



RAP

Energy solutions
for a changing world

Can ~~Renewables~~ Low-Carbon Resources Thrive through Markets?

Harvard Electricity Policy Group

Houston

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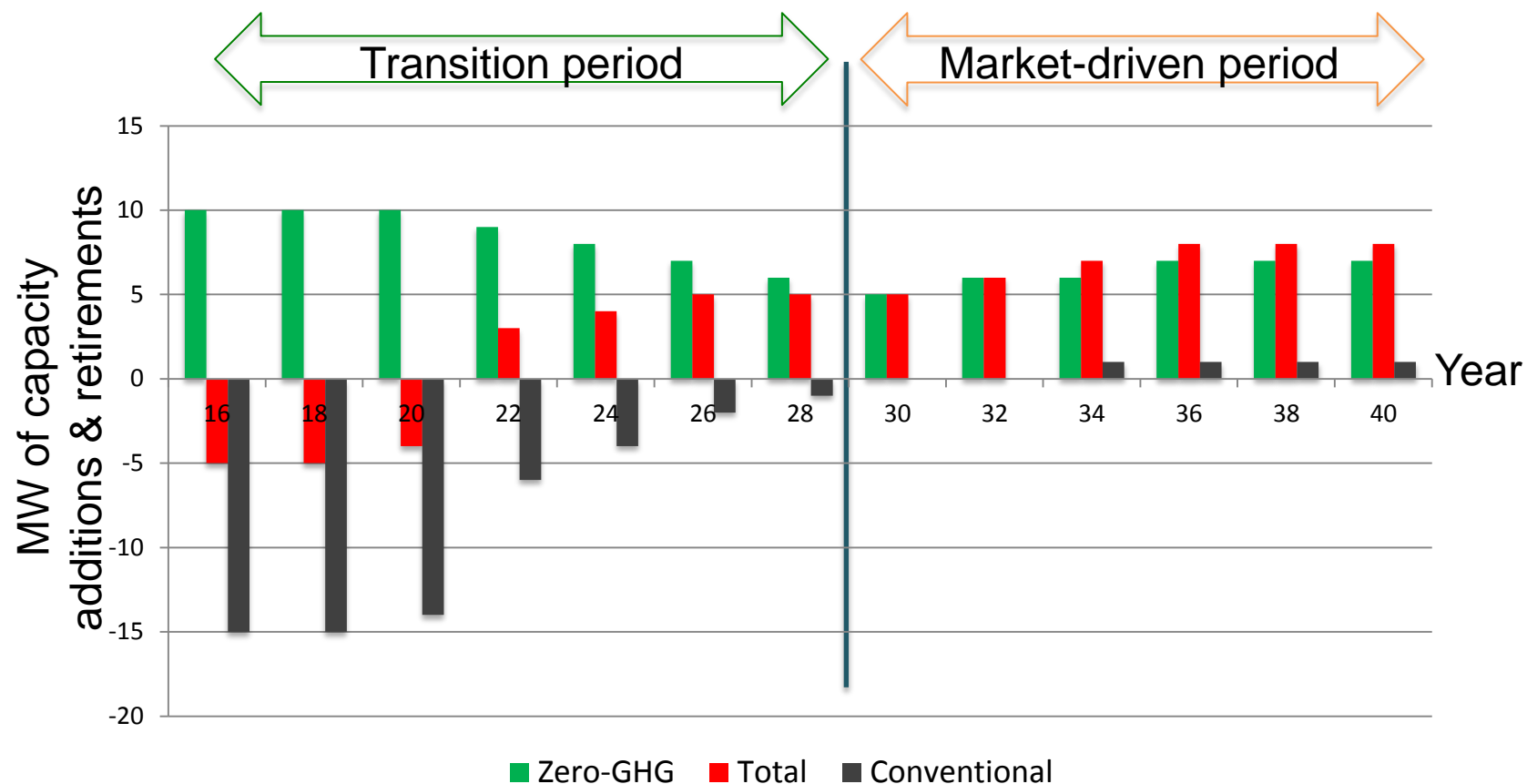
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Spoiler alert...

Sure...eventually.

