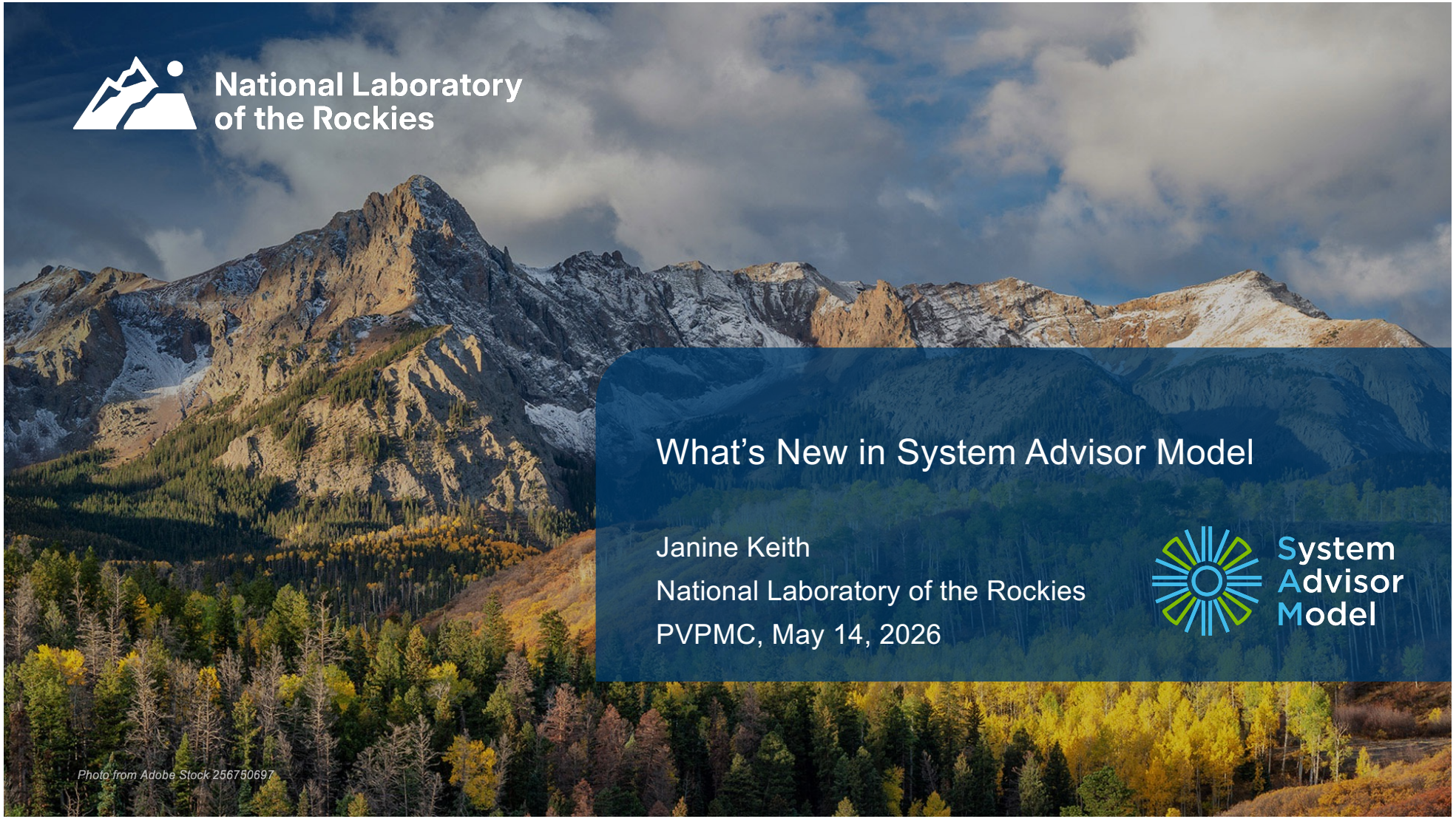

National Laboratory
of the Rockies
What's New in System Advisor Model
Janine Keith
National Laboratory of the Rockies
PVPMC, May 14, 2026
System
Advisor
Model
Photo from Adobe Stock 256750697

National Laboratory of the Rockies

PSA: nrel.gov domain disappears May 29

Please update all **email addresses**, **bookmarks**, **API calls**, and **links** on websites

