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ISSUE BRIEF

DEFINING AFFORDABILITY IN THE CLEAN ENERGY TRANSITION:
PRINCIPLES AND STRATEGIES FOR CLIMATE POLICY

Affordability is the word of the day. Although there is no agreed-upon economic definition of affordability, it is increasingly used as a catch-all term reflecting concern over the rising prices of consumer goods, including household electricity, and how these prices impact Americans across the socioeconomic spectrum.[1] We know that affordability concerns—an understandable response to historically high levels of inflation—significantly influenced the outcome of the 2024 presidential election.[2] Energy affordability was a central part of the 2025 gubernatorial races in New Jersey and Virginia, and it may have influenced the 2026 midterms as well.[3]

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A family checking out at a grocery store in New Orleans, Louisiana.

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Among other sectors, climate policy has come under scrutiny for its perceived impact on both energy affordability, in the form of rising household utility bills, and on the affordability of consumer goods like efficient appliances and electric cars. New York's governor, for example, recently signed legislation delaying state climate goals, citing affordability concerns.[4] Other state governors are grappling with similar issues.[5]

Concerns over rising prices aren't solely political rhetoric; the clean energy transition can carry a real, near-term net cost. The three main levers of clean energy policy—investing in or subsidizing cleaner technologies, taxing polluting ones, and setting new standards—all account for environmental externalities that today's markets and policy do not completely address. Updating markets and policy to include the costs of environmental damage from pollution can increase prices in the near term. The public is rightfully concerned about the cost of living and the extent to which climate policies may contribute to rising prices.

But it is equally true that the environmental and economic cost of unmitigated climate change is significant, though hard to completely quantify. An economy that runs on clean fuels is a healthier and likely more productive economy than one powered by burning fossil fuels.[6] Building a more productive, pollution-free economy is worth the near-term investment, but that doesn't necessarily guarantee a seamless economic experience for individual households or communities.

Given this, how do we ensure that the clean energy transition doesn't become or isn't perceived as "unaffordable"?

Confronting this challenge requires 1) clearly defining the term *affordable* in the context of a clean energy transition, 2) developing a strategy to construct this affordable transition by identifying the real economic problems that climate policy may cause, and 3) crafting policy to better manage the costs of climate transition and how households experience those costs.

DEFINING AFFORDABILITY IN THE CLEAN ENERGY TRANSITION

Different people mean different things when they refer to affordability in policy debates. Without a standard definition of the term in this context, we risk affordability becoming a political cudgel to cut down the clean energy transition.

We propose that an affordable clean energy transition is one in which three conditions are satisfied:

- **Individual clean products are relatively affordable** when the cost to purchase, own, and operate them is similar to or less than the costs of their polluting alternatives. How individuals value differences in up-front costs, operating costs, and the utility between two products is a function of personal preferences and constraints, but policy actions like incentives and taxes can make cleaner options relatively affordable to encourage consumers to adopt them.
- **The price of electricity—the primary low-carbon energy source—is affordable** when it is stable and predictable enough for households and businesses to plan around. Households must be able to meet their basic electric needs without being forced into uncomfortable trade-offs with other necessities, like food and medicine.
- **The broader suite of climate policies are affordable** when they don't concentrate costs on any single funding source (like utility bills), shift costs among customer bases (e.g., from electric to gas customers), or pass them through to essential goods (like fuels or housing) to the point that consumers are forced into uncomfortable trade-offs.

Additionally, the costs and benefits of this transition should be equitably distributed.

THE DIFFERENCE BETWEEN COST EFFECTIVENESS AND AFFORDABILITY

From a societal perspective, a clean energy product, such as an electric car or a heat pump, is cost effective when the total lifetime cost of that product—i.e., the cost of acquiring it, operating it, and the cost of environmental externalities associated with that product's use—is lower than that of a polluting alternative, such as a gasoline-powered car or a gas-fired heater. From the individual customer's perspective, the clean energy product is more cost effective if owning and operating it is cheaper than the polluting alternative.

These conditions, however, don't guarantee that individual households will consider that same product affordable. This is because affordability, unlike cost effectiveness, is much more subjective and contextual. Households that are short of cash today may consider an electric car with an up-front cost premium unaffordable even though it is cheaper to operate and maintain in the long run. On the other hand, households with cash to spare may consider it a worthwhile purchase, or affordable, because it will save them money in the long run or because the electric car meets other personal preferences like style, color, or driving experience.[7]

Affordability of individual products

Individual clean products are relatively affordable when the cost to purchase, own, and operate them is similar to or less than the costs of their polluting alternatives.

