

# Achieving Generation Adequacy for the CAISO

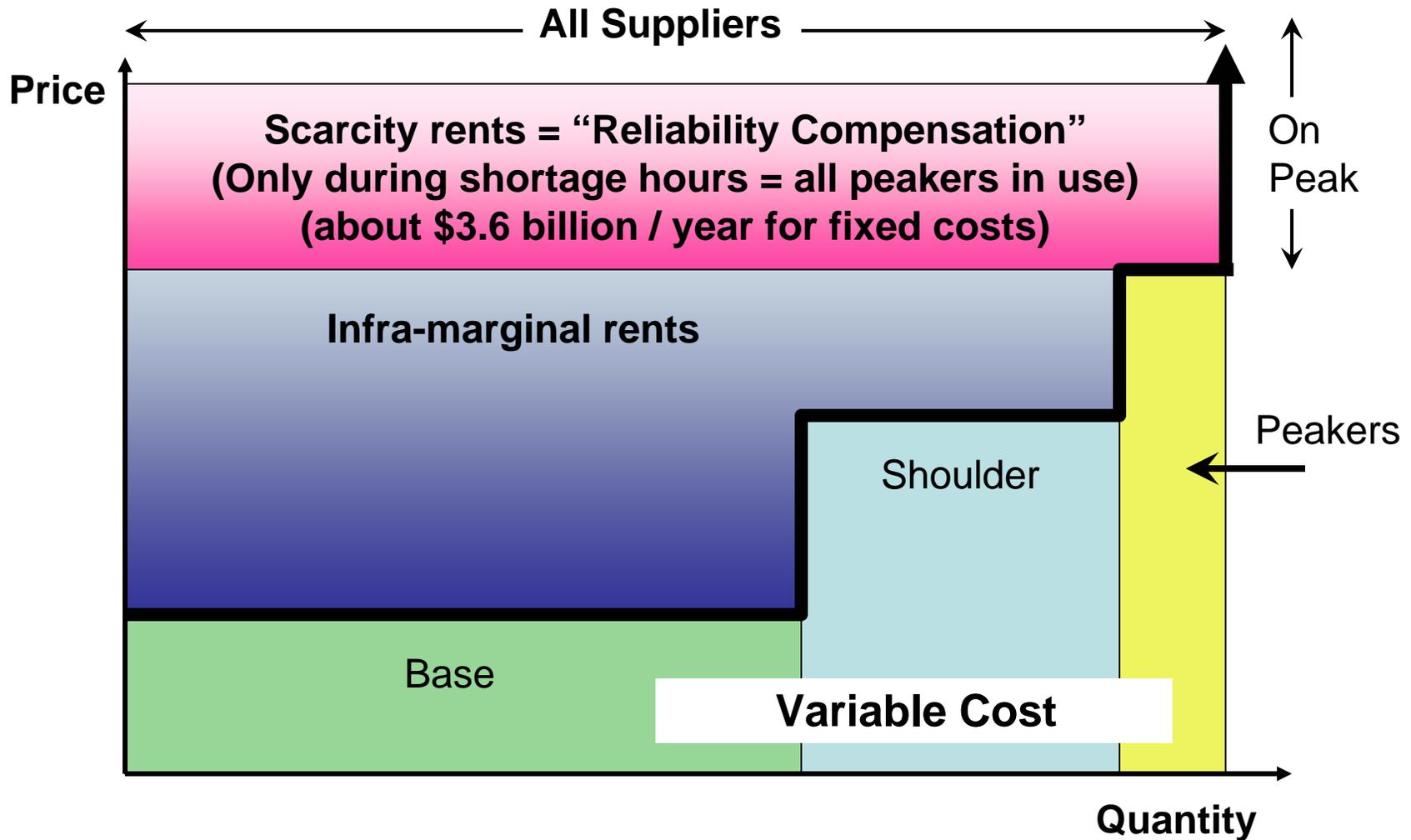
Steven Stoft, Consultant to the CPUC  
FERC/CPUC/CEC/CAISO Joint Conference On  
Energy Infrastructure And Investment In California  
June 2, 2005

# Generation Adequacy: What's the Point?

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- Present energy markets do not have the advanced infrastructure needed to solve the reliability problem.
- Using administrative inputs, the market can be made to provide any level of capacity resources.
- At an “adequate” capacity level, present energy-market designs pay investors too little.
- How much is too little?

