Planning for Resilience and Hybridization

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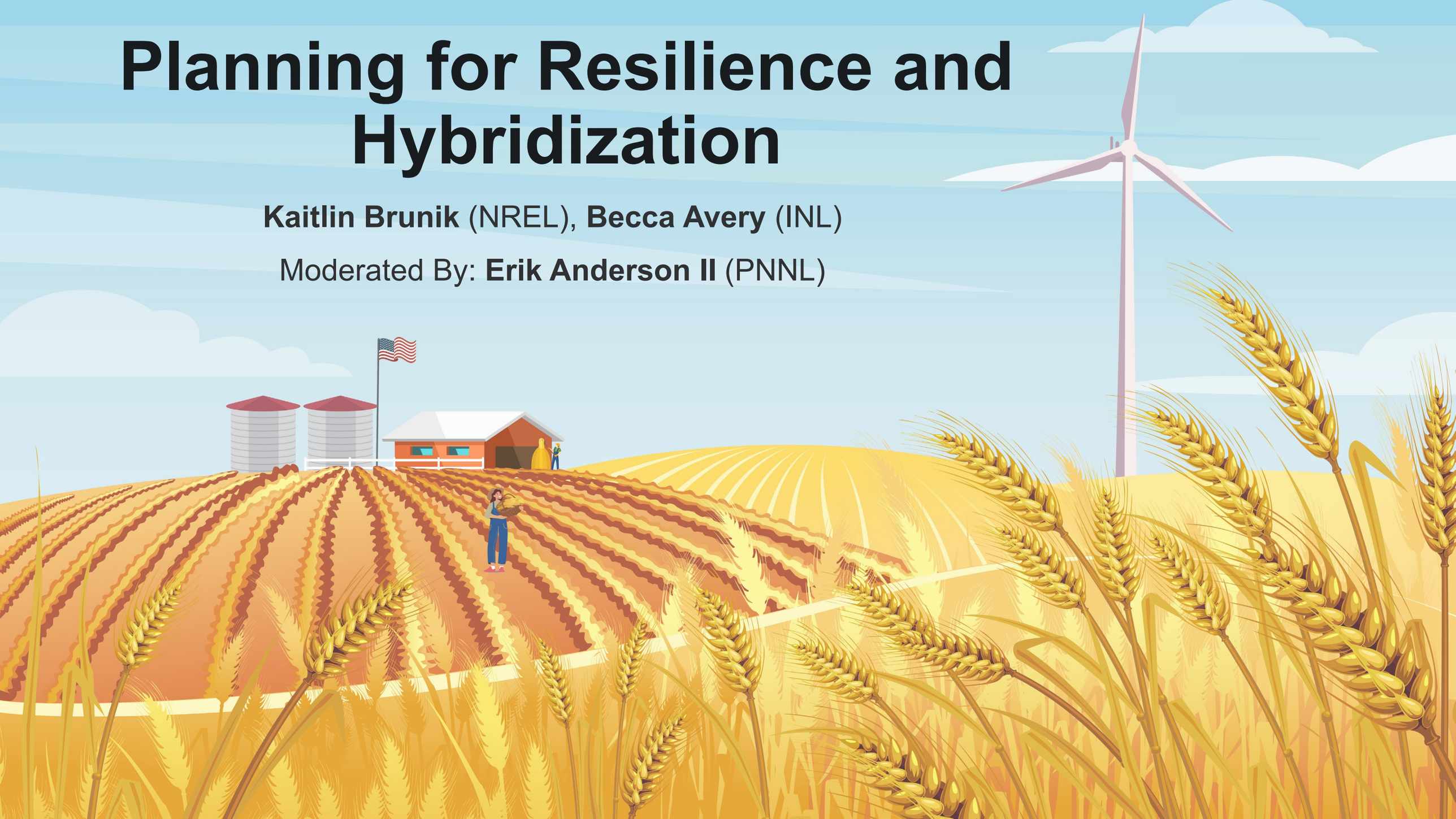
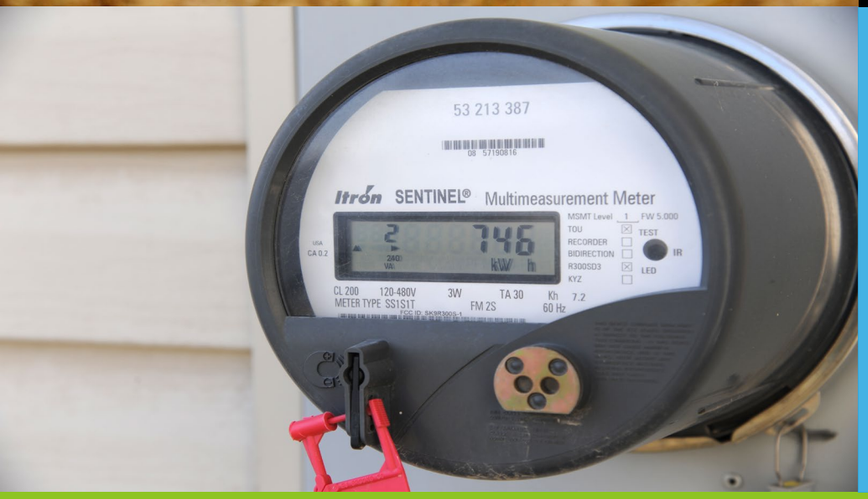
Moderated By: **Erik Anderson II** (PNNL)



