

24/7 Clean Energy Procurement and Electricity System Decarbonization

Moving from “RE100” to “ZC100”

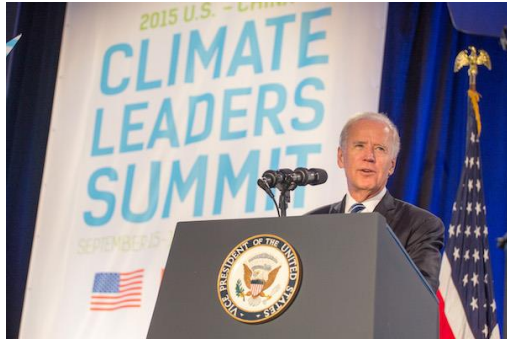
Dr. Melissa Lott

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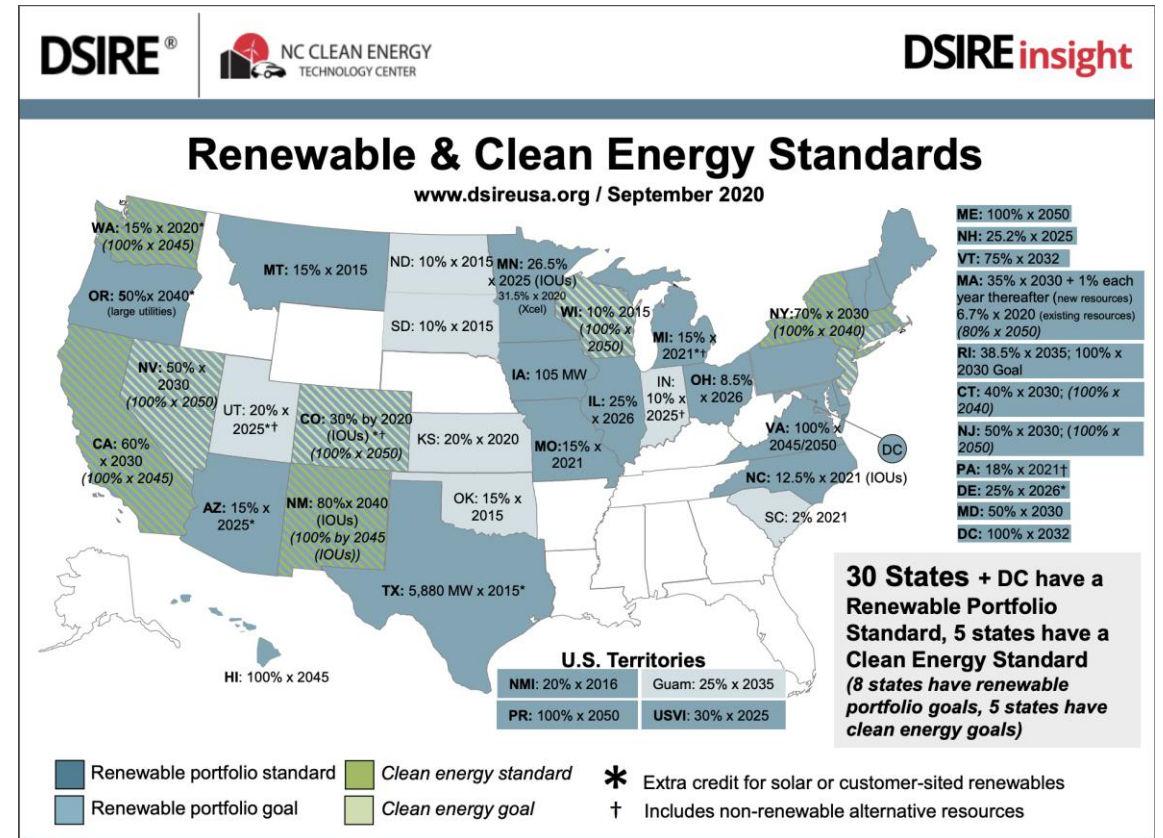
October 13, 2020



