Driving Sustainable Power Adoption: US Policy and Promotion

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To reduce carbon emissions, proponents of sustainable residential power promote policies that subsidize and thereby accelerate its adoption in the United States. Discovering how proponents of sustainable residential power systems promote policies for subsidizing and accelerating adoption in the United States is crucial for advancing energy sustainability and reducing carbon emissions. Such policies have already begun the transition to clean energy (Ufer, 2023).

Participants include four proponents of sustainable, energy efficient power systems: community and national advocacies, resident organizations, engineers, and policymakers. The American Council on Renewable Energy (ACORE), a national nonprofit, engages in collaborative advocacy across the renewable energy sector. Its goal is to unite policy, technology, and finance to accelerate the transition to a renewable energy economy (ACORE, 2023). Trade associations such as the American Clean Power Association (ACP) lobby for policies that support sustainable residential power systems (Oquist, 2023). Solar United Neighbors, a community advocacy, offers residents a solar co-op that promote solar conversions (Schalk, 2023). Improvements in power generation, storage and distribution have made renewable energy more cost-effective. Mechanical engineers have found that a demand for their expertise in renewable energy has grown, as the number of job postings for these positions increased 7.15 percent between 2018 and 2019 (Ufer, 2023). Policymakers include at least two classes, those who favor the expansion and increased adoption of sustainable residential power systems (UN, n.d.), and others who favor fuel-burning power plants and the restriction of renewable energy development (Despart et al., 2023). 67 percent of Americans say the United States should prioritize developing alternative energy sources, such as wind, solar and hydrogen

technology, while 32 percent say the priority should be expanding the exploration and production of oil, coal, and natural gas (Kennedy et al., 2023).

Through proactive advocacy and direct initiatives, proponents of more sustainable residential power systems, including community and national advocacies, engineers, and policymakers, will continue to influence legislation to subsidize and accelerate their adoption in the United States, making them more accessible for homeowners.

Review of Research

Researchers are continuing to investigate the economic benefits of renewable energy, which help to support policies that accelerate renewable energy development (Ufer, 2023). Public policy plays a large role in leading the United States' efforts to achieve net-zero emissions by 2050 and net-zero power sector by 2035. Proponents of more sustainable residential power systems in the United States use many different approaches to promote public policies, as the energy sector accounts for approximately 75 percent of global greenhouse gas emissions (Department of State, n.d.). Federal tax credits offer financial incentives to homeowners who install sustainable energy systems. The Residential Clean Energy Credit equals 30 percent of the costs of new, qualified clean energy property for your home installed anytime from 2022 through 2032 (IRS, 2023). In some states, there are net metering policies where residential and commercial customers who generate their own electricity with solar power can sell their remaining electricity back to the grid. This allows customers to reduce their future electric bills (SEIA, 2023).

In some states, lawmakers have worked on passing "solar access laws." Local ordinances or homeowner's association (HOA) rules can create uniformity among a community, but may

prohibit the installation of solar electric, heating, or cooling technologies (SEIA, 2023). These solar access laws can protect property-owner's solar access rights.

Advocates have supported the adoption of green building standards that contain model codes or rating systems so communities can develop green building programs or revise building ordinances (EPA, 2023a). Besides solar installations, existing buildings can reduce carbon emissions by switching oil and combustion appliances to low-carbon fuels like renewable biomass, low carbon district heating/cooling systems, and high efficiency electricity-based heat pump systems (Chisholm et.al, 2019).

