Modeling Renewable Energy, Clean Technologies and Electrification For Deep Decarbonization Future

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Prepared For:

Bipartisan Policy Center

May 31st, 2019

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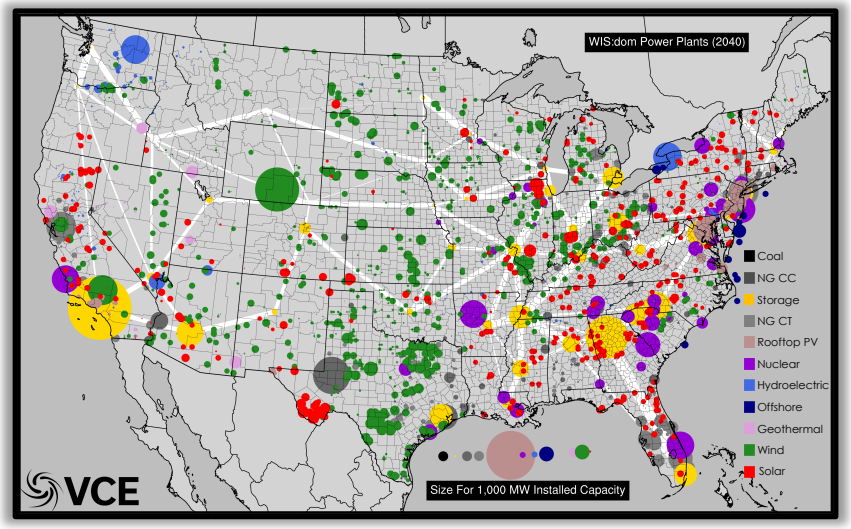
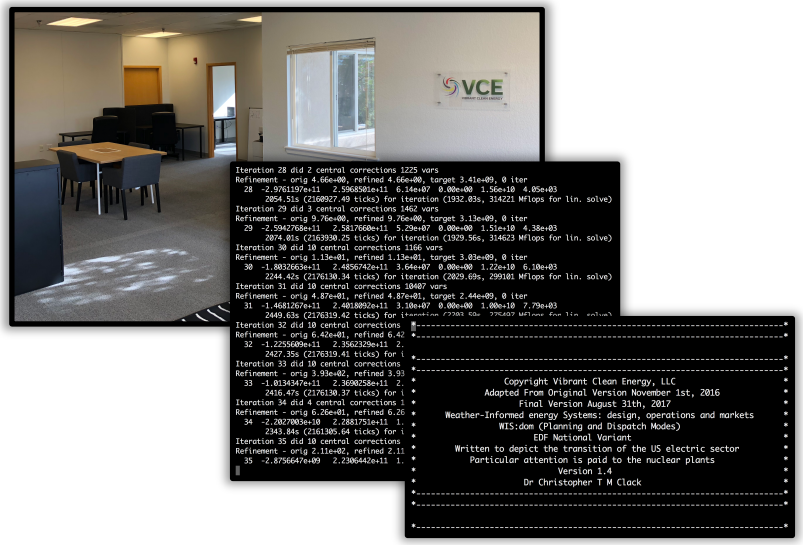
Who Are We: Vibrant Clean Energy (VCE®)





Purpose of Vibrant Clean Energy, LLC:

- Reduce the cost of electricity and help evolve economies to near zero emissions;
- Co-optimize transmission, generation, storage, and distributed resources;
- Increase the understanding of how Variable Generation impacts and alters the electricity grid and model it more accurately;
- Agnostically determine the least-cost portfolio of generation that will remove emissions from the economy;
- Determine the optimal mix of VG and other resources for efficient energy sectors;
- Help direct the transition of heating and transportation to electrification;
- License WIS:dom® optimization model and/or perform studies using the model;
- Ensure profits for energy companies with a modernized grid;
- Assist clients unlock and understand the potential of high VRE scenarios, as well as zero emission pathways.

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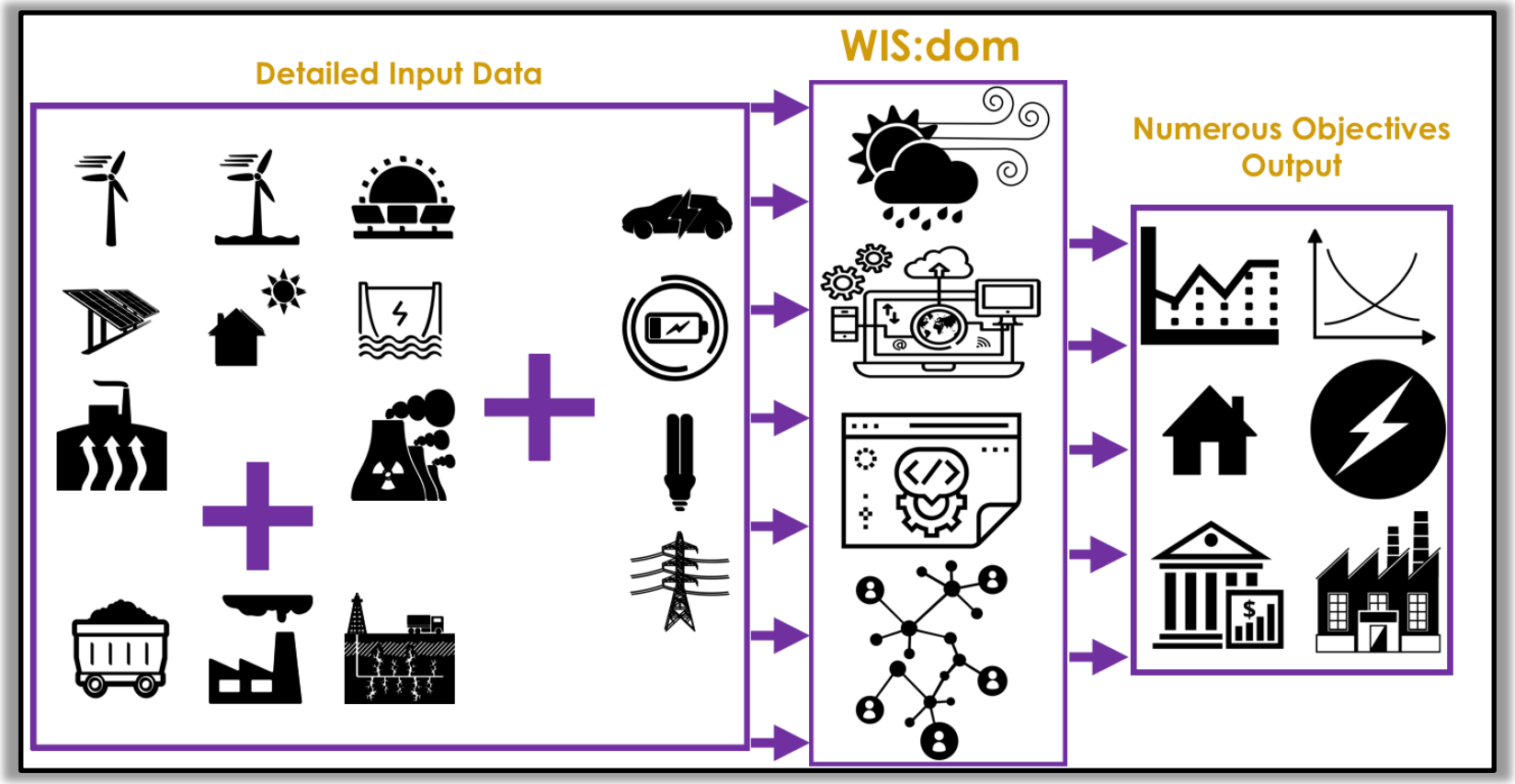
The WIS:dom® model co-optimizes generation, transmission, storage and DERS across the entire CONUS at 3-km for each chronological 5-minutes for multiple years