We need push AND pull if we want to quickly move to 100% zero carbon electricity

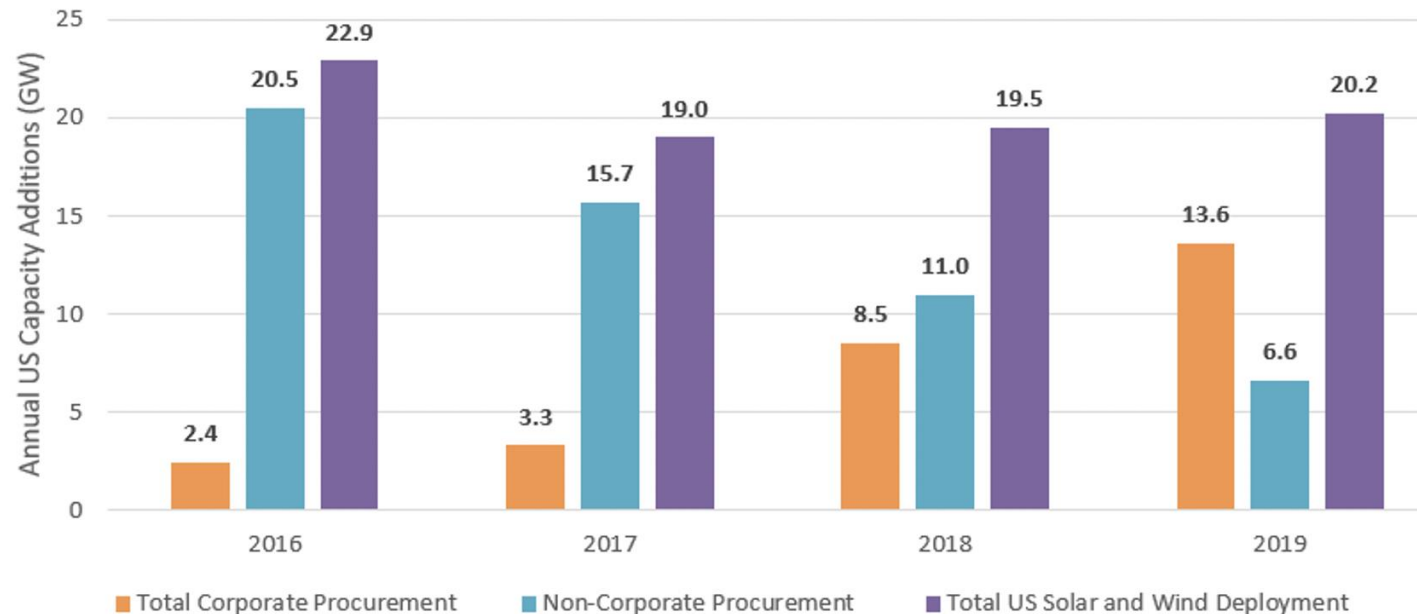


THE Paris...
CLIMATE 10 years
PLEDGE Early



Corporate pledges have largely focused on variable renewables

- These "RE100" goals are frequently met using four basic methods:
 - Deploying **distributed renewable generation** resources (e.g., rooftop solar panels) on site.
 - Purchasing **renewable energy certificates (RECs)** that are generated by renewable electricity generation sources.
 - Purchasing electricity from local utility distribution companies via **green tariff programs**, designed to provide compensation for renewable energy sources that the utilities have procured directly.
 - Entering into **Power Purchase Agreements (PPAs)** with new renewable electricity generation suppliers.
- Corporate goals have led to significant progress.



Credit: Kobus, et. al. 2020

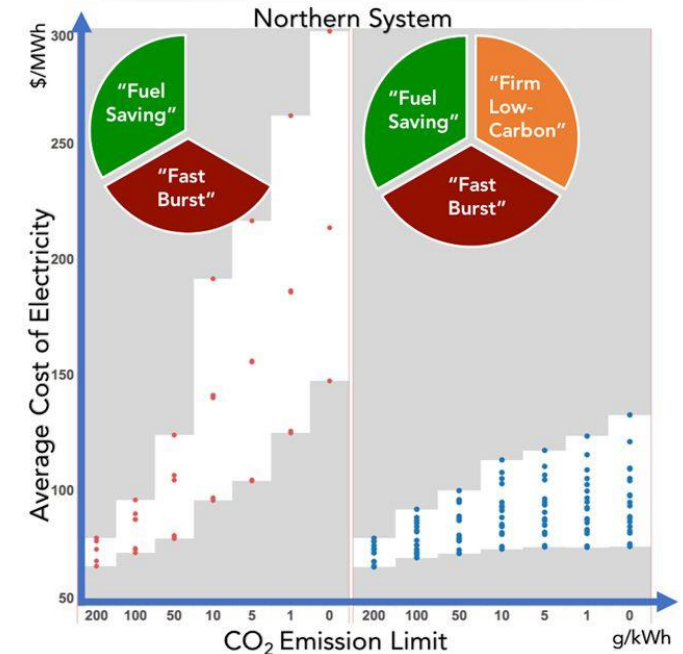
But “RE100” strategies limit future progress