Policymakers are already driving sustainability to reduce emissions in the United States. President Biden's Executive Order 14057 on 'catalyzing American clean energy industries and jobs through Federal sustainability and accompanying Federal Sustainability Plan sets out a range of ambitious goals to deliver an emissions reduction pathway consistent with President Biden's goal of reducing U.S. greenhouse gas emission by 50-52 percent from 2005 levels by 2030 and limiting global warming to 1.5 degrees Celsius, as the science demand' (OFCSO, n.d.-b)." Federal agencies and military installations are taking action to implement the Federal Sustainability Plan and Executive Order. Edwards Air Force Base (AFB) located in Edwards Air Force Base, California, created a 520-megawatt (MW) solar project, one of the largest solar photovoltaic (PV) array projects in the country. This project reached substantial completion in 2023 and created clean energy jobs and increased carbon-pollution-free electricity. The Naval Construction Battalion Center in Gulfport, Mississippi constructed a 3.5 MW PV array and microgrid that configures battery energy storage and Environmental Protection Agency (EPA) Tier 4 diesel back-up power generators to be used in case of emergencies. In Cambridge, Massachusetts, on behalf of the Department of Transportation, an underutilized 14-acre DOT

parcel will be redeveloped to include energy efficiency features like triple-planed glass windows, a high-efficiency heating, ventilation, and cooling system, exterior solar shade devices, and green and cool roof technology including a PV array (OFCSO, n.d.-a).

While proponents of advancing greater sustainability have utilized this expertise on a larger scale, federal and state policymakers have used a range of policies to 'encourage the deployment of solar systems and other technologies that allow residential customers to generate, store, and manage their electricity consumption' (GAO, 2017)." Examples of technologies could include rooftop solar panels, batteries, and smart thermostats. GAO's analysis of Energy Information Administration (EIA) data explains that from 2010 to 2015, the total number of residential customers with solar systems increased seven times, but still only represents 0.7 percent of overall electricity customers (GAO, 2017).

Proponents and advocates for a more sustainable future have made progress at both the federal and state levels. Despite advancements through tax incentives, solar access laws, net metering, and President Biden's Executive Order, many challenges remain in achieving widespread adoption of renewable energy technologies. Public awareness and continued research will help proponents develop and advance policies in efforts to transition to accelerate and subsidize renewable energy adoption in residential households.

Environmental Benefits and Resilience to Climate Change

Accessibility and investing in clean energy provide strong environmental benefits and increases resilience to imminent climate change. The Intergovernmental Panel on Climate Change (IPCC) states that "the magnitude and rate of climate change and associated risks depend strongly on near-term mitigation and adaptation actions, and projected adverse impacts and related losses and damages escalate with every increment of global warming." Climate change

results in global temperatures continuing to rise, as the Summer of 2023 was Earth's hottest summer on record, changes in precipitation patterns, longer wildfire season, more droughts and heat waves, and rising of United States sea levels (NASA, 2023).

The United Nations (UN) states that since the 1800s, "human activities have been the main driver of climate change, primary due to the burning of fossil fuels like coal, oil, and gas." The burning of fossil fuels and use of unsustainable energy has led to an increase and frequency of extreme weather events caused by climate change. (UN, n.d.-a**)**

The use of clean energy is considered more environmentally friendly than fossil-fuel-based resources as clean energy results in less air and water pollution. The Office of Energy Efficiency and Renewable Energy states that "power generated by renewable sources, such as wind, water, and sunlight, does not produce harmful carbon dioxide emissions that lead to climate change, which causes drought, wildfires, flooding, poverty, health risks, species loss, and more." Renewable energy like solar can be placed on existing buildings and wind turbines are suited for agricultural land. The Department of Energy (DOE) continues to fund research to reduce environmental impacts after a project's lifetime to recycle, repurpose, and upcycle materials once renewable energy technology has reached the end of its lifecycle (EERE, n.d.-e).

The Center for Climate and Energy Solution (C2ES) is a national advocacy group that forges practical and innovative solutions to address climate change. C2ES explains that "cities and local communities are responding by investing in infrastructure updates and climate-smart planning to mitigate the impacts of acute and chronic events." Climate-smart planning could include installing green roofs or planting street trees. Cities have created resilience solutions like the city of Phoenix who developed a heat action plan to prioritize natural cooling solutions. The federal government provides grant and loan funding for state and local projects combating

climate change impacts. Providing more resources and research like climate data, planning tools, and technological assistants can help policymakers assess the risk and impact climate change will continue to have (C2ES, 2021).

