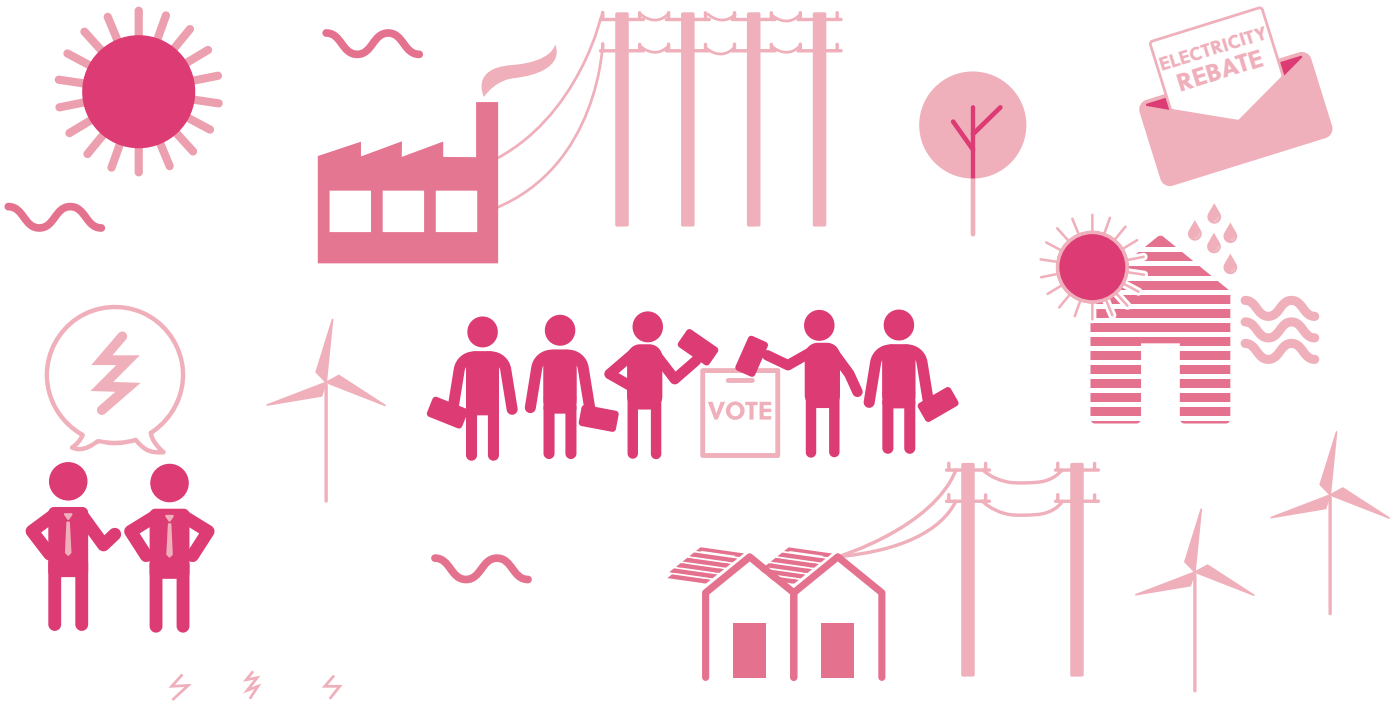
Policy Brief:

Energy Justice: An Evolved Model



The shifting energy landscape and the increasing impacts of climate change are leading to new frameworks for both energy provision and governance. Energy democracy envisions energy as "a democratically controlled, common resource for enriching and servicing our communities. Communities are powered by renewable energy, with the majority coming from community-based decentralized electricity generation that provides affordable, reliable, and clean power to meet community needs."[22] It is a framework that looks at both democratized energy management as well as decentralized energy generation:

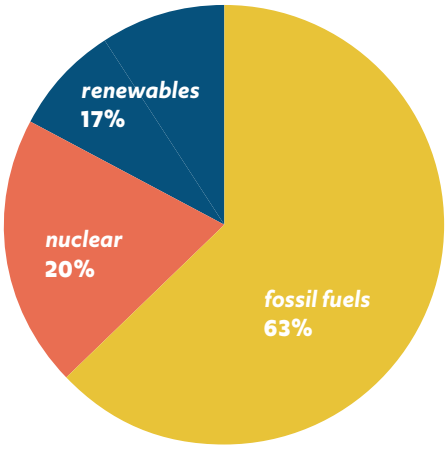
Democratized energy management: energy, just like all natural resources, should be managed for the benefit of all. Most utility systems manage energy resources for investors benefit, and even publicly-owned utilities are often dependent on purchasing energy from these same companies and then distributing it to their customers. In contrast, democratized energy management shifts control to local communities, enabling people to be active participants in deciding what their energy system looks like.

Decentralized energy generation: renewable energy projects that are small-scale (generally considered 5 megawatts or less), can be sited in a diversity of homes, businesses and community institutions. They are more resilient to the impacts of climate change, including severe weather events, and do not have the same environmental impacts as large-scale fossil fuel generation projects. Decentralized energy generation can be a tool to increase localized economic benefits as well.

