

# U.S. Department of Energy- National Lab Equity Summit: Grid Planning and Operations

## Workshop Report

**March 2024**

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*operated by*  
BATTELLE  
*for the*  
UNITED STATES DEPARTMENT OF ENERGY  
*under Contract DE-AC05-76RL01830*

Printed in the United States of America

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# **U.S. Department of Energy-National Lab Equity Summit: Grid Planning and Operations**

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March 2024

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## Executive Summary

Lawrence Berkeley National Laboratory and Pacific Northwest National Laboratory held a U.S. Department of Energy (DOE)-National Lab Equity Summit on February 5, 2024, that was focused on equity in grid planning and operations. The summit was part of the Grid Modernization Laboratory Consortium (GMLC) project, *Advancing Equity in Grid Planning and Operations*.

The objectives of the summit were to:

- Connect DOE and lab researchers working on grid-related equity issues
- Share information on current and planned grid-related equity projects and initiatives
- Inspire and educate participants by hearing from our panelists about solutions and challenges to integrating equity in grid planning and operations.

Kelly Crawford, Energy and Environmental Justice Senior Advisor in the DOE Office of Equity and Environmental Justice, was the keynote presenter and provided an overview of the office's work and described the importance of energy justice in our power system. She also described Justice40 relative to grid investments and shared mapping tools and resources. When engaging with communities for research or grid planning, Kelly encouraged practitioners to get to know communities and their needs, connect with local leaders, go where people are already gathered, and be thoughtful and deliberate in planning engagements.

The summit included two panels of industry leaders. The first was a state and community perspectives panel that included representatives from a state public utility commission (Oregon Public Utility Commission), a state energy office (Washington Department of Commerce), a state utility consumer advocate (Connecticut Consumer Counsel), and industry consultants (Elevated Engagement and ArkSpring Consulting). Panelists shared successes they have seen, critical challenges related to equity and grid planning and operations, and other considerations.

The second panel addressed utility perspectives and included representatives from two utilities (Commonwealth Edison and Tacoma Power), the National Rural Electric Cooperative, and a former utility employee and legal consultant. Panelists discussed the role of the utility concerning equity, the most significant technical and data modeling needs and opportunities, and the role the labs could help advance equity in grid planning and operations.

There was also a session on partner organization presentations. Todd Levin, from Argonne National Laboratory (ANL), made a short presentation on the GMLC project he is leading on equity-informed power system planning. As partners of the GMLC project, the National Association of Regulatory Utility Commissioners, the National Association of State Energy

Officials, and the Clean Energy States Alliance also shared updates on relevant activities and resources.

During the summit, there were two rounds of lightning presentations by national labs and DOE highlighting research that address equity and grid planning and operations (the slides are provided in the Appendix). The goal of the lightning rounds was to share information between participants to encourage collaboration and leverage ongoing research at labs and DOE.

The summit included two interactive exercises where summit participants shared their perspectives on relevant equity projects and initiatives (Table 2), key challenges regarding equity and grid planning and operations (Table 3), and promising innovations or progress (Table 4). At the end of the session, participants were asked to share essential insights from the event (Table 7) and an action they plan to take as a result of the event.

Participants agreed that the event was useful in helping them share and learn from each other. The project team plans to use the information from the summit as a starting point to help inform future research and technical assistance. In 2026, another equity summit will be held (virtually or in person) as part of the same project to help raise awareness and disseminate research and resources completed during the project's duration.

## Acronyms and Abbreviations

ANL	Argonne National Laboratory
CEJST	Climate and Economic Justice Screening
CESA	Clean Energy States Alliance
co-ops	cooperatives
DOE	U.S. Department of Energy
EJE	Energy Justice and Equity
EV	electric vehicle
GMLC	Grid Modernization Laboratory Consortium
INL	Idaho National Laboratory
LBNL	Lawrence Berkeley National Laboratory
LIDR	low-income discount rate
NARUC	National Association of Regulatory Utility Commissioners
NASEO	National Association of State Energy Officials
NREL	National Renewable Energy Laboratory
PNNL	Pacific Northwest National Laboratory
PUC	(Oregon) Public Utilities Commission
SNL	Sandia National Laboratories

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## 1.0 Introduction

The U.S. Department of Energy (DOE)–National Lab Equity Summit focused on grid planning and operations was held on February 5, 2024. The summit was organized by Lawrence Berkeley National Lab (LBNL) and Pacific Northwest National Lab (PNNL) as part of the Grid Modernization Laboratory Consortium (GMLC) project called Advancing Equity in Grid Planning and Operations.

The objectives of the summit were to:

- Connect DOE and lab researchers working on grid-related equity issues
- Share information on current and planned grid-related equity projects and initiatives
- Inspire and educate participants by hearing from our panelists about solutions and challenges to integrating equity in grid planning and operations.

**Table 1. National Lab Equity Summit Agenda**

Time	Title
9:00–9:20	Welcome, Introductions, and Background <ul style="list-style-type: none"> <li>• Natalie Mims Frick, LBNL</li> <li>• Juliet Homer, PNNL</li> </ul>
9:20–9:50	Opening Keynote: <ul style="list-style-type: none"> <li>• Kelly Crawford, Senior Advisor Energy and Environmental Justice, DOE Office of Equity and Environmental Justice</li> </ul>
9:50–10:50	Panel #1 – State and Community Perspectives <ul style="list-style-type: none"> <li>• Claire Coleman, Connecticut Consumer Counsel</li> <li>• Tanya Paslawski, Elevated Engagement</li> <li>• Deidre Sanders, ArkSpring Consulting</li> <li>• Michelle Scala, Oregon Public Utility Commission</li> <li>• Michael Furze, Washington Department of Commerce</li> <li>• Moderator: Natalie Mims Frick, LBNL</li> </ul>
10:50–11:05	Break
11:05–11:25	Interactive Exercise <ul style="list-style-type: none"> <li>• Juliet Homer, PNNL</li> </ul>
11:25–12:00	Lab Lighting Presentations – Round 1 <ul style="list-style-type: none"> <li>• Juliet Homer, PNNL</li> <li>• Nichole Hanus, LBNL</li> <li>• Holly Carr, DOE (two presentations)</li> <li>• Sydney Forrester, LBNL</li> <li>• Michele Boyd, DOE</li> <li>• Bobby Jeffers, National Renewable Energy Laboratory (NREL)</li> </ul>