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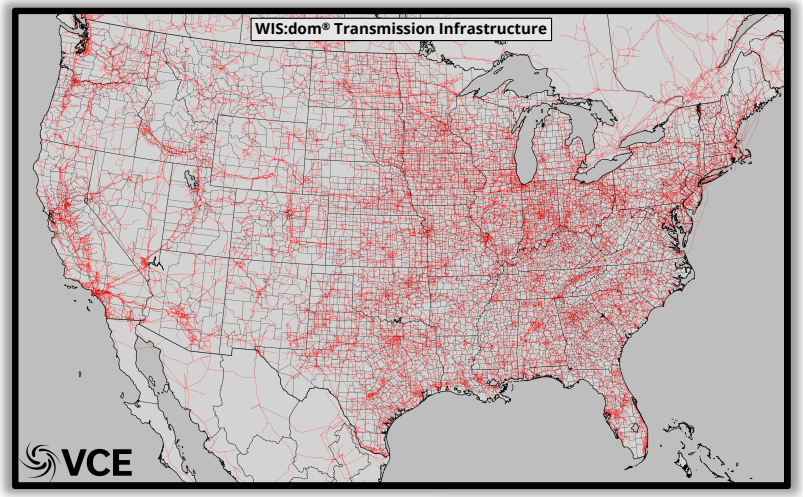
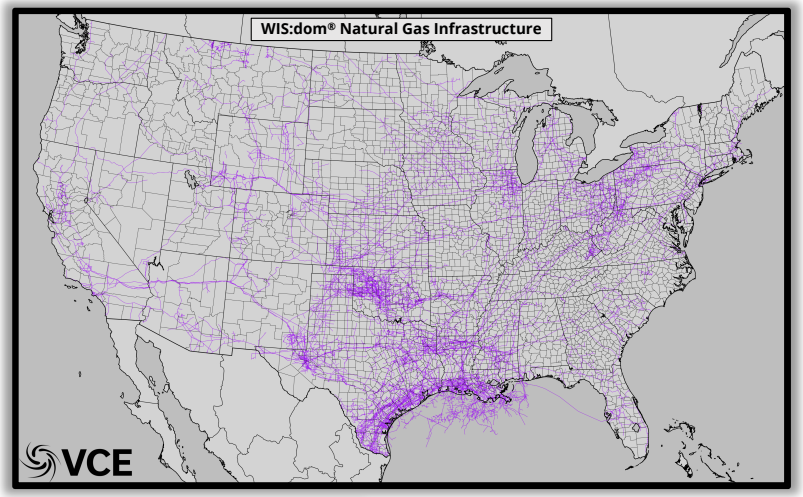
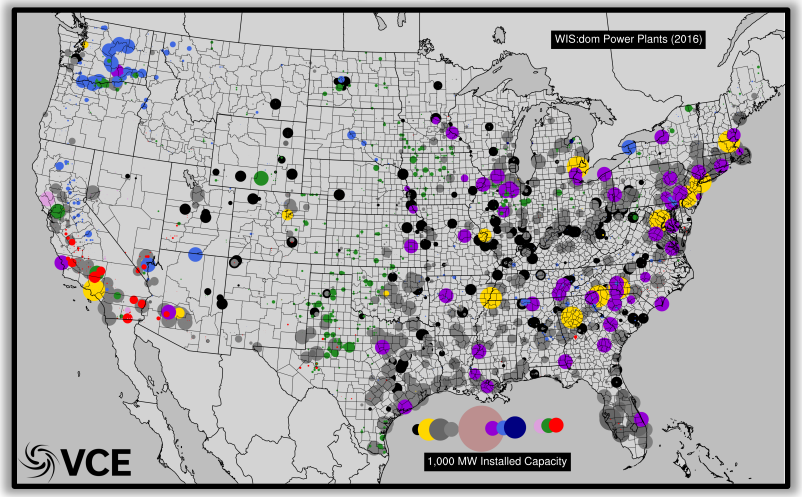
The WIS:dom® model co-optimizes across sectors that are dependent upon each other when considering economy wide decarbonization







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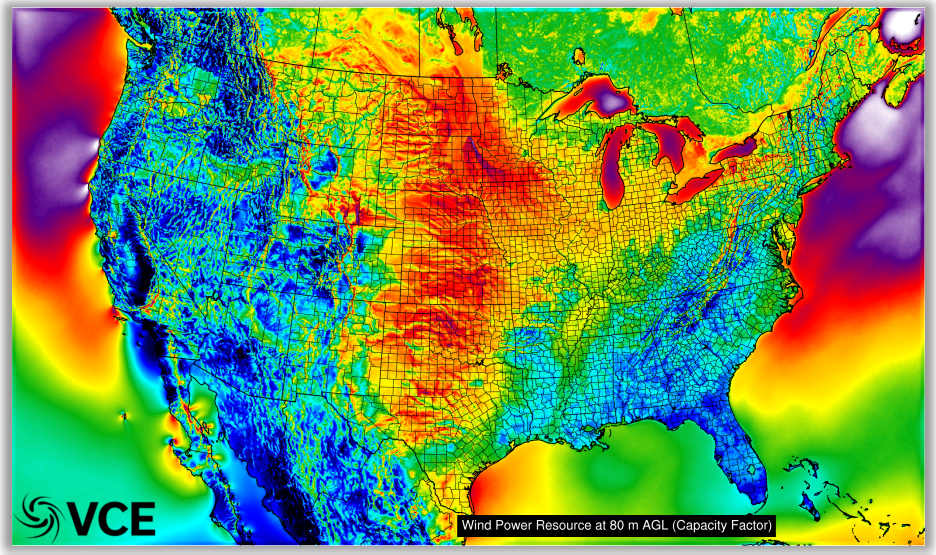
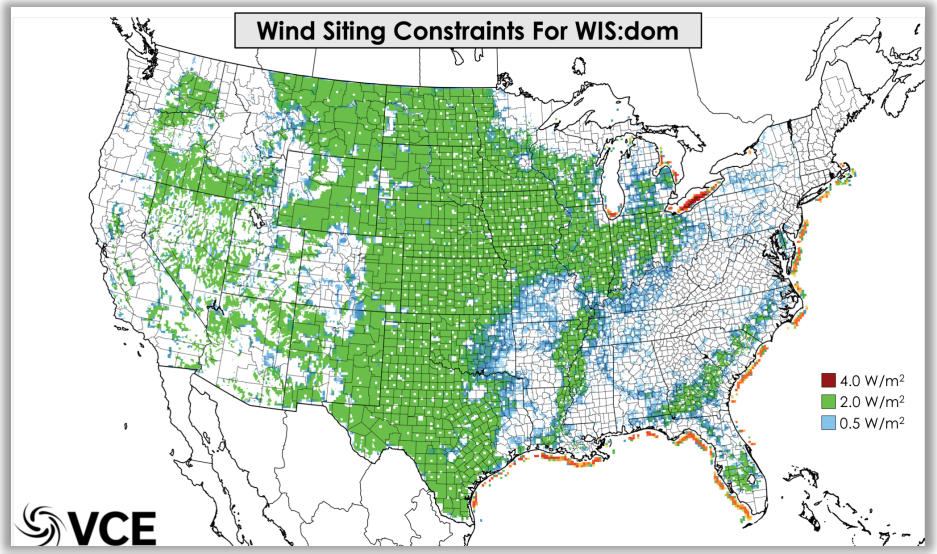
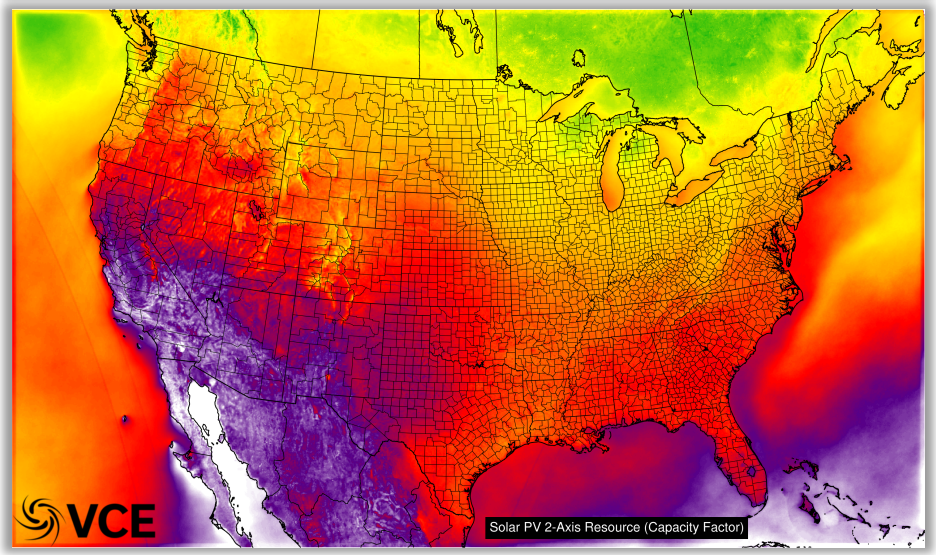
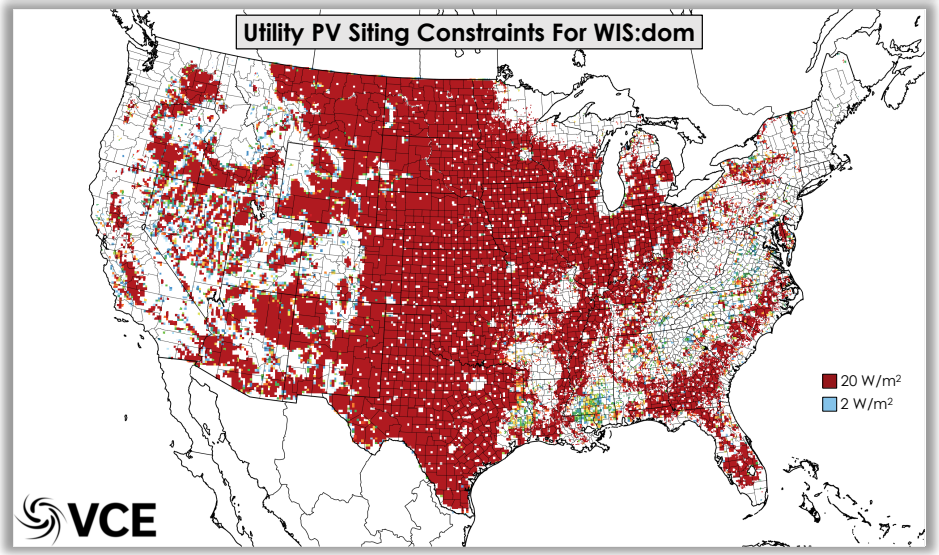
WIS:dom® Contains Detailed Wind Datasets









