

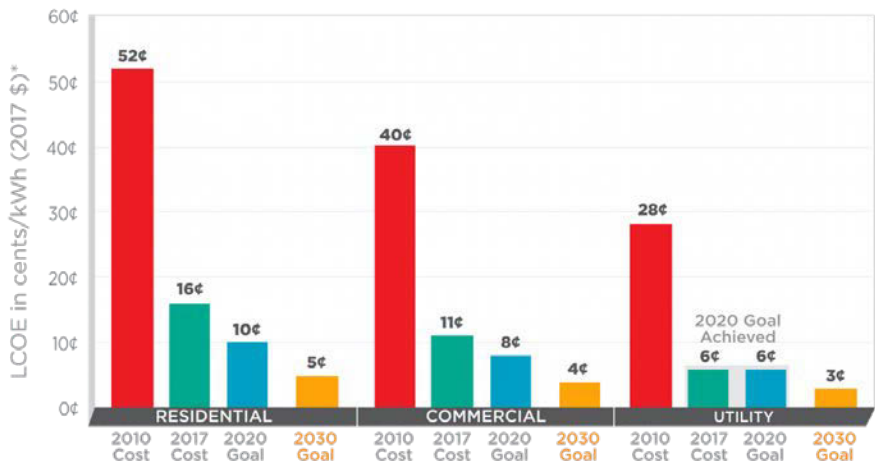
The Potential Role of Concentrating Solar Power within the Context of DOE's 2030 Solar Cost Targets

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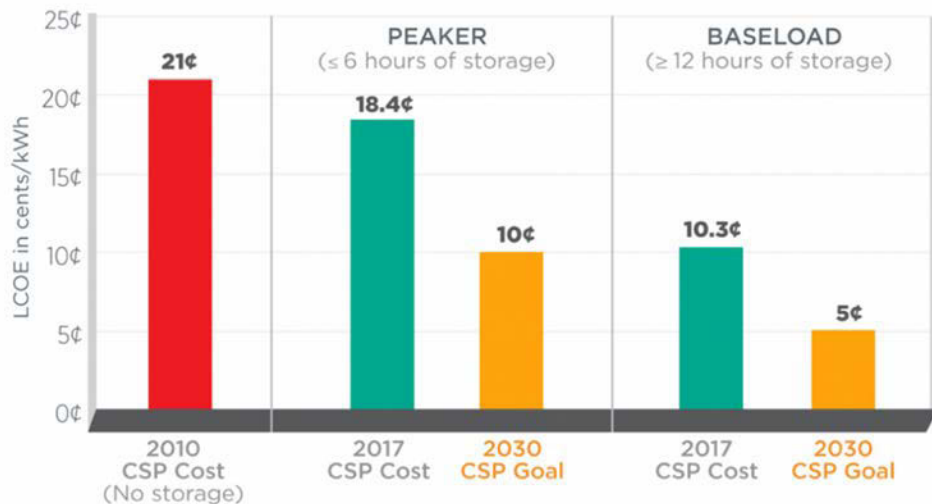
What are the potential impacts of simultaneously achieving DOE's 2030 cost targets for PV and CSP-TES?

SunShot PV Progress and Goals



*Levelized cost of electricity (LCOE) progress and targets are calculated based on average U.S. climate and without the ITC or state/local incentives. The residential and commercial goals have been adjusted for inflation from 2010-17.