HOPP: https://github.com/NREL/HOPP



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ResDEEDS Demo

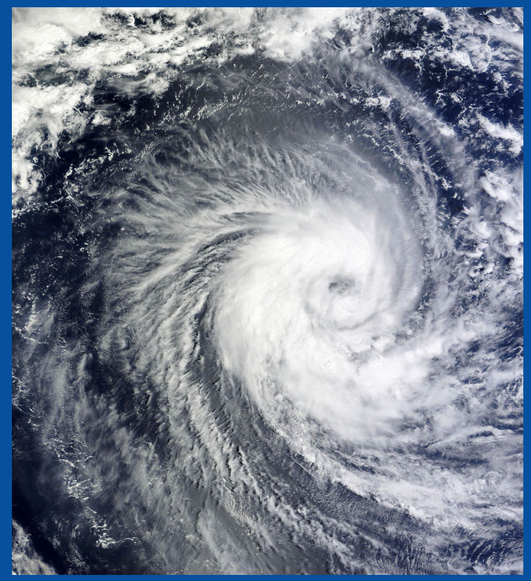
Resilience Framework for Electric Energy Delivery Systems

Battelle Energy Alliance manages INL for the
U.S. Department of Energy's Office of Nuclear Energy

Idaho National Laboratory

What is ResDEEDS?

- ***ResDEEDS is a resilience decision support tool for system planners & operators***
  - Assess different system configurations, investment decisions, or operational responses against hazards of interest
  - Get qualitative data to support decisions based on resilience
  - Built for customization and “what-if” scenarios

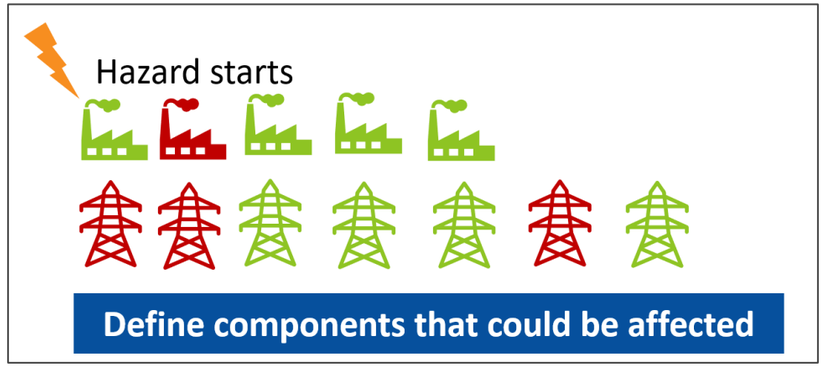


INL’s Resilience Framework Powers ResDEEDS

- Downloadable application automates the INL’s Resilience framework & enables users to:
  - Identify system components & qualities
  - Define system resilience goals & metrics.
  - Prioritize physical & cyber hazards.
  - Model a hazard.
  - Prioritize hazards and risk mitigations.
  - Evaluate the system against all business risks.
  - Implement changes & operate system under new configuration.

