

# ENERGY SYSTEMS INTEGRATION



ESI optimizes the design and performance of electrical, thermal, fuel, and water pathways at all scales.

## ADMS Evaluation Platform

Deploying an ADMS or looking to optimize its value? NREL offers a low-cost, low-risk evaluation platform for assessing ADMS performance.

The National Renewable Energy Laboratory (NREL) and the U.S. Department of Energy’s Office of Electricity Delivery & Energy Reliability have developed a vendor-neutral advanced distribution management system (ADMS) evaluation platform and is expanding its capabilities. The platform uses actual grid-scale hardware, large-scale distribution system models, and advanced visualization to simulate real-world conditions for the most accurate ADMS evaluation and experimentation.

We are looking to partner with utilities that have deployed or are deploying an ADMS. The goal is to help optimize the value of the utility’s ADMS by using its features to solve complex grid control challenges, reduce costs, and improve reliability.

### Examples of the types of questions the ADMS evaluation platform can answer:

“What is the best approach to maximizing volt/VAR optimization (VVO) performance when the ADMS needs to interact with legacy voltage control equipment, smart inverters, storage assets, grid-edge devices, and distributed energy resource management systems (DERMS)/microgrids?”

“What are the settings for maximizing the effectiveness of the ADMS fault location, isolation, and service restoration (FLISR) application if the feeder load level consistently exceeds 50%?”

“Can downstream battery energy storage systems (BESS) be used to shorten the length of customer outages?”

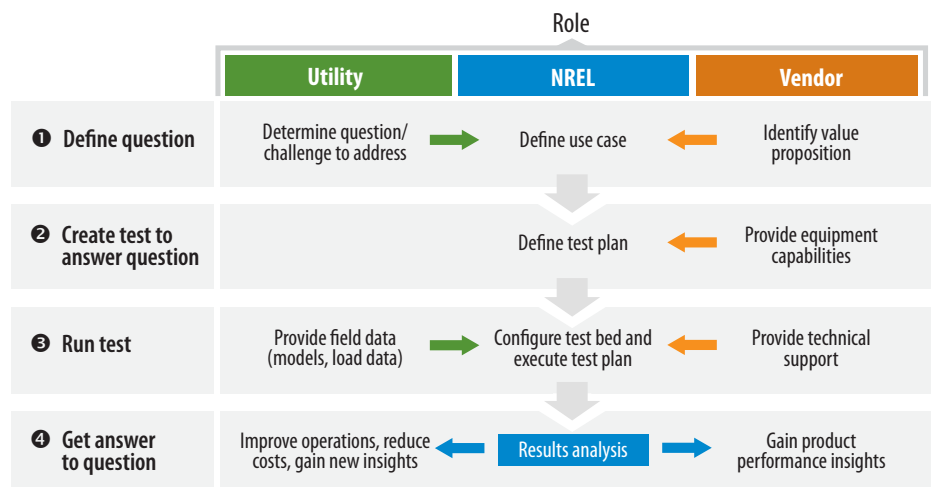
“How many new telemetry points should be added to ensure complete observability for the ADMS online power flow application for feeders with high photovoltaic (PV) penetrations?”

“Is the ADMS power flow capable of capturing scenarios when there is a loss of rooftop PV systems?”

“How can a utility participate in markets most effectively to maximize additional revenue while meeting other constraints?”

### Process

NREL’s ADMS evaluation platform takes a collaborative approach, involving the utility, the vendor, and NREL. The utility identifies the operational question it would like answered, including any specific performance objectives and metrics, and provides the necessary data. Generally, no utility personnel are required to execute the research. The figure to the right is a high-level outline of the process.



