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Locational Pricing in Poland

Lessons from experience

Expert Panel Discussion

Warsaw

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1 Context and issues definition

Context:

- Variable RES will grow in Poland
- System flexibility increasingly valuable for security of supply at reasonable cost
- Market design should expand system flexibility:
  - Maximize value of scarce investment capital & assets
  - Draw in widest suite of flexibility options
  - Support optimal portfolio of resource investment
- Approach to locational pricing a key factor
- “Bidding zones” debate in Winter Package: opportunity & risk

What is “locational pricing”?

- Market function rests on the principal of “marginal cost pricing”
- Absent congestion, marginal cost (almost) the same everywhere
- Even efficient grids experience congestion
- With congestion, marginal cost different at each location affected
- “Locational pricing” central to marginal cost pricing – often a major contributor to marginal cost
- Prices that socialize congestion costs create market distortions & risks that must be offset administratively

Locational pricing options

- “Large zones” – single-price market
- “Small zones” – zonal or market-splitting
- Locational marginal pricing – LMP

Large zones (single-price)

a) Uniform price across all locations increases (apparent) liquidity

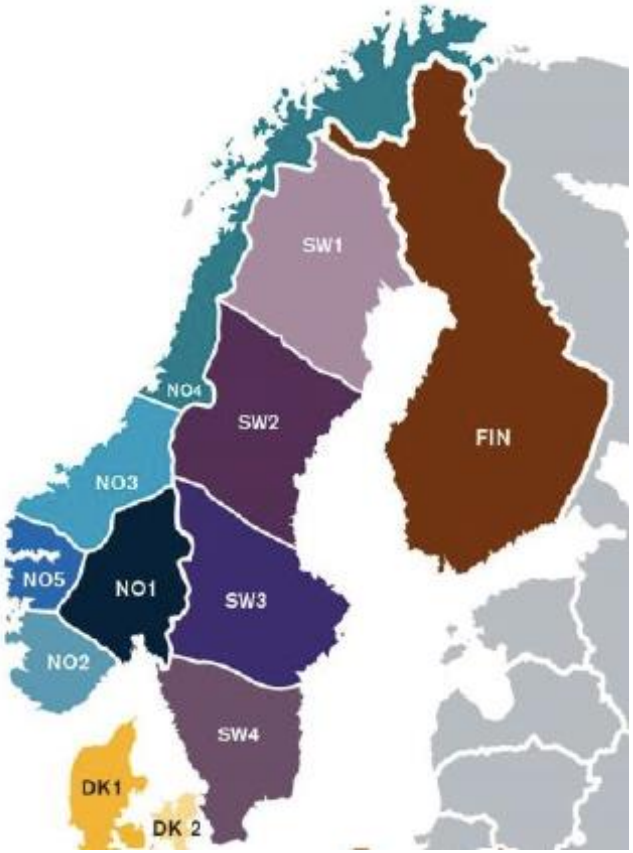
b) Zonal boundaries reflect political borders, not grid constraint locations

c) All congestion resolved administratively, costs socialized

d) Political boundaries invite political “constraints”

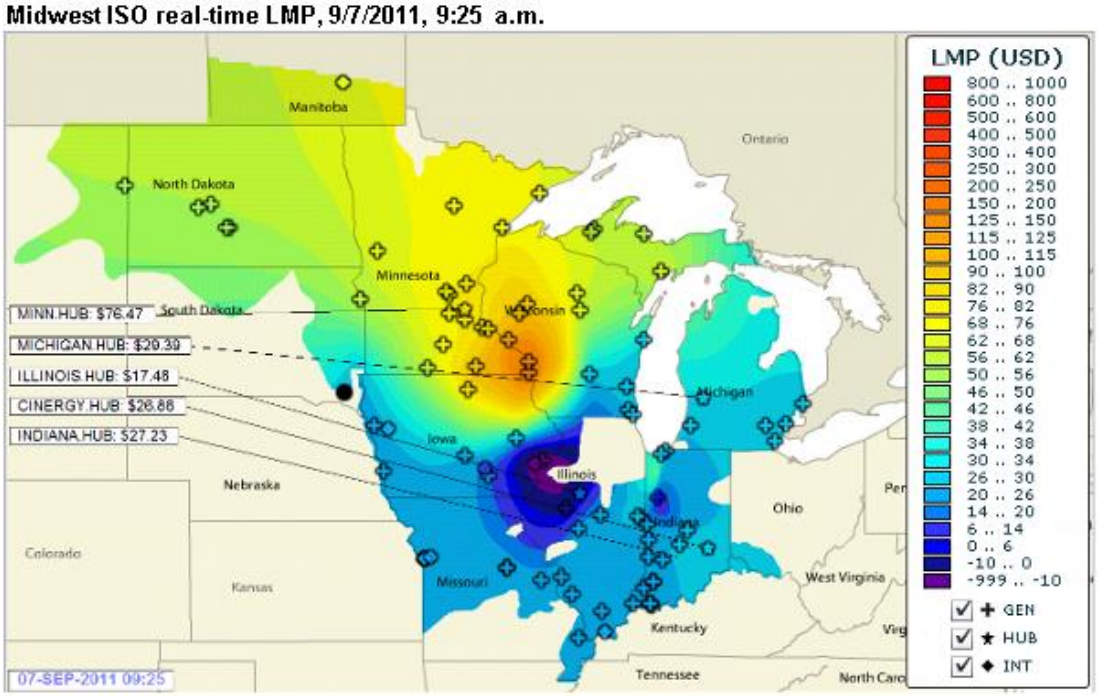
e) Challenges: Limited visibility; disconnect between prices & costs creates risk, requires withholding of capacity; loss of flexibility; cost; perverse incentives

Small zones (zonal or market-splitting)



a. Uniform prices across all nodes within defined zones
b. Boundaries track major grid constraints
c. Intra-zonal congestion resolved administratively, costs socialized
d. Challenges: Constraint locations shift; disconnect between prices & costs persists; market concentration

Locational Marginal Pricing (LMP)