The clean energy transition relies on consumers to adopt many clean products such as efficient appliances, electric cars, and heat pumps. Although how individuals value differences in up-front costs, operating costs, and the utility between a clean product and its polluting alternative is a function of personal preferences and constraints, policy actions like incentives and taxes can make cleaner options cheaper to encourage consumers to adopt them.

An electric car, for example, has additional features, like the ability to charge at home and the fact that it doesn't pollute. It also has features that may provide less utility to a consumer, like long charging times and lack of equivalent public charging infrastructure. An electric car may also cost more to purchase, but on the other hand consumers can save money because electric cars are cheaper to operate than those that run on gasoline.

Exactly how consumers value the cost of owning an electric car and any additional features it may or may not provide relative to a gasoline-powered car depends on their personal preferences and budgetary constraints. Policymakers can, however, provide incentives for electric cars and manage the price of electricity to ensure that the electric car is relatively affordable so that consumers are more likely to willingly adopt the cleaner electric option.

The price of electricity requires special consideration

The price of electricity must be stable and predictable enough for households and businesses to plan around. Households must be able to meet their basic electric needs without being forced into uncomfortable trade-offs with other necessities.

The clean energy transition mostly relies on continually reducing carbon emissions from the electric sector and then switching from fossil-powered end uses, like cars and gas-powered appliances, to electricity.[8] Ideally, for the switch to clean electricity to be cost effective for consumers, the cost of using electricity should be lower than the cost of powering the same end use via fossil fuels.

Electricity, moreover, is a necessity for modern life. Rising prices, even when they merely track inflation, can cause hardship for low-income households. If households can't manage to pay their electric bills today, they won't be in favor of investing further in the electricity sector to transition to an economy powered by clean and renewable energy. Ensuring that households can afford their bills is not only a policy priority, but also a prerequisite for building trust in the broader clean energy transition.

Ensuring stable and predictable electricity prices doesn't have to be at odds with pricing electricity efficiently. Mechanisms such as time-varying rates, which charge consumers more for electricity during times of scarcity, aren't at odds with the need for stability and predictability. Households and businesses can manage their usage and thus their monthly bills when they are on a time-varying rate. Moreover, the costs imposed by using electricity spike only during scarcity, which is generally predictable. For example, spikes usually occur in California during summer evenings, which is when demand is high, and there is less solar operating.[9]

The good news is that the price of electricity can be managed. Because electric distribution utilities are natural monopolies, they either are regulated by a state agency or are publicly or member owned and managed by an elected board. Agencies that oversee utilities have significant say on how much utilities spend, what their average rates are, and how they set electric rates for different groups of consumers, including low-income households. This isn't true for fossil fuels like gasoline, whose prices can be more volatile and are subject to the effects of broader international markets and policy actions.

Managing the price of electricity thus requires regulating utilities to ensure that electricity rates are designed in line with climate goals and to ensure that the costs of running the electric grid are equitably distributed among customers.

Affordability of a suite of climate policies

The broader suite of climate policies are affordable when they don't concentrate costs on any single funding source (like utility bills), shift costs among customer bases (e.g., from electric to gas customers), or pass them through to essential goods (like fuels or housing) to the point that consumers are forced into uncomfortable trade-offs.

Markets for many clean energy technologies are still developing, and today they may cost more than their polluting alternatives. On the other hand, because consumers don't see the full cost of pollution when they use products that run on fossil fuels, using polluting technology is systematically underpriced.[10] Even when markets for cleaner alternatives are well developed, consumers may default to the polluting alternative because that's what they are accustomed to or because it is readily available.[11]

These barriers can be overcome via subsidizing cleaner technologies, taxing polluting technologies, offering education and better product labeling, and setting standards that move the market toward the cleaner option.[12] Each of these actions can, however, impose a cost. Subsidizing cleaner technologies requires raising funds from somewhere, taxing polluting alternatives makes it more expensive for consumers to pollute, and technology standards can impose additional costs on producers and consumers when the cleaner option costs more to manufacture. Moreover, the impact of these costs can be inequitable if they raise the prices of essential goods.

