

GRID-EDGE CUSTOMER TECHNOLOGIES NEWSLETTER

Dear Grid-Edge Customer Technologies Program Advisors,

Thank you to those that attended our in-person advisory in Atlanta, GA which ran from February 28–March 1, and was held jointly with Programs 182 (Customer Insights) and 204 (Advanced Buildings & Communities). Many thanks to Georgia Power for graciously hosting us in their state-of-the-art headquarters. The feedback we receive from our advisors during these meetings is of the utmost value in guiding us throughout the current and future years research.

Program

I would also like to bring to your attention that in 2023 we have a new program name: Grid-Edge Customer Technologies. Additionally, our project set (p-set) titles have been slightly adjusted. The "Featured Research" section of the newsletter highlights those new names as well as our 2023 base research in each area. I look forward to another collaborative year with all of you.

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RECENTLY PUBLISHED PRODUCTS

- Refrigerants: Leakage Detection and Regulations <u>3002024136</u>
- Affordable Technologies for Equitable Decarbonization <u>3002024057</u>
- Membrane Technologies for Efficient Dehumidification
 <u>3002024181</u>
- Screw Based LED Lamp Lifespan <u>3002025742</u>
- Commercial Task Robots <u>3002025741</u>
- Opportunities with Advanced Residential Appliances - <u>3002024054</u>
- U.S. Survey of Residential Electrical Panels <u>3002024056</u>
- Leveraging the Learnings from the Frost Supplemental Project
 – <u>3002024060</u>
- 2022 Technology Readiness Guide (TRG) <u>3002024213</u>
- Load Shape Library: Status Update <u>3002024038</u>
- Electric Disinfection Technologies: Efficacy and Operational Characteristics of Light-Based Disinfection Devices – <u>3002025990</u>
- Enabling Industrial DR: Opportunities in the Water, Wastewater, and Meat Processing Industries – <u>3002024055</u>
- Technology Innovation: Mitigating the Impact of Refrigerants with Low GWP Alternatives, Leakage and Reclaim Management – 3002024182

FEATURED RESEARCH - 2023 BASE RESEARCH PROJECTS

P-Set A – Load Analytics and Grid Insights

(Lead: Krish Gomatom)

- Electric Panel Survey Results: What do They Mean and How Can They be Applied
- Energy Efficiency Potential Study
- Customer Technology based DR as a Resource

P-Set D – Technology Transfer and Education

- (Lead: Micah Sweeney)
 - 2022 Summary of Deliverables
 - Quarterly Newsletters
 - Emerging Technology Assessments
 - Technical Education Materials

P-Set E – Efficiency and Decarbonization Evaluation (Lead: Doug Lindsey)

- Lab Testing of New or Near-to-Market HPWHs
- Customer-Installed Heat Pumps
- Agricultural Lighting Efficiency and Controls Evaluation
- Addressing GHG Impacts of Heat Pumps with Refrigerant Leakage Detection Technologies

P-Set X – Next-Gen Technologies and Demand Flexibility (Lead: Frank Sharp)

- Smart Panels: Market Survey and Lab Testing
- Evaluation of Membrane Technologies for Efficient Dehumidification
- Comparing Test Results of Novel Coatings with e-Coated Coils

TECHNOLOGY TIDBIT

The Humble Diode



Two separate diode forms, the thermionic diode

and the semiconductor diode, were discovered within one year of each other, by Frederick Guthrie (thermionic) and Ferdinand Braun (semiconductor) in 1873–1874. Edison also separately discovered the thermionic effect several years later. The diode is an underpinning technology for the pursuit of efficient decarbonization that is integral to variable motor drives, solar panels, LED lighting and every modern electronic device.

INDUSTRY INSIGHT



Historically, the Residential Energy Consumption Survey (RECS) data-base has reported its estimates with a geographic granularity of census regions, but in the 2020 survey state level results were also included. This finer resolution can allow utilities, researchers, and device manufacturers to solidify their assumptions and further understand energy usage trends within the United States. The included map uses this state data to plot the percentage of homes in each state that are estimated to use heat pumps as their primary method of heating in 2020.

Overall, the EIA estimated that 117.4 million of the 123.5 million (~95%) U.S. households use some form of space heating equipment. 17.5 million of these homes use central heat pumps as their primary method of heating. As shown in the attached map, the Southern states are where the highest penetration of heat pumps is seen. This can largely be attributed to the historical reliance on electricity throughout the region and milder winter temperatures. Another point of interest within this map is the missing data in many northern cold climate states. These are points where the EIA chose to omit the estimates due to a low number of responses within the category or high relative standard error. Hopefully in the coming years as coldclimate heat pumps continue to be researched and improved, the responses within these northern states will be statistically significant enough to be reported upon.

SAVE THE DATE

2023 Heat Pump Symposium, Nashville, TN, April 19–20, 2023

After a three-year hiatus, EPRI's Heat Pump Working Council (HPWC) is excited to announce the next Heat Pump Symposium will be held April 19–20, in Nashville, Tennessee. The agenda will include but is not limited to a pre-event dinner, shaping the conversation on how heat pumps can play a starring role in electrification, an update on cold climate heat pumps, the latest on industrial heat pump applications, and more! For more information, please reach out to <u>LK Browning</u>.

EPRI STAFF PROFILE

Have you met Edwin Hornquist?

Edwin joined the P170 team in December 2022 as a Principal Technical Leader, based in southern California. His 30 plus year career spans utility and non-utility experience focusing on energy efficiency, demand-sidemanagement, advanced meter data acquisition systems, and supply-side resource planning. Edwin is a mechanical engineer with a master's degree in business



administration. He is an advisor in several organizations that help advance customer technologies.

In his free time, he enjoys outdoor activities and being in nature.

SUPPLEMENTAL PROJECT HIGHLIGHT

Flexible Pumping Collaborative (Flexible DR-Phase 2) – <u>3002024828</u>

Flexible Demand Response (Flex DR) refers to end-use customer capability to adjust power consumption based on power system operational needs. Flex DR is an emerging source of flexibility that can be employed as a balancing resource to support integration of wind, solar, and other variable supply.

This collaborative effort to demonstrate effective and sustainable demand flexibility from large pumps and other loads seeks to identify viable load shift strategies, considering uncertainty about DR availability and response characteristics. The objectives of the project are to: 1) demonstrate the capability and value of large pumping loads to flex usage; 2) characterize and model the capability and availability of large pumps and other loads for better integration in power system operations; and 3) foster industry collaboration to explore program alternatives and share best practices in sustainably engaging Flex DR to support system flexibility needs.

UPCOMING WEBCASTS & EVENTS

2023 Heat Pump Symposium – April 19–20, 2023, Nashville, TN IEA Heat Pump Conference – May 15–18, Chicago, IL LCRI Tech Week – May 16–18, Charlotte, NC ASHRAE Annual Conference – June 24–28, Tampa, FL

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EPRI

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