

Transmission Insights from “ZeroByFifty”

Prepared By:

Vibrant Clean Energy, LLC

Dr Christopher T M Clack

Dr Aditya Choukulkar

Brianna Coté

Sarah McKee

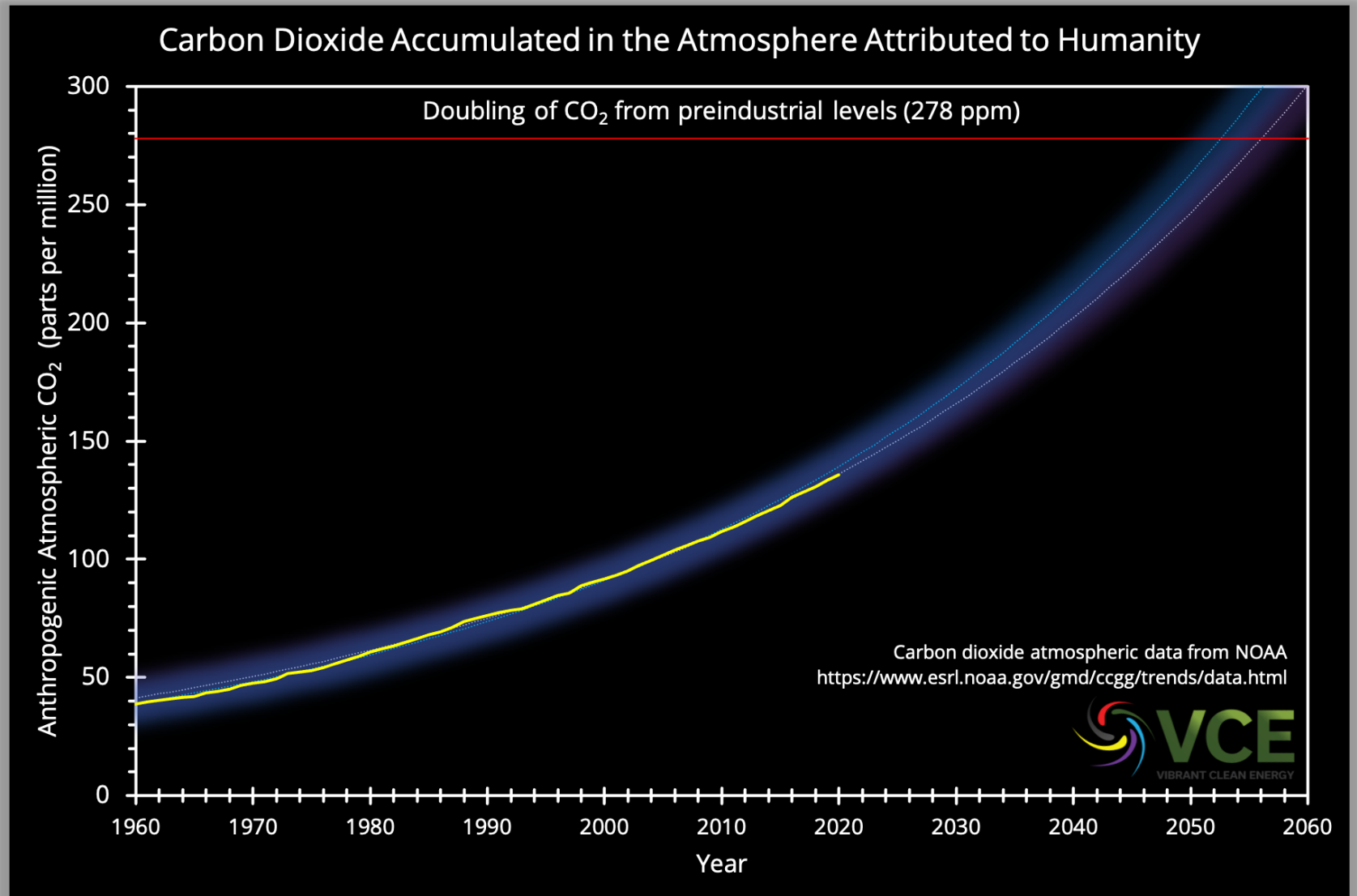
Prepared For:

ESIG Transmission Workshop 2020

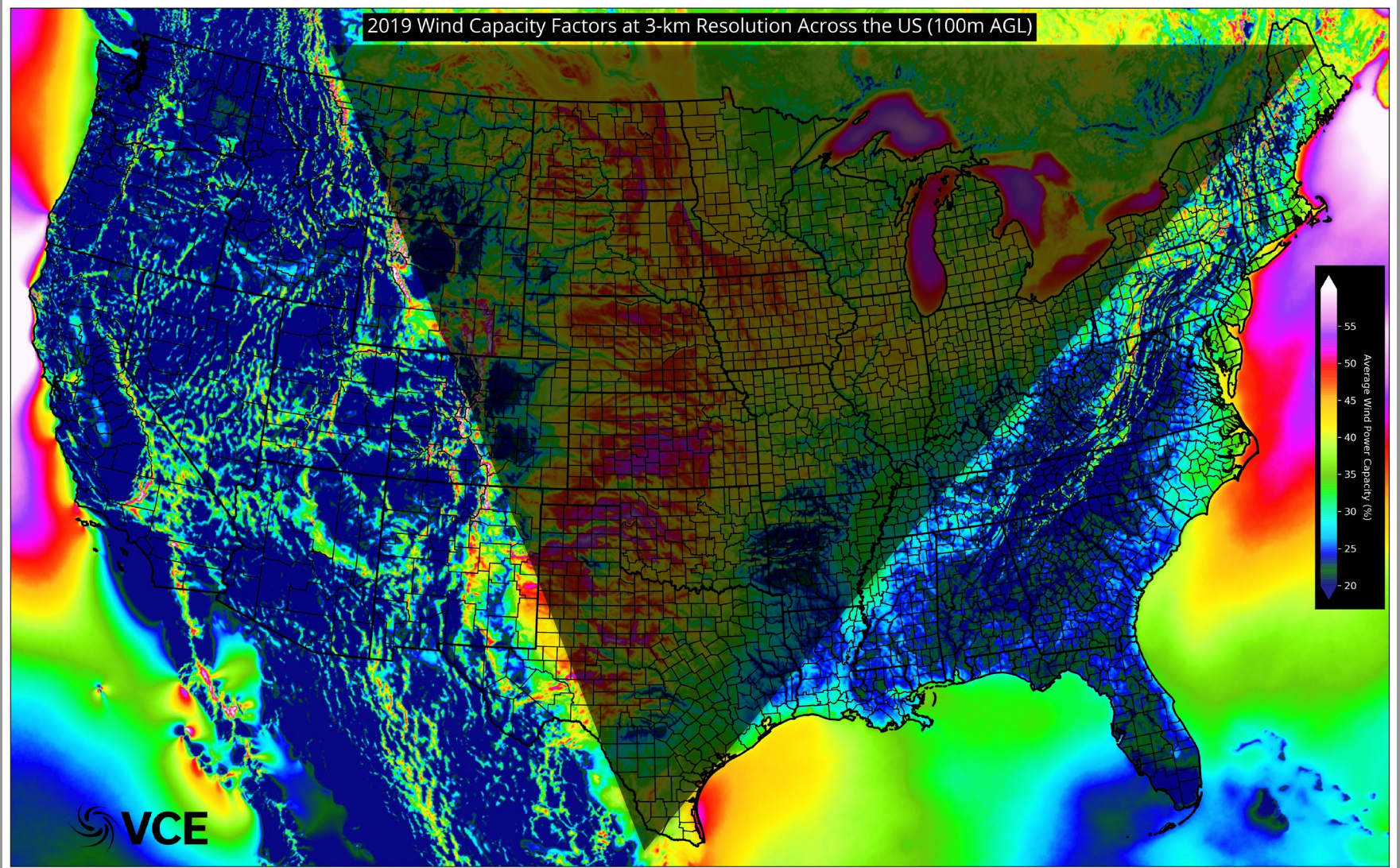
November 11th, 2020



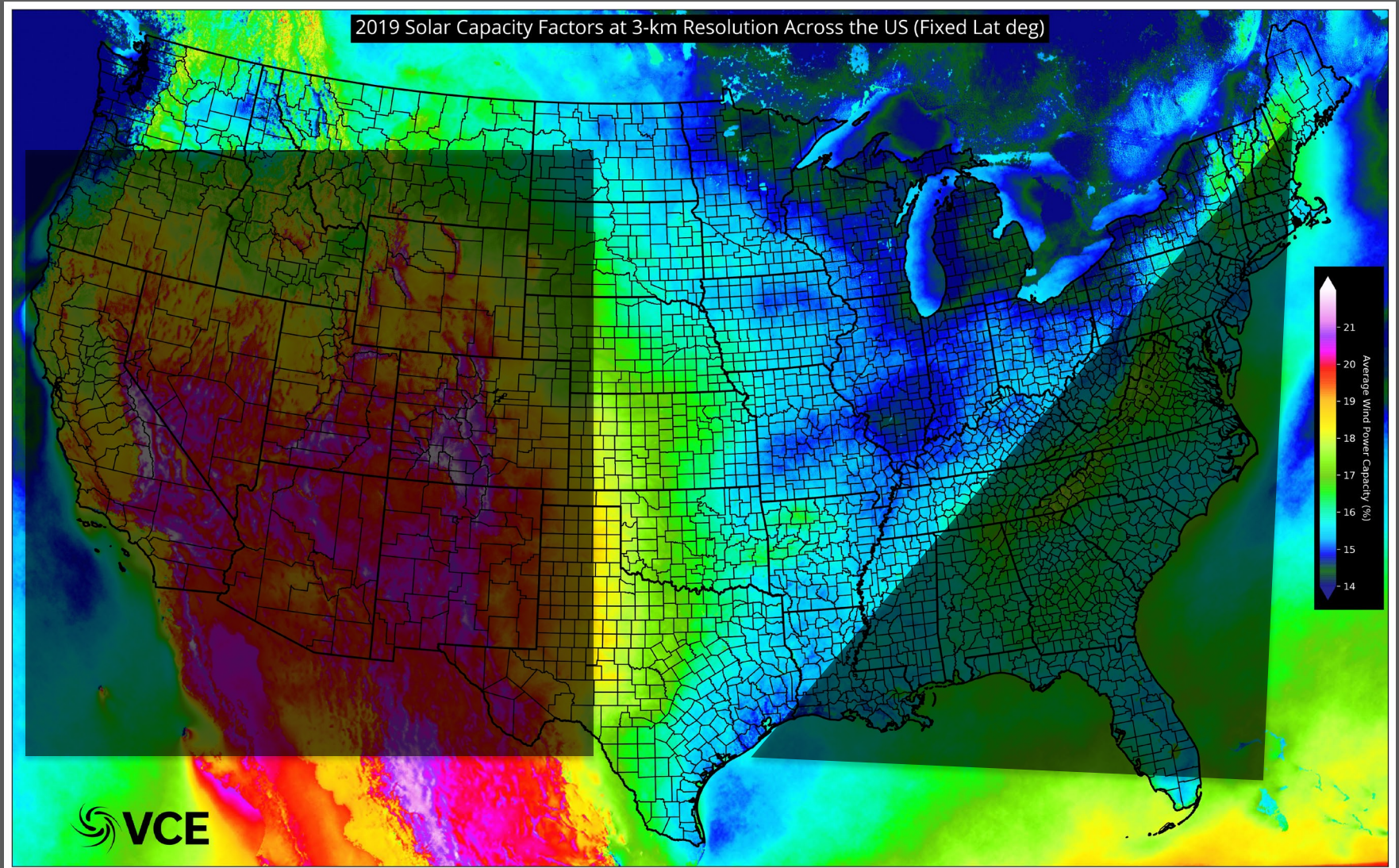
Motivation for "ZeroByFifty" Study



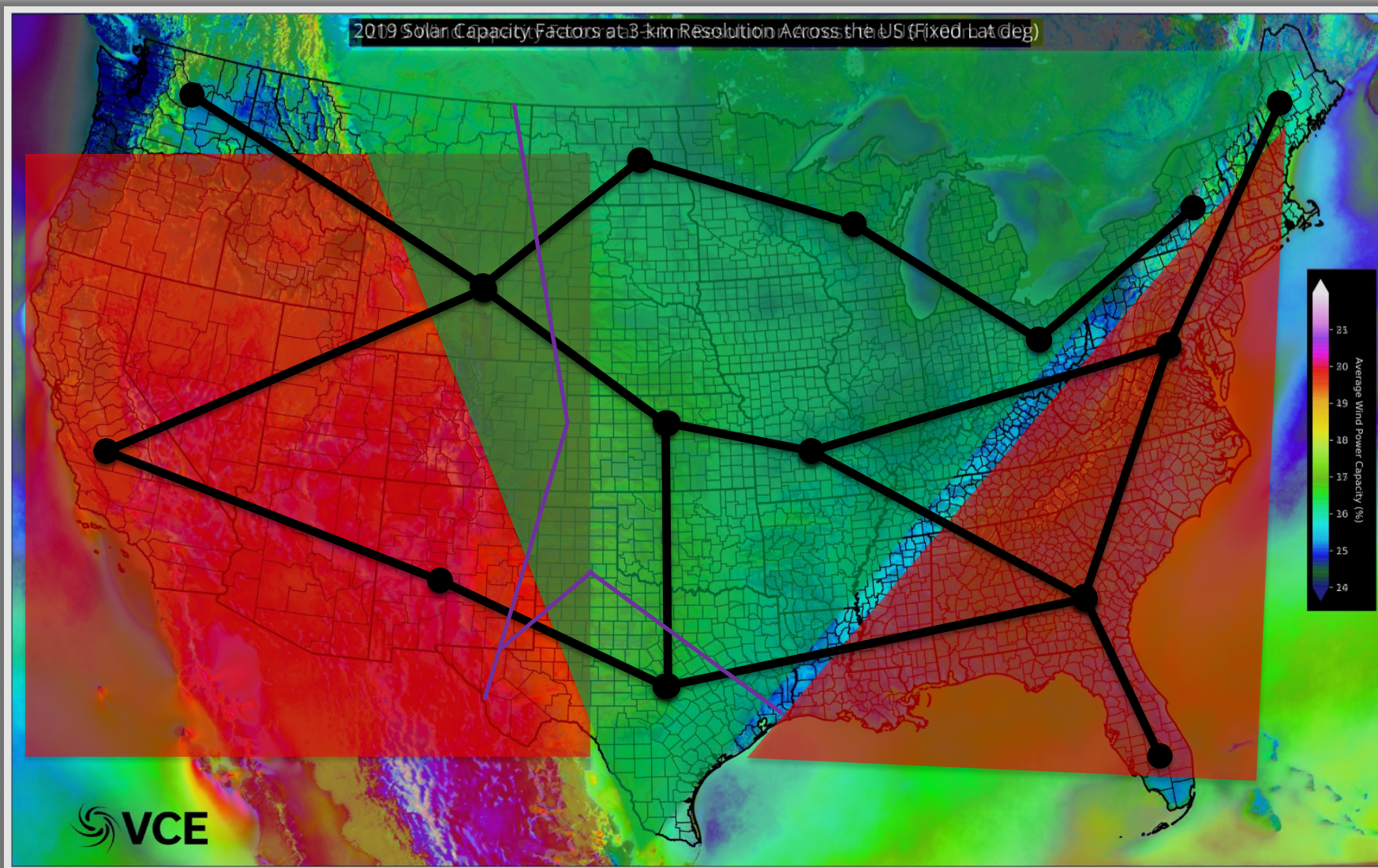
"ZeroByFifty" Includes Detailed Wind & Solar Data



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HVDC Based Upon Interconnections & Weather?



