

# Energy Systems Integration Facility (ESIF) – Capabilities Feedback Session

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# Introduction

## Agenda

- NREL & ESIF Overview
- ESIF Equipment & Capabilities
- Polling Questions
- Discussion and Q&A



Sarah Truitt

User Program  
Manager



Greg Martin

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Manager

**ESIF Operations Center**



# Transforming Energy through Science

NREL advances the science and engineering of **energy efficiency**, **sustainable transportation**, and **renewable power technologies** and provides the knowledge to **integrate and optimize energy systems**



# The energy landscape is in the midst of a remarkable transformation



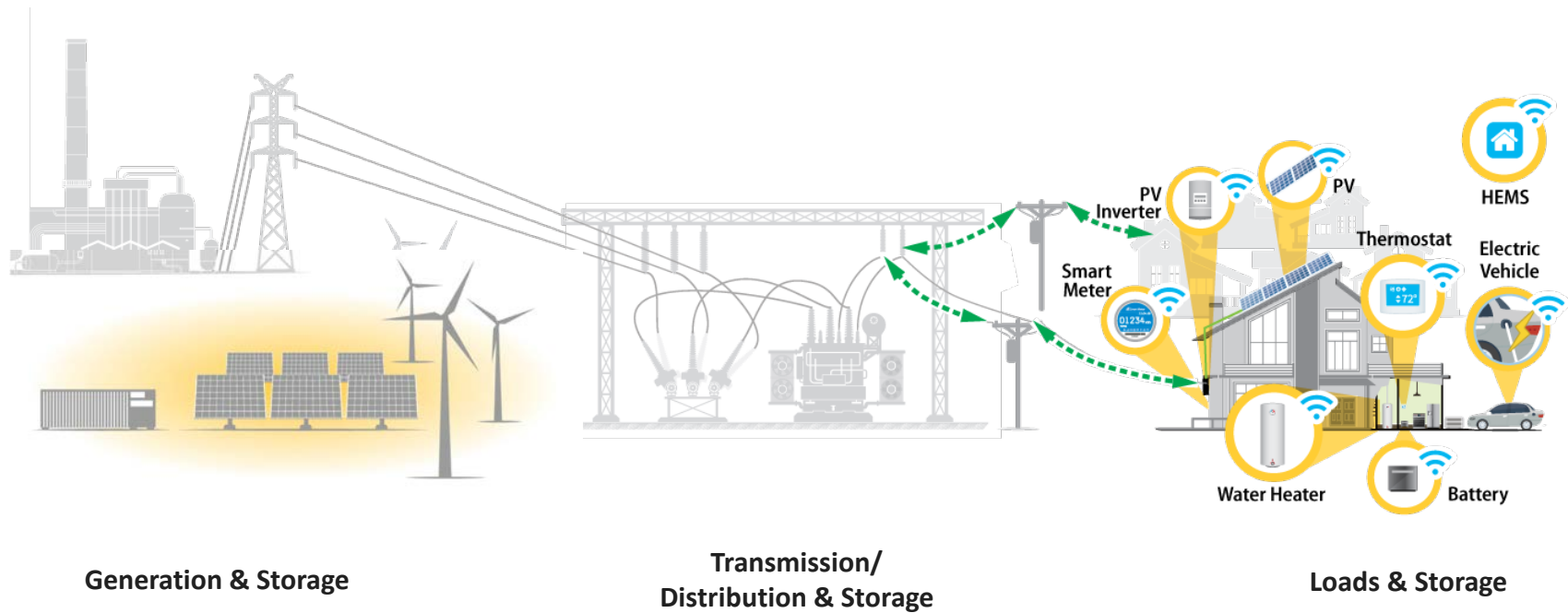
Increasing  
Consumer Choice



Declining Cost of  
Renewable Energy



More Connected  
and Distributed



The **grid edge** is transforming into a dynamic space where energy is **generated, stored, managed, and traded** in entirely new ways.



And sectors that once operated in silos, such as electricity, transportation, fuels, and buildings are **overlapping and interconnecting** with each other.