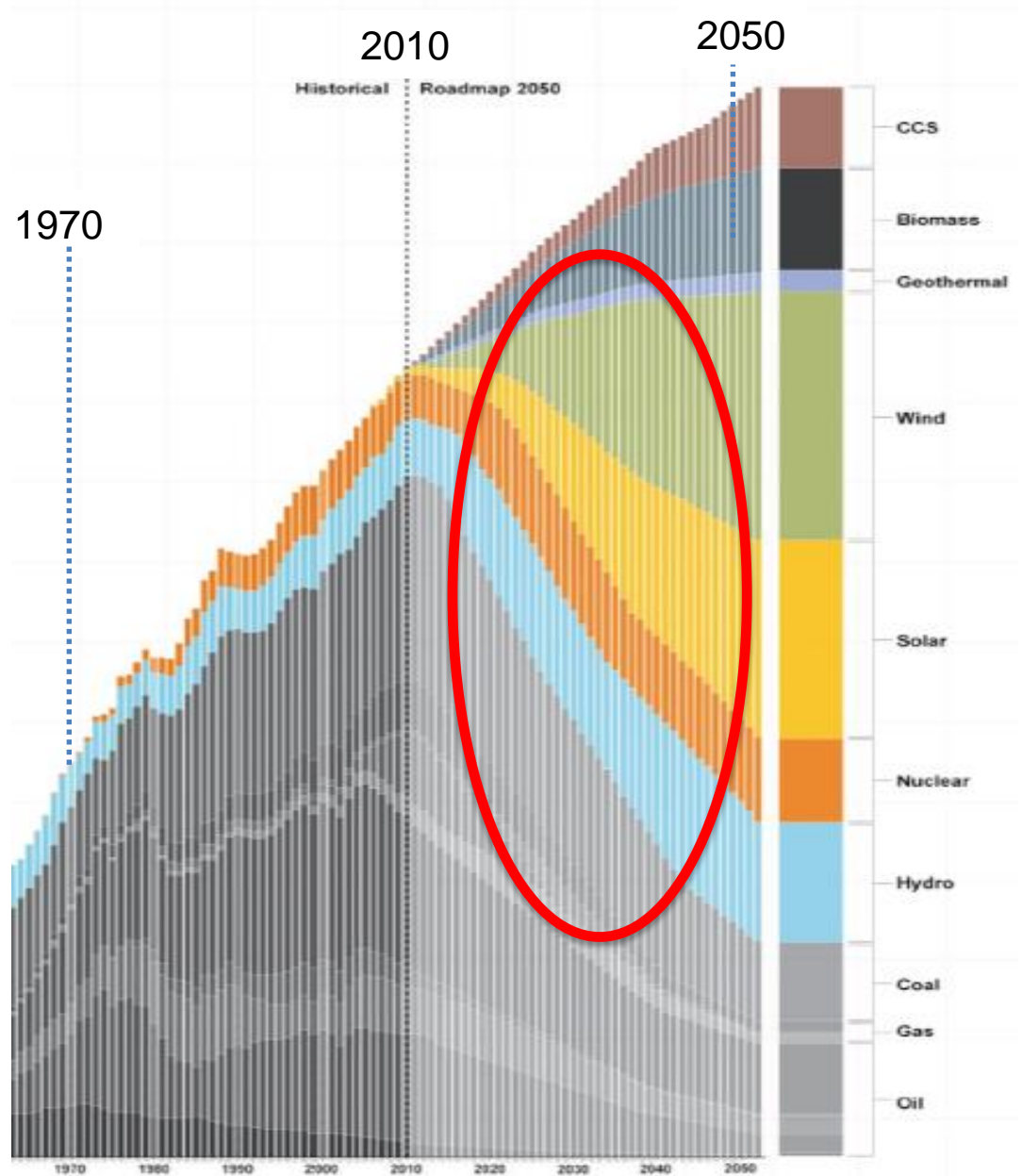
In fact, real markets are essential.

Rationale for initial low-carbon investment



Conceptual – mature 200 GW regional market

Making room
for low-carbon
deployment:
The hard part
is only
beginning...



