

Space and Digital Transformation for Green Energy Utilities - EPRI and ESA Collaboration

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EPRI's Mission

Advancing **safe, reliable, affordable and environmentally responsible** electricity for society through global collaboration, thought leadership, and science & technology innovation.

- Independent
- Non-Profit
- Collaborative



Nuclear



Environment



Generation



Power Delivery
and Utilization

EPRI Research Priorities for the Green Energy Transition



Near-term

Near-term

Mitigation (low-carbon future)

- Advance an interconnected grid
- Clean energy resources:
Generation and storage
 - Grid modernization to enable efficient electrification
 - Transmission

Long-term

- Create clean molecules from clean electrons
- Hydrogen
 - Ammonia
 - Synthetic methane

Digital Transformation

- Preserve affordability through the digital energy technology
- Resilient communications
 - Sensors, communications, and AI
 - Smart maintenance and diagnostics

Adaptation (grid resilience)

- Mitigate climate impacts and cyber/physical risks
- Grid modernization
 - System hardening
 - Cybersecurity
 - Microgrids

Long-term

- Change grid design basis for new weather normal
- Undergrounding
 - Resilient T&D system

Making Energy More

Clean

Affordable

Reliable

Collaboration to Accelerate Innovation

Universities



Government



European
Commission

Horizon 2020
European Union funding
for Research & Innovation



Innovate
UK



USAID
FROM THE AMERICAN PEOPLE

USTDA
U.S. TRADE AND DEVELOPMENT AGENCY



Industry



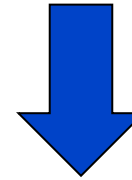
Founding System
Operators



ESA Energy Priority Topics -

1. Renewable Energy – Net Positive
2. Small-Scale Renewable Generation
3. Electric Mobility Planning
4. Circularity and Decommissioning
5. Green Hydrogen & Alternative Energy Carriers
6. Ensuring Energy Supply Security
7. Decarbonization
8. Energy Asset Operation & Maintenance Technology

- Satellite communications
- Geopositioning
- Satellite Data



- Advanced Communications
- GIS
- Digital Twins
- Artificial Intelligence
- ...

Example Use Cases

- Smart Grid communications and control
- Resilience of grid and communications infrastructure
- Grid and asset monitoring
- Tracking vulnerability to disturbances
- Wildfire risk assessment
- Restoration support
- Load and EV forecasting
- Flexibility resources coordination
- DER integration
- Renewables forecasting and management
- Geomagnetic disturbance prediction and response management
- Circular economy – digital twins and energy models

EPRI research roadmap –
close alignment with ESA Priority topics in Energy



Leveraging space applications for advancing environmentally responsible innovation in the electricity sector

A collaboration between EPRI and the European Space Agency (ESA)

There is a wealth of knowledge and technology in the space sector with potential applications that cut across many aspects of the energy system from power generation, to electric grid design and maintenance, real time control and forecasting, and efficient energy use. Many of these applications are becoming more critical because climate change is challenging the resilience of the electric system and electrification objectives provide opportunities to optimise new investments. Historically, the space sector has been a leader in non-carbon power generation as it was necessary for sustaining life during space missions. For instance, the successful employment of solar panels on spacecrafts precedes their use on homes by about 15 years [1]. Similarly, decades of knowledge about prioritizing energy conservation in space is transferrable to the current quests for energy efficiency on Earth [2].

The Electric Power Research Institute and EPRI Europe DAC (collectively, EPRI) and the European Space Agency (ESA) have signed a Memorandum of Intent to investigate space applications for advancing environmentally responsible innovation in the electricity sector. Specifically, ESA has expertise in space assets and their applications which are considered essential to future electricity systems. This collaboration between ESA and EPRI will actively pursue pre-operational solutions from space technology in the energy sector and help deepen knowledge across the two organisations.

[1] John Perlin. *From Space to Earth: The Story of Solar Electricity*. United Kingdom 1999.

[2] ESA, "Space Energy. How space technology can help us on Earth." [Online]. Available: http://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/Energy/Space_Energy_How_space_technology_can_help_us_on_Earth

EPRI engages with a wide variety of research organisations, academic institutions, industry organisations, and other groups to coordinate research activities, support technology transfer, and work to apply research results. These collaborative engagements enable EPRI research to keep pace with the rapidly changing energy industry. Each engagement provides EPRI with insights into unique industry challenges and pathways to solutions. This brief aims to highlight the potential value this engagement can bring to EPRI, EPRI members, and society.

