

## Grid IMPACT

### Grid Infrastructure and Modernization to Propel a Clean Energy Transition



*Develop the Capabilities Now to Provide a Grid that Enables Society's Future*

#### PROJECT HIGHLIGHTS

- Maximize utilization of existing T&D infrastructure and capital deployment
- Optimize grid investment across supply, delivery, and grid edge
- Enable advanced grid operations, control, protection, and data security

#### Background, Objectives, and New Learnings

A decarbonized energy system requires a resilient and adaptable power grid to electrify expanding end uses in transportation, space heating, and others while serving the exploding AI economy. The grid must also enable higher levels of renewable and distributed resources as society depends more on electricity. The energy must be delivered reliably and resiliently, even as extreme weather and other hazards increase.

Utilities, regulators, and policymakers need scientifically grounded tools and insights to optimally expand existing grid infrastructure and capabilities to enable decarbonization while ensuring energy affordability. EPRI's *Grid IMPACT* initiative is a broad industry collaborative aimed to generate strategic grid capabilities through extensive research to identify and address the key challenges in grid decarbonization.

The new learnings from *Grid IMPACT* is expected to inform new asset and system designs, identify new planning frameworks, specify new operating practices and decision support methods, and conduct field demonstrations, benefitting system operators, planners, as well as the public and utility industry at large. More specifically, *Grid IMPACT* aims to provide tools to support:

1. Developing T&D infrastructure to meet the unprecedented scale of electric demand,
2. Optimally planning investments across the electric enterprise considering broader energy systems, and
3. Operating the resulting grid to meet all objectives including reliability, resiliency, affordability, safety, and equity.

#### Benefits

This research may benefit the public by increasing reliability and the adoption of clean energy while maintaining affordability and flexibility due to the ability to "right-size" energy delivery infrastructure for future needs.

Funders of this research are expected to benefit from the planning, operation, and system/asset design tools that will inform near-term decisions.

## Project Approach and Expected Outcomes

The project includes 3 workstreams addressing strategic research gaps (SRG) identified by utility executives. The scope of proposed deliverables and outcomes is extensive and summarized below with each workstream.



**SRG1: Energy Delivery at Scale** maximizes the capabilities and utilization of existing infrastructure while optimally deploying new grid infrastructure, designs, and architectures.

- Optimized T&D asset maintenance, replacement, and life extension tools
- Modernized T&D designs and architectures
- Long-term, multi-objective distribution planning tools to optimize modernization and new build



**SRG2: Integrated Energy System Planning** enables cost-effective and reliable long-term resource investment decisions across supply, delivery, and grid edge resources considering broader energy system interactions and operational capabilities.

- Integrated energy system planning toolbox and implementation guidelines
- Risk-based, integrated planning metrics and uncertainty management methods and tools
- Standardized, intelligent scenario generation and optimization framework



**SRG3: Resilient and Flexible Grid Operations** equips control room operators with the data, controls, and tools to operate a highly

variable, distributed, and inverter-based system reliably and resiliently while minimizing cost to customers.

- Integrated control paradigm to optimally provide grid services from resources T&D and grid edge
- Modeling framework and architecture for control center tools and applications
- Operator visibility, decision support, and analytical tools to provide flexibility and stability

Related outcomes will be pursued through coordinated efforts in EPRI's annual research portfolio and "Affiliated" government-funded projects and coordinated efforts of other researchers. These "Affiliated" project outcomes will be coordinated with the *Grid IMPACT* initiative and participants. Affiliated outcomes include:

*SRG1: Energy Delivery at Scale*

- Dist. asset standardization to mitigate supply chain issues and reduce costs

- Asset degradation and related inspection methods
- Transmission planning tools to integrate new technologies

*SRG2: Integrated Energy System Planning*

- Coordinated electric/gas/H<sub>2</sub>/water planning toolbox
- Algorithms to improve computational efficiency

*SRG 3: Resilient and Flexible Grid Operations*

- Interoperable inverter resource control specification
- Advanced communication and protection methods

## Price of Project

Pricing is based on the higher of a participant's annual distribution throughput (TWh) or peak transmission (GW) metric. This project qualifies for self-directed (SDF).

Tier	Metric	Price
Large Utility	> 15 TWh T or >75 TWh D	\$1.25M (\$250k/yr.)
Medium Utility	15 TWh > T > 10 TWh or 75 TWh > D > 30 TWh	\$1.0M (\$200k/yr.)
Small Utility	< 10 TWh T or <30 TWh D	\$750k (\$150k/yr.)
Alternate	No metric	\$750k (\$150k/yr.)

## Project Status and Schedule

*Grid IMPACT* is a 5-year initiative planned to begin in 2025 and be completed by end of 2029. A minimum of 10 participants is required to begin work; participant prioritized outcomes will be completed first until full project participation is achieved.

## Who Should Join

*Grid IMPACT* will deliver the most value to electric delivery utilities, energy system operators, and other electric grid stakeholders.

## Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 ([askepri@epri.com](mailto:askepri@epri.com)).

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