# ESIF is a critical resource in the energy systems R&D ecosystem

1

**Thought  
Leadership**

2

**Cutting-edge  
Research**

3

**Data &  
Modeling  
Tools**

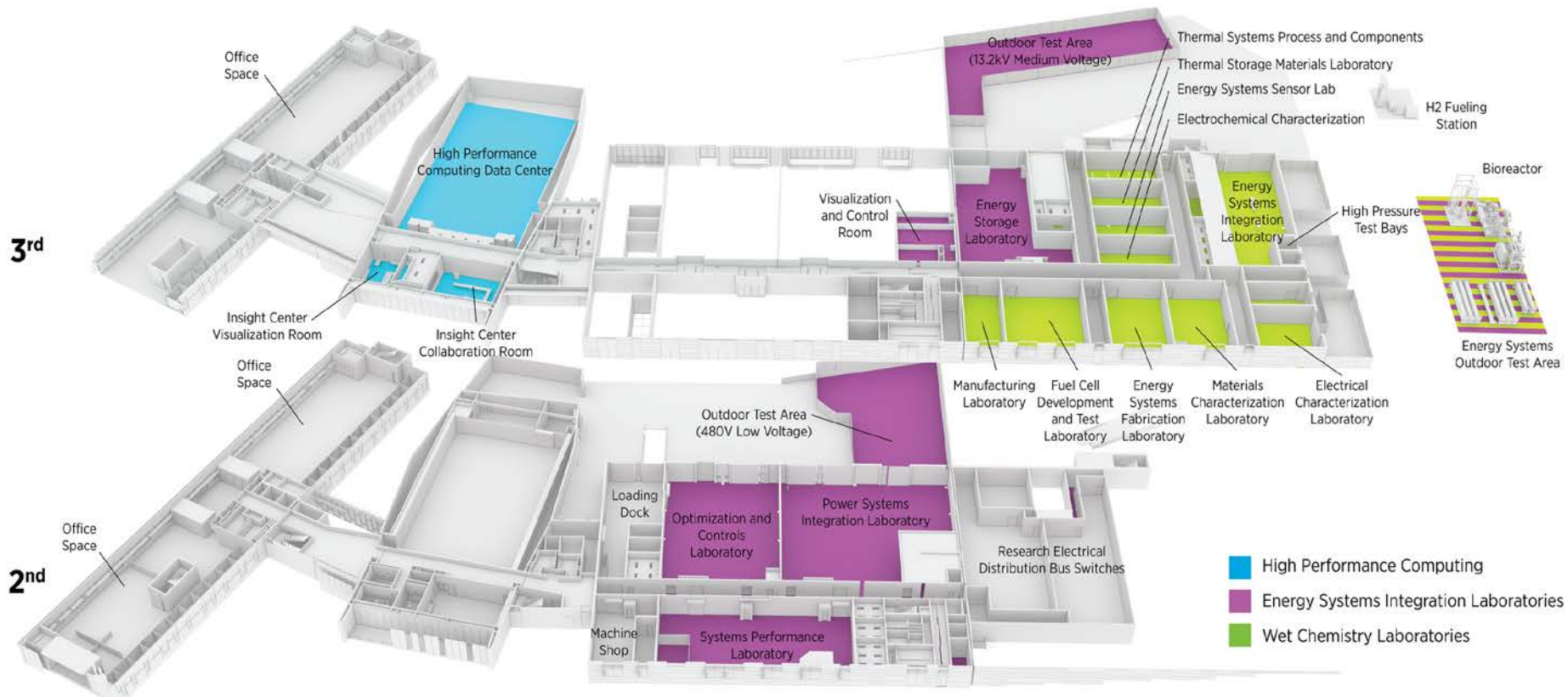
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**Scientific &  
Engineering  
Expertise**

5

**World-class  
Computing &  
Laboratory  
Facilities**

# ESIF: Building Overview







The ESIF is open to the research community to conduct mission-aligned R&D.



An aerial photograph of an industrial or utility site. In the upper left, a large, modern building with a mix of grey and tan panels is visible. To its right, a fenced-in area contains several large white storage tanks and electrical equipment. In the foreground, a paved parking lot is filled with several small cars, including two red ones and a blue one. The background shows a grassy hillside and distant mountains under a clear blue sky.

