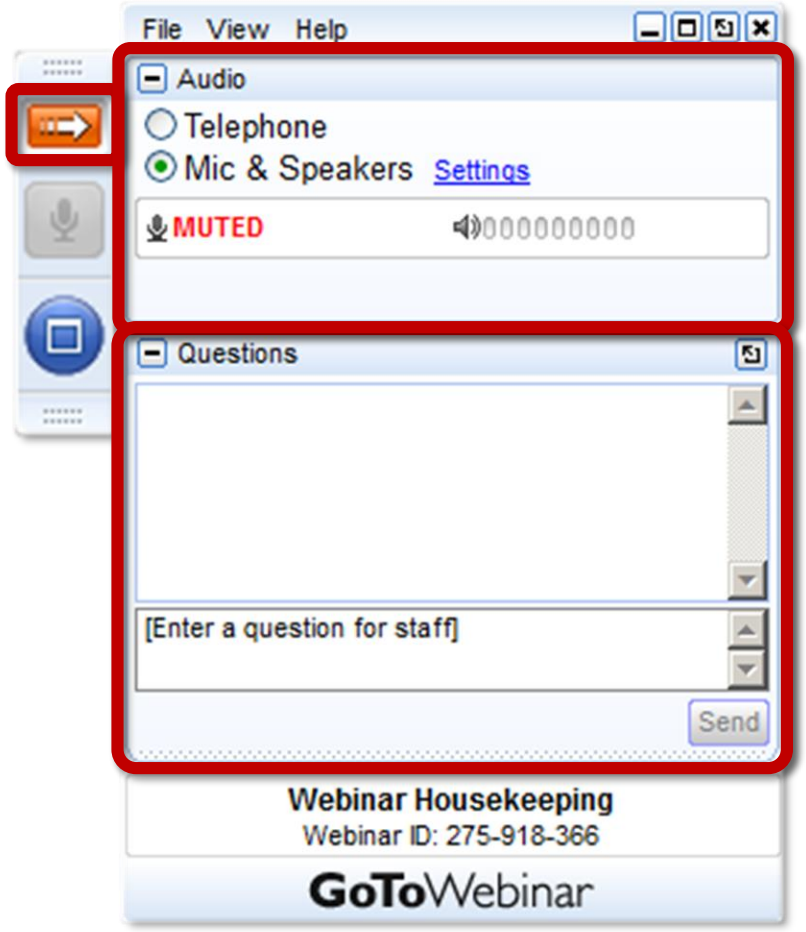
CESA Webinar

Exploring the Outcomes of New Grid Projects on the Power System: PNNL's GridPIQ Tool

Hosted by
Nate Hausman, Project Director, CESA

January 31, 2019

Housekeeping



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CleanEnergy States Alliance

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STATE OF CALIFORNIA ENERGY COMMISSION

DEPARTMENT OF ENERGY & ENVIRONMENT

EnergyTrust of Oregon

IOWA economic development

MASSACHUSETTS CLEAN ENERGY CENTER

IPA ILLINOIS POWER AGENCY

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OEI Wisconsin Office of Energy Innovation

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BPU New Jersey's cleanenergy njcleanenergy.com program™

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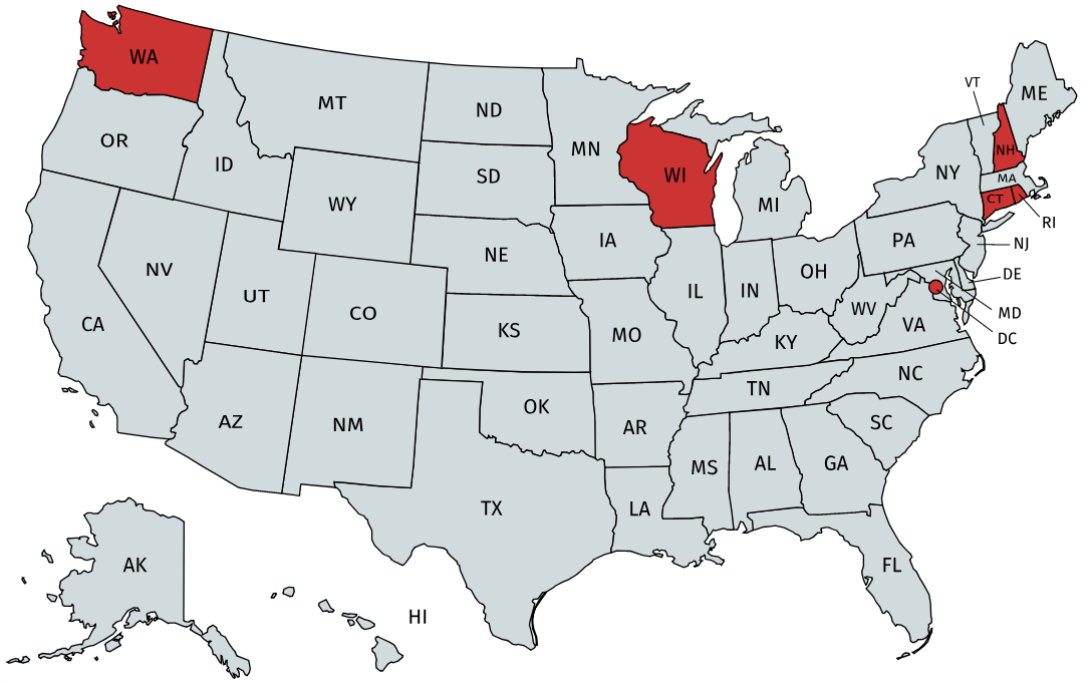
www.cesa.org

Multistate Initiative to Develop Solar in Locations that Provide Benefits to the Grid

CleanEnergy States Alliance
www.cesa.org

The Clean Energy States Alliance (CESA) is working with five states and the District of Columbia to identify locations where solar and other DERs could increase the reliability and resilience of the electric grid.