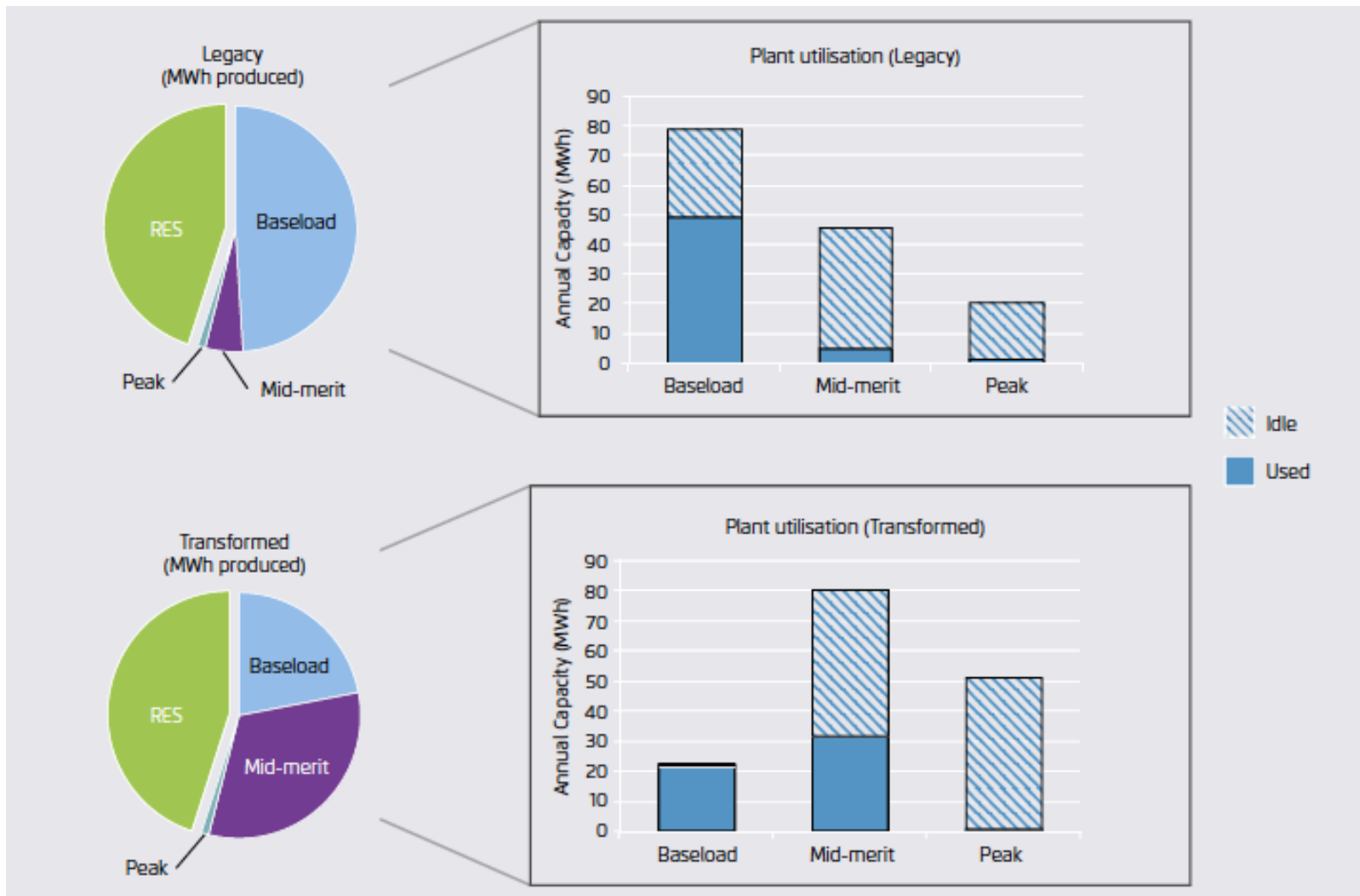
Investment decision vs. operations

Low-carbon investment decisions during transition *cannot* be left to “the market”...

