

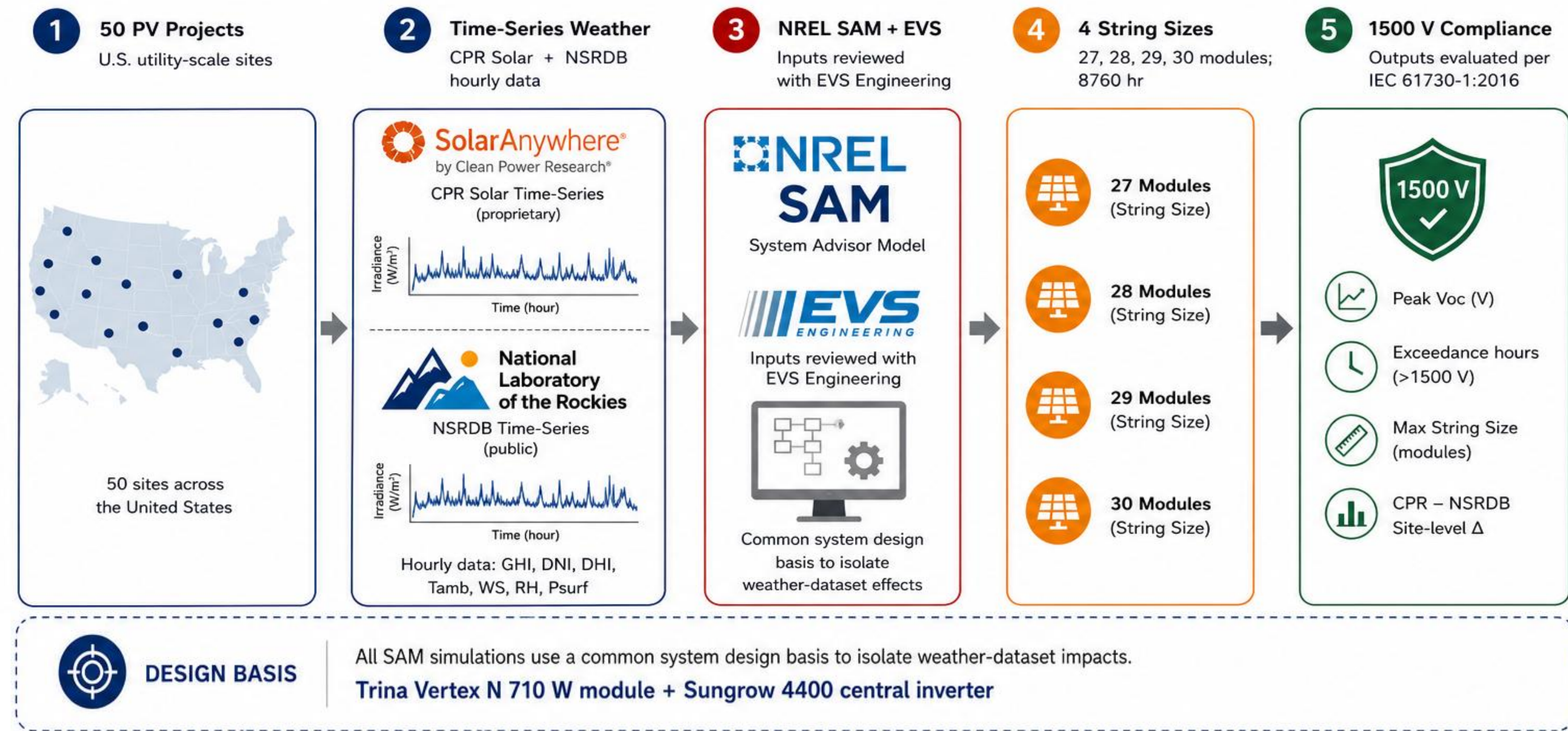
# Impact of Time-Series Weather Dataset Selection on NEC-Compliant PV String Sizing and Balance-of-System Economics