“RE100” strategies limit the carbon emissions reductions that companies can achieve.

- These methods focus on procuring **annual** electricity needs.
- RE100 methods allow for **annual** offsetting of emissions --- but don't allow for zero carbon goals to be met.
- Risks criticisms from shareholders and customers (e.g., greenwashing)
- At the core of the issue is the gap between:
 - **when** and **where** companies **use** electricity and
 - **when** and **where** electricity is **generated**
- Research to date clearly shows that:
 - procurement methods that focus purely on variable renewable generation resources lead to a continued reliance on the power grid for a significant portion of a company's electricity consumption.
 - pathways to zero-carbon electricity are most affordable when they include a mix of variable renewables, firm dispatchable power, and energy storage



Credit: Canva.com



Credit: Prof. Jesse Jenkins (Princeton)

A quick example...

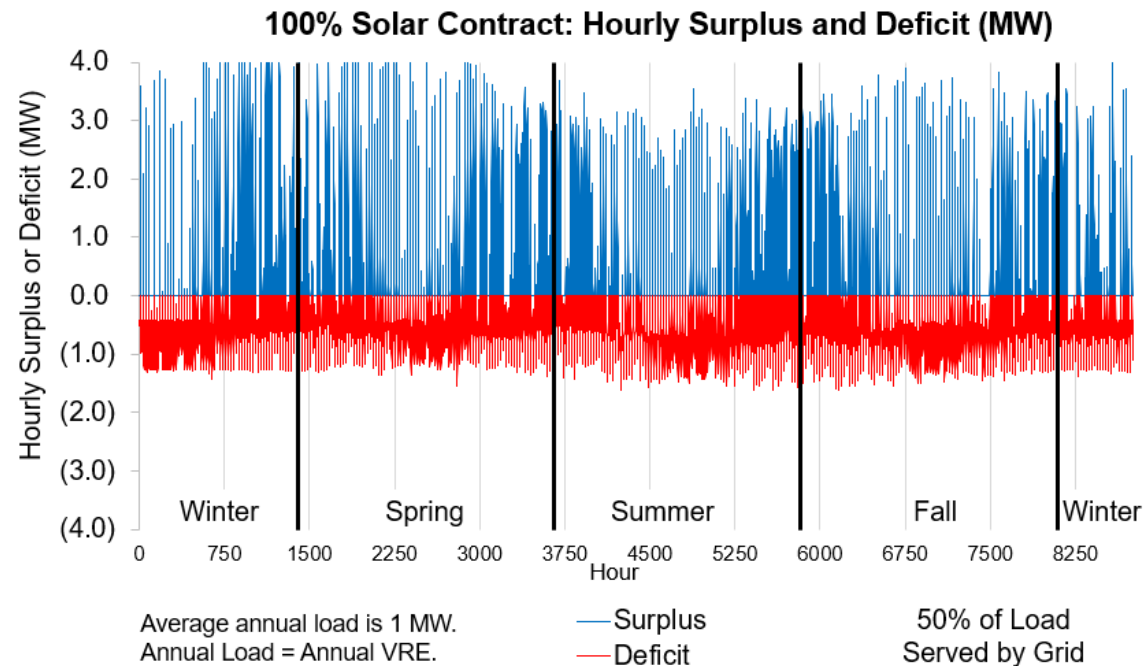
Credit: Columbia University's Center on Global Energy Policy & The NorthBridge Group

A series of faint, light blue icons representing various energy sources and infrastructure, including wind turbines, solar panels, a power transmission tower, a factory with smokestacks, and an oil pumpjack, arranged horizontally across the bottom of the blue banner.