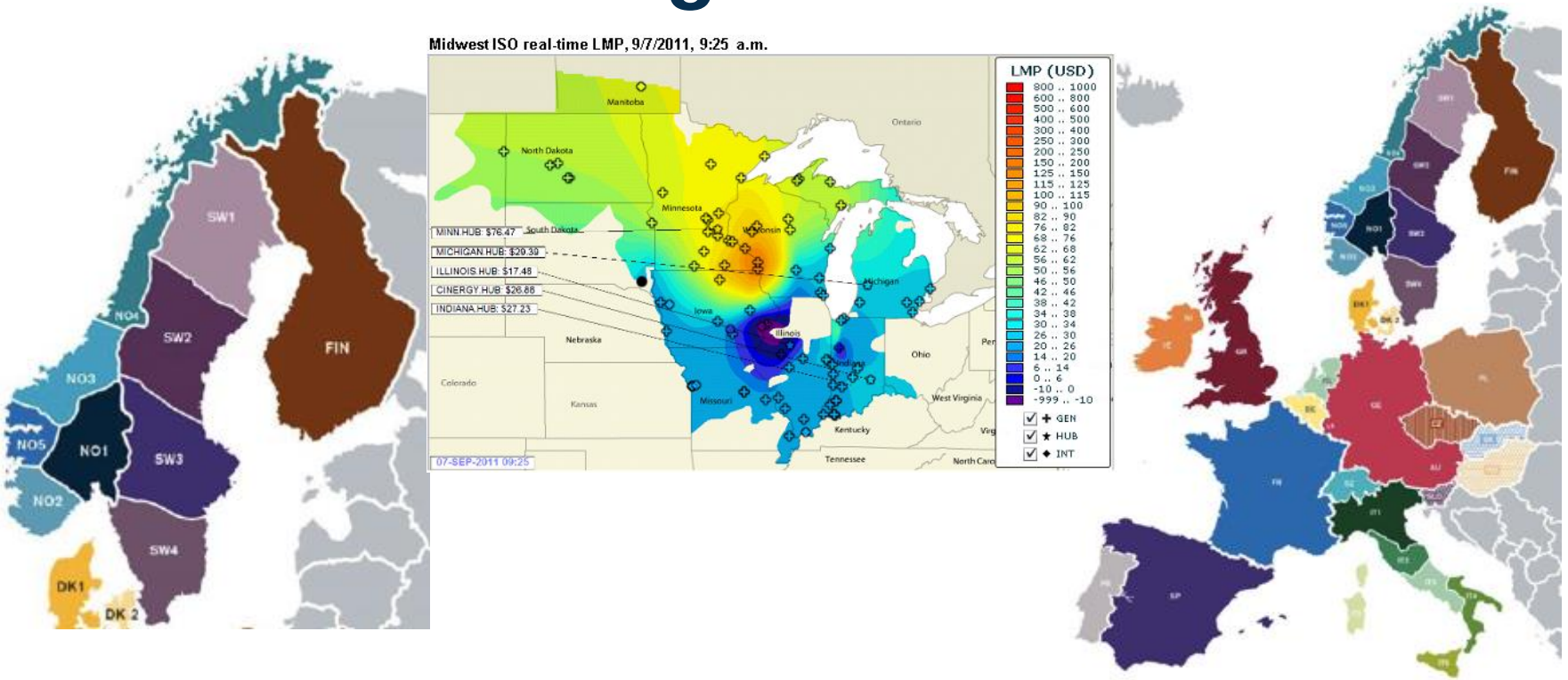
a) Most consistent with reality and market theory

b) Price at each “node” based on marginal cost to serve next increment of demand at that location

c) Prices, capacity schedules respond flexibly to physical grid conditions

d) Challenges: localized liquidity, mkt. power issues; complexity; setup cost

The Winter Package



- Winter Package process is considering “small bidding zones”
- The “fix” shares many of the challenges of “large zones”, plus new ones, with limited benefits
- LMP best in theory, maximizes flexibility; what about challenges?

2 Locational pricing in practice

Locational pricing around the world

LMP:

ISO New England
New York ISO
PJM (Mid-Atlantic U.S.)
Mid-Continent (U.S.) ISO
Southwest (U.S.) Power Pool
California ISO
ERCOT (Texas)
IESO (Ontario)
EIM (Western N. America)
New Zealand
Singapore
Argentina
Chile
Mexico
Philippines
Brazil

Small zone:

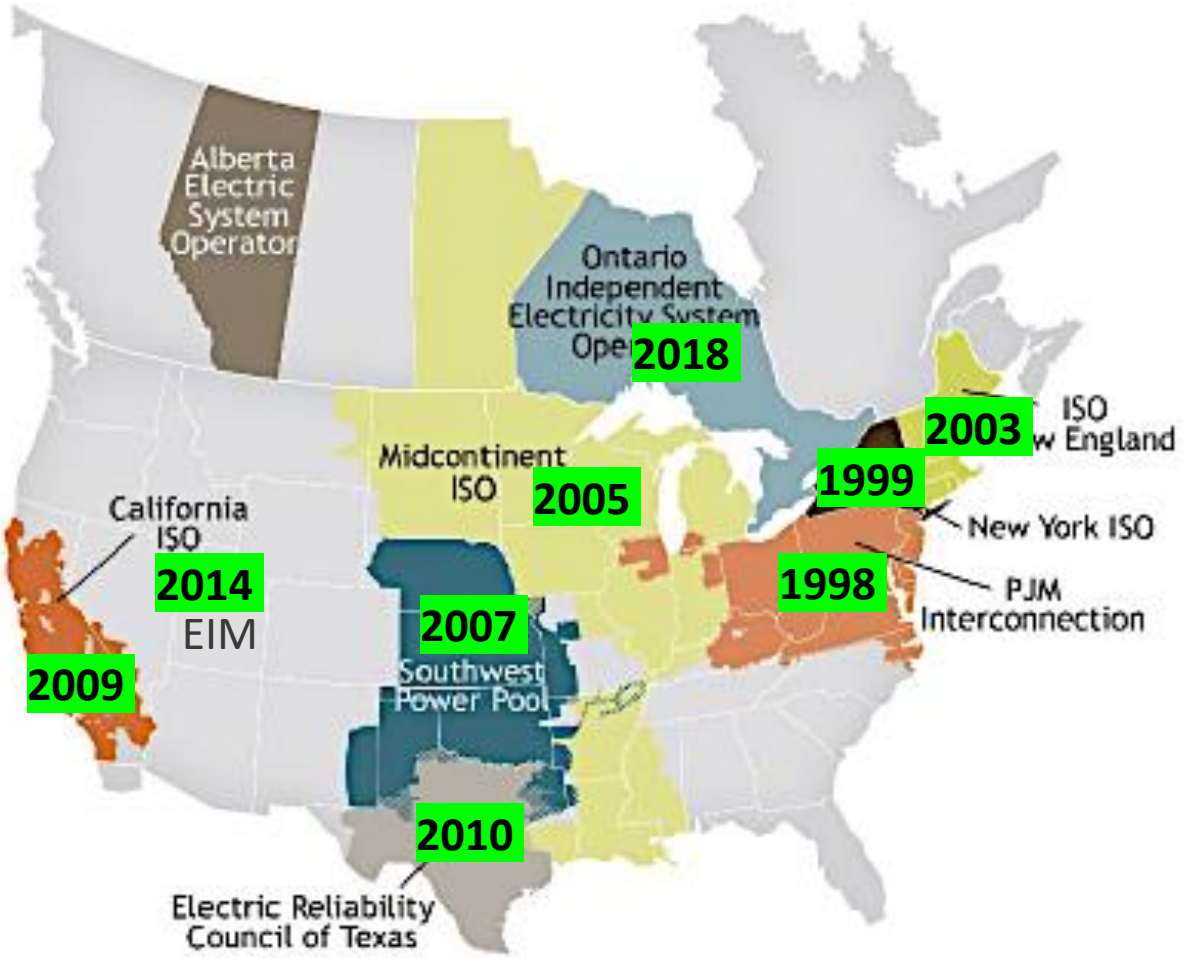
Nordic Market
Italy
Japan

Large zone:

IEM (Cont EU+UK/IE ex IT)
AESO (Alberta)
Colombia

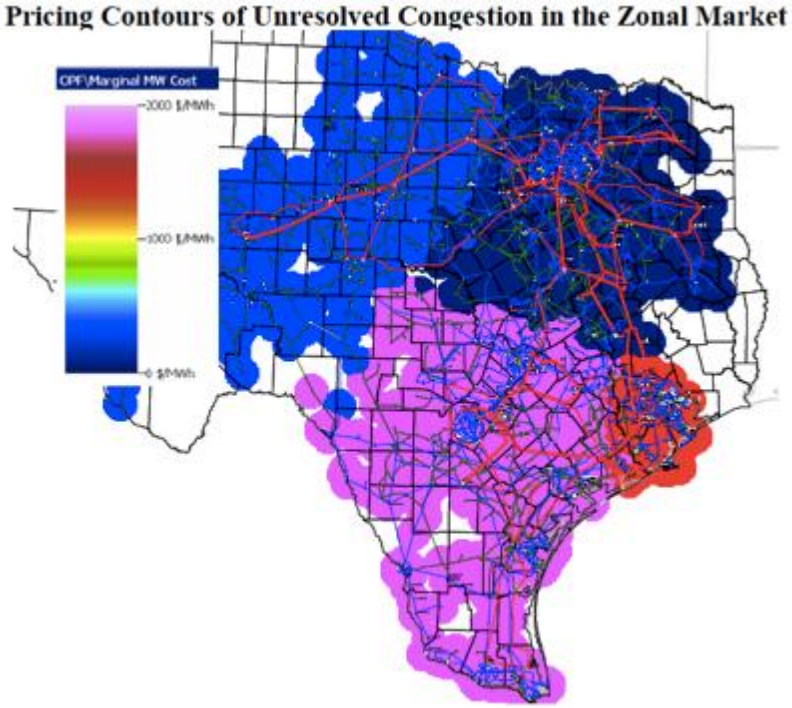
*Australia, as a gross pool, is difficult to characterize; exhibits characteristics of political zones, small zones, and LMP

LMP adoption in North American mkts.

