

An Efficient Built Environment

Description:

[Buildings consume 40%](#) of the energy used in the U.S. Because of this, energy efficiency¹ plays a prominent role in state energy and climate policies that aim to reduce energy demand and emissions. Coupled with beneficial building electrification, energy efficiency offers great potential to reduce energy costs and pollution, and provide more resilient, comfortable, and healthy buildings.

As the share of low carbon resources supplying the electric grid increases, the emissions associated with the electric sector decrease. When policies are adopted to shift building energy uses from those based on fossil fuels (like natural gas) to highly efficient electric alternatives, states can ensure achieving the dual objectives of increased energy efficiency and reduced emissions.



Source: ACEEE (2022), [A Roadmap for Climate-Forward Efficiency](#)

Discussion:

Electrification Policies

Target areas of beneficial building electrification include space and water heating systems and other systems and appliances that typically use natural gas or another fossil fuel as an energy source. According to the Environment and Energy Study Institute, new electric heat pump technology can heat space and water at efficiencies of 200 to 300%, compared to 67% efficiency in typical Energy Star gas water heaters.² This not only reduces energy bills, it also results in decreased greenhouse gas (GHG) emissions and improved indoor air quality.

Building codes and financial incentive programs can be used to advance beneficial electrification. While in some states local governments are primarily responsible for adopting and implementing building energy codes, in other states a state legislature, or a code commission tasked by the legislature, adopts and implements statewide standards. Incentive programs established and implemented by states, local governments, or utilities can target replacing systems and appliances that traditionally rely on fossil fuel resources with high efficiency electric systems and appliances including water heaters, furnaces, ovens, and ranges. As an example, [heat pump water heaters](#) and space heating systems are being promoted as high efficiency replacements for traditionally fossil-based equipment. In conjunction with utility regulatory policy, these technologies can also serve as [demand response management](#) tools by utilities in exchange for compensation to the ratepaying customer.

Cities across the country are implementing new building codes promoting beneficial electrification by limiting or banning the installation of natural gas in new construction. State legislatures can pass enabling legislation, allowing municipalities to make independent decisions about beneficial electrification. On the other hand, some states have adopted pre-emptive legislation, banning local governments from adopting policies that limit utility service.³

¹ Energy efficiency includes a number of measures ranging from installing energy efficient appliances to full building renovations.

² For more information, see [EESI's Beneficial Electrification](#).

³ Based upon research conducted by the Center for the New Energy Economy.

Energy Efficiency Policies

Building Codes: Building codes can set requirements for energy systems, require disclosure of building energy usage, and set performance standards for energy use or emissions. Building codes can be required by state legislation or implemented by home rule, where local governments adopt and implement their own standards. The Department of Energy projects that, over time, improvements in building codes can have the greatest single impact in energy efficiency within the built environment. On average, commercial buildings waste 30% of energy used.⁴ Because buildings will be around for generations, energy efficiency within the built environment is a matter of statewide and long-term importance. In an example from Colorado, 2020 [legislation](#) established requirements for new residential construction by requiring that home builders offer energy efficient electric space and water heating options and provide pricing, energy efficiency, and utility bill information for each option.

Appliance Efficiency Standards: Appliance efficiency standards set minimum requirements for efficiency in everything from washing machines to water heaters. Efficiency standards save consumers money on utility bills and reduce energy demand on the grid. Most importantly, they reduce peak demand. Some states have elected to adopt the federal appliance standards that were in effect on January 1, 2017.⁵ These include, among other things, standards on metal halide lamp fixtures, residential furnaces and boilers, and external AC to DC power supplies.

Energy Saving Performance Contracts (ESPCs): ESPCs are a financing mechanism for energy efficiency upgrades. ESPCs are often used by large institutions, such as college or government campuses, allowing them to meet their energy and environmental goals. An energy service company will pay the upfront cost of the efficiency upgrades and execute the project, often guaranteeing the projected energy savings. The large institution will then pay back the service company with savings from their utility bills. This allows institutions to pay for their upgrades from their operating budget, instead of finding new financing, such as loans or bonds, for capital upgrades. Essentially, they pay their upgrade costs with their energy savings. In 2021, [Texas](#) and [Oklahoma](#) passed legislation updating their ESPC statutes. In 2022, [Virginia](#) added select roof replacement projects as energy conservation or operational efficiency measures permissible under an ESPC.

Low-Income Energy Efficiency Programs: While equity should be incorporated into all policy development, it is often necessary to ensure that specific programs are [targeted](#) towards historically underserved populations. In the U.S., low-income households spend approximately [three times more](#) of their income on energy bills than other households. Recent research suggests that weatherization can reduce energy use by [25-35%](#), allowing households to reduce their financial energy burden. The federal [Weatherization Assistance Program](#) (WAP) provides energy efficiency upgrades for income qualified homeowners. However, there might be difficulty in reaching individuals who are eligible. Policy makers might require outreach and education to eligible groups.

A 2022 [report](#) released by the American Council for an Energy Efficient Economy (ACEEE) revealed that the median electric and gas utility spending for low-income programs is approximately 13% of total energy efficiency program budgets. However, the report also found that 27.5% of the U.S. population are income-qualified for these programs, demonstrating a sizeable shortfall in the level of utilities' spending relative to the amount of qualifying low-income customers.

Despite this shortfall, utilities across the country are striving to provide energy efficiency programs for their low-income customers. The ACEEE [report](#) details over 100 low-income energy efficiency programs offered by electric and gas utilities. Additionally, [numerous states](#) have passed legislation and enacted regulations to encourage utilities to increase participation in low-income energy efficiency programs.

Energy Efficiency Resource Standards (EERSs): EERSs require utilities to demonstrate a reduction in energy demand through programs offered to their customers. Because this means selling less energy and reducing revenues, there is not always an incentive for utilities to make their consumers more productive or efficient users of energy. Policymakers may want to require that a utility demonstrate a percent reduction in demand through efficiency or "demand side" programs. Legislators can also instruct their utility regulators to consider energy efficiency when approving rate cases, allowing cost-recovery of energy efficiency improvements on a customer's utility bill.

⁴ See the Office of Energy Efficiency & Renewable Energy's [Commercial Buildings Integration \(CBI\) Program](#).

⁵ Based upon research conducted by the Center for the New Energy Economy.

Virginia is the [most recent](#) state to enact a mandatory EERS. The legislation sets utility energy efficiency standards, while also allowing large industrial consumers of electricity a self-direct option. Self-direct options allow large consumers to be exempt from EERS on-bill cost recovery fees if they commit to making measurable energy efficiency improvements on their own. The bill also sets requirements for the input process utilities must undertake when developing their EERS compliance plans.

Revenue Decoupling and Performance-Based Incentives: Utilities earn revenue by selling energy. As a result, there is little to no incentive for them to promote energy efficiency because it leads to a reduction in sales, and therefore a reduction in revenue. Revenue decoupling disconnects revenue from the amount of energy sold. Rather than selling as much energy as they can, utilities are allowed a set amount of revenue regardless of the amount of energy sold. While this does not directly incentivize energy efficiency, it does remove the inherent disincentive to promote energy efficiency.

Incentive policies can be layered on top of a decoupling policy. For example, performance-based incentives (as determined by a public utility commission) for energy reduction targets can be implemented for utilities, providing a benefit for increasing energy efficiency. This also ensures that customers benefit from the extra revenue from electrification by saving on their bills. 20 states have authorized decoupling through public utility commission (PUC) orders and utility rate cases, and another 11 states have done so through legislation.⁶ As the electricity generation mix changes, it is important to incorporate a regular review of decoupling and incentive policies to ensure they are still meeting their intended purpose.

Programmatically, there will always be greatest benefit by combining measures – incentives that bundle improvements will generate greater gains than individual measures. For example, a high efficiency heat pump will be much more effective and efficient when coupled with improved building insulation. Rather than only realizing the gains of the new mechanical component, this combination of measures will increase the efficiency of the entire system.

Workforce Needs

Workers perform many essential tasks to design, build, maintain, repair, and update existing buildings and infrastructure to run smoothly and efficiently. In early 2020, nearly 2.4 million workers across a range of professions were involved in the energy efficiency sector, according to estimates from the [National Association of State Energy Officials](#). To help more workers enter the expanding sector, states can develop “green” credentialing programs in their public colleges and universities or offer incentives to enter relevant STEM and trades fields. States may also choose to implement mentoring programs to encourage workers to join the industry by creating a place where individuals can address specific needs and answer questions through the lens of experience. States can additionally curate a list of resources for individuals interested in entering the sector, including information about which colleges and organizations offer mentorship programs.

Example Programs:

Minnesota’s Energy Conservation and Optimization Act of 2021:
<https://www.aeltracker.org/bill-details/27929/minnesota-2021-hf164>

EmPOWER Maryland:
<https://www.psc.state.md.us/electricity/empower-maryland/>

New Efficiency: New York:
<https://www.nyserda.ny.gov/about/publications/new-efficiency>

Massachusetts LEAN Multifamily Program:
<https://leanmultifamily.org/>

⁶ See [ACEEE’s A Roadmap for Climate-Forward Efficiency](#).

Duke Energy Neighborhood Energy Saver Program:

<https://www.duke-energy.com/home/products/income-qualified/neighborhood-energy-saver>

<https://www.epa.gov/statelocalenergy/duke-energy-neighborhood-energy-saver-program>

Dominion Energy Virginia, Income & Age Qualifying Energy Efficiency Program:

<https://www.dominionenergy.com/virginia/save-energy/income-and-age-qualifying-home-improvements>

More Information:

American Council for an Energy Efficient Economy:

<https://www.aceee.org/>

A Roadmap for Climate Forward Efficiency:

<https://www.aceee.org/research-report/research-report/u2202>

Analysis by ACEEE of Five State Energy Efficiency and Electrification Policies:

<https://www.aceee.org/sites/default/files/electrification-dc.pdf>

Renovating Regulation to Electrify Buildings: A Guide for the Handy Regulator:

<https://www.raonline.org/knowledge-center/renovating-regulation-electrify-buildings-guide-handy-regulator/>

Equitable Building Electrification: A Framework for Empowering Resilient Communities:

<http://greenlining.org/publications/reports/2019/equitable-building-electrification-a-framework-for-powering-resilient-communities/>

U.S. Department of Energy Weatherization Assistance Program:

<https://www.energy.gov/eere/wap/weatherization-assistance-program>

Energy Savings Performance Contracting:

<https://www.energy.gov/eere/slsc/energy-savings-performance-contracting>

Meeting the Challenge: A Review of Energy Efficiency Program Offerings for Low-Income Households:

<https://www.aceee.org/research-report/u2205>

Supporting Low-Income Energy Efficiency: A Guide for Utility Regulators:

<https://www.aceee.org/toolkit/2021/04/supporting-low-income-energy-efficiency-guide-utility-regulators>

2022 State Energy Efficiency Scorecard:

<https://www.aceee.org/research-report/u2206>

Guidelines for Low-Income Energy Efficiency Programs:

<https://database.aceee.org/state/guidelines-low-income-programs>