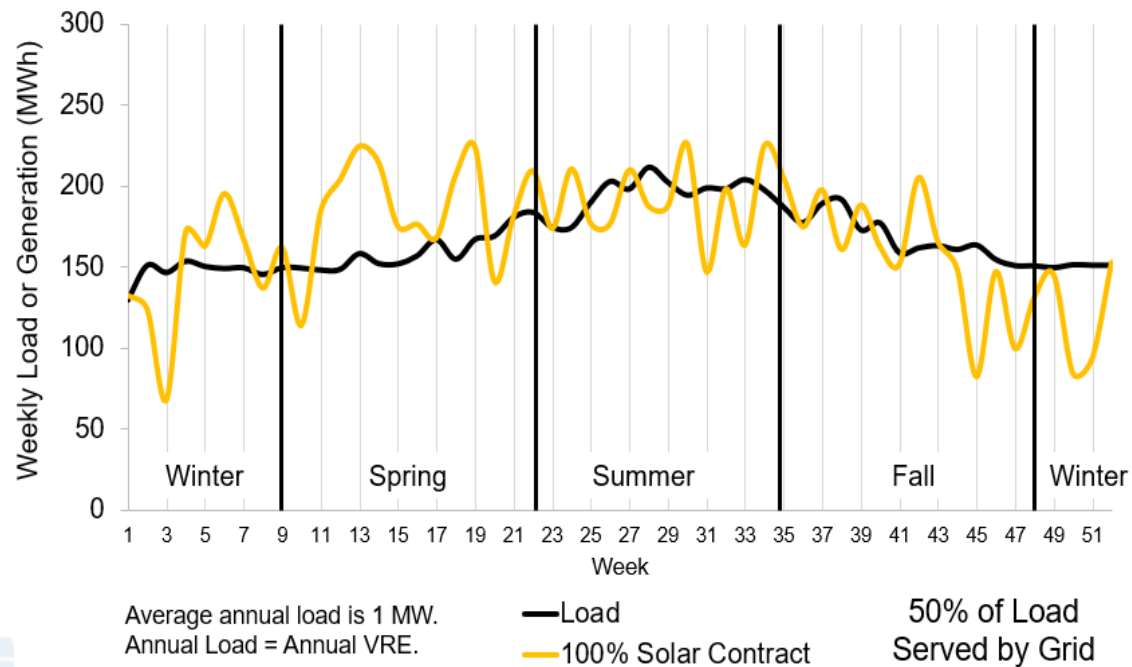
Big Box Store in New England

100% Solar

Hourly Breakdown



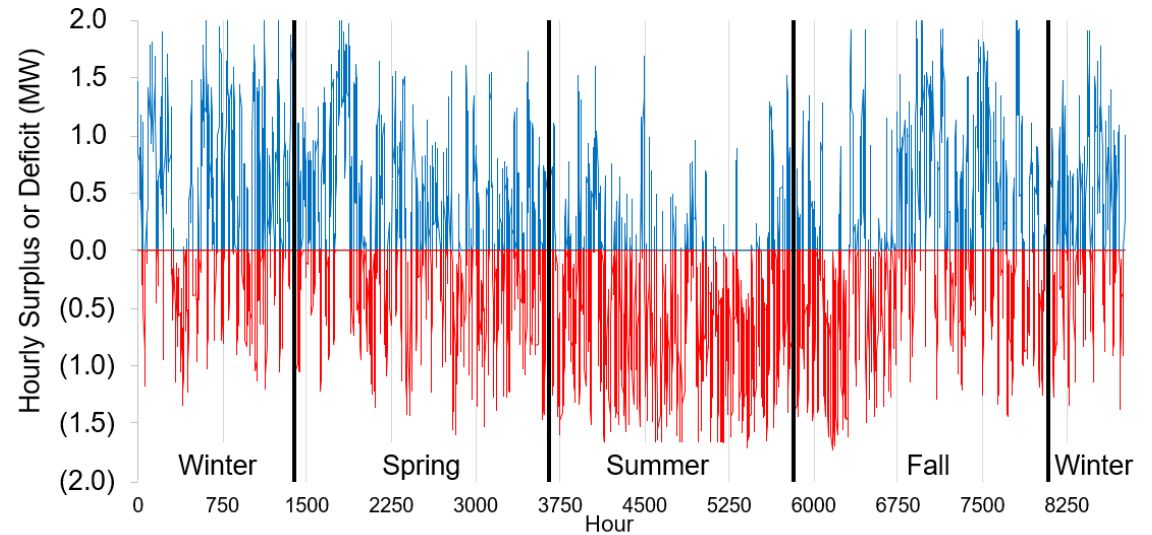
Weekly Breakdown



Big Box Store in New England

100% Wind

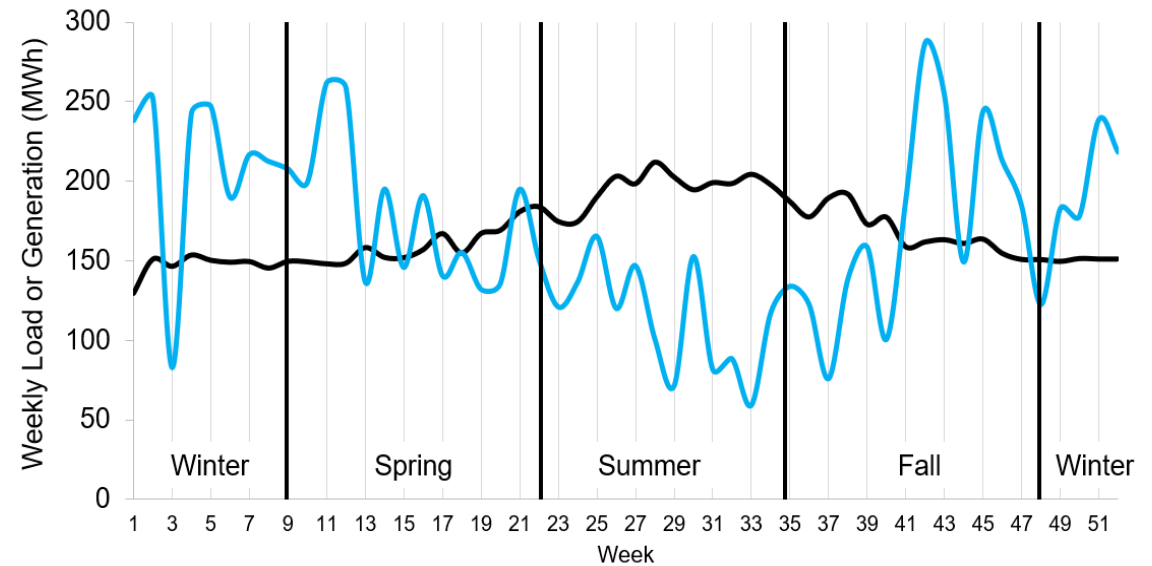