“ZeroByFifty” Scenarios

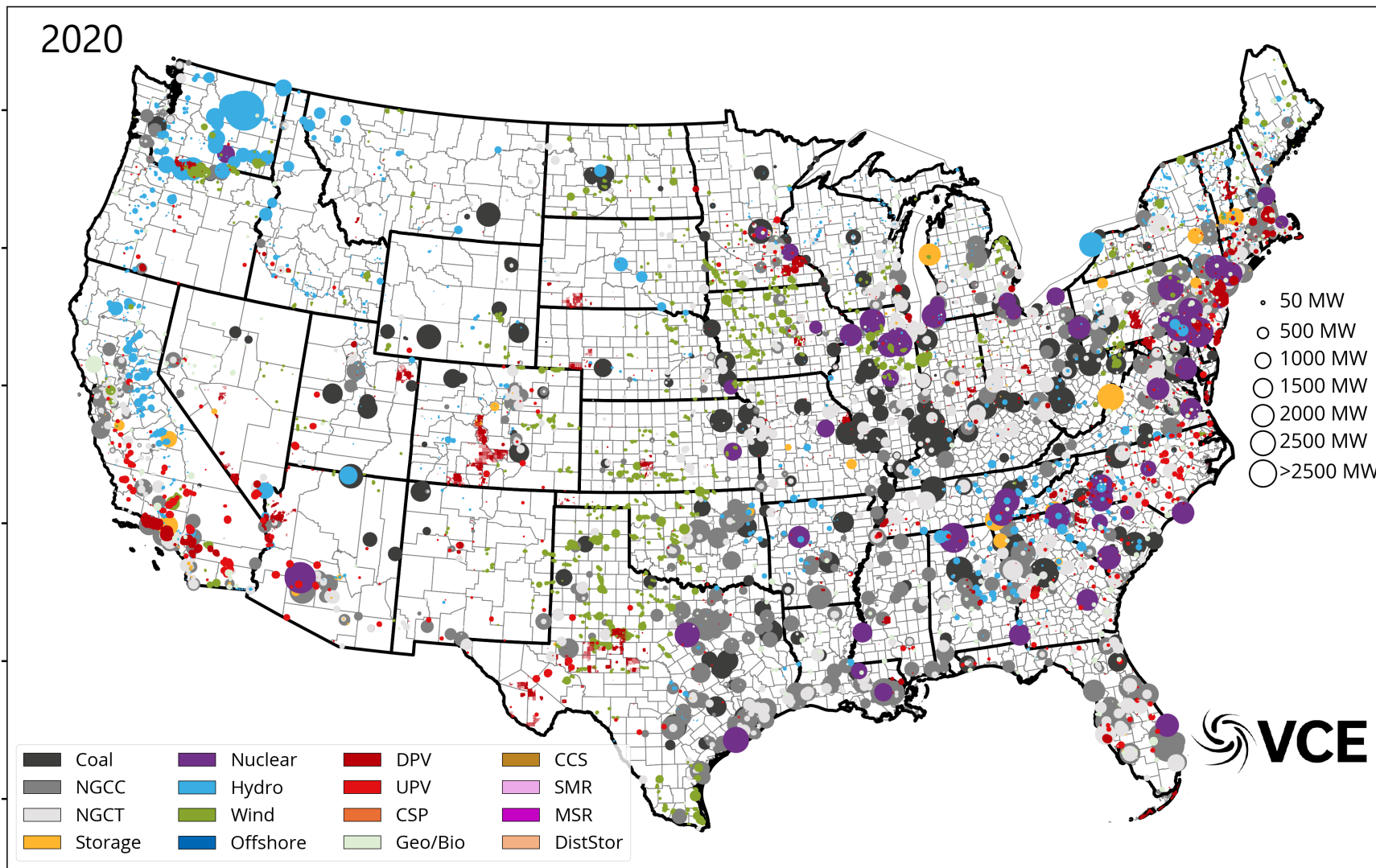
VCE[®] internally funded the “ZeroByFifty” Study and deployed the latest version of the WIS:dom[®]-P (v10.0) software.

The core scenarios are:

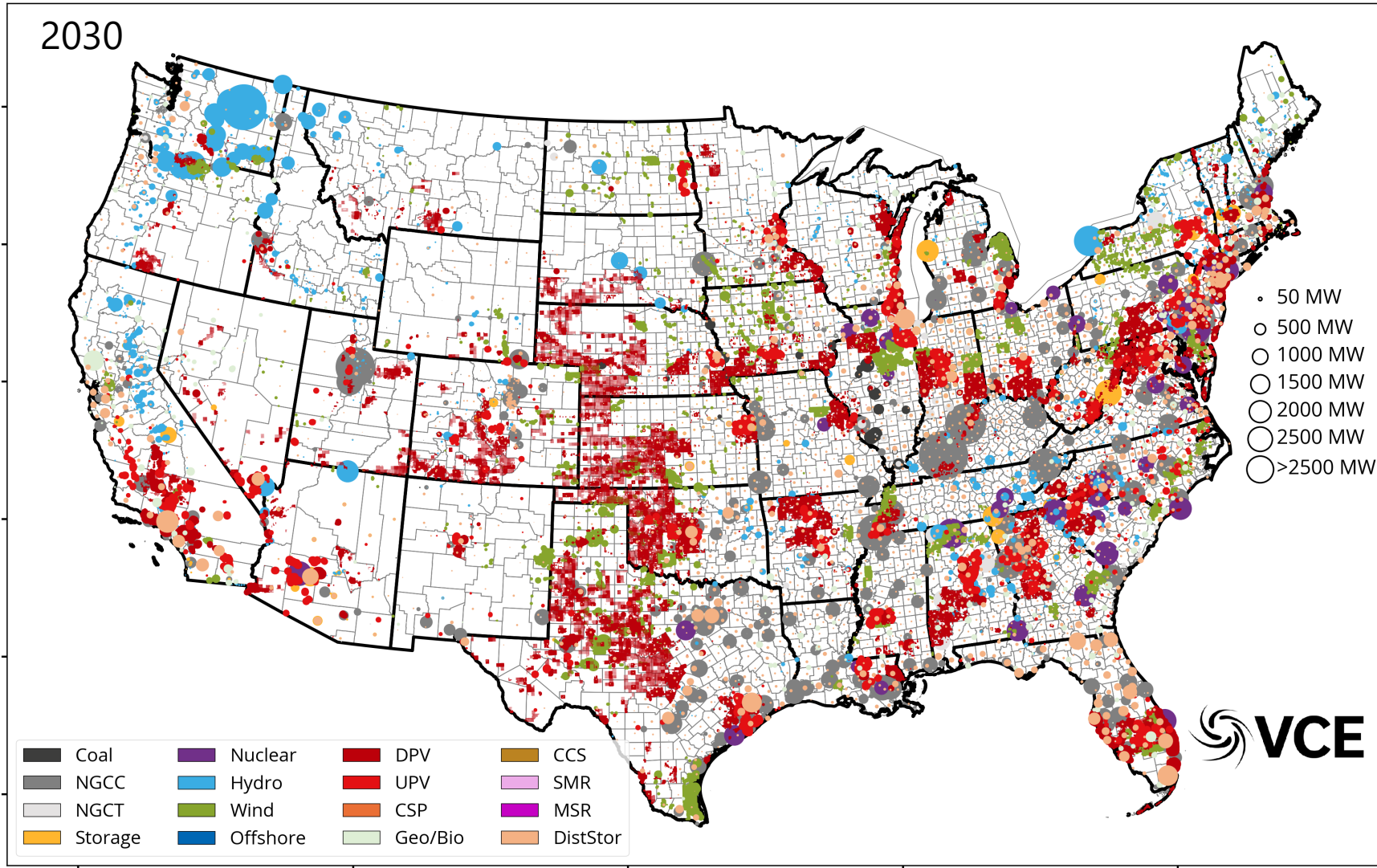
- i. *[BAU] Economic expansion with existing policies for all sectors (minimal electrification);*
- ii. *[BAU+Elec] Electrification of all other sectors, but economic expansion of electricity sector;*
- iii. *[CES2050] Electrification of all other sectors, with a clean electricity standard by 2050;*
- iv. *[CES2050+HVDC] Electrification of all other sectors, with a clean electricity standard by 2050 & **HVDC interstate enabled by 2025;***
- v. *[CES2035+HVDC] Electrification of all other sectors, with a clean electricity standard by 2035 & **HVDC interstate enabled by 2025;***