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Innovation is in our nature.

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

SOLAR ENERGY TECHNOLOGIES OFFICE
U.S. Department Of Energy

Learn more at: www.cesa.org/projects/locational-value-of-distributed-energy-resources

Webinar Speakers

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CleanEnergy
States Alliance

Advanced Grid Research
OFFICE OF ELECTRICITY
US DEPARTMENT OF ENERGY

Pacific Northwest
NATIONAL LABORATORY

Introducing the Grid Project Impacts Quantification Web Calculator

31 January 2019

Webinar with the Clean Energy States Alliance

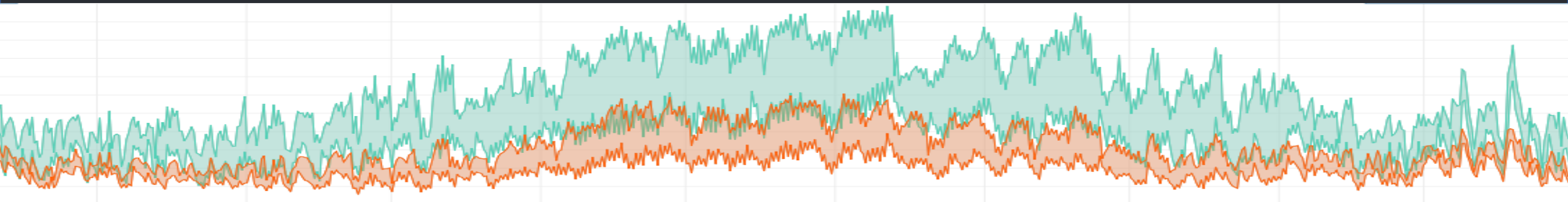
Karen Studarus, Pacific Northwest National Laboratory

https://GRIDPIQ.PNNL.GOV

PNNL-SA-137754

"If Only I Could Quickly and Easily…"

- Ask many "what if?" questions about my system
- Screen grid project ideas
- Visualize grid time series
- Compare assumptions
- Sanity check results
- Check for knock-on benefits or unintended consequences
- Document benefits of my project or product
- Leverage many data sources in one place



Introducing the Grid Project Impacts Quantification Tool (GridPIQ)

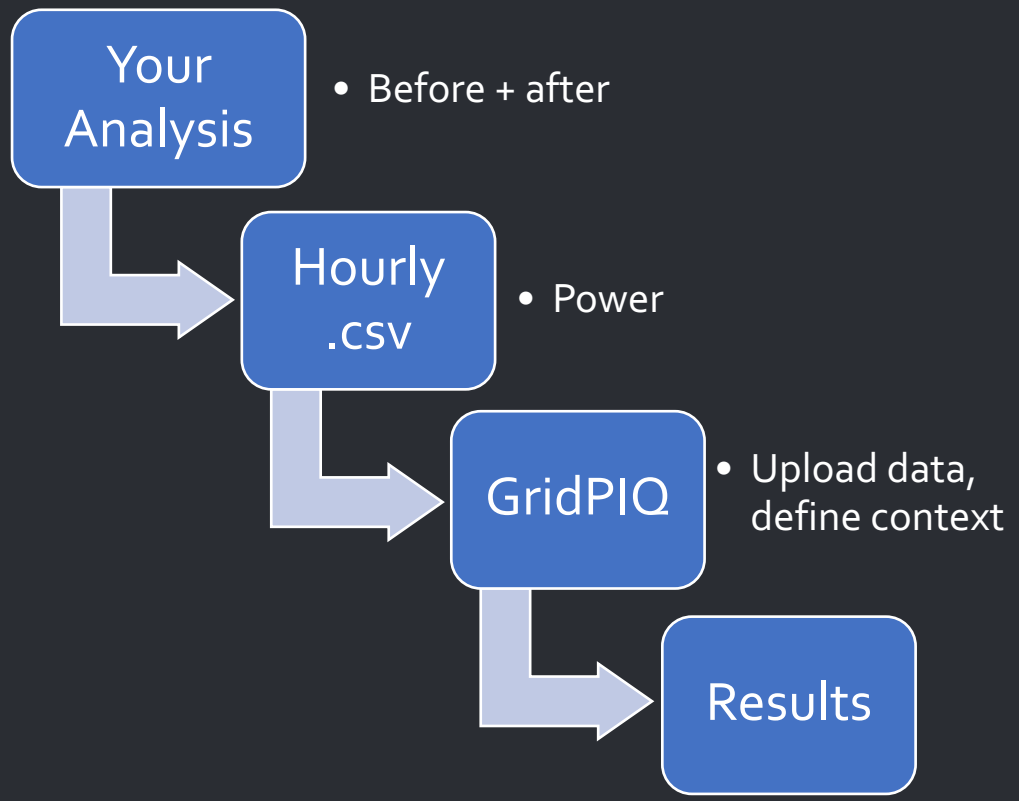
- Screening tool for grid projects – various technologies (*e.g.* energy storage, PV) and impacts (*e.g.* inter-hour ramping, emissions, peak power)
- Publically available right now – gridpiq.pnnl.gov
- Transparent methodologies and data sources
- Built in online instructions and explanation of methodology
- Intuitive user interface

How does it work?