	<ul style="list-style-type: none"> <li>• Natalie Mims Frick, LBNL</li> <li>• Jasmine McAdams, LBNL</li> <li>• Thomas Mosier, Idaho National Laboratory (INL)</li> </ul>
12:00 – 1:00	Lunch
1:00–1:20	Partner Presentations <ul style="list-style-type: none"> <li>• Todd Levin, ANL</li> <li>• Danielle Sass Byrnett and Catherine Reed, National Association of Utility Regulatory Commissioners and National Association of State Energy Officials</li> <li>• Anna Ziai, Clean Energy States Alliance (CESA)</li> </ul>
1:20–2:20	Panel #2 – Utility Perspectives <ul style="list-style-type: none"> <li>• Ryan Burg, Commonwealth Edison</li> <li>• Shubha Harris J.D., Legal Consultant, formerly Regulatory Attorney at Xcel Energy</li> <li>• Lauren Khair, National Rural Electric Cooperative Association</li> <li>• Ahlmahz Negash, Tacoma Power</li> <li>• Moderator: Jennifer Yoshimura, PNNL</li> </ul>
2:20 – 2:35	Break
2:35 – 3:30	Lab Lightning Presentations – Round 2 <ul style="list-style-type: none"> <li>• Bobby Jeffers, NREL</li> <li>• Bobby Jeffers, Jennifer Yoshimura, Abraham Ellis; NREL, PNNL, Sandia National Laboratories (SNL)</li> <li>• Summer Ferreira, SNL (two presentations)</li> <li>• Margaret Taylor, LBNL</li> <li>• Andrew Satchwell, LBNL</li> <li>• Thomas Mosier, INL</li> <li>• Sarah Awara, NREL</li> <li>• Miguel Heleno, LBNL</li> <li>• Murali Baggu, NREL (two presentations)</li> <li>• Rebecca Tapio, PNNL</li> <li>• Abraham Ellis, SNL</li> <li>• Sarah Awara, NREL (two presentations)</li> </ul>
3:30 – 3:50	Closing Interactive Exercise <ul style="list-style-type: none"> <li>• Juliet Homer, PNNL</li> </ul>
3:50 – 4:00	Wrap-up and Appreciations <ul style="list-style-type: none"> <li>• Natalie Mims Frick, LBNL</li> </ul>
4:00	Adjourn

## 2.0 Keynote Speaker: Kelly Crawford

Kelly Crawford provided an overview of DOE's Office of Energy Justice and Equity (EJE) roles and responsibilities and described the importance of energy justice in our power system. She also described Justice40 relative to grid investments and shared EJE mapping tools and resources.

EJE advises the Secretary of Energy on the effects of energy policies; works with the Energy Information Administration to research and collect data; develops and recommends programs, policies, and regulations; assesses energy burdens, and provides technical assistance, all with a focus on people of color and minority business enterprises. EJE's Office of Energy Justice Policy and Analysis conducts research and evaluation and provides technical assistance on Federal energy policy and programs to advance equity for racial and ethnic minorities and other disadvantaged communities and individuals.

"The summit was great! I really appreciated Kelly Crawford's keynote address and how it effectively provided context and set the stage for the discussions and presentations we'd hear throughout the day."

- *Summit participant*

Kelly shared a definition of energy justice that:

- Seeks equity in the social and economic participation in the energy system
- Concurrently remediates social, economic, and health burdens on “frontline communities” explicitly centering their concerns
- Aims to make energy more accessible, affordable, clean, and democratically managed for all communities.

Kelly highlighted research showing that black-identifying and disadvantaged communities have disproportionately less grid capacity to host renewable solar energy and distributed energy resources at the household level in California.<sup>1</sup>

She also shared that underlying assumptions in grid planning tools and models may reinforce inequities. For example, least-cost transmission siting potentially discounts benefits to impacted communities and may prioritize siting infrastructure on lower-value properties.<sup>2</sup> In distribution planning, higher income neighborhoods may receive grid upgrades first or have their power restored more quickly.<sup>3</sup>

<sup>1</sup> Brockway, A.M., Conde, J. & Callaway, D. Inequitable access to distributed energy resources due to grid infrastructure limits in California. *Nat Energy* 6, 892–903 (2021). <https://doi.org/10.1038/s41560-021-00887-6>

<sup>2</sup> Elisabeth Blaug and Nils Nichols, Recommended Siting Practices for Electric Transmission Developers, Americans for a Clean Energy Grid, Feb. 2023.

<sup>3</sup> Shah, Z., Carvallo, J., Hsu, F., & Taneja, J. (2023). The inequitable distribution of power interruptions during the 2021 Texas winter storm Uri. *Environmental Research Infrastructure and Sustainability*, 3(2), 025011. Report #: ARTN 025011. <http://dx.doi.org/10.1088/2634-4505/acd4e7> Retrieved from <https://escholarship.org/uc/item/9z65w4mq>

Promising practices and opportunities Kelly described include:

- Incentivize/prioritize projects that benefit communities
  - Oregon community benefits tests development
  - Prioritizing grid investments based on their ability to maximize value for adjacent communities (e.g., Hawaii Energy Equity and Justice docket is exploring this)
  - Prioritize renewable energy deployment on tribal lands.
- Non-wires solutions for infrastructure upgrades
  - [California policy](#) to consider alternative energy strategies
- Energy affordability practices and considerations
  - Automatic enrollment in bill discount programs if eligible
  - Energy affordability standards (e.g., [New York](#), [Massachusetts](#))
- More granular geospatial data
  - Hosting capacity maps, consumer-facing power outage metrics, interconnection prioritization
  - Xcel Energy MN Electric Service Quality Interactive Map was highlighted as an example,

Kelly pointed to DOE's Disadvantaged Communities Reporter and the Energy Justice Dashboard (<https://energyjustice.egs.anl.gov/>). Additional energy justice tools, including the federal Climate and Economic Justice Screening (CEJST) tool can be accessed at <https://energyjustice.egs.anl.gov/>.

Finally, in response to a question about how labs should approach working with communities, Kelly encouraged labs to take care to not overburden communities. She suggested getting to know communities and connecting with local leaders and looking at where people are already gathered (e.g., churches or parent-teacher association meetings). She warned that people may not have time to go to multiple meetings and that organizers should be thoughtful and deliberate in their planning.

### 3.0 State and Community Perspectives Panel

The state and community perspectives panel was moderated by Natalie Mims Frick from LBNL and included the following panelists:

- Claire Coleman, Connecticut Consumer Counsel
- Tanya Paslawski, Elevated Engagement
- Deidre Sanders, ArkSpring Consulting
- Michelle Scala, Oregon Public Utility Commission
- Michael Furze, Washington Department of Commerce.