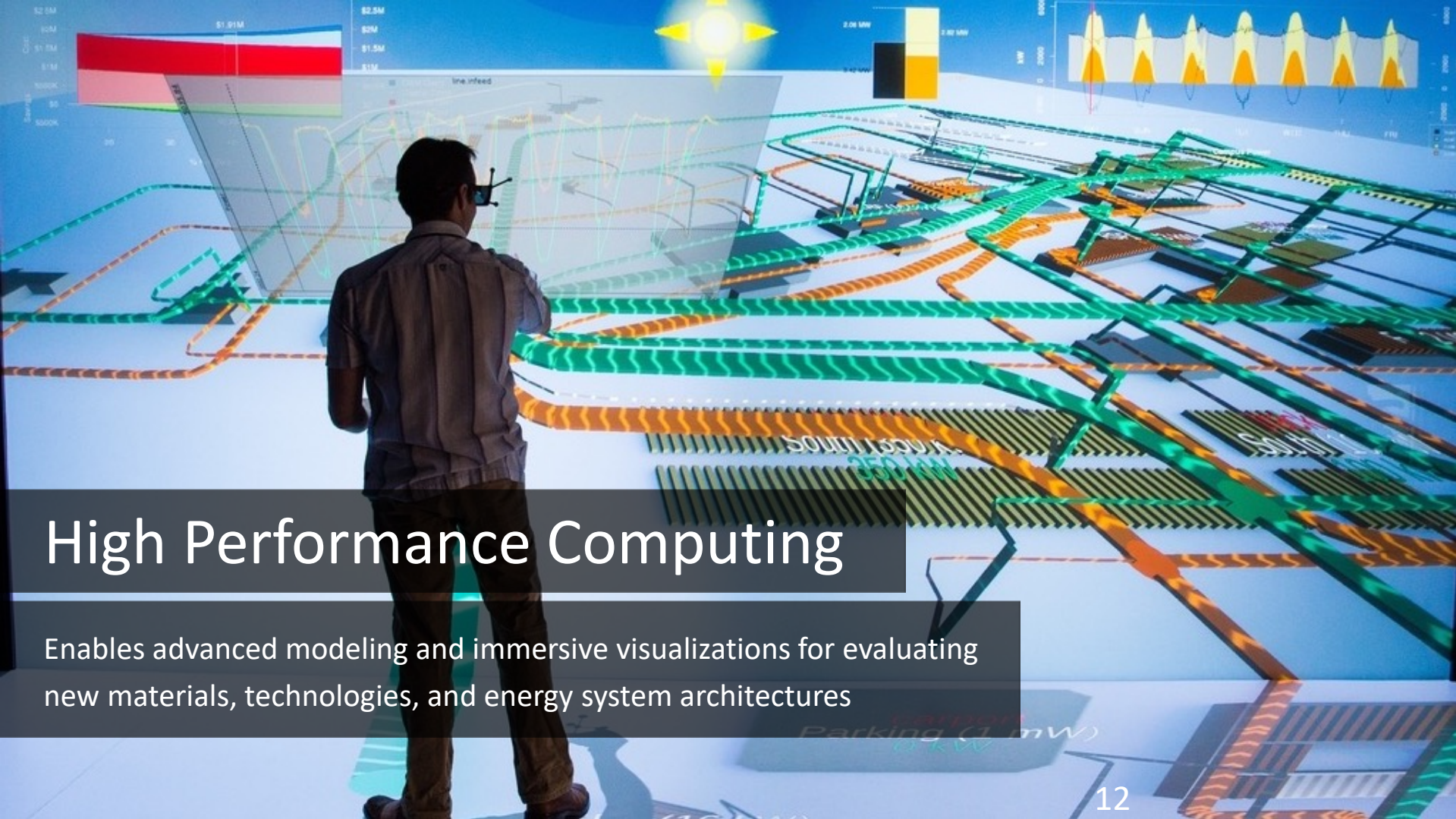
# ESIF Capabilities and Projects



## Microgrid Research for Utility & Community-Scale Applications

NREL is simulating microgrid control at a scale that matters for communities and utilities. Through multi megawatt grid simulation and analysis, NREL will deliver technical and economic insight about large microgrid deployment.