*The generation & storage cost assumptions are from NREL ATB 2020, the fuel cost assumptions are from EIA AEO 2020 (HRT), the HVAC cost assumptions are from Black & Veatch, the HVDC cost assumptions are from blending “tier I” vendor & publicly available data. The other input assumptions are from the standard WIS:dom[®]-P software initialization (see [here](#)). Net-zero GHG emissions is assumed to be achieved if a maximum of 600 mmT CO₂-e is emitted from the economy, because it is assumed that 600-1000 mmT are absorbed by the land use. Note do have the ability to include DAC (co-optimization) to remove any emissions reach zero emissions.

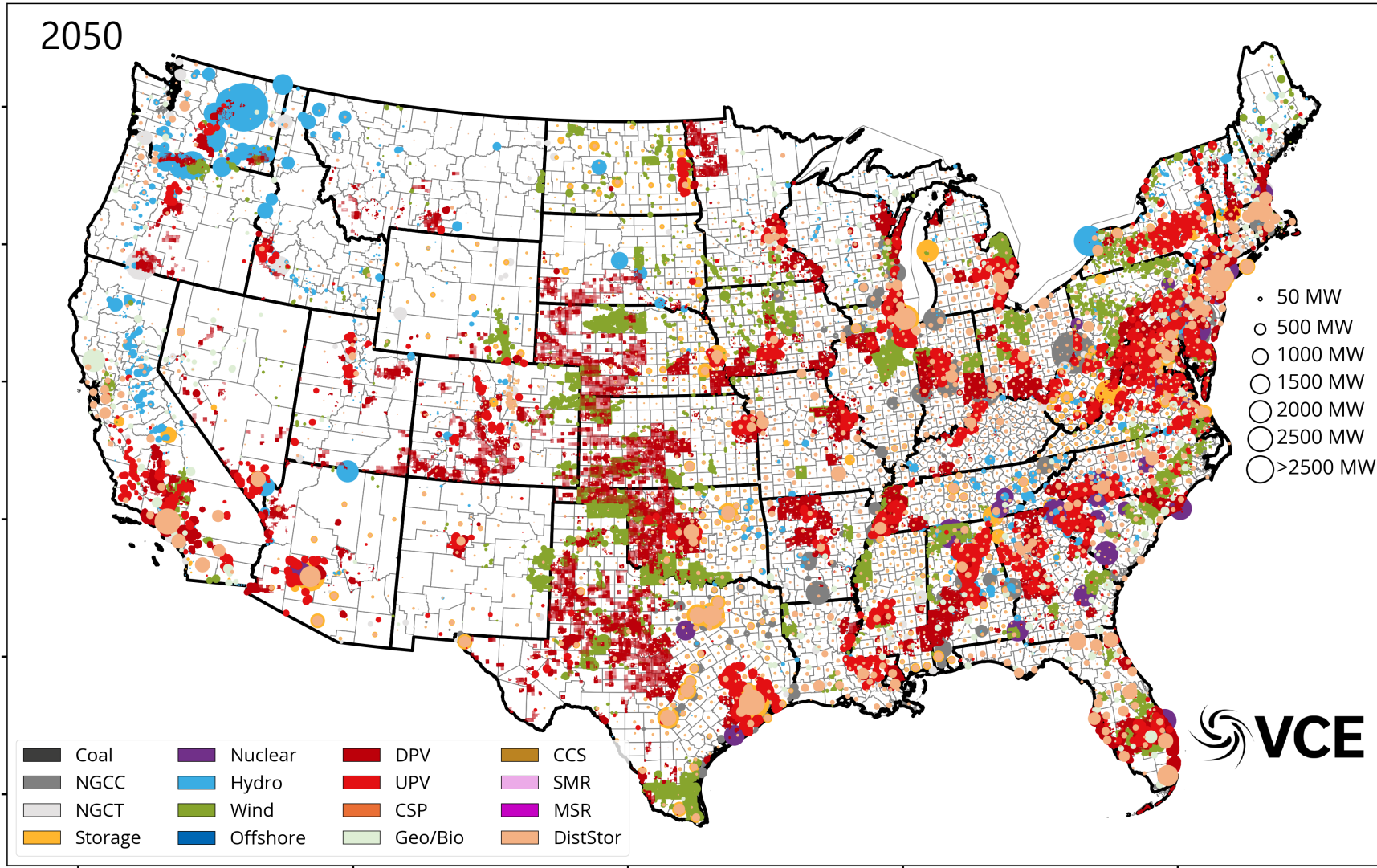
"ZeroByFifty" Resource Mix Change (Siting)



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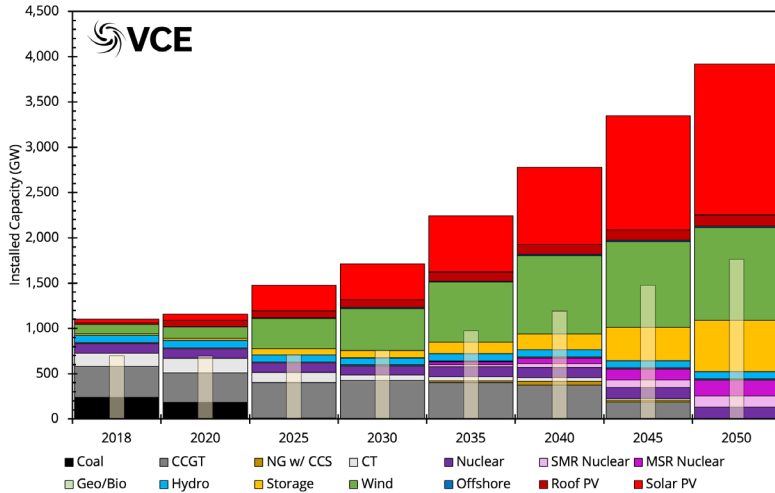


"ZeroByFifty" Resource Mix Change (Siting)