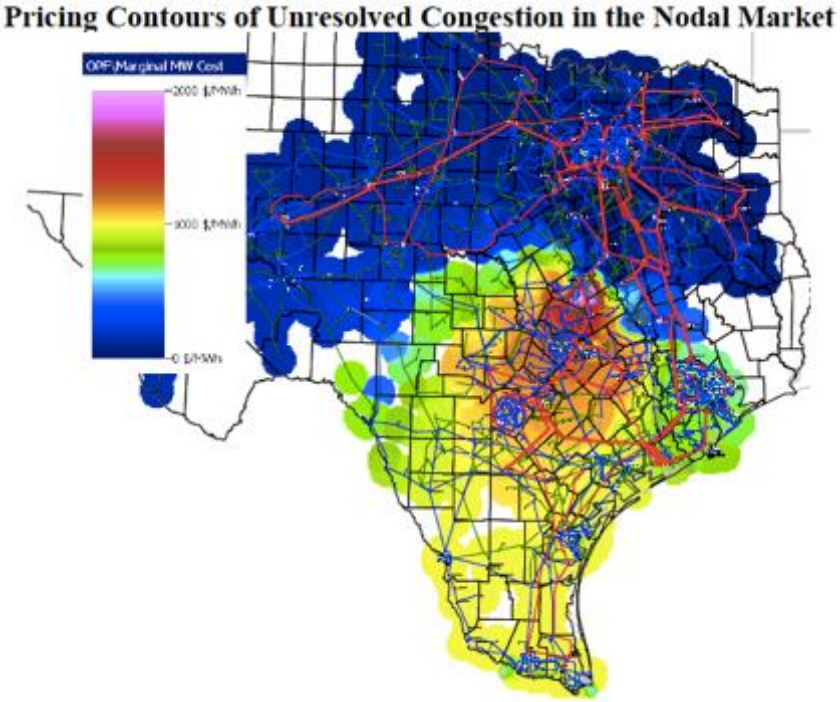


ERCOT (Texas) locational pricing contours

Zonal

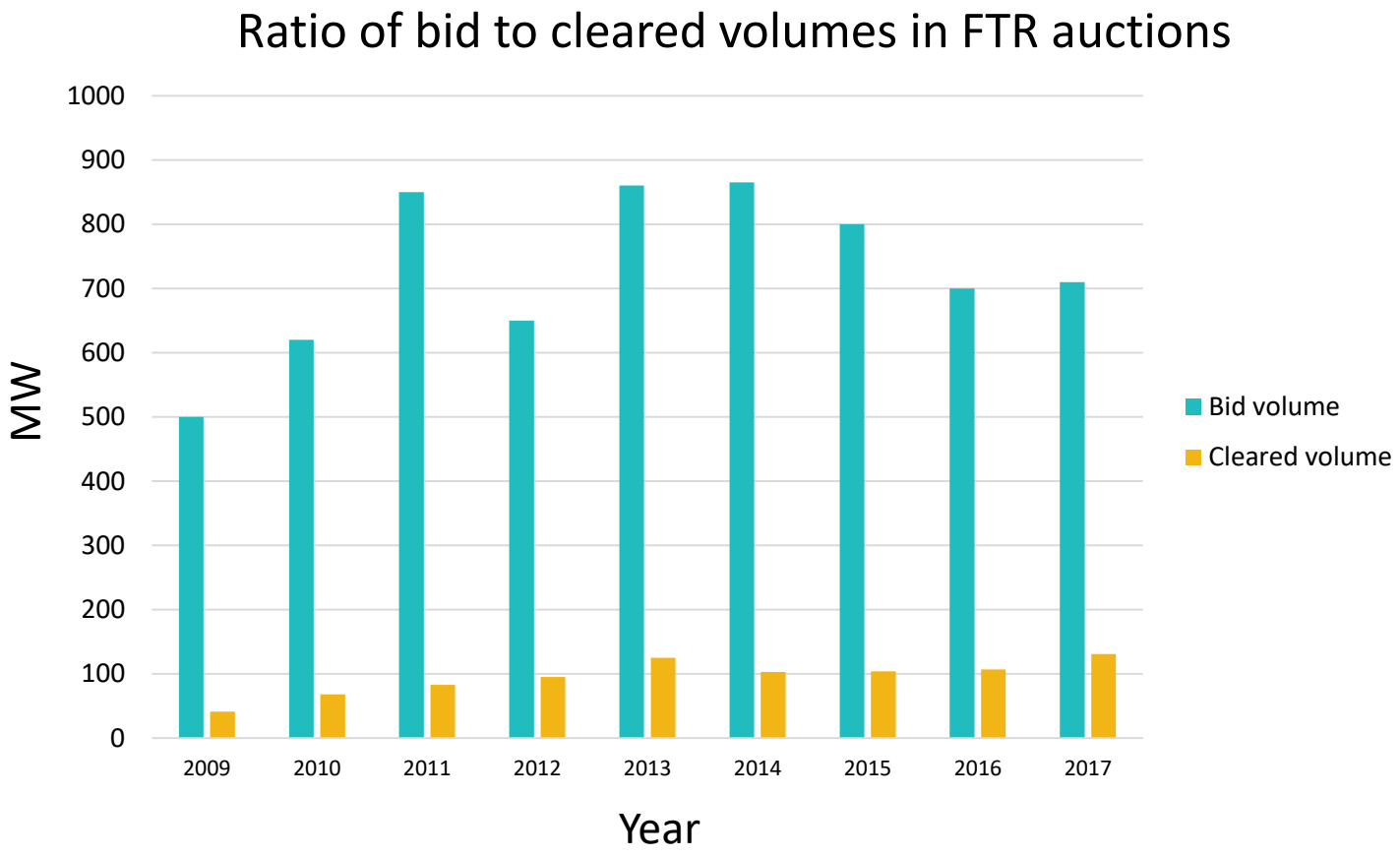


LMP



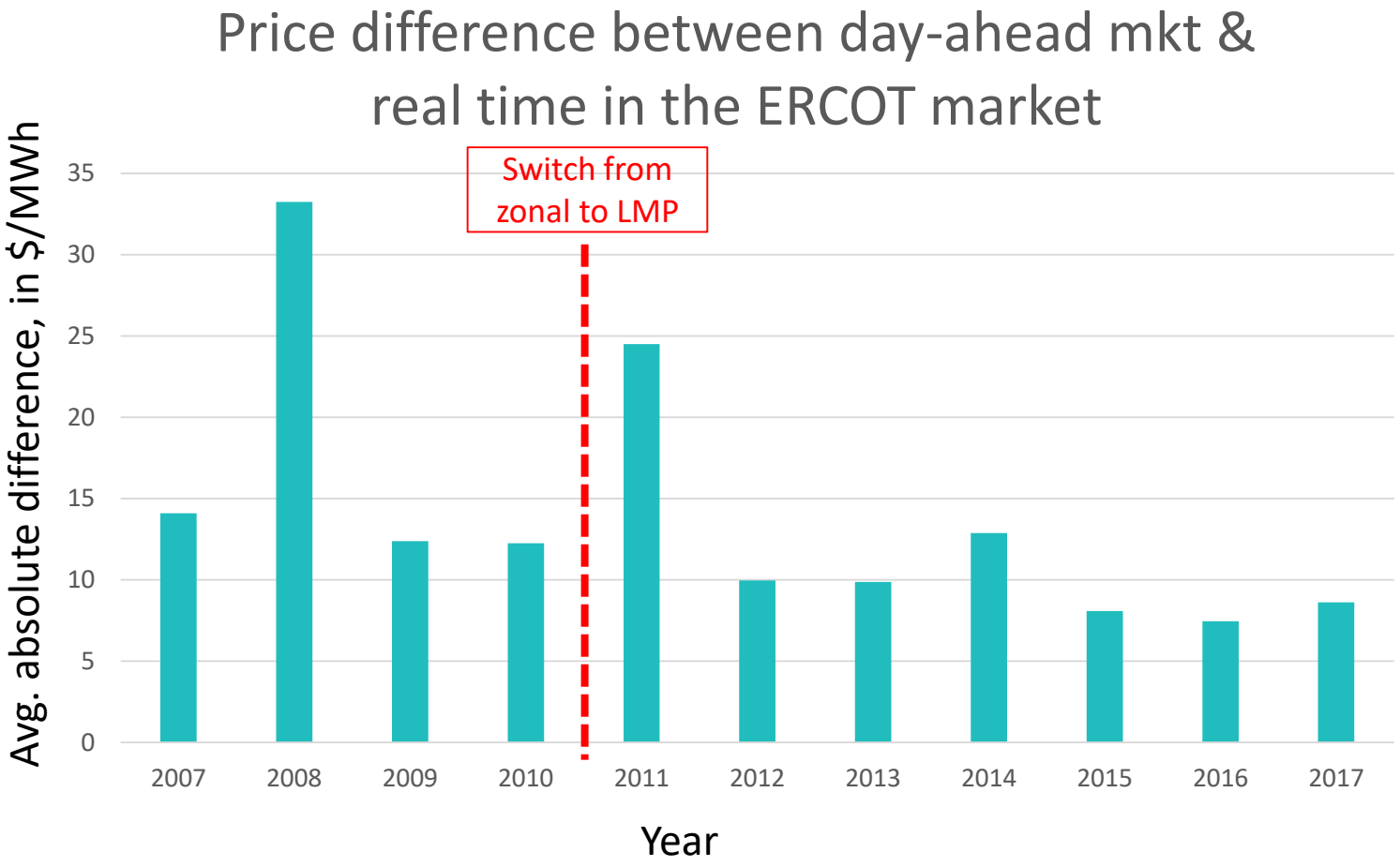
Source: ERCOT 2008 State of the Market Report