THE Climate + Clean Energy EQUITY FUND

Snapshot of the Current Utility System

Even as community groups advocate for a more equitable vision of energy justice, it is important to keep in mind the complexities of the current energy infrastructure currently under the jurisdiction of utilities, and their core functions, which include generation, transmission, distribution, and other consumer services.

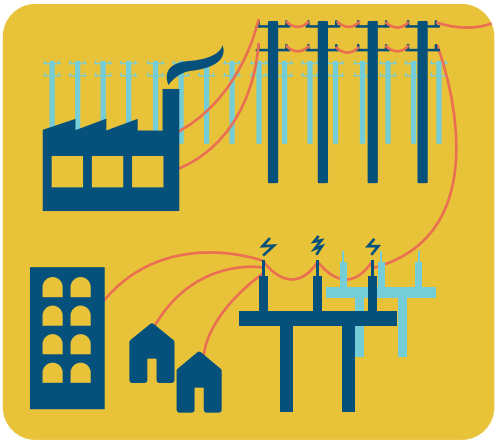


GENERATION:

Energy is generated at individual facilities. In 2018, 63% of all energy generated in the US was from fossil fuels (coal, natural gas, petroleum or other gases); 20% was from nuclear energy, and about 17% was from renewable energy sources.[1] This includes about 8,652 power plants,[2] as well as hydroelectric dams, solar, wind and geothermal generators.

TRANSMISSION AND DISTRIBUTION:

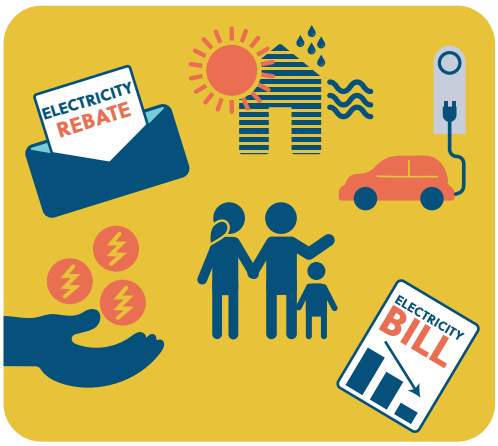
There is an extensive infrastructure network in place to carry energy generated at individual facilities to places where energy is used, which is collectively known as the energy "grid." The grid includes 200,000 miles of transmission lines and 5.5 million miles of local distribution lines.[3] Energy is transported through high voltage, overhead power lines or underground power cables, often over long distances and across state borders.[4] The large-scale infrastructure has both negative environmental impacts, and is also inefficient; it is estimated that 8 - 15% of power is lost between generation and consumer.[5]



There are three large, interconnected systems of transmission lines across the entire country. The operation of these networks is divided amongst 8 Independent System Operators or Regional Transmission Organizations, which manage sales, competition and use of transmission lines within their respective regions. They also ensure that the total "load" - the amount of energy demand - is balanced with supply (there are also additional entities that help balance the load, usually utilities who take on this responsibility).[6] Wholesale energy transactions are regulated by the Federal Energy Regulatory Commission, while transmission lines must be approved by state utility commissions. Local transmission systems are connected into this larger system.

The transmission lines go to a substation, which then has a system of wires and poles that transmits energy from the substation to homes, businesses and any facilities that need power. Distribution lines are not networked, so it is hard to move energy across lines depending on consumption needs. They system not only includes local power lines, but also approximately 180 million utility poles across the country, which are generally owned by the utilities.[7]

One of the primary purposes of the grid is too ensure reliability of services. Different places need energy at different times, and the grid is supposed to help ensure that energy is deployed to the right places at the right time. It is also meant to create flexibility so that energy generated in one area that is not needed at that time can be sent elsewhere for use. For example, wind turbines must be built where the wind is the strongest; the grid allows for this electricity to be transmitted to distant cities.[8]



CONSUMER SERVICES:

Utilities provide a range of services to consumers, most predominantly reliable, reasonably priced electricity. In doing so, they set the rates for energy for individual consumers. They also administer energy efficiency programs, including rebates for energy efficient purchases such as appliances. Some offer energy rate assistance programs or other programs to reduce the energy burden for low-income people, such as weatherization services. Increasingly, utilities are also providing electric vehicle infrastructure and services as well.

Injustices in the Current System and Challenges to Advancing Equitable Energy Policies in the Current System

The profit-driven, centralized model has resulted in numerous injustices:

Disproportionate burden of pollution: Fossil-fueled power plants are not only drivers of climate change, which will impact communities of color first and worst, but are disproportionately located in low-income communities and communities of color, leading to significant health and quality of life burdens.