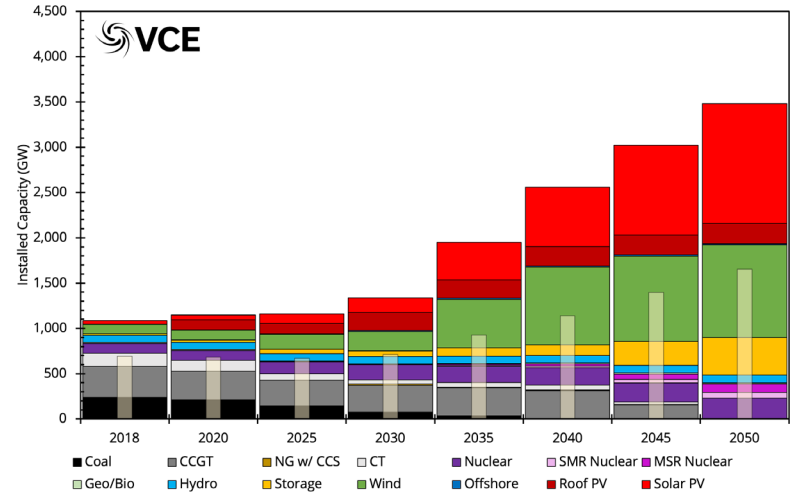


"ZeroByFifty" System Metrics

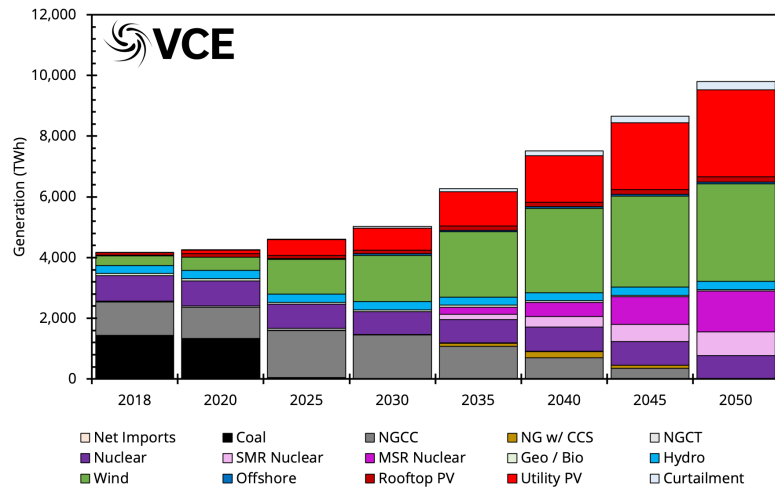
WIS:dom[®]-P Installed Capacities For The CONUS



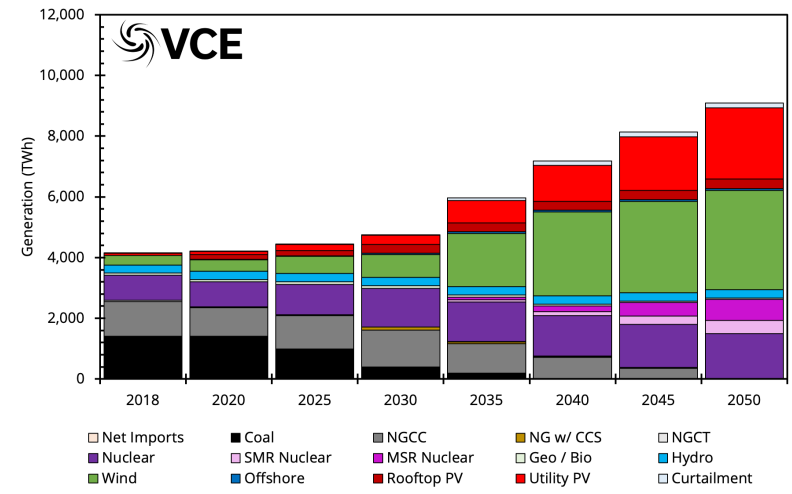
WIS:dom[®]-P Installed Capacities For The CONUS



Electricity Generation By Technology



Electricity Generation By Technology



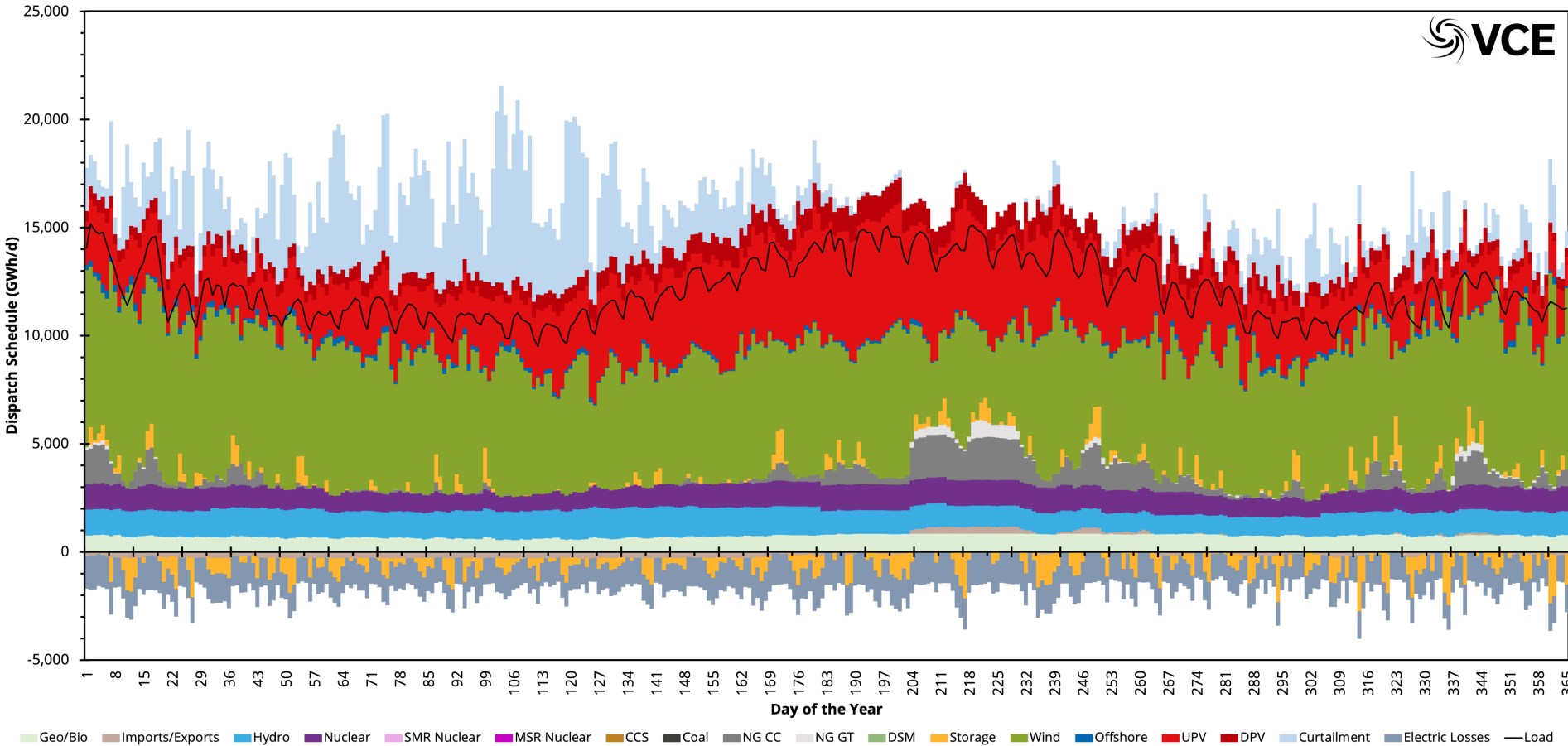
Without HVDC

With HVDC

"ZeroByFifty" System Metrics

Example!

