RAP® Energy solutions for a changing world

Capacity Markets 101: Understanding Options for Alberta

Webinar
Pembina Institute

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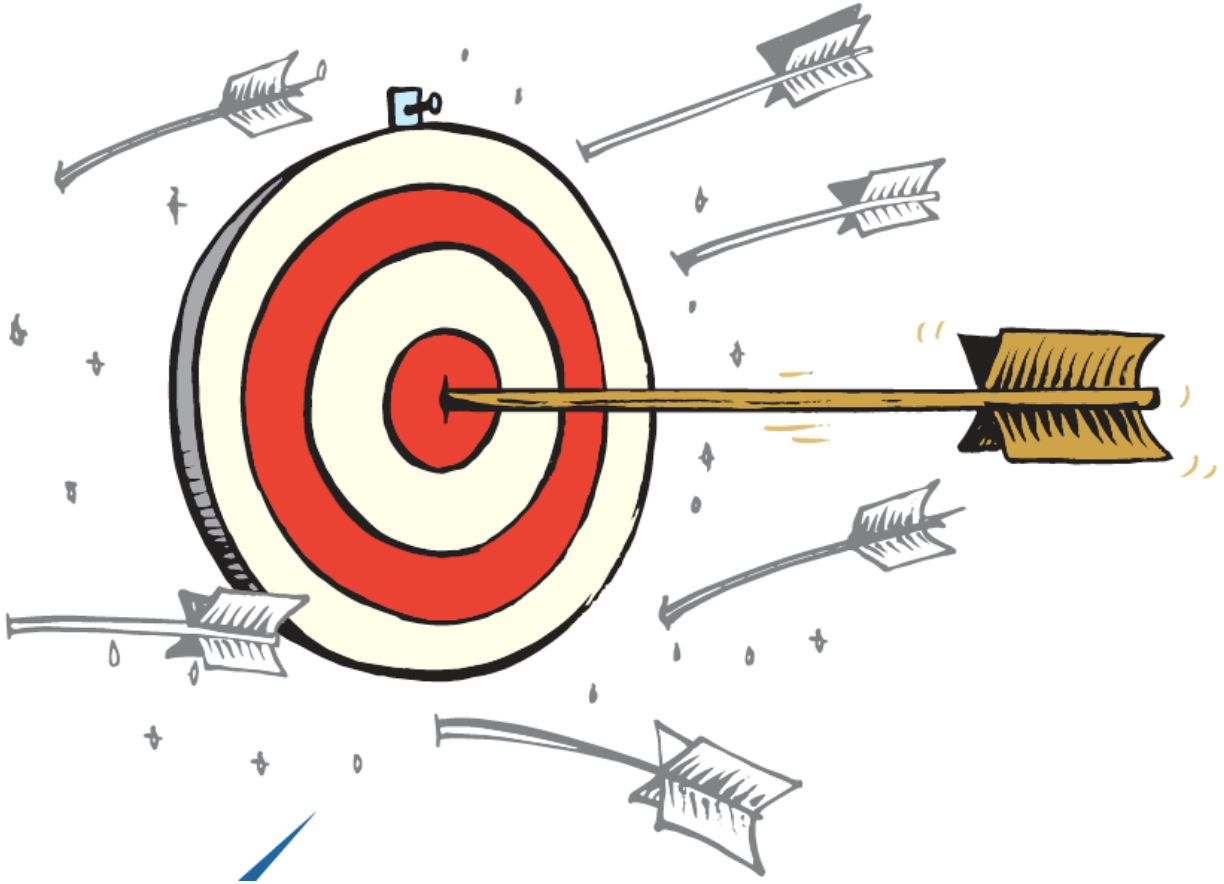
The Regulatory Assistance Project (RAP)®



- Lots of ways to ensure resource adequacy…
- …but how to do so at least cost to consumers?
- Especially in the low-carbon power system?

AESO's stated objective is laudable

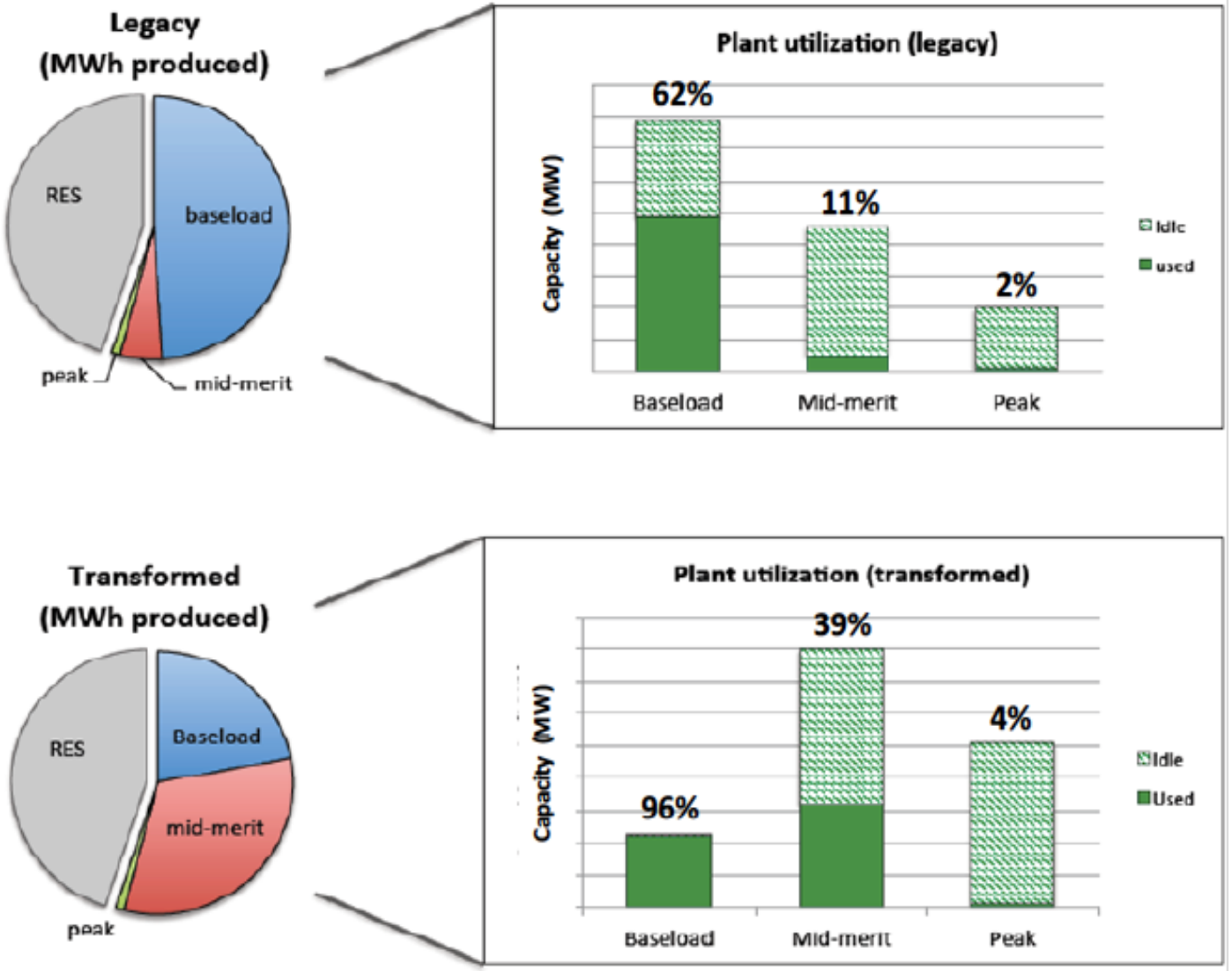
"The desired end state is to develop a capacity market that…

ensures continued supply adequacy and reliability…

at a reasonable cost [to consumers]."

…but will the proposal deliver in a low-carbon power system?