Risk management trading liquidity



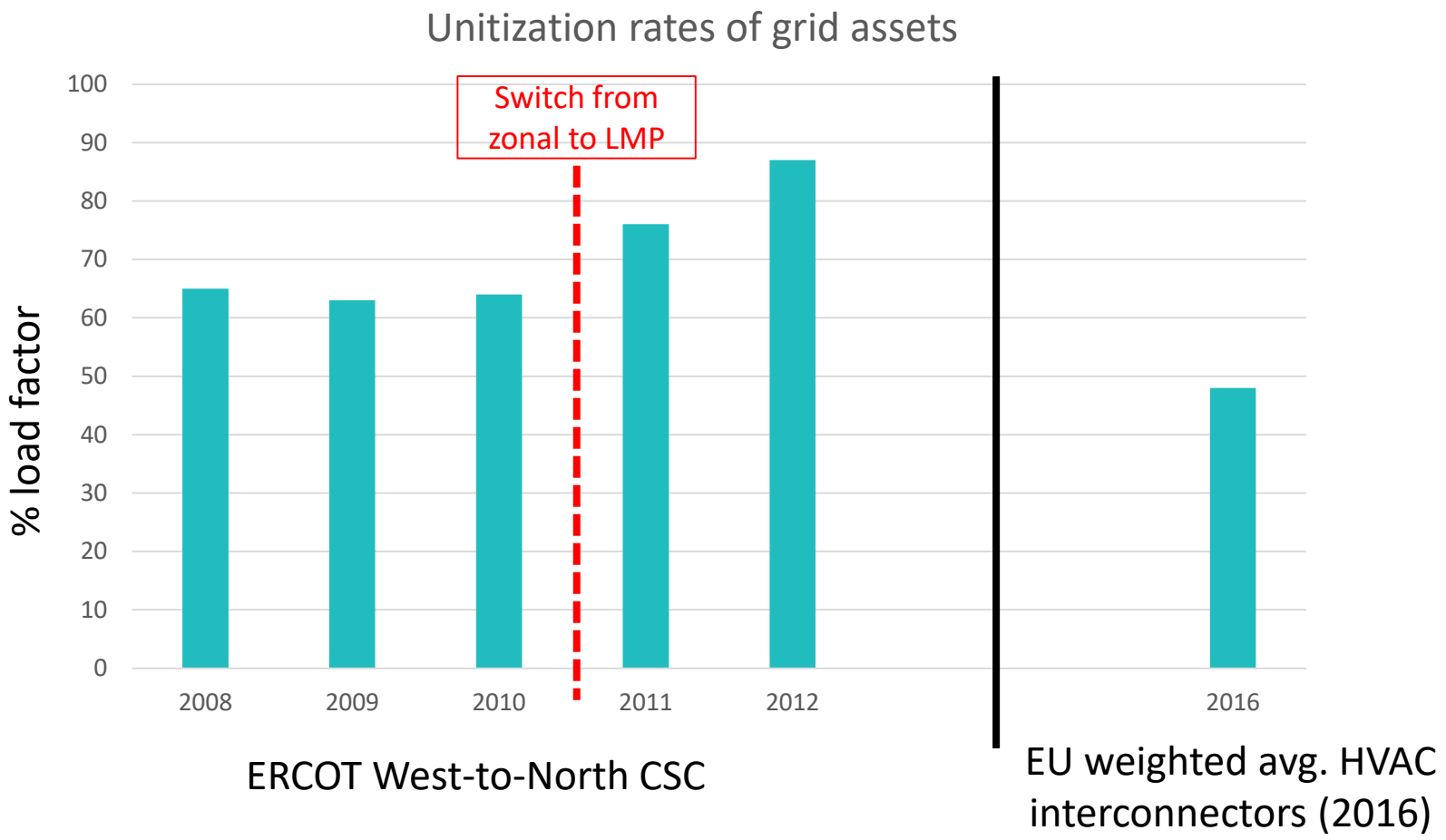
Source: PJM 2017 State of the Market report

Trading efficiency (liquidity metric)