ResDEEDS Capabilities

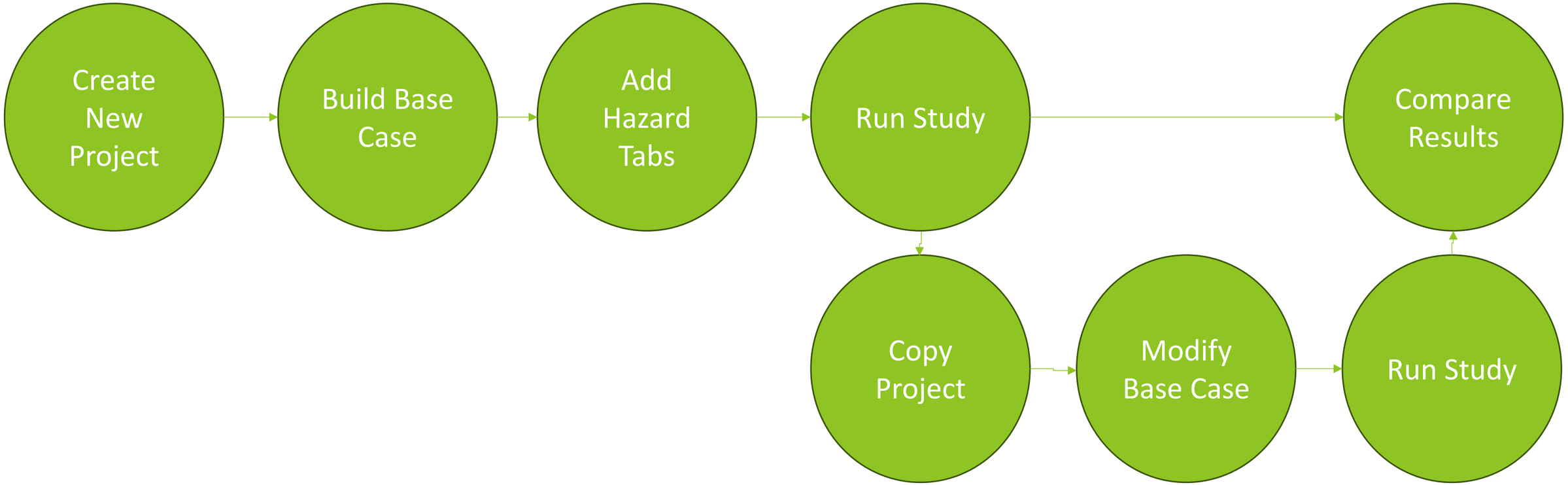
- UI allows for components to be modeled under a given hazard
  - Derated
  - Eliminated
- Predict how a hazard, such as a hurricane, winter storm, or cyberattack, might impact a system.
  - Enables simulations
    - Wind, solar, diesel generators
    - Battery storage
    - Utility interconnect
    - Various load types
  - Assess whether critical, medium, and/or low priority loads can be supported by remaining infrastructure.



Where to Download

- Releases · idaholab/ResDEEDS
- Chrome is preferred browser for Windows
- MacOS is not signed and may require admin privileges
- PyPSA Information: https://pypsa.readthedocs.io/en/stable/

