

EFFICIENT ELECTRIFICATION AT EPRI

EPRI's Efficient Electrification Newsletter provides monthly news and insights on this new initiative. We will discuss broad concepts of electrification, report on specific R&D activities, and present opportunities for EPRI members and stakeholders to engage in the ongoing work.

Efficient electrification encompasses using cleaner power at the point of use to benefit customers and society through boosting efficiency and grid flexibility, reducing cost, reducing emissions and water consumption, and increasing productivity.

Advanced electric technologies and cleaner electricity are providing more opportunities to use electricity to reduce emissions in the workplace or for an entire region. Burning natural gas in today's power plants and delivering electrons to "fuel" vehicles can be more than twice as energy efficient as traditional internal combustion engines—up to 70% savings in fuel cost and 75% lower CO₂ emissions.¹

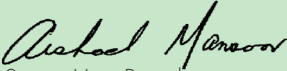
For space heat, technological advances are making it more efficient to move heat with an electric heat pump than to produce it with traditional electric and fossil heating technologies. As electricity is generated more cleanly, emissions associated with electric heating can progressively decrease.

Indoor agriculture offers benefits both to producers and consumers, providing fresh, local food produced with significantly less pesticides and water.

EPRI's Efficient Electrification Initiative is integral to our Integrated Energy Network pathway to the future. It includes our forthcoming U.S. national efficient electrification assessment, extensive communication and outreach, creation of centers of excellence, future regional assessments, accelerated R&D programs, and supplemental R&D projects. We invite you to connect with us and to share your thoughts and suggestions.

Sincerely,

Arshad Mansoor



Senior Vice President,
Research and Development

Rob Chapman



Vice President,
Energy and Environment

Introducing EPRI's Efficient Electrification Initiative

Increasing electricity's portion of energy use offers the potential to increase economic productivity, improve general and worker health and safety, reduce water consumption and CO₂ emissions, and enhance grid flexibility. With potential benefits accruing to society, the energy sector and the environment, EPRI is organizing and offering a slate of research and development programs, demonstration projects, in-depth analyses, and stakeholder engagement opportunities to assess and measure such benefits and to consider more fully other aspects of electrification.

EPRI's Power Delivery & Utilization (PDU) sector research in efficient electrification includes:

- **Program 199, Electrification for Customer Productivity**, works with utilities and customers to identify electric technology shifts that make sense today.
- **Program 170, End Use Energy Efficiency and Demand Response**, develops next-generation electric technologies—such as the next-generation heat pump.

- **Program 18, Electric Transportation**, examines R&D issues surrounding on- and off-road electric vehicles and associated infrastructure.
- **Program 182, Understanding Customer Behavior** will examine consumer-related aspects of efficient electrification.

Four supplemental projects examine technologies that can support efficient electrification, including advanced heat pumps, DC fast charging, electric vehicle marketing assessments, and indoor agriculture.

EPRI's Energy and Environment sector research Program 102, Energy and Climate Policy Analysis, examines and evaluates policy options with the potential to accelerate or inhibit electrification. Sector research also examines implications of electrification for load, system operation, air and water quality, and emissions reductions.

Together, these sectors are developing the National Assessment for Efficient Electrification (publication expected March 2018). In parallel, EPRI will offer utilities the opportunity to participate in state assessments that will benefit their strategy development.

To learn more about EPRI's electrification research and an Integrated Energy Network, visit <http://integratedenergynetwork.com>.

¹Key assumptions underlying these calculations include: gasoline at \$3/gallon; electricity at \$100/MWh; 30 mpg and 0.08 tons CO₂/mile for the gas vehicle; 300 Wh/mile and 0.3 tons CO₂/MWh for the electric vehicle.

FEATURED EVENTS

Registration Now Open—Regional Workshops to Explore EPRI's Efficient Electrification Initiative and Benefits to Customers and Society

EPRI Members and Guests: Please join EPRI and your utility peers at one or more upcoming regional workshops to explore benefits and near-term opportunities associated with EPRI's Efficient Electrification Initiative. Utilities have indicated interest in developing an electrification strategy focused on the nuances associated with their location (specific to their customers) service territories, and operations. These regional workshops can bring these discussions closer to home.

[Click Here to Register](#)

Each workshop will cover

- High-level overview: National Assessment of Efficient Electrification;
- Modeling capabilities to support strategy development and state-level electrification analyses;
- Key electrification technologies for transportation and space heating;
- Industrial electric technologies that make economic sense for your customers;
- Assessing grid impacts and costs of electrification; and
- Peerto-peer insights on electrification strategies and activities.