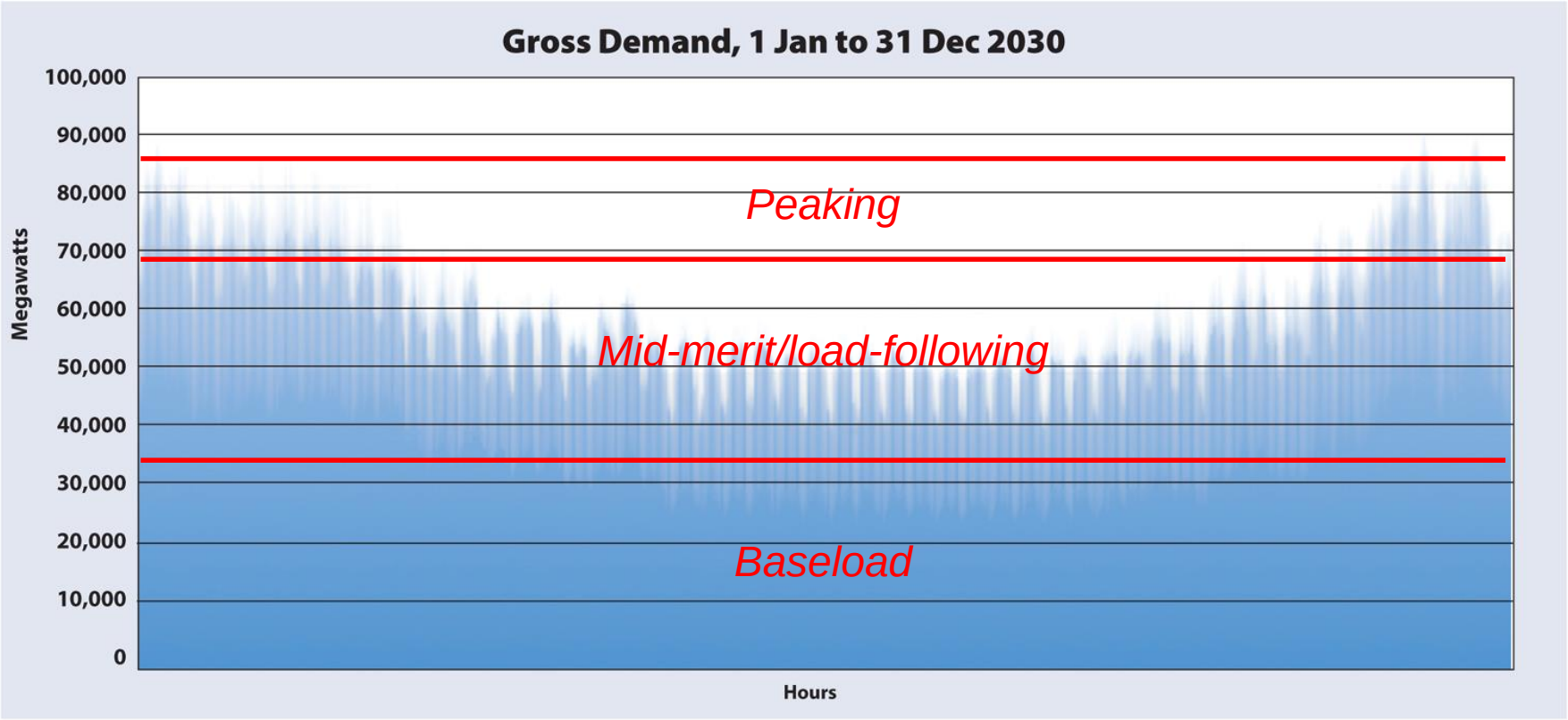
“How much?” depends on “what kind?”



Source: “The Power of Transformation” (IEA, 2014)

“How much?” depends on “what kind?”

Figure 3

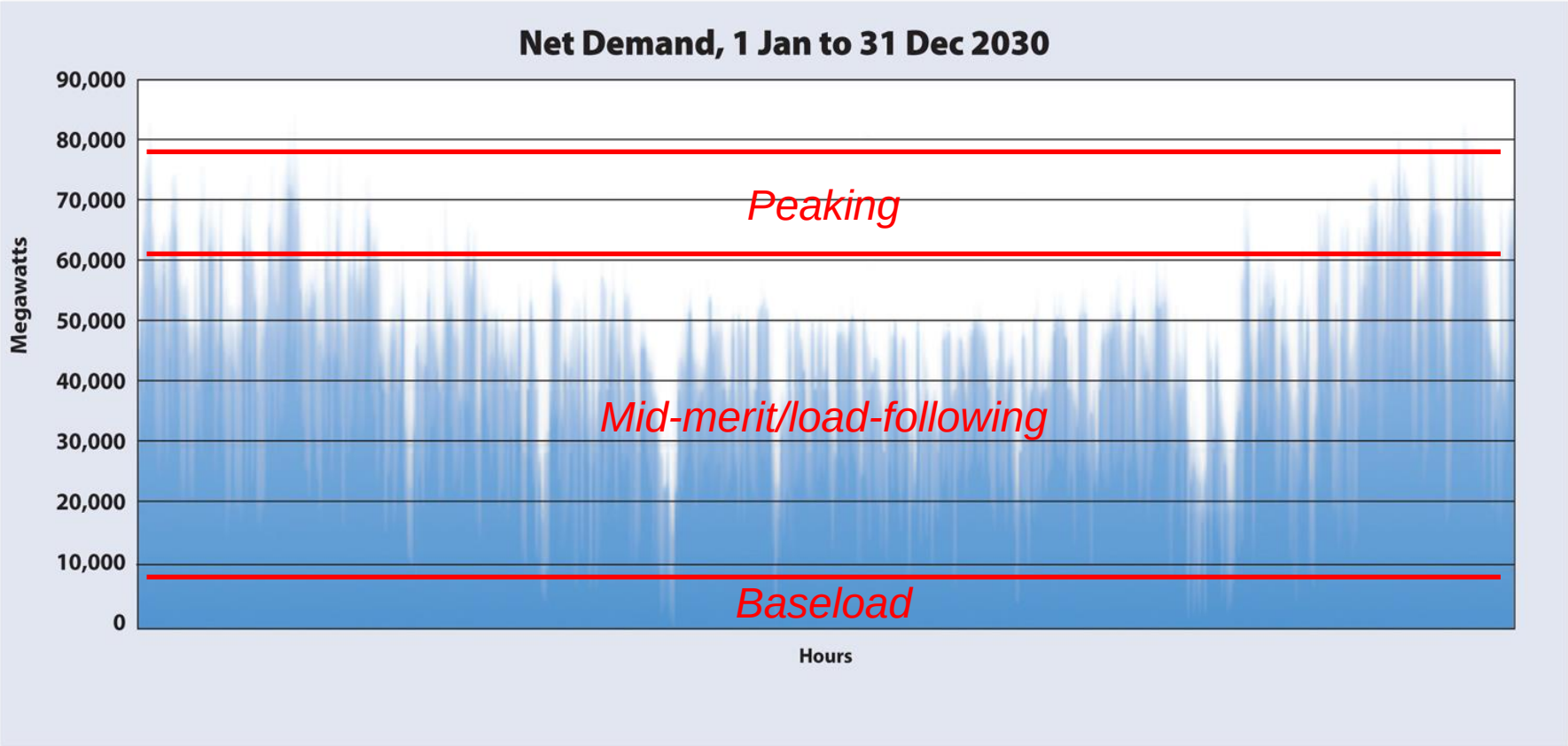


Gross load (2030), Southern UK, 28% variable RES

Source: “Roadmap 2050” (McKinsey/ICL/KEMA 2010)

“How much?” depends on “what kind?”