Higher energy burden for low-income people and people of color: Low-income households pay up to three times as much as the average household on their energy bills, and renting, multifamily, African American, and Latino households also face disproportionately high "energy burdens."[9] This can exacerbate mental and financial stress, as well as lead to higher rates of health problems. Nationwide, 25 million households – including 11 million with children – reported reducing or forgoing food or medicine to pay for energy-related household expenses in 2015, impacting nearly half of all Black and Latino households, and over 17 million households reported receiving disconnect or deliver stop notices in the past year.[10]

Lack of access to renewable resources: disparities in access to renewable energy are pervasive; a recent study found that majority Black, Latino and Asian census tracts show on average less rooftop photovoltaics (PV) when compared to majority white census tracts.[11] While governments have moved billions in clean energy tax incentives and credits, the bottom three fifth of income earners in the US have received only ten percent of the tax credits.[12]

Undemocratic decision-making: many large-scale utlities have opaque and technocratic governance and decision-making processes that inhibit community engagement and participation.[13] Rural electricity cooperatives were first started in the 1930's as a way to provide energy to rural areas because IOU's would not extend services to areas where the population was so dispersed. They are still the main energy provider in rural areas.[14] In the South, many rural cooperatives deliberately excluded Black and poor residents from service provision when they were established, and have continued to operate in an exclusive manner.[15] Rural cooperatives rely predominantly on coal, and surveys have shown that elections and member participation is low, undermining the potentially democratic governance structure.[16]

Roadblocks from achieving an evolved and just model include:

- Financing the transition from fossil fuel based energy generation to renewables is costly. This includes the costs of decommissioning fossil fuel facilities and infrastructure, such as coal plants, but also the needed investments in transmission lines, electric charging infrastructure, etc. Who should bear the cost - ratepayers, shareholders or private companies - is a critical policy challenge.
- Often places and times where renewable energy can be plentifully generated does not line up with the highest demand; thus increased storage is critical.
- There are often significant technical and legal barriers to bringing more distributed energy generation online, such as local permitting for renewable siting and interconnection with the grid, among others.
- With increased risks from climate change, there is a heightened need to ensure proper maintenance and safety of energy transmission infrastructure, such as poles and lines.
- IOU's are concerned with providing a profit for their shareholders, not maximizing ratepayer interests or environmental benefits.
- Utilities have generally fought or at least not supported increased renewable energy mandates, because they have so many investments in the fossil-fuel based system.[17]
- Utilities have in particular fought distributed generation, or small-scale renewable energy projects, because it threatens their monopoly and entire business model.[18] Not only does it increase renewable energy, it also diversifies where and who is generating energy.
- As discussed, IOU's essentially have a built-in incentive to build more large-scale infrastructure because they can justify rate increases to regulatory commissions is by covering infrastructure costs.[19]

Key Frameworks to Consider when Developing Equitable Utility Policies

How energy is generated - from fossil fuels or renewables - is clearly an important question in the fight against climate change and for clean air and water, but there are multiple additional dimensions that impact both long-term sustainability of energy sources and whether or not all people have equitable access to affordable services. Each of the below core functions must be considered when developing solutions to make energy service provision more equitable and sustainable.

Governance and Management: how an entity is structured makes a significant difference in how it will provide services, from the cost of energy, to the consumer services provided, (ie 10% return on investment can be 10% to lower bills, develop programs for LIFs) to the sources of energy provided. There are solutions that focus on reforming the functioning of traditional utility structures, and there are also solutions that develop alternatives outside of the traditional utility structure, which include Community Choice Aggregates and new energy cooperatives.

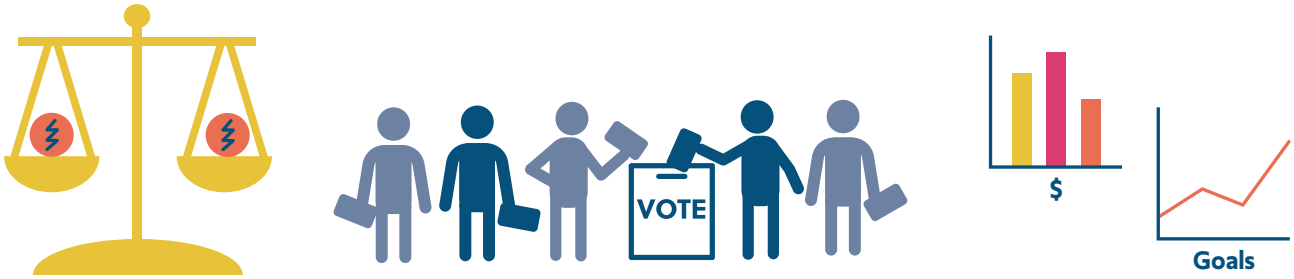
Generation: Despite increases in renewable energy, our dominant system is still highly dependent on fossil fuels. Policies must consider orderly retirement of these facilities and address the "stranded assets" issue. There are a range of solutions that can create incentives, requirements or re-structure utilities to prioritize either centralized or decentralized renewable energy production and increased energy efficiency. Other solutions focus on expanding the generation of decentralized renewable energy resources, such as distributed generation and shared solar. A hybrid of these sources can also be pursued at a state level.