- User inputs a few simple things to see results in seconds
  - For example: Technology type, efficiency, size, location
- Completely customizable
  - Change parameters to
    1. explore assumptions,
    2. compare scenarios, or
    3. tune the results to your specific location for maximum applicability
- User cautioned when boundaries of the GridPIQ model are pushed
- We'll show two examples today:
  - New control scheme on a distribution feeder
  - Energy Storage

Use Case and Demo: Amplify your own analysis

- You have modeled an upgrade to your own distribution feeder and you have hourly data (power time series in kW)
- You've already got a scenario and would like to do quick sanity check of results
- Report additional insight
  - Changes fuel costs
  - Changes ramp rates
  - Changes emissions
  - Changes energy usage… etc.
- Now, a live demo in the web browser



Use Case and Demo: Energy Storage

- Characteristics you input:
  - Battery size,
  - location characteristics,
  - dispatch objective
- Expect insight about how the battery changes the system's:
  - Net Load Profile (MW)
  - Energy consumption
  - Peak Power
  - Ramping requirement from other generators
  - Carbon footprint
  - Etc.
- Now, a live demo in the web browser

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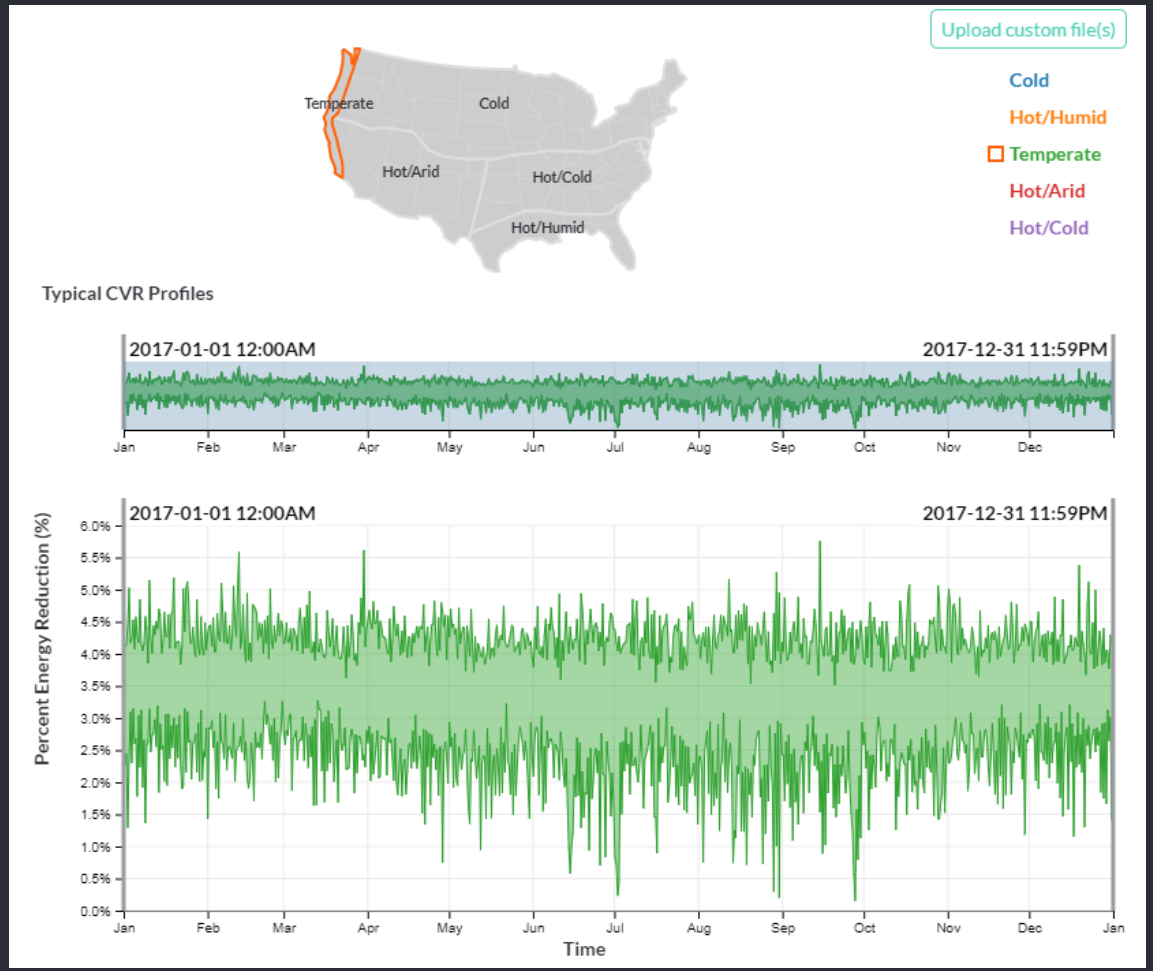
GridPIQ