Hourly Breakdown



Average annual load is 1 MW.
Annual Load = Annual VRE.

34% of Load Served by Grid

Weekly Breakdown



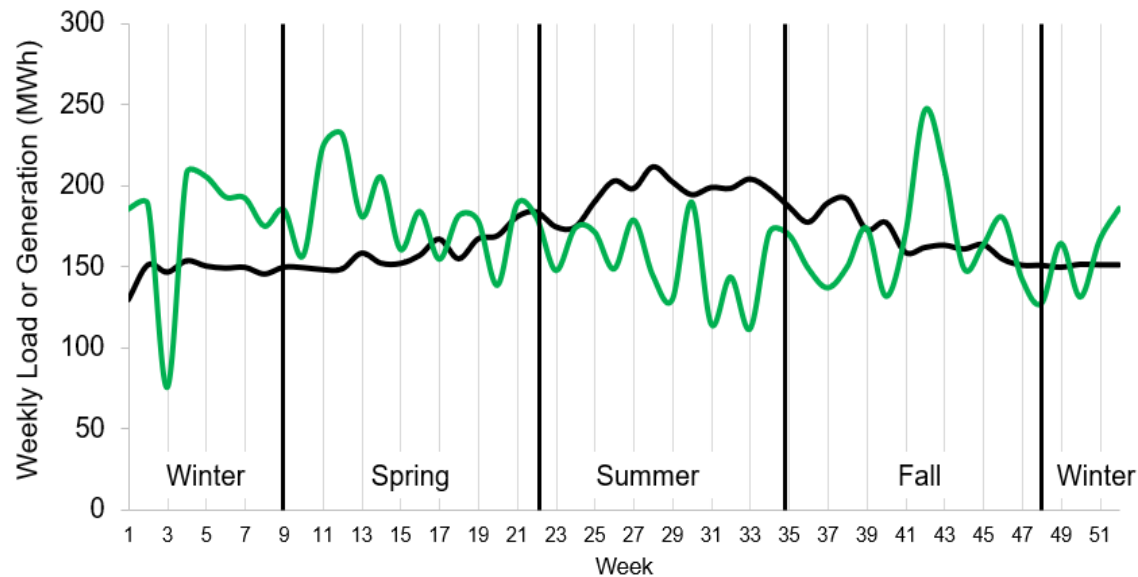
Average annual load is 1 MW.
Annual Load = Annual VRE.