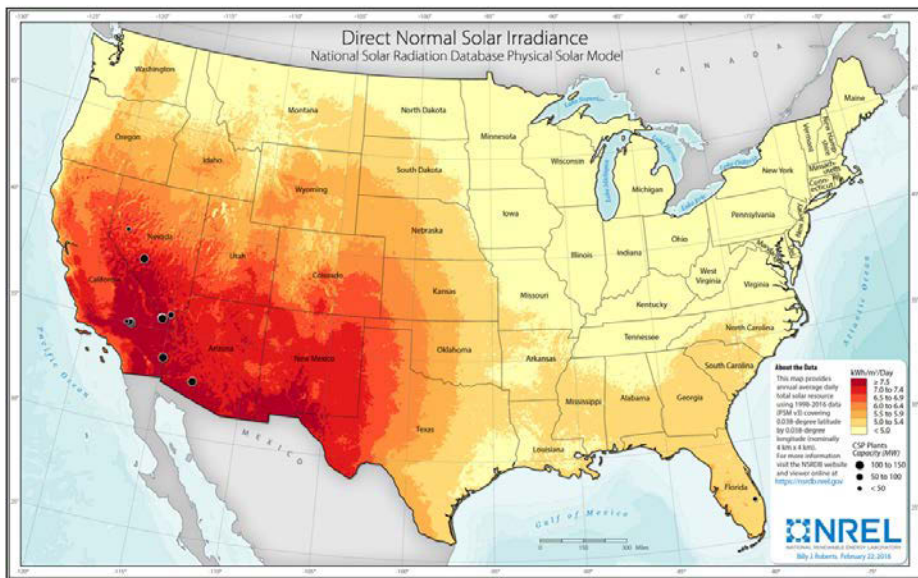
SunShot CSP Progress and Goals



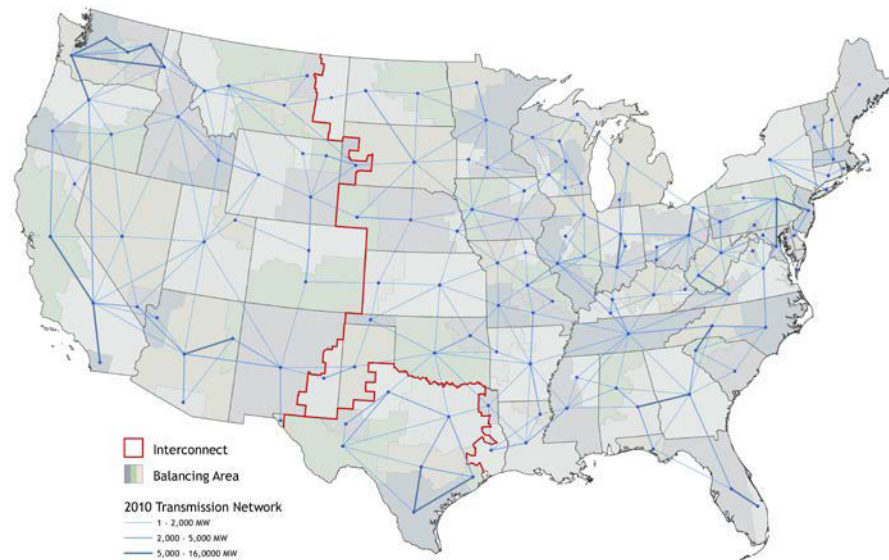
Approach: Capacity Expansion Modeling

Scenario analysis to evaluate the potential impacts of simultaneously achieving the 2030 cost targets for PV and CSP-TES through long-term capacity expansion modeling, which simulates the expansion and operation of the U.S. generation and transmission systems through 2050

National Solar Radiation Database (NSRDB)