Overview of Available Technologies

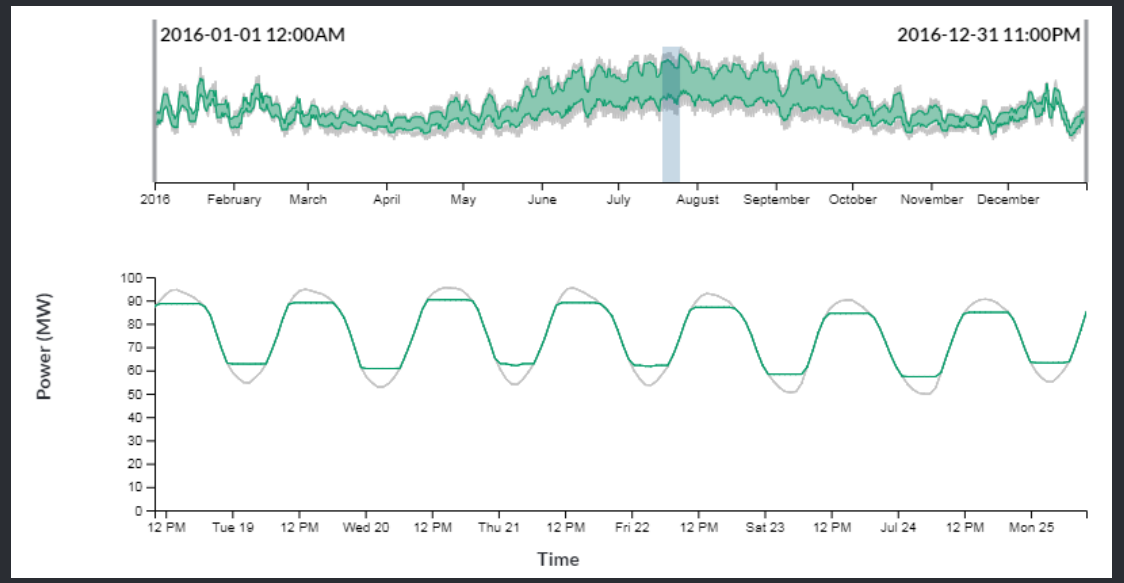
Conservation Voltage Reduction (CVR)

- Hourly percent reduction (or increase) in power due to implementation of CVR
- Typical hourly profiles using data from PNNL Report: “Evaluation of Conservation Voltage Reduction on a National Level”
  - KP Schneider, JC Fuller, FK Tuffner, R Singh