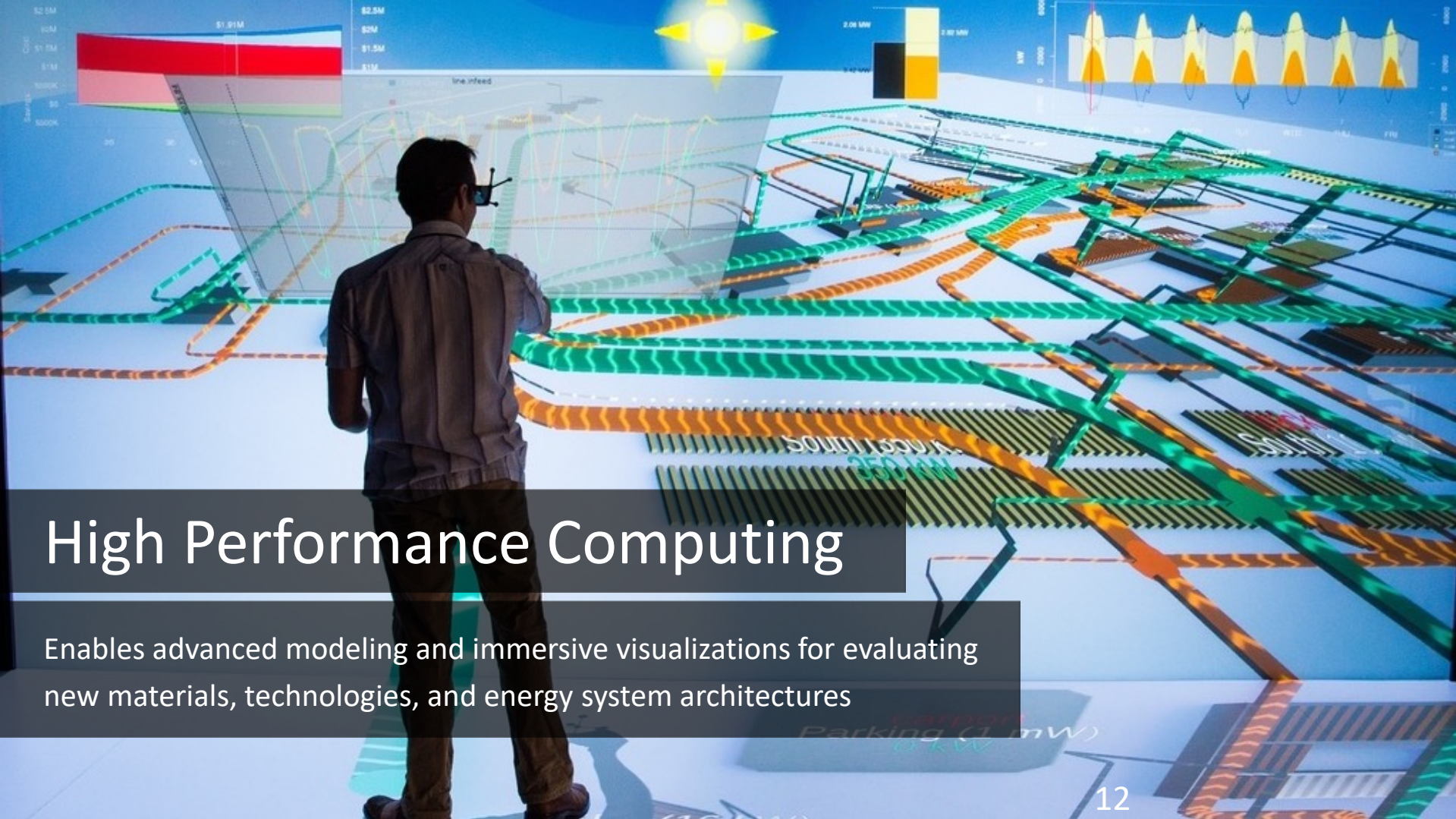




# High Performance Computing

Enables advanced modeling and immersive visualizations for evaluating new materials, technologies, and energy system architectures