"The panelists were thoughtful and challenging. I particularly liked that the panelists knew the topical field and had deep expertise, but also had knowledge of DOE and the labs. so they could speak directly to our perspective."

- *Summit participant*

The panelists were asked what successes they have seen. Some responses are summarized below:

#### Washington

- Washington has dedicated \$85M to electric vehicle (EV) infrastructure. As part of this, the state will make use of a disadvantaged communities map developed by the Washington Department of Health to ensure disadvantaged communities benefit from investments.
- The Washington Department of Commerce is working with the Makah Tribe on critical infrastructure resilience.
- The Department of Commerce also has \$10M for an ambassadors program to embed staff with local community organizations to help them connect with state programs, including funding opportunities.

#### Connecticut

- The state has an equitable modern grid initiative, with 12 subdockets that includes a focus on equity in a number of areas.
- The Public Utilities Regulatory Authority, with support from the Office of Connecticut Consumer Counsel, has adopted Justice40 goals and are using state and federal environmental justice definitions.
- The state has a performance-based ratemaking proceeding with equity incorporated into the goals. The Connecticut Consumer Counsel is currently working with RMI to develop performance metrics related to reliability and resilience, as well as in the deployment of advanced metering technology, in the performance based ratemaking proceeding.

- Connecticut has a two-tier low-income discount rate (LIDR) for qualifying residential electric customers. Because utilities do not track income, there was a data challenge in anticipating the cost of the LIDR. The Office of Connecticut Consumer Counsel has proposed using census block group data to assess impact of LIDR as well as in the performance-based regulation framework.
- Connecticut electric distribution companies have executed data sharing agreements with the state Department of Social Services to determine eligibility for hardship programs and the low-income discount rate.

## **Oregon**

- Oregon has made progress in procedural and structural equity. They are still working on distributive equity.
- The state has improved laws around engagement and have support from the legislature that empowers the regulators, for example, to consider energy burden when designing rates and demand side management programs.
- In integrated resource planning and distribution system planning the Oregon Public Utilities Commission (PUC) is moving from a system-centered perspective to community-centered perspective.
- The PUC is working on developing tailored solutions. Utilities are performing energy burden assessments. Currently, they are considering how to engage with other state agencies to identify environmental justice communities and leverage existing programs and resources.
- The PUC is working with industry partners using heat maps tracking environmental justice indices to prioritize utility investment. For example, there are several state and federal tools, and the electric utilities have incorporated important demographic layers into several of their publicly available system maps.
- The PUC is exploring equity metrics they can track over time. For example, they are considering a metric to track dollars spent on different types of programs and upgrades at different locations over time.

The biggest feedback the Oregon PUC receives from community benefits assessments is interest in the affordability of rates and the reliability of service. In contrast, utilities are concerned about technical elements and detailed feedback on specific investment decisions at the system level.

General remarks from panelists included:

- A success is that I am relaxing the bar that I have for success. I am no longer expecting the perfect engagement. I'm trying to learn through multiple approaches.
- It is premature to talk about distributional effects.

- Equity pillars are not all equal. They are directional. We need to get to more distributive successes.
- There are questions about how to engage in a way that is not performative.
- When engaging with communities and other parties, actions must be integrated with their mission. You need to align their interests with your aims.
- In order to achieve meaningful community engagement, organizers must make information digestible. We need to do our prework, and focus on what the community really needs, and wants, to know.
- Talk with them about their priorities. Engage communities from their need.
- Flooding communities with information is not an effective way to engage; the informers must think critically about what people actually need to know. Informers need to research the communities' priorities first and determine if their suite of solutions addresses the communities' problems.

Challenges that were described include:

- How do we create spaces to listen to experiences beyond integrated resource plan proceedings?
- We need to go beyond affordability. So many things factor into community priorities. For example, a developer wants to build a renewable energy project. In the information sessions, the developers discussed new rates, but the communities wanted parks for their kids.
- How can we show up for communities? One solution is talking to community members.
- You need to connect what you are working on to what communities need. Be clear on the energy system inputs you need and do an inventory of community needs.
- State energy offices are strong conveners, but everyone uses different language. There are multiple different groups (e.g., community groups, utilities, legislators, regulators) that all have their own language.
- There is a challenge related to lack of data, and data is key to beginning a conversation.
- There is a tension with clean energy and low-income programs that are funded by ratepayers. Ratepayer-funded programs present an affordability challenge in that they socialize the costs be borne by all customers, including those who cannot afford their electric bills.
- In a performance based ratemaking framework one debate is whether it is appropriate to hold utilities accountable for outcomes that are not 100% in their control. For example, with bill assistance programs, when utilities can offer a program, but it is up to the customers to participate. Can we evaluate utility performance based on participation in the program? The Office of Connecticut Consumer Counsel position

has been that complete 100% control on an outcome is not necessary to be able to measure a utility's performance, but some control is.

- Be aware of paternalization in designing potential solutions. Insulating certain populations from short-term costs may have long-term economic impacts if certain programs are only offered to certain parts of utility service territories.
- Be sensitive to time requirements to participate. Make engagements efficient and effective. It is not fair to ask working moms to go to six different potential project meetings in one night.
- Be clear on where your interests and scope overlap with what communities are interested in.
- There is concern that the cost for distributed energy resources is being passed on to those who cannot afford electric bills. There are short and long-term costs, and they need to be effectively balanced.

## 4.0 Interactive Exercise #1

The summit participants were asked to think about and share, via sticky notes, their thoughts regarding to the following issues.

1. Relevant projects and initiatives of which you are aware
2. Key challenges regarding equity and grid planning and operations
3. Promising innovation or progress regarding equity and grid planning and operations.

Sticky note responses are summarized in Table 2, Table 3, and Table 4.