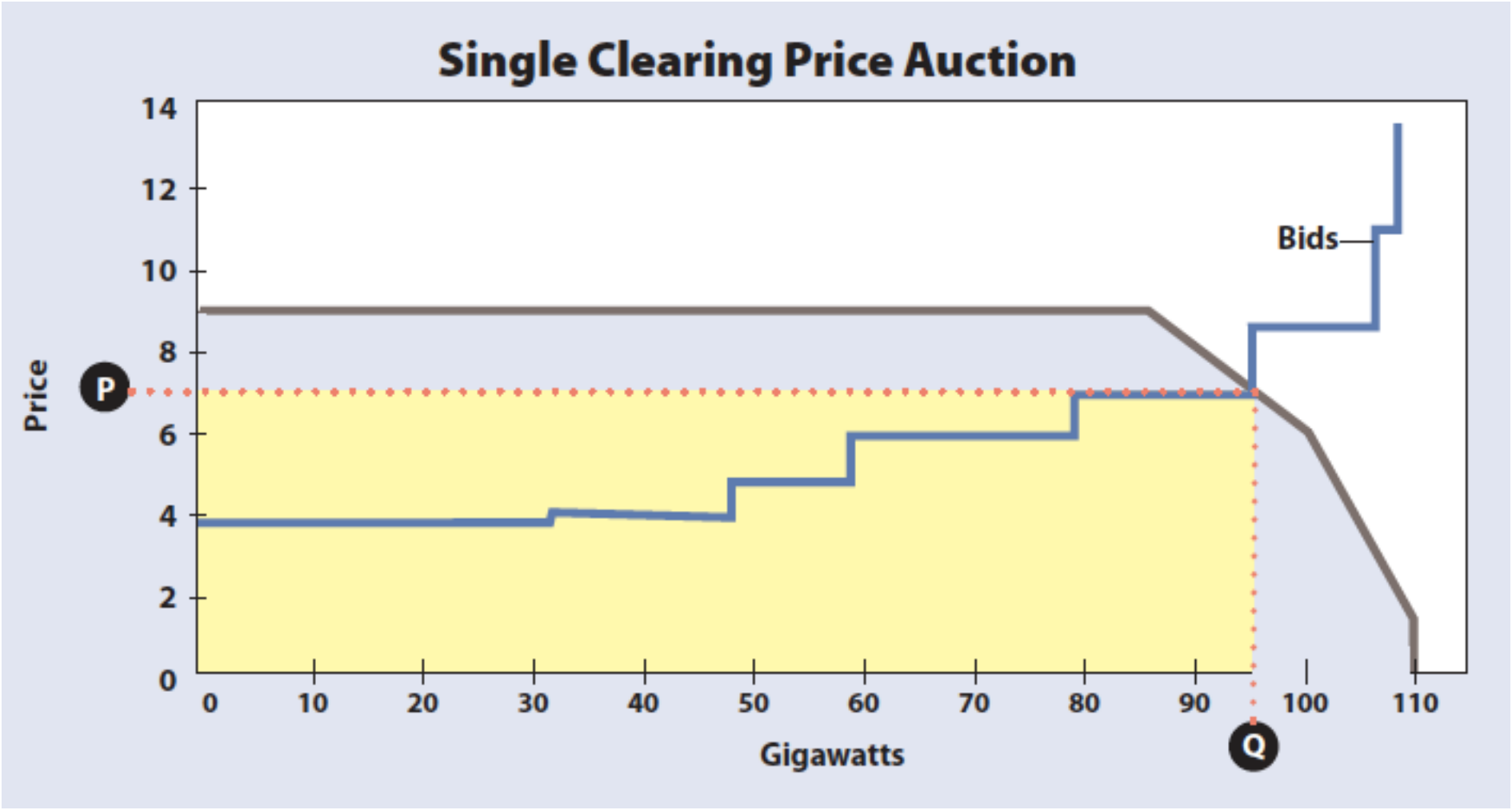
Figure 4



Net load (2030), Southern UK, 28% variable RES

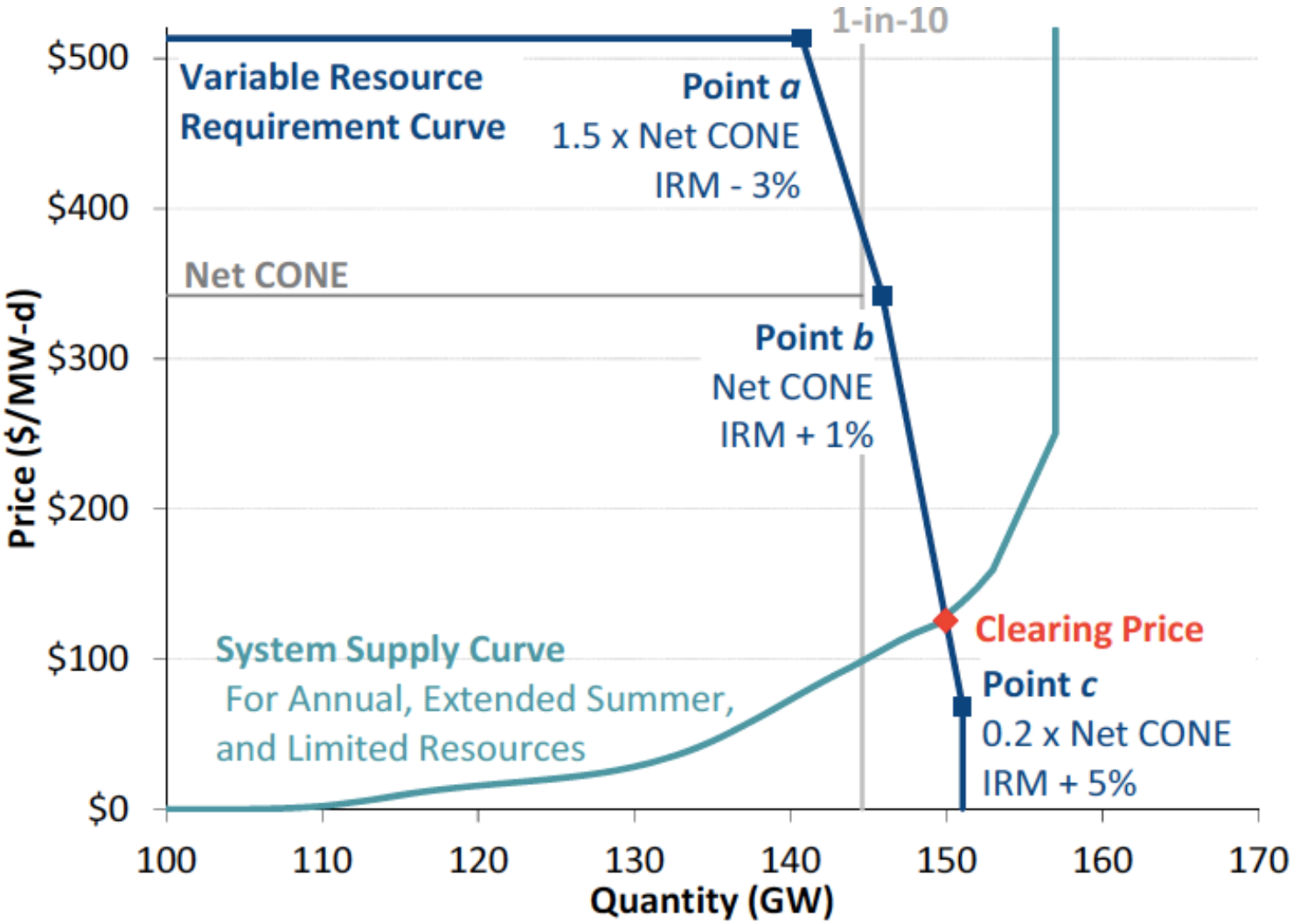
Source: “Roadmap 2050” (McKinsey/ICL/KEMA 2010)

Capacity market



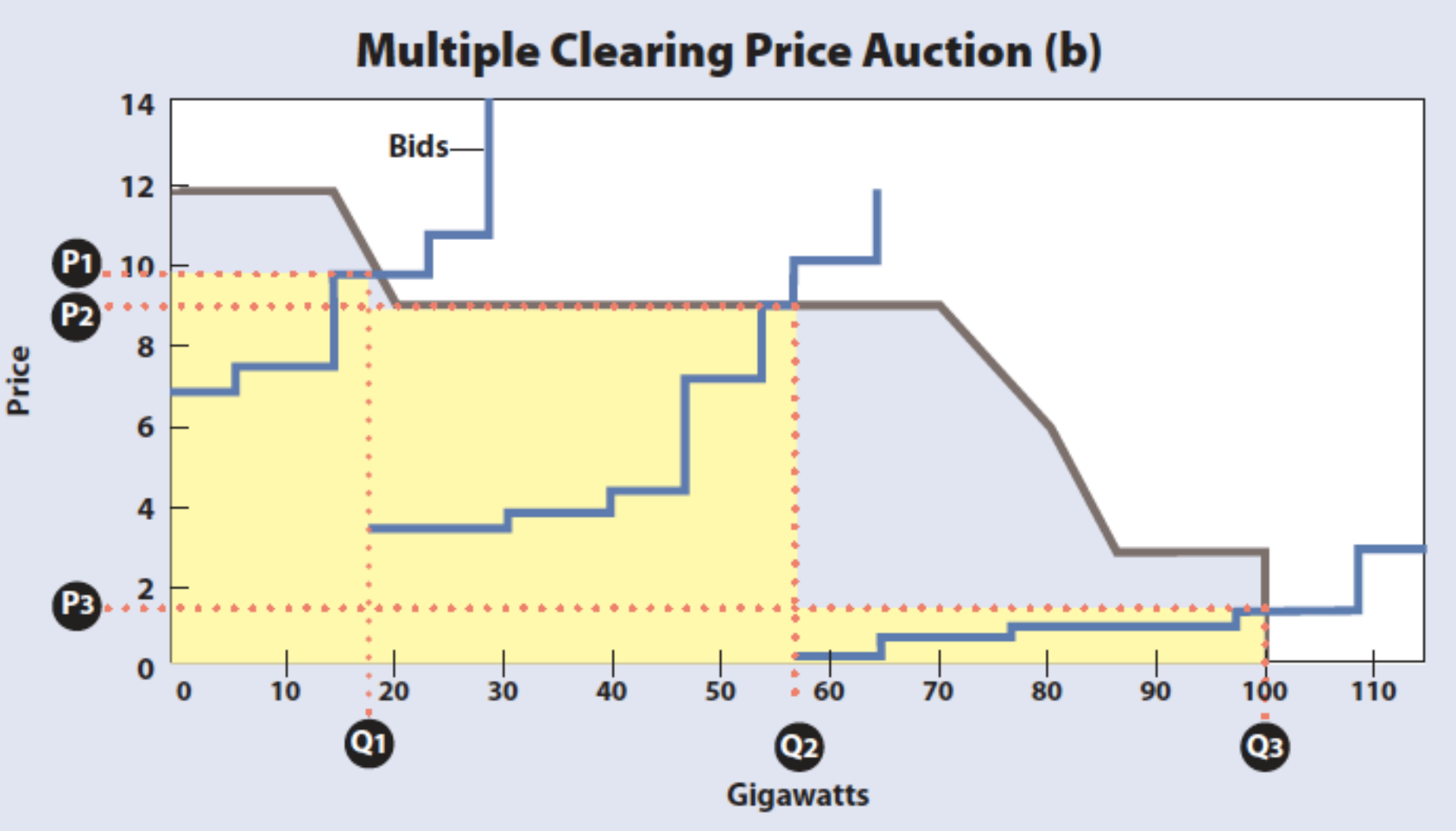
Source: "What Lies Beyond Capacity Markets?" (RAP, 2015)