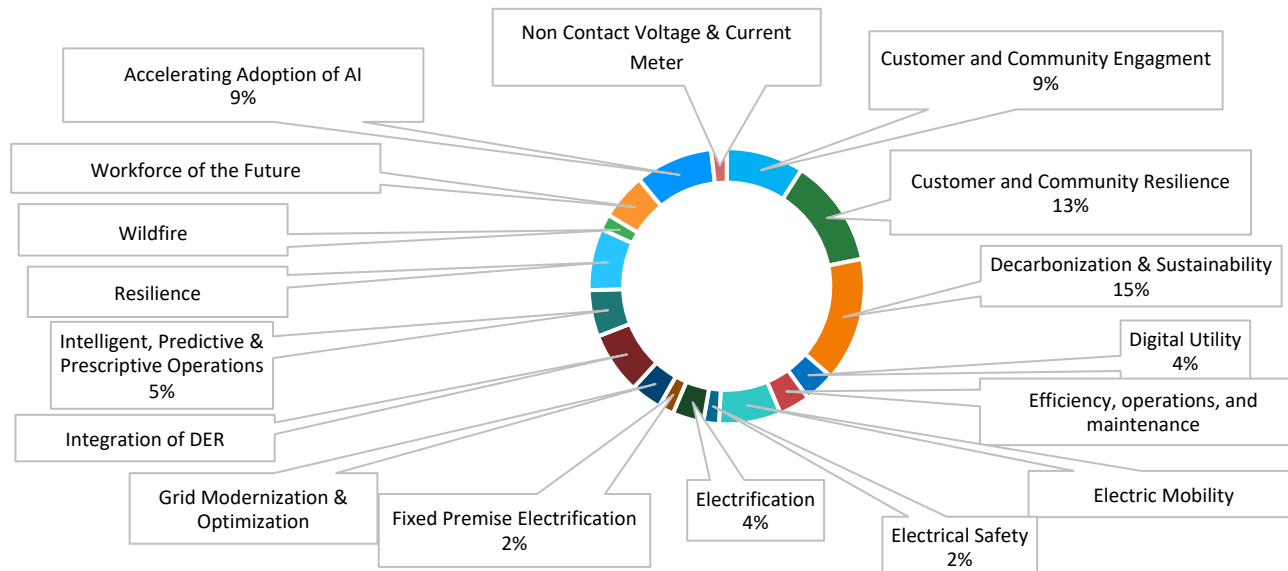
<https://www.epri.com/research/products/000000003002020720>

incubateenergy labs

Rapid Demonstration and Scale of Emerging Technologies since 2019

	2019	2020	2021	2022	2023
Participating Utilities	7	11	15	17	20+
Startups Applied	55	136	253	152	~200
# of Demos	6	10	20	20	20-25
SME Participation		63	83	108	110+