**Table 2. Participants’ list of relevant equity projects and initiatives**

DOE Office of Electricity’s Advanced Grid Modeling Program provides outage prediction and proactive resilient transmission and distribution restoration with disadvantaged communities
Clean Energy to Communities Program
Energy Improvements in Rural or Remote Areas Program
NREL’s Comstock, ResStock - building analysis tools
LBNL Reports: Equity in EV Supply Equipment deployments; state regulating frameworks for equity
Berkeley Lab, Distributional Equity Analysis
Initiative for Energy Justice
LBNL Projects: LIHEAP, Equity Database, technical assistance to PUCs and State Energy Officials, Community Solar for social equity
Joint Office of Energy and Transportation EV charger planning and public transit electrification
Resilient Node Cluster Analysis Tool
Solar for All
Residential Energy Consumption Survey
Solar Demographics tool
Leadership for Equity Assessment and Development tool
ESIG Energy Justice Workshop - report is forthcoming
Energy Transitions Initiative Partnership Project
Tribal GDO TA
Two new DOE GMLC projects
Community engagement work at Carnegie Mellon University
ANL Justice 4 EV infrastructure mapping
Least-cost optimal distribution grid expansion modeling tool
Joint Office United Support for Transportation (JUST) lab consortium support for EV infrastructure rollout
Energy storage for social equity
Strategize, engage, network, deploy; distributing wind LDW
CEJST - Climate and Economic Justice Screening Tool
JUST-R metric effort (Justice Underpinning Science and Technology Research)
Connected communities specifically 2 projects focused on LMI multi-family housing; Leads: Electric Power Research Institute Open Market Energy Service Company
CLEAR
Equity Transfer Initiative

American Recovery and Reinvestment Act of 2009
DOE Solar Energy Technologies Office Renewables Advancing Community Energy Resilience
PNNL and DOE Grid Deployment Office Equitable transmission planning project
Americans for Clean Energy Grid
Transmission-Developer recommended siting practices report
White House Justice40 Initiative (J40)
Tribal Energy Equity Summit
PNNLs Principles for Equitable Transmission Planning

**Table 3. Key challenges regarding equity and grid planning and operations**

Cost
Identifying the actual needs of the community without assuming their needs for grid planning and operations
Misalignment of incentives (equity is not necessarily financially incentivized)
Time required to build community relationships and knowledge
Defining equity
Understanding the key decision points, levers that can drive different outcomes
Effective community engagement, capacity building
Disconnect in perspectives between grid planners and underrepresented communities
Lack of expertise in how to effectively engage and how to pay for engagement
Metrics: lack of, applicability of, appropriateness, where to use
Who pays for equitable resilience?
Equity metrics and adoption
State's making decisions about variable quality of electricity service
Connecting with states, not enough data/research
Relating energy burden and disparity to the circuit model
Workforce
Energy equity a political football
Knowing the landscape and having accurate data
Misaligned grid planner objectives and community goals/needs
Take into account the urban planning perspective
Utility doesn't understand the term "equity"
Policy/regulatory models
Data, capturing hyper-local objectives/impacts in system-level planning processes
Existing inequity
Balance burdening and engaging communities
Locational attribution of benefits
Incorporating climate change into the equity conversation
Data, complexity of topics for community participants
Tight timelines can prevent adequate time for meaningful engagement
Creating relationships with the people in the community
Timelines/difference in time expectations
Political uncertainty/are these attempts perennial?

Language barriers
Place-based equity: residential vs. industry, transport
Incorporating heterogeneous feedback (but actually incorporating it)
Identifying interdisciplinary goals of communities and relevant solutions/agencies for achieving those goals
Not overwhelming communities with education and engagement
Quantifying impacts of grid solutions/projects at the community-/household-scale
Impacts = costs and benefits
How to adequately hear and incorporate lived experiences and stories
Understanding equity as a process with ever-evolving goals and objectives
Lack of shared understanding of energy equity outcomes (metrics and definitions)
Non-predatory data collection
Robust tools where you don't have to manually make models speak

**Table 4. Promising innovation or progress regarding equity and grid planning and operations**

The fact that we are talking about equity and new planning methodologies
Social burden metrics
NREL equitable resilience analysis for distribution
Energy burden within integrated distribution system planning
Resilience awareness of California PUC
Increased funding to equity
Nonintegrated energy storage for EJ actions and community
Defining ways to incorporate equity into transmission planning that will provide value
This collaborative meeting!
Community innovation networks, communities creating platforms for energy solutions to plug in
What is promising is there being enough engagement in this topic to hold summits like this (Or ESIG a few months ago)
Academic research rate tools and methods that allow utilities to consider equity in their processes
Fellowships/training for students/recent grads/community members
Recasting of DOE offices and initiatives
Distributional equity analysis framework – tool, pilot practical guide
State activity in various avenues (so vague but there's no time!)
New DOE-funded grid planning tools and datasets, BI CEP, Least-cost optimal distribution grid expansion, ResStock/ComStock
Recognition and budgeting to compensate community members for participation
Interest of PUC and grid planners in equity space
Intervenor compensation program funding, participation from EJ groups
Awareness of issue is a significant achievement
Community benefits plans in DOE proposals
Integration of grid planning and resilience planning
More programs, funding, conferences related to equity, more discussions. Datasets and tools to show some EJ metrics
Improved socioeconomic data with GIS mapping, focus on developing new equity informed planning metrics, recognition of diverse objectives is the first step

## 5.0 Lightning Round Lab and DOE Presentations

In two different sessions during the summit, representatives from DOE and the national labs provided three-minute lightning round presentations on relevant work (presentations are provided in Appendix A). Many participants agreed that the lightning talks were informative and a high point of the event. Many agreed that there's a need for more of this type of information sharing and cross-pollination at DOE, the labs, and in industry. Lightning presentation speakers and topics are summarized in tables 5 and 6. Note that in some cases, participants presented projects being led by other individuals or organizations. Slides from all lightning-round presentations are included in Appendix A.

"The lightning rounds were fantastic. A great way to provide a snapshot of all the good work that is being done."

- *Summit attendee*

**Table 5. First round of lightning talks**

Name	Organization	Topic(s)
Nichole Hanus	LBNL	Assessing the Current State of U.S. Energy Equity Regulation and Legislation
Juliet Homer	PNNL	State Energy Equity Self-Assessment Exercise (for Jason Eisdorfer at PNNL)
Holly Carr	DOE	The Buildings Upgrade Prize (Buildings UP) and the Solar Decathlon Design Challenge
Sydney Forrester	LBNL	Low-income energy burden reduction strategies: Bill assistance, Weatherization, and Rooftop PV
Michele Boyd	DOE	Interconnection Innovation e-Xchange (i2X)
Bobby Jeffers	NREL	Planning for Solar at the Convergence of Resilience and Equity (SCORE)
Natalie Mims Frick	LBNL	Distributional Equity Analysis
Jasmine McAdams	LBNL	Piloting Distributional Equity Analysis Framework
Thomas Mosier	INL	Planning sustainable fuel production pathways, considering disadvantaged communities (for Pralhad Burli at INL)

**Table 6. Second round of lightning talks**

Name	Organization	Topic(s)
Bobby Jeffers, Jennifer Yoshimura, Abraham Ellis	NREL, PNNL, SNL	National Labs Directors' Council (NLDC) Working Group on Community Engaged Research
Summer Ferreira	SNL	Equitable Grid Planning Projects and Resources: Technical assistance projects in Cordova, Alaska, US Virgin Islands, and Puerto Rico
Summer Ferreira	SNL	Energy Storage for Social Equity
Margaret Taylor	LBNL	Equity and the Publicly Funded EV Infrastructure Rollout – JUST Lab Consortium and BILD AQ
Andrew Satchwell	LBNL	Electric Vehicle Program Designs and Strategies to Enhance Equitable Deployment
Thomas Mosier	INL	Transit Bus Electrification Needs Assessment (for Torrey Lyons, INL)
Miguel Heleno	LBNL	Justice40 Model
Murali Baggu	NREL	LA100 Equity Strategies
Murali Baggu	NREL	PR100 Study

<b>Name</b>	<b>Organization</b>	<b>Topic(s)</b>
<b>Murali Baggu</b>	NREL	Clean Energy to Communities
<b>Rebecca Tapio</b>	PNNL	Considerations for Resilience Guidelines for Oregon Utilities' Clean Energy Plans
<b>Abraham Ellis</b>	SNL	Sociotechnical Systems (STS) Analysis, engineering, and design in Support of energy justice
<b>Sarah Awara</b>	NREL	Energy Justice Metrics and Methods in Early Technology Readiness Level
<b>Sarah Awara</b>	NREL	Energy Justice Constrained Power System Dispatch and Planning (Just Dispatch)

After the lightning round presentations, there was time for participants to share other equity-related activities happening at their organizations. Information shared included:

- LBNL (Margaret Taylor) is developing an upcoming survey on solar/EV co-adoption.
- PNNL (Jennifer Yoshimura) is starting a new equitable transmission project and another new PNNL project, led by Rebecca O'Neil is focused on multifunctional benefits of transmission corridors.
- NREL (Bobby Jeffers) talked about the SLOPE tool for state and local planning for energy. One of the datasets looks at energy and transportation burden simultaneously.
- Deidre Sanders (ArkSpring Consulting) is working on a project with the American Association of Blacks in Energy to develop a framework for a bottom-up approach for communities to identify their infrastructure needs, using three categories of community investment (foundational, remedial, and resilient).
- EARNEST is a project led by Stanford and the National Rural Electric Cooperative is a partner. They are focusing on resilience in underserved communities.
- PNNL (Juliet Homer) is touching on equity in the Regulatory Pathways paper they are developing as part of the National Transmission Planning Study.

## 6.0 Partner Presentations

After lunch, representatives from partner organizations presented on their work and recent activities. Presenters were:

- Todd Levin, ANL
- Danielle Sass Byrnett, NARUC
- Catherine Reed, NASEO
- Anna Ziai –CESA.

Todd Levin presented on a GMLC project, named Enhanced Modeling to Ensure Equitable Power System Operations and Planning, that he is leading. Project partners include NREL (Sarah Awara), Carnegie Mellon University (Destinie Nock), and Colorado School of Mines (Maxwell Brown). The objectives of the project are to:

- Build upon the team’s experience in assessing the challenges associated with ensuring energy equity across several dimensions of power systems
- Review key equity metrics, modeling methods, and data needs for improving equity outcomes
- Identify a prioritized list of model enhancements to capture equity considerations
- Implement model enhancements to demonstrate impacts through case study analysis
- Disseminate findings to key stakeholders and incorporate feedback.

The desired outcomes of the project are to advance the state-of-the-art in power system modeling and ensure systems are planned and operated in a reliable and equitable manner. Todd is organizing a stakeholder advisory committee for the project. People interested in joining the advisory committee can contact Todd at [tlevin@anl.gov](mailto:tlevin@anl.gov).

Danielle Sass Byrnett and Catherine Reed presented on equity-related NARUC and NASEO efforts, including the NASEO, NARUC, National Governor’s Association, and National Association of State Utility Consumer Advocates Regional Equity Roundtables that were held in 2023 (the Midwest in June, the West in September, and the Northeast in December) and those that will be held in 2024 (the Mid-Atlantic in May, the Southeast in June, and the Central in the Fall). They also shared a summary of equity related publications by each organization that can be found at [www.naseo.org/issues/equity](http://www.naseo.org/issues/equity) and <https://www.naruc.org/core-sectors/energy-resources-and-the-environment/energy-equity-and-justice/>.

NASEO energy equity publications include those on:

- Stakeholder Engagement

- Workforce Development
- Equity-focused Building Energy Code Activities.

NARUC energy equity publications include:

- Energy Justice Series
  - Metrics
  - Affordability and Arrearages
  - Participation in Decision Making
- Intervenor Compensation
- Stakeholder Engagement
- Equity in Transportation Electrification.

In 2024, NASEO will focus on equity in clean energy research and development and stakeholder engagement in transmission planning, and NARUC will also focus on equity and transmission.

Anna Ziai from [Clean Energy States Alliance](#) (CESA) presented background on the organization and recent activities. CESA has been working with states on clean energy issues for more than 20 years. CESA convenes states to talk about pressing issues. Recently, they have been EPA's Greenhouse Gas Solar for All Initiative, DOE's Home Energy Rebates programs, helping states stack federal and local incentives, and providing support for community benefits plans. They provide one-on-one technical assistance in the form of programmatic templates and plain English explainers, meetings of states and webinars, and informational education, and more. Each year, they host an annual, in-person clean energy summit with DOE, the labs, NARUC, and NASEO in Washington D.C. for state and federal government employees. They also develop a weekly newsletter of all federal funding opportunities exclusive to states with a specific focus on those opportunities relevant to states.

## 7.0 Utility Perspectives Panel

The second panel of the summit focused on utility perspectives on equity and grid planning and operations. Jennifer Yoshimura from PNNL moderated the panel. Panelists included:

- Ryan Burg, Commonwealth Edison
- Shubha Harris J.D., Legal Consultant, formerly Regulatory Attorney at Xcel Energy
- Lauren Khair, National Rural Electric Cooperative Association
- Ahlmahz Negash, Tacoma Power.

Panelists were asked what the role of the utility is with regard to equity. Their responses follow.

Utilities have a few key roles that are described below:

1. *Community engagement* – Utilities have a relationship with communities and communities have a dependence. We can think of utilities as having a service obligation and a responsibility to understand impacts
2. *Program design* – Utilities are responsible for developing effective programs.
3. *Regulatory space* – Achieving the kind of community engagement needed to ensure grid plans are well connected to community needs.

Cooperatives (co-ops) strive to be the trusted energy advisor. All of the leadership comes from the communities that they serve. Safe, reliable, and affordable power is their mission. Many co-op customers are located in rural disadvantaged communities. Co-op utilities meet members where they are. Members could benefit from templates to guide community engagement, including guidance on community benefits plans. Most co-ops have smaller staff. It is important to make sure templates are not so detailed that they aren't scalable and usable.

Utilities have a role to play due to the large opportunity to influence the energy economy. Utilities also have a monopoly, and with rights come responsibilities. Businesses have a role in servicing the public good. Some utilities may not consider equity to be a core function of business. We need to better articulate that it is a core function of business. Utilities have monopoly privilege and they have the responsibility to serve a captive customer base. Additionally, utilities have a large economic component, so utilities have a role in ensuring that economic inequities are not exacerbated. Leadership also should be more reflective of the communities (e.g., communities of color) and the experiences of their members.

Municipal utilities are consumer-owned, and a lot of utility structures and processes are already in place to prioritize public good considerations such as energy justice. However, utilities still struggle with procedural justice aspects of incorporating community input into

decision-making as well as incorporating energy justice in their planning and operation practices in general. Some folks at utilities hold the sentiment that equity is not a core function or objective of the business. Utilities can rethink their role. Because there are factors outside of the utility sphere of influence that affect customers' experiences, utilities will need to be strategic by choosing to engage in utility actions that align with broader societal justice efforts. More partnerships would be beneficial to that kind of strategic alignment.

Next, panelists were asked what the biggest technical and data modeling needs and opportunities are. Responses included:

- Co-ops are just trying to keep the lights on and want money for poles and wires. Many co-ops are smaller utilities located in rural areas. What is innovative to co-ops may not be innovative to investor-owned utilities and municipal utilities. Many co-ops do not have the level of visibility into the system that other utilities do. How can we help co-ops and other smaller and more rural utilities use and analyze their data?
- A challenge for technical groups is how to best share with the community. On the data/modeling side, there is a challenge of knowing what to measure. There are no off-the-shelf tools that have an equity component.
- Utilities need help translating what priorities are and making sense of the concept of equity. They also need help being clear about what aspects of the grid we are trying to make equitable, and how to drill down to performance. Utilities also need more conceptual clarity about what to measure and how, especially spatially. What does it mean to spend money on infrastructure in a location if impacts are felt at another?
- As an example, the Xcel energy service quality map provides a granular look, by census block group, that can help us answer what equity is in the clean energy transition. Additional indicators needed include emissions by census block group, spend/investment by geography, and social burden. It would be useful to have one indicator that can capture multiple aspects of equity.

The last questions the panel answered addressed the role the labs could play to help advance equity in grid planning and operations and what the first priority would be for labs. Responses included:

- *More outreach* – For example, information on measuring distributional equity and showing that the work the labs do matters. The first priority is to conduct a review of what utilities have already done and been successful at.
- *Looking at existing tools (e.g., Xcel maps) and identifying additional, robust indicators* – Can the labs support a conversation around affordability that is not just about discounted electricity rates? It feels like we need a more nuanced conversation around affordability that is different than what we have now. We should ask, is there some

principled reason to re-examine the structure that was built? First priorities for labs are making the equity conversation more central within planning and identifying the right metrics. Labs can help decision-makers understand that this is an issue.

- Co-ops need one-stop-shop engagement with national laboratories. Resources need to be focused on projects of less than 1MW and rural challenges. The first priority is seeing if the labs could help measure the impact co-ops are currently having with community engagement and identify the opportunities to increase their impact.
- Some utilities are working with labs. ComEd and ANL are working on future-focused transportation/climate resilience models/analyses, which can show that an equity-focused strategy benefits everyone. Labs can work with utilities and use lab research capabilities to make utility programs and efforts better, more rigorous, and available to a wider community. National laboratories can help capacity-strapped organizations implement more thoughtfulness.

The panel and summit attendees also had a group discussion about how to quantify qualitative information from communities. Their responses included:

- Utilities can use the power and information to ask less of communities, not more. Can we create some transparency into how much we have subsidized costs for the wealthy? There is a whole docket around low-income energy assistance, but there is no visibility into how much we are subsidizing energy for people who can afford it.
- Labs can engage social scientists and ask if we need to engage a quantitative framework. The social burden metric also can integrate the qualitative side.
- Ahlmahz shared that she is working on a project with the University of Washington on a system dynamics model that involves bringing in the qualitative framework into a quantitative framework. The ultimate goal is to identify more effective and strategic utility policy interventions that promote energy justice.
- It is all about the question and how the question is framed. Think about the least cost framework. The people who have the most are the ones who cost the least to serve. A problem exists if the questions that we ask define resource allocations and we do not question that approach.

Additional comments by the panelists included:

- The fundamental interests of communities of color were lower bills and more jobs. There are a lot of people who do not trust their utility.
- One example of an action a utility is considering is to provide an automatic discount for low-income customers.

- There's a clean energy boom going on. Utilities will be spending trillions of dollars. We need to make sure that the spending is equitable and that current inequities aren't exacerbated.

## 8.0 Key Participant Insights

At the end of the summit, participants were asked to share the most significant insights they gained from the event. Brief statements from participants are listed in Table 7.

**Table 7. Participant insights from the event**

Opportunity to share and learn from each other
Network with national lab colleagues more since we're all working in the same space. No need to duplicate work!
Look at how to leverage lab projects with similar scopes
Data gaps and needs
Need for improved ownership and collaboration beyond energy for energy
Frameworks are still needed
Stakeholders and leaders still have different understandings of equity
Continuing partnerships with labs - highlighting strengths (vs. competition)
The need for community engagement to focus on their needs, what the community needs to know
Importance/likely interest in getting more utility partnerships and awareness of equity-related work by labs "lightning rounds" for utilities
Standardizing the language used in our different spaces will be very important in advancing grid equity if we are to keep community needs front and center
There are a ton of resources out there (it's overwhelming)
We must bake social assessments, that have nothing to do with energy, into the research
Owning EV is causing wealthy households to look like they have higher energy burdens
States are at different stages of being able to consider equity within regulation
How do we incorporate qualitative info from communities into plans?
Just reduce electric costs
Create a storefront
Do a road show of capabilities
Can we work on a standard framework for TA regarding energy justice and equity response
DOE needs to create more space for intentional/deliberate/outcome-driven stakeholder engagement
The number of tools that are out there that somehow incorporate equity—whether it's DOE tools, utility tools, or national lab tools
How to structure utility accountability from the regulatory perspective? What can be done to define utility's responsibilities in the equity space?
There is a lot more work going on in this area than I realized. How do we coordinate and bring it all together?
Lots of great equity work happening in different spaces but so much more time and energy required to affect meaningful change at scale
Get involved in interagency working groups; definitions of rural, joint office DOE/DOT approaches; segmentations of people and of utilities
We need to understand other people's definitions of words we use, and be willing to consider new definitions of fundamental concepts like "success"
Communities may not care what they are eligible for
The importance of listening to what communities actually need and not just info-dumping and over-burdening them
Just because a process is established does not mean it's a barrier

We need to do a better job of distilling and communicating the most relevant information

Even among veterans within the industry, we interpret and communicate issues very differently—need to challenge our own lens more

The people part is time-consuming but important

All the labs are doing incredibly innovative work - consumer offices can benefit from

There is a tremendous amount of research happening in this space. So good to convene like this and learn about it all

## 9.0 Next Steps

The DOE-Lab Equity Summit was a successful event that built upon prior efforts to bring together researchers and DOE on these topics. A variety of next steps were identified, including regional lab/DOE lightning round research presentations and more regular lightning-style research updates for DOE.

Many summit participants filled out surveys after the event. Following are a few comments from participants in response to the question of potential next steps and topics for future events:

- "Continued linkage of lab research to state-level implementation is critical."
- "Translating grid planning and operations into more "tangible" impacts for communities and customers; for example, energy bills, financial assistance, marketing channels, jobs and skills training." This was something someone wanted to hear about that we didn't cover.
- "We recognize that the communities we serve are not a monolith. Can we be more specific about community-specific needs? What are the considerations we should have if we represent a community we do work for versus if we do not represent the community?"

The project team plans to use the information from the summit to help inform our research and technical assistance. The research presentations will be the starting point as we begin to populate the document repository that will house DOE-funded research related to equity and grid planning. In the project's final year, a final Equity Summit will be held (virtually or in person) to help raise awareness and disseminate research and resources completed during our project.

Up-to-date information on the project can be found at the following websites:

<https://emp.lbl.gov/projects/equity-in-grid-planning-and-operations>

<https://www.pnnl.gov/projects/energy-equity/projects-and-programs>

## Appendix A – Lightning Round Presentations



# Department of Energy – National Lab Equity Summit: Grid Planning and Operations

**Natalie Mims Frick, Lawrence Berkeley National Lab**  
**Juliet Homer, Pacific Northwest National Lab**

February 5, 2024

U.S. DEPARTMENT OF  
**ENERGY**



## Round 1 Lightning Presentations



- ▶ Juliet Homer, PNNL
- ▶ Nichole Hanus, LBNL
- ▶ Holly Carr, DOE
- ▶ Sydney Forrester, LBNL
- ▶ Michele Boyd, DOE
- ▶ Bobby Jeffers, NREL
- ▶ Natalie Mims Frick, LBNL
- ▶ Jasmine McAdams, LBNL
- ▶ Thomas Mosier, Idaho National Lab





## Project Name: State Energy Equity Self-Assessment Exercise

- **Summary:** A simple self-assessment tool was developed for state utility regulators (and other stakeholders who work with them) to evaluate the actions they have taken to advance their state's energy equity goals, identify gaps, and consider potential future actions.
- **Desired outcomes:**
  - Offer snapshot assessment of state progress toward energy equity policy goals
  - Enable regulators to assess gaps in certain energy equity areas
  - Offer suggestions for additional actions that states can take to build on what they have done, based on work from other states
  - Create a shared approach and framework to support different stakeholders to compare their assessments of a state's energy equity progress
- **Relevant links:** <https://www.pnnl.gov/publications/database-reveals-energy-equity-policy-activities-across-states>
- **Team/partners:**
  - Jason Eisdorfer, PNNL ([jason.eisdorfer@pnnl.gov](mailto:jason.eisdorfer@pnnl.gov))
  - Jay Barlow, PNNL ([jay.t.barlow@pnnl.gov](mailto:jay.t.barlow@pnnl.gov))
  - Devyn Powell, PNNL ([devyn.powell@pnnl.gov](mailto:devyn.powell@pnnl.gov))
- **Timeline:** Expected rollout Q1 2024

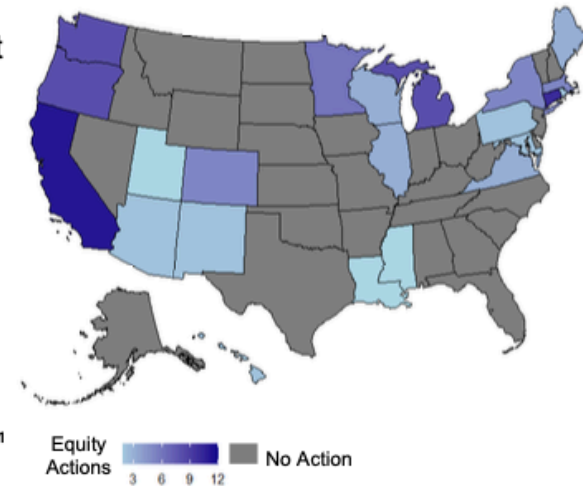


Screenshot of draft self-assessment tool

# Assessing the Current State of U.S. Energy Equity Regulation and Legislation



- We developed a database of **95 energy equity actions** (executive, legislative, and regulatory) focusing on energy equity and directed at electricity and natural gas utilities.
- Along with each action, we categorized: **driver(s), regulatory focus, objective(s), outcome(s), and metric(s)**.
- Based on our review, **almost half of states (22 + DC)** were taking some sort of action on energy equity (i.e., executive order, PUC activity, agency plan, or executive bill).
- **Link:** <https://live-etabiblio.pantheonsite.io/publications/assessing-current-state-us-energy>
- **Team:** Nichole Hanus<sup>1</sup>, Jay Barlow<sup>2</sup>, Andrew Satchwell<sup>1</sup>, and Peter Cappers<sup>1</sup>  
<sup>1</sup>LBNL; <sup>2</sup>PNNL
- **Timeline:** Phase 1: 2022-2023; Phase 2: 2024-2026
- **Phase 2:** Update legislative, regulatory, and executive actions and include a repository of additional resources such as reports, tools, and datasets.



BERKELEY LAB



Pacific Northwest  
NATIONAL LABORATORY

# The Buildings Upgrade Prize (Buildings UP)

Launched in January 2023, Buildings UP is designed to rapidly scale energy efficiency and efficient electrification building upgrades in communities nationwide

Phase 1  
Concept

Phase 2  
Plan

Phase 3  
Pilot

Phase 4  
Full-scale

- 45 teams (Equity-Centered and Open Innovation Pathways)
- \$44+M in prizes and technical assistance (Phases 1+2)
- Partners include: NREL, ACEEE (R2E2), Elevate, REEOs



Buildings UP is a capacity-building prize to support teams with solutions that:

- **Accelerate building upgrades** for efficiency and on-site emissions reductions beyond current best practices in the applicant's identified area of focus
- **Demonstrate scalability and replicability** across building type(s), climate zone(s), and/or, community type(s)
- **Advance holistic and lasting energy efficiency and efficient electrification** initiative development
- **Benefit underserved communities** by ensuring that benefits accrue to equity-eligible buildings\*, their occupants, and surrounding communities.

\*Equity-eligible buildings include buildings in disadvantaged communities; low- and moderate-income (LMI) households; and underserved commercial, nonprofit, and public buildings.

Buildings UP | U.S. Department of Energy

# Solar Decathlon Design Challenge

The Solar Decathlon Design Challenge is an annual competition challenges collegiate student teams to design high performance, low-carbon buildings powered by renewables.

## Design Challenge

### RESIDENTIAL

Single-Family Housing  
Attached Housing

### COMMERCIAL

Multifamily Building  
Education Building

- ~25% MSI/ HBCU teams
- Mentorship program
- Travel scholarships
- ~50% Equity-focused projects

### 10 CONTESTS

Architecture



Market



Life-Cycle



Health



Efficiency



Engineering



Envelope



Grid-Interactivity



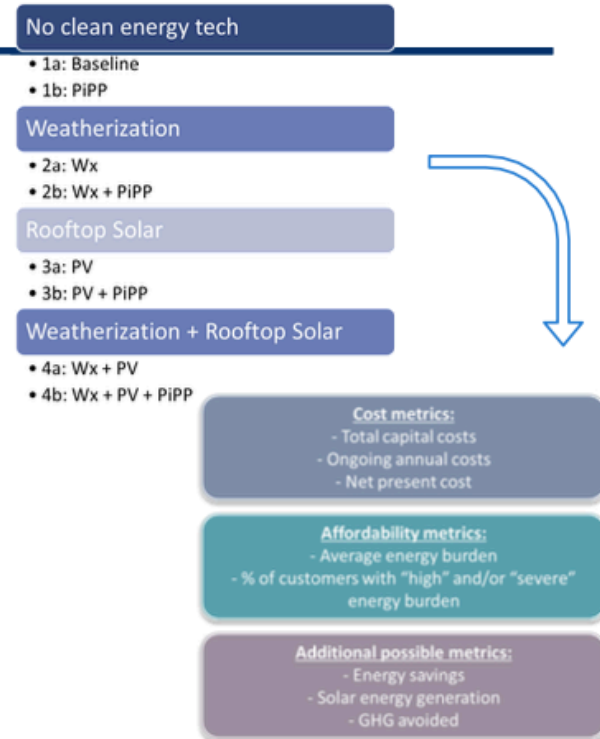
Community



Presentation

## Low income energy burden reduction strategies: Bill assistance, Weatherization, and Rooftop PV

- Research questions:
  - ▣ How do different interventions help improve low income household energy burden?
  - ▣ How can they complement one another?
  - ▣ What are the programmatic costs and benefits?
- Audience: State regulators and policymakers, utilities, energy assistance program designers/managers
- Will analyze each strategy separately & together
- Tracked metrics:
  - ▣ Program cost metrics: total capital costs, ongoing annual costs, net present cost
  - ▣ Affordability metrics: average customer energy burden, % of participants that continue to have “high” or “severe” energy burdens
  - ▣ Additional possible metrics: energy savings, solar energy generation, GHG avoided
- Authors: Sydney Forrester, Cristina Crespo Montañés, Eric O’Shaughnessy, Galen Barbose
- Timeline: Currently finalizing methods, developing figures and final narrative with draft Spring 2024



# Interconnection Innovation e-Xchange (i2X)

*Mission: To enable the simpler, faster, and fairer interconnection of clean energy resources while enhancing the reliability, resiliency, and security of the electric grid*

- **i2X EEJ Objective:** To identify energy and equity justice (EEJ) interconnection challenges and solutions, develop metrics to track EEJ outcomes, and disseminate best practices for incorporating equity goals in interconnection policies and procedures.
- **DOE Offices:** SETO, WETO, VTO, OE, GDO
- **Partner Labs:** LBNL, PNNL, SNL, NREL
- **Activities:**
  - **EEJ Technical Advisory Group**
    - Comprised of participants from 10 organizations including developers, utilities and tribal advocacy groups.
  - **EEJ Stakeholder Meetings**
    - 2 meetings focused on EEJ with 106 participants, part of the i2X Solutions e-Xchange series.
  - **Transmission and Distribution Interconnection Roadmaps**
    - Solutions and best practices for ensuring more equitable and just outcomes for interconnection stakeholders.
  - **Office Hours**
    - Every Friday the i2x team is available for 4 hours to meet with stakeholders across the clean energy ecosystem.

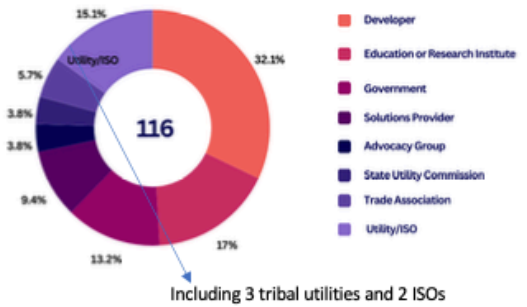
## Identified Barriers

- ❖ Significant administrative burden
- ❖ Limited access to financing and loan programs
- ❖ Lack of transparency about grid conditions and favorable points of IX
- ❖ Limited access to technical expertise
- ❖ EEJ communities not correctly identified as EEJ communities

## Identified Solutions

- ❖ Incorporate equity goals in transmission and distribution planning and valuation efforts
- ❖ Create independent engineering and legal service opportunities to support navigation of IX process and disputes
- ❖ Simplify application forms and IX process for small DER projects in EEJ communities
- ❖ Establish loan and financing programs with direct and flexible payment options
- ❖ Incentivize community and tribal ownership of generation, grid infrastructure and the IX process
- ❖ Improve transparency about grid conditions and information accessibility
- ❖ Provide technical assistance programs for developers and communities

## i2X EEJ Stakeholder Engagement



More information on i2X at

<https://www.energy.gov/eere/i2x/interconnection-innovation-e-xchange>



# Planning for Solar at the Convergence of Resilience and Equity