Capacity market



Source: PJM Triennial VRR Review (2014)

Capability market



Source: "What Lies Beyond Capacity Markets?" (RAP, 2015)

Capability market

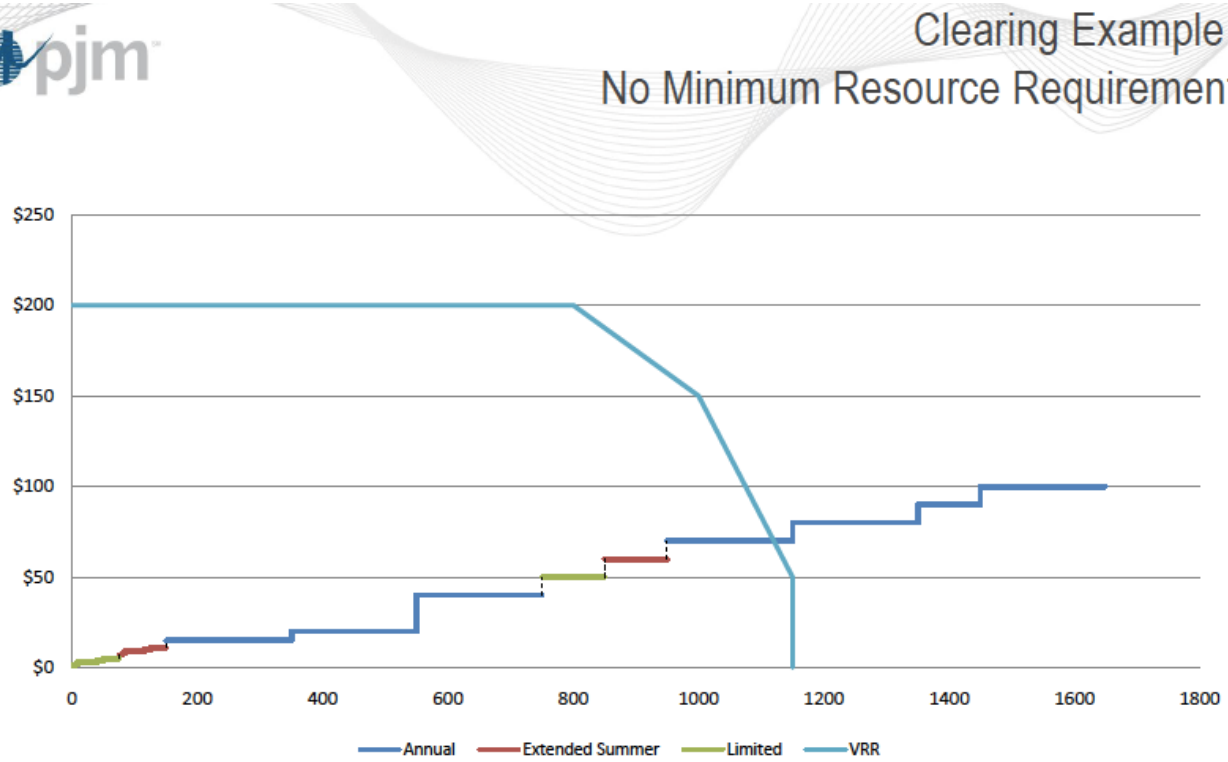
2005: PJM proposed three capacity tranches (baseload, load-following and supplemental reserves):

"[T]he intent…is to…ensure ongoing system reliability through operational diversity. In order to encourage long-term operational diversity, the long-term investment signals must include operational reliability constraints to clearly value the diversity from an investment signal perspective."

…and FERC concurred:

" We agree with PJM that the region must have at least a minimum amount of these capabilities…we conclude that quick-start and load-following capabilities are characteristics of capacity, just as location is a characteristic of capacity."

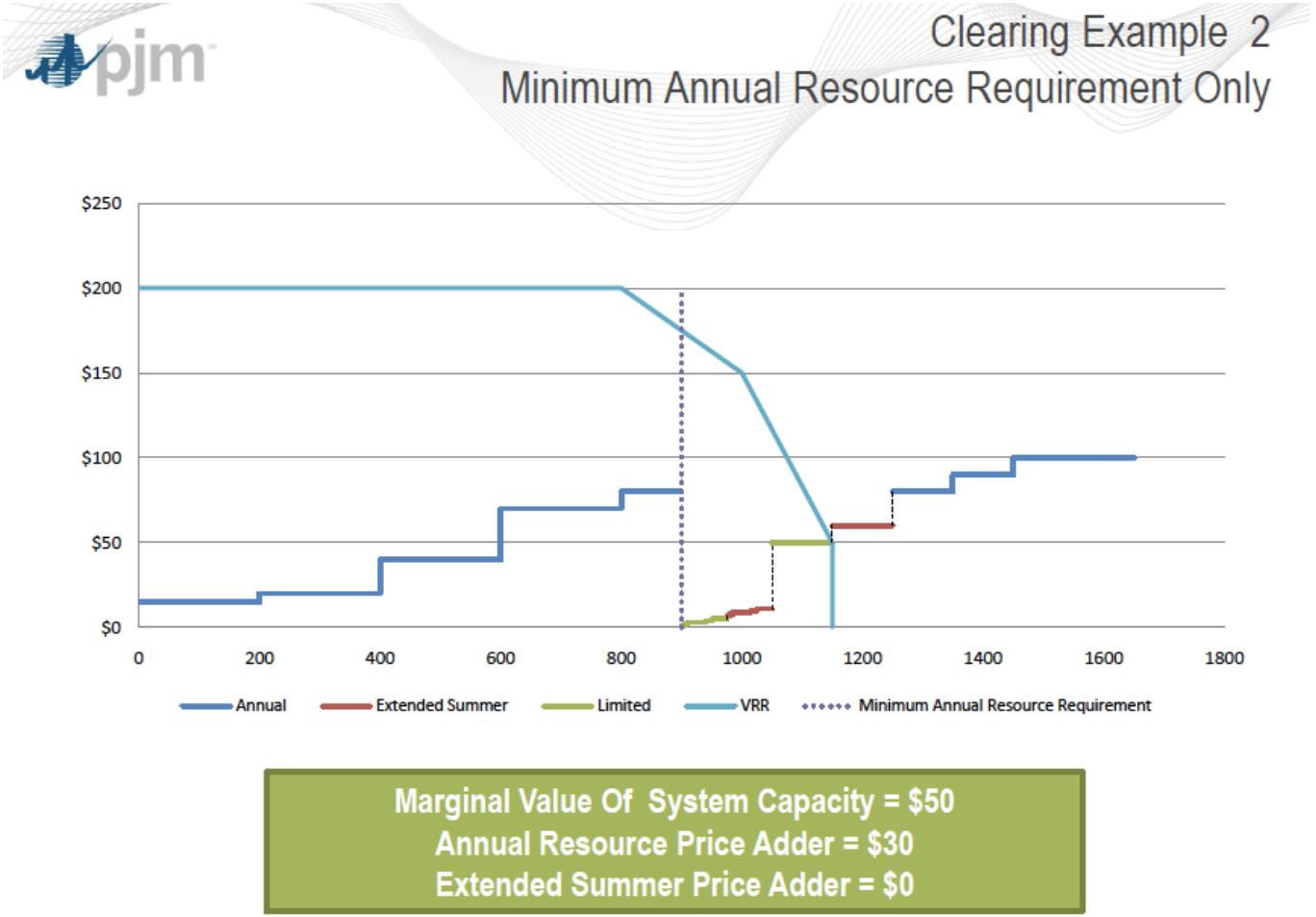
Capability market in practice



Marginal Value Of System Capacity = $70
Annual Resource Price Adder = $0
Extended Summer Price Adder = $0