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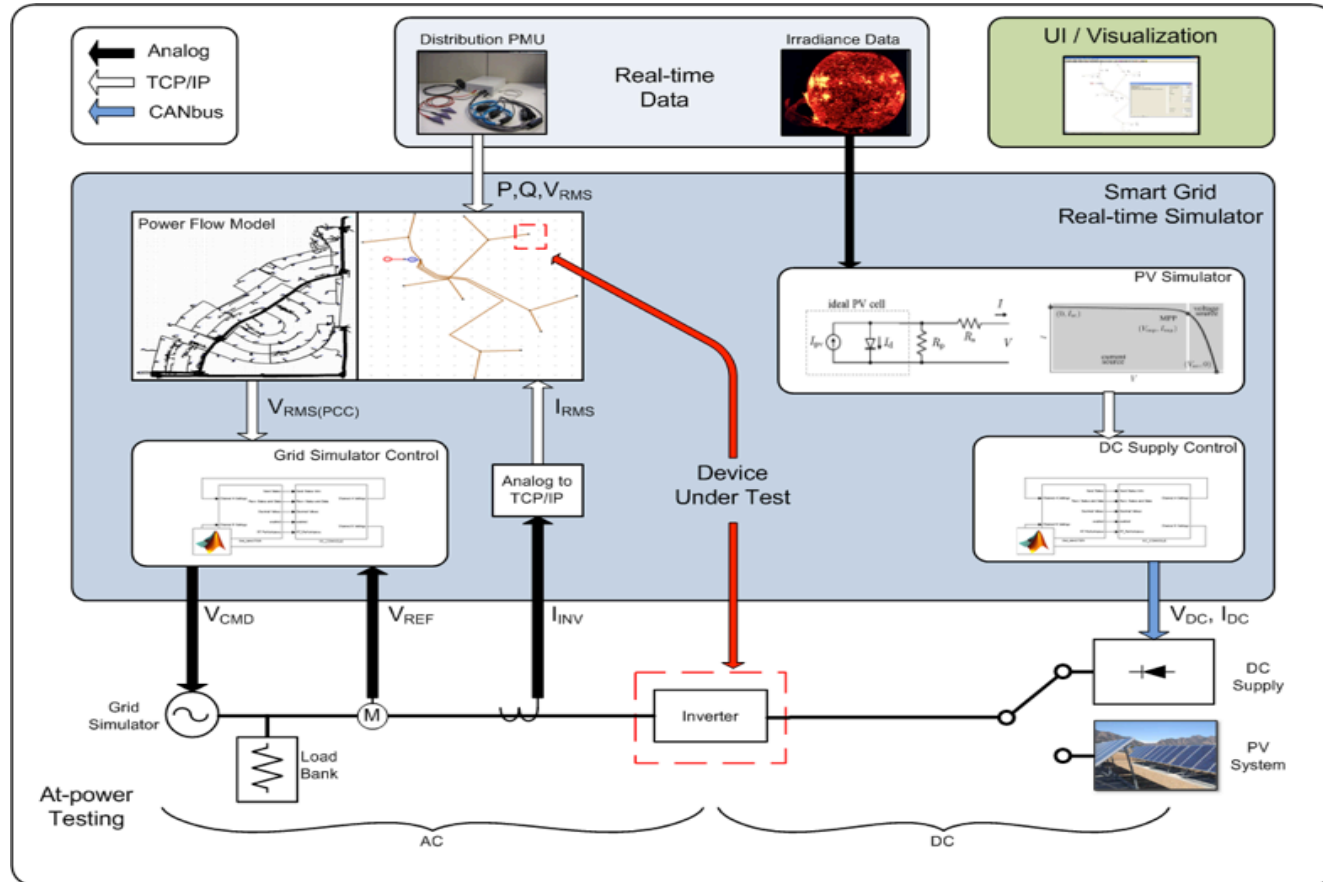