# “Mitigation” Reduces On-Peak Fixed-Cost Recovery for All Generators



# “Mitigation’s Two Problems

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- Eastern ISOs appear to be missing over half of required fixed-cost recovery when capacity is at an adequate level.
1. Consumers may be saving **~\$2 billion / year**– but that **won’t pay the cost of plants needed for reliability.**
  2. To duplicate **market incentives**, the missing “Reliability Compensation” should be returned **to the same generators missing it for the same service**, i.e. to generators available during shortage hours for on-peak performance.

# Two Parts of the Solution

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- **Induce load to pay more**
  - For higher price spikes, or
  - For “ICAP,” or
  - For long-term contracts, or
  - For energy options.
- **Induce generators to perform** as they would in an energy-only market.
  - Options are a help.
  - On-peak enforcement of long-term contracts might work.
  - On-peak testing for capacity payments would work.

# Load Won't Want to Pay !!!

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- **Penalties** for not buying capacity, options or contracts **are required**.
- Penalties are the engine that drives RAR.
- They must be **right and proven right**.
- Right = Adequate Resources for Reliability.
- They must be **politically acceptable**.
- With some designs this is hard, with others it is much harder.

# Are Administrative Penalties Needed? (**Yes**) Can't "the Market" Do It? (**No!**)

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- Adequate Capacity  $\leftrightarrow$  Desired Reliability.
- If the market could solve the adequacy problem, it could tell us how much reliability we desire.
- The market has **NO** information about our desire for reliability. You cannot pay more or less and get more or less reliability from the CAISO.
- The energy market works (pretty well).
- The reliability market is broken (totally).

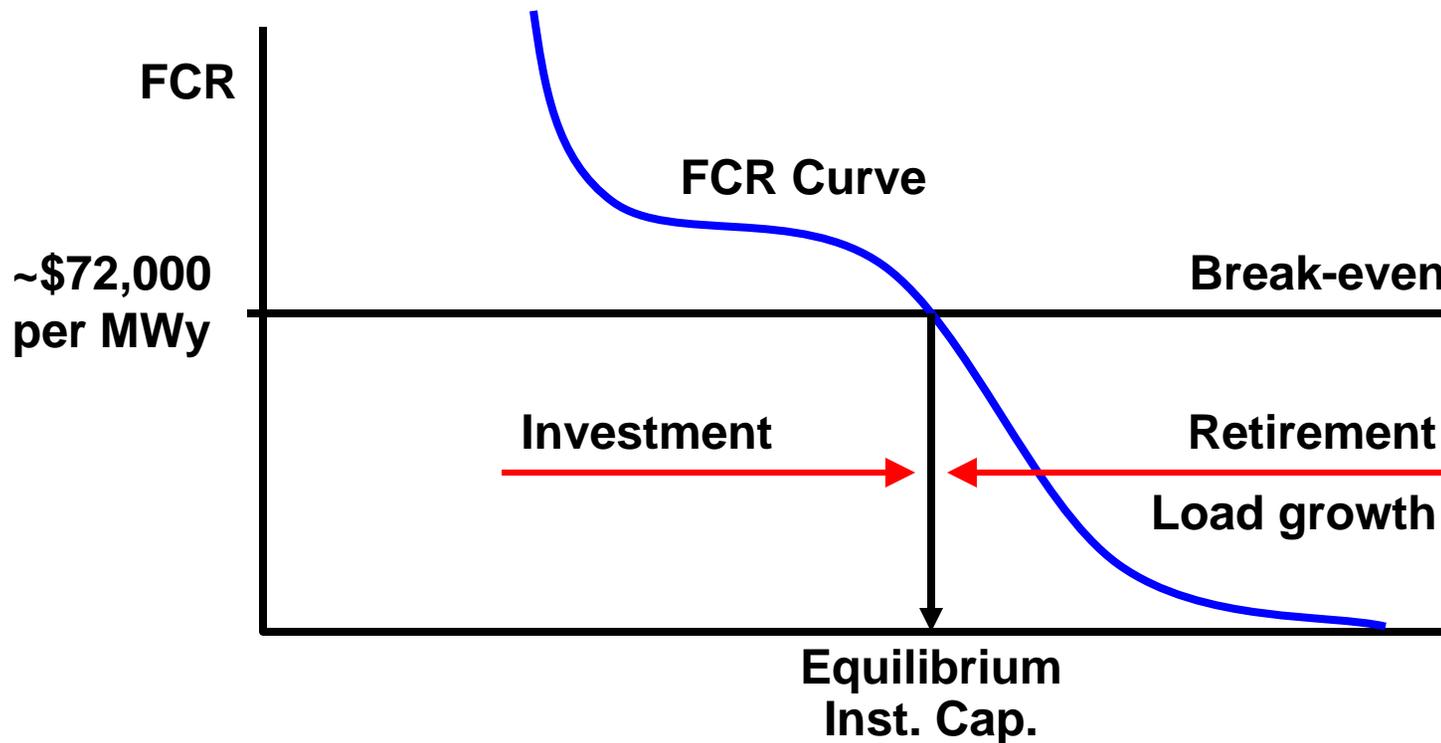
# How to Tell if the Penalties Are Right

