

# Market Structure and the “new normal” in power markets

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# The Issues

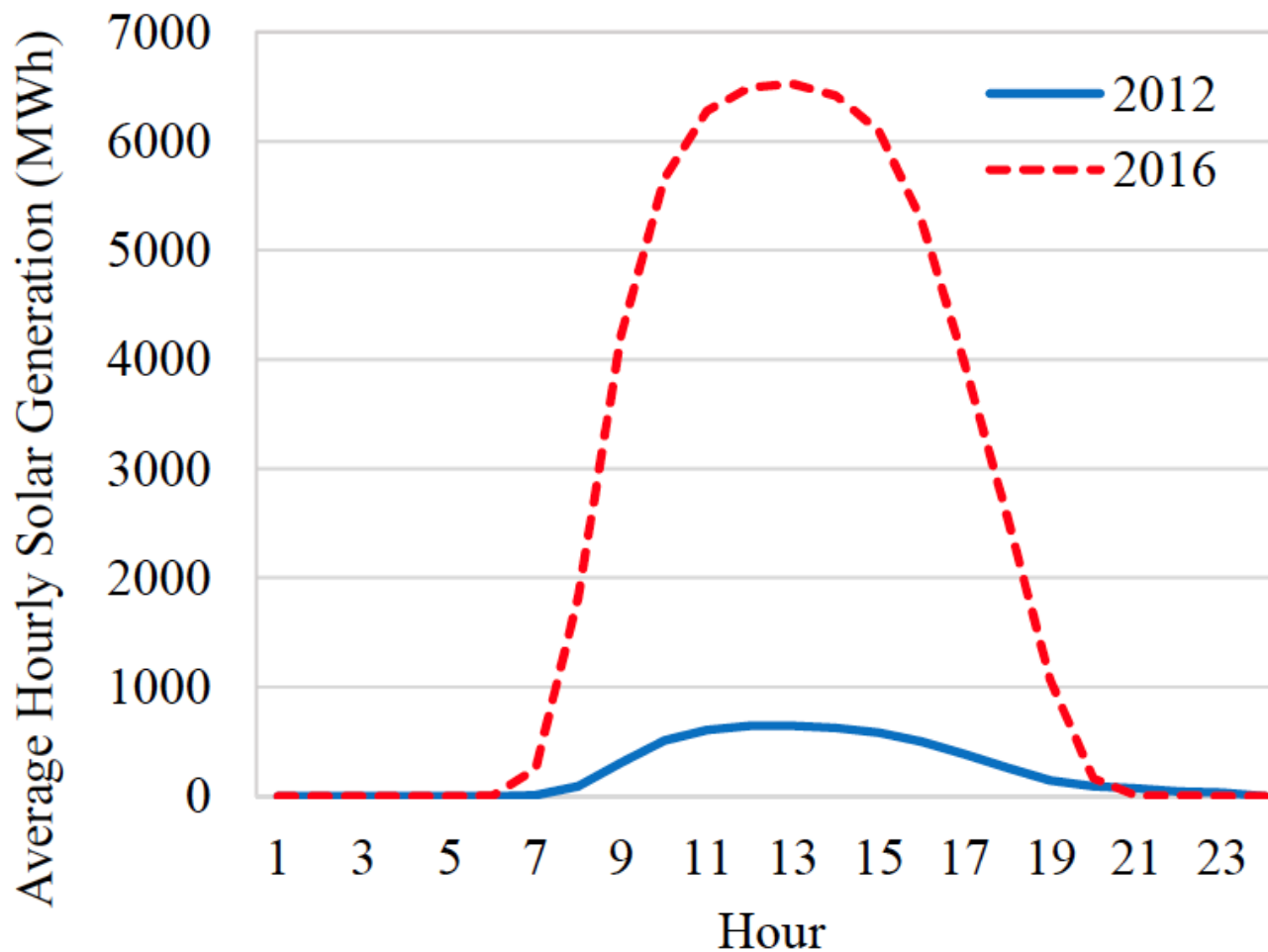
- **Low energy prices** are posing serious financial challenges for many classes of incumbent generation.
- Some of this generation *may* provide **value currently not reflected** in market prices (location, flexibility, low carbon – probably *not* baseloadability)
- Question is if/how markets **reward generation attributes** we previously took for granted.
- Many States have **differing policy goals** and regulatory structures
  - These policies almost certainly impact regional market prices
    - Renewable mandates
    - “Baseload” generation supports
    - Many combinations of retail choice, vertical integration, and in between.