Harvard School of Public Health states that "renewable electricity projects and energy efficiency measures can improve health and reduce air pollution." Decreasing the use of fossil fuels lowers emissions of harmful gases. In turn, health issues like heart attacks, asthma exacerbations, and hospitalization for respiratory or cardiovascular issues can be reduced by using clean, renewable energy (Harvard, 2022).

Fossil fuels account for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions, which is largely emitted through energy production by generating heat and electricity. The UN explains that investing in alternative sources of energy that are clean and renewable will emit little to no greenhouse gasses or pollutants. According to data from the World Health Organization (WHO), 13 million deaths annually are due to environmental causes like pollution, and around 99 percent of people breath air that exceeds air quality limits, all in which affect an individual's physical health (UN, n.d.-d).

According to the EPA, "producing and using electricity more efficiently reduces both the amount of fuel needed to generate electricity and the amount of greenhouse gases and other air pollution emitted as a result." Renewable energy systems like solar panels, geothermal systems, and wind turbines do not contribute to climate change (EPA, 2023c).

Driving Job Creation and Economic Growth

Investing in clean and renewable energy infrastructure and projects will create job growth and economic growth in the United States. According to EERE, "there are just over 8 million jobs in renewable energy today. In 2021 and 2022, energy jobs grew faster than overall U.S.

employment." Job creation within clean energy leads to an increase of union jobs to manufacture and deploy batteries, wind turbines, solar panels, and other technology infrastructures. Promoting policy to ensure this change to clean energy in the U.S. has been spearheaded by agencies like DOE who are advancing in technologies that create jobs in areas such as construction, engineering, and skilled training. The DOE is working to standardize education and training in clean energy technologies and applicable incentives for DOE funding to improve accessibility of jobs and training. The DOE's Office of Energy Jobs "focuses on creating economic opportunity and economic justice, especially for historically neglected workers and communities, by leading the effort to ensure clean energy jobs provide good wages, good benefits, worker protections, and the right to form unions and collectively bargain (EERE, n.d.-a)."

Investments in clean energy have resulted in an increase in clean energy jobs nationwide. Following President Biden's Investing in America agenda, the 2023 U.S. Energy and Employment Report (USEER) shows that "the energy workforce added almost 300,000 jobs (+3.8% growth) in 2022 (EERE, n.d.-b)." Sectors including clean vehicles, solar, wind, and geothermal have experienced significant job growth. "The clean energy sector plays a critical role in combating the ongoing climate crisis as well as promoting job creation and economic development across the nation," said the U.S. Senator Jeanne Shaheen (NH).

The BlueGreen Alliance is a national advocacy group that unites labor unions and environmental organizations to combat climate change and protect the environment. A new analysis contracted by this group through the Political Economy Research Institute (PERI) at the University of Massachusetts Amherst found that "more than 100 climate, energy, and environmental investments in the Inflation Reduction Act will create more than 9 million good jobs over the next decade – an average of nearly 1 million jobs each year." This proves that

promoting policies that subsidize access to renewable energy will enhance the economy by increase job growth in the US (BlueGreen Alliance, n.d.).

Investing in renewable energy infrastructure and technologies create millions of jobs for American workers and offers cheaper energy alternatives. According to the UN, "the cost of electricity from solar power fell from 85 percent between 2010 and 2020, and the costs of onshore and offshore wind energy fell by 56 percent and 48 percent respectively." It is also stated that "cheap electricity from renewable sources could provide 65 percent of the world's total electricity supply by 2030." Transitioning to clean energy will advance the economy, create jobs, and reduce the cost of electricity (UN, n.d.-d).

Promoting Equitable Access to Clean Energy

Low-income communities and diverse communities are disproportionally affected by pollution and environmental impacts of fossil fuel emissions, so equitable access to clean energy will help mitigate these disparities and promote renewable energy (EERE, n.d.-c).

The World Resources Institute (WRI) is an advocacy group working to secure a sustainable future. According to WRI, "Low-income and communities of color face barriers like high upfront cost of technology, lower rates of homeownership, lack of rooftop access for renters, inability to access financing, complicated or hard to access energy incentives." To overcome these barriers to equitable access to clean energy there must be collaboration from all proponents to advance the access to renewable energy to all individuals (WRI, 2023).