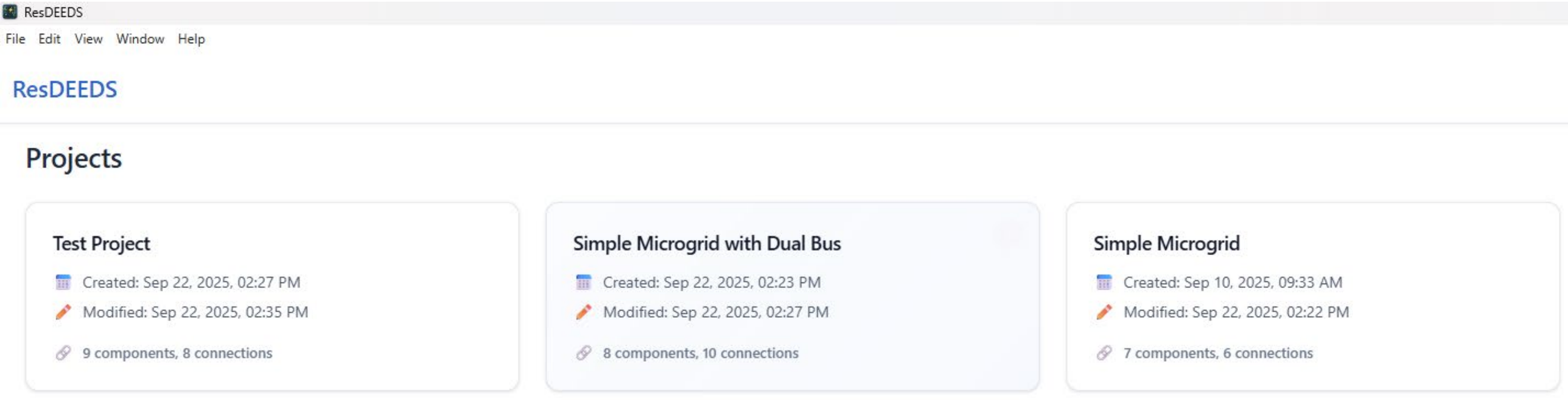
Workflow & Dashboard



ResDEEDS Demo

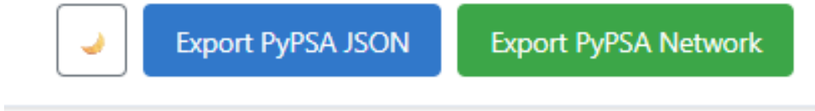
- Workflow Overview & Dashboard
- Build custom topology
- Export to PyPSA
- Create custom hazard cases
- View load support results
- Design for enhanced Resiliency