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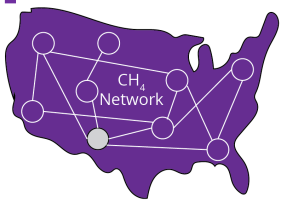
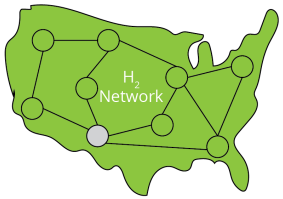
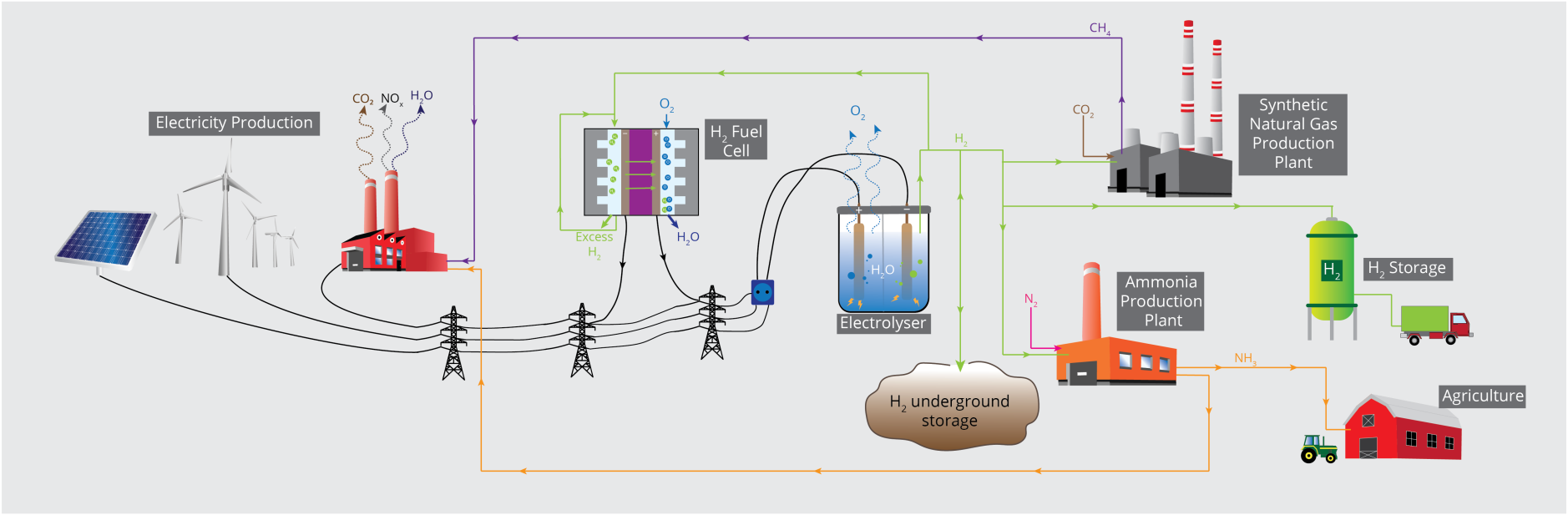
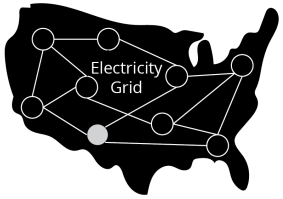
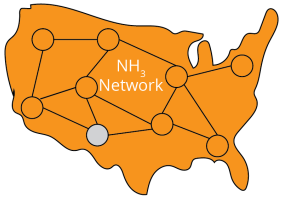
The interconnection between sectors will create possible emergent behavior