# High Performance Computing

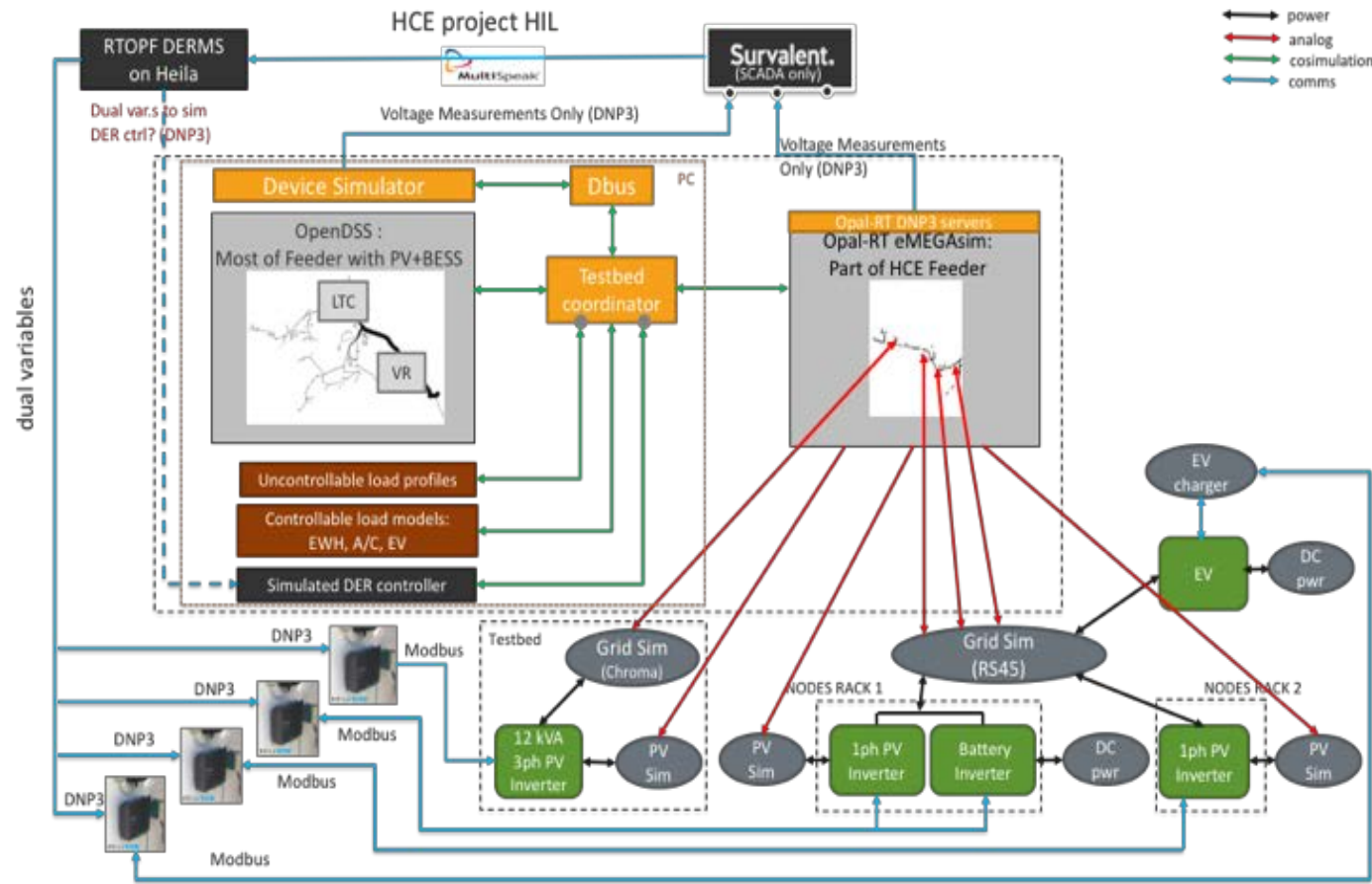
Enables advanced modeling and immersive visualizations for evaluating new materials, technologies, and energy system architectures