A Resilient Grid: the current electrical grid is out of date in need of upgrades, vulnerable to disruption from severe weather events, and must still be managed and maintained, and even expanded to help integrate renewable energy. At the same time, new technologies can significantly reduce energy usage and create a more dynamic energy grid than the centralized utility model. Policy solutions focus on increasing the resilience, technological capacity and consumer interface of the grid.

Energy as a Right: ensuring that all people have access to affordable, reliable, and renewable energy is critical. Ideally, these services are combined with affordable, accessible energy efficiency upgrades that can reduce household energy costs, improve health, reduce energy demand and thus GHG emissions, and include robust, in-language outreach programs to low-income communities and communities of color.

EV Policies and Infrastructure: EV charging structure investments should be made in areas that bear disproportionate amounts of transportation related pollution. These investments should also be placed in locations that are deemed important by these communities and paired with rate payer protections and programs that will not inhibit the adoption of electric vehicles for low-income households.

Potential Policy Solutions



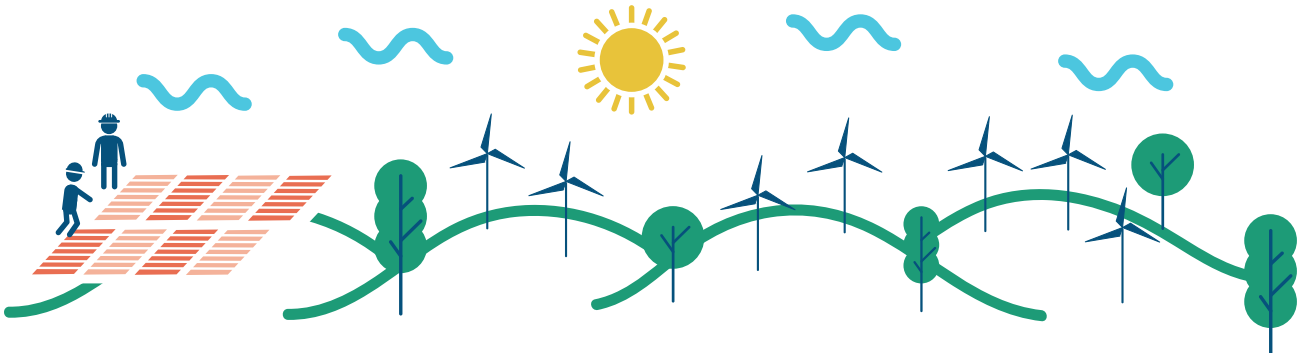
Governance and management of the entity providing energy:

Performance based regulation (PBR): these policies seek to align utility profits with environmental and social goals, instead of capital investments as is the traditional model, seeking to "reward the utility based on its achievement of specific performance measurements."[20] Incentive regulation is a specific form that sets performance goals for a multi-year period and allows the utility flexibility in how to achieve the goals. At the end of the period, the utility is rewarded if they met the performance goals. De-coupling, or separating the utility finances from the volume of energy it sells, is another example of PBR. Hawaii is using PBR to move forward its commitment to 100% renewable energy by 2045. A recent bill directed regulators to create a new utility business model that separated revenues from capital expenditures. It will "will create PBR incentives that "directly tie an electric utility revenues to that utility's achievement on performance metrics" through incentives and penalties to increase customer affordability, support grid reliability, and rapidly transition to renewable energy."[21]

Including the social cost of carbon in utility accounting: utilities can be required to consider the full cost of climate pollution in their planning or wholesale market sales. These "adders" are generally based on the "social costs of carbon," or the long-term costs of damages from greenhouse gas pollution, including far-reaching impacts such as property damage from flood risks, changes in agricultural productivity, public health impacts, loss of natural ecosystem services, and more.[22] Public utility commissions in at least 7 states require carbon adders.[23] For example, under New York's utility reform efforts, they are now required "to consider the full marginal damage costs associated with carbon dioxide pollution when performing benefit-cost analyses. This will allow utilities to avoid courses of action that look deceptively "cost-beneficial" because externalities that will be imposed on all of society are being ignored."[24] The recently passed clean energy standard in Washington requires utilities to adopt the federal social cost of carbon and include it in all decisions.[25]

Municipalizing energy service provision: this entails taking energy service provision out of private control and placing it into public control. Reasons for municipalization include a desire to increase the amount of renewable energy available, reducing costs of energy provision, to an interest in increased local control. Municipal utilities often have lower electricity rates than IOU's, for several reasons: they do not operate on a for profit basis, have access to low-cost government financing for infrastructure, and do not pay federal taxes.[26] Publicly owned utilities have elected or appointed Boards, which can provide opportunities for increased accountability. However, publicly owned utilities do not necessarily have more equitable, sustainable service provision; for example, many are exempt from renewable energy mandates and thus do not provide substantially higher amounts of renewables, and rely on buying wholesale from the same fossil-fuel generators as IOU's. Municipalization is also a complicated process that varies from state to state, and different laws can either impede or support municipalization.[27] It can also take a long time, and potentially be contentious with an IOU that does not wish to give up customers.[28] Examples of municipalization efforts include Boulder, Colorado, who has been in a process to create a publicly owned utility separate from large IOU Xcel Energy.[29] Boulder's decision has been driven predominantly by a desire to increase renewable energy provision; the process started in 2010 and is in its final stages now.