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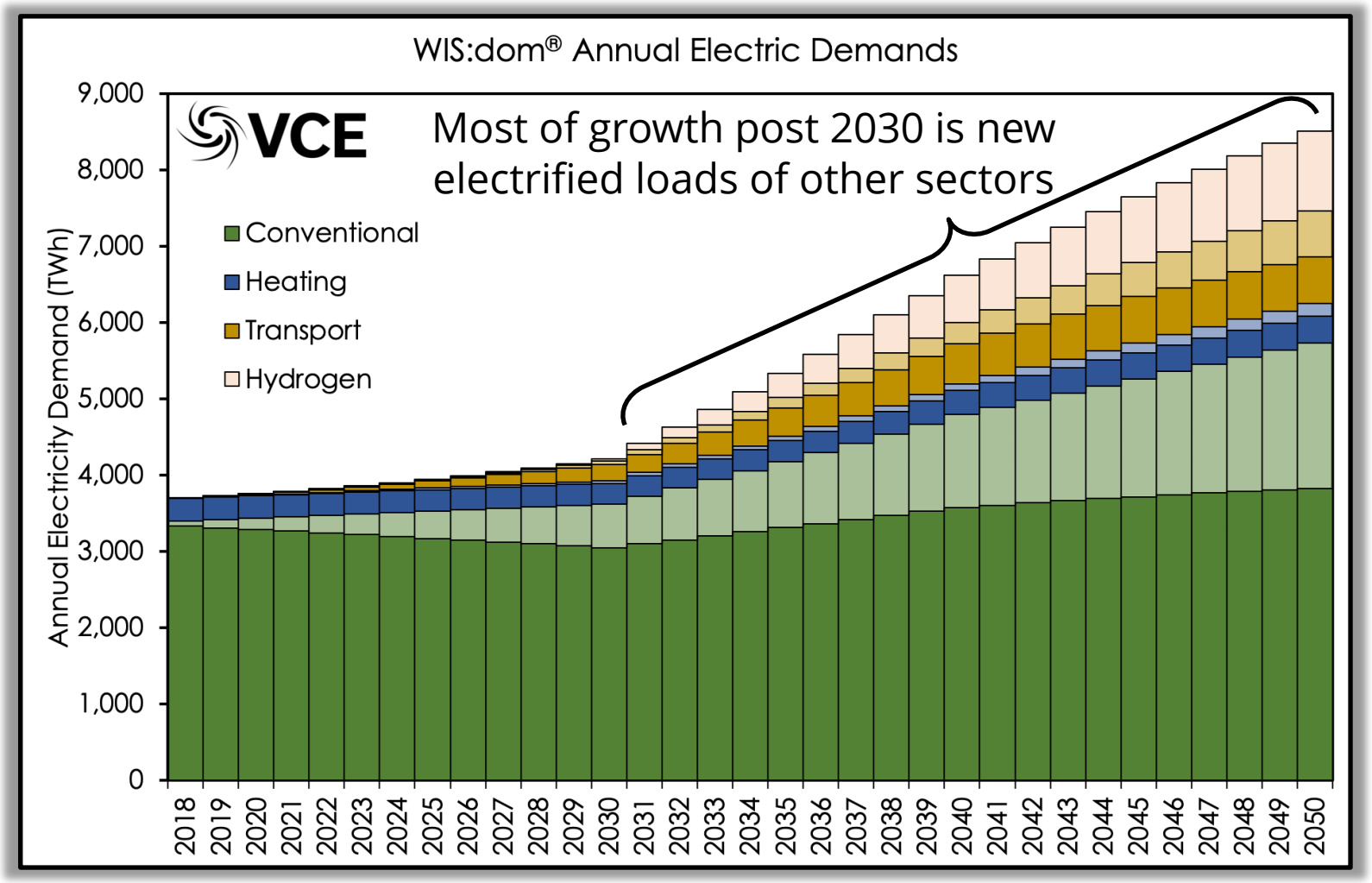
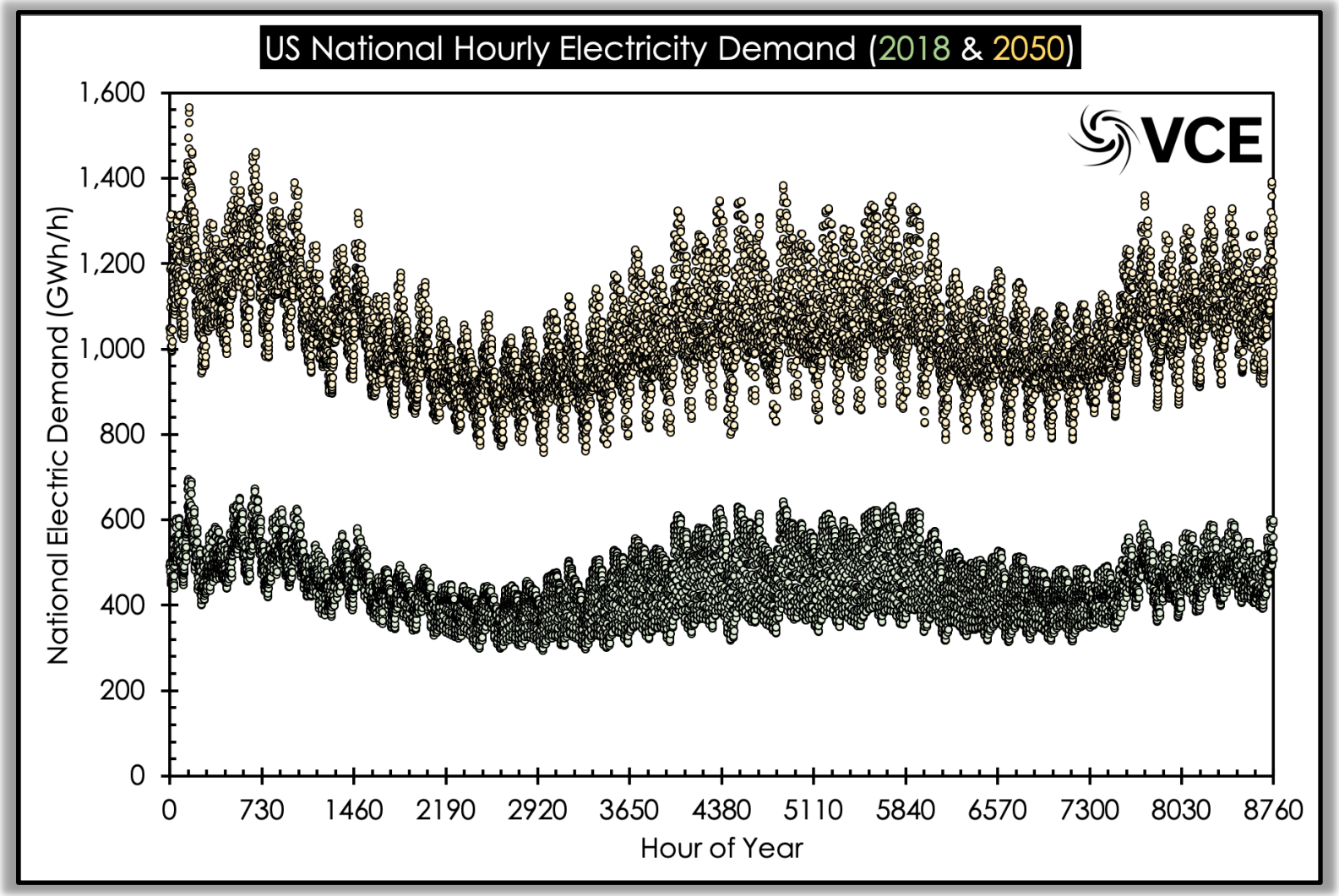
Electrification Changes Electricity Needs