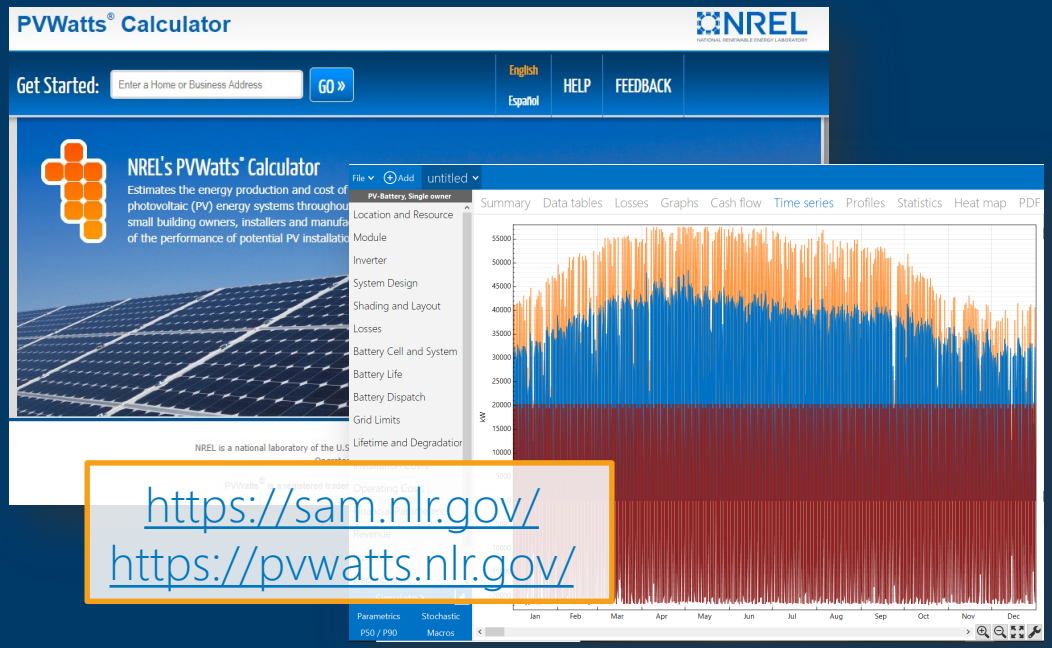
nrel.gov → nlr.gov

github.com/nrel → github.com/NatLabRockies

This includes all API calls to NSRDB and PVWatts*

System Advisor Model (SAM) & PVWatts

Free software that enable detailed performance and financial analysis for renewable energy systems



- ✓ Desktop application
- ✓ PVWatts web tool & API
- ✓ Software development kit
- ✓ PySAM Python package
- ✓ Open source code
- ✓ Extensive documentation
- ✓ User support

Technologies

- Photovoltaic
- Energy storage
  - Electric battery
  - Electric thermal
  - Pumped thermal
- Concentrating solar power
- Industrial process heat
- Marine energy
- Wind power
- Fuel cell
- Geothermal power
- Solar water heating
- Biomass combustion
- Generic system