# The new market drivers

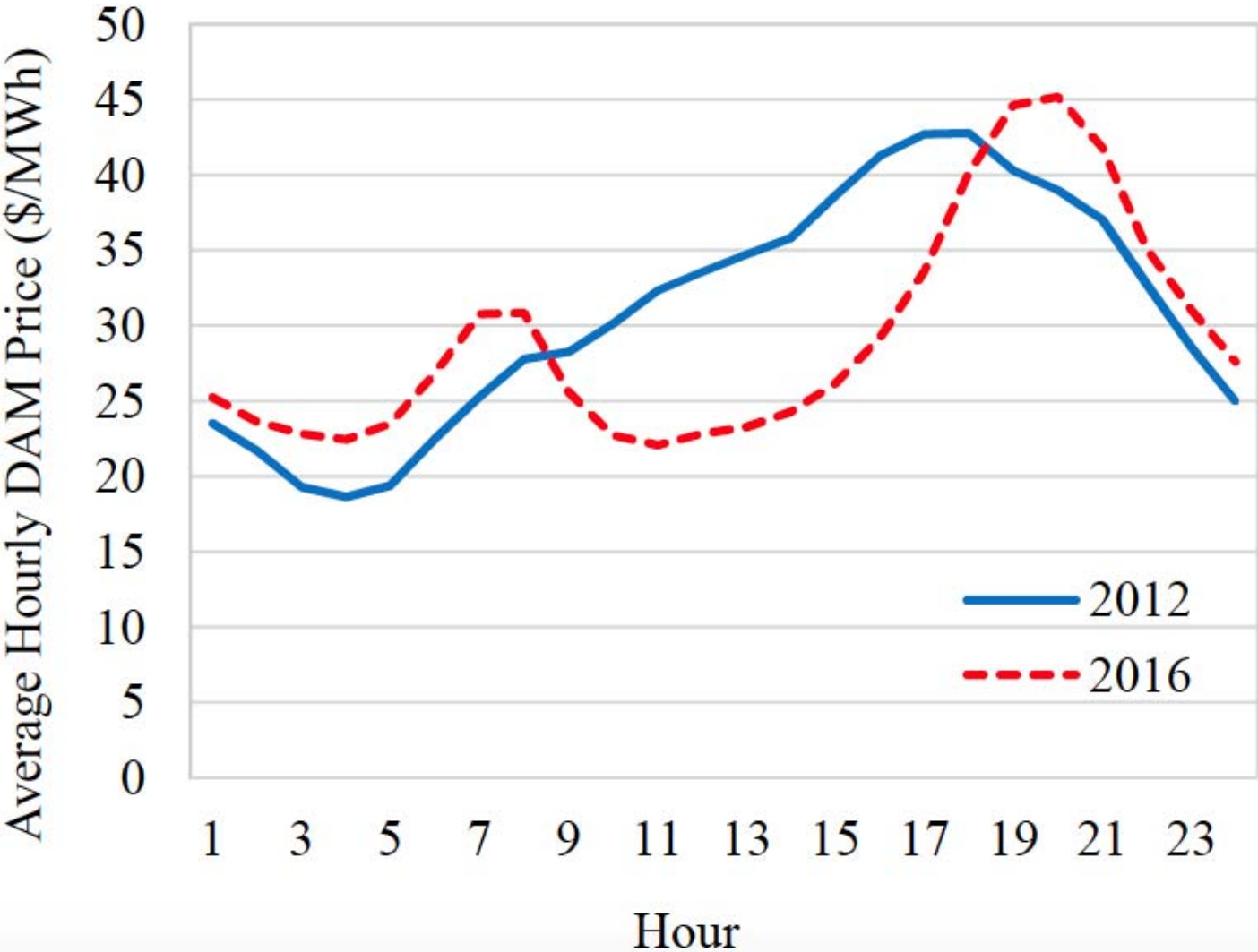
- The main culprits are low natural gas prices and new renewable energy
  - “zero” marginal cost less important than lower MC than previous baseload.
  - Renewable mandates main influence is *timing* of new capacity additions.
- Ongoing research shows that gas is main driver of low prices in the east
  - Renewables playing a non-trivial role in California