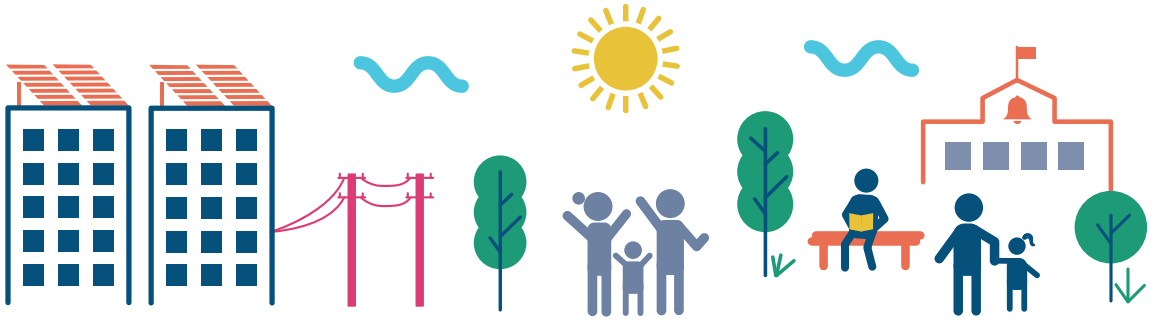
Cooperatives: cooperatively run energy utilities have a long history in the US, and have been gaining more interest recently as a way to empower local communities and increase renewable energy provision. Cooperatives are consumer-owned businesses, and are separate from local government.[30] The governing Board of a cooperative is voted on by and comprised of member-owners, theoretically containing more opportunities for accountability and community control. Cooperatives operate on a not for profit basis, and any revenues are credited to member-owners.[31] However, rural cooperatives have not always operated with principles of democratic governance or sustainability, as discussed above. Cooperatives can also be subject to contracts that prohibit increasing decentralized energy.[32]



However, a more recent generation of cooperatives have started developing with a clear focus on increasing renewable energy and inclusive, local control.[33] Examples include the Kauai Island Utility Cooperative in Hawaii, started in 2002 when a local group bought a power plant from a Connecticut company and turned it into a rural electric cooperative. In order to shift from relying on importing diesel electricity, the coop has steadily built out renewable resources, and is set to hit 50% renewable energy this year.[34]

There are a range of energy-specific policies that are prerequisites to the development of energy cooperatives, which are discussed in the RPS section, particularly inclusive financing models such as net metering and feed-in-tariffs.[35] Other ways to generate support for renewable energy worker cooperatives are to secure low-cost public loan financing or create specific public funds to support renewable energy co-operatives. Eligibility, or better yet, preference for cooperatives can also be included in the criteria for public energy investments or related grant programs.[36]

Community Choice Aggregates: this is a mechanism which allows local governments to aggregate consumer demand in a particular area to provide alternative energy supplies, while the IOU continues to operate the transmission and distribution grid.[37] This allows local customers to have more control over where their energy is coming from, increase the supply of renewables, and potentially lower costs for customers. States have different laws governing whether a CCA is allowable or not; currently seven states (California, Illinois, Ohio, Massachusetts, Rhode Island, New Jersey, and New York) permit them.[38] Bulk purchasing is another option for customers to aggregate their purchasing power to secure increased renewable energy. It does not require the establishment of a whole new utility, but can be a way for individuals to group together to access renewable energy and thus drive demand.[39]

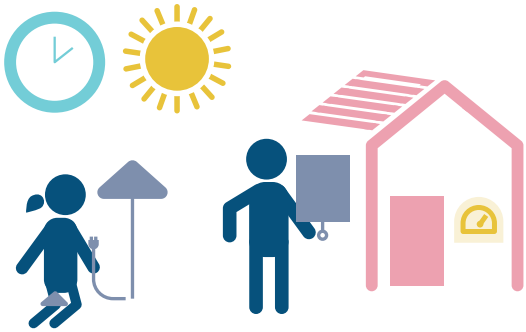


Increasing renewable energy generation:

Integrated resource planning requirements: traditional utility planning requires utilities to submit a plan to regulatory commissions on how much energy they forecast is needed and how they will align this with their available supplies at the lowest cost. This model often under values energy efficiency, which focuses on reducing demand for energy, as well as the social and climate benefits from renewable energy. In contrast, Integrated Resource Planning is a comprehensive planning process to determine the most efficient, affordable, and reliable mix of energy sources, taking into account factors like reliability, cost-effectiveness, and impacts on the environment, usually looking at a 20 year timeline. Approximately 33 states - either by state statute or regulation - require IRPs or their equivalent with their regulatory commission. IRPs typically require a detailed implementation plan and then regular updates every two to three years. Regulatory commissions usually have authority to review plans and reject them if they feel certain requirements have not been met.[40] IRP's also create a more transparent process for resource planning at the utilities. They can be an important place to secure increased commitments for energy storage, renewable and distributed generation, and increased energy efficiency.