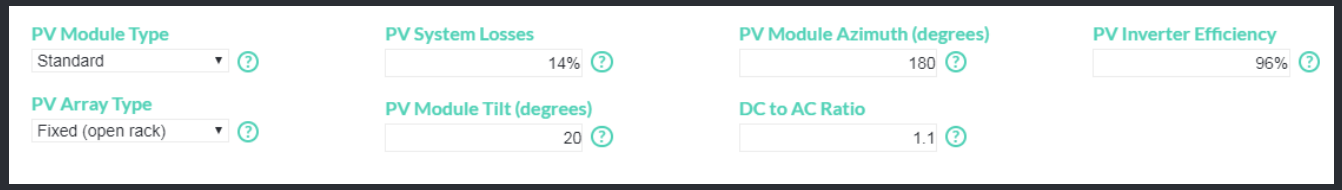
Energy Storage

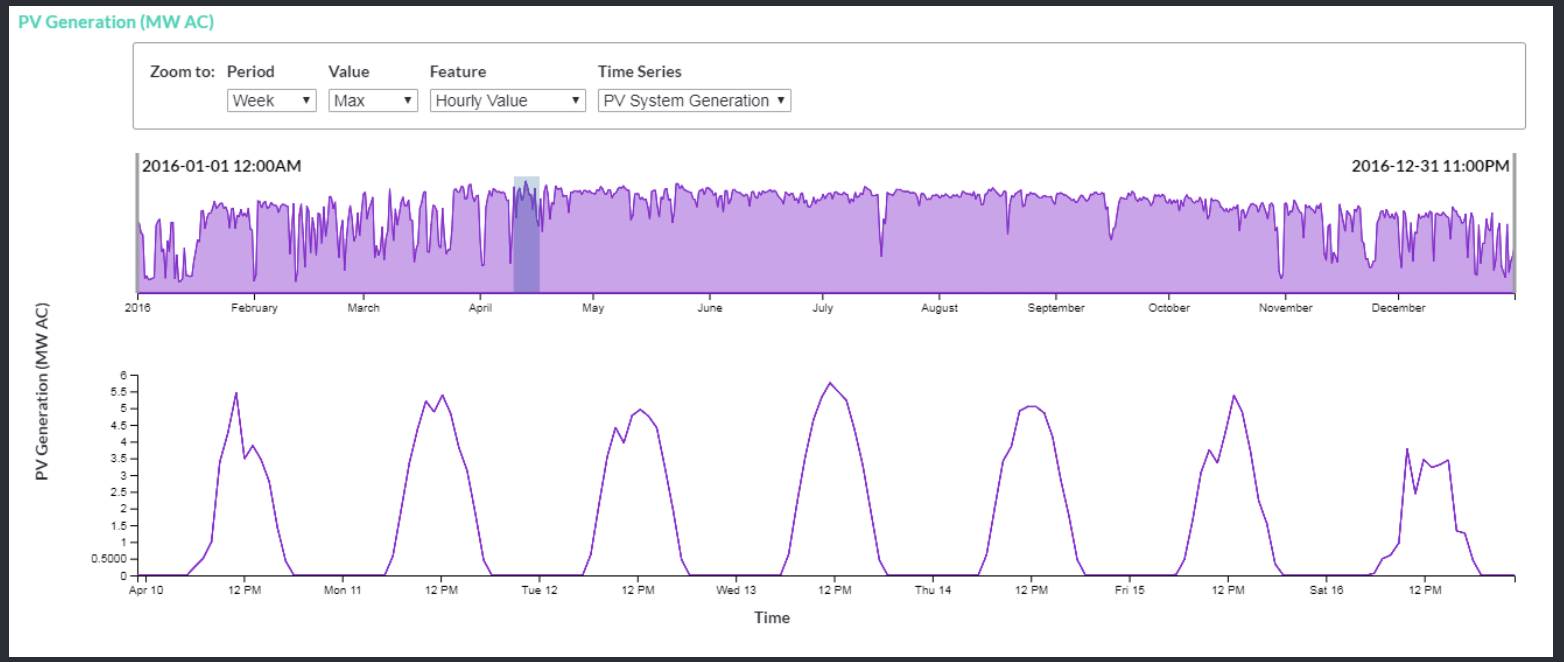
- Market Participation
  - Operate storage to maximize profit
  - Input prices
  - Discover operating profile and consequences
  - Based on PNNL work: D Wu, C Jin, P Balducci, M Kintner-Meyer
- Daily Peak Shaving
  - Operate storage to “peak shave and valley fill”
  - Quadratic program developed by Emily Barrett
- Annual Peak Shaving
  - Operate storage to reduce annual peak to specified level
  - Discover requisite battery sizing



Photovoltaics

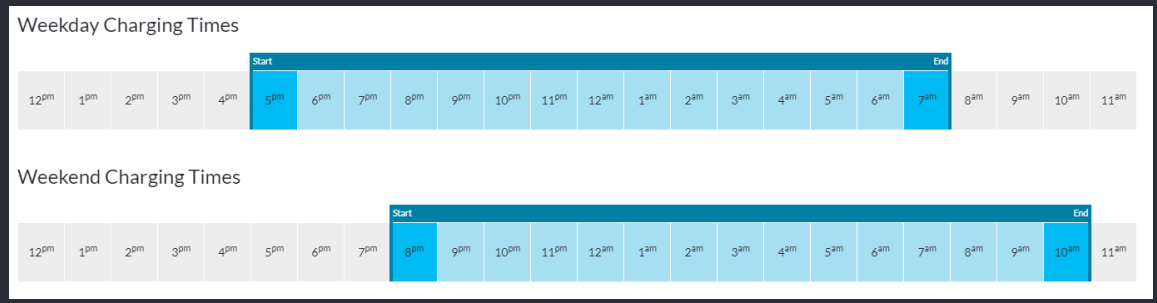
- Upload PV generation profile, or model PV output
  - Modeling directly uses NREL's PV Watts, part of the System Advisor Model