Dates and locations

- Central United States Wednesday July 12, 10:00 a.m. – 4:00 p.m., FirstEnergy, West Akron Campus, OH
- Western United States Friday, July 14, 10:00 a.m. – 4:00 p.m., Pacific Gas & Electric, San Francisco, CA
- Southeast United States Thursday, July 20, 10:00 a.m. – 4:00 p.m., Tennessee Valley Authority (Sheraton Music City Hotel), Nashville, TN
- Northeast United States Friday, July 21, 10:00 a.m. – 4:00 p.m., New York Power Authority, White Plains, NY

Efficient Electrification R&D: Upcoming EPRI webinars

- Monday, July 10, 2:00 p.m., ET: Quarterly Update on EPRI's Efficient Electrification Initiative ([Click here to join WebEx](#))
- Tuesday, July 18, 2:00 p.m., ET: EPRI's July Project Update, Indoor Agriculture ([Click here to join WebEx](#))
- Friday, July 28, 1:00 p.m., ET: Electrification for Customer Productivity, an EPRI Program 199 Update ([Click here to join Webex](#))

TECHNOLOGY SPOTLIGHT

How Electricity Could Shorten the Distance from Farm to Plate



NEED also comes from:

- Broad interest in local sustainability;
- Growing urban populations;
- Water and land constraints for irrigation; and
- Market demand for local produce.

Given a substantial expansion of indoor agriculture, utilities should consider impacts and opportunities of a growing market, including understanding load impacts, economic development, environmental and water impacts, and other factors.

Read more in Quick Insights: Water Saving Opportunities with Electric Technologies: <https://www.epri.com/#/pages/product/000000003002011028/>

The Center for Urban Education about Sustainable Agriculture reports this statistic: It is estimated that the average American meal travels about 1,500 miles from farm to plate.

With improved lighting, thermal/building management, and water delivery/recovery systems, new opportunities are emerging to grow, distribute, and purchase local crops. Industrial-scale, indoor agricultural operations can take advantage of empty, under-utilized, or abandoned buildings to serve local markets and create local jobs.

Each year U.S. consumers ultimately pay billions for delivering and distributing crops and produce from where they are grown to where they're processed or consumed.



Electrification Alliance Launched for “an Efficient and Decarbonized Europe”



Members of the Electrification Alliance discuss their mission at the June 2017 Eurelectric Annual Meeting in Brussels. Pictured from left to right: Thomas Nowak, secretary general, European Heat Pump Association; Pierre Tardieu, chief policy officer, WindEurope; Bert Witkamp, secretary general, AVERE, the European Association for Electromobility; and Bernard Respaut, chief executive, European Copper Institute.

Eurelectric, AVERE, the European Copper Institute, the European Heat Pump Association, Solar Power Europe, and Wind Europe in June launched the Electrification Alliance, which is calling for electricity to be recognized as the key energy carrier for an efficient and decarbonized Europe.

EPRI leaders attended Eurelectric’s annual meeting in Brussels where the group **announced** the alliance and its Declaration on Electrification, which has garnered support from nearly 50 European organizations.

Eurelectric Secretary General Kristian Ruby said, “Electricity is becoming increasingly decarbonized, more efficient, sustainable, and competitive. But the transformation of the electricity sector must

go hand in hand with the electrification of other sectors. More electricity means cleaner energy.”

The declaration calls on European policymakers “. . . to remove barriers to electrification, to roll-out the much needed widespread electric vehicle charging infrastructure, and to enable the deployment of smart and efficient heating and cooling technologies.”

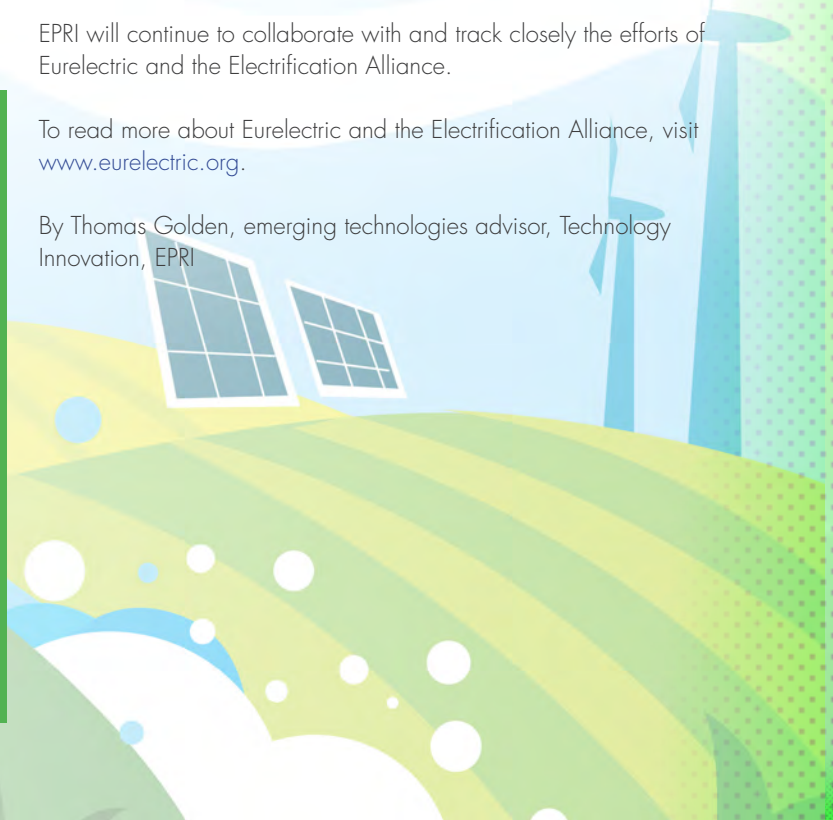
The announcement of the alliance and the declaration came on the heels of a benchmark report on the potential for electrification in the EU. http://www.eurelectric.org/media/318404/electrification_report_-_a_bright_future_for_europe-2017-030-0291-01-e.pdf