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- Many, many “theories:”
  - Less. (The load’s theory.)
  - More. (The generator’s theory.)
- Economics:
  - Pay more than enough when there’s too little capacity.
  - Pay less than enough when there’s too much capacity.
  - Reduce risk and save consumers half a \$ billion / year.

# Penalty → ? → Installed Capacity

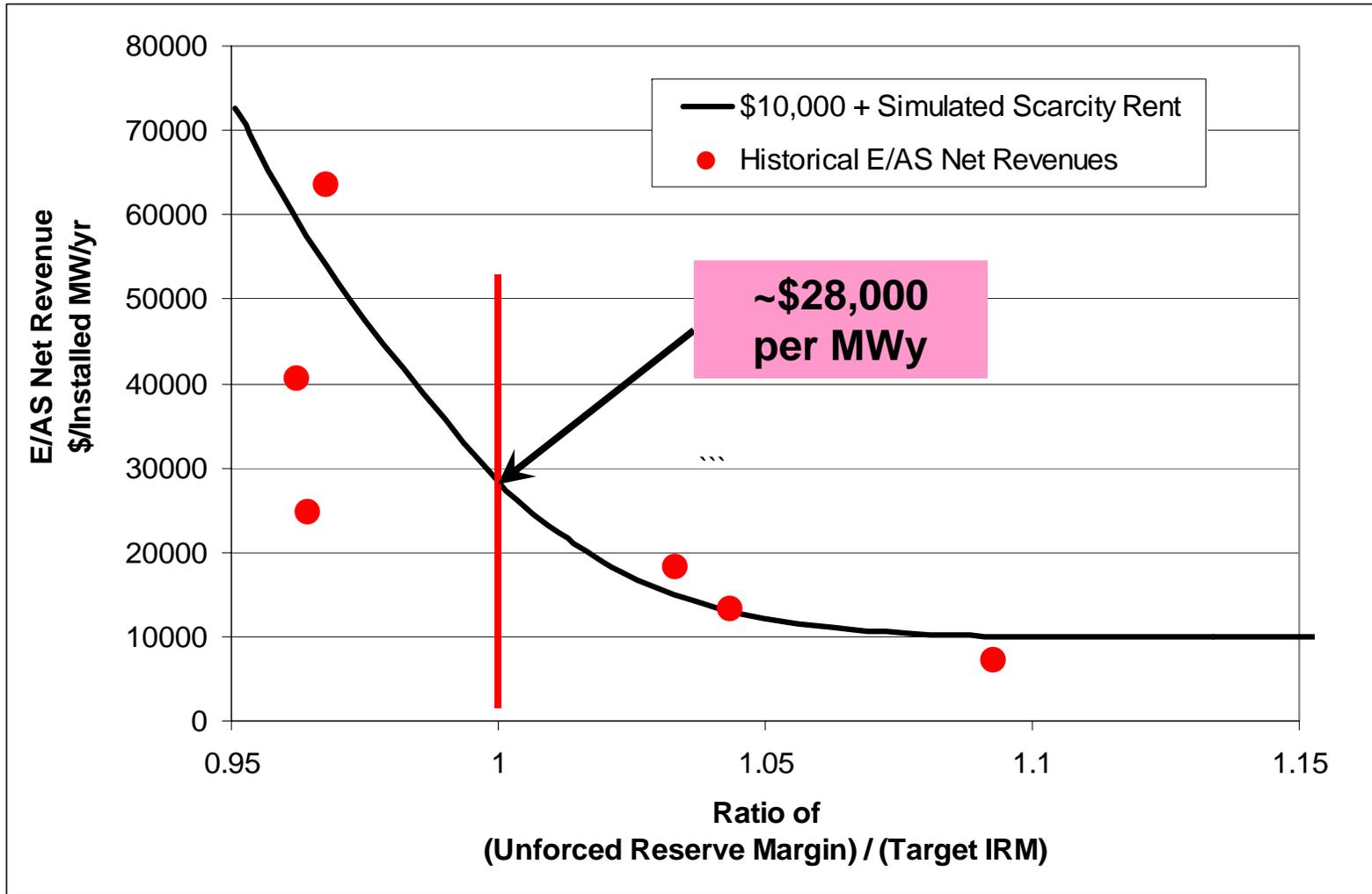
? = (Peaker) Fixed-Cost Recovery Curve  
(the pink part of slide #3)