# Hourly Utility Scale Solar Output on CAISO System

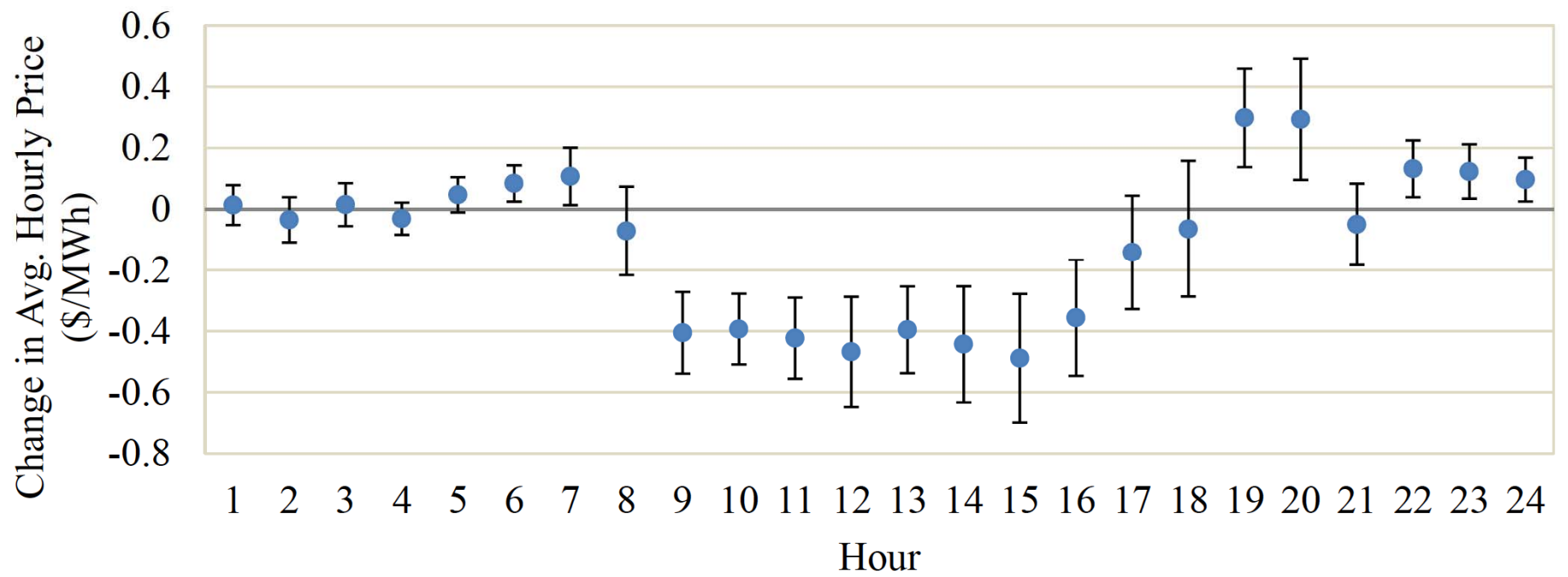
## Average Hourly Solar Generation



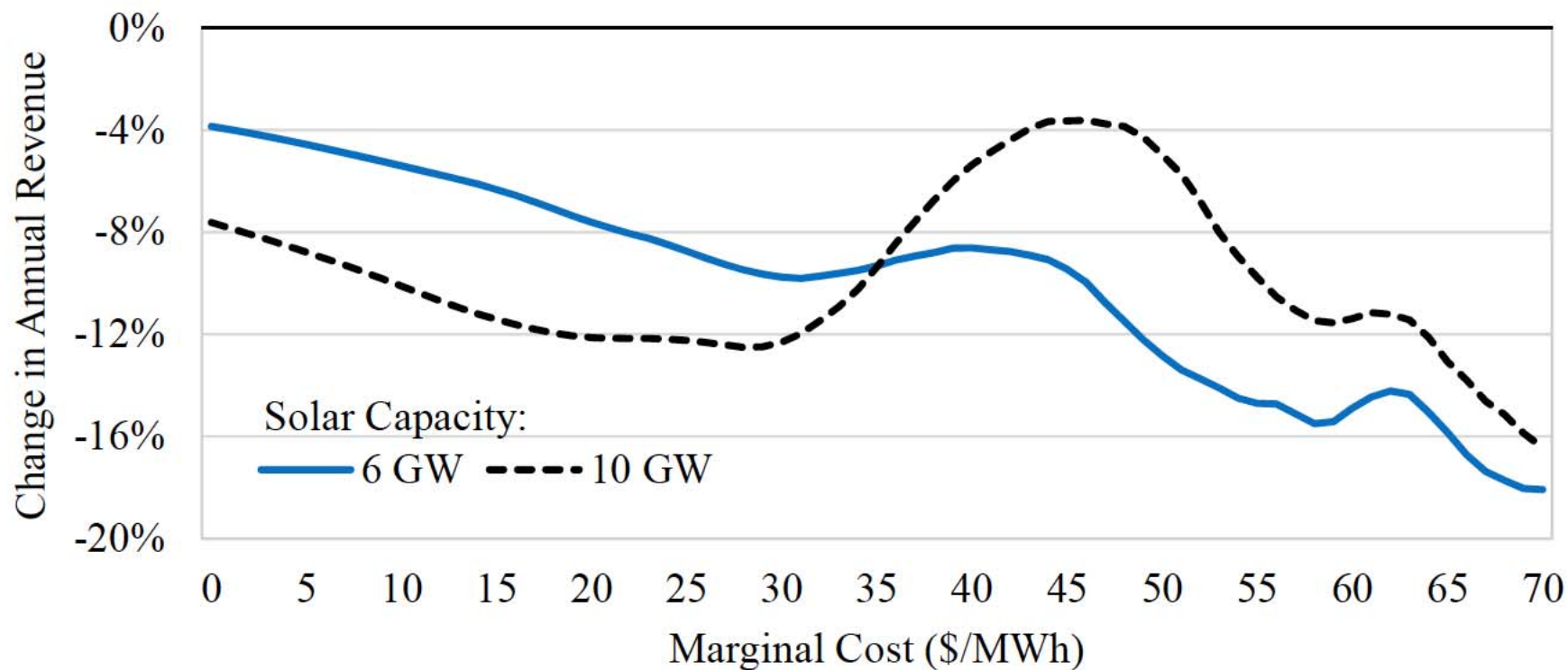
# Average Hourly DAM Price



### Change in RTM Price per GWh of Daily Solar



## Change in 2016 Revenue Relative to 2 GW Solar



# Reliability is not the Issue: Efficiency is

- Institutional structures (ISOs/NERC) have strong powers and incentives to maintain reliability
  - But at what cost?
- Lots of generation has been built under capacity markets (resource adequacy); energy-only; and traditional cost-of-service.
  - How well do such mechanisms adopt to new market conditions?



# Changing Reliability Paradigms Requires Changing Capacity Policies

- What does one get when they buy “capacity”?
  - Increasingly difficult to identify (years in advance) where and how system will need units to perform.
  - Greater emphasis on generic “on demand” performance.
- RA Policies are either bifurcating capacity requirements (California) or emphasizing performance reward/penalties (PJM/ISO-NE)
  - Convergence between energy only and capacity markets?
  - Requires energy markets to reflect multiple forms of “scarcity”

# State support is nothing new

- Long history of tax competition between states to lure large firms/factories
- Some economic justification (for States) if they can spur “agglomeration” benefits
- Recent research argues that counties with coal plants developed more slowly than comparable counties
  - Negative impacts of environmental and other ammenity benefits

# What are the policy options in response?

- Reject/overturn anticompetitive arrangements?
  - Limits of jurisdiction and authority linked to type and form of arrangements
- Mitigation through ISOs?
  - Minimum offers and other mitigation tools
  - Risks of exacerbating original inefficiencies
    - Does it make sense to maintain even more capacity by kicking subsidies capacity out of RA markets through minimum offer regulations?
    - Key question of deterrence effect
- Accept that markets are imperfect?

# One last thought

- We are experiencing disruptive, *not* equilibrium conditions
  - New capacity coming on “early”; major shifts in relative costs of fuel
  - Existing system not designed for those conditions
  - Current price levels and patterns are likely not the long run levels and patterns
  - Policies and market design should focus on the end game and not just the transition

# Thank you

James Bushnell, UC Davis

Comments drawn from:

Bushnell and Novan. "Generation Green: Renewable Electricity Supply in the U.S."

UC Davis working paper. 2017

Bushnell, Flagg, and Mansur. "Capacity Markets at a Crossroads."

*UC Davis working paper. 2016*