Workflow & Dashboard



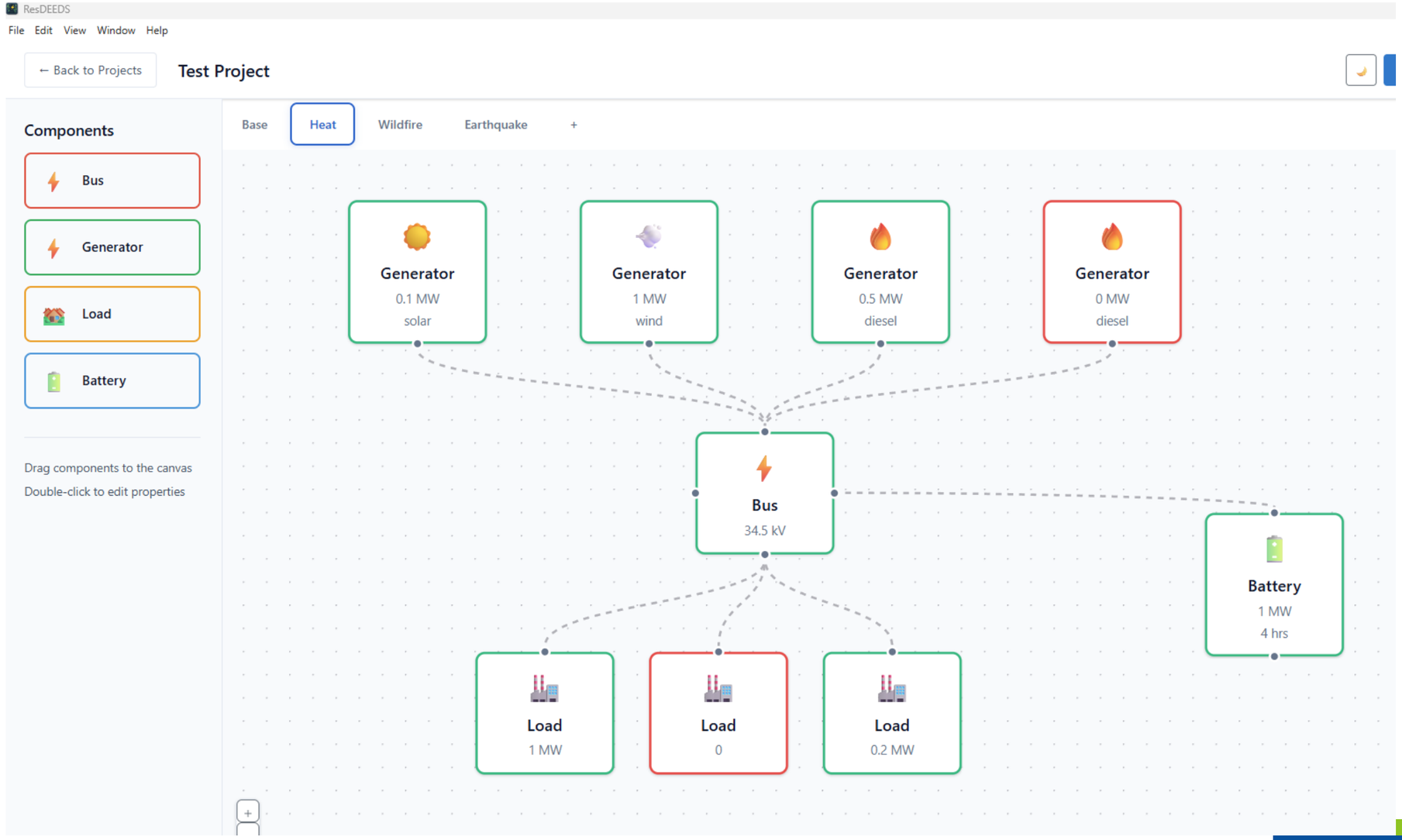
Build Custom Topology

Export to PyPSA

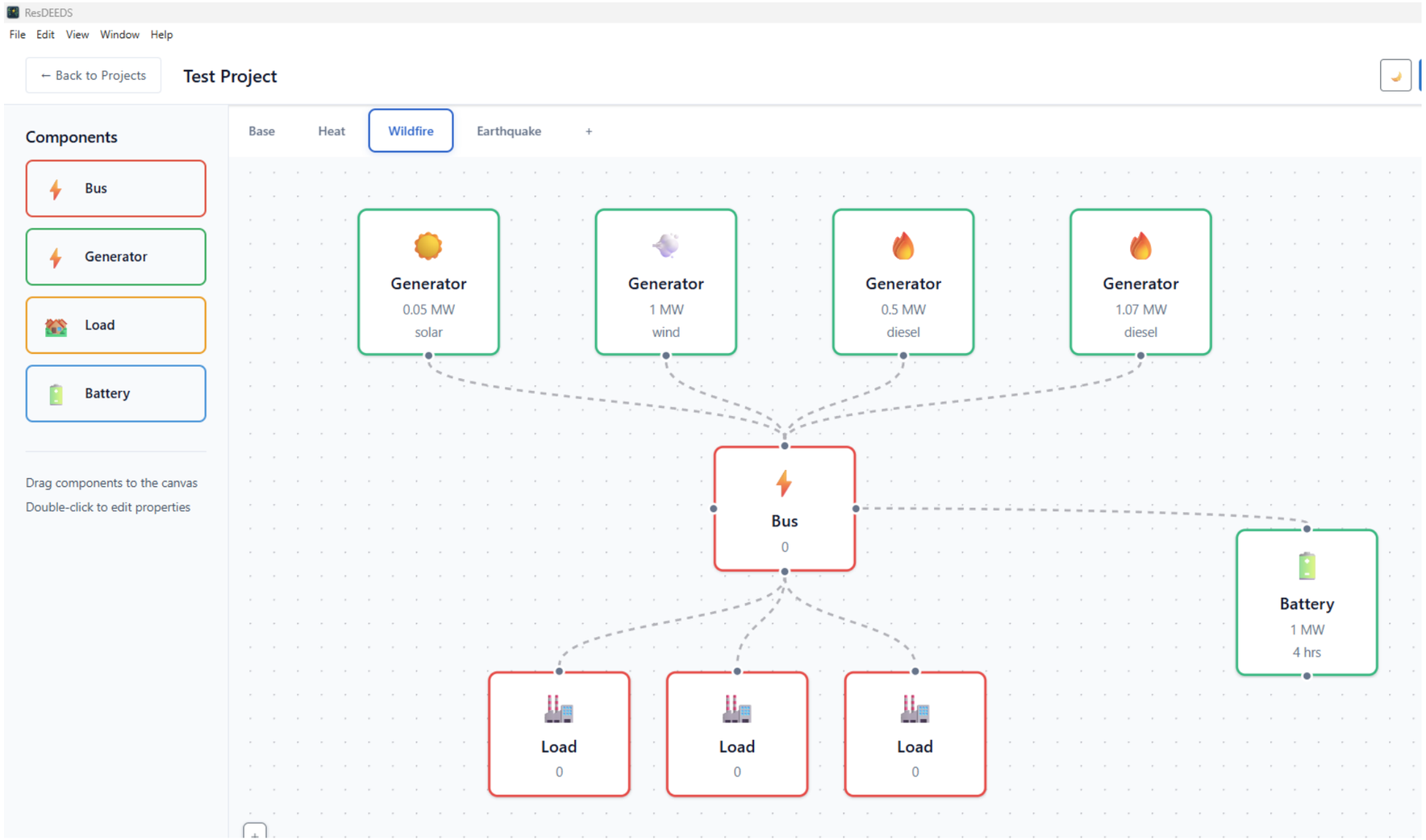


- Use buttons on top right to export files for use in PyPSA
- PyPSA is an open source power system solver
- Use to build models to send for:
  - Advanced research and technical assistance
  - Analysis by third party firms
- PyPSA can perform:
  - Optimal linear power flow
  - Cost-based generation dispatch
  - System optimization
  - Contingency analysis