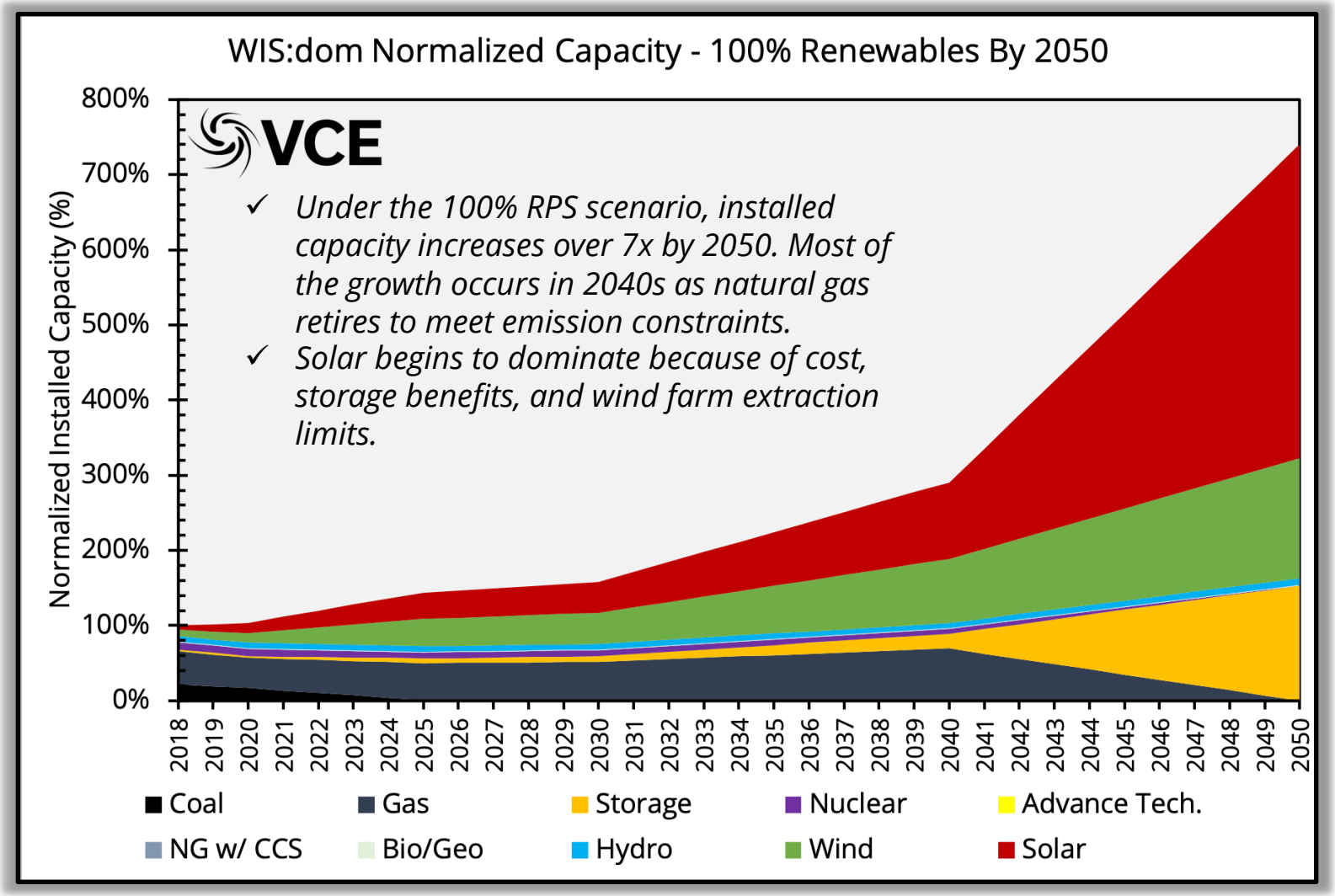


Electrification Changes Electricity Needs Everywhere



Results for deep decarbonization futures

100% Renewable Energy Capacity for Contiguous US



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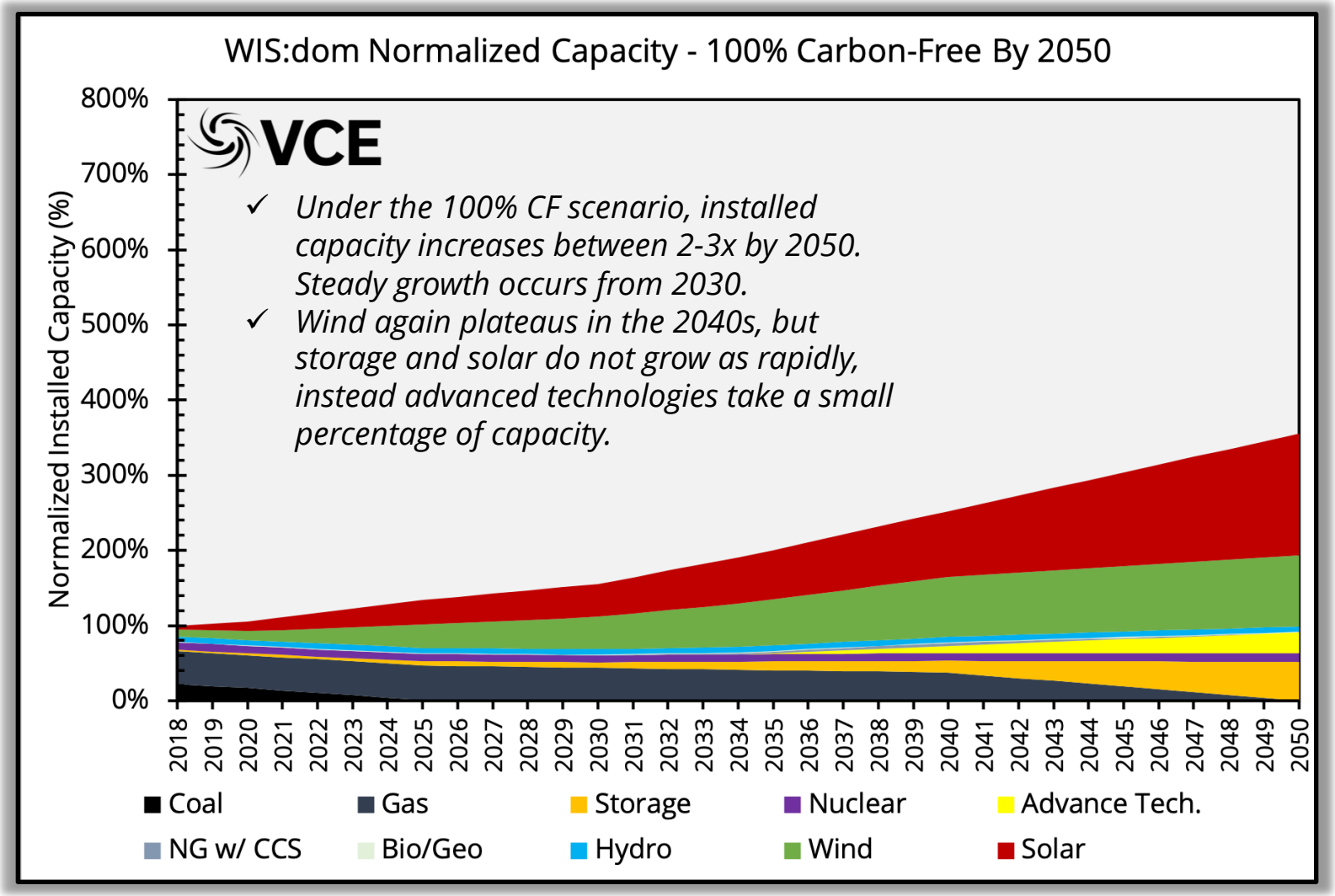
100% Clean Energy Capacity for Contiguous US