EPRI will continue to collaborate with and track closely the efforts of Eurelectric and the Electrification Alliance.

To read more about Eurelectric and the Electrification Alliance, visit www.eurelectric.org.

By Thomas Golden, emerging technologies advisor, Technology Innovation, EPRI

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ELECTRIFICATION IN THE NEWS

Electrification's Diverse Technologies and Opportunities to Continue to Receive Broad News Coverage.

Utility Dive reported that grid-integrated water heating could be a path to system flexibility at a fraction of the cost of battery energy storage. "At last count, 53.6 million of the 118.2 million U.S. water heaters were electric. Each could act as a battery for load shifting, peak shaving, or to integrate renewables, according to a [Regulatory Assistance Project \(RAP\)](#) paper."

Public Utilities Fortnightly featured EPRI's Arshad Mansoor discussing efficient electrification. Key points included how EPRI prioritizes its research and aligns it with industry and social needs, emerging technologies, and a new wave in energy efficiency.

The Wall Street Journal reported on efforts in Kentucky to retrain coal miners for jobs in high-tech industry and agriculture. [AppHarvest](#), plans to build high-tech greenhouses with "computerized monitoring, cutting-edge hydroponic, above-ground growing systems." Read the [news release](#).

Other news:

[REA Signs MOU With 8 Universities on Electrification](#)

Leadership (Nigeria), June 26, 2017

The Nigerian Rural Electrification Agency (REA) has signed a Memorandum of Understanding (MOU) with eight Federal Universities and one Teaching Hospital for the first phase of its government's Energizing Education program.

[Togo to Increase Rural Electrification From 7% to 40% by 2022 Through Solar](#)

PV Magazine, June 26, 2017 The government of the small African country has launched a program to bring solar power to two million people without access to electricity.

[Cummins Moving electrification, Digital Technologies to Forefront](#)

The Republic (Denver), June 15, 2017

Cummins Inc. is further diversifying as a company to fuel growth by placing an emphasis on electrification and digital technologies.

[What's Basic Energy Access Worth? A Randomized Controlled Trial](#)

Energy Collective-June 7, 2017

Technological advancement and falling prices offer opportunities to "leap frog" to off-grid electrification.

[Rural Electrification, the Way to Go](#)

Bulawayo24 News (blog), June 6, 2017

Rural electrification in Zimbabwe is part of a national strategy to provide industrial employment and boost agriculture.

[Editorial: Caltrain Gets Big Win With Electrification Funding](#)

The Mercury News, May 22, 2017

The Federal Transit Administration approved a \$647 million grant to help fund the \$1.98 billion Caltrain electrification project.

[Decisive Policy Actions Needed to Drive Technological Development](#)

The Edge Markets MY, June 6, 2017

The report looks at driving forward high-efficiency lighting, cooling and appliances and the related benefits of electrification.

About EPRI:

The Electric Power Research Institute, Inc. (EPRI, www.epri.com) conducts research and development relating to the generation, delivery and use of electricity for the benefit of the public. An independent, nonprofit organization, EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including reliability, efficiency, affordability, health, safety and the environment. EPRI's members represent approximately 90 percent of the electricity generated and delivered in the United States, and international participation extends to more than 30 countries. EPRI's principal offices and laboratories are located in Palo Alto, Calif.; Charlotte, NC; Knoxville, Tenn.; and Lenox, Mass.

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Get Involved

How can efficient electrification benefit you? To learn more or get involved in one of EPRI's programs, contact [Jimmy Herren \(West\)](#) or [Brian Fortenbery \(East\)](#).

Electric Power Research Institute

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