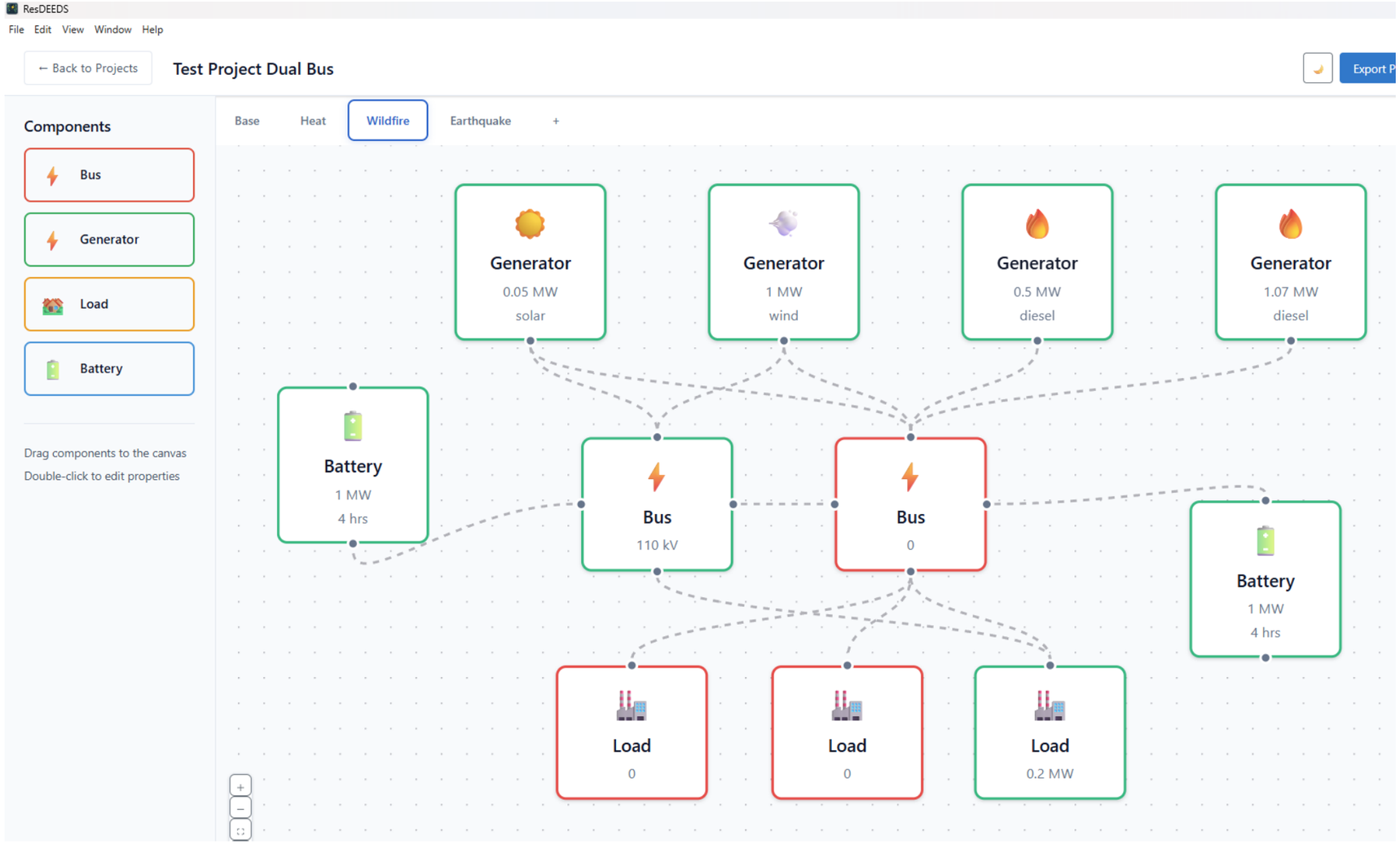
Create Custom Hazard Cases



View Load Support Results



Design for Advanced Resiliency



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Battelle Energy Alliance manages INL for the U.S. Department of Energy's Office of Nuclear Energy. INL is the nation's center for nuclear energy research and development, and also performs research in each of DOE's strategic goal areas: energy, national security, science and the environment.