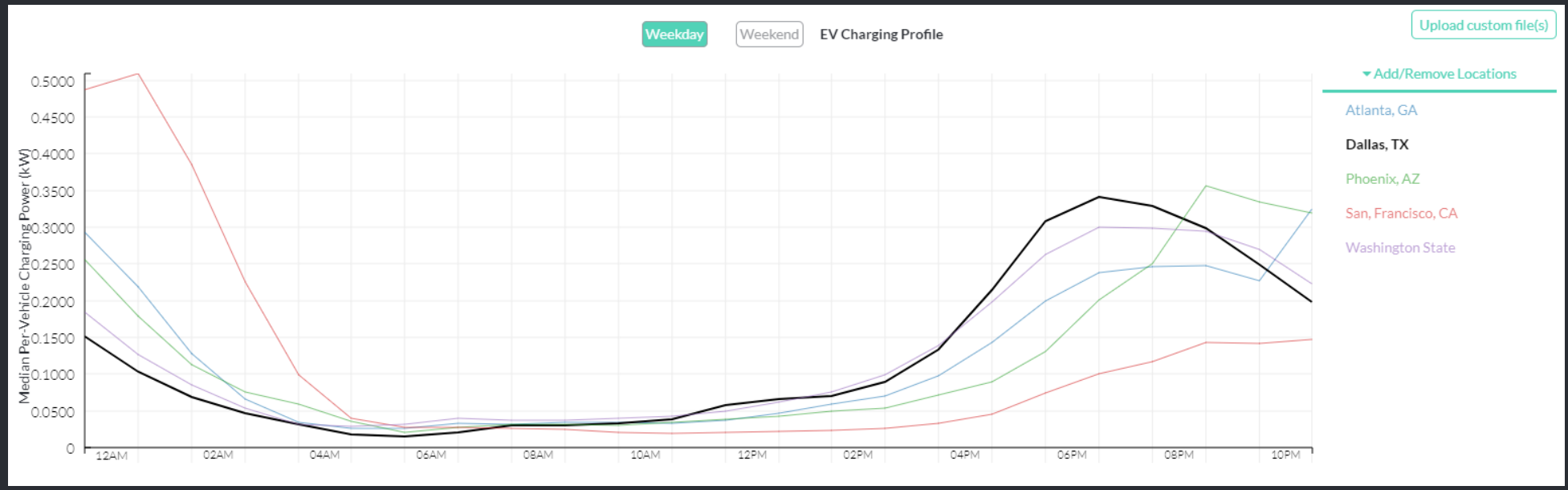




Electric Vehicle Coordinated Charging

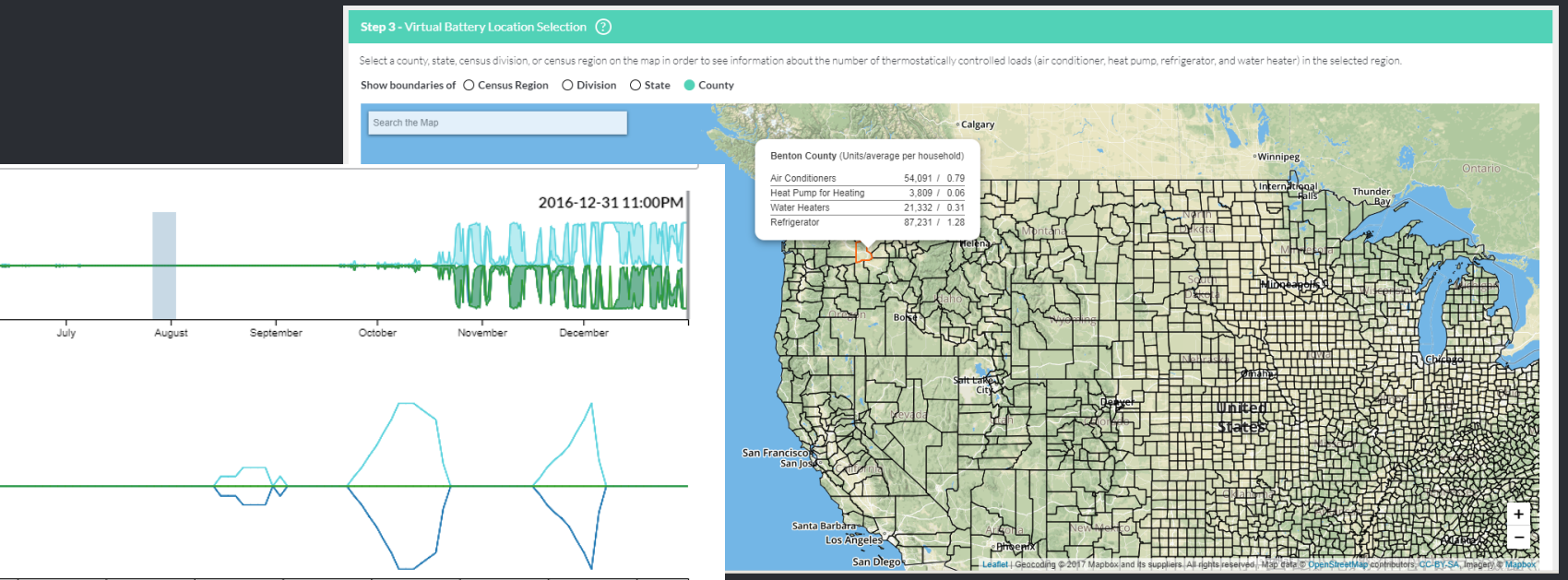
- Use typical charging behavior to compare with coordinated charging
- Charging data from Idaho National Laboratory's EV Project

