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) Virtually 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)

Midwest ISO real-time LMP, 9/7/2011, 9:25 a.m.

- Most consistent with reality and market theory
- Price at each “node” based on marginal cost to serve next increment of demand at that location
- Prices, capacity schedules respond flexibly to physical grid conditions
- 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?
Locational pricing in practice
## Locational pricing around the world

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<td>New York ISO</td>
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<td>PJM (Mid-Atlantic U.S.)</td>
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<td>Mid-Continent (U.S.) ISO</td>
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<td>Southwest (U.S.) Power Pool</td>
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<td>California ISO</td>
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<td>ERCOT (Texas)</td>
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<td>Brazil</td>
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<th>Small zone:</th>
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<td>Nordic Market</td>
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<td>Italy</td>
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<td>Japan</td>
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<th>Large zone:</th>
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<td>AESO (Alberta)</td>
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<td>Colombia</td>
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*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

Source: ERCOT 2008 State of the Market Report
Risk management trading liquidity

Ratio of bid to cleared volumes in FTR auctions

Source: PJM 2017 State of the Market report
Trading efficiency (liquidity metric)

Price difference between day-ahead mkt & real time in the ERCOT market

Source: ERCOT annual State of the Market reports
Use of critical grid assets

Unitization rates of grid assets

Switch from zonal to LMP

ERCOT West-to-North CSC

EU weighted avg. HVAC interconnectors (2016)

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

Regulatory Assistance Project (RAP)® 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

Incremental output gap

Avg. % of capacity (highest load level)

Year

Switch from zonal to LMP

Source: ERCOT State of the Market reports
Market power – impact test

Capacity subject to mitigation

% total cap mitigated (highest load level)

Year

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.

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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