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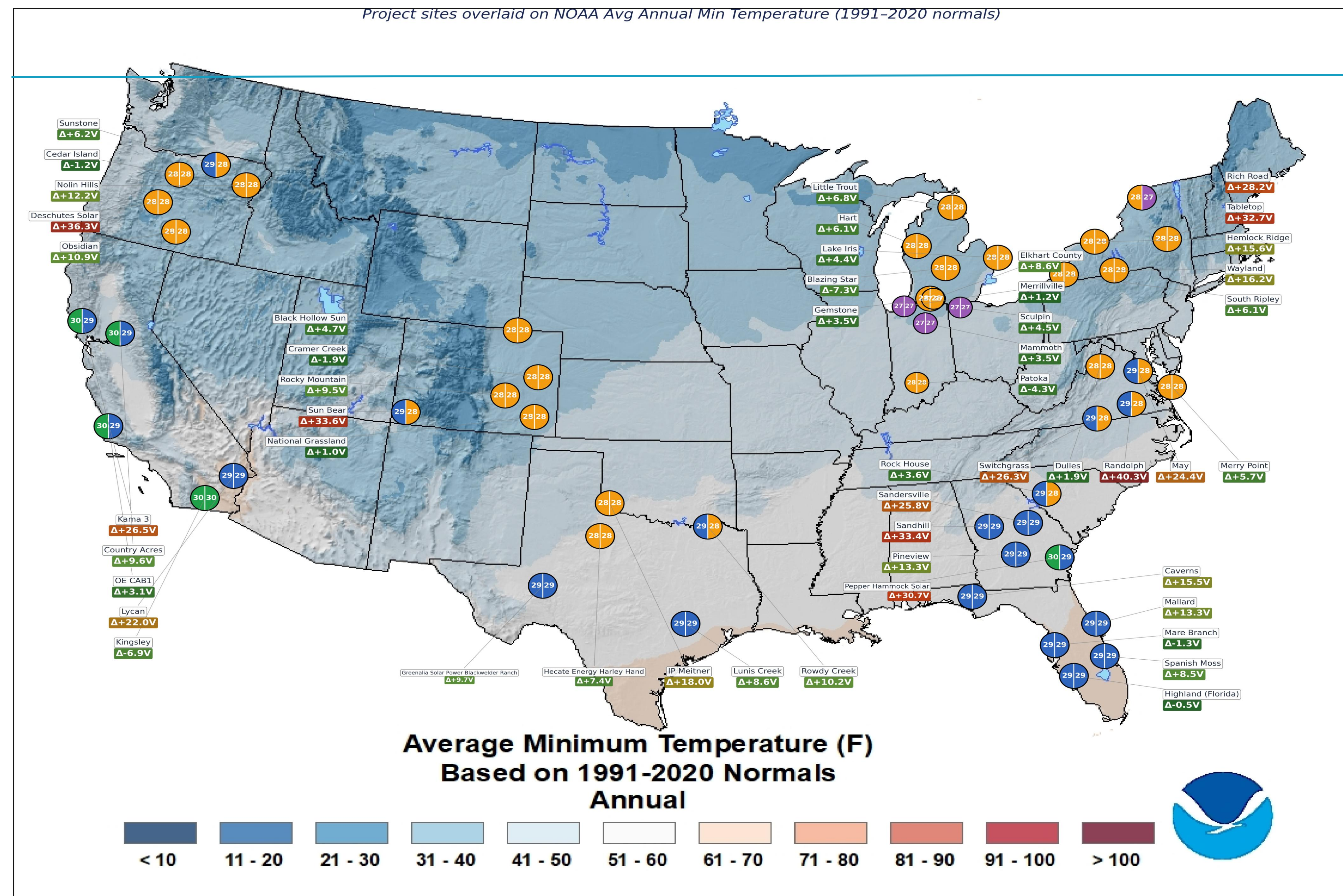
## Motivation

**NEC 690.7(A)(3) Compliance:** PV systems  $\geq 100$  kW may use a documented, professionally stamped engineering method to determine maximum system voltage.  
**Industry Selection:** Default workflows often use NSRDB PSM, while alternate datasets such as CPR SolarAnywhere are less commonly evaluated.  
**Modeling Practice:** NREL SAM uses historical time-series weather data to calculate maximum open-circuit voltage and allowable string size.  
**Weather Dataset**  
**BOS Cost Implication:** A one-module change in string size can scale into significant material and construction cost impacts.  
**Research Objective:** This study evaluates how allowable string size changes when only the weather input source is varied.