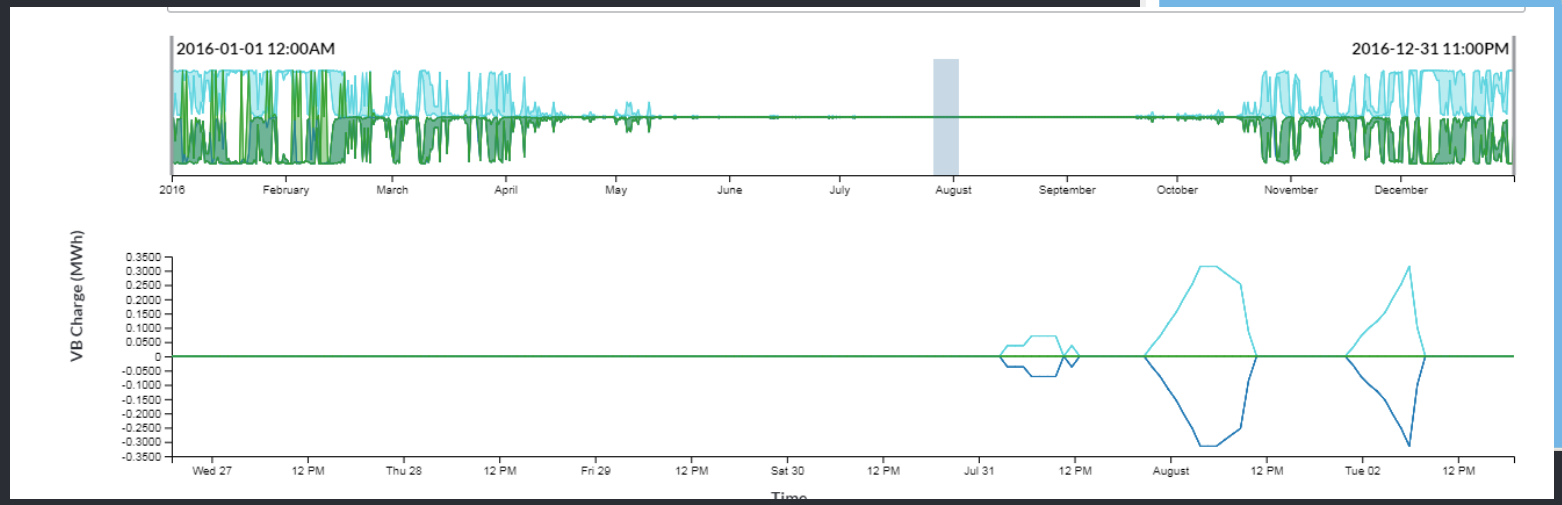




Virtual Battery

- Use residential loads like water heaters for demand response
- Estimate how much capacity is available in your region or county
- Demand Response modeled as a battery [H Hao, D Wu, J Lian, T Yang]

