Policy Brief Focus: Buildings

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Introduction

This policy brief is part of an RMI series focused on federal government action that can move the United States closer to limiting warming to 1.5°C, build a sustainable economy, and create lasting, quality jobs. For the US building stock to be 1.5°C aligned, we need to decarbonize through electrification of combustion-based appliances, deep efficiency retrofits, and construction of decarbonized new buildings—all-electric, highly efficient, and low-embodied carbon. Built from RMI's existing work and theory of change, the featured ideas below provide significant emissions reductions and other benefits. RMI is available to provide more detailed support to policymakers to further develop these ideas. All policy briefs in the series can be found here.

IDEA #1: Reduce Emissions from Buildings Through Direct Health-Based Regulation of Combustion-Based Appliances

- **Agency:** Environmental Protection Agency (EPA), Department of Energy, Department of Health and Human Services
- **Recommended action:** Develop regulations and programs to address air quality impacts (both indoors and outdoors) associated with the use of combustion-based appliances, based upon both the climate and health benefits of emissions reductions. For example, EPA could issue emissions standards for gas appliances under the Clean Air Act, which could support replacing gas appliances with cleaner alternatives when they burn out. Provide technical assistance and funding support (e.g., to cover panel upgrades, equipment costs, etc.) for lower-income communities through existing and expanded EPA community and grant programs, partnerships with the Department of Energy or Department of Health and Human Services, and other agencies.
- **Authority:** A number of agencies already have authority to address pollution from combustion-based appliances. One key agency is EPA, which has existing authority under the Clean Air Act to set emissions standards for stationary sources and has already implemented rules that limit emissions from in-home devices like wood stoves and backup diesel generators. Additionally, several state and regional clean air regulators already have rules in place to limit nitrogen-oxides emissions from gas appliances in order to meet federal air quality standards, an approach which can be strengthened and expanded to more locations.
- **Opportunity:** There have long been energy efficiency standards on gas furnaces and water heaters. However, those standards alone are not enough to decarbonize the buildings sector, as they encourage more efficient gas appliances, not necessarily a shift to emissions-free end uses. In order to reach deep decarbonization goals and provide significant health benefits, the building decarbonization community needs to apply new and creative tools to electrify end uses.
- **Benefits:** This idea has significant human health benefits. Emissions from burning fossil fuels in residential and commercial buildings (e.g., for space heating, hot water, cooking) contribute to more premature deaths (over 28,000 per year) associated with air pollution in the United States than any other sector.[1] Gas appliances in our homes and workplaces emit over five times as much harmful nitrogen oxide (NO_x) pollution as power plants, for the same amount of gas burned.[2] Homes with gas stoves have 50% to 400% higher harmful nitrogen dioxide (NO_2) emissions than homes with electric stoves; a child living in a home with a gas stove has a 42% increased risk of suffering asthma symptoms.[3]

IDEA #2: Climate-Align Housing Finance Through Government- Sponsored Enterprises

- **Agency:** Federal Housing Finance Agency (FHFA)
- **Recommended action:** The FHFA can require government-sponsored enterprises (GSEs) Fannie Mae and Freddie Mac to support residential sector decarbonization by addressing information gaps and by making mortgages a primary vehicle for financing home performance and resilience upgrades. Specifically, GSEs can:
    - Incorporate home energy performance data (e.g., home energy costs) into appraisal and underwriting standards for all homes via the GSEs' Uniform Appraisal Dataset redesign underway.[4]
    - Assess and disclose their portfolio-wide emissions and climate risk exposure and develop plans to reduce both (emissions in line with federal targets), including by scaling up single-family green mortgages—a tool for both mitigation and adaptation.
    - Provide incentives for lenders to market/include their existing single-family green mortgage products (Fannie Mae's Homestyle® Energy and Freddie Mac's GreenCHOICE®) in all new and refinance transactions to finance home energy, electrification, and resilience improvements at scale.
- **Authority:** As the GSEs' regulator under the Housing and Economic Recovery Act of 2008, FHFA can issue new regulation or directives to this effect. There is also precedent for the federal government using the credit system to shape the housing market.
- **Opportunity:** Household energy use accounts for roughly 20% of total US greenhouse gas emissions.[5] However, a lack of information transparency and awareness, market signals and incentives, and scalable low-cost financing solutions all contribute to stagnant residential sector decarbonization. Fannie Mae and Freddie Mac back nearly half of all single-family mortgage originations each year and set standards or requirements to which lenders and appraisers nationwide conform. They represent a powerful lever through which the US housing market can become more equitable, resilient, and low carbon. These specific actions would serve to create transparency and rationality around energy and emissions across the housing market while scaling up green capital for home performance improvements at current historically low interest rates. This offers a key opportunity to leverage private capital markets to finance decarbonization at a convenient intervention point for homeowners: through normal-course home purchase and refinancing transaction processes.
- **Benefits:** A robust single-family green mortgage market can deliver significant benefits. Assuming the GSEs' existing green mortgage products are scaled up to comprise 15% of their annual single-family mortgage volumes (roughly half the penetration level achieved by their green multifamily business), within a decade that could generate an estimated $2+ trillion new green mortgage-backed securities market, improve nearly 9 million homes across the country, generate net cost savings (accounting for higher loan payments) of $12 billion for consumers, create over 650,000 domestic jobs, and avoid 57 million metric tons of carbon emissions.[6]

IDEA #3: Invest in Advanced Building Construction to Ensure the Future of Construction and Manufacturing is Low Carbon and Firmly Rooted in American Soil