...but they can & should increasingly adapt to market conditions

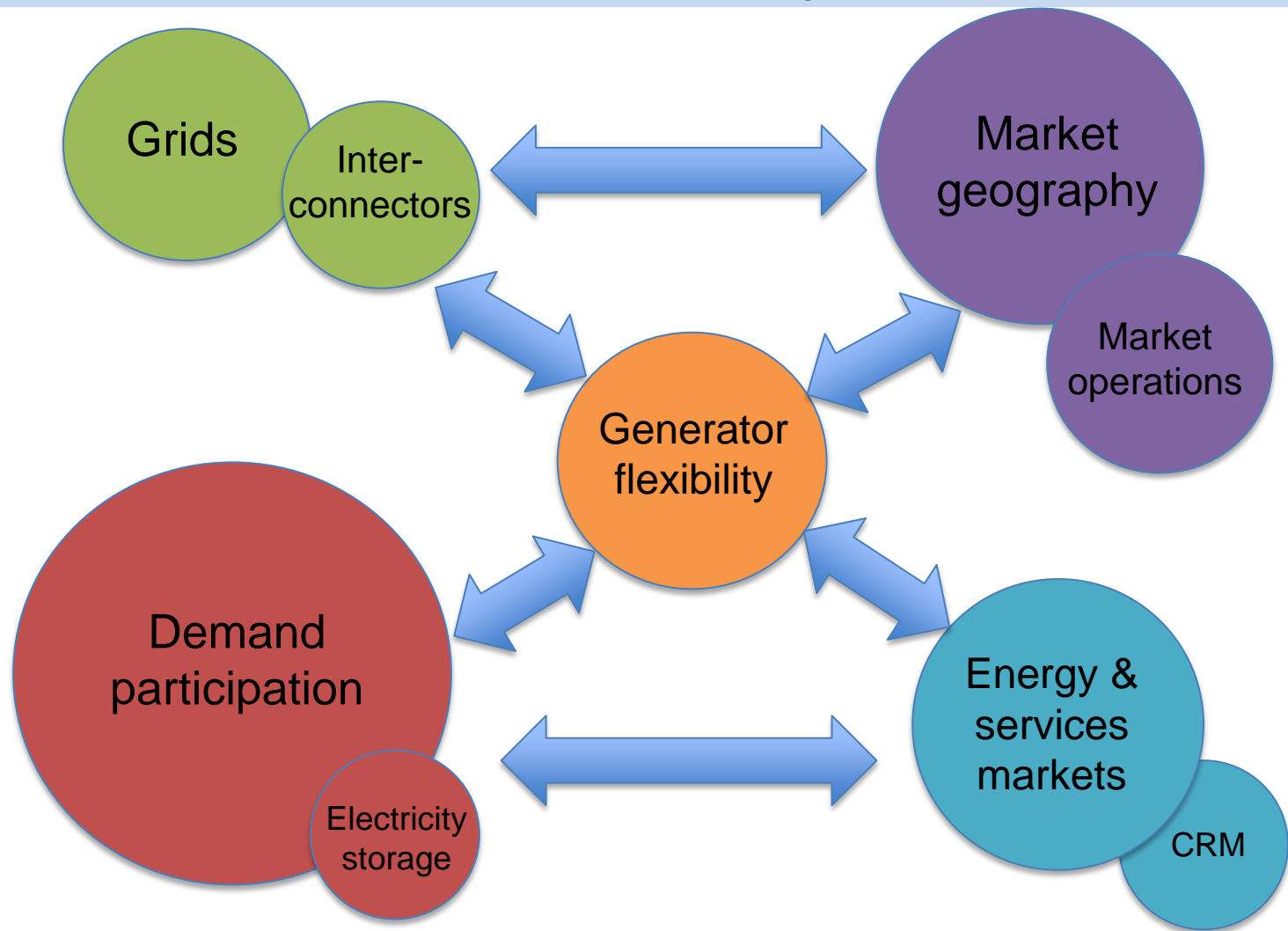
- Locational price signals
 - Imbalance responsibility
 - Real-time price exposure
 - Economic curtailment
 - Real-time volume-based retail tariff structures