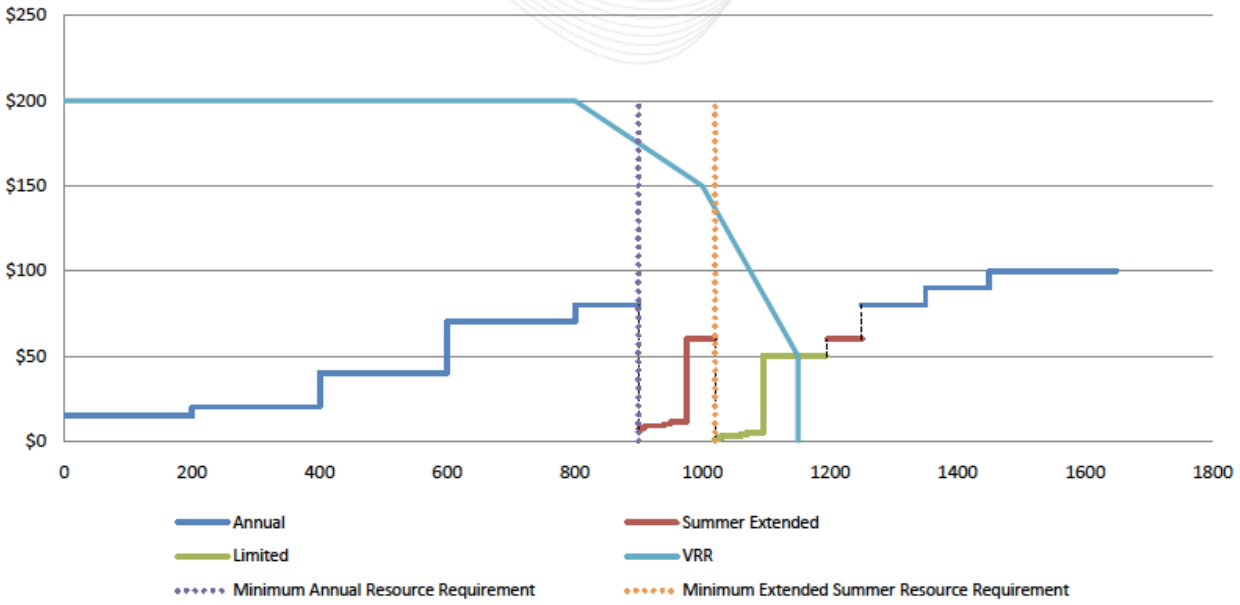
Source: PJM

Capability market in practice



Source: PJM

Capability market in practice

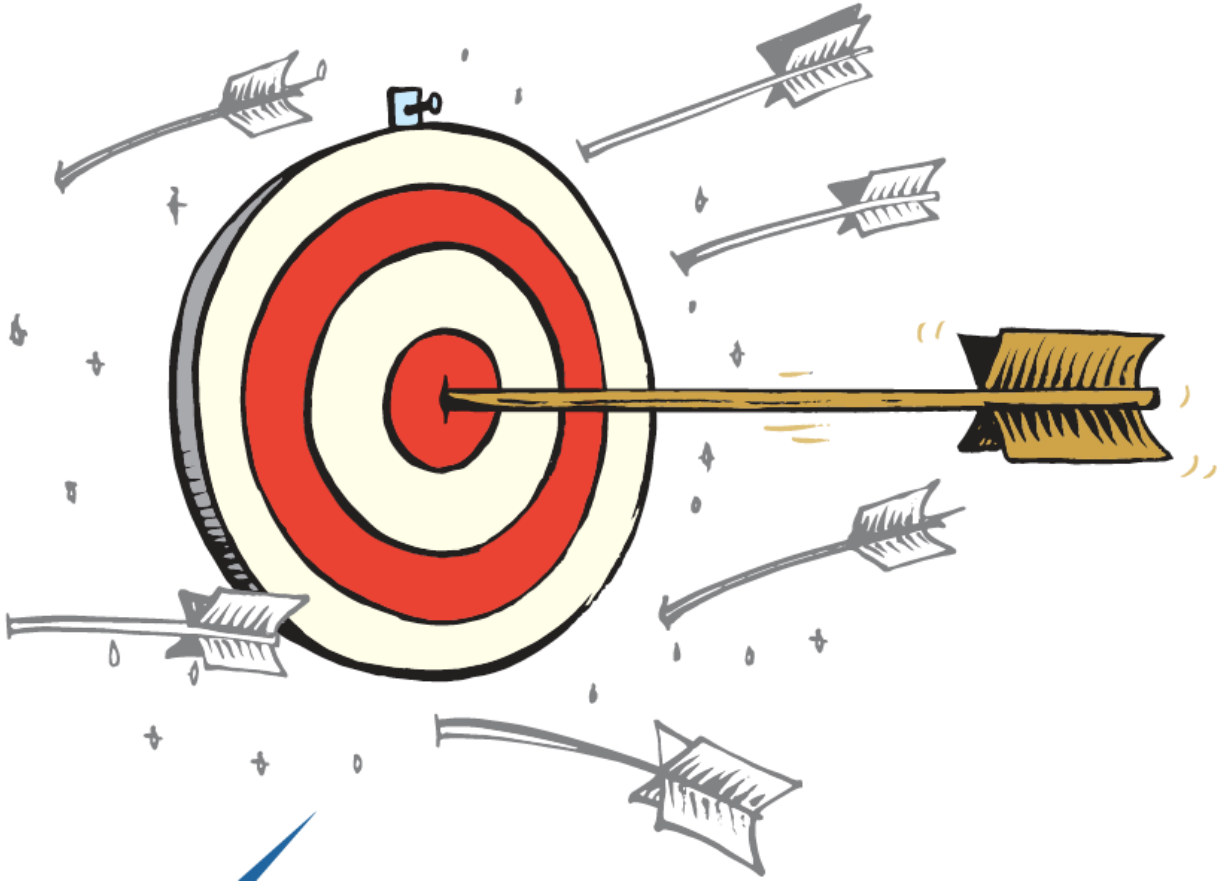


Marginal Value Of System Capacity = $50
Annual Resource Price Adder = $20
Extended Summer Price Adder = $10

Source: PJM

Clarifying questions?

Source: PJM



- Lots of ways to pay for resource adequacy…
- …but how to do so at least cost to consumers?
- Especially in the low-carbon power system?

The capacity market & the energy market

Capacity and energy are NOT separate products

How do we know this?

Because the demand curve is not based on Gross CONE, it's based on Net CONE

Net CONE = CONE – (E + AS margins)

That is, CMs are designed assuming capacity is remunerated by energy & AS margins

The capacity market & the energy market

"Capacity" (actually, fixed costs) is simply a component of the energy value chain

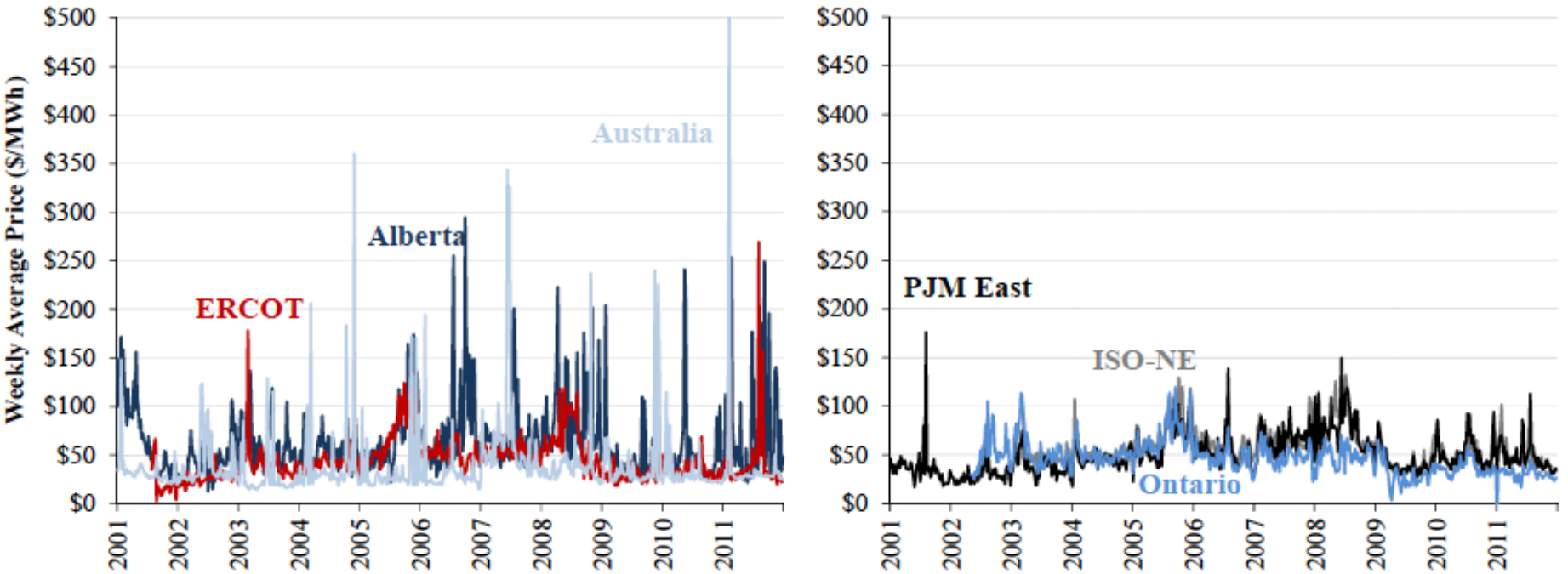
A CM should be a belts-and-braces backstop to the energy & AS markets

The better you do on energy price formation, the less you need to rely on a capacity market…

…and the more transparent the value of investments in resource flexibility

Energy prices & flexibility in a low-carbon system

Prices in Energy Only Markets (Left) and Markets with a Reliability Requirement (Right)



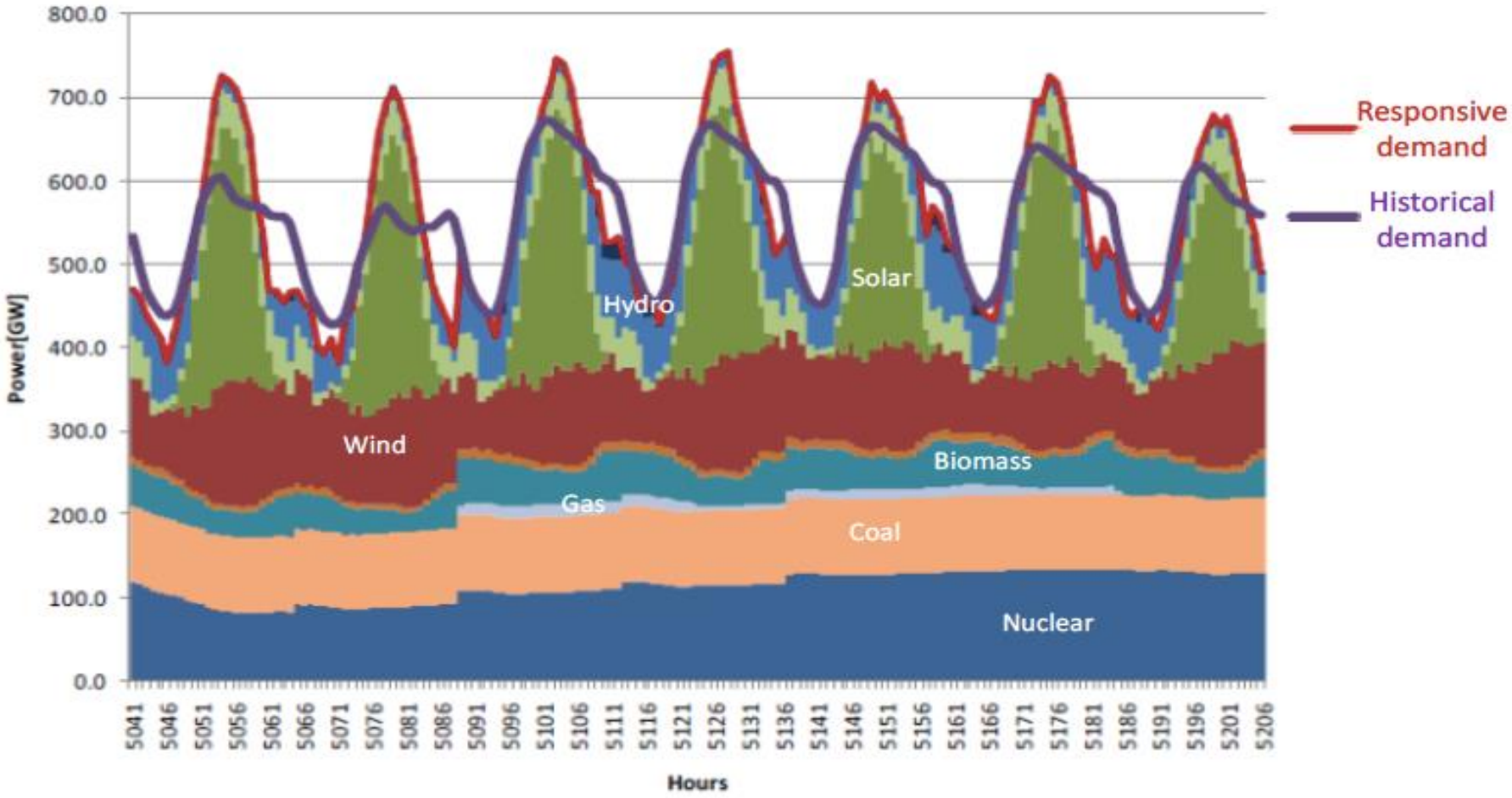
Sources and Notes:

Weekly average prices from Ventyx (2012); Weekly average prices for Australia from AEMO (2012).

Historical prices shown for ERCOT are at the North Hub; Australia prices are at New South Wales; PJM prices are at the Eastern Hub; and ISO-NE prices are at the System Hub.

Source: Brattle Group, "ERCOT Investment Incentives and Resource Adequacy"

Energy prices & flexibility in a low-carbon system



Source: "Roadmap 2050" (McKinsey/ICL/KEMA 2010)

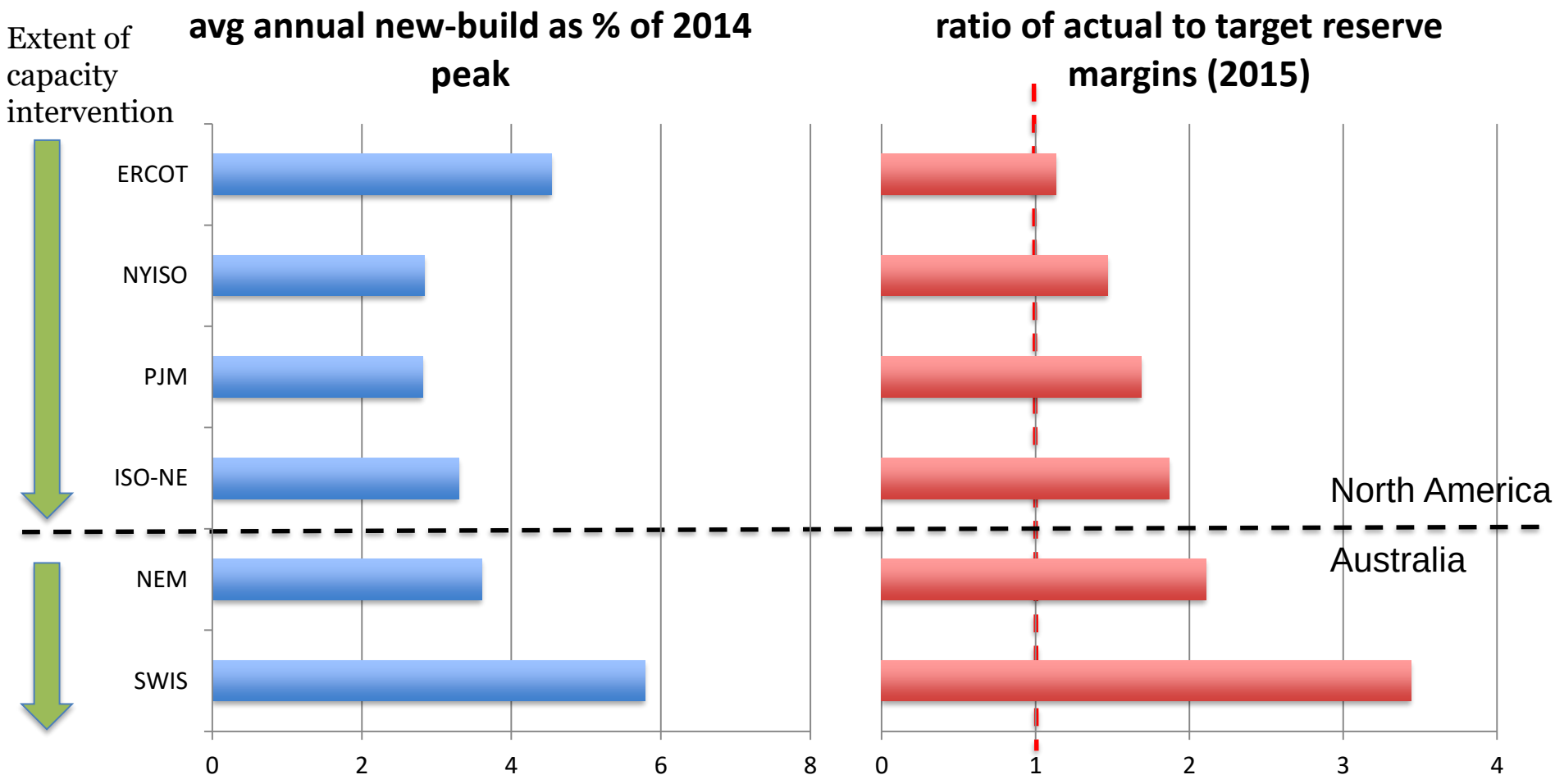
The term is the term…and it should be short

AESO: "Long-term investment risks should continue to be largely borne [or rather managed] by investors rather than by consumers."

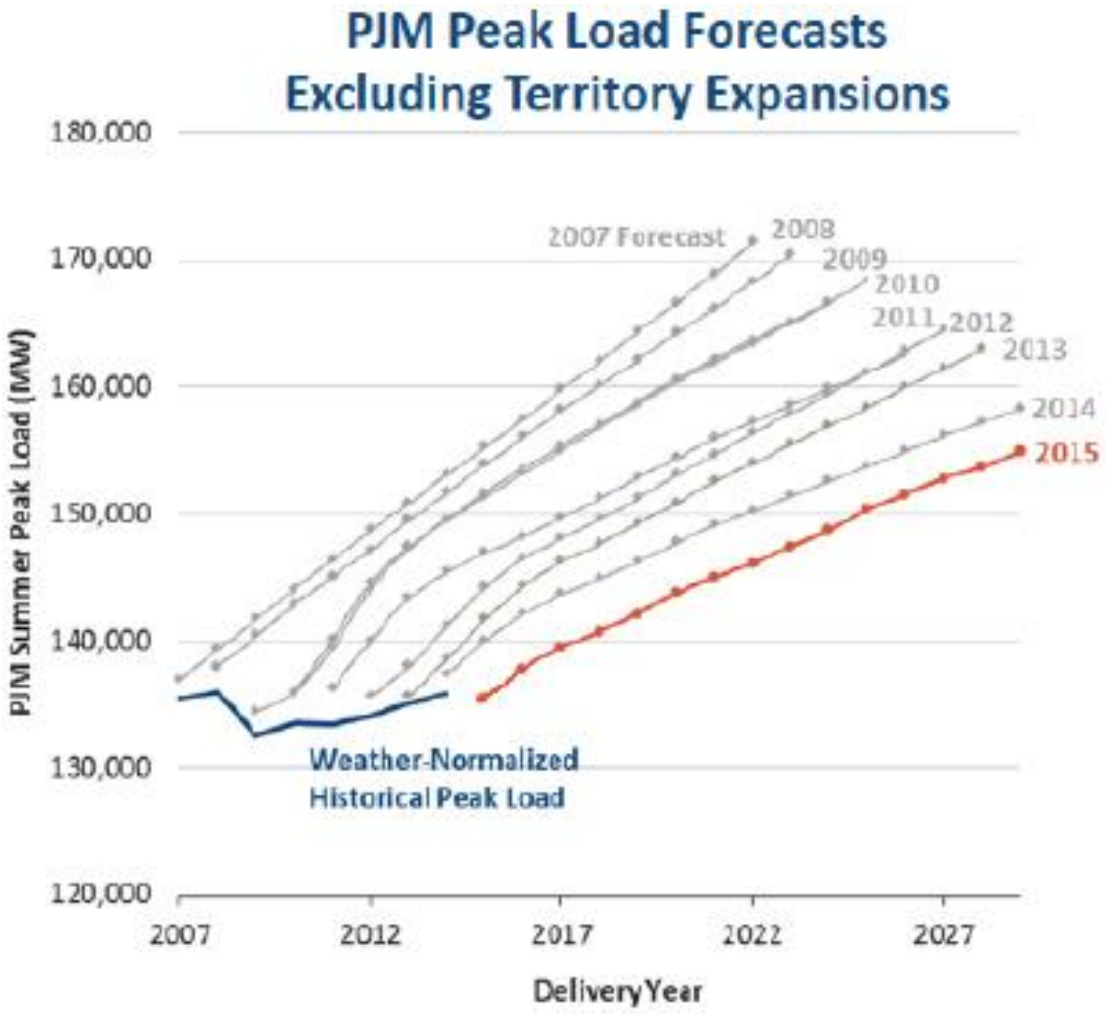
Bilateral contracts and financial hedging remain the principle basis for investment…

…even where there are capacity markets

Capacity markets & adequacy: empirical data

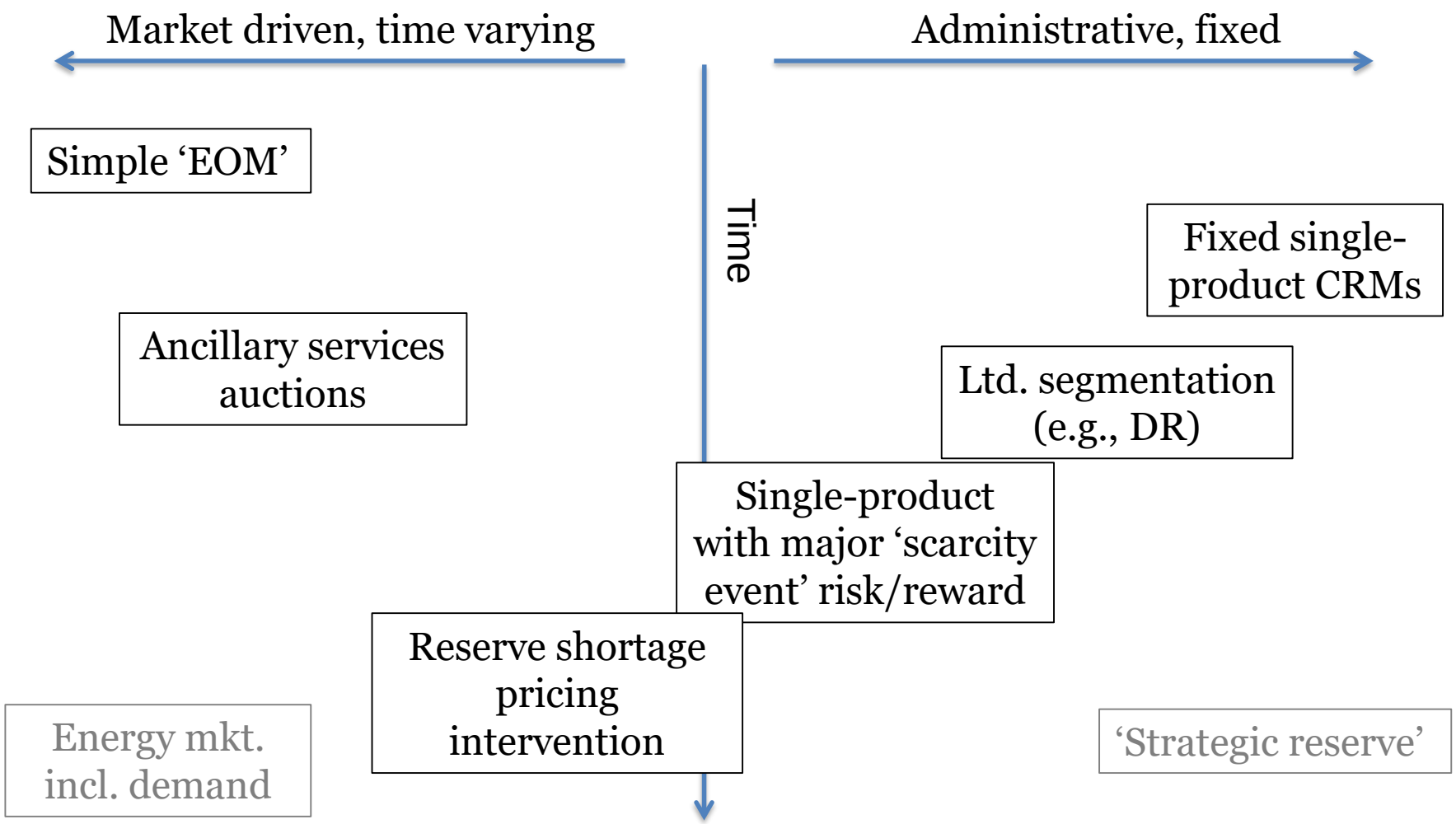


Capacity markets & adequacy: empirical data



Source: The Brattle Group

Evolution of CR away from binary model



Clarifying questions?

Source: PJM

Parting thoughts (1): How much depends on what kind

The objective of any resource adequacy mechanism is reliability at the lowest reasonable cost; that has important implications for the design of a capacity market and its proper role.

Parting thoughts (2): Energy and capacity are not separate products

Effective energy and balancing markets are essential to value investments in flexibility and spur innovation; administrative remedies should target them rather than simply pay for capacity

Parting thoughts (3): Capacity markets are not PPA markets, nor are they "new investment" markets

No evidence CMs offering multi-year terms to new investment are more effective; doing so heavily distorts the market and contravenes the risk allocation for which markets were adopted.

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power sector. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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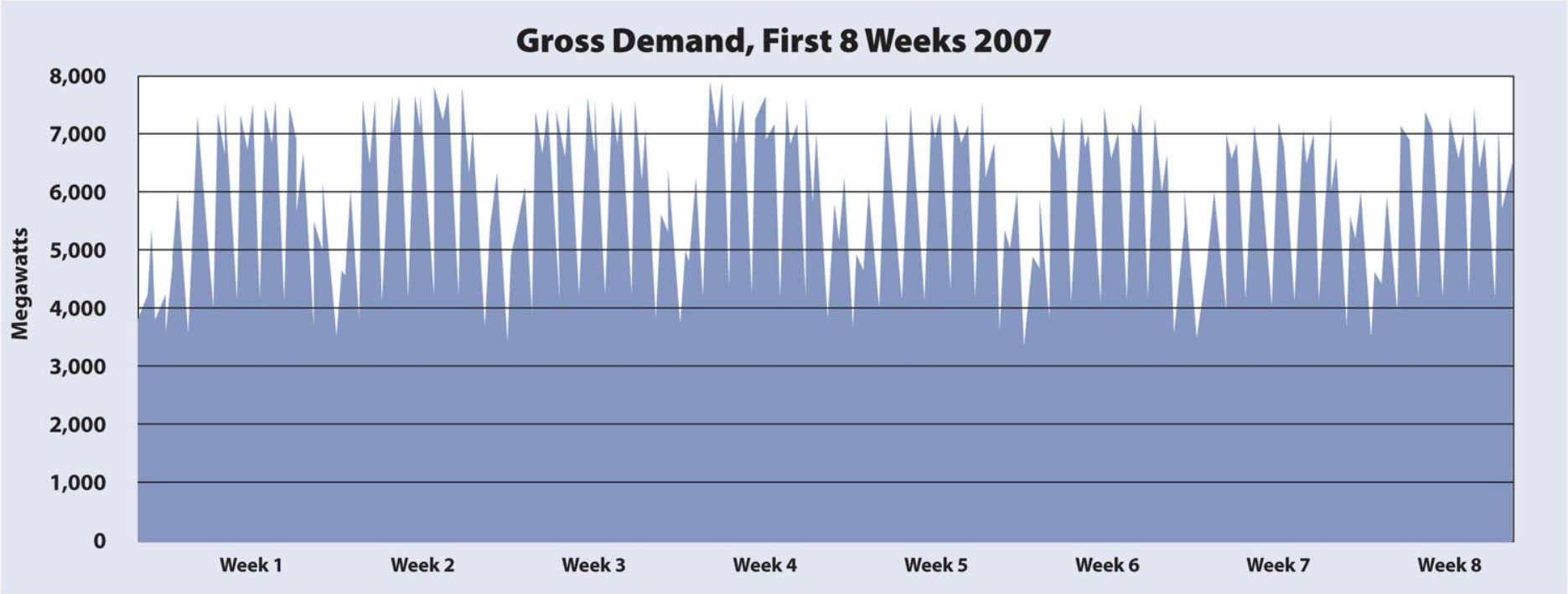
“How much?” depends on “what kind?”

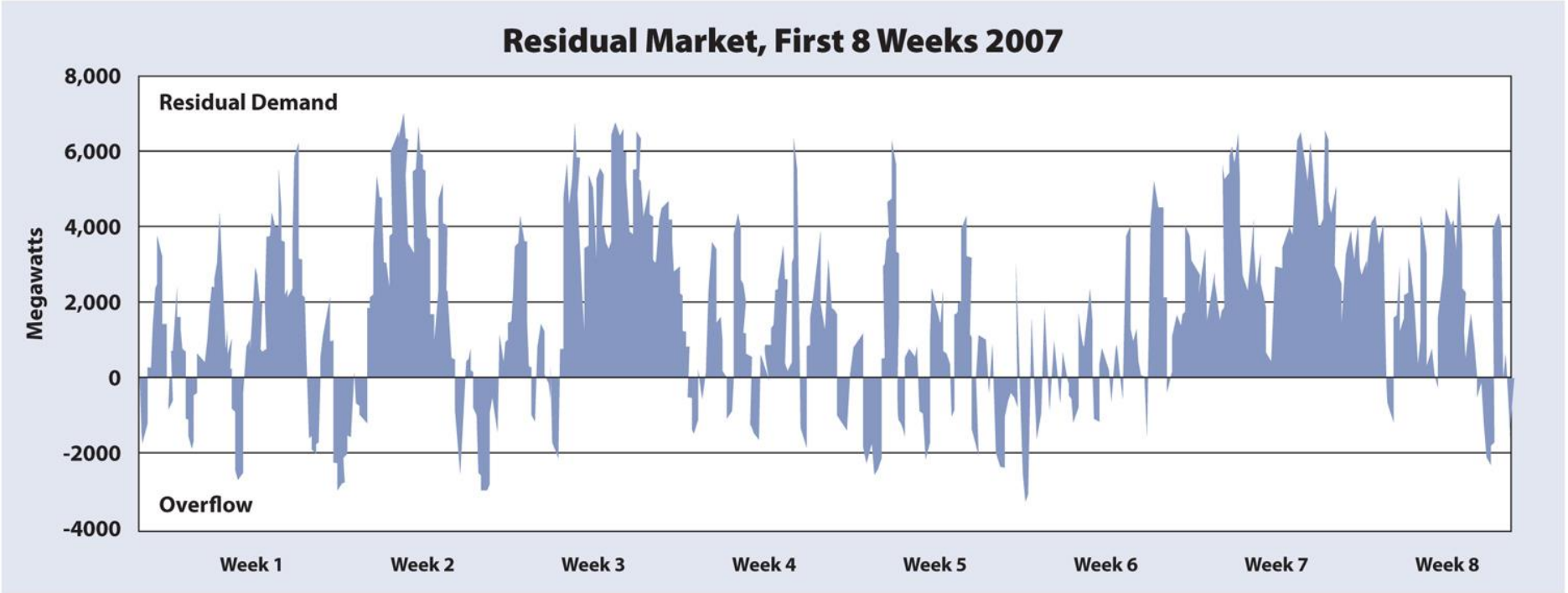
Figure 1



Gross load, West Denmark, January-February 2007

“How much?” depends on “what kind?”

Figure 2



Net load, West Denmark, January-February 2007