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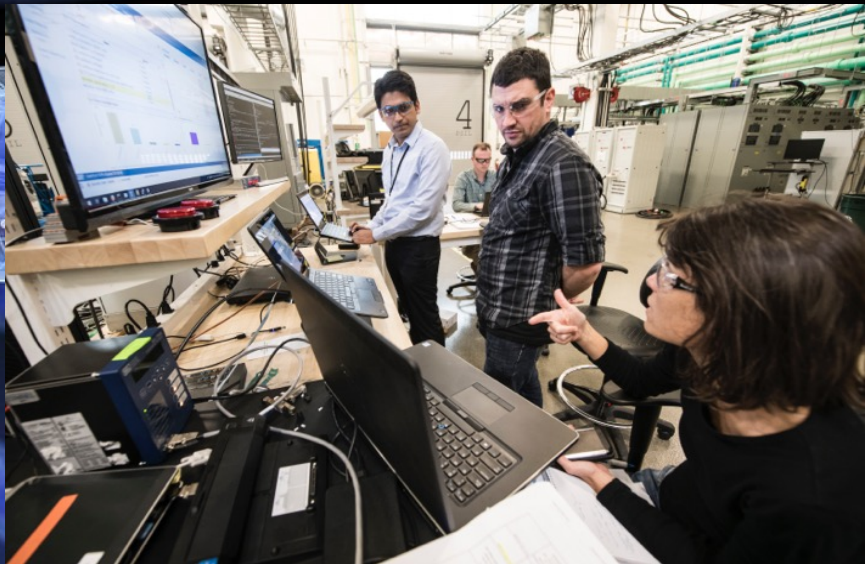
# Power-Hardware-In-The-Loop (PHIL)