Distributed resources planning: these processes require utilities to create a plan for establishing and managing a network of distributed energy generation, including how to connect distributed energy resources into the grid, maximize data flow throughout the grid between consumers and generators and vice versa, and resolve technical barriers to increased distributed energy generation. In doing so, these plans enable "market-friendly connections between distributed energy resources (DER), large-scale power generators, customers, and other parts of the energy system... energy and data will flow across the grid in multiple directions to allow storage, microgrids, demand-response technology, and other innovative services to increase efficiency while lowering costs and harmful emissions."[41] In California, for example, as part of the Distribution Resources Plan, utilities have released maps for where distributed generation can be sited and the interconnection capacities across the grid, because connecting distributed generation installations into the larger grid can often be difficult and time consuming.[42] New York state has initiated a comprehensive utility reform process to move towards a Distributed systems platform, under which all utilities are required to submit implementation plans for how they will analyze and plan for system needs related to integrating distributed energy, how to ensure distributed energy is integrated reliably onto the grid, and establish pricing and market agreements for distributed energy.[43] The platform also requires utility level plans for energy efficiency goals and implementation and non-wires alternative projects, which "allow utilities to defer or avoid conventional infrastructure investments by procuring distributed energy resources that lower costs and emissions."[44]

Shared / community solar: this is a model of distributed renewable generation that allows customers to opt into a local solar project without having to install their own system, thus making it more accessible to renters and households that cannot afford to install their own solar system. Community solar projects are directly owned by participants, while shared solar projects are usually owned by a third party, such as a utility. As a model, shared solar has the potential to reach 50% of US homes and businesses that cannot install rooftop solar, and generates more significant economic benefits for the local community.[45] However, community solar relies on an ability to share electricity generated from a project, and currently only 16 states allow this.[46] Shared and community solar projects can also be targeted to environmental justice communities. For example, the community-based environmental justice group UPROSE in Brooklyn has partnered with multiple entities to create a cooperative community solar project, to be installed on the Brooklyn Army Terminal. The project includes a local training and hiring component, and will provide solar to about 200 households in Brooklyn.[47]



Resilient grid maintenance and management:

Demand response: these programs provide an opportunity for consumers to play a significant role in the operation of the electric grid by reducing or shifting their electricity usage during peak periods in response to time-based rates or other forms of financial incentives. In doing so, they reduce overall energy consumption as well as save costs. Time-varying rates programs creates incentives for customers to alter their consumption habits in response to varying prices. They can be structured in a variety of ways, such as increasing prices during peak hours or offering rebates for reduced consumption during peak hours.[48] Direct load control programs allow a utility to directly cycle the customer energy end uses (such as air conditioners and water heaters) off and on, generally through a remote control device installed on a customer's appliance, when energy demand is highest, in exchange for a financial incentive and lower electric bills.[49]

Grid modernization and "smart grids": grid modernization refers to the process of upgrading the outdated electrical infrastructure of the 20th century, and installing "smart grid" technologies, controls and devices that work together to communicate about real-time energy needs, usage, and outages. A "smart grid" creates the ability to determine in real time the flow and usage of electricity, allowing utilities to quickly respond to power shortages and blackouts. It gives more control to consumers, who can better track and control their personal energy consumption. Smart grids can also increase both energy efficiency and integration of renewables.[50] "Smart meters" are the most commonly known example of smart grid technologies; energy meters owned by the utility that send wireless data to the utility in real time, foregoing the need to send someone out to check a meter. Grid modernization and smart grids are not without controversy; advocates have raised concerns about ensuring privacy of customer data, concerns about the health impacts of smart meters, and concerns about the hefty cost to ratepayers. Many states require utilities to offer an "opt out" option for smart meters.

Many states have enacted policies that support grid modernization. Policies can require or create incentives for various aspects of grid modernization, such as installation of smart meters; remove regulatory barriers and reforme rate structures to facilitate more smart grid integration; create tax credits for installation; or define smart meters as clean energy improvements or energy efficiency programs to make them eligible for existing programs.[51] Illinois passed a smart grid bill in 2011 that reformed utility rate structures and required new infrastructure upgrades within the two largest IOU's, as well as rural electric cooperatives. The modernization efforts include installation of smart switches and meters and implementation of demand response programs.[52]

Microgrids: these are small energy grids that can connect and disconnect from the larger grid. It can be powered by distributed renewable generation. It includes its own, localized transmission and distribution system, is more resilient because it does not rely on the same large-scale infrastructure that utilities do. They can be targeted for development in low-income communities and communities of color, as is the case in Boston, where two community-based organizations are organizing in two communities to explore the feasibility of creating microgrids.[53]

Equitable provision of energy services:

Energy efficiency programs: Energy efficiency and conservation programs reduce overall energy usage and lower total energy costs,he types of programs range improving the conservation and efficiency performance of goods, such as homes and appliances, as well as creating new standards that require higher levels of energy efficiency in goods, buildings and industrial operations. Financial incentive programs play a critical role in expanding access to energy efficiency benefits for low-income residents. These include federal programs such as the Weatherization Assistance Program, which provides grant funds to states to improve home energy efficiency and reduce energy consumption by low-income households, and the Low Income Home Energy Assistance Program, a block grant to states, territories and tribes to assist low-income households with heating and cooling expenses and home weatherizing.[54] In addition to these public funding streams, utilities often apply a surcharge to all ratepayers to fund energy efficiency programs.

