Can We Achieve Resource Adequacy Without ICAP? With ICAP?

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(With thanks/apologies to Ruff, Stoft, Hogan, et al.)

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Session 1: Pros and Cons of Installed Capacity Markets
Does An Electricity Market Need a Resource Adequacy or ICAP Requirement?

In other markets, *market clearing prices* for the basic commodity are assumed to do the job.

- Market-clearing prices are set by the intersection of demand/supply.
  - If supplies are tight, prices rise to “clear” the market.

- Expectations of future clearing prices that are high enough over time to cover the investment costs and risks provide the “correct” investment incentives.

In markets where prices are allowed to “clear the market,” there is no apparent need for capacity/adequacy requirements.
Marginal-cost Offers From High-cost Generators Can Clear the Market At Very High Prices In or Near Shortage Conditions

Generators may have legitimate marginal costs with sharply sloping curves.
Price Responsive Demand Can Set Prices In Shortage Conditions = Willingness to Pay

Concept requires “real-time” pricing of at least larger price-sensitive loads
Some (of Several) Problems With the Theory

Relies of key (sometimes heroic?) assumptions:
- Competitive conditions (See Shanker, Wolak, Stoft, et al)
- Efficient dispatch/pricing rules (e.g., LMP)
- Strong (justified) belief in regulatory certainty

Practical Problems:
- Insufficient demand response to help markets clear in scarcity conditions – a fixable regulatory failure?
- Allowing generators to define high enough clearing prices requires complex and controversial bidding and efficient dispatch rules.
- Is it market power or legitimate marginal costs? How can we tell?
The Dilemma For Market Monitors When Faced With Possible Economic Withholding

With this offer curve, relatively small changes in output can cause very large changes in price. Is the bid legitimate?

What info do we need to decide?

Does this Offer Reflect:
- Economic withholding to exercise market power?
- or
- Valid marginal cost?
  - Spot gas costs?
  - High heat rates?
- High opportunity cost?
  - Wear/tear risks?
  - Need for maintenance?
- Energy-limited or emission-limited resource?
The Specter of Market Power and Physical Withholding

Is Unit Withheld Because of:
- Forced outage?
- Maintenance?
- Energy limited?
- Market power?
- Inflexible bid rules?

Price responsive demand

Supply Offers

Competitive Price?

Clearing Price

Quantity
We Can’t Resist Price/Bid Caps

Uncapped clearing prices lead to unpopular results:

- High potential for spot price volatility
- Likely boom/bust investment cycles – from “too little” to “too much” for sustained periods
- Occasional price spikes move from business page to front page

The reality: Public officials are unlikely to accept the political risks of allowing an “energy-only” market to “work” without price and/or bid caps.
If Price Caps Preclude Market-clearing Prices, *All Plants* Are Adversely Affected

The “missing revenues” = lost contributions to fixed costs

The tendency to focus on “peakers” misses much of the under-investment problem.
Capacity Markets Are Attempts to Provide The “Missing Revenues” and Incentives

If scarcity pricing is not allowed in the real-time spot markets, then a workable ICAP mechanism must:

• Provide the “missing revenues” for each resource to support investments in . . .
  – New plants (or Demand-response capability)
  – Maintaining, refurbishing existing plants (and DR),

• Provide the right incentives to ensure that necessary supply/demand-side resources are offered . . .

• When we need them – i.e., at peak hours, and

• Where we need them – i.e., at key grid locations
Still, Some Market Designers Dismiss the Need for Capacity Markets, Because . . .

Under competitive conditions, allowing energy (and operating reserve) prices to clear the market solves difficult problems:

- The price incentives will be sufficient to support an efficient level of investments (cover fixed and variable costs) for:
  - The right amount and mix of capacity, at the right locations

- *In real time*, generators have the right incentives to produce when/where they are needed, especially in scarcity and near scarcity conditions

- Consumers have the right incentives for demand-side response

- Buyers and sellers have strong incentives to contract to hedge spot price volatility (and contracts will reflect expected spot prices)

- Spot plus contract prices are, on average, just and reasonable.
Some Designers Also Doubt that Capacity Markets Actually Achieve Their Objectives

“Good” capacity markets are very hard to design (an oxymoron?)

- The goal isn’t just “enough” iron in the ground or 15% reserves. It’s getting enough energy provided at the right time and the right place at the right price.

- It’s hard to get the operational incentives right
  - The right incentives to be available at the right times and places are the uncapped real-time energy and operating reserve prices.
  - Correcting the capacity price incentives tends can mimic the spikes that parties dislike about spot energy prices.

- And some capacity markets facilitate market power
  - Inelastic demand (fixed reserve margins) plus inelastic supply (delayed entry) invites market power.
Problems with *Current* ICAP Approaches

Don’t always provide the “missing revenues” for fixed cost recovery
- Temptation is to solve the problem for “pocket” peakers only
- Which ultimately leads us into “pocket” RFP cycles (SW Connecticut)

Don’t provide the right incentives for availability at peak
- The right incentives at peak are uncapped market-clearing LMPs
- ICAP availability is less reliable unless penalties mimic peak LMPs

Don’t provide the right incentives for demand-side response
- The right incentives at peak are uncapped scarcity prices
- The rationale for ICAP was to avoid paying these RT clearing prices

Don’t provide the right locational incentives
- The right incentives at each location are the LMPs
- Politics forces even “locational” ICAP into large, politically designed zones (“déjà vu all over again”)

Can the “Steve Stofts” solve these problems? Stay tuned.
The Central Dilemma With ICAP Markets

How can we ensure that sufficient supply/demand-side resources are, in fact, available when and where we need them? Penalties?