- **Agencies and committees:** House Energy and Commerce Committee and Senate Committee on Energy and Natural Resources, U.S. Department of Energy (DOE), U.S. Economic Development Administration (EDA), General Services Administration (GSA), Department of Defense (DOD), Department of Housing and Urban Development (HUD)
- **Recommended action:** Congress can create an investment strategy that combines supply-side investments to spur modernized buildings-related technologies, manufacturing, and industrialized construction methods with demand-side support for procuring decarbonized retrofits and new buildings. This can be based on the efforts of the DOE's Advanced Building Construction (ABC) Initiative and Collaborative. Technologies and practices are considered "ABC" if they: enable superior energy performance and low carbon footprints (with a target of zero-carbon performance), enable faster on-site construction timelines, are attractive, and are affordable to developers and consumers.
    - Congress should authorize increased funding to DOE and EDA to provide grants, low-interest loans, and loan guarantees that help bring new capital into manufacturing investment for industrialized construction. Additional funding should also be directed to DOE's ABC Initiative and Collaborative to support its efforts to catalyze market adoption and scaling of ABC.
    - The GSA and DOD can provide demand-side support by creating procurement policies that favor the use of ABC for the construction and retrofitting of federal buildings and leases. DOE's Federal Energy Management Program in partnership with GSA Office of Federal High-Performance Buildings should develop technical assistance resources to support agencies in incorporating ABC technology into any future retrofit.
    - Congress should authorize increased funding to address the $35B shortfall in deferred maintenance resources for public housing, as well as increase the overall pool of low-income housing tax credits available to states.[7] Congress should also remove the 25% state tax exempt bond requirement and allow other forms of below market-rate debt to finance projects.
    - HUD should ensure all public housing projects adopt low-carbon technologies/practices in new build and retrofit projects, including ABC, by requiring state qualified action plans and project scoring systems to evaluate the decarbonization strategies of a project when determining competitiveness for funding. HUD should reform utility allowance policies across all housing assistance programs to ensure 1) owners can capture savings to sow them into financing building capital improvements and 2) a consistent process for evaluating utility spend and utility allowances is used across states.
- **Authority:** DOE and EDA have authority to administer and issue grants and loans based on annual congressional budgetary allocations to the agencies. GSA handles federal procurement for most civilian buildings and sets specific regulations and guidance for federal procurement. HUD oversees distribution of federal resources for affordable housing and public housing and regulates utility allowances and federally mandated planning requirement for the state LIHTC allocations.
- **Opportunity:** A large proportion of the nation's approximately 130 million existing buildings will need low- or zero-carbon retrofits before 2030 to meet climate and health targets.[8] Simultaneously, the $1.4 trillion US construction sector faces the threat of offshoring and declining productivity.[9] There is a growing need for industrialized construction—including off-site, modular, and prefabrication—due to the high cost, low efficiency, and slow timelines of traditional construction practices. Investing in ABC technologies and practices can help address these dual challenges by catalyzing a modernization of the construction sector and harnessing this transformation to dramatically reduce emissions.
- **Benefits:** A robust retrofit market is needed to support the estimated 5 million decarbonization retrofit projects required annually to meet our Paris Climate Action goals. Establishing this new sector will spur the creation of millions of new, high-quality jobs across the United States. In addition to jobs, this will create a better American building stock. The controlled, standardized, and streamlined construction practices inherent in ABC support more consistent high-quality construction outcomes. Technologies that improve resilience, health, indoor air quality, and acoustics are also hallmarks of high-performance construction.

[1] Dedoussi, IC., et al., "Premature mortality related to United States cross-state air pollution," *Nature* 578, 2020, 261-265, https://www.nature.com/articles/s41586-020-1983-8/tables/3.

[2] "2016 SIP Emission Projection Data, 2012 Estimated Annual Average Emissions Statewide," California Air Resources Board, https://www.arb.ca.gov/app/emsinv/2017/emssumcat_query.php?F_YR=2012&F_DIV=-4&F_SEASON=A&SP=SIP105ADJ&F_AREA=CA#AREAWIDE; "Natural Gas Consumption by End Use," U.S. Energy Information Administration, https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm.

[3] "Integrated Science Assessment for Oxides of Nitrogen – Health Criteria (Final Report, July 2008)," US Environmental Protection Agency, EPA/600/R-08/071, 2008, p. 2–38, https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=194645; Weiwei Lin, Bert Brunekreef, and Ulrike Gehring,
"Meta-analysis of the effects of indoor nitrogen dioxide and gas cooking on asthma and wheeze in children," International Journal of Epidemiology, Volume 42, Issue 6, (December 2013), 1724–1737, https://doi.org/10.1093/ije/dyt150.

[4] "Uniform Appraisal Dataset (UAD) and Forms Redesign Initiative," Fannie Mae and Freddie Mac, 2019, https://singlefamily.fanniemae.com/media/8566/display.

[5] Goldstein, B., Gounaridis, D., Newell, J., "The carbon footprint of household energy use in the United States," *Proceedings of the National Academy of Sciences*, 2020, https://www.pnas.org/content/117/32/19122.

[6] RMI estimates based on internal analysis using data from "Consumer Expenditure Survey 2019," U.S Bureau of Labor Statistics; "Residential Energy Consumption Survey (RECS) 2015," U.S. Energy Information Administration; "Assessing National Employment Impacts of Investment in Residential and Commercial Sector Energy Efficiency: Review and Example Analysis," Pacific Northwest National Laboratory, 2014, https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23402.pdf.

[7] "Rental Assistance Demonstration (RAD)," U.S. Department of Housing and Urban Development, 2020, https://www.hud.gov/RAD.

[8] "2019 American Housing Survey," Department of Housing and Urban Development, 2020; "American Housing Survey (AHS)," U.S. Census Bureau, https://www.census.gov/programs-surveys/ahs.html.

[9] "Monthly Construction Spending, November 2020," U.S. Census Bureau, https://www.census.gov/construction/c30/pdf/release.pdf.