Additional checks on the aggregate cost of climate policy—and how that consumers feel that cost—are therefore necessary.

In California, for example, electricity bills include additional fees to fund policy priorities such as a renewable portfolio standard (RPS), energy efficiency programs, rooftop solar net-energy metering, and a price on carbon via the state's cap-and-invest program. The RPS is a standard for clean electricity that the state's utilities must meet; energy efficiency and rooftop solar net-energy metering provide consumers incentives and thereby subsidize the cost of efficient appliances and solar panels; the cap-and-invest program taxes greenhouse gas emissions from, among other things, fossil-fueled power plants. In addition to these, California's electricity rates fund other social policies like wildfire risk mitigation.

Although each of these programs may be desirable, if their funding isn't well managed, it could make electricity increasingly expensive. This in turn risks electricity failing the first two principles of affordability: It can get more expensive to use heat pumps to heat homes relative to fossil fuels; and consumers, especially lower-income households and small businesses, may struggle to meet their basic electricity needs. Instead, a more affordable route might be to pay for these policy priorities through taxes.

Distributional equity is embedded in each part of the definition

Each principle of affordability's definition requires attention to who bears its costs and benefits.

The first principle—that consumers must willingly adopt a cleaner option over a more polluting one—has a threshold that varies by consumer, often as a function of disposable income or wealth. Lower-income households and small businesses typically need more financial assistance to adopt clean energy equipment such as heat pumps and electric vehicles.



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The second—that essential goods like electricity must remain stable and predictable-—is especially salient for low-income households on tight budgets and for price-sensitive industries and small businesses. The same holds for the third principle: Lower-income households and other price-sensitive consumers are the ones most likely to bear the consequences when the cost of funding climate policy shows up as higher prices for essential goods. This is because they would then end up paying a larger share of their income, relative to wealthier households, to fund climate action.

STRATEGIES FOR ADVANCING AFFORDABLE CLIMATE POLICY

Defining affordability can shape proactive climate policy, protect it from being dismissed on nebulous affordability grounds, and give policymakers a framework to manage additional costs of the clean energy transition. The remainder of this guide focuses on the strategies and questions that put the three principles into practice.

Opportunities available today

Some measures both advance climate progress and reduce costs at the same time, without requiring a trade-off between the two. These opportunities fall into three categories:

Efficiency. An inefficient system is costlier and more energy intensive than it needs to be. And because it is more energy intensive than necessary, the inefficient system emits more carbon and air pollution. Efficiency opportunities are therefore among the most direct points of intersection between climate progress and affordability: Reducing waste is simultaneously good for lowering bills, good for cutting carbon emissions, and good for easing local air pollution.[13]

Expansion. Larger systems—markets or jurisdictions with common regulatory requirements—generally provide more opportunities to reduce costs and emissions by taking advantage of diversity of resources, capabilities, and demand.[14] Expansion doesn't only mean building more; it means connecting what already exists so the whole system can operate more efficiently than its parts.

Expanding a system creates new winners and losers, and incumbents can resist that change via political opposition. Practitioners should anticipate this opposition and decide whether it is worth overcoming to attain the long-run affordability and climate gains from expansion.

Innovation. Fostering the right conditions—consistent policy and a well-designed market—encourages innovation and can reduce the costs of the clean energy transition.[15] History shows that when these conditions are in place, costs for clean technology can fall faster than expected.[16] Another route to innovation is via public investment (discussed below).

Enhancing Equity in Existing Systems

The three categories above reduce systemwide costs, but such reductions do not automatically reach everyone equitably.[17] Addressing this requires intentional policy design. First, initiatives to make individual goods affordable—such as those that incentivize cleaner options like energy efficiency and electrification programs—should target lower-income households first. Second, utility regulators should require discounted electricity rates for low-income households. Together, such policies can help ensure that households of all income levels can participate in the clean energy transition.

Examples of such policies include low-income energy efficiency programs, bill assistance programs such as percentage of income payment plans (PIPP) or California Alternate Rates for Energy (CARE) discounts, and income-graduated fixed charges to reduce the inequitable impact of existing rate design structures.

Managing additional investment in the clean energy transition

Where advancing climate goals requires new spending—whether in the form of subsidies, standards, or new infrastructure—three questions help ensure that spending is efficient, well funded, and fairly distributed.