Solving this issue leads us right back to something that looks like Real-time energy/operating reserve markets with scarcity pricing.

- The “right” set of penalties must produce the same incentives as scarcity pricing with demand-side response = very high prices during peaks.

- A “perfect” ICAP approach = Real-time markets with LMP, scarcity pricing and efficient demand-side response.

Anything else could cost consumers more, but not work as well.
Session 2: The Role of ISO-Coordinated Capacity Markets
How James Carville Explains the Problem:

“It’s the dispatch, stupid!”

Reliability is about having the right amount of power (real/reactive) at the right locations at the right time, every second.

- The entity that controls the real-time dispatch is the entity responsible for reliability.

- The ISO has to solve this problem, no matter what politicians say.
How *Mrs. Carville* Explains the Problem:

“You can’t flip-flop between markets and regulation!”

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What If Adequacy is Just LSE Acquisition?

Contract transmission feasibility is doubtful.
- Without ISO coordination to handle transmission constraints, contracts could be awarded that could not all be implemented simultaneously.

Efficiency seems less likely.
- Even if bilateral contract market is efficient, parties would need a short-run (spot) capacity market to trade and reconcile their forward positions with their short-run expectations.

Market power seems likely.
- Not clear how we avoid the problems of vertical demand curve, given fixed reserve targets, even if LSE obligation is forward enough (e.g., 3 years in advance) to allow entry.
The ISO Has To Address Resource Adequacy Because . . .

Resource adequacy is more than just setting reserve margins.
- In a vertically integrated monopoly/regulated regime, adequacy is about finding an efficient balance between generation, transmission and demand response, given the selected reliability objective.
- In a market regime, the same is true, but now prices must do the work.
- In a hybrid regime (good luck), regulations must support (or at least not undercut) pricing, but can’t focus just on generation/reserves.

Transmission constraints are critical factors
- Huge reserve margins (30%) in the wrong locations = darkness
- Modest reserve margins in the right locations = light

Only the ISO can address the transmission constraints and integrate the pricing across all resource adequacy elements
- So it’s not just a problem of insufficient CPUC jurisdiction.
One Way of Thinking About the ISO Role

In real-time, the ISO maintains reliability through the dispatch.

- The set of generators dispatched must be security-constrained
  - It must meet all operating security limits, at all times
- The dispatch should be economically efficient
  - It should be the “least-cost” dispatch capable of meeting load, given the binding constraints
- Spot prices will differ by location = LMP

In forward (contract/capacity) markets, supply adequacy can be seen as an extension of the dispatch problem.

- The set of generators awarded contracts must be physically capable of delivering under their contracts within security limits.
- The set of awarded contracts should be economically efficient.
- Contract/capacity prices will differ by location = LICAP

It is hard to image how reliability can be achieved and electricity prices can be “just and reasonable” without meeting these tests.
Essential Tasks for the ISO to Support Adequacy and Reliable Operations

Provide a consistent framework for evaluating transmission, generation and demand-side options.
- Using LMP pricing of a bid-based, security-constrained economic dispatch, California can:
  - Use LMP-based usage charges to reveal the value of using the grid
  - See the value of generation/demand response investments at each location
  - Use LMP and FTRs to reveal the value of grid upgrades

Coordinate system-wide planning
- To help reveal opportunities for economic grid upgrades and/or resource investments, as revealed by LMP/FTR prices.
- And award incremental FTRs created by upgrades to those who pay

Coordinate the forward (capacity) auctions that we use to acquire and trade supply resources in the long run.
Some Key Issues the ISO Forward Auctions Should Address

“Deliverability” in the face of transmission constraints
- Simultaneous feasibility can be part of the auction solution
- Appears to have better properties than forcing only new generators to upgrade the grid to be “deliverable.”

Defining a price to replace “missing revenues.”
- A demand curve can be tailored to achieve this – See NY/NE ISOs

Re replacing the incentives lost from capped energy prices
- Requires at least LICAP for locational incentives, but is that enough?
- Availability incentives are a tough problem – but see Stoft in NE

Mitigating market power
- A demand curve approach helps, and so might forward obligations

Accommodate “switching” in retail choice – See Shanker
Strategy for Compatible Markets/Regulation

State regulators still play an essential role in helping to define and support resource adequacy. E.g., . . .

- You speak for consumers that can’t respond easily to prices.
  - You define how much “reliability” these consumers are willing to buy

- You can implement real-time pricing for larger, metered, price-sensitive loads. It’s the best, least-used mitigation of market power.

- You can define the risks you’re willing to allow IOUs to take.
  - But extreme limits on spot versus forward contracts create risks

- You can ensure that costs don’t shift as customers respond to prices or switch suppliers, e.g., in setting rules for core/non-core markets.

- You should be cautious of requests to rate-base elements of resource adequacy – especially generation but even transmission -- when competing elements are subject to market risks.
In/near Scarcity Conditions, Demand-side Response Can Mitigate Price Spikes . . .

In or near scarcity, fairly small changes in demand can cause very large changes in price.

RT Pricing for Price-Sensitive Loads May Be the Best (But Mostly Unused) Mitigation Tool
And Contracting, etc., Can Hedge Volatility

Consumers can be hedged against spot volatility. In New England, PJM and New York . . .

- All small consumers (residential and small commercial) pay fixed or average prices for standard offer or default service.

- LSEs shield small/medium consumers from spot prices.

- Larger consumers are free to, and do, contract with their own LSE/retailers or directly with suppliers.

- The entities that actually face spot prices all have the ability, incentive and intelligence to hedge themselves through self supply and/or contracts at the risk levels of comfort.

Contracting with generators hedges their risks too. But a “risk premium” can still arise from regulatory uncertainty.