34% of Load Served by Grid

Big Box Store in New England

50% Wind
50% Solar

Without Batteries

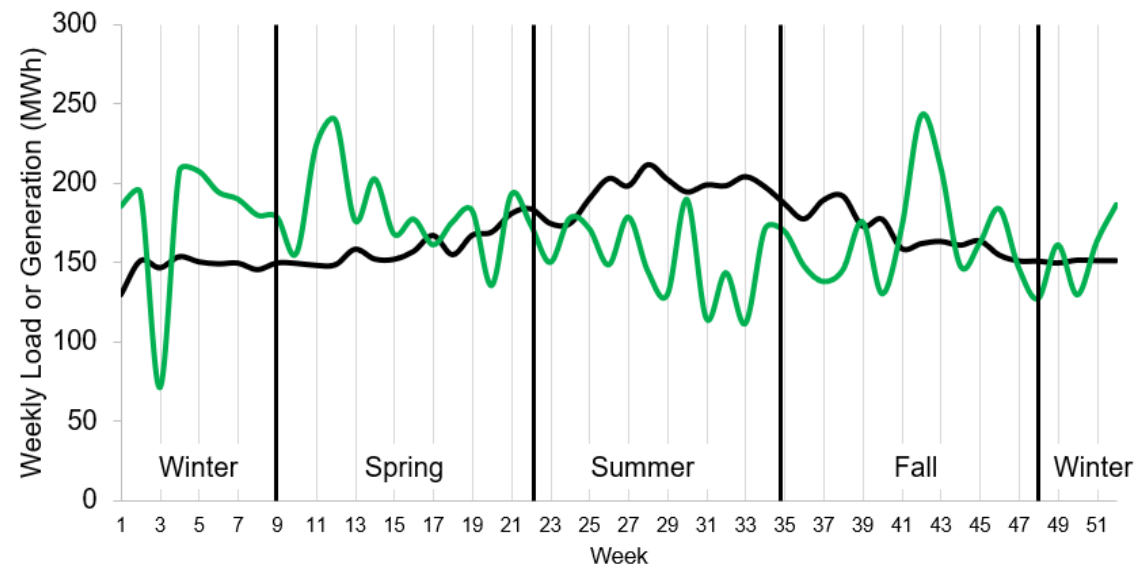


Average annual load is 1 MW.
Annual Load = Annual VRE.

— Load
— 50% Wind + 50% Solar

26% of Load
Served by Grid

With a 1 MW Battery



Average annual load is 1 MW.
Annual Load = Annual VRE.
Battery is 1 MW, 8 MWhs.