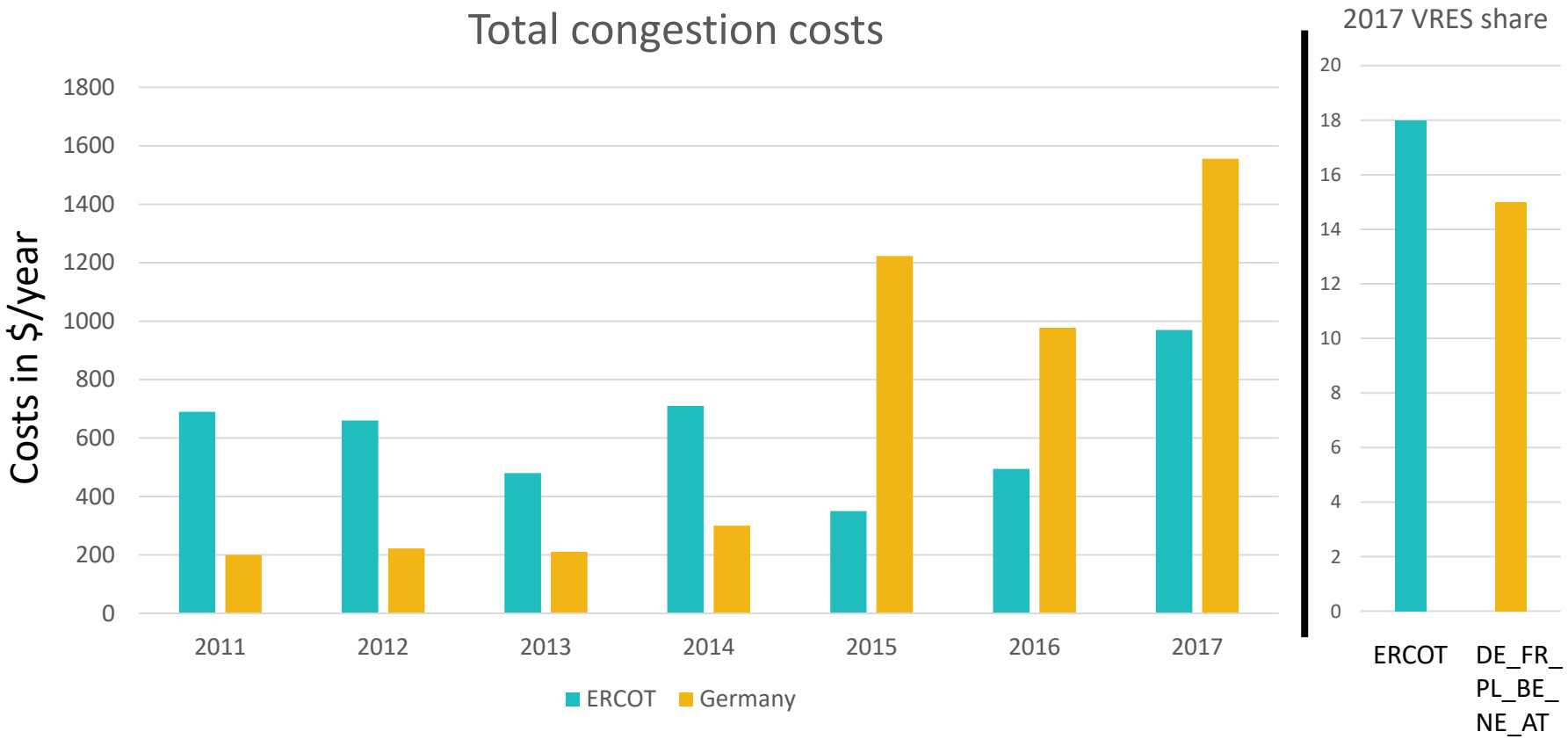
Source: ERCOT annual State of the Market reports

Use of critical grid assets



Sources: ERCOT annual State of the Market reports; ACER & CEER
2008 datum abstracted from IMM graphic presentation; 2009 is estimated

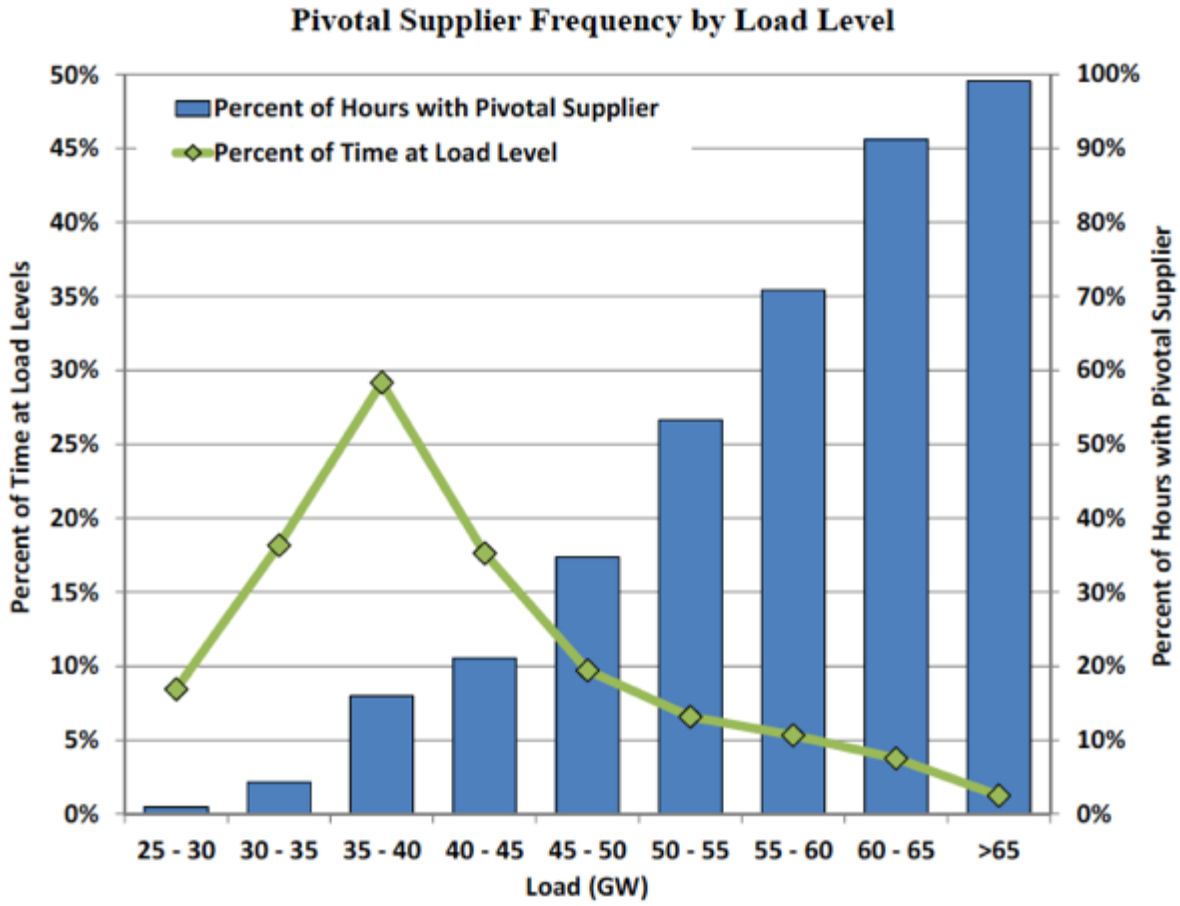
Congestion costs



German costs converted to US $ at 0.9 € to the $; ERCOT 2017 reflects, *inter alia,* impact of Hurricane Harvey