The other transition...a job for the market



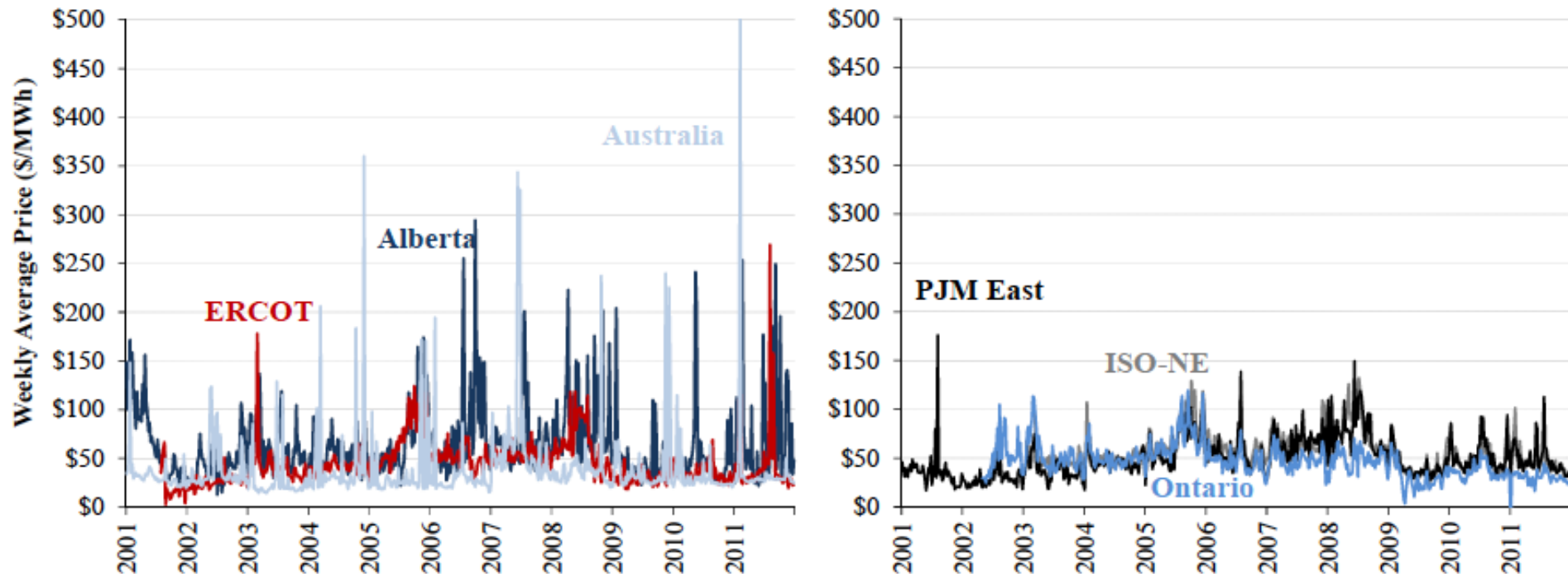
Source: IEA

Markets should favor the most efficient sources of flexibility



FCMs: antithetical to an efficient transition

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



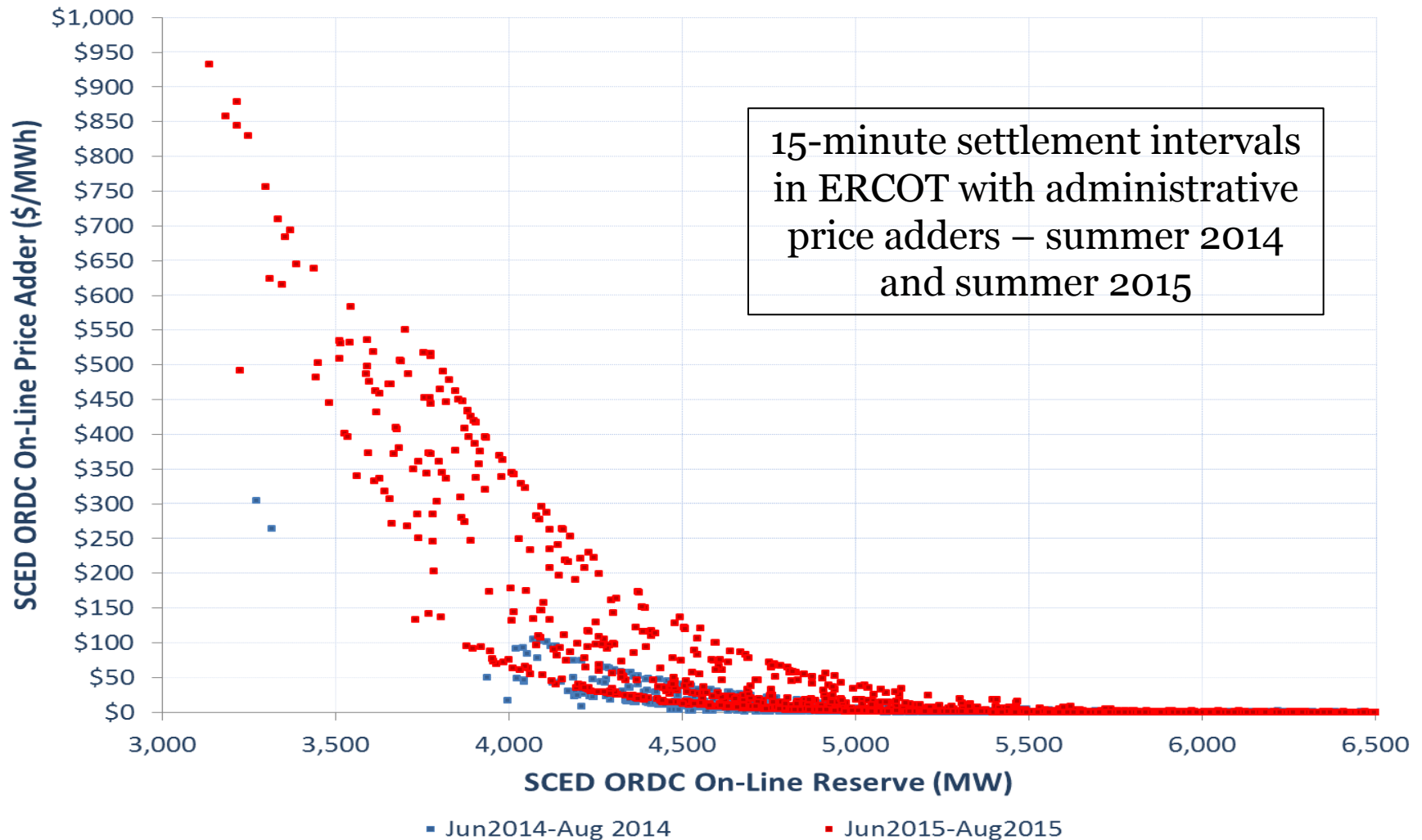
