

The Electrification Working Group was an engaging forum for partners to discuss electrification at the building level. It focused on how to implement technical solutions to significantly reduce fossil fuel use onsite. More than 60 Better Climate Challenge participants across 45 organizations exchanged valuable perspectives about planning and executing electrification efforts, including how to leverage building efficiency to aid electrification efforts. National Renewable Energy Laboratory technical experts supported participants on key issues like heating and hot water systems and long-term planning. Design and Construction Allies joined the final meeting to listen to partners to more effectively design electrification solutions that meet market needs.

### WORKING GROUP TAKEAWAYS

- ▶ Many organizations have a strong desire to electrify their portfolios; the largest challenges are heating and hot water systems.
- ▶ More case studies across the commercial building sector are needed, including variations for climate, building use, and building type.
- ▶ Long-term planning is critical for electrifying systems as they are often capital-intensive and best done when current equipment reaches the end of its service life. Tools such as the [Action Plan Template](#) and the [Framework for Greenhouse Gas Emissions Reduction Planning](#) can help partners with the planning process.
- ▶ Design professionals can offer vital assistance to partners on how to implement electrified heating solutions.

### Discussion Topics and Outcomes

The working group brought partners together to discuss the successes, challenges, and opportunities of strategically electrifying buildings. These discussions have contributed to a better understanding of the challenges and opportunities associated with electrifying buildings. Key points are summarized below:

- ▶ **Current systems and configurations with potential for strategic electrification**

Partners generally use rooftop units, district steam, electric resistance heating or reheat, and traditional boilers. Multifamily partners are interested in replacing centralized natural gas HVAC and DHW systems. Commercial partners are also interested in dual fuel options and information for cold climates. Most partners have experience with heat pumps, even if just starting out. Some heat pumps are in use, but most electric equipment is electric resistant, especially for multifamily partners. Ideally, strategies should minimize the use of electric resistance heating.

Many partners have centralized hot water systems. About 35% of partners have used heat pump water heaters. About half of multifamily participants use heat pump water heaters, but the level of experience is mixed. For 80% of partners, hot water heaters are installed in a mechanical room, and for the remaining 20%, hot water heaters are installed on rooftops.

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Other areas were identified for strategic electrification. Cooking and clothes drying were considered priorities depending on the sector. Other amenities such as fireplaces and firepits are a low priority. Replacing equipment using steam was also considered a high priority. Generators, pool heating, autoclaves, and utility upgrades were also mentioned as additional areas of interest.

▶ **Energy efficiency as part of the electrification strategy**

For most partners, weatherization and energy efficiency are considered part of the electrification strategy. Partners agreed that energy efficiency is the best starting point for electrification, but that timing for improvements can be an issue related to tenants.

▶ **Barriers to electrifying buildings**

Funding, capital costs, skilled workforce and staff retraining, space availability, working with utility providers, expanded electrical capacity, supply chain equipment availability, lack of available types of products, skepticism about available technologies, concerns about a dirtier grid compared to natural gas heating, and increased energy burden on tenants prevented partners from electrifying buildings. Previous undesirable experiences, costs and finances, electrical capacity, and hesitancy from property managers and maintenance staff prevented partners from using heat pumps in the past.

▶ **Information and resources needed to effectively electrify**

To make more effective decisions, partners also discussed what information is needed. Design guidance and case studies were discussed and ranked as the most important areas for additional information. Staff training, utility provider cooperation, and funding were also considered important needs. Other topics included technical training, market availability, and implementation guidance, especially for retrofit options. In addition, comprehensive cost-benefit information is needed, including upfront, operational, maintenance, costs, and split incentives.

▶ **Characterization of the electrification journey**

More than half of participants self-identified as having a plan to pilot or test an electrified solution. Only a quarter of participants stated that they have an inventory or asset list of their scope 1 emissions. No participants have strategically electrified all their facilities. This demonstrates the need for continued solutions and electrification pathways to meet the needs of industry.

## Partner Highlights

Many partners provided useful insights garnered throughout their electrification journey. All working group members contributed to informal breakout discussions, and the following organizations presented their successes and barriers, which are outlined below:

- ▶ **Columbia Association:** Presented on their electrification journey with a focus on a package unit replacement for a small commercial building with two heat pump solution options. These heat pump solutions included dual fuel heat pumps or a dedicated outdoor air system with ductless mini-split heat pumps. They felt the likely outcome for them will be a combination of the two solutions.
- ▶ **Tenderloin Neighborhood Development Corporation (TNDC):** Discussed their electrification journey with a focus on their challenges with heat pump adoption. They used an approach of addressing tenant concerns and working with manufacturers. Some of the primary issues they addressed were concerns around heat pump noise and acquiring products with short turnaround times for pilot efforts.

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- ▶ **City of San Diego:** Presented on the coordination challenges associated with a 400-building portfolio. The process of gaining access to panels and mitigating security issues can be difficult to standardize with the variety of site managers throughout their portfolio. Through their electrification study, they discovered discrepancies between consultant cost estimates and actual costs. Electric vehicle parking may also be an issue, highlighting the need for installing upgrades to prepare for future electricity needs.
  - ▶ **Fairfax County:** Discussed their geothermal well installation at a recreation center, which provided the county with an electrified solution. Challenges included capacity limitation, installation timeline for a well field, and budgetary constraints.
  - ▶ **Lendlease:** Discussed the challenges they faced in their electrification journey, sharing how the high cost of electrification was a barrier. When switching from natural gas to electricity, there was a high premium. The primary factors that influenced high costs were cold climate technologies as well as costs to upgrade envelopes to improve heat pump efficiency.
  - ▶ **Stoneweg:** Focused on electrification of their multifamily properties in Arizona. Stoneweg found several technical, process, and cost challenges associated with electrification. One of the technical challenges was limited staff bandwidth and education leading to difficulties in maintaining the equipment. Many involved in the project focused on the short-term barriers and ignored the long-term benefits, making the justification for electrification difficult. The organization also had difficulty obtaining accurate information for HVAC replacement and the increase in other costs associated with heat pumps in comparison to traditional heating systems.