Demos by Challenge Area

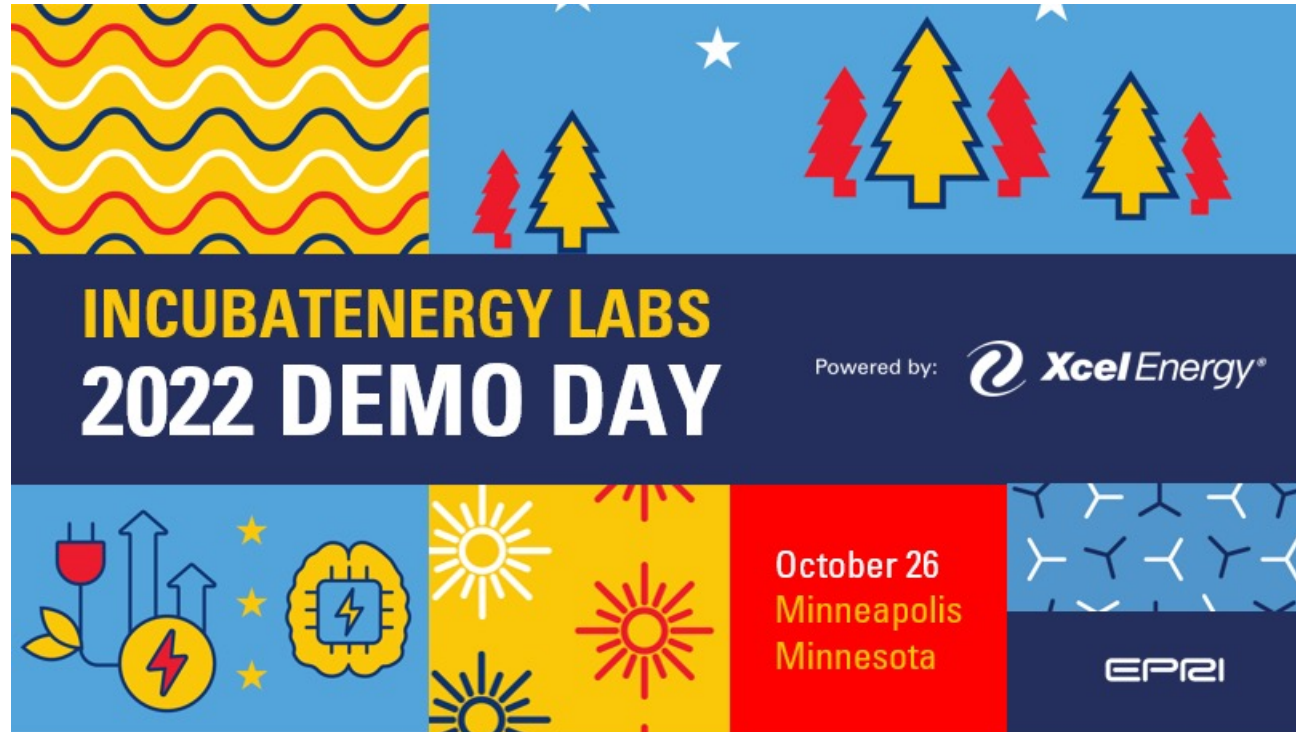


HOST UTILITIES

and collaborators



2022 Demo Day Success



Attendance: Virtual 350 In Person 85

THANK YOU to the 2022 Cohort of Utilities for your Participation & a special THANK YOU to Xcel Energy for hosting Demo Day

HOST UTILITIES and collaborators



Important Dates & Schedule for 2023 Cohort

HOST UTILITIES and collaborators



An EDISON INTERNATIONAL Company

2022

November 21, 2022: Call for Startup Applications Open*
November 21, 2022: SME DATABASE NOW OPEN!

2023

- **January - February:** Top 30 down-select process w/ Utilities
- February: Startup participation agreements signed
- February: Startup bootcamps/Pitch Day Prep/Tech Assessments
- March: Pitch Day (at Arizona Public Service, Phoenix)
- March: Final Projects selected
- April – May: Project Scoping and Contracting
- June: Project Kickoffs*
- August: Mid-Point Reviews*
- October 25-26: Demo Day(s) + Investor Connect Sessions* (at Fortis BC, Vancouver, British Columbia)
- October 31: Final project reports due*

2023 Challenge Areas

- Decarbonization & Sustainability (includes sustainable hydrocarbons and hydrogen technologies)
- Predictive & Prescriptive Operations
- Electric Mobility
- Resilience and Adaptation
- Customer and Community Engagement
- Workforce of the Future
- Fixed Premise Electrification
- **Robotics (NEW)**
- **Nuclear Assists (NEW)**
- Open

<https://labs.incubateenergy.org/en/>

HOST UTILITIES

and collaborators



incubatenenergy labs

2023 Startup Applications Now Open

WELCOME TO INCUBATENERGY LABS

Incubatenenergy® Labs is built for startups to engage EPRI and electric power utilities in paid demonstration projects. A utilities summit and collaborative demonstrations program in one, the program links startup companies leading the advancement of electrification, decarbonization and grid modernization with utilities from around the world that have the capacity and desire to demonstrate and scale those innovations. We structured the program to give you maximum exposure to utilities and ensure that the results of a successful demonstration with one utility turns into opportunities with many. New for 2023 startups now have the possibility of demonstrations in the US, Canada, Europe, South America, or Latin America.

Startups Apply Here!

SME Database Registration

HOST UTILITIES

and collaborators



<https://labs.incubatenenergy.org/en/>

A blue-tinted photograph of four people (three men and one woman) standing together, looking towards the camera. They are dressed in professional attire, including lab coats and a hard hat. The background is a solid blue color.

Together...Shaping the Future of Electricity

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