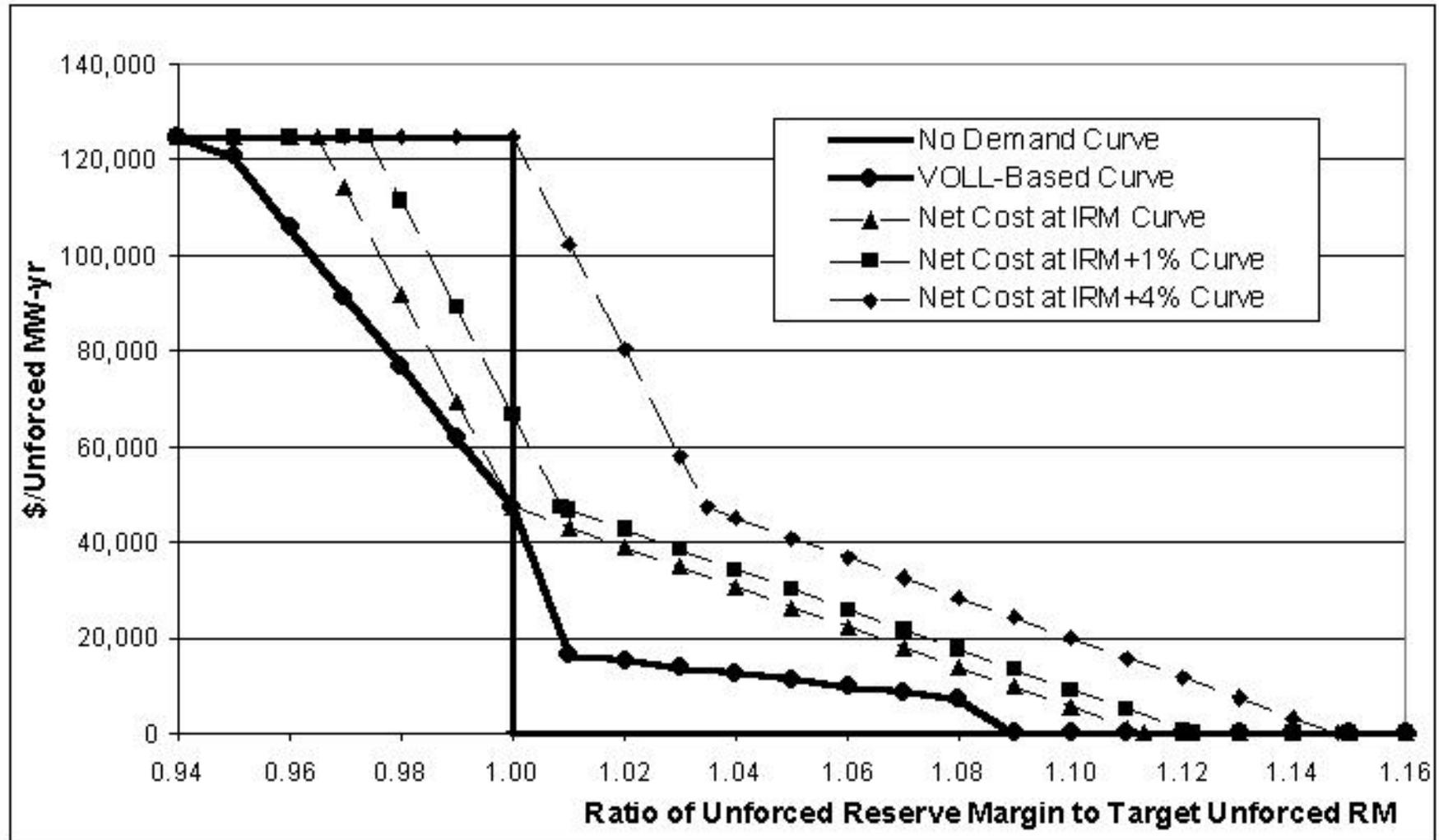


# PJM's Analysis of Fixed-Cost Recovery Curves

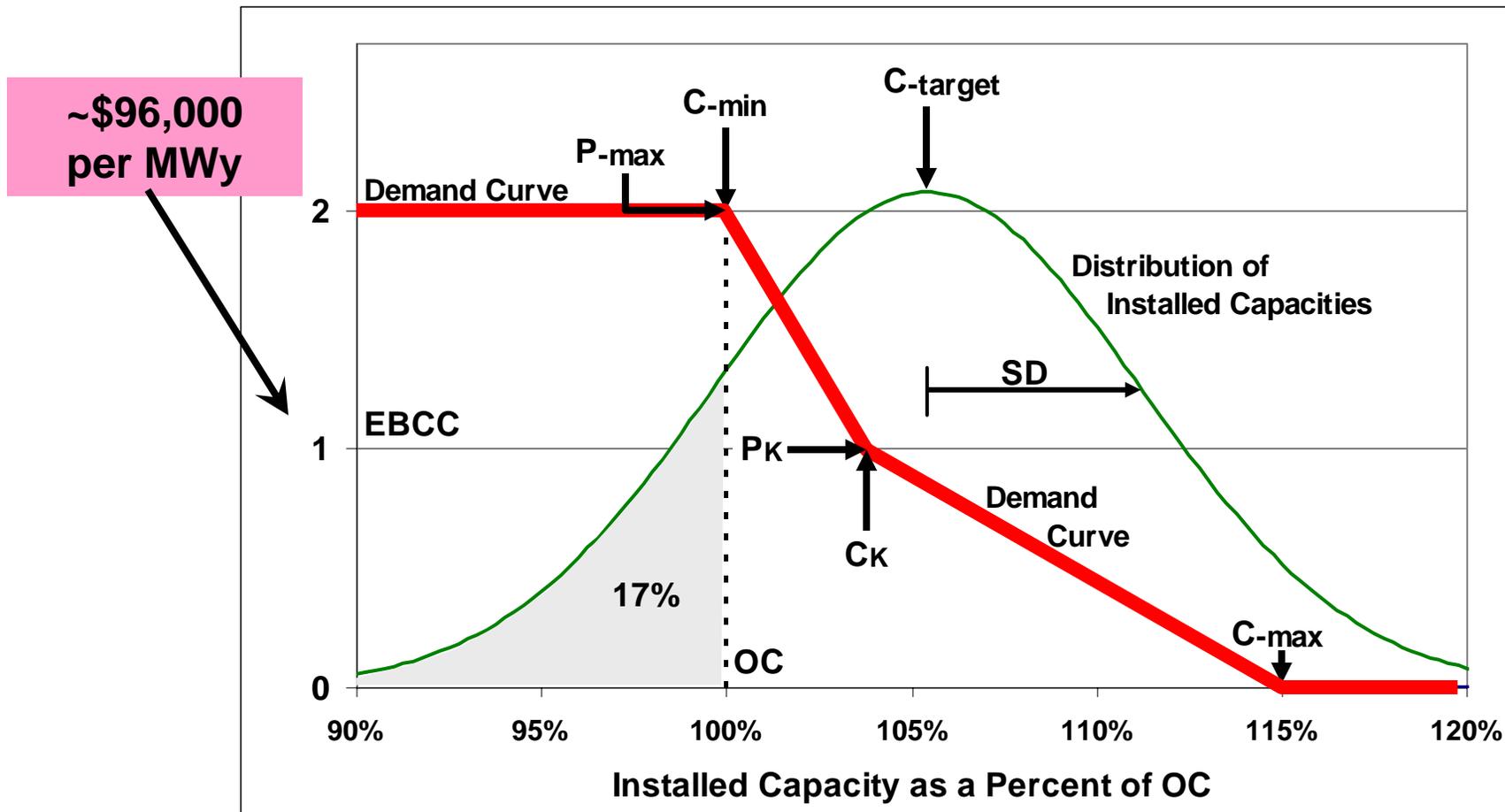
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- PJM breaks the curve into its two components:
  - Energy plus ancillary-service revenues
  - ICAP revenues
- These are used together.
- The following two slides were presented by Ben Hobbs to the PJM Board on April 27<sup>th</sup>.