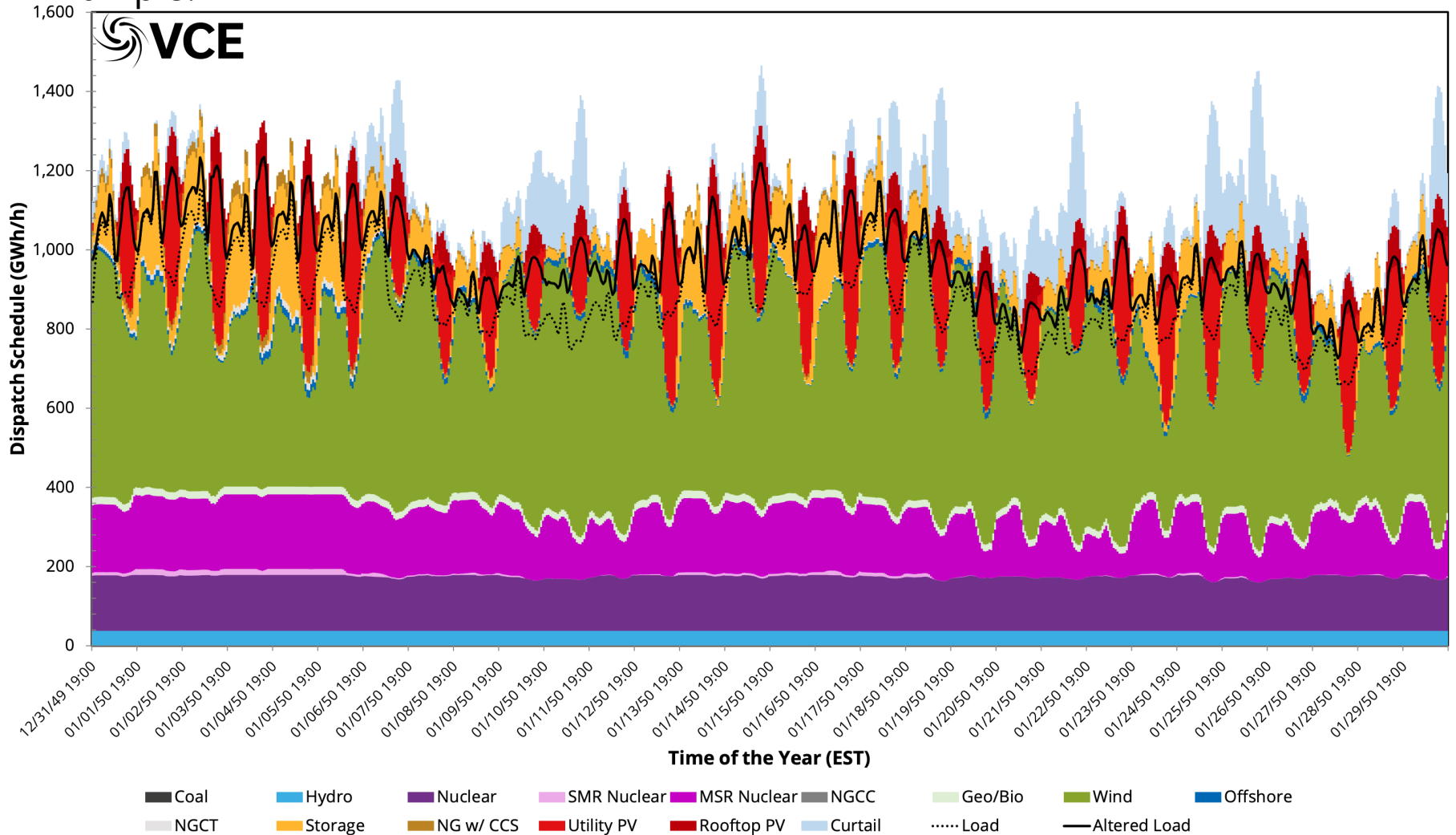
Daily Electricity Generation & Consumption (CES2050)



"ZeroByFifty" System Metrics

Example!

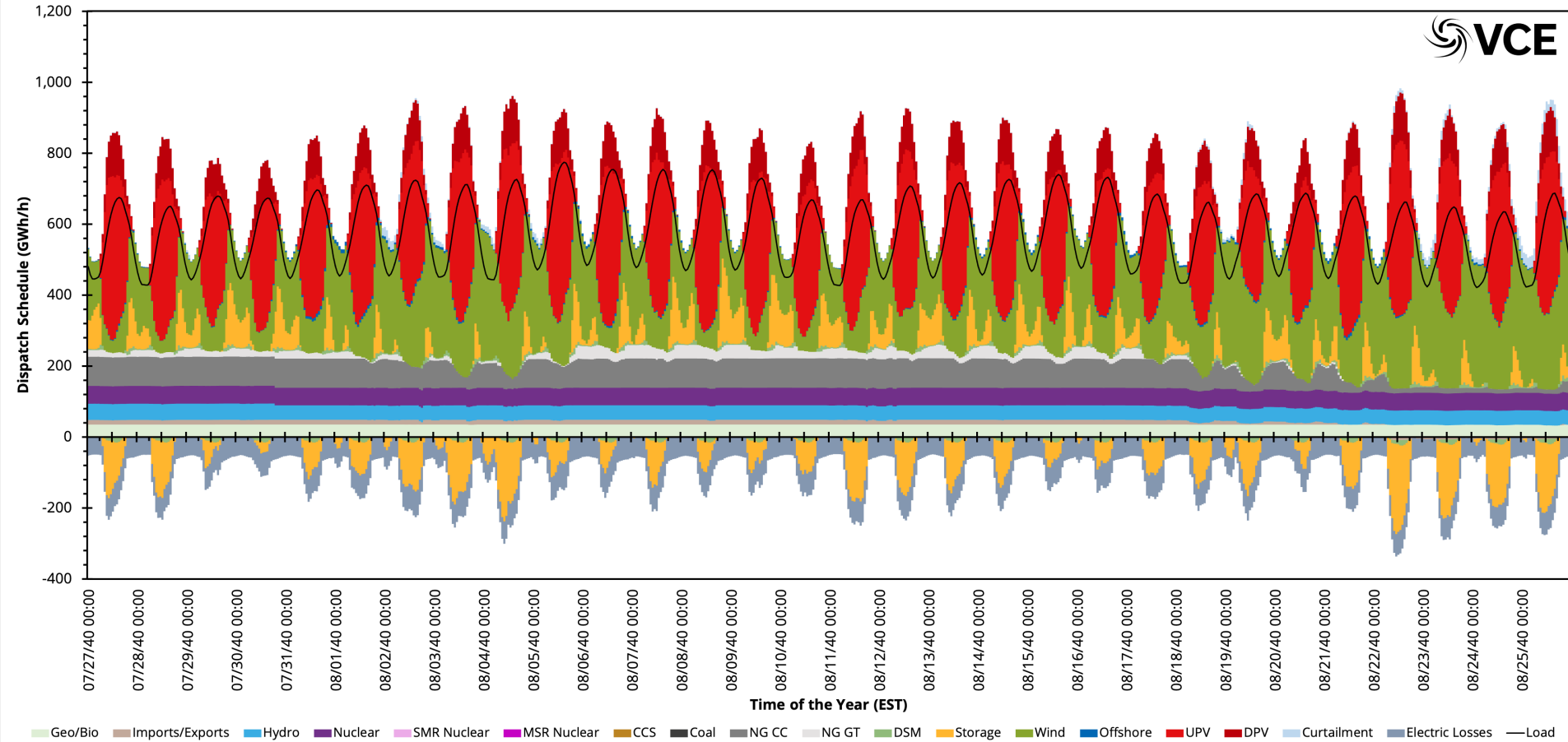
Example CONUS Winter Economic Dispatch (2050)