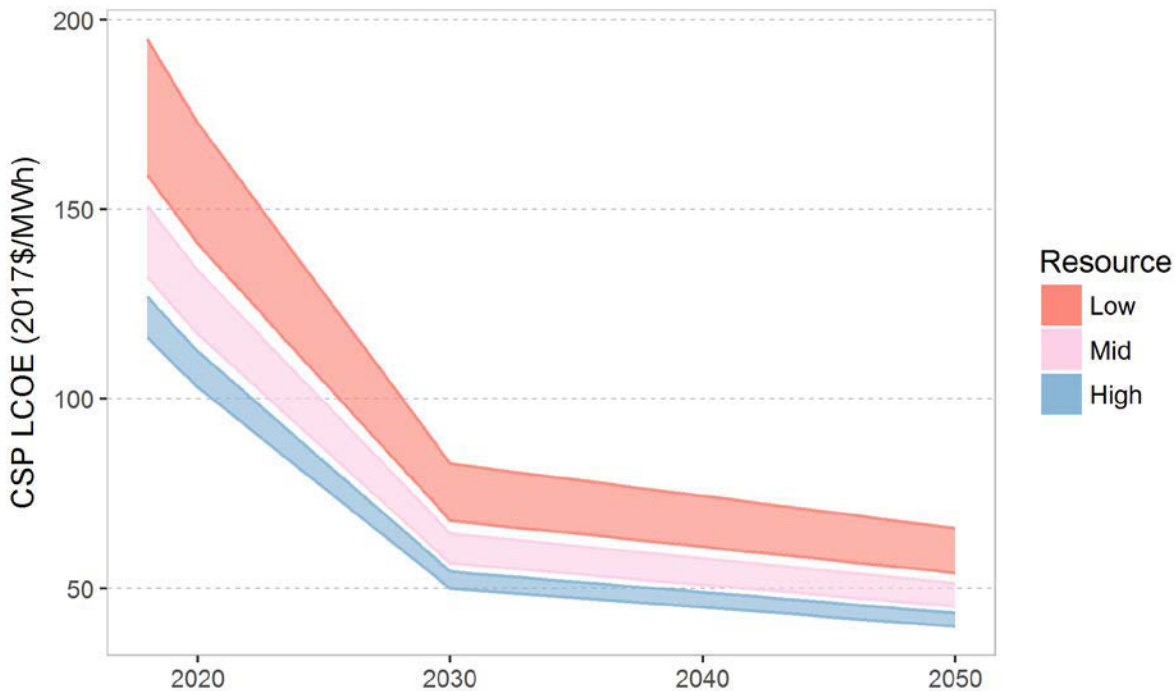


Regional Energy Deployment System (ReEDS) model

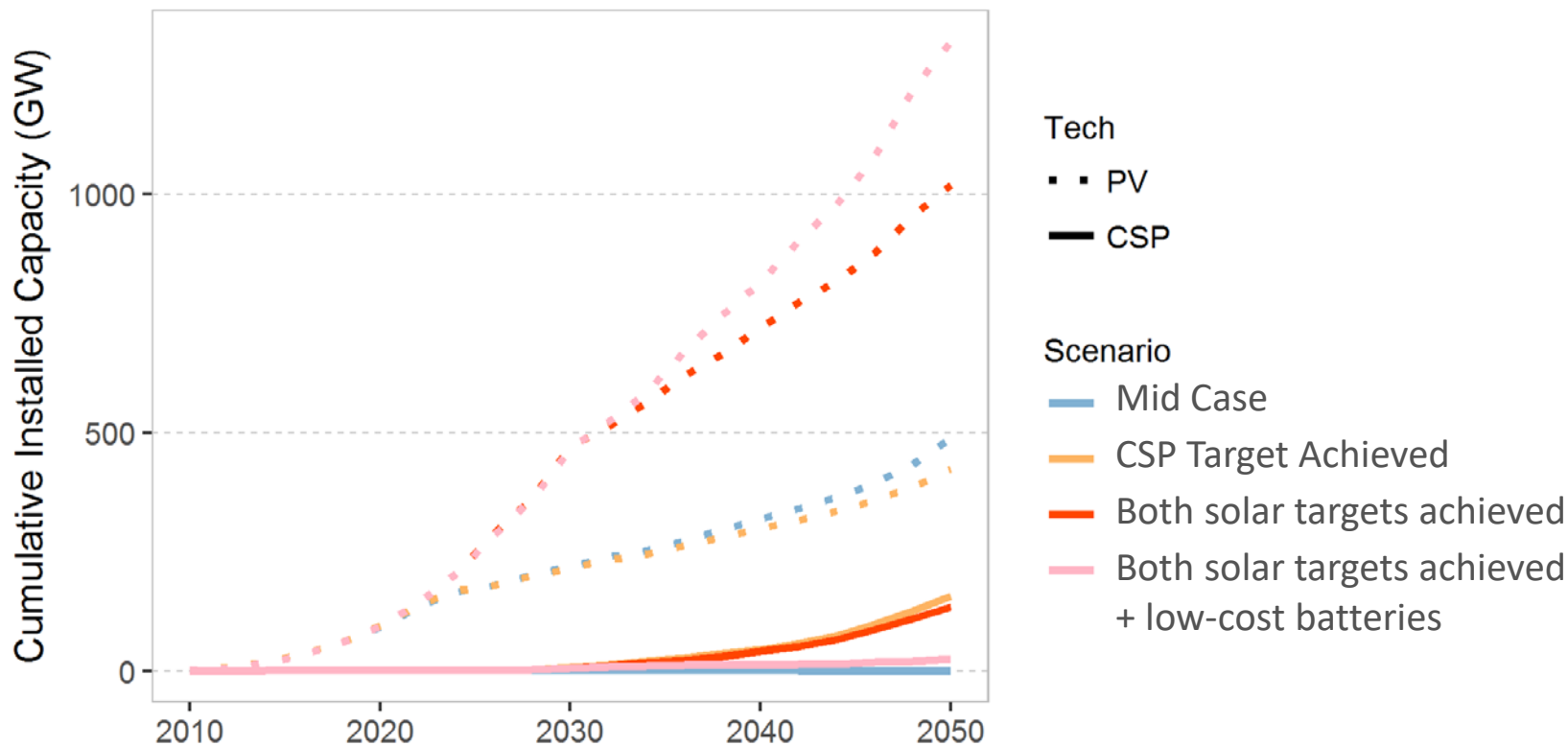


Representing DOE's Cost Targets for CSP-TES

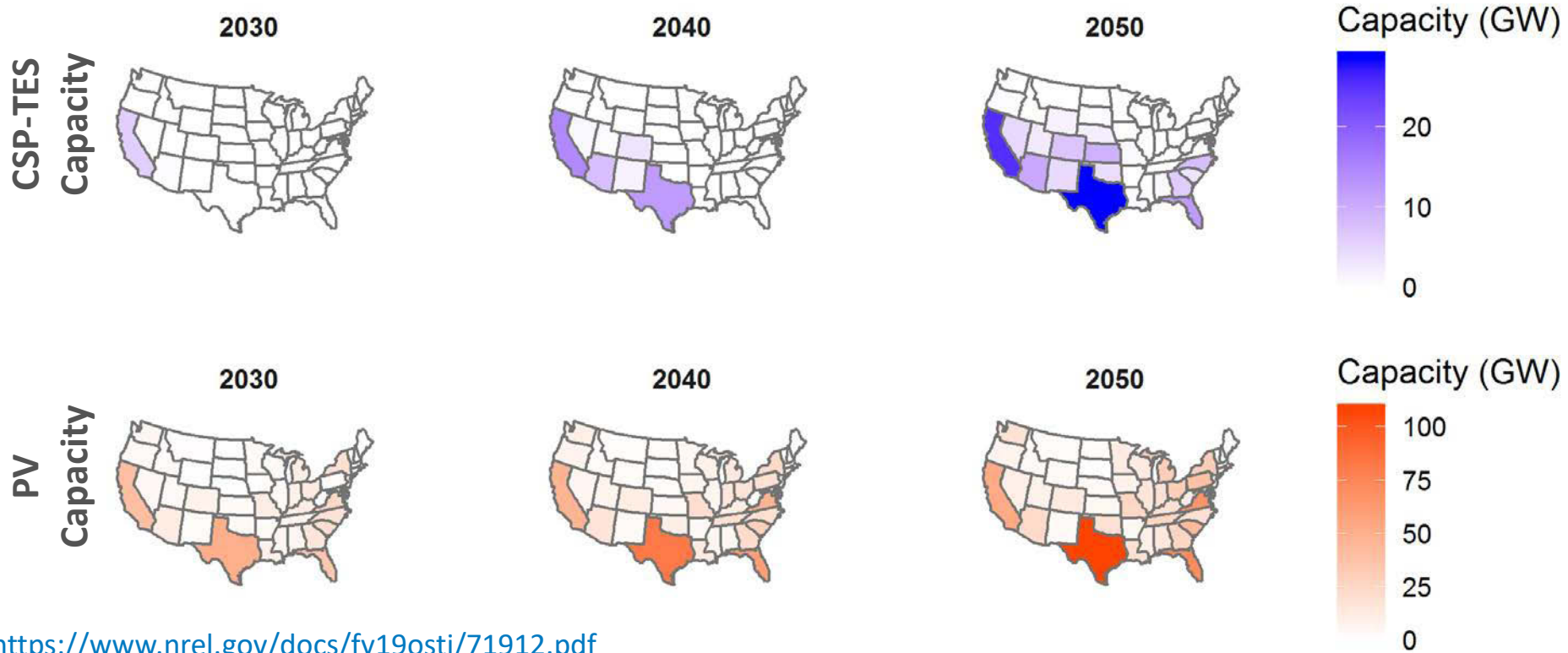
- DOE's 2030 cost target for CSP-TES assumes 50%-80% reductions in the solar field and TES material costs
- Cost reductions after 2030 represent technology learning and/or improvements that could result from innovation