The Solar Futures Study reveals that "only 31% of solar adopters came from households that earned less than the area median income. Census tracts with majority Black and Hispanic populations exhibit 30% and 69% less rooftop PV adoption compared to the average census tract. Having available and affordable solar energy for all US consumers will reduce energy costs

for households experiencing disproportionally high energy burdens. The EERE found that "low-income households' average energy burden is three times higher than for non-low-income households." High energy burdens are associated with respiratory illnesses and economic stress (EERE, n.d.-g).

As the U.S. clean energy transition is not equitable, Congress and the Federal Government have taken initiative to address these issues through support for equitable climate action and environmental justice. President Biden's administration created the Justice40 initiative, "which pledges to deliver at lease 40% of benefits from federal climate investments to disadvantaged communities, comes at an inflection point in the country and federal government's reckoning with systematic discrimination, its relationship with climate and environment, and its generational effects," states the WRI. Congress passed the Infrastructure Investment and Jobs Act which includes advancements in accessibility for EV charging with priority given to rural, moderate to low-income neighborhoods (Said et al., 2021).

EERE explains that community solar can be beneficial for low-or moderate-income households with high energy burdens who cannot install solar panels on their roof. The benefits of a community solar project go to all customers who either buy or lease a part of the solar panels in an off-site array (EERE, n.d.-f). Community solar projects creates a collaborative environment for consumers to access clean energy even though they are unable to install solar panels on their own roof. Fostering community engagement and supporting local initiatives help promote sustainability and clean energy.

Fostering Energy Independence and Security

Advancing renewable energy systems in the United States will help achieve energy independence and security by having a power system infrastructure that is protected against

physical and cyber threats. The Office of Energy Efficiency and Renewable Energy (EERE) states that “energy independence and energy security enhance national security, American competitiveness, and economic standing.” Renewable energy will decrease reliance on other countries for energy and technologies. Energy security can be expanded by utilizing renewable energy and increasing the diversity of electricity sources, local electricity generation, and backup energy on the grid (EERE, n.d.-d).

The Energy Independence and Security Act of 2007 aimed to move the US toward greater energy independence and security, increase the production of clean renewable fuels, protect consumers, increase the efficiency of products, buildings, and vehicles, promote research on and deploy greenhouse gas capture, improve energy performance of the Federal Government, and increase US energy security, develop renewable fuel product, and improve vehicle fuel economy (EPA, 2023d).

The National Resources Defense Council (NRDC) is an international environmental advocacy group that aims to combat the climate crisis and protect public health. By utilizing renewable power, power transmission and storage grids can help create energy independence. The NRDC states that “ending our dependence on oil will distance US families and businesses from the volatility of global markets (Bowman, 2022).” Transitioning to renewable energy sources, according to the NRDC, will reduce vulnerability to global oil markets. This enhances energy security for American consumers.

Conclusion

Proactive advocacy and direct initiatives to advance clean energy throughout the United States, including residential power systems, will continue to influence legislation aimed at subsidizing and accelerating their adoption. The implementation of renewable energy

infrastructure and technologies in the US will lead to job creation, economic growth, and environmental benefits, aiding in the fight against climate change. Clean energy improves public health, reduces air pollution, and advances resilience to natural disasters that happen due to climate change.

Innovation and research drive advancements in sustainable infrastructure and technology to continuously progress. Investing in clean energy will enable the US to achieve energy independence, thereby enhancing security measures to protect the electrical power grid and technologies that Americans rely on in their everyday life. Despite the creation of incentives and subsidies to support homeowners in adopting renewable energy, there remains unequal access to clean energy in lower economic and minority areas, which must be addressed. Targeted policies and initiatives to promote equity and inclusion in the transition to clean energy are needed. Such policies must prioritize education to empower communities, encouraging them to participate in this renewable transition. It is crucial to continue advocating and prioritizing the advancement of energy sustainability and reduction of carbon emissions through a collaborative effort with the government, private sector entities, and local communities.

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