Is this the most cost-effective way to make progress, both now and later?

Prioritizing the cheapest path to emissions reductions matters, but choosing only the most cost-effective actions today, without a pipeline of longer-term ones ready to sustain momentum for emissions reduction, can exhaust available options. The right balance is a mix: near-term cost-effective action alongside longer-term investment in nascent sectors.

For example, focusing only on deploying cheap and effective solar and wind energy is the fastest way to reduce grid emissions. However, completely substituting gas and coal generation also requires deployment of complementary technology such as geothermal and long-duration storage. Ensuring that energy markets are ready for these technologies is needed alongside solar and wind deployment.[18]

Getting the portfolio balance wrong in either direction, too cautious or too speculative, can have negative consequences. An overly cautious portfolio may not achieve ambitious carbon goals and may be costlier to society in the long run; an overly speculative one front-loads costs without near-term payoff.

Who bears the cost of making this additional investment, and are the total amount and distribution sustainable?

Durable climate funding structures draw on multiple sources—federal tax expenditures, state tax bases, ratepayer surcharges, and carbon pricing proceeds—without exhausting any one of them. Every funding source has a sustainable range; drawing too heavily on any single one, even a progressive one, risks making that funding politically or economically unsustainable.

A politically sustainable funding source isn't regressive. One of the most progressive funding sources available today is the federal tax base, which is why policies like the Investment Tax Credit and Production Tax Credit for renewable energy are among the most equitably funded climate policies. Funding sources like surcharges on electricity bills or taxes on gasoline are less progressive.[19] And whether they are regressive is context dependent.[20]

The practical step for practitioners is straightforward: Given a choice of funding sources, select the more progressive one unless there is a specific reason to rely on a less progressive source. (For instance, the less progressive source may provide the right price signal, or the more progressive source may be politically unavailable.)

How many additional public priorities can the climate policy address?

Advancing climate policy often requires partnering with stakeholders whose support depends on more than emissions reduction alone. For example, their concerns may include domestic manufacturing, labor standards, or targeted benefits for specific communities. Each priority is a worthy cause on its own and can help build the coalition needed to make a policy durable, but espousing other priorities can increase the costs of attaining climate-focused outcomes.

Sometimes it is worth taking the scenic route, but we must be clear about what those detour costs are and whether they are worth it. The goal isn't to avoid these trade-offs but to build a durable coalition while efficiently reducing carbon emissions.

CRAFTING AFFORDABLE POLICY: AN ILLUSTRATION

To illustrate exactly how each affordability principle can be met via a mix of the strategies listed above, we pick three policies that run the gamut: decarbonizing the electric sector, electrifying buildings, and taxing carbon via mechanisms like cap-and-invest.

Decarbonizing electricity

Decarbonizing electricity requires substituting fossil-powered generation with clean energy and then delivering cleaner electricity to power both existing and new end uses. Applying our proposed principles of affordability, successfully decarbonizing electricity will look like this:

- Consumers willingly use electricity to power their cars and appliances because it is cheaper than running them on fossil fuels.
- The price of electricity is stable and predictable enough for households and businesses to plan around. Also, all households are able to meet their basic electric needs without being forced into uncomfortable trade-offs with other necessities.
- The suite of policies to decarbonize the electric sector do not concentrate costs on any single funding source, or shift costs among customer bases, or pass them through in the price of electricity itself to the point that consumers are forced into uncomfortable trade-offs.

Distributional equity is implicit in the second and third conditions.

Getting to a very low carbon electric grid—90 percent (or more) carbon free, for example—requires additional investment. However, this doesn't have to conflict with providing affordable electricity.

Opportunities available today to make electricity more affordable

Making the electric sector more **efficient** will reduce the cost of delivering electricity and make it less carbon intensive. Effectively regulating utilities to ensure that they make efficient investments, efficiently dispatching electricity generation via wholesale electricity markets, providing the right price signals via electricity rates to align demand for electricity with supply, and **expanding** regional electric grids and wholesale markets to more efficiently serve a geographically diverse region are prominent examples of useful actions.[21] Additionally, a more expansive transmission system may be necessary to interconnect different regions, and such a system opens the opportunity to interconnect more renewables to the grid.