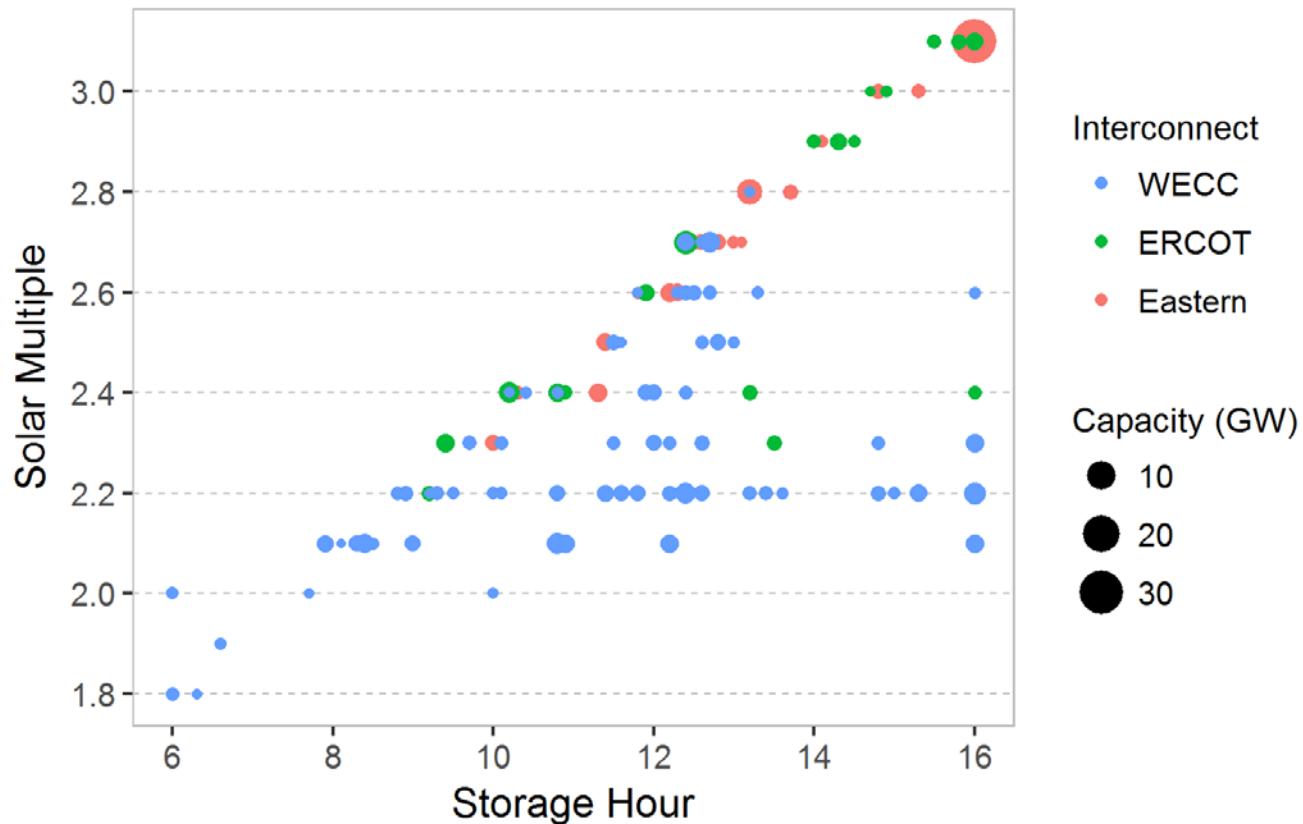
Achieving DOE's 2030 solar cost targets could drive an expansion of installed solar capacity by 2050