PLUS: HYBRID SYSTEMS

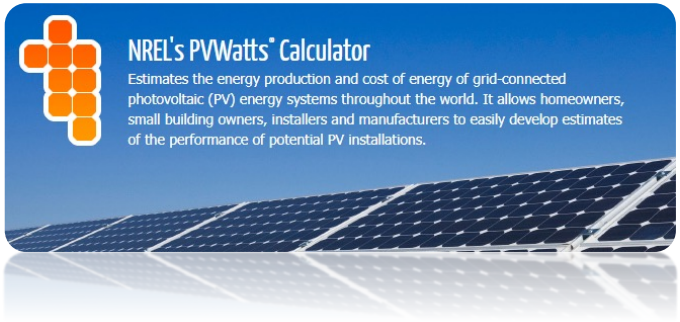
Financial Models

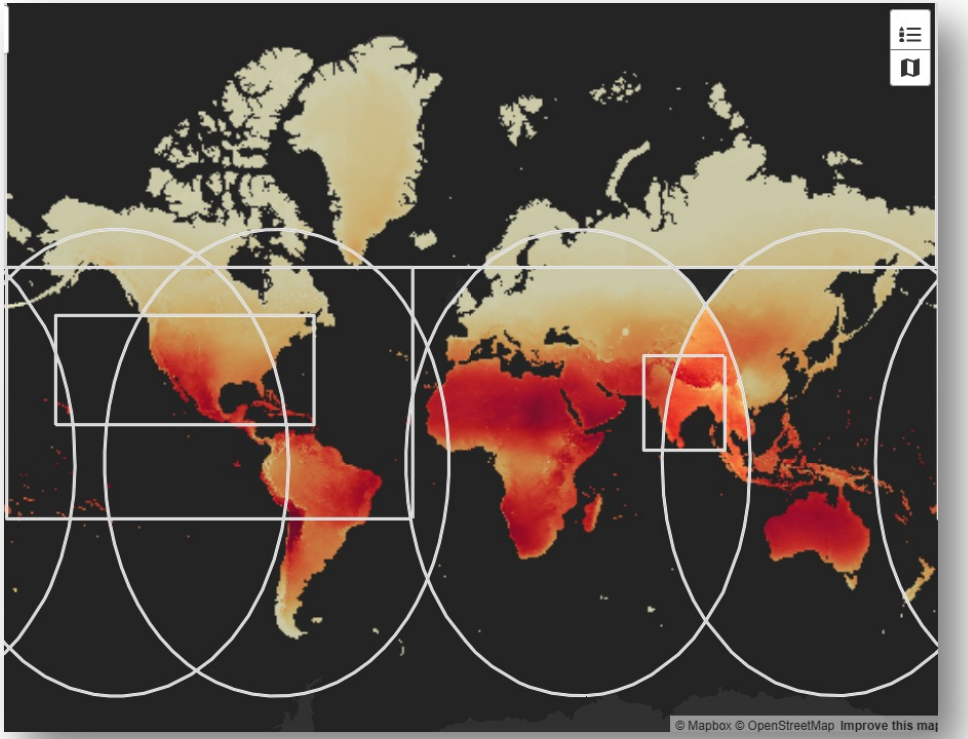
- Power purchase agreements
  - Single owner
  - Partnership flips
  - Sale leaseback
- Residential
- Commercial
- Third party ownership
- Merchant plant
- Community solar
- Simple LCOE calculator

Recently and soon-to-be released

Recently expanded PVWatts data

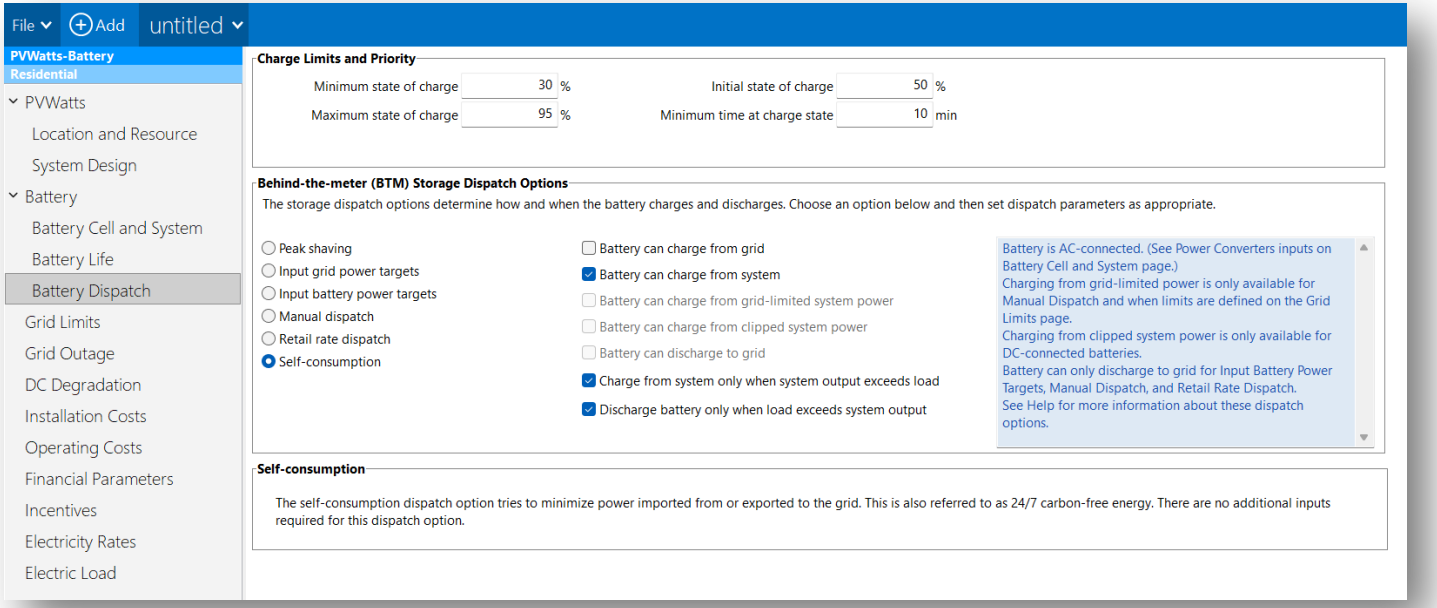
PVWatts now has Arctic data! Using NSRDB Polar Data (60°-90° N)