# ISO-NE's Proposed Fixed-Cost Recovery Curve



# Every Design Has a FC-Recovery Curve

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- Top-down, Bottom-up, Long-term contracts, Options, ... even no RAR at all.
- It is especially easy to calculate it with an ISO-NE style ICAP market.
- No one yet knows how to figure it out with a long-term contract market, but no one has tried.

# Why Think about Penalties Early?

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- The choice of approach largely determines the nature of the penalties.
  - All hours and low?
  - Few hours and high?
  - Seasonal or annual?
  - Imposed on load and passed through to suppliers?
  - Fluctuate with weather and hydro?
- You might not like the type of penalty.
- You might not be able to calculate the FCR curve and justify the penalty.

# Suppliers Won't Want to Perform !!!

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- If load only pays for performance, it will pay somewhat less—just as an energy-only market saves money by paying only those who perform.
- Poor performers are paid less than new peakers.
- A lot of existing suppliers don't like this idea.

# Changing ICAP to UCAP Is Not Enough

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- Moving to un-forced-out-capacity, UCAP, is a small step towards pay-for-performance.
- PJM and ISO-NE are both unhappy with the performance it induces and with the types of investment it induces.
- The West, with more hydro, wind, and pollution limits, will have no choice but to move beyond UCAP. Giving a wind farm a 90% UCAP rating can be ignored in the East, not in the West.

# Building in Pay-for-Performance

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- Option contracts provide on-peak signals backed by mitigated spot prices.
- Liquidated-damage contracts provide similar on-peak signals.
- ICAP payments can be tied to on-peak performance. This can reproduce the full strength of the missing energy-price signal.

# Two Approaches to Market Power

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1. “Mitigate it.” The ISO has first call on all required capacity up to some unspecified last minute.
  - Eastern markets do not do this!!! Day ahead “must bid” does not impose any cost on a supplier who “bids in” but also buys it back and sells it out to another market.
  - To my knowledge, no one has ever analyzed a must-bid scheme like the one proposed here.

# Approach #2. Prevent Market Power

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- Long-term contracts dramatically reduce spot-market power. Suppliers simply don't want to raise the spot price—it's not profitable.
- ICAP can do this just as well. Plus a good ICAP design eliminates market power in the ICAP market.
- Watch out for market power in the 2-3 year energy-contract market. With administered vertical demand, it could be significant.

# Practical Questions & Advice

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- Don't try to reinvent the car. Buy a car and just reinvent the wheel.
- Don't forget to buy one with an engine.
- Are we trying to make the whole West have adequate capacity? If not what is the philosophy on the 19% of capacity that must be imported?
- If you want to control the full required capacity, just re-regulate. Otherwise save controls for emergencies.