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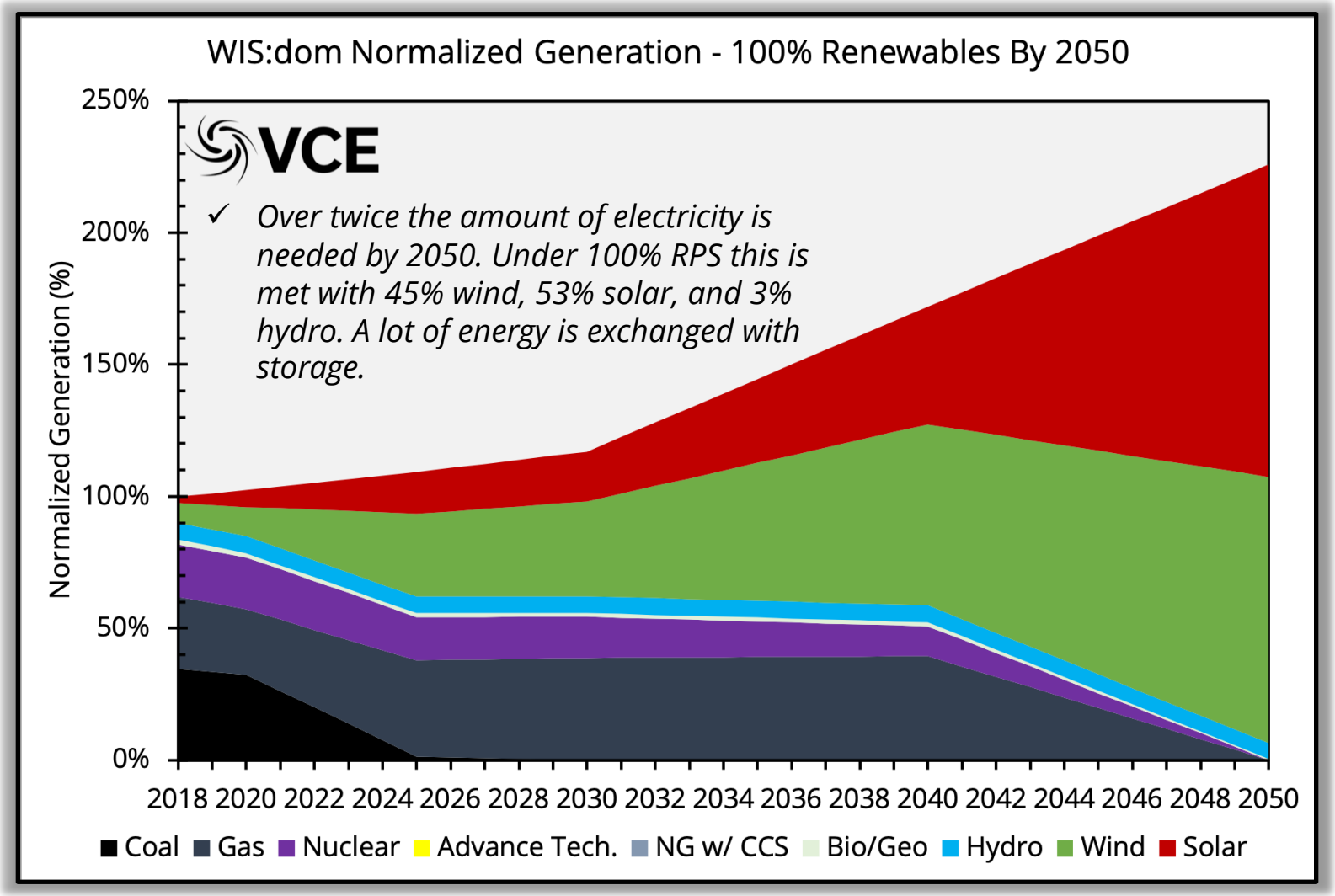
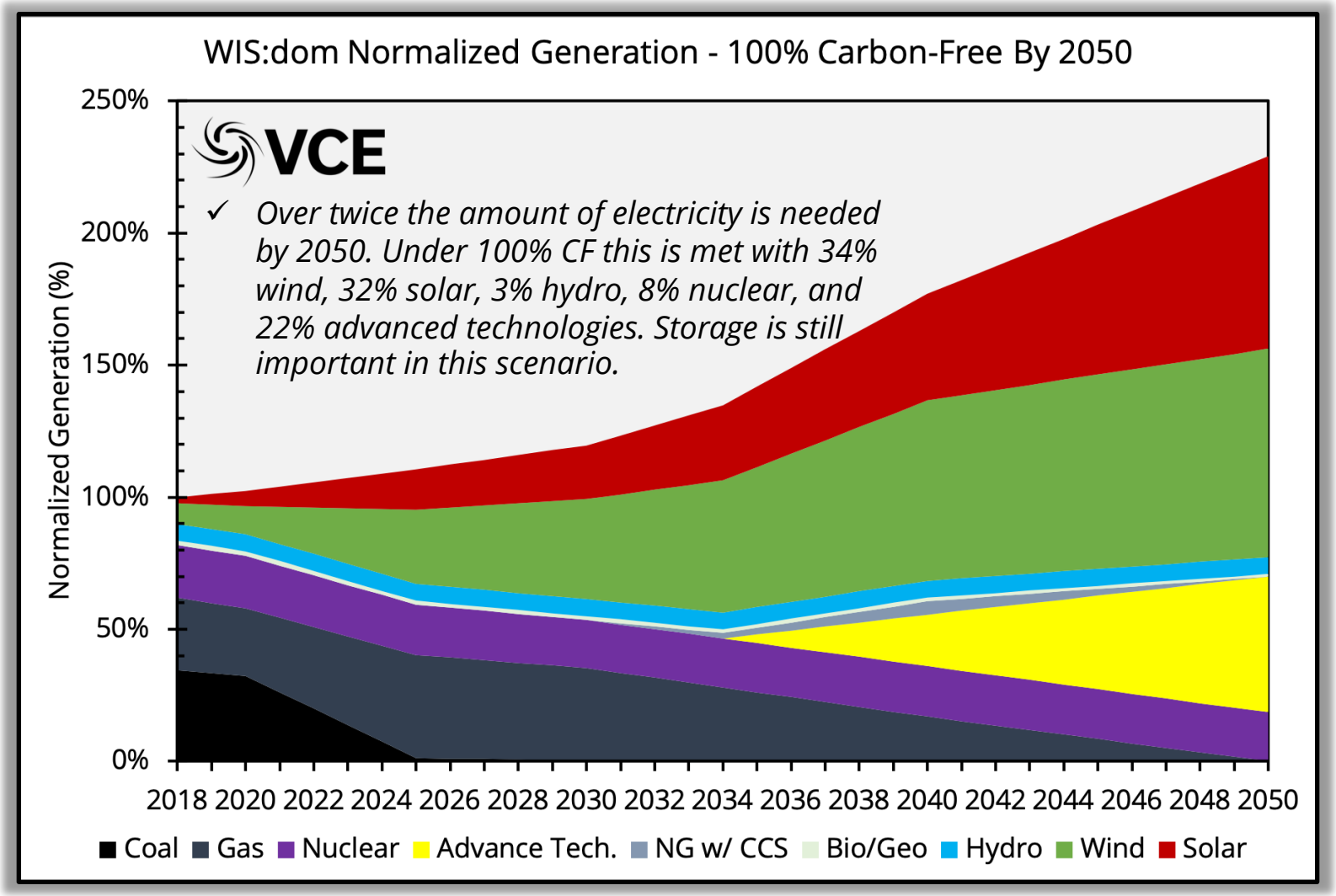
100% Renewable Energy Generation for Contiguous US



100% Clean Energy Generation for Contiguous US



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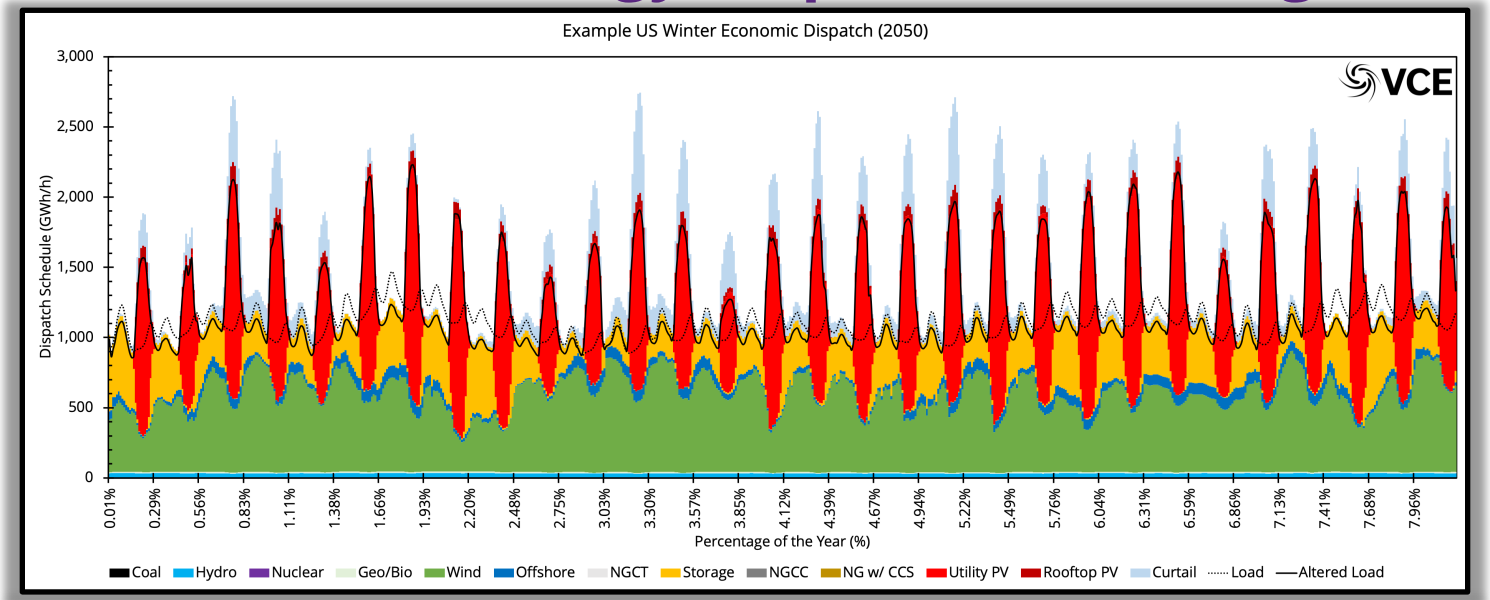
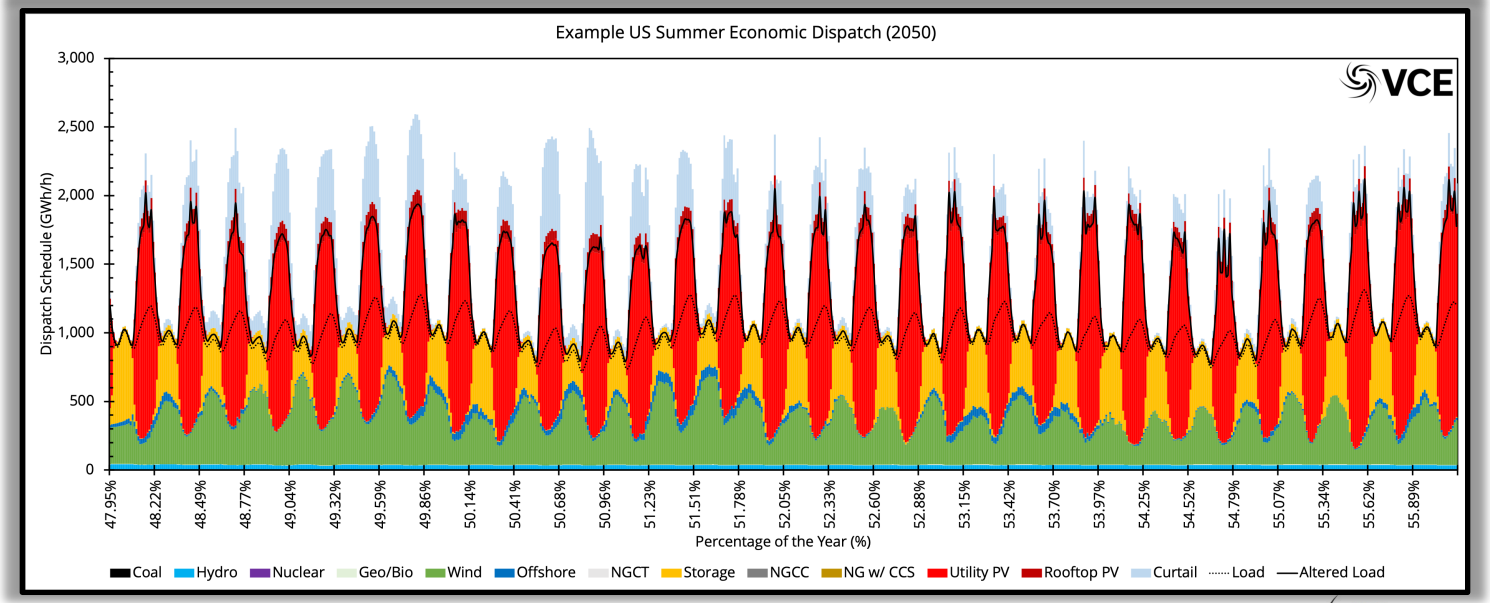
100% Renewable Energy Dispatch for Contiguous US