State renewable portfolio standards and federal tax credits combined with organized energy markets and innovation in manufacturing can foster **innovation** to dramatically drive down costs of solar and wind power.[22] Permitting reform for rooftop solar can reduce installation costs in a way that doesn't require any new technology at all.[23]

Regulators and utilities can offer discounted electricity rates to lower-income households and allocate fixed costs of the grid in a manner that minimizes utility bill burden among these customers.[24]

Managing additional investments in the electricity sector

Is this the most cost-effective way to make progress, both now and later?

Integrated resource planning, stable policy signals, and correct market design can encourage the most efficient mix of clean energy and storage to reduce carbon emissions and meet electric demand. Getting to a low-carbon grid requires acquiring the right mix of clean resources available today—predominantly solar, wind, and battery storage—and making some longer-term investments in complementary resources such as geothermal and offshore wind.

Who bears the cost of making this additional investment, and are the total amount and distribution sustainable?

Investing in clean energy is usually funded via the electricity sector itself. Any additional spending on climate programs shows up via an increase in electricity bills.

Federal Investment and Production Tax Credits effectively co-fund the clean energy transition by using progressive federal tax dollars to reduce the ratepayer burden of funding clean energy. On the other end of the progressive-regressive spectrum, policies like rooftop solar net-energy metering can in instances increase electricity rates by creating a cross-subsidy from lower-income households that don't own rooftop solar to those that do.[25]

To ensure that electricity remains affordable for all households, intervention in regulatory processes can shape decisions that determine who bears the costs of electric sector spending and how these costs are recovered.[26]

How many additional public priorities can the climate policy address?

State clean energy targets often contain related provisions such as restrictions on where new clean energy resources can be built, limitations on how resources outside a jurisdiction or grid operator's boundary count toward compliance, or labor standards for constructing new resources.[27] Customer-side programs also often require spending on specific program types, such as those that target a specific technology or a specific customer segment like low-income customers.

Many of these requirements, although necessary or desirable, can add costs to the clean energy transition. Policymakers should strive to balance providing benefits to key stakeholders with efficiently decarbonizing the electric sector.

Decarbonizing buildings via heat pumps

Decarbonizing buildings mainly entails substituting fossil fuel use for space and water heating with heat pumps that run on cleaner electricity. Applying our proposed principles of affordability to building decarbonization, successfully decarbonizing buildings via heat pumps looks like this:

- Consumers willingly adopt heat pumps for space and water heating instead of fossil fuel–powered appliances because they are cheaper, cost less to operate, and provide the same service as fossil fuel–powered appliances.
- The price of electricity, which powers heat pumps, is stable and predictable enough for households and businesses to plan around. All households are able to meet their basic electric needs without being forced into uncomfortable trade-offs with other necessities.
- The suite of policies to decarbonize the building sector do not concentrate costs on any single funding source or pass them through to consumers by imposing standards on an immature market. Policymakers also develop strategies to protect customers left paying for the legacy gas system as heat pump adoption accelerates.

Managing the price of electricity through the clean energy transition, explained in the previous section, is a prerequisite for building decarbonization. Equitable distribution of costs and benefits is inherent in this policy because getting all households to adopt heat pumps requires providing enough incentives to get lower-income households to adopt heat pumps and managing the price of electricity such that these homes also reduce their household utility bills.

Further, to comply with these affordability principles, decarbonization policy must figure out how to avoid concentrating costs of the legacy gas system as a growing number of consumers, who may be wealthier than the average and own their homes, make the switch to clean electricity. This is a possible mid-transition problem that arises only when significant building decarbonization momentum builds.

Opportunities available today to encourage heat pump adoption

Making the electric sector more **efficient**, as explained above, will reduce the costs of operating heat pumps and make owning them a better economic proposition. Making heat pump installations more efficient—using less time and material and right-sizing equipment—will make obtaining heat pumps cheaper.

Expanding consumer options and installation opportunities, by promoting ductless heat pumps or encouraging consumers to upgrade their existing air conditioners to heat pumps, increases the odds of households adopting and using the technology. More expansive and consistently funded programs can work to impact all aspects of the heat pump market—consumer education, labor practices, and so on—that smaller, balkanized programs struggle with.

Consistent policy signals and stable programs can develop markets and encourage contractors to **innovate** and provide more efficient installations for consumers. These consistent signals will give manufacturers the incentive to put out cheaper and more efficient heat pumps.