# Overview of NREL's ADMS Evaluation Platform

Following are the core capabilities that enable this advanced research:

## Multiscale Simulation

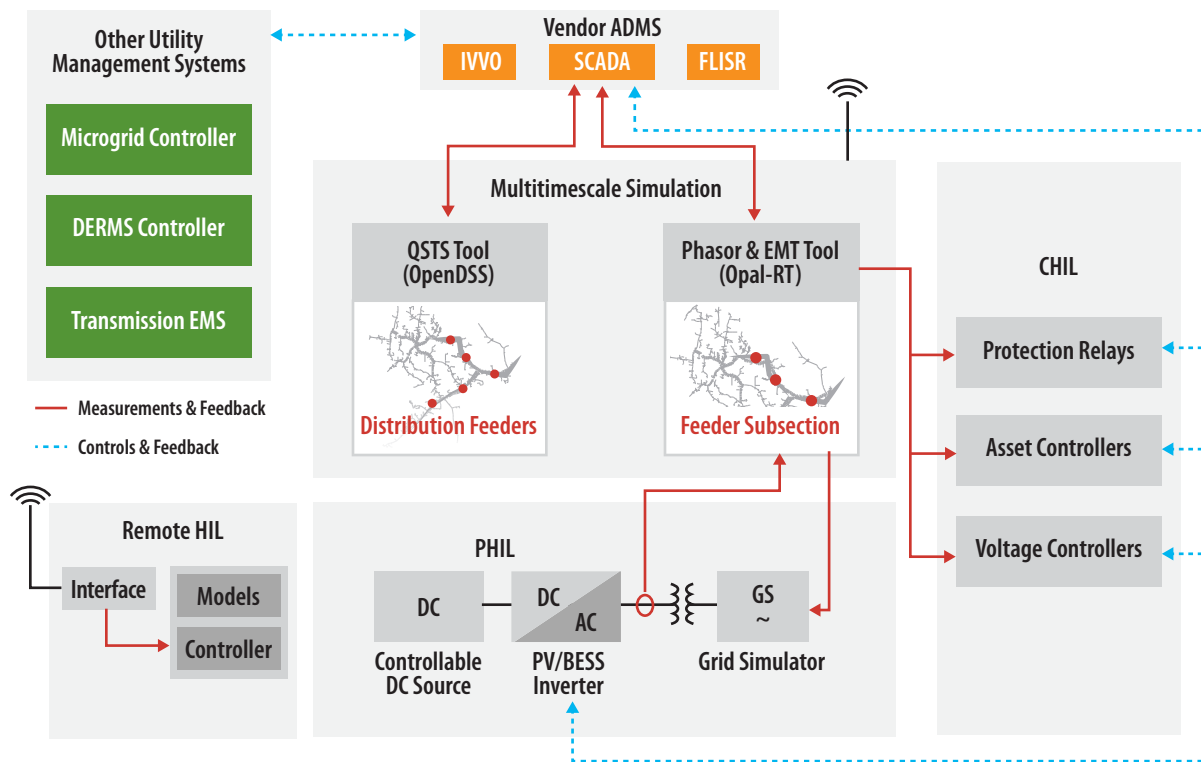
The multiscale simulation environment will act as the real distribution system on which the ADMS operates. The simulation environment is capable of performing quasi-steady-state simulations, phasor-domain simulations, and electromagnetic transient simulation studies.

## Controller Hardware-in-the-Loop

Controller hardware-in-the-loop (CHIL) makes it possible to evaluate controller hardware when testing at actual scale or power levels is not required or possible.

## Power Hardware-in-the-Loop

Power hardware-in-the-loop (PHIL) links actual power system equipment such as PV and BESS inverters, grid-edge devices, and legacy utility control and automation equipment to a lab-simulated utility environment. With PHIL, researchers can test how equipment interacts with the ADMS at scale and validate software models.



## Getting Started

Each ADMS project has unique objectives and challenges. We want to hear about yours. Contact **Martha Symko-Davies**, Laboratory Program Manager for Energy Systems Integration, [Martha.Symko.Davies@nrel.gov](mailto:Martha.Symko.Davies@nrel.gov), at NREL for more information.