Achieving DOE's 2030 solar cost targets could expand the geographic distribution of economic solar deployment



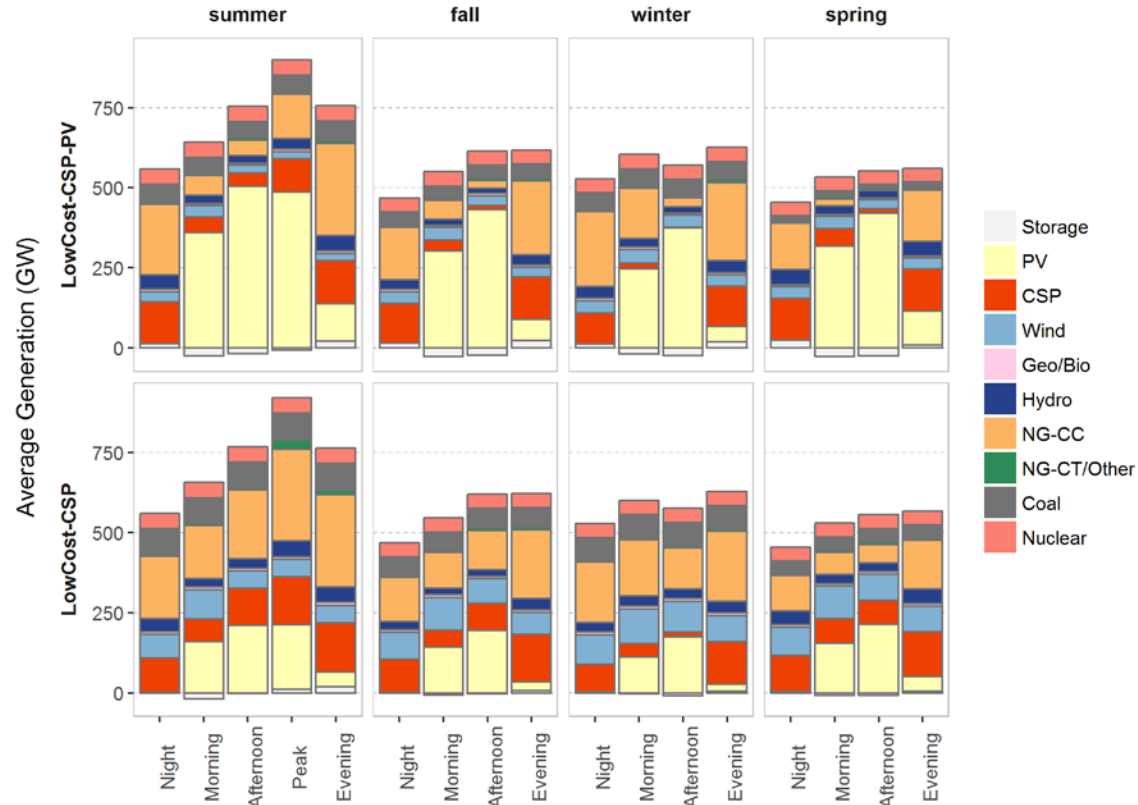
The ReEDS model finds the highest-value in low-cost CSP- TES plants that have high-capacity factor configurations