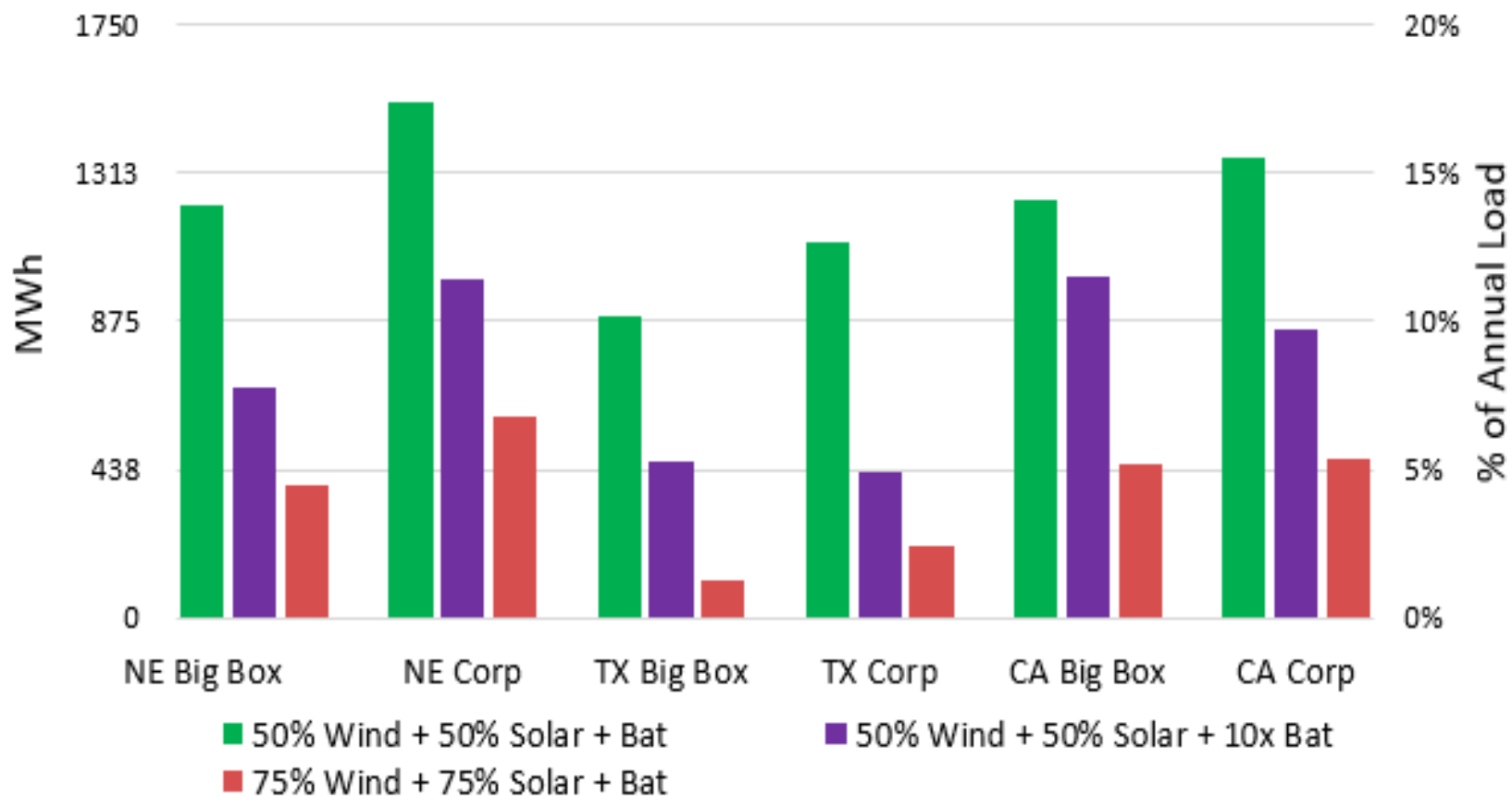
— Load
— 50% Wind + 50% Solar + Bat

14% of Load
Served by Grid

Annual Deficits Across All Regions and Customer Types

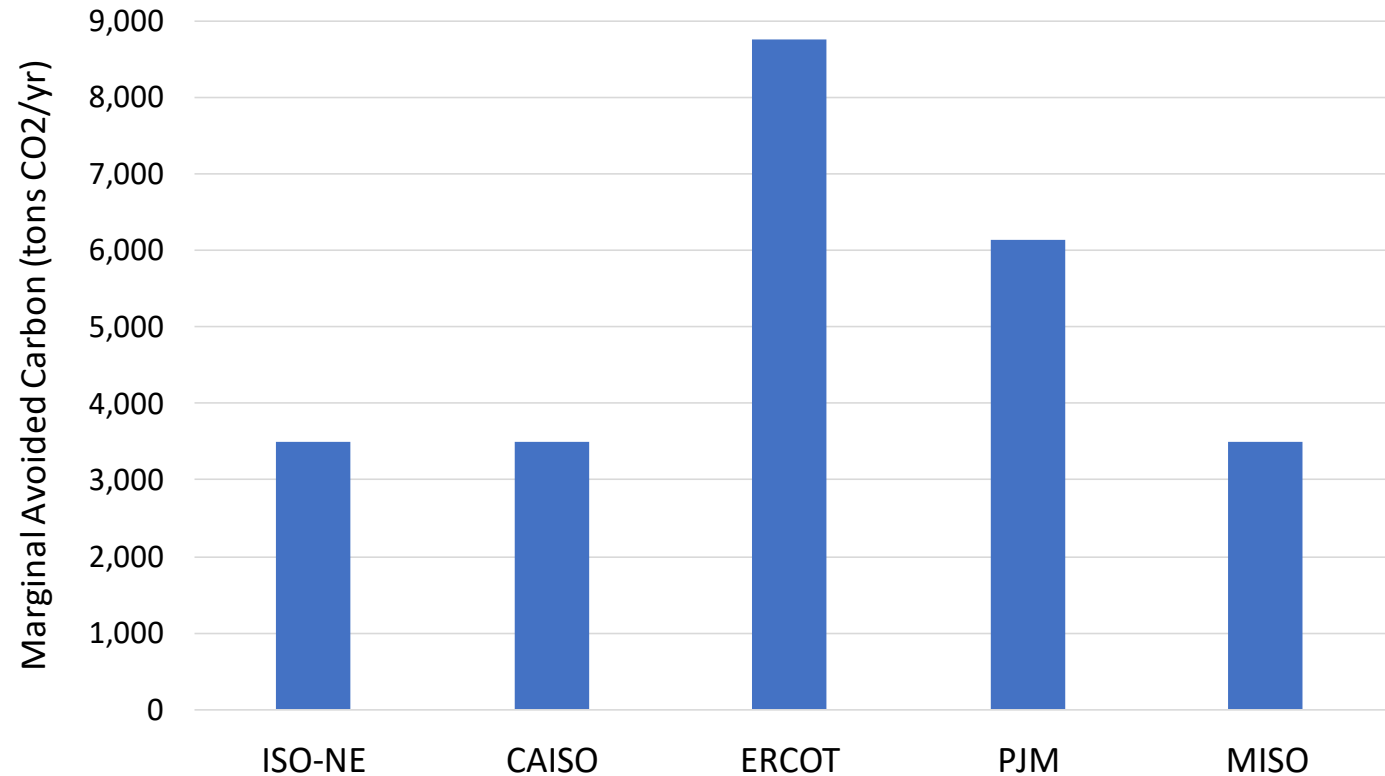
i.e., overbuild renewables or 10x battery storage

Annual Deficits with additional renewables or additional storage



Estimated Marginal Avoided CO₂ Emissions

Impacts of a 1 MW
average load
contract vary
considerably
across regions.



- Interesting (not intuitive?) results
 - MISO burns more coal than ERCOT on average, but natural gas tends to be on the margin. In turn, the carbon impacts are lower in MISO.



The cheaper and lower-risk solution is zero-carbon electricity procurement

Using ZC100 procurement methods allows companies to achieve net-zero goals.

- Lower cost, Lower risk
 - Adding options in any market lowers costs and risks to operation, performance.
 - The mix ****might**** end up being 100RE --- but it shields the company if not.
- Pass the Greta Test
 - Rapid growth of scrutiny of company strategies will reveal failure of RE100 to deliver ZC operations
 - Verifiable emissions reductions --- avoids accusations of “greenwashing”
 - Best-in-class ESG
- Tools for local engagement
 - Some jurisdictions are wary of 100% RE and may be amenable to improved partnerships
 - Possible tool for engagement with government, utilities, advocacy/green groups, organized labor...
- Best-in-class Branding
 - Aligned with new state and national policies around the US and globe
 - Potential to attract new customers, new spokespeople, and investors through proactive action

Thanks!

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