Sources and Notes:

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

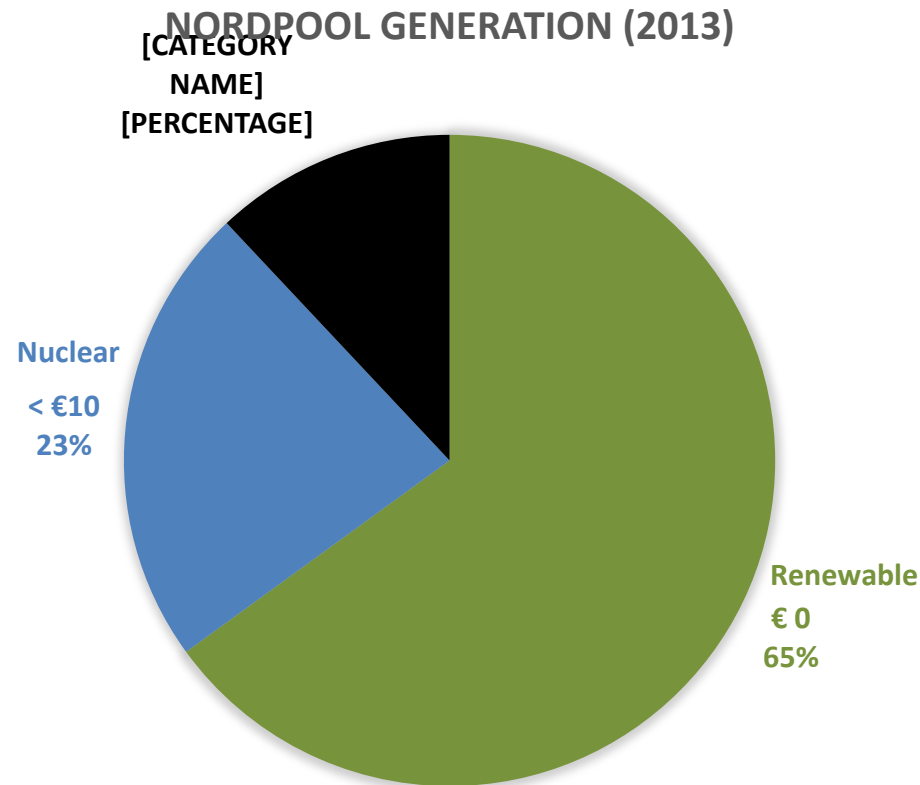
Historical prices shown for ERCOT are at the North Hub; Australia prices are at New South Wales; PJM prices are at the Eastern Hub; and ISO-NE prices are at the System Hub.