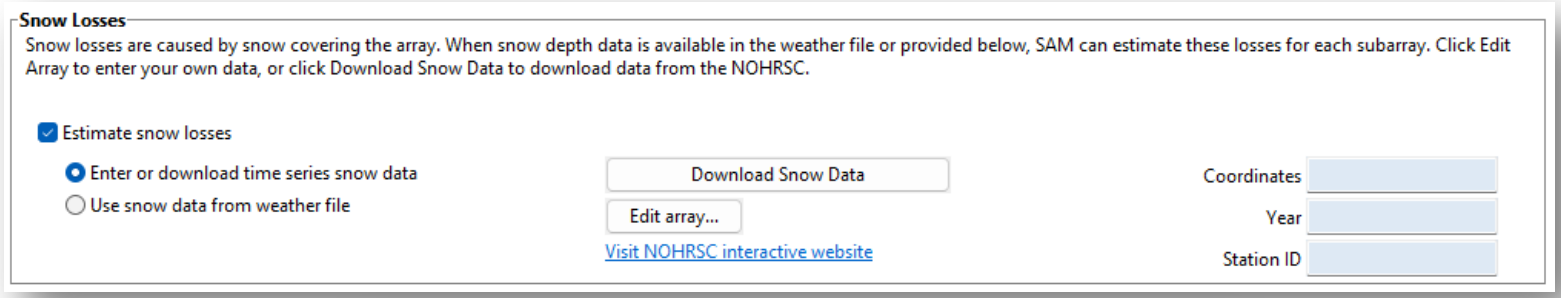


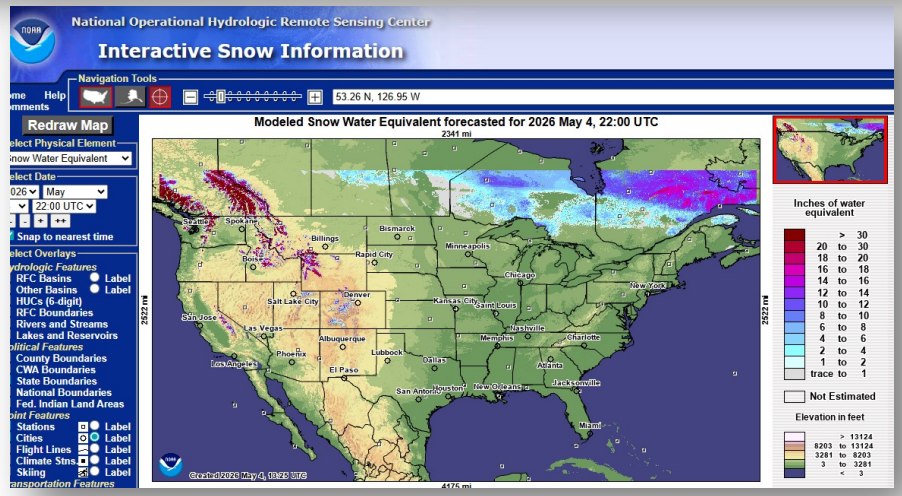
PVWatts with detailed battery model in SAM

SAM's full detailed battery model is now available connected to PVWatts in SAM. Users can choose any of the available dispatch algorithms, and have more control over the detailed models for performance and degradation.