✓ *Annual curtailment by 2050 is 15% of generation – this is the most economic it could be (the model includes storage, HVDC, H2 production, reserves from curtailment, etc.)*

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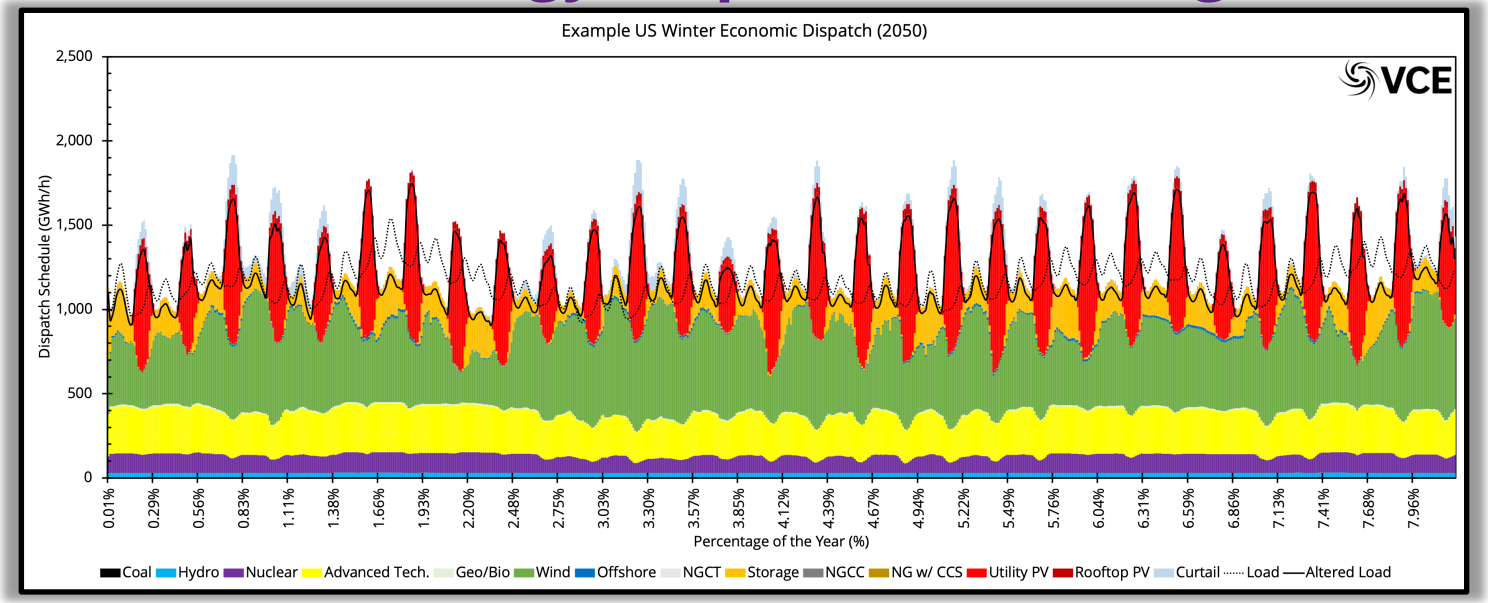
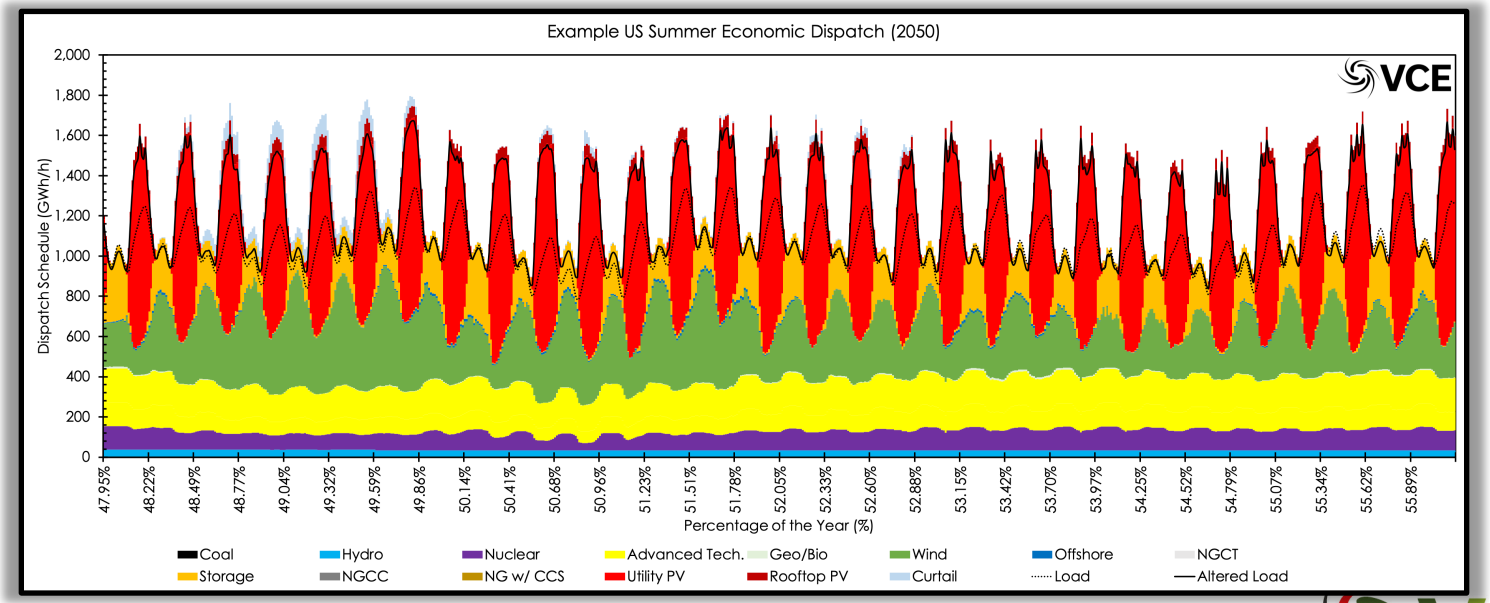
100% Clean Energy Dispatch for Contiguous US