Managing additional investments to encourage heat pump adoption

Is this the most cost-effective way to make progress, both now and later?

Getting the most out of available funding to reduce carbon emissions requires focusing on where heat pumps save the most carbon and air pollution; this means targeting high-usage consumers, regions with cleaner electric grids, and climates where heat pumps operate most efficiently. These efforts need to be combined with early investment to ensure the next tranche of the fuel-substituting market is ready for heat pumps.

Who bears the cost of making this additional investment, and are the total amount and distribution sustainable?

Heat pump policy must rely on progressive and diverse sources of funding, when available, and develop a strategy to ensure that households that can't adopt heat pumps aren't left footing the bill for maintaining the legacy gas system.

How many additional public priorities can the climate policy address?

Programs are often tasked with additional objectives such as making other energy upgrades and meeting wage requirements.[28] These are worthy goals and are to some extent necessary to save additional energy and garner broad support for programs. These can, however, add costs to the program and slow implementation if not well managed.



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Induction stoves are more energy efficient than their gas counterparts.

A well-designed cap-and-invest policy should conform to the principles laid out in this paper

Cap-and-invest policy sets a price on carbon emissions, creates a carbon market, and applies the revenue from that market to further policy goals. Because it is both a funding mechanism and a price signal, it plays a critical role in keeping the clean energy transition affordable when it is designed with the three principles in mind.

Although this policy mostly falls under the third affordability condition—keeping total costs of the transition in check—it can also affect the first two conditions of affordability depending on how carbon markets increase electricity prices and whether policymakers use the proceeds of carbon markets to buy down the cost of clean alternatives.

In accordance with the principles of affordability, a cap-and-invest policy must:

- Apply at least some revenue to reduce the cost of clean energy options, making them cheaper for consumers. This requires collecting sufficient revenue, which in turn requires setting a stringent enough allowance limit and a price floor.
- Prevent its own downstream cost impacts from becoming a political liability, by avoiding price volatility or unsustainable increases in the price of essential goods. This requires a price ceiling and other mechanisms to manage allowance prices directly.
- Direct proceeds toward keeping electricity affordable, particularly for low-income households during periods of price volatility, and toward longer-term benefits through programs like low-income energy efficiency. Making this distributional benefit visible is necessary to build durable support for the policy.
- Protect economically sensitive industries through complementary policies, such as free allowances for specific sectors, without letting that protection come at the expense of consistent climate progress.

When designed this way, cap-and-invest does more than fund the transition; a stable, well-managed market price encourages regulated entities to innovate and reduces their emissions in ways that are cheaper than the prevailing price for carbon emissions. Linking markets across regions can extend these benefits further, making the market more efficient and its price more stable at the same time.

CONCLUSION: AN AFFORDABLE CLEAN ENERGY TRANSITION IS POSSIBLE AND NECESSARY

Affordability can be a nebulous concept used to justify all sorts of policies, both pro- and anti-climate, but it is also a symptom of a real challenge that the clean energy transition must confront. Due to high recent inflation, prices of individual goods are rising faster than they have in the recent past, and consumers are rightfully concerned. Policymakers in turn are looking to identify both problems and solutions to affordability concerns. Because the clean energy transition is premised on near-term investment for long-term gain, it runs the risk of being considered unaffordable.

This paper helps climate policymakers embrace this challenge and come out better for it. Our working definition of affordability in the clean energy transition provides policymakers with tangible goals to work toward: keeping the price of individual clean energy products competitive with polluting alternatives for all households, managing the price of electricity—a daily necessity and the fuel almost every clean technology runs on—and keeping overall cost impacts of the climate transition in check.

Policymakers can accomplish these goals by focusing on many opportunities available today to cut carbon emissions and costs, ensuring that the costs and benefits of existing climate policy are equitably distributed, and carefully managing the necessary additional investments.

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13 Consider the electric grid, for example. A demand-side inefficiency, like an inefficient clothes washer or an uninsulated home, means that more electricity generation is needed to fulfill demand than would otherwise be required. Because the marginal resource in almost all of the United States is a gas-fired power plant, inefficiently high demand means more money is spent on fuel, more carbon is emitted, and more local air pollution is produced by gas power plant operation. Strategies like energy-efficient appliances and time-varying pricing can reduce demand-side waste and lower costs for consumers. On the supply side, better resource planning and well run energy markets can ensure that the grid is powered by the least-cost mix of resources available. A well regulated system is necessary to make sure consumers aren't overpaying for utility grid services.