Energy efficiency programs can have additional equity benefits of improved health and living conditions, and increased economic security for low-income households. Older, inefficient housing stock can not only be a driver of high energy bills,[55] and is much more likely to have substandard conditions such as mold, lead, pests, poor ventilation, inadequate heating and cooling, or dilapidated water and wastewater systems, all of which can have severe impacts on health.[56] Energy efficiency programs can combine weatherization and home improvements, if structured correctly.

Unfortunately, despite the significant potential benefits, energy efficiency programs often fail to reach low-income households. Many barriers are related to financing; some programs require upfront cash outlays, or are in the form of loans that households may be unable to take on due to poor credit or existing financial strains. In addition, many low-income people rent, but since they pay the utility bill, landlords do not have a financial incentive to make efficiency upgrades, which means renters lose the opportunity to benefit from efficiency and conservation.[57] Finally, many utilities or agencies do not have accessible, in-language information about available programs and their benefits.

Equitable energy efficiency policies programs should reach multifamily, affordable housing; have targeted outreach for low-income communities; have clear and aggressive targets set; and should encourage comprehensive retrofits.[58] Many states combine and leverage funding sources to maximize reach. Energy efficiency programs can also be crafted to include partnerships with community-based organizations to provide services. For example, community-based organization PUSH Green has a contract with the New York State Energy Research and Development Authority to provide free energy assessments, installation services, low-cost financing, solar, and, most importantly, workforce opportunities.[59] Examples of policies supporting equitable energy efficiency programs include New York's Multifamily Performance Program provides per-unit incentives as well as low-cost financing for new construction and retrofits of existing multifamily buildings that achieve 15 percent energy savings from electric and gas, with escalating performance incentives for higher energy savings.[60] Washington state also launched a "Weatherization plus Health" program to combine weatherization services with household improvements to combat asthma.[61]

Energy assistance programs: these policies provide utility credits or direct financial assistance to income-qualified homes, thus reducing the overall energy burden for low-income households and ensuring access to energy. They can also help offset any potential rate increases from the transition to renewable energy. For example, the recently enacted Washington clean energy standard requires utilities to make funding available for bill assistance low-income households, submit a biennial report that includes reporting on the amount of funding available, an analysis of the needs in their service territory, and plans to improve to service to meet specified targets based on energy burdens.[62]

Outreach programs: in order for any utility programs to successfully reach low-income people and people of color, there must be adequate funding for outreach. Outreach programs should be conducted in multiple languages appropriate to the target communities and have clear and accessible information on available programs. They can also be structured to partner with community-based organizations to provide the outreach services, who may have more trusted relationships with community residents.

[1] https://www.eia.gov/tools/faqs/faq.php?id=427&t=3

[2] https://www.eia.gov/tools/faqs/faq.php?id=65&t=2

[3] https://www.scientificamerican.com/article/what-is-the-smart-grid/

[4] https://www.eesi.org/files/070913_Wayne_Galli.pdf

[5] https://blog.schneider-electric.com/energy-management-energy-efficiency/2013/03/25/how-big-are-power-line-losses/

[6] https://www.eia.gov/todayinenergy/detail.php?id=27152

[7] http://blog.nj.com/PSEG/2016/04/utility_poles_are_the_backbone.html

[8] https://www.ucsusa.org/clean-energy/how-electricity-grid-works

[9] https://aceee.org/files/proceedings/2018/#/paper/event-data/p390

[10] https://www.jchs.harvard.edu/blog/us-households-are-using-less-energy/

[11] Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity

[12] http://ei.haas.berkeley.edu/research/papers/WP262.pdf

[13] https://thenextsystem.org/learn/stories/energy-democracy-taking-back-power

[14] https://mce.uwcc.wisc.edu/utilities-overview/rural-electric-cooperatives/

[15] http://appvoices.org/2018/10/17/the-problem-with-monopoly-utilities/ see also https://www.dissentmagazine.org/article/the-unlikely-case-for-utility-populism-rural-electric-cooperatives

[16] https://ilsr.org/wp-content/uploads/2016/03/Report-Re-Member-ing-the-Electric-Cooperative-1.pdf

[17] https://www.vox.com/2015/9/9/9287719/utilities-monopoly

[18] https://e360.yale.edu/features/utilities-grapple-with-rooftop-solar-and-the-new-energy-landscape