## Methodology

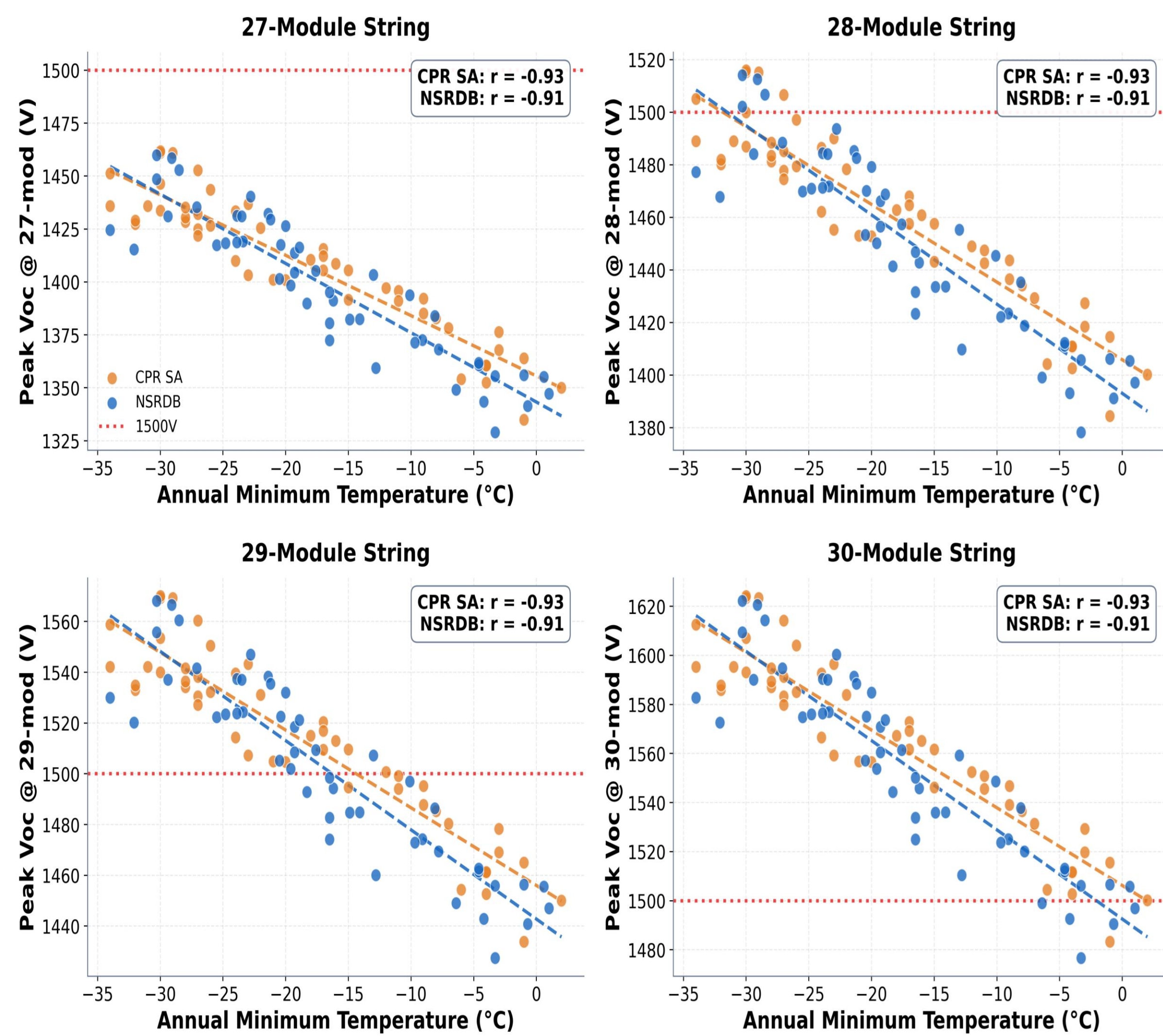


## Max Viable String Size by Project

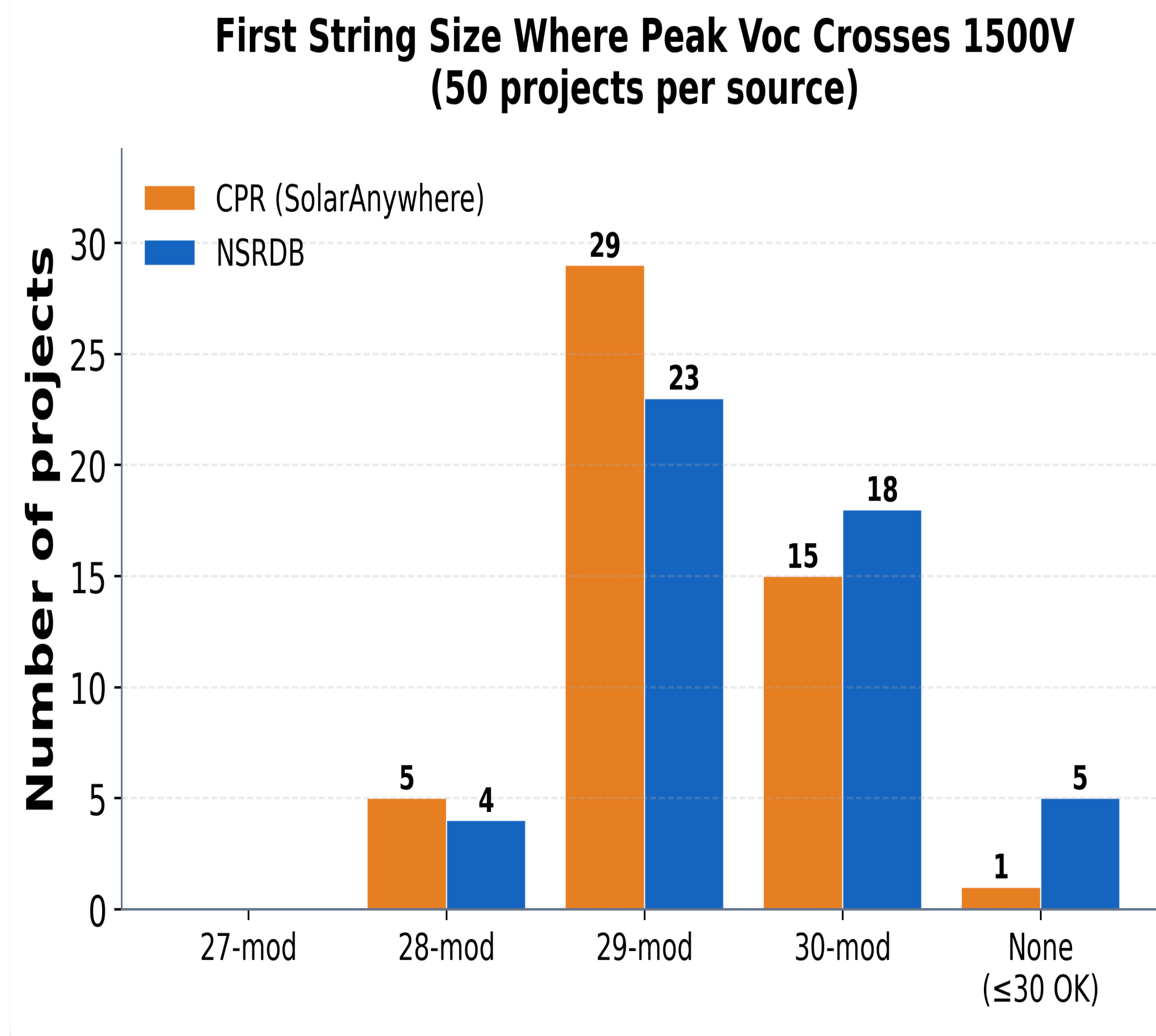


## Results

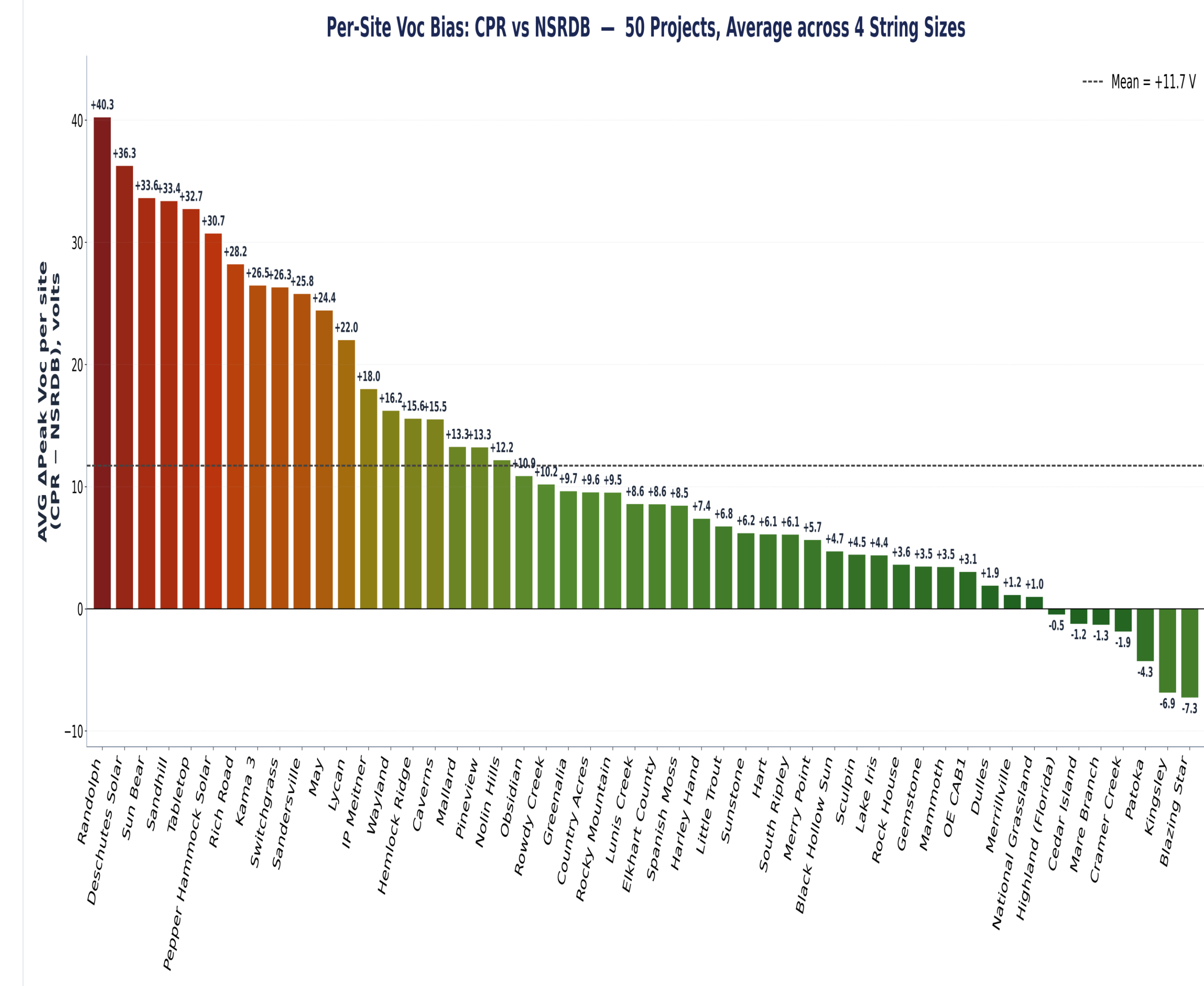
### A. Coldest hour drives peak Voc



### B. First string size crossing 1500 V



### C. Site-level Voc difference



## Conclusions & Recommendations

**Cold temperature tails control peak Voc:** both datasets show strong negative correlation between annual minimum temperature and 30-module peak Voc.

**Weather dataset choice can affect NEC-compliant string sizing:** especially for sites with small voltage margin near 1500 Vdc.

**CPR was generally more conservative in this sample:** 43/50 sites produced higher string peak Voc with CPR than NSRDB.

**BOS implication:** final string length should be locked only after checking weather-dataset sensitivity for low-margin sites.

**Multiple Weather Sources** should be used to derisk the project from future O&M and financial risk.

## Future Work

**Expand** source comparison to additional commercial weather products.

**Quantify** project-specific BOS cost deltas for string-length changes, including source-circuit count, cabling, trenching, terminations, and labor.