"ZeroByFifty" System Metrics

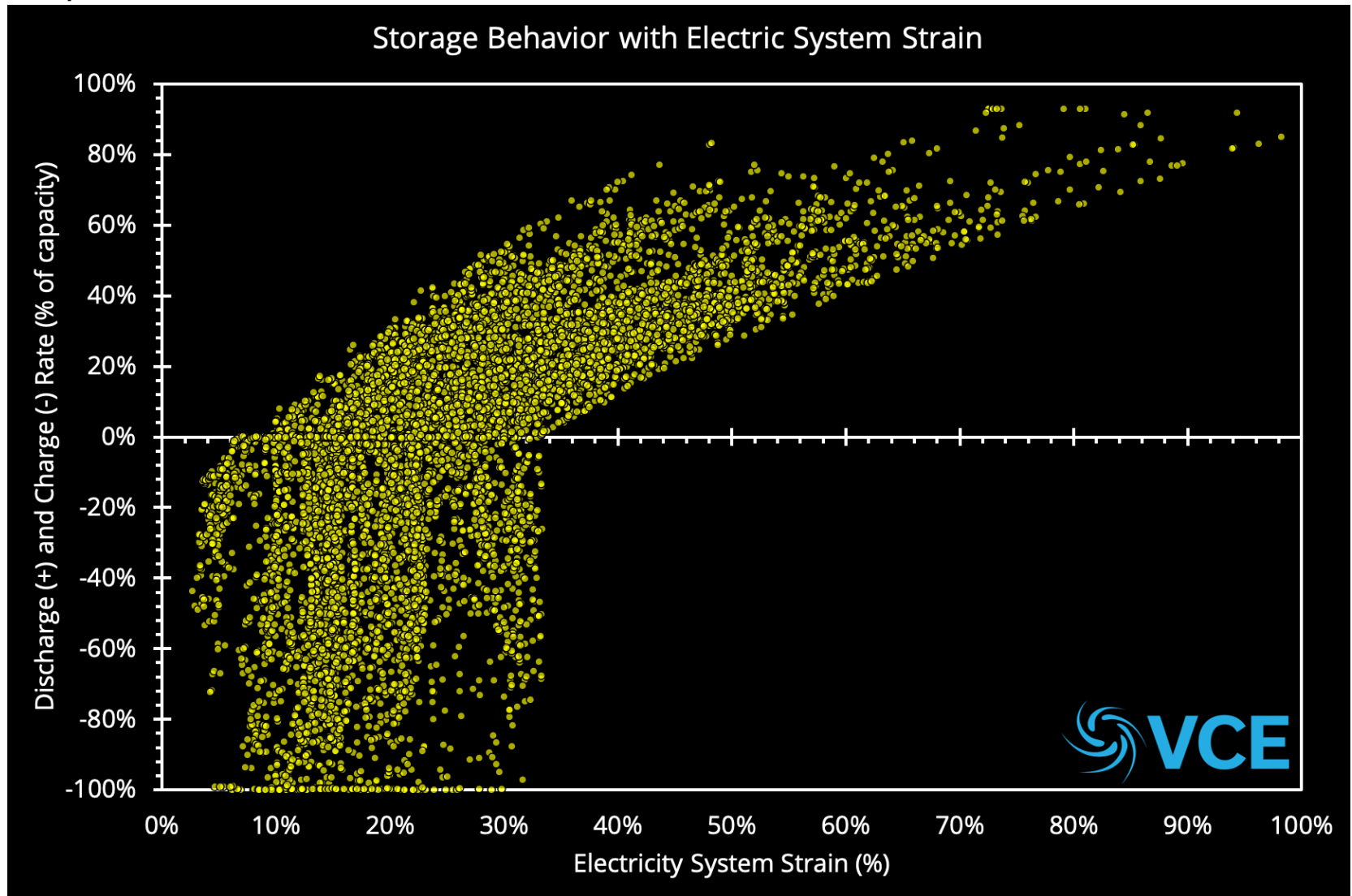
Example!

Highest System Strain Period Dispatch (CES2050)