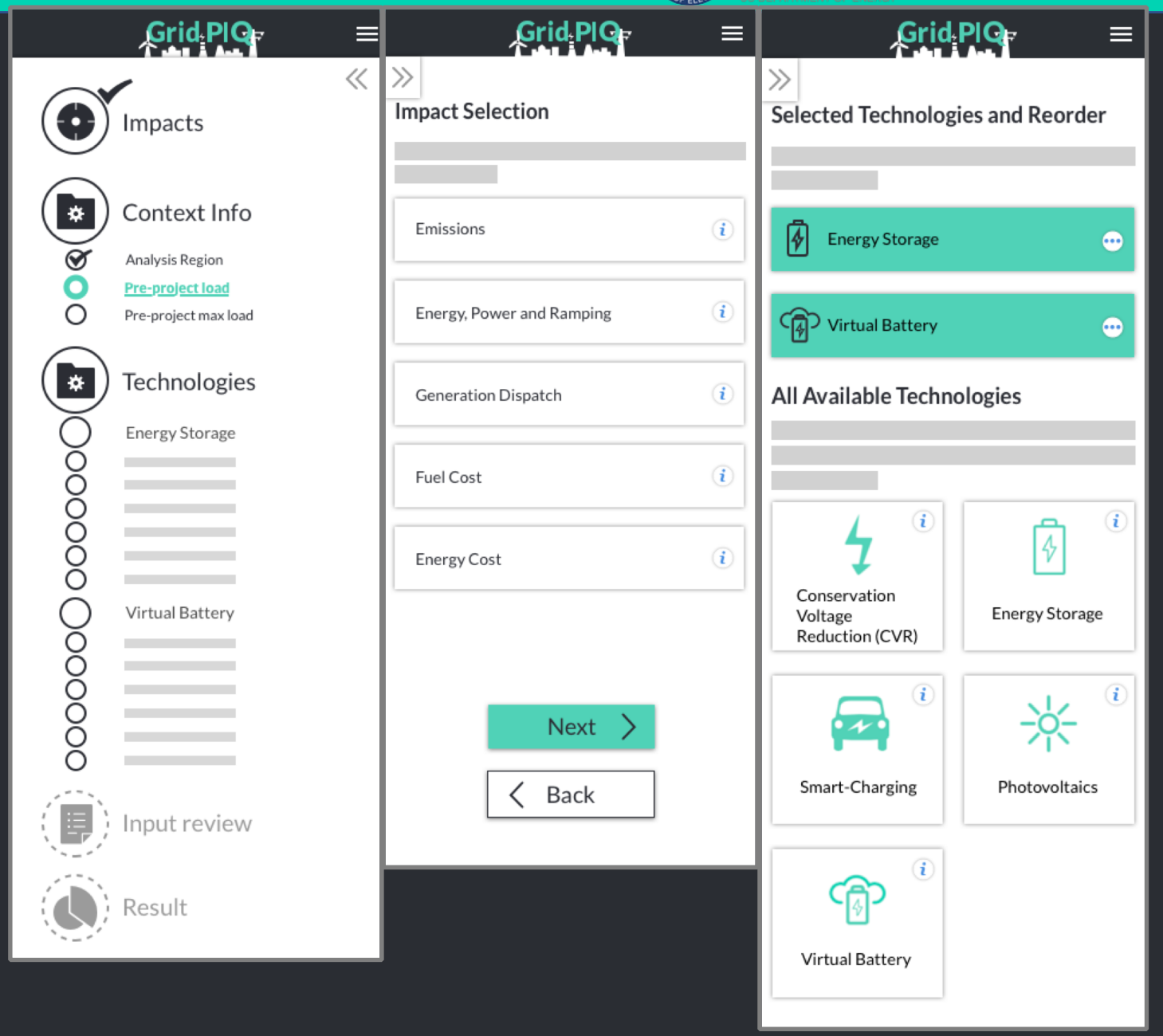




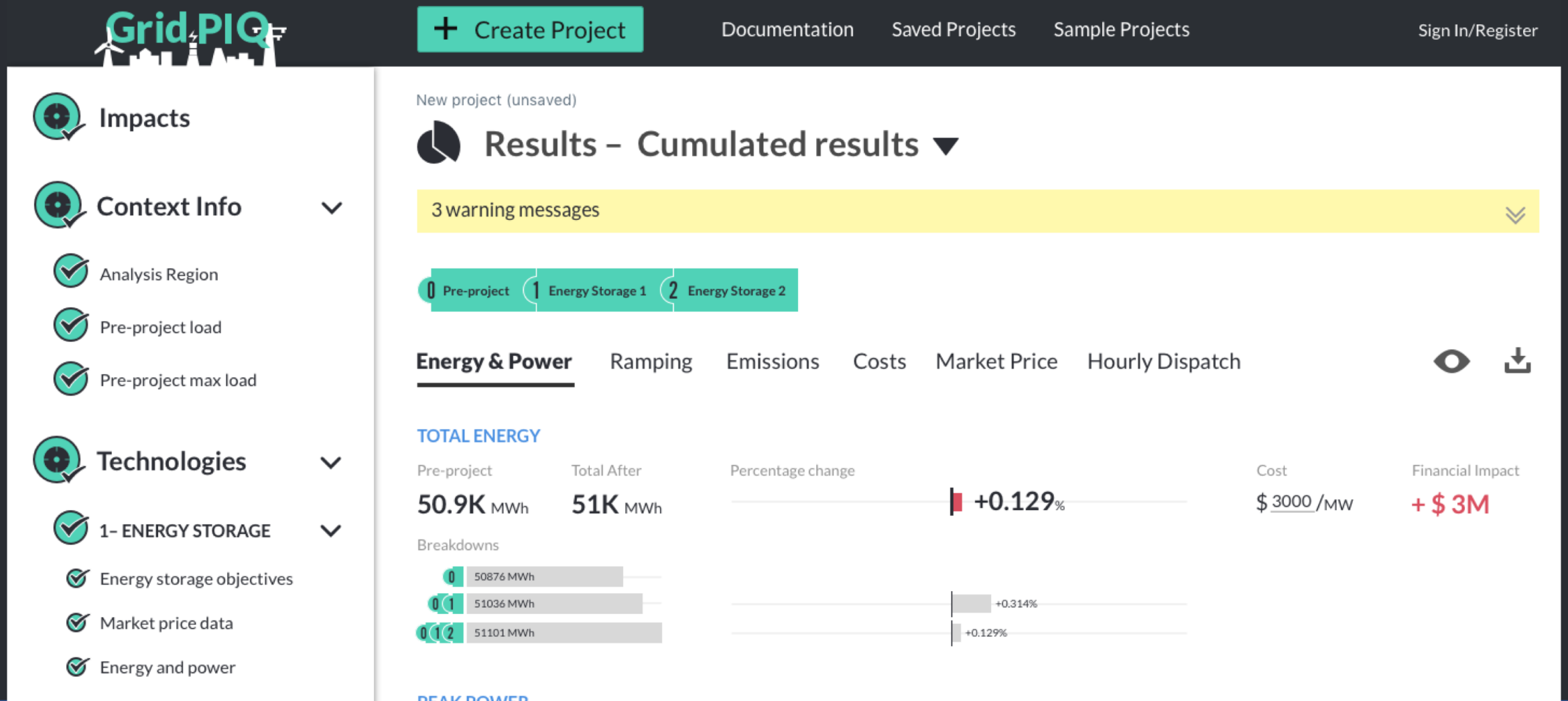
What's Next?

GridPIQ 2.0

- Enable different tech combos
- Choice of results
- Improved mobile design
- Quicker/improved Performance
- More options for customizing scenarios



GridPIQ 2.0 (continued)



Get involved!

- Contact us if you'd like to join the **GridPIQ Steering Committee. M**eet once a year to influence future development of the project, check progress, and make sure GridPIQ meets your needs.
- Use the calculator: GridPIQ.pnnl.gov
- Partner for analysis
- Incorporate your methodology or tool with GridPIQ
- News about this and other Advanced Grid Research on SmartGrid.gov
- Contact us: gridpiq@pnnl.gov, 206-528-3487

Thank you for attending our webinar

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Upcoming Webinar

State of the U.S. Energy Storage Industry: 2018 Year in Review

February 28, 2019
1:00pm — 2:30pm ET

The U.S. energy storage market experienced substantial growth in 2018. In this webinar, Dan Finn-Foley from Wood Mackenzie Power & Renewables will share insights related to recent developments in the U.S. energy storage market, including deployment trends, policy updates, and market outlook.

Read more and register at: www.cesa.org/webinars