Harvard Electricity Policy Group
Load Granularity

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Background

• California ISO (CAISO) currently uses load aggregation point (LAP) pricing to loads
  – All customers in each investor-owned utility’s service territory pays load-distribution factor (LDF) weighted average price
  – Three major pricing areas for all CAISO load – PG&E, SCE, SDG&E

• Generation units are paid or pay the locational marginal price (LMP) at their node for all energy they buy or sell

• CAISO proposing introduction of greater pricing granularity for load based on geographic locations
  – Federal Energy Regulatory Commission (FERC) ordered increased granularity (load zone disaggregation) to start April 1, 2012
  – California ISO plans to file for 1 year delay
Pricing Granularity Impacts Both Utility/Non-Utility Customers

• Difference of geographical granularity between wholesale market settlement and retail rate making could result in unintended consequences

• On limited basis California allows for customers to depart from host utility and receive 3rd party supply (Direct Access or Community Choice Aggregation)

• Host utilities currently charge average rates without geographic adjustments (per the CPUC)

• If customer can depart from utility:
  – Creates opportunities for customers in lower-priced locations to avoid higher average rates
  – Customer in high-priced areas have incentive to stay in host utility
  – Average costs will increase for IOU bundled customers as low-priced customers depart
Initiative Lacks Support From Key Stakeholder

• CA Public Utilities Commission (CPUC) does not currently support geographically differentiated rates:
  – Distortions and perceived inequities created for both business and residential customers
  – Changes at wholesale level may not provide the market with the benefits assumed by CAISO
  – "...disaggregating load at this time would be costly, uncertain, and premature." – CPUC stakeholder comments, January 19, 2011

• Proceeding on Direct Access departing load charge
  – Power charge indifference amount – customer’s power rates designed to keep unbundled customer indifferent to exit
Stated Benefits of Load Granularity Need to be Quantified

- CAISO has not conducted a cost-benefit analysis to determine effectiveness of a granular energy rate
  - Energy component is just one part of total rate charged
  - All other utility rate components are result of political process inefficiencies
  - Just adding up the LMP does not ensure the price signal would be more efficient than the status quo
  - For example, if a Tier 5 customer is already paying more than the marginal cost of service and the geographic rate is higher, the new rate would be less efficient

Despite geographical differences, majority of customers pay at Tier 1 and Tier 2 (~ 60%)
Much of the Benefit From Locational Price Signals can be Captured in Today’s Market

• Proxy Demand Response (PDR)
  – Allows existing DR programs to participate in CAISO markets
  – PDRs can respond to custom LAP price signals that align with their actual physical location

• Temporal rates – Time of Use (TOU)
  – Full deployment of smart meters and rates more aligned with the time of use will further enhance demand response (based on time not geography)

• Smart Meter deployment
  – As of 2011, over 2 million meters installed
  – End of 2012, 4.5 million meters installed
Geographic pricing presents limited benefits

- Minimal geographic price diversity found in highly populated areas
- More price diversity is found over time

Time differentiated annual prices

Areas of dense populations: 500K - 10 mil

Geographic differentiated annual prices
Unclear Relationship Between Geographic-Based Rates and Investment Decisions

- Typically end-use customers would barely consider electricity rates in location decisions.

- For businesses dependent on electricity costs, in most instances, location decision may be to relocate.

- Other cost element such as fuel source is likely more significant in location decisions.

Locational price signals are a minor component of an end use customer’s investment decisions.
Challenges to Implementation

• Cost implications:
  – Stakeholder development of new models and tools
    • Bidding, scheduling systems, forecasting and analysis
    • At least initially the change over will introduce additional errors
  – Scheduling systems and ISO interfaces
    • New functionality to manage schedules and settlements
    • Likely translates to costly new systems

• Potential conflicts with State policy objectives
  – CPUC can “undo” LMP signals via changes to wire charges and “indifference” charge, potentially leading to new costs to implement, but no new price signals

Nodal pricing increase number of prices from 3 load forecast zones ultimately to 3,000 nodes
Challenges with Forecasting

- **Short term forecast (daily market participation):**
  - Forecast accuracy - more variation and forecast error in our weather forecasts by sub-regions than system overall
  - Short-term load forecasts are very sensitive to weather

- **Long-term forecast (planning)**
  - Benefits of sub-regional forecasts are speculative at best
    - Historical data by sub-LAP not currently available
  - Minimal gain in long term forecasting
    - Significant investment decisions are not based on small geographical differences in wholesale rates
  - Adverse impacts to short-term forecasting
    - More costs involved in forecasting long or short term if we break the area into sub-LAPs

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\text{Load} = \beta X + \varepsilon
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\text{Load} = \beta X_1 + \varepsilon_1
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\[
\text{Load} = \beta X_2 + \varepsilon_2
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\[
\text{Load} = \sum_{i=1}^{N} \text{Load}_i
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Is Geographical Pricing the Best Avenue to Achieve Market Efficiency?

- Not the right time to implement this change:
  - CPUC does not support current proposal
  - CAISO has not analyzed the costs and benefits
  - CPUC can undo if proposal goes forward

If we are seeking to increase pricing efficiencies, there is much greater potential associated with:

- Time of Use (TOU) rates
- Home Area Networks (HAN)

Technology reacting to price signals
Questions?
Appendix
Benchmarking

- Varying approaches to load zone disaggregation:
  - NYISO – directed to consider additional capacity zones, but not additional load zones
  - MISO & PJM – they leave load zone determination to their participants, and provide nodal optionality
  - ISO-NE – on their own initiative, they attempted to split one load zone to align with a proposed capacity zone