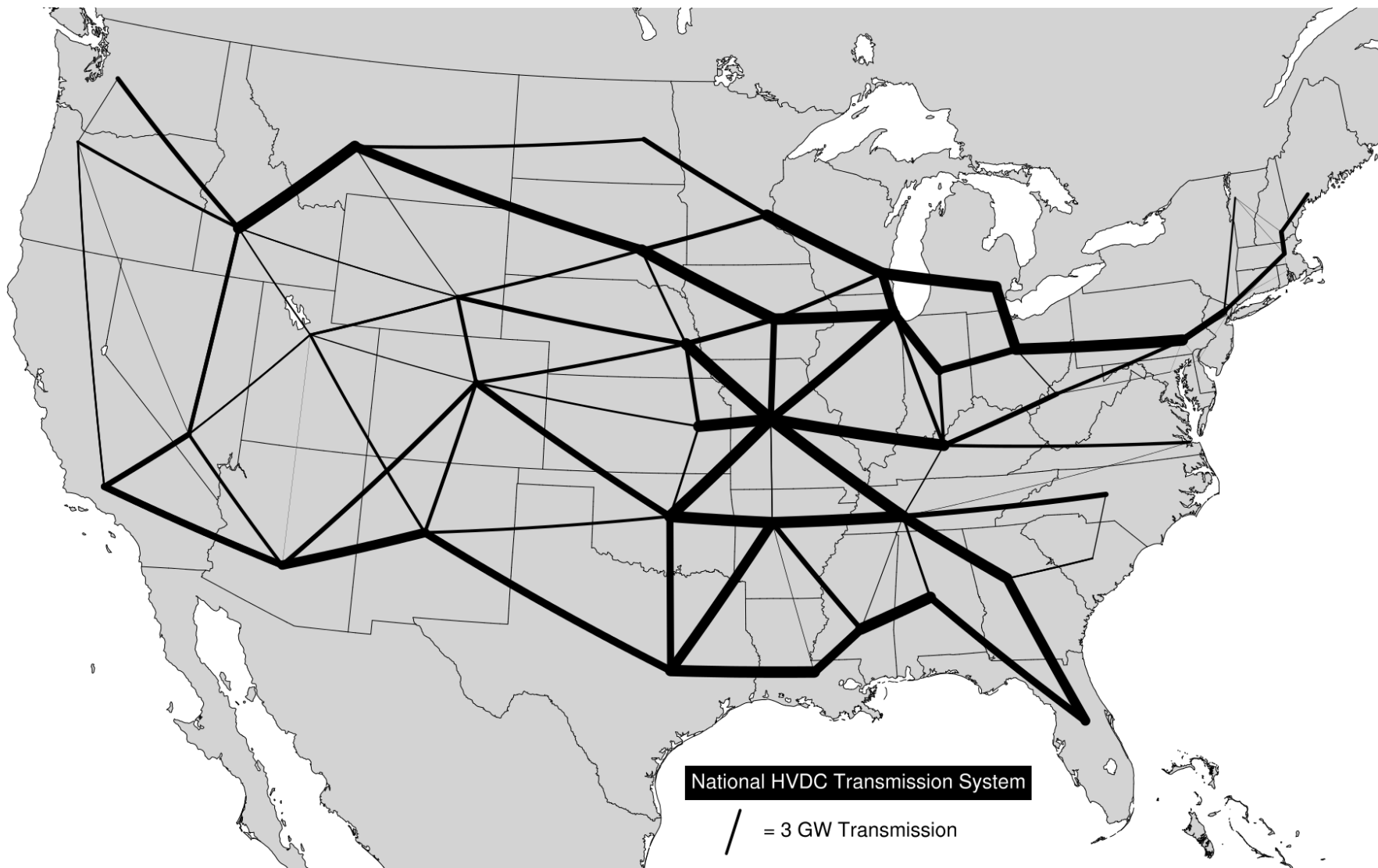


"ZeroByFifty" System Metrics

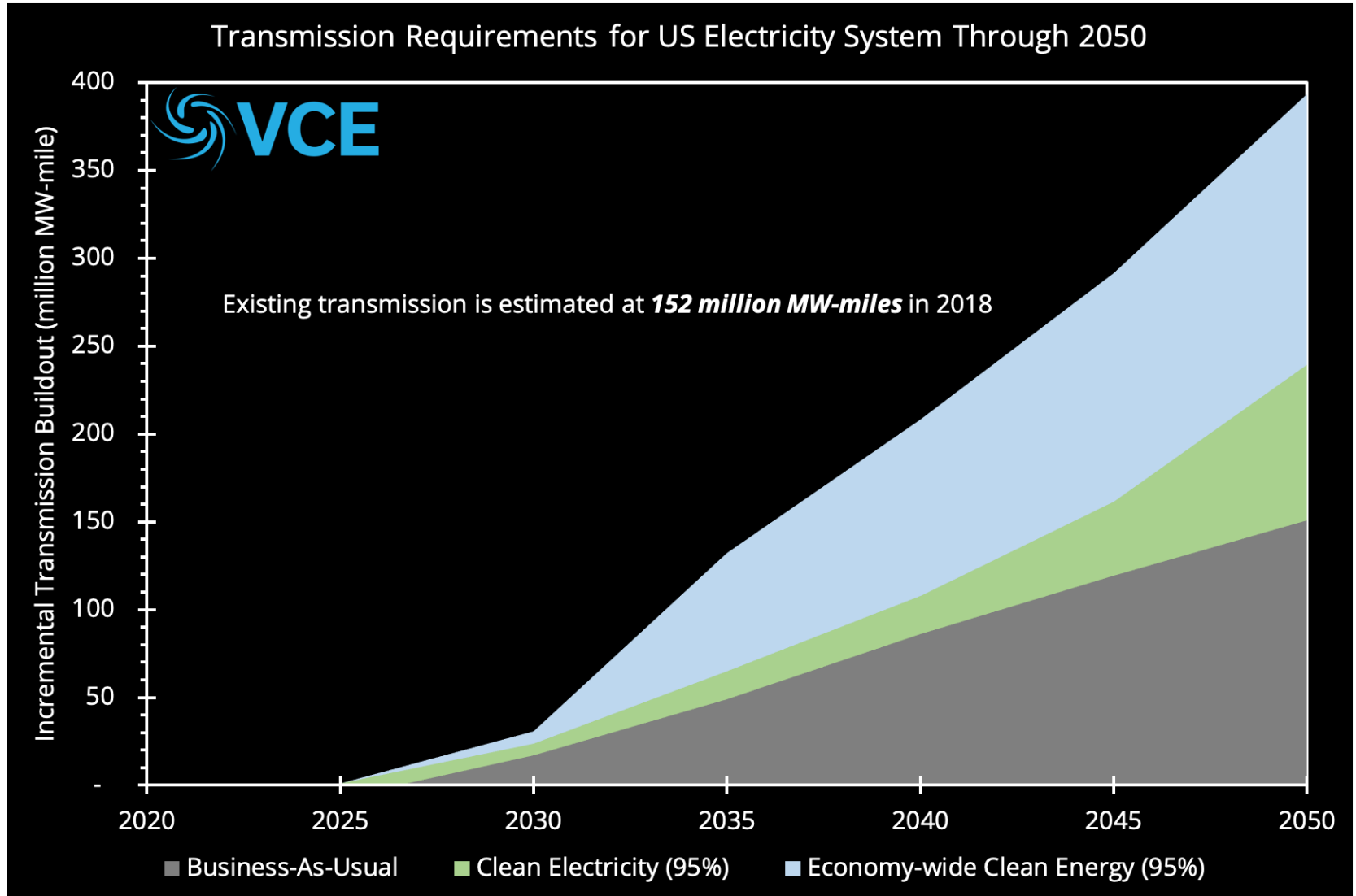
Example!



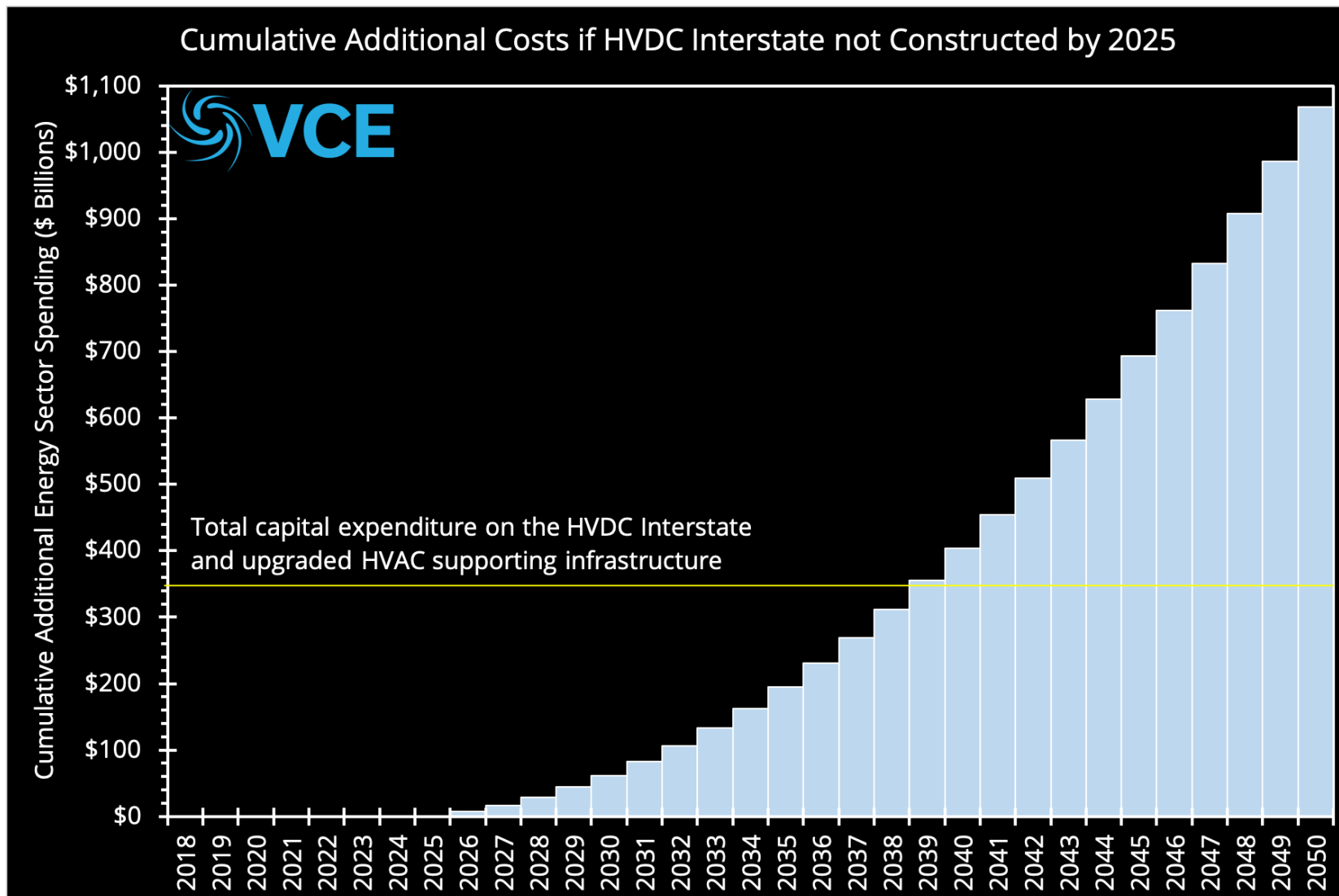
"ZeroByFifty" HVDC Interstate Transmission (State-Level)



"ZeroByFifty" HVDC Interstate Transmission (State-Level)



"ZeroByFifty" Indicates NOT Building an HVDC Super grid Adds \$1 Trillion in Energy Costs By 2050



Thank You!

WIS:dom[®] -P Technical Documentation:

[https://vibrantcleanenergy.com/wp-content/uploads/2020/08/WISdomP-Model_Description\(August2020\).pdf](https://vibrantcleanenergy.com/wp-content/uploads/2020/08/WISdomP-Model_Description(August2020).pdf)

Where "ZeroByFifty" Will Be Published (before end of 2020):

<https://zero2050usa.com>



Dr Christopher T M Clack
Telephone: +1-720-668-6873
Website: VibrantCleanEnergy.com
Twitter: @DrChrisClack; @VibrantCE
E-mail: christopher@vibrantcleanenergy.com