

**Testimony Before the
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Chairwoman Kaptur, Ranking Member Simpson, and members of the Committee, thank you for the invitation to participate in today's hearing. I appreciate the opportunity to discuss the important issue of equity in energy and climate innovation.

We are not accustomed to thinking about equity in the context of innovation. But in recent years, we have begun to recognize that marginalized communities (including those who are low-income and those who come from historically disadvantaged communities of color) are often unable to access the benefits of science and technology, but may be disproportionately subject to the harms. The key to addressing this is to bring equity considerations into every step of the research and development process, even at the earliest stages.

Managing Inequities in Energy Innovation

It is easy to provide examples of how energy technology can both reflect and reinforce inequalities. The renewable energy transition requires enormous sacrifice from low-income communities that are economically dependent on fossil fuels. People are losing jobs, may have to be retrained and/or move elsewhere to find employment, and manage the pain of watching

their hometowns decline.¹ Where large scale deployment of solar and wind energy has begun, local citizens are losing control over land use and community priorities.² And, the low-income people around the world who mine the materials needed for solar panels, and those who dismantle and dispose of them, are at greater risk of adverse health impacts including respiratory ailments.³ They also often fall victim to unsafe labor practices.

At the same time, while low-income households and historically disadvantaged communities of color tend to pay a much larger share of their income on energy bills, often because they live in poorly insulated homes with inefficient heating and cooling equipment, it is more difficult and expensive for them to access energy-efficient products.⁴ Even energy-efficient lightbulbs, for example, are less available and more expensive in high-poverty areas.⁵

Our research, development, and demonstration funding programs seem to operate largely oblivious to these impacts. These programs tend to focus on funding projects that seem the most technically feasible, economically viable, and especially now, effective in fighting climate change. Governments then address inequities retrospectively, seeing them as hard, if not impossible to predict and distinct from the innovation process. To compensate, they

¹ Shannon Elizabeth Bell (2009). "There Ain't No Bond in Town Like there Used to Be." *Sociological Forum*. 24(3): 631-657

² Gwen Ottinger (2013). "The Winds of Change: Environmental Justice in Energy Transitions." *Science as Culture*. 22(2): 222-229.

³ Alastair Iles (2004). "Mapping Environmental Justice in Technology Flows: Computer Waste Impacts in Asia." *Global Environmental Politics*. 4(4): 76-107.; Dustin Mulvaney (2019). *Solar Power: Innovation, Sustainability, and Environmental Justice*. University of California Press.

⁴ American Council for an Energy-Efficient Economy (2020). *How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burden Across the United States*. <https://www.aceee.org/energy-burden>. Accessed February 22, 2021.

⁵ Tony G. Reames, Michael A. Reiner, and M. Ben Stacey (2018). "An incandescent truth: Disparities in energy-efficient lighting availability and prices in an urban U.S. county." *Applied Energy*. 218: 95-103.; Deborah A. Sunter, Sergio Castellanos, and Daniel M. Kammen (2019). "Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity." *Nature Sustainability*. 2: 71-76.

develop subsidy programs to make it easier for people to access renewable energy technologies, public health interventions to help manage risks, educational programs to convince people of a technology's benefits, and retraining programs for those who lose their jobs.

But these solutions often meet with limited success. Historical injustices keep repeating themselves, opportunities to empower marginalized communities are lost, and resentment and distrust seem to grow.

My central point today is that to ensure that energy innovation is equitable and just, and even reduces inequalities, then both government funders and innovators must incorporate this goal much earlier, in the innovation process itself: when they are making choices about which research to fund, which technologies to develop, and even how technologies should be designed. Both policymakers and technologists need to understand that our innovation decisions aren't just technical, but also simultaneously social, organizational, and moral.⁶ And the social and equity implications of innovation are much more predictable than we tend to think.⁷

To accomplish this, I suggest that the Department of Energy integrate additional expertise—both from affected communities and from social scientists—throughout its

⁶ Clark A. Miller, Alastair Iles, and Christopher F. Jones (2013). "The Social Dimensions of Energy Transitions." *Science as Culture*. 22(2): 135-148.; Shobita Parthasarathy (2007). *Building Genetic Medicine: Breast Cancer, Technology, and the Comparative Politics of Health Care*. MIT Press.

⁷ Claire Galligan, Hannah Rosenfeld, Molly Kleinman, and Shobita Parthasarathy (2020). *Cameras in the Classroom: Facial Recognition Technology in Schools*. Technology Assessment Project, University of Michigan. <http://stpp.fordschool.umich.edu/technology-assessment>; Jack Stilgoe, Richard Owen, and Phil Macnaghten (2013). "Developing a framework for responsible innovation." *Research Policy*. 42(9): 1568-1580.; David Guston and Daniel Sarewitz (2002). "Real-time Technology Assessment." *Technology in Society*. 24: 93-109.

research, development, and demonstration funding process. In other words, the government needs to integrate expertise and insights on equity into science funding programs.

Integrating Expertise from Affected Communities

The example of breast cancer provides a sense of how this can work. As many of you may know, in the early 1990s, breast cancer advocates successfully convinced scientists and policymakers not only to dramatically increase research funding for the disease, but also to integrate the expertise of advocates and patients into the research enterprise.⁸ Congress created the Department of Defense's Breast Cancer Research Program, which included women with breast cancer on its scientific peer-review panels. The National Institute for Environmental Health Sciences, in consultation with the National Breast Cancer Coalition, created research centers around the country that pioneered a new partnership model: scientists and women with breast cancer collaborated on research priorities and design.

These collaborations have produced greater community trust as patients felt that scientists saw them as more than just biological samples, data points, or people that needed to be educated or convinced. And it changed research: scientists gained a better understanding of both the breast cancer experience and the realities on the ground and integrated this knowledge into their choices about which research and technology to pursue.⁹ In one case,

⁸ Janet R. Osuch, Kami Silk, Carole Price, Janice Barlow, Karen Miller, Ann Hernick, and Ann Fonfa (2012). "A Historical Perspective on Breast Cancer Activism in the United States: From Education and Support to Partnership in Scientific Research." *Journal of Women's Health*. 21(3): 355-362.

⁹ Sabrina McCormick, Julia Brody, Phil Brown, and Ruth Polk (2004). "Public Involvement in Breast Cancer Research: An Analysis and Model for Future Research." *International Journal of Health Services*. 34(4): 625-646.

women with breast cancer taught researchers why they should investigate the impact of environmental pollutants by zip code rather than by county. In another, they convinced scientists to assess the impacts of low-level radiation exposure even though it required a different set of measurement tools.

In the energy sphere, similar changes could be made at both the programmatic level and with individual projects. Vulnerable communities often see great benefits in community-based models such as solar micro-grids, for example, which enable grassroots empowerment and small-scale or collective entrepreneurship.¹⁰

Native Renewables, a non-profit organization, provides Navajo families that are “off the grid” in Utah, Arizona, and New Mexico with access to solar photovoltaic systems so they can power their homes.¹¹ And Native Americans across these states, who for decades depended on jobs in the mining industry, are studying the feasibility of large-scale solar and wind projects due to environmental, health, and economic concerns with mining.¹² The Department of Energy (DOE) might create programs specifically to fund community-based energy innovation, and reward research and development partnerships between technical experts and affected communities.

¹⁰ Mary Finley-Brook and Erica L. Holloman (2016). “Empowering Energy Justice.” *International Journal of Environmental Research and Public Health*. 13(926): 1-19.; Shannon Elizabeth Bell, Cara Daggett, Christine Labuski (2020). “Toward feminist energy systems: Why adding women and solar panels is not enough.” *Energy Research and Social Science*. 68: 1-13.

¹¹ Native Renewables (2021). “Our Work.” Website. <https://www.nativerenewables.org/our-work>. Downloaded February 21, 2021.

¹² Mireya Navarro (2010). “Navajos Hope to Shift from Coal to Wind and Sun.” *The New York Times*. October 25.

Rather than the customary approach—what scholars call a “decide-announce-defend” model, in which technologists and policymakers determine the solution and then convince communities to accept it—DOE should consider a “consult-consider-modify-proceed” model for research, development, and demonstration programs. That could allow researchers to learn from citizen knowledge and concerns while also minimizing opposition when innovations are deployed.¹³

Integrating Social and Equity Analyses of Technology

The Department of Energy could incorporate the expertise of researchers who know how to evaluate the social and equity consequences of emerging technologies in a couple of ways. First, it could favor interdisciplinary research proposals that include equity analyses. Along with this, it should include experts in these fields and methods on its peer review panels, to ensure proper assessment of these projects. Consider a recent study funded by the Netherlands Organization for Scientific Research, in which Dutch researchers compared four smart grid systems and found that low-income communities would experience different impacts depending on the project’s design.¹⁴ Equitable smart grid design, they concluded, would ensure that all energy users (not just homeowners) could benefit, that financial profits and costs be fairly distributed, and that users have a voice in the governance of the system including collection and use of household data.

¹³ Maarten Wolsink (2000). “Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support.” *Renewable Energy*. 21: 49-64.; Roopali Phadke (2013). “Public Deliberation and the Geographies of Wind Justice.” *Science as Culture*. 22(2): 247-255.

¹⁴ Christine Milchram, Rolf Künneke, Neelke Doorn, Geerten van de Kaa, and Rafaela Hillerbrand (2020). “Designing for justice in electricity systems: A comparison of smart grid experiments in the Netherlands.” *Energy Policy*. 147: 1-15.

DOE could include such expertise on the staff of its research, development, and demonstration programs. These experts could inform both the agency and potential grantees on how to explicitly consider equity in research and development projects, and also help evaluate the most equitable innovation paths for further demonstration.

The key is not just to support equity assessments of emerging energy technologies, but to use the findings to guide priorities for further development.

In closing, to ensure that energy and climate innovation can reduce rather than exacerbate inequities, we need to bring these considerations into the research and development process at the earliest stages, through the expertise of both vulnerable communities and social scientists. As you consider policy alternatives with this goal in mind, I am happy to provide whatever assistance I can.