- ✓ *Annual curtailment by 2050 is 4% of generation – Much less wasted energy.*

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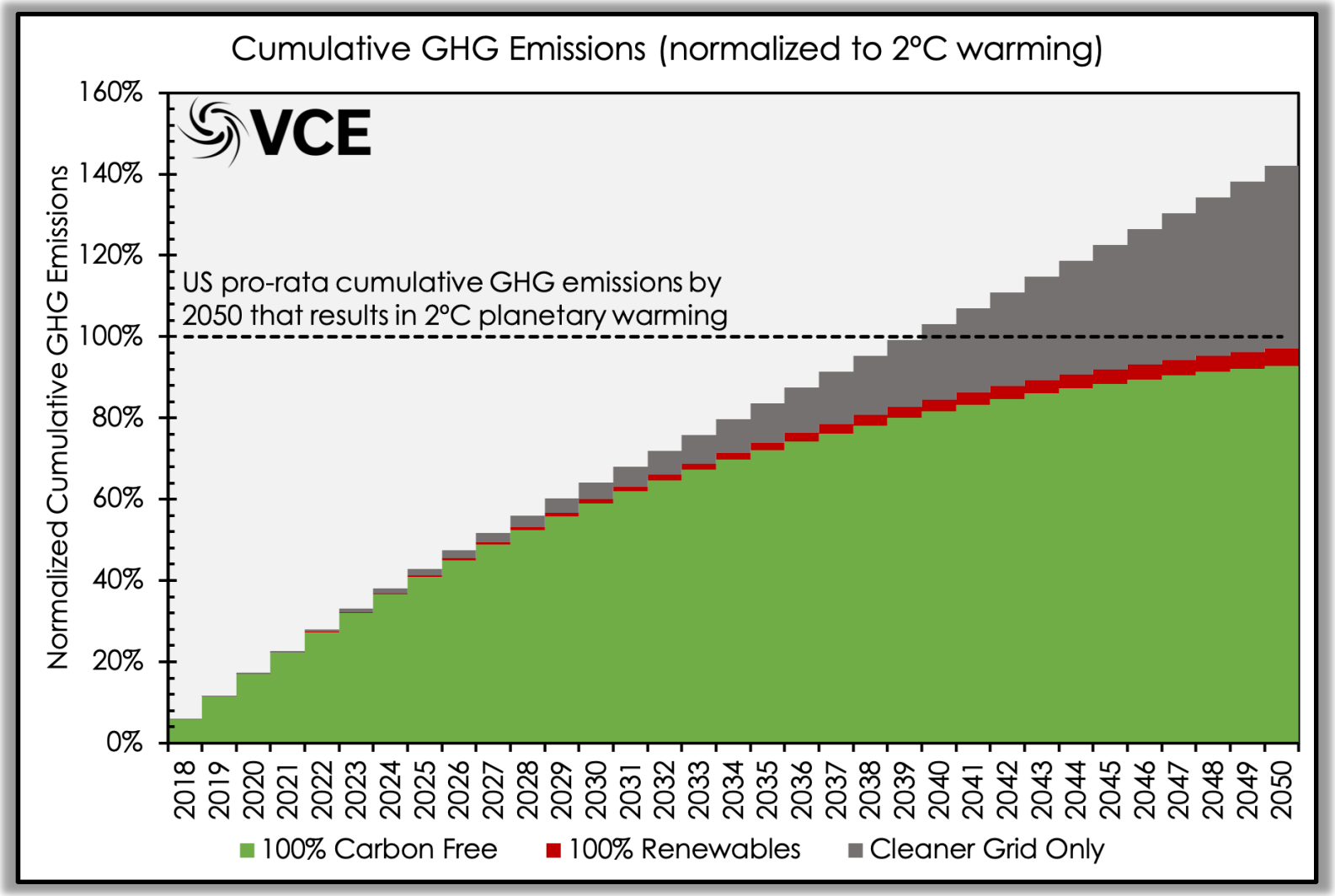
GHG Emissions for Contiguous US



✓ *Both 100% RPS and 100% CF reach 80% GHG emission reductions from 1990 levels by 2050 across the whole economy. The electricity system is zero emissions.*

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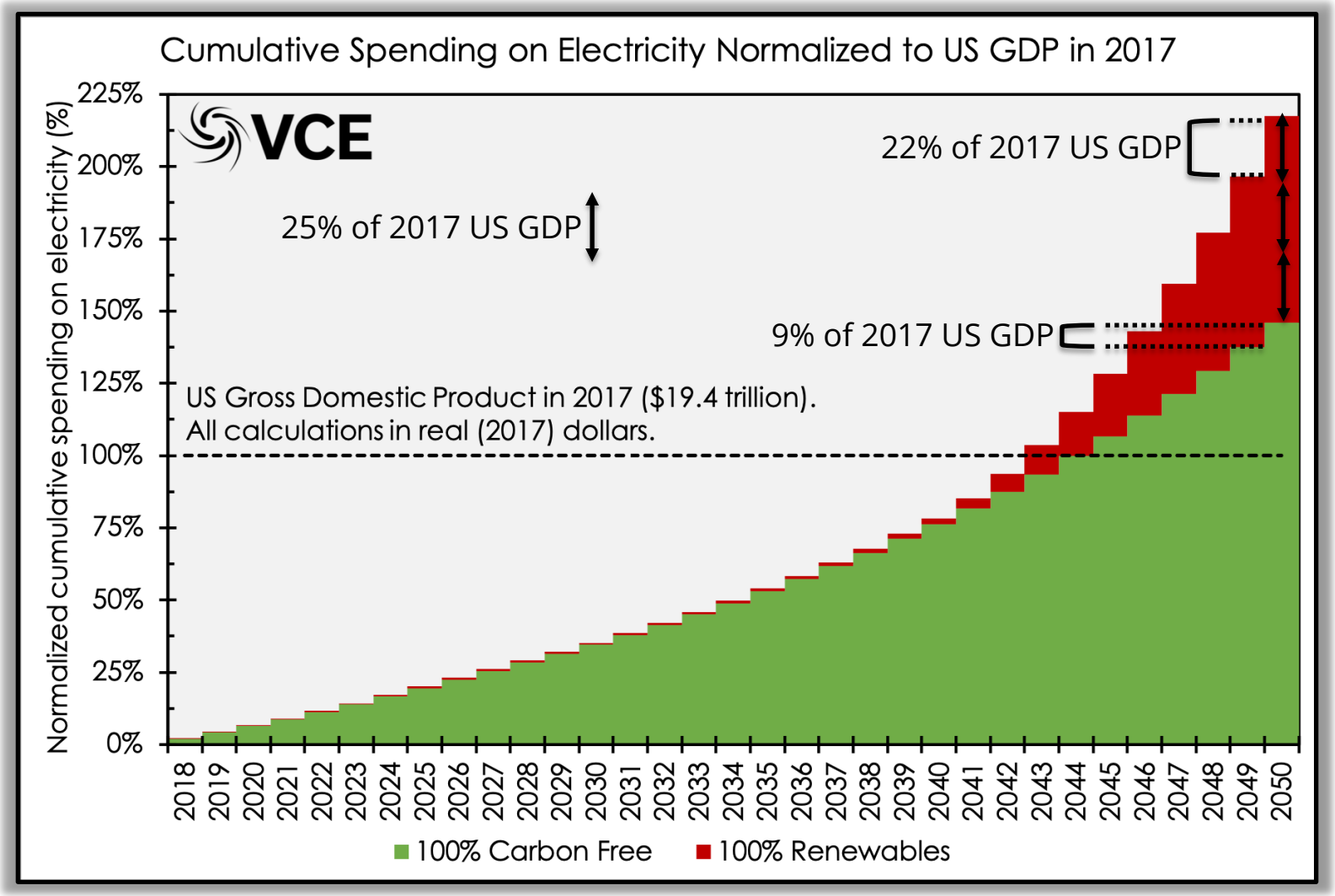
Cumulative Electricity Costs for Contiguous US



- ✓ *By 2050, the average cost of electricity in the 100% RPS Scenario is **$155 / MWh***
- ✓ *By 2050, the average cost of electricity in the 100% CF Scenario is **$95 / MWh***

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Thank You

Questions?

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