 Sources: ERCOT annual State of the Market reports; BnetzA; DG Energy

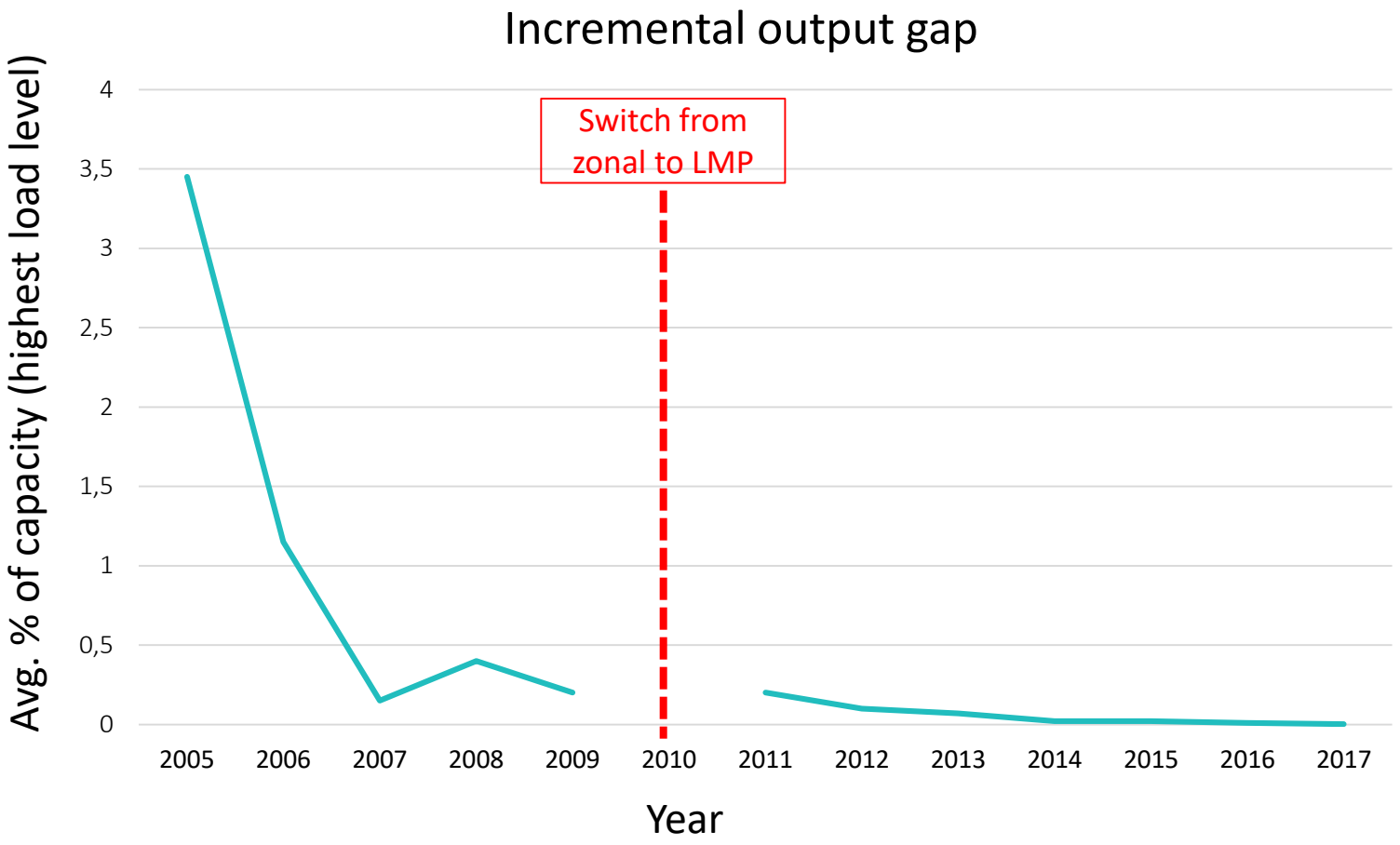
Market power (competitiveness) – structural test



2017: pivotal supplier approx. 25% of hrs. (vs. avg. 13% from 2005-2009)

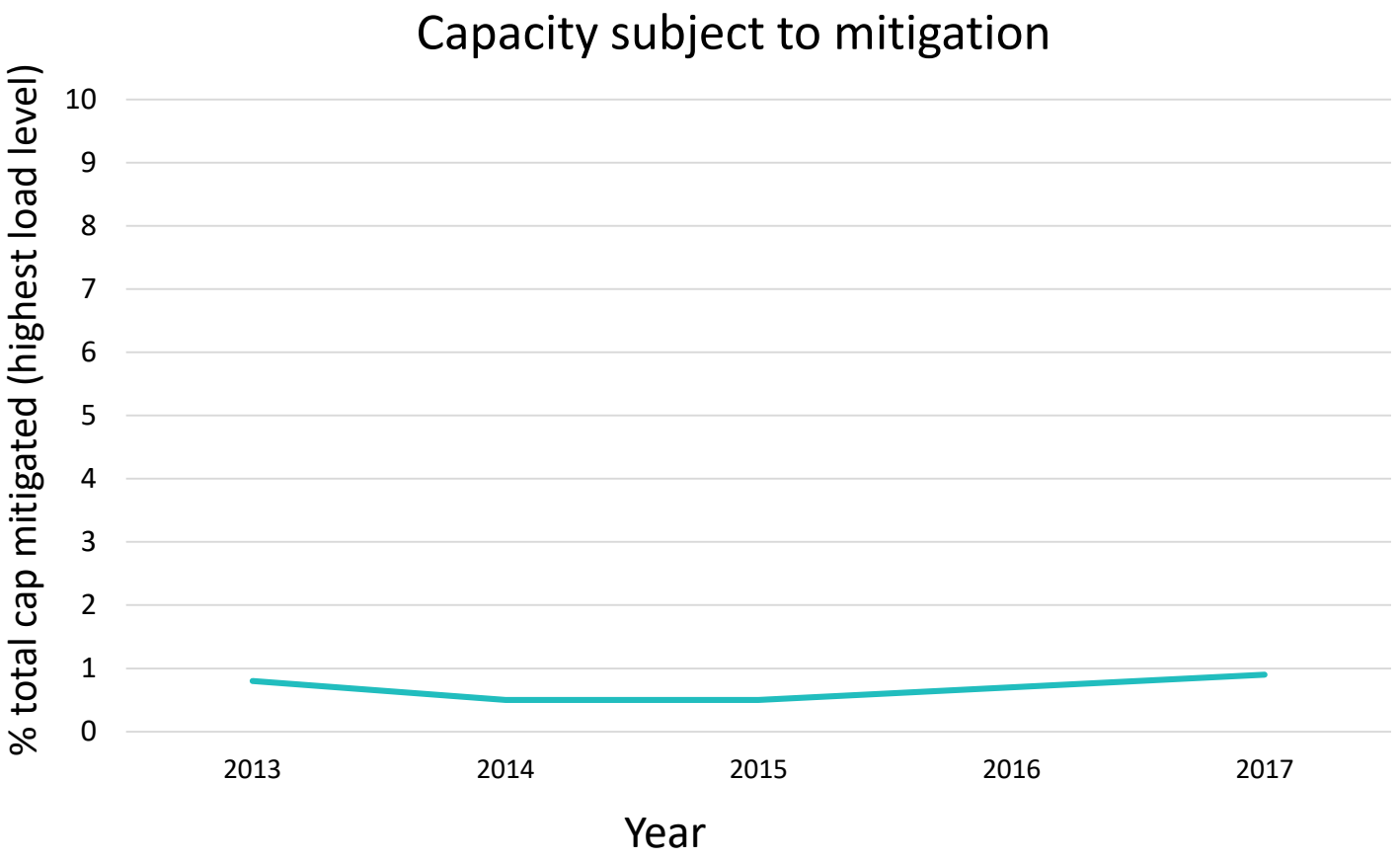
 Sources: ERCOT 2017 State of the Market report