Improved access to snow data

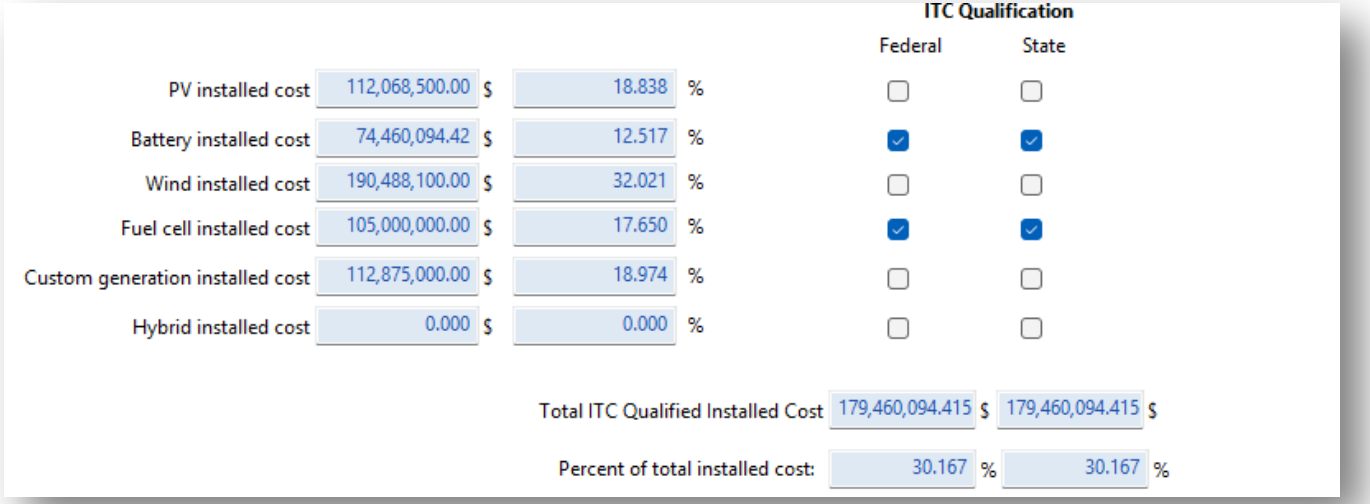




Screenshot of https://www.nohrsc.noaa.gov/interactive/html/map.html

Reworking incentives and depreciation for ITC changes

- With the upcoming change to the ITC where it will apply to storage but not PV, we've reconfigured the financial models to allow different incentives to apply to different parts of a system
- Related changes to depreciation inputs to allow users to specify depreciation basis



Non-energy revenue inputs

NLR Photo Gallery Image 103814

New inputs to allow revenue, revenue sharing, and O&M costs for “non-energy” revenue sources

- Agrivoltaics
- Co-located EV charging revenue
- and more

Hybrid configurations running in lifetime mode

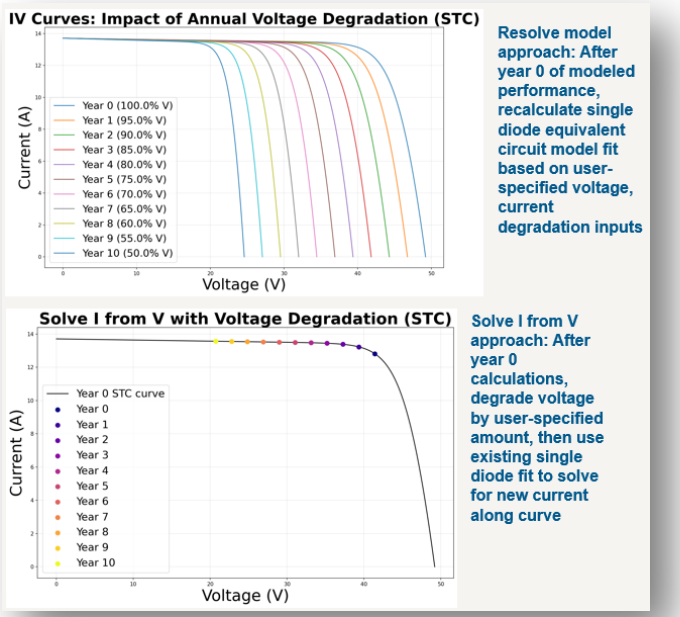
PVWatts, wind, and “custom generation” performance models expanded to be able to run in “lifetime mode” → examine battery degradation impacts for all hybrid configurations!

PVWatts + Wind + Battery
PVWatts + Wind + Fuel Cell + Battery
Detailed PV + Wind + Battery
PVWatts + Wind + Custom Generation + Fuel Cell + Battery

In progress

Voltage degradation modeling

- Previously, power was degraded in out-years, but voltage and current were not
- Investigating different methods of degrading voltage in out-years to impact current and power calculations
- If you didn't see Matt Prilliman's poster, go check it out or talk to him to learn more!



From Poster: Enhancements in voltage degradation modeling for multi-year analyses

Funded by Southern Company

Technology-specific features

- Tandems: developing simplified and more computationally tractable models for tandem modules that could go into SAM
  - shoutout to Rajiv Daxini's poster "Is IEC-61853 testing useful for predicting the energy yield of tandem solar cells?"
- Thin film: implementing precipitable water spectral models
- PV, CSP, electric battery, and thermal energy storage hybrid

Floatovoltaics

NLR Photo Gallery Image 102973

Collecting data from a floating PV installation in Golden CO, planning to use the data to create correlations for thermal effects on floating PV

Improved Python interoperability

New way of communicating with Python packages from within SAM's C++ framework which will allow faster and easier interoperability with external packages

Thank you!

www.nlr.gov
www.sam.nlr.gov

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