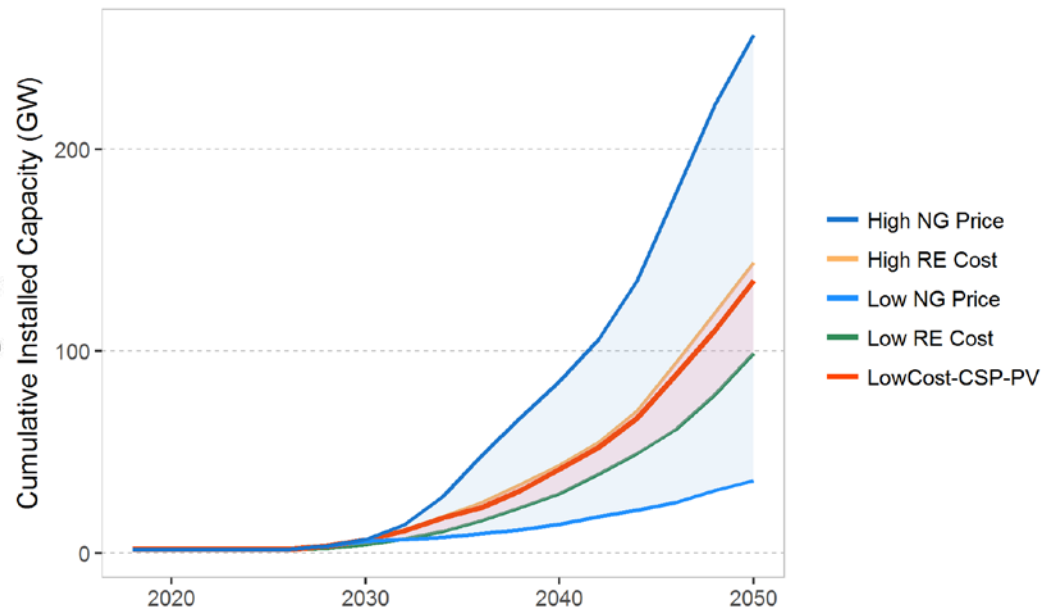
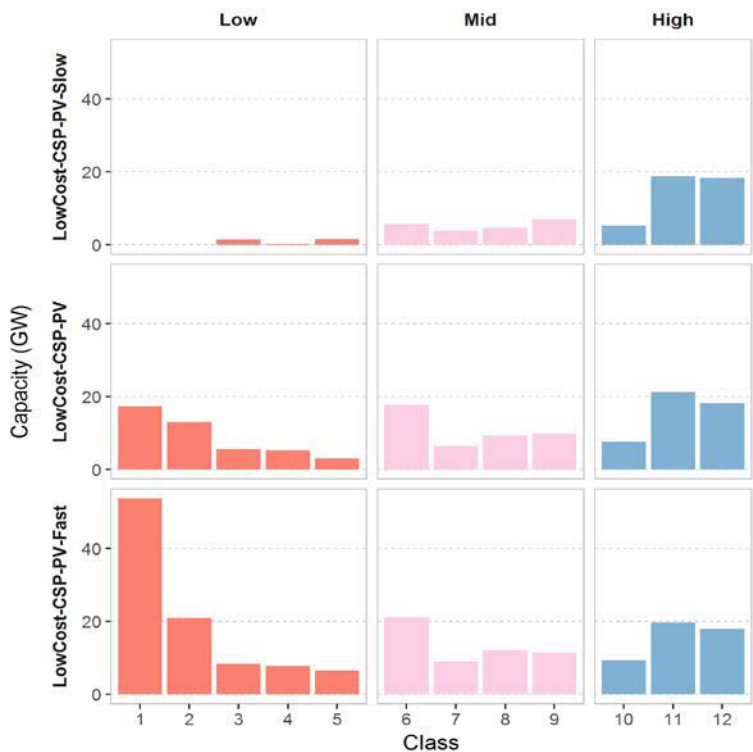
Low-cost CSP-TES provides firm energy value

