3 standout technologies from the Summer 2023 tech roundup

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Key takeaways

- EV charging in streetlights can bring affordable charging to underserved communities, but lower voltage of networks may limit uptake in some US and Canadian cities.
- California's new cost-effectiveness test could change how utilities value emerging technology measures, making many more available to include in their programs.
- Combination heat pumps use one compressor and outdoor heat exchanger coil to heat and cool spaces and heat water. But because of their complex technology and controls, poor cost and energy savings, and unlikely application in retrofit projects, we don't recommend them beyond niches for now.
- Among other technologies to keep watching are virtual power plants, induction stoves with batteries, and industrial heat pumps.

Contents

Our tech roundup webinars keep you up to date on the latest developments in efficiency, load management, and decarbonization technologies. At the E Source Summer 2023 tech roundup, we highlighted nine technologies or concepts that we think define the emerging technology opportunity for this year. We chose

several to highlight here; some are promising, while others need more development.

Streetlight EV charging

Most EV charging happens at home, but today's early EV adopters tend to be higher-income households that can install dedicated home charging. People who live in multifamily buildings don't always have garages or other places to plug in an EV. So access to charging is still a barrier for many people.

E Source is constantly reviewing efficiency technologies

The Summer 2023 tech roundup is one of many ways we share insights on established and emerging technologies that utilities consider including in their programs. Visit our Technology Assessment Service to learn more about what we do.

Results in our 2020 Electric Vehicle Residential Customer Survey confirm this. The most common reason people don't charge their EV at home is that it's too expensive, followed by their property owner or homeowners' association not allowing it. More than a quarter of respondents said they park on the street and are unable to charge their vehicle at home.

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One solution to this problem is streetlight EV charging. It's a way to quickly deploy public and multifamily charging. And it helps utilities fill gaps in areas that private charging operators might not prioritize.

A streetlight EV charging pilot is happening in Kansas City, Missouri. The pilot will show how charging can integrate with the streetlight system to provide curbside access to public EV charging in the city right-of-way. The pilot will expand access for:

- Renters
- Multifamily building residents
- Taxis and rideshares

The pilot will assess the efficacy of streetlight charging in terms of technical, social, economic, and environmental benefit to the community. The project hopes to show that streetlight charging can:

- Minimize the footprint of charging infrastructure
- Minimize construction activity
- Maximize access

- Use spare capacity from LED lighting upgrades

World Resources Institute published preliminary guidance for pole-mounted EV charging (PDF), which collects insights from pilots and interviews with stakeholders (utility pole and streetlights). The institute noted that:

- Streetlight capacity isn't standardized in the US. The 120-volt (V) connection is most common, but some cities have streetlights with 208/240 V.
- Streetlight charging can be less expensive than the cost of a ground-mounted installation.
- The cost depends on the upgrades required. Even without upgrades, a streetlight's preexisting capacity can supply Level 1 charging and docks for micromobility.

Other countries are doing this, but it's not yet clear if it's useful or possible in every service area. Depending on the regulatory environment, not all utilities can invest in any available type of EV charging infrastructure.

California's Total System Benefit cost-effectiveness test

California is launching a new cost-effectiveness test called Total System Benefit (TSB). It could change how utilities evaluate energy efficiency and even electrification when they consider emerging technology measures—technologies that weren't seen as cost-effective in the past.

TSB is California's proposed solution to a problem that the California Public Utilities Commission (CPUC) outlined in Decision 21-05-031 (PDF): the value of saving energy changes across hours and days, and location, depending on grid constraints and other avoided cost considerations.

Traditional cost-effectiveness practices incentivize energy savings equally, regardless of when the savings happen. TSB recognizes the value of energy at specific times and locations, encouraging utilities to optimize portfolios accordingly. With the TSB, the CPUC defines utilities' goals by a dollar amount instead of kilowatts or kilowatt-hours. To read more about the calculations, see the CPUC Draft Technical Guidance (PDF).

While TSB sounds simple, the calculations are complex and will take some getting used to, even in California. For this reason, while we're excited about the potential for TSB to take a foothold across the US and Canada, the complexity of the calculations may limit its immediate adoption elsewhere. But what starts in California doesn't stay there. Watch out for a form of TSB coming to your state or province after the California rollout in 2024.

Combination heat pump and water heater

A combination heat pump and water heater is an air-source heat pump that uses one compressor and outdoor heat exchanger coil to provide space heating and cooling while also providing water heating. The technology is upcoming in the US and Canada, with only a handful of developing products.

A market study (PDF) from CalNext and the UC Davis Western Cooling Efficiency Center got us excited about this technology. They estimated energy savings of up to:

- 29% for space cooling
- 80% for space heating
- 85% for water heating

But we're not as enthusiastic about it anymore. Aside from the $10,000–$25,000 price tag, there are many reasons why we don't recommend adding this to your emerging technologies portfolio:

- There are little initial cost savings
- These technologies probably won't create much annual energy savings over stand-alone efficient heat pumps
- Water heating and space conditioning are different, and they use complex controls
- Developers and trade allies don't like exotic and complex technologies
- These combination heat pumps won't likely get into retrofits because they require three simultaneous failures (or large remodels)
- Homeowners don't care if they have one compressor or two

Without gains in price or efficiency, it's hard to see this expanding beyond niche adoptions. There's nothing bad about this technology, but it's just not compelling. We're advising to wait and see.

Honorable mentions

We presented a few other innovative technologies and concepts worth mentioning.

Induction cooktops with batteries

Induction stoves are far more energy efficient than gas stoves and more efficient than traditional electric stoves with glass tops. They're safer and healthier too. But not all kitchens' electrical setups are ready for induction. And up-front costs to install or change electric circuits can reach $6,000 or more. In many cases electrical upgrades are cost prohibitive.

Stoves with batteries are a great solution because they plug directly into 110 V wall sockets. They work by using the battery to boost heat output during normal operation. And if there's a power outage, you can still cook for at least four hours; exact time depends on the model. Only two models exist, and they're pricey and not readily available. But we're excited to see how this technology evolves.

Virtual power plants

Coordinated distributed energy resources (DERs) have existed as utility virtual power plant portfolios for decades. They've included demand response and, increasingly, distributed batteries and EV charging.

As DERs proliferate, cost reductions and the need for an affordable and clean power supply have brought virtual power plants back into the spotlight as a true alternative to conventional resources. Watch this space as technology that coordinates DERs matures and more utilities run pilots.

Heat pumps for industrial processes

Heat pumps could provide about a third of the energy consumed to provide process heat for the US industrial sector, but so far, few industries have used heat pumps for this purpose. Manufacturers are offering new heat pumps for manufacturing, and factories focused on decarbonizing their facilities are installing them.