[19] https://www.vox.com/2016/6/29/12038074/power-utilities-suck

[20] https://americaspowerplan.com/wp-content/uploads/2013/10/APP-OVERVIEW.pdf

[21] https://www.forbes.com/sites/energyinnovation/2018/05/07/americas-utility-of-the-future-forms-around-performance-based-regulation/#483b86142bb2

[22] https://www.nap.edu/read/24651/chapter/3 pg 5

[23] Lessons from Integrated Resource Planning and Carbon Trading for integrating carbon adders into wholesale electricity markets, pg 4

[24] https://www.edf.org/sites/default/files/documents/driving-environmental-outcomes.pdf

[25] https://www.vox.com/energy-and-environment/2019/4/18/18363292/washington-clean-energy-bill

[26] https://www.nytimes.com/2013/03/14/business/energy-environment/cities-weigh-taking-electricity-business-from-private-utilities.html

[27] https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/An%20Analysis%20of%20Municipalization%20and%20Related%20Utility%20Practices.pdf

[28] https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/An%20Analysis%20of%20Municipalization%20and%20Related%20Utility%20Practices.pdf

[29] http://www.dailycamera.com/news/boulder/ci_31697170/boulder-municipalization-negotiations-xcel

[30] https://www.publicpower.org/system/files/documents/municipalization-what_is_public_power.pdf

[31] https://mce.uwcc.wisc.edu/utilities-overview/rural-electric-cooperatives/

[32] https://thenextsystem.org/learn/stories/democratic-energy-utility#challenges

[33] https://www.scientificamerican.com/article/how-co-ops-are-bringing-solar-power-to-rural-america/?utm_source=Ag+Insider+Subscribers&utm_campaign=9404f58c99-EMAIL_CAMPAIGN_2019_03_25_11_56&utm_medium=email&utm_term=0_b0e8c666dd-9404f58c99-120345957

[34] https://www.scientificamerican.com/article/how-co-ops-are-bringing-solar-power-to-rural-america/?utm_source=Ag+Insider+Subscribers&utm_campaign=9404f58c99-EMAIL_CAMPAIGN_2019_03_25_11_56&utm_medium=email&utm_term=0_b0e8c666dd-9404f58c99-120345957

[35] https://www.theselc.org/community_energy_policy

[36] https://community-wealth.org/sites/clone.community-wealth.org/files/downloads/report-camou%20%281%29.pdf

[37] https://thenextsystem.org/learn/stories/community-choice-aggregation

[38] Al Weinrub, Energy Democracy chapter

[39] https://www.centerforsocialinclusion.org/wp-content/uploads/2010/04/Energy-Democracy-Report-WEB-1.pdf

[40] https://blog.aee.net/understanding-irps-how-utilities-plan-for-the-future

[41] https://nyrevconnect.com/rev-briefings/track-one-defining-rev-ecosystem/

[42] https://www.utilitydive.com/news/california-ious-provide-solar-developers-with-map-to-grow-renewables/545507/

[43] https://nyrevconnect.com/rev-briefings/track-one-defining-rev-ecosystem/

[44] https://nyrevconnect.com/rev-briefings/track-one-defining-rev-ecosystem/

[45] https://ilsr.org/wp-content/uploads/2018/03/Advantage_Local-FINAL.pdf

[46] https://ilsr.org/report-beyond-sharing/#Benefits%20of%20CRE

[47] https://sunsetparksolar.org/community-solar/

[48] https://www.michigan.gov/documents/energy/Common_Practices_Feb22_522983_7.pdf

[49] https://www.michigan.gov/documents/energy/Common_Practices_Feb22_522983_7.pdf

[50] http://www.ncsl.org/research/energy/regulating-and-encouraging-smart-grid-technologies.aspx

[51] http://www.ncsl.org/research/energy/regulating-and-encouraging-smart-grid-technologies.aspx

[52] https://energynews.us/2017/04/27/midwest/after-five-years-illinois-smart-grid-buildout-showing-results/

[53] https://cpaboston.org/en/news-events/news/run-gjc-to-conduct-studies-for-microgrid-projects-in-boston-and-chelsea

[54] https://aspe.hhs.gov/basic-report/approaches-low-income-energy-assistance-funding-selected-states

[55] http://energyefficiencyforall.org/sites/default/files/Lifting%20the%20High%20Energy%20Burden_0.pdf

[56] https://www.ajpmonline.org/article/S0749-3797(08)00682-X/fulltext

[57] https://www.citylab.com/equity/2016/04/electricity-bills-by-city-low-income-costs/478155/

[58] http://energyefficiencyforall.org/issues/regulations-and-policies

[59] http://www.pushgreenwny.org/

[60] http://energyefficiencyforall.org/issues/program-design-and-budgets

[61] https://www.commerce.wa.gov/growing-the-economy/energy/weatherization-and-energy-efficiency/matchmaker/weatherization-plus-health-wxh/

[62] http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bill%20Reports/Senate/5116-S2.E%20SBR%20FBR%2019.pdf