Market power – conduct test



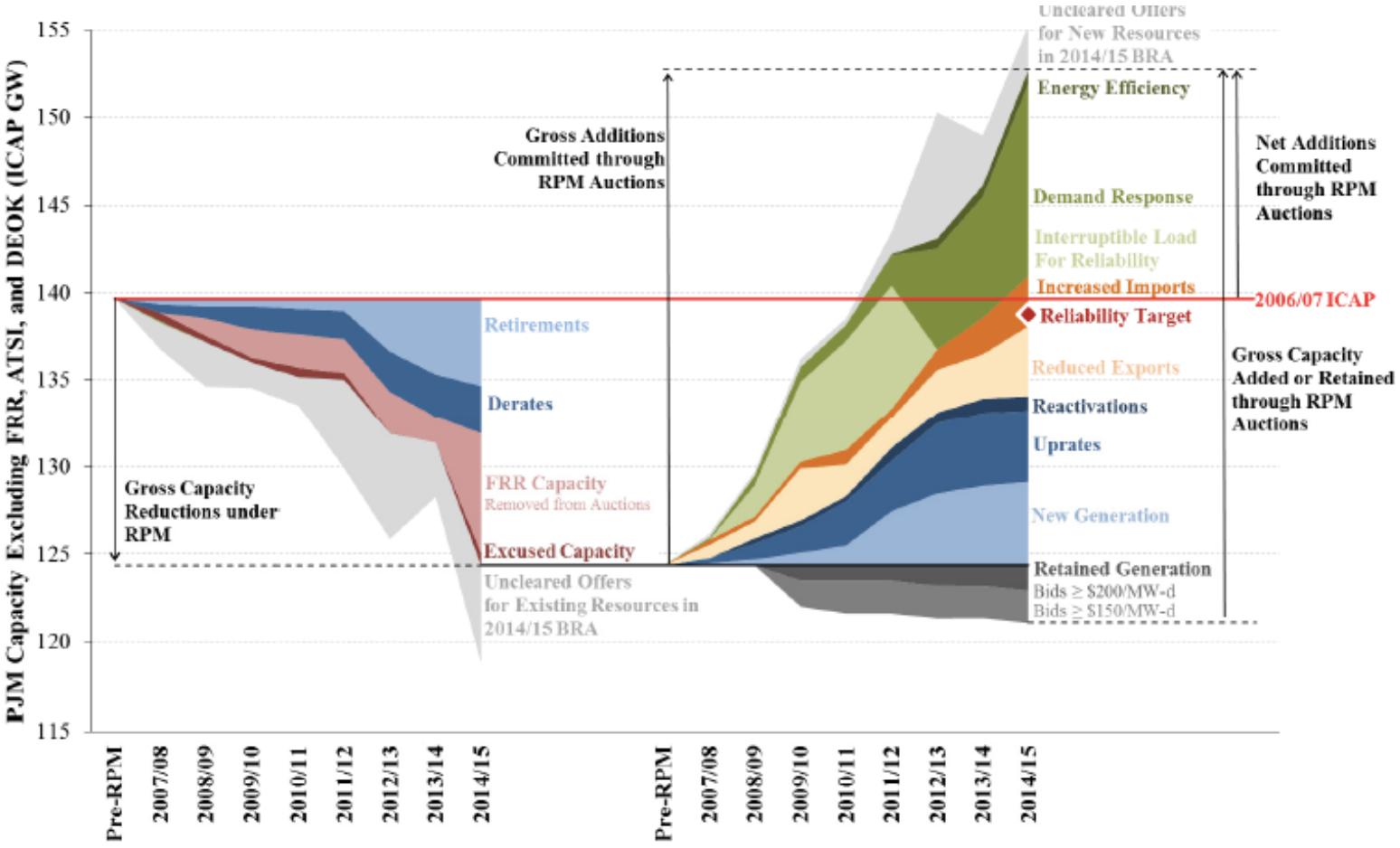
Source: ERCOT State of the Market reports

Market power – impact test



Source: ERCOT State of the Market reports

Investment for security of supply



Source: 2nd Performance Assessment of PJM's Reliability Pricing Model (The Brattle Group, 2011)

2 Takeaways

Experience with LMP:

- Great majority of markets outside of Europe switched from zonal to LMP over past 20 years
- Recent switching decisions heavily influenced by growing vRES
- ERCOT case (switched Dec 2010) – improvements in:
  - Utilization of critical system assets (generation + transmission)
  - Trading efficiency
  - Lower average energy prices
- Good design can neutralize market power abuse
- Tools available to achieve robust trading liquidity
- Good support for investment in needed generation & transmission

About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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“Locational pricing” definition

- **Locational marginal pricing** is a way for wholesale electric energy **prices** to reflect the value of electric energy at different locations, accounting for the patterns of load, generation, and the physical limits of the transmission system.

Source ISO – New England