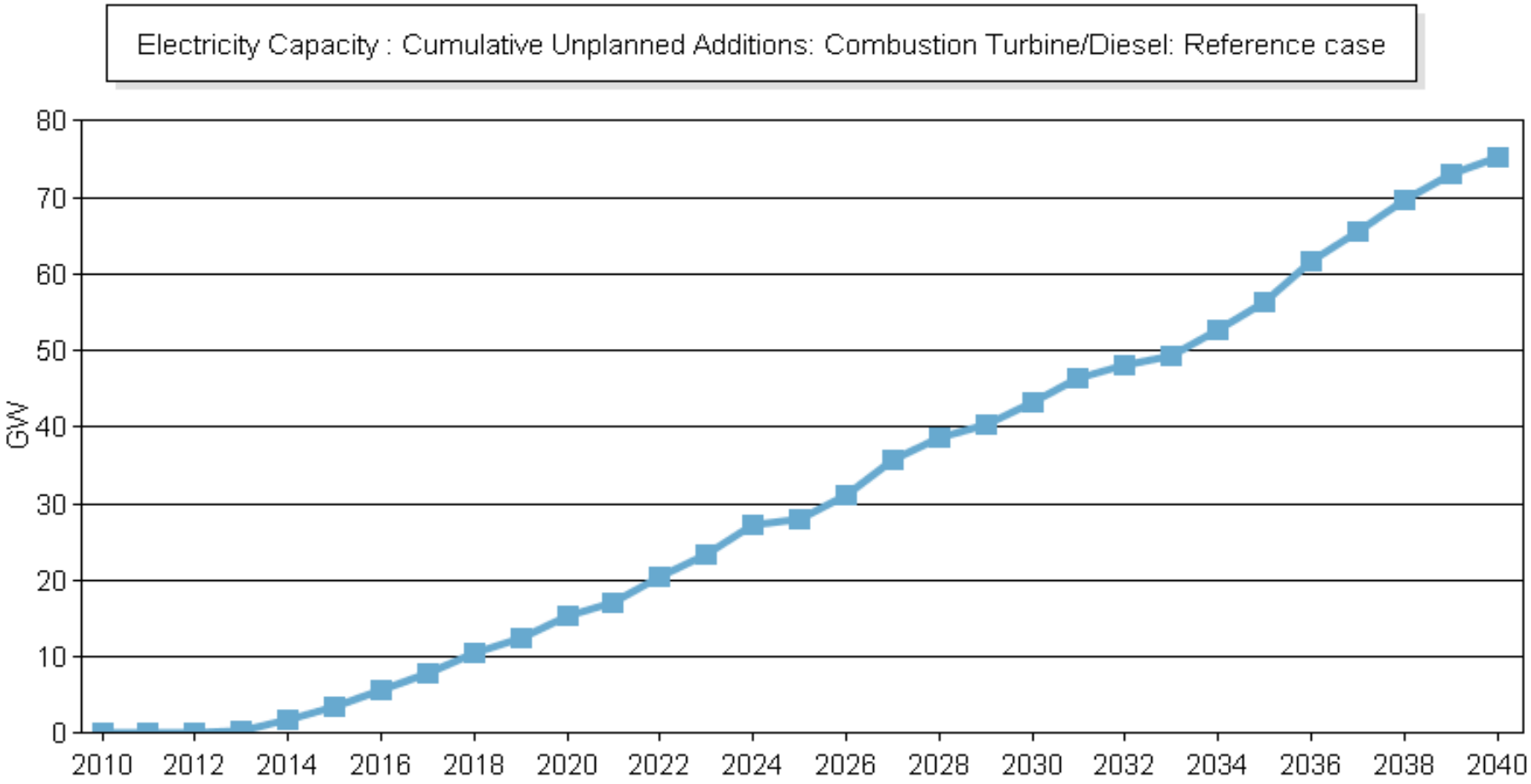
- Deregulated wires companies can't own "generation'
- Integrated study found that 5 GW of energy storage would be viable/ideal for ERCOT system
- Based on $350/kw price target in 2018



AZ Market Update

- ESA participated in effort to open up AZ market to storage
- Require APS to evaluate storage, DR, and efficiency as alternative to building or upgrading conventional power between 2015 and 2021
- 3rd party reviewer for all peaker proposals
- If peaker is chosen, 10% of capacity must still be storage
- Over 5 GW of projected peaker need

40 GW Peak Generation Needed in Next 15 Years



eia Independent Statistics & Analysis U.S. Energy Information Administration

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Policy Drivers and How to Move the Needle

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Policy Brings Capitol Investment, Lower Cost

Equity **Profits**	**Revenues**	**Costs**
	e.g. Pay For Performance, additional competitive markets ➢ FERC/ISO's	e.g. Investment Tax Credit, MLP's, leveling the playing field ➢ Congress
Debt **Risk**	**Revenue Certainty**	**Technology Risk**
	e.g. PPAs, RFPs, IRP, TOU Rates ➢ States, FERC	e.g. Loan guarantees, ARPA-e, NY-BEST ➢ States, DOE, Congress

Sample System with Incentives

- Hypothetical system installed in CA could take advantage of:
  - SGIP - $2/watt for ES
  - Fed Tax Credit – 30%
  - TOU Rates - $500/kWh over system lifetime
- System could cost over $1400 per kWh, or $7000 for a 5 kWh system, and still breakeven
- Policy and regulation needed to drive market creation


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