# Advanced Distribution Management System (ADMS) Testbed







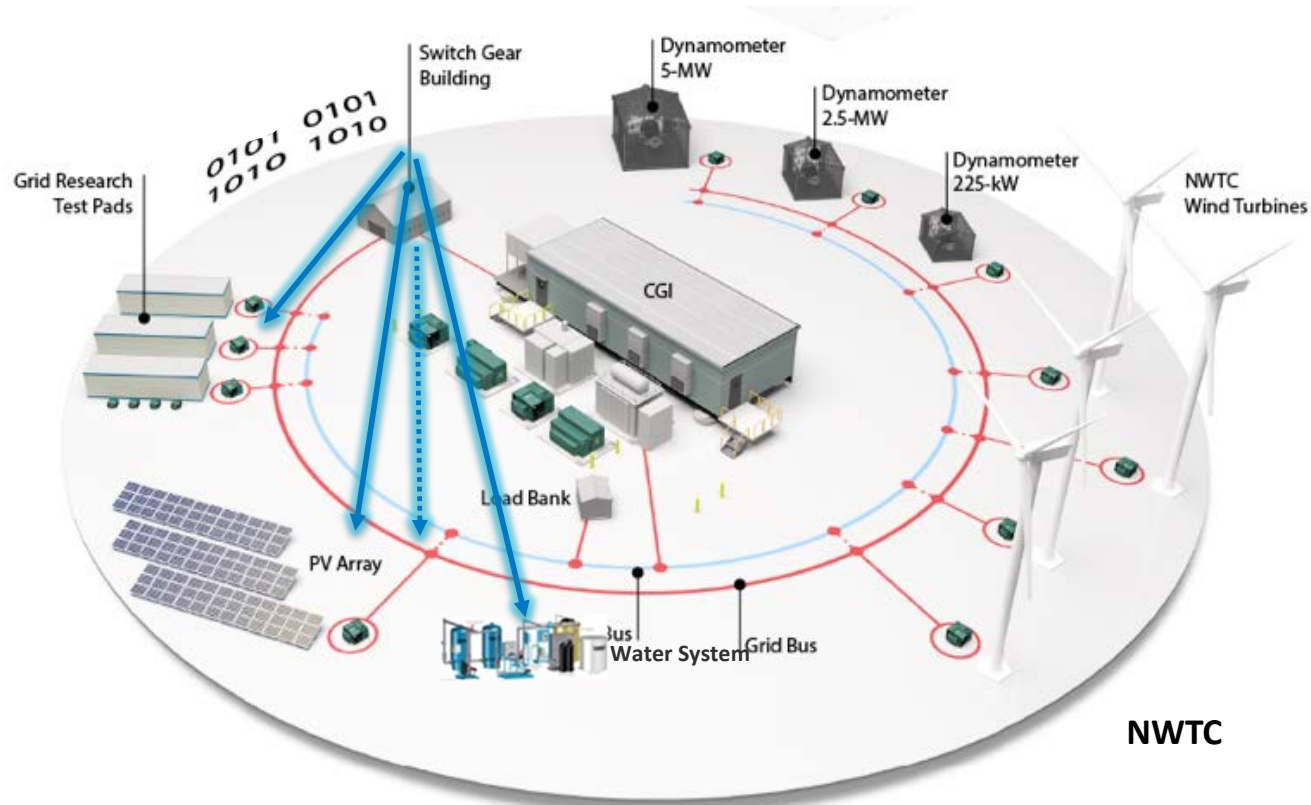
# Security And Resiliency Research

NREL is conducting research to identify, detect, design against, and respond to today's biggest threats to make a more resilient energy grid.



# Expansion to Link with NREL's National Wind Technology Center (NWTC)

Increasing R&D capabilities to include multi MW, substation – level voltages





# Polling Questions

ESIF  
15257  
Energy Systems  
Integration Facility



# Question #1

- Please rate the level of impact you expect **electrification of the transportation sector** to have on your organization over the next decade.
  - ☐ Not Significant
  - ☐ Slightly Significant
  - ☐ Significant
  - ☐ Critical

## Question #2

- Please rate the level of impact you expect **thousands of connected devices at the grid edge (appliances, vehicles, etc.)** to have on your organization over the next decade.
  - ☐ Not Significant
  - ☐ Slightly Significant
  - ☐ Significant
  - ☐ Critical

## Question #3

- Please rate the level of impact you expect **energy storage** to have on your organization over the next decade.
  - ☐ Not Significant
  - ☐ Slightly Significant
  - ☐ Significant
  - ☐ Critical



## Question #4

- Please rate the level of impact you expect **grid cybersecurity** to have on your organization over the next decade.
  - ☐ Not Significant
  - ☐ Slightly Significant
  - ☐ Significant
  - ☐ Critical

## Question #5

- Please rate the importance of ESIF providing **early stage R&D on new materials, chemistries, and grid architectures.**
  - ☐ Not Important
  - ☐ Slightly Important
  - ☐ Important
  - ☐ Critical

## Question #6

- Please rate the importance of ESIF providing **research-ready facilities for R&D done independently (support limited to set up/take down and oversight)**.
  - ☐ Not Important
  - ☐ Slightly Important
  - ☐ Important
  - ☐ Critical



## Question #7

- Please rate the importance of ESIF providing **expertise to help your organization develop Intellectual Property.**
  - ☐ Not Important
  - ☐ Slightly Important
  - ☐ Important
  - ☐ Critical

## Question #8

- Please rate the importance of ESIF providing **publicly available data sets and modeling tools**.
  - ☐ Not Important
  - ☐ Slightly Important
  - ☐ Important
  - ☐ Critical

## Question #9

- Please rate the importance of ESIF providing **supercomputing resources to the research community**.
  - ☐ Not Important
  - ☐ Slightly Important
  - ☐ Important
  - ☐ Critical



## Question #10

- Please rate the importance of ESIF providing **3D data visualization resources**.
  - ☐ Not Important
  - ☐ Slightly Important
  - ☐ Important
  - ☐ Critical

# Question #11

- What types of research capabilities are most applicable to your organization? Choose all that apply.

- ☐ Vehicle to Grid (V2G)
- ☐ Extreme Fast Charging (EVs)
- ☐ Building Controls & Technologies- residential
- ☐ Building Controls & Technologies- commercial
- ☐ Energy Storage
- ☐ Cybersecurity

- ☐ Power Electronics- low voltage
- ☐ Power Electronics - medium voltage
- ☐ Power Hardware-in-the-Loop (PHIL)
- ☐ Microgrid Controllers
- ☐ ADMS/DER Management System
- ☐ Other

## Question #12

- Please select the following that best describes your organization type.
  - ☐ Manufacturing
  - ☐ Engineering, Procurement, Construction
  - ☐ Academia / Private Research Organization
  - ☐ Government / National Laboratory
  - ☐ Utility
  - ☐ Consulting
  - ☐ Other





The ESIF is a [U.S. Department of Energy User Facility](#) located at the National Renewable Energy Laboratory

# Thank you!

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[www.nrel.gov](http://www.nrel.gov)

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