- CSP-TES generation is highest during the evening and overnight hours in low-cost solar scenarios
- This result highlights the importance of thermal energy storage, which offers *flexibility* and allows CSP-TES to provide dispatchable generation when the sun is down

Average dispatch (operation) of the system in 2050

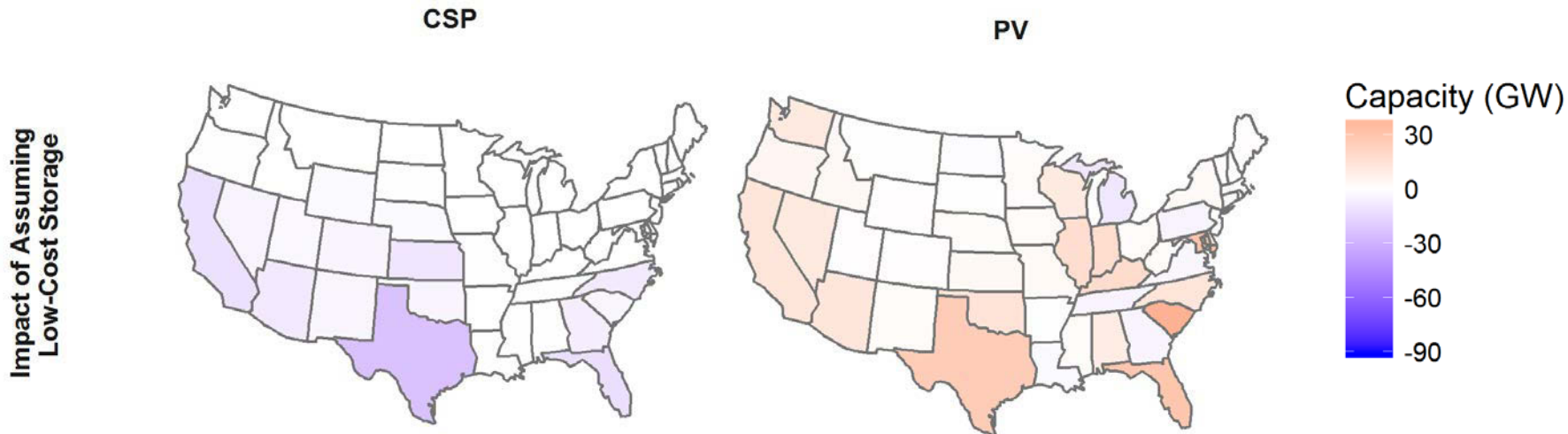


CSP-TES deployment results are sensitive to many technology cost and fuel price assumptions



Lost-cost trajectories for non-solar renewable energy technologies are based on the 2017 Annual Technology Baseline (<https://atb.nrel.gov>).

The magnitude and extent of solar installations depend on future costs for advanced energy storage



Assuming low-cost battery storage results in increased deployment of PV capacity across the contiguous United States, and a corresponding decrease in CSP-TES capacity

Summary of Key Findings

- Solar electricity generating capacity could grow significantly by 2050 if DOE's 2030 solar cost targets are achieved
- The geographic extent of economic solar deployment could expand across the contiguous United States, particularly for low-cost CSP-TES
- CSP-TES is primarily deployed in a highly dispatchable, high-capacity factor configuration, which allows CSP-TES to provide valuable services to the grid
- The assumed price trajectories of natural gas and advanced energy storage have pronounced impacts on the magnitude and geographic extent of low-cost CSP-TES deployment

Thank You

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