BUILDING DECARBONIZATION COALITION

Neighborhood-scale Building Decarbonization Brief

Neighborhood-scale building decarbonization is an emerging strategy that focuses on transitioning street segments, developments, or even entire neighborhoods to decarbonized energy sources and electric appliances with the end goal of managing the transition off of the gas system.

Neighborhood-scale building decarbonization ("neighborhood decarbonization") is a strategy that can support states in meeting their greenhouse gas reduction goals while also improving air quality, increasing comfort, and managing energy affordability. It is intended to complement, not replace, the existing appliance-by-appliance approach to electrification. This document provides an introduction to neighborhood decarbonization and its advantages as well as the technology pathways for implementation and recommended next steps. For further details, read our full white paper here.

Advantages

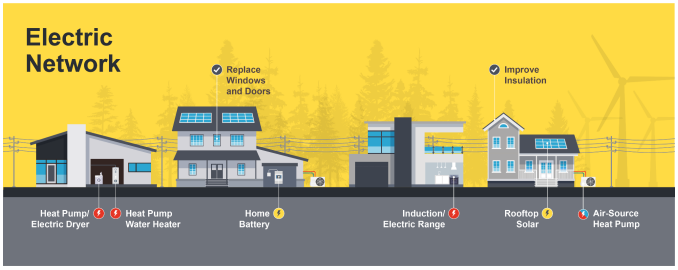
The advantages of neighborhood decarbonization are wide-ranging:

1. Accelerates climate and health benefits of decarbonization
2. Enables a managed transition from the gas system to clean energy systems, which maximizes cost savings and protects low-income ratepayers
3. Centers communities in decision-making about their energy systems and allows environmental justice communities to be prioritized for investments
4. Provides demand and job security for organized labor through long-term infrastructure projects
5. Supports alternatives to major capital investments in fossil fuel infrastructure
6. Creates business opportunities for gas utilities and their workers in the clean energy transition
7. Offers opportunities for local ownership
8. Improves the economics of decarbonization projects by creating economies of scale and allowing for avoided gas system investments

Technology Pathways

Implementation of neighborhood decarbonization can occur via two primary pathways: the Electric Network and the Thermal Energy Network (TEN). These pathways can apply to both new construction and existing buildings and should be paired with weatherization and energy efficiency measures to reduce energy needs and costs.

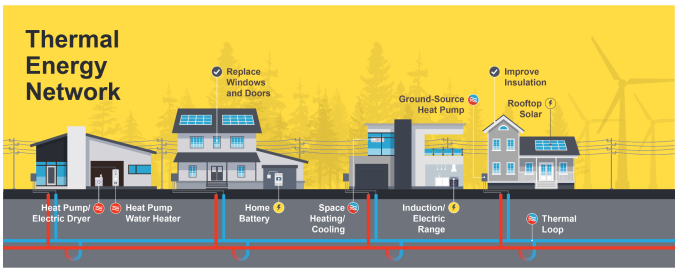
Pathway 1: The Electric Network
This pathway pairs electric appliances with the existing electric grid. As states achieve increasingly ambitious renewable energy targets, electricity becomes less carbon-intensive and more renewable. This pathway utilizes four major appliances: heat pump water heater, air-, ground-, or water- source heat pump for space heating and



cooling, induction or electric resistance range for cooking, and heat pump or electric clothes dryer.

Pathway 2: The Thermal Energy Network (TEN)
This pathway distributes thermal energy across linked buildings via pipes filled with water, or other liquid solution, and utilizes a ground-source heat pump for space heating and cooling, water heating, and clothes drying and an induction or electric resistance range for cooking. This technology has been in use for years at college campuses, housing developments, and other private or single-owner properties. TENs can also be owned and operated by an existing regulated utility or a municipal government.

This approach to neighborhood decarbonization has the added benefit of reducing demands on the electric grid due to its increased efficiency. It also offers an opportunity to continue employing the existing gas workforce, which has many of the skills needed to construct and maintain TENs. There are many different configurations of TENs including district energy systems and networked geothermal.



Networked Innovations
Within these two primary pathways, there are many variations on how energy is stored, distributed, and used that we designate as "Networked Innovations." These innovations may include microgrids, on-site renewable energy, backup storage, etc., and would pair with the existing electric grid and/or TENs.

How to Select the Technology Pathway
State, community, and building-specific criteria may influence the ideal pathway for neighborhood decarbonization in a given location. These criteria can affect both the cost and feasibility of a particular pathway. When selecting the ideal technology pathway, it is important to consider both the upfront costs of installation and construction (e.g., appliances, new infrastructure, labor) as well as the long-term operational costs.

Example selection criteria may include:

- Types and condition of buildings in the area, including building density
- Condition of the electric grid in the area, including existing peak demand and capacity
- Local climate
- Condition of gas pipelines in the area
- Presence of anchor customers and/or community champions
- Proximity to a heat source/sink
- Location on the gas system (e.g., near the end of the line which can be easily removed from service without impacting pressure and flow rates)
- Other planned street infrastructure projects that could be pursued concurrently (waste water system upgrades, undergrounding of electrical cables, etc.)

Recommendations

Regulatory, legislative, social, and economic changes are needed to advance neighborhood decarbonization. Below we outline the most pressing changes that you can address today.

Utility Regulators and Legislators

1. Align utility infrastructure investments with climate goals by identifying opportunities to avoid fossil fuel investments and setting appropriate asset depreciation schedules
2. Allow utilities and municipalities to operate thermal energy networks via statute and policies
3. Reform the "obligation to serve" to allow gas and dual fuel utilities to provide thermal energy while maintaining the commitment to provide energy to consumers
4. Pursue long-term, integrated electric, gas, and thermal energy system planning
5. Develop rate models that support building decarbonization like all-electric and thermal energy rates
6. Prioritize funding for neighborhood decarbonization demonstration projects
7. Lead with workers by collaborating on policies that support long-term, sustainable, high-road jobs for workers in neighborhood decarbonization
8. Reduce coordination complexity by streamlining the process for home and building owners who want to pursue decarbonized solutions

Local Governments

1. Prioritize funding for neighborhood decarbonization projects
2. Reduce coordination complexity by streamlining the process for home and building owners who want to pursue decarbonized solutions
3. Build relationships with local communities and community-based organizations (CBOs) and understand their interests, concerns, and needs

Utilities

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2. Pursue long-term, integrated electric, gas, and thermal energy system planning
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4. Prioritize funding for neighborhood decarbonization demonstration projects
5. Lead with workers by collaborating on policies that support long-term, sustainable, high-road jobs for workers in neighborhood decarbonization
6. Reduce coordination complexity by streamlining the process for home and building owners who want to pursue decarbonized solutions
7. Build relationships with local communities and community-based organizations (CBOs) and understand their interests, concerns, and needs
8. Encourage knowledge sharing among other utilities, appliance manufacturers, workers, advocates, local governments, and customers
9. Analyze projects and conduct additional research