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

Theme 4: a “climate-friendly” CRM



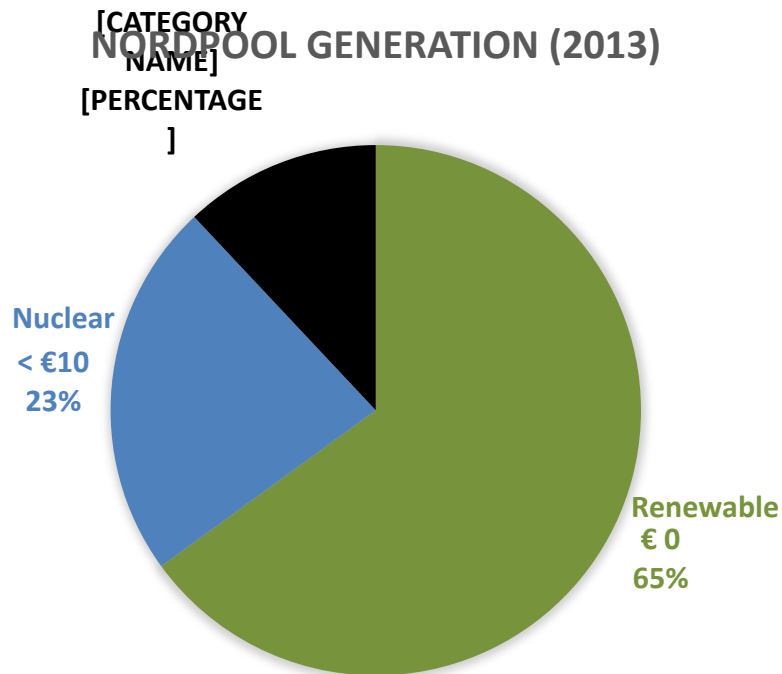
The myth of short-run production cost pricing



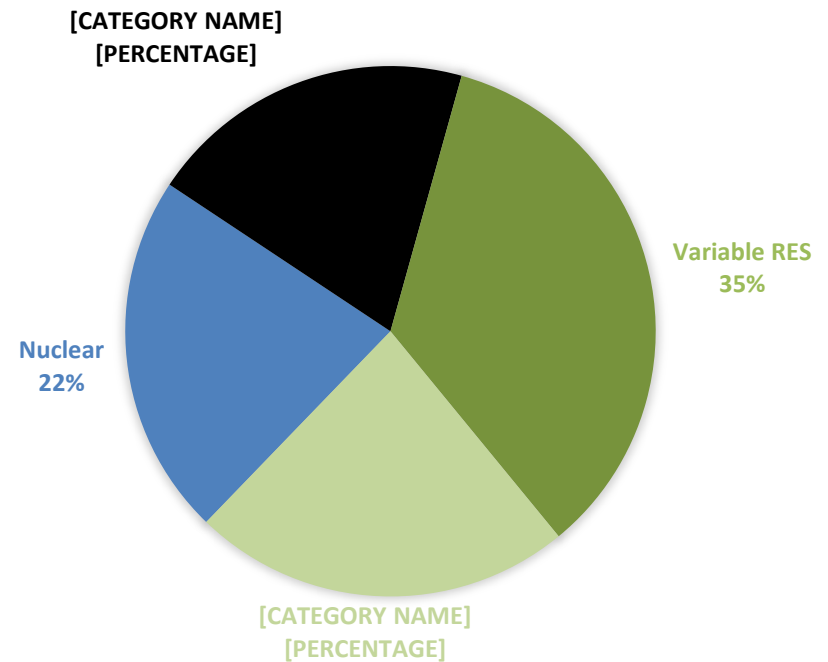
...and yet the average DAM price (2001-2014) = €35.74/MWh

Source: ENTSO-e

Decarbonization: not entirely uncharted territory



DIVERSIFIED 95% DECARBONIZED SYSTEM

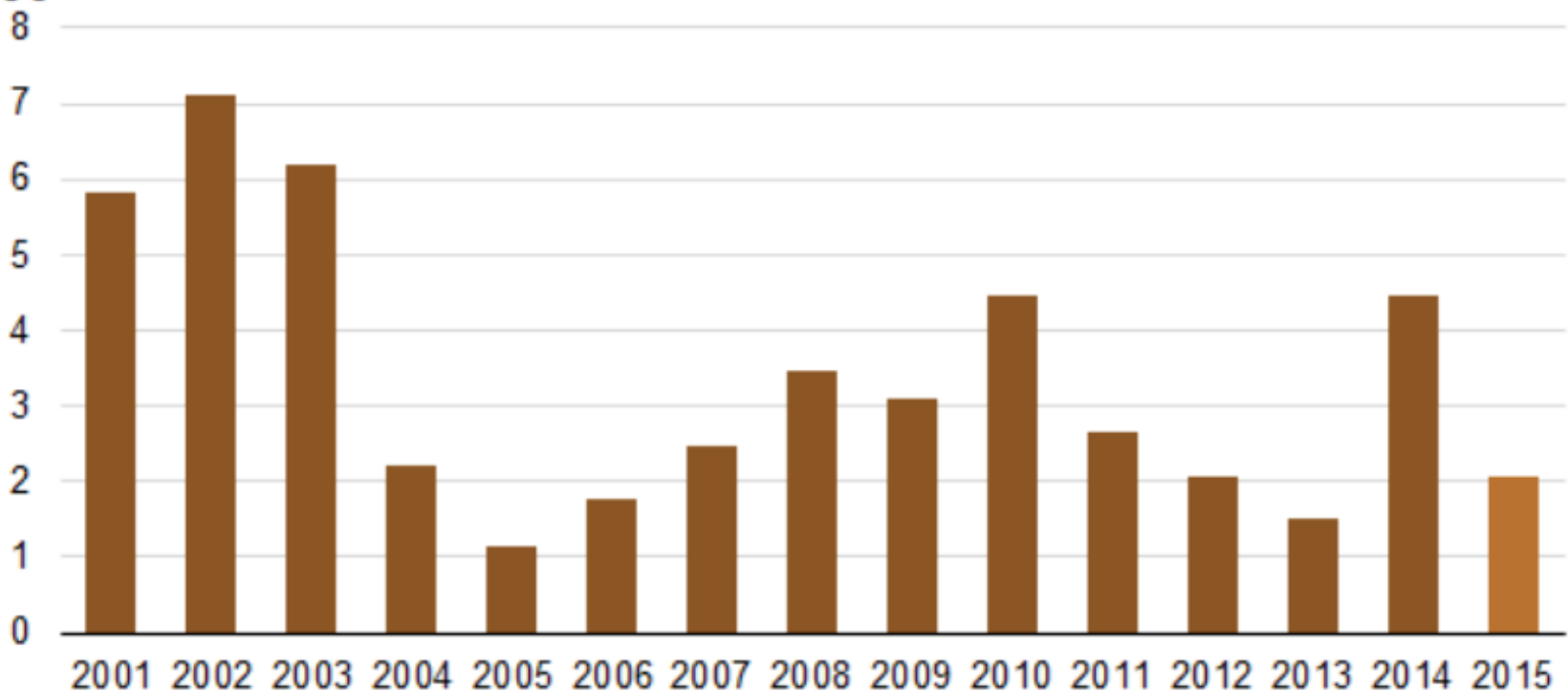


Source: ENTSO-e

A market with reserve shortage pricing and growing RES: it seems to be working

Annual capacity additions in ERCOT (2001-15)

gigawatts



Source: EIA, data from [Survey Form EIA-860](#), Summer Capacity

Note: Data for 2015 are through May.

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 and natural gas sectors. 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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