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15 Mohit Chhabra et al., *Effective, Efficient, and Informed Research, Development, and Demonstration for the Electricity System: Issue Paper* (National Academies Press, 2026), https://doi.org/10.17226/29348.

16 Catherine Wolfram, "What Drove Solar PV Price Reductions?," Energy Institute at HAAS Blog, Haas School of Business, University of California at Berkeley, September 9, 2019, https://energyathaas.wordpress.com/2019/09/09/what-drove-solar-pv-price-reductions/.

17 Efficiency programs that rely on household participation tend to reach higher-income households first; things like weatherization, smart thermostats, and rooftop solar all require up-front capital or creditworthiness, which lower-income households are less likely to have. System expansion can socialize costs broadly while concentrating near-term benefits among customer classes best positioned to take advantage of buying cheaper goods. Although innovation can benefit everyone via lower costs, someone needs to bear higher costs during the investment period.

18 Kasparas Spokas and Wilson Ricks, *Clean Firm Generation Technologies: What, Why, How*, Clean Air Task Force, February 17, 2026, https://www.catf.us/resource/clean-firm-electricity-technologies-why-what-how/.

19 James Sallee, "Equitable Decarbonization Requires Rate Reform," Energy Institute at HAAS Blog, Haas School of Business, University of California at Berkeley, September 26, 2022, https://energyathaas.wordpress.com/2022/09/26/equitable-decarbonization-requires-rate-reform/.

20 For example, because electricity usage does not always increase proportionally with income, lower-income households spend a larger share of their income on electricity bills, meaning that surcharges can fall harder on them relative to higher-income households. Severin Borenstein, "(Mis)Judging Energy Hogs," Energy Institute at HAAS Blog, Haas School of Business, University of California at Berkeley, August 21, 2023, https://energyathaas.wordpress.com/2023/08/21/misjudging-energy-hogs/.

21 Mohit Chhabra, "Powering Change: Understanding California's Electric Rate Challenges and Affordability Solutions," NRDC, March 11, 2025, https://www.nrdc.org/resources/powering-change-understanding-californias-electric-rate-challenges-and-affordability; Severin Borenstein and James Bushnell, "Do Two Electricity Pricing Wrongs Make a Right? Cost Recovery, Externalities, and Efficiency," *American Economic Journal: Economic Policy* 14, no. 4 (2022): 80–110, https://haas.berkeley.edu/energy-institute/research/abstracts/wp-294/.

22 Wolfram, "What Drove Solar PV Price Reductions?"

23 Louise Bedsworth, "Four Innovations Driving Climate Progress in State Government," Federation of American Scientists, April 22, 2026, https://fas.org/publication/four-innovations-driving-climate-progress-in-state-government/.

24 RMI, "Energy Affordability Toolkit: Low Income Discount Rates," updated June 1, 2026, https://affordability-toolkit.rmi.org/pdfs/low-income-discount-rates.pdf.

25 Fischer J. Espiritu Argosino and Christopher R. Knittel, *Renewables and Electricity Affordability: Untangling Correlation from Causation*, MIT Center for Energy and Environmental Policy Research, December 2025, https://ceepr.mit.edu/workingpaper/renewables-and-electricity-affordability-untangling-correlation-from-causation/; Sydney Forrester et al., *Residential Solar-Adopter Income and Demographic Trends: 2024 Update*, Lawrence Berkeley National Lab, December 2024, https://emp.lbl.gov/publications/residential-solar-adopter-income-3.

26 While there are ways to minimize the cost impact, there will be periods when the transition will carry additional costs. But just because systemwide costs rise, that doesn't mean that prices for all customers will need to commensurately increase. How those cost pressures are felt by different electricity customers is determined by local regulators, and these regulators have the ability to protect the public interest and prevent electricity price increases for those households that can least afford it.

27 California Public Utilities Commission, "RPS Compliance Rules and Process," accessed September 21, 2026, https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/rps/rps-compliance-rules-and-process.

28 U.S. Government Accountability Office, "Recovery Act: Officials' Views Vary on Impacts of Davis-Bacon Act Prevailing Wage Provision," GAO-10-421, March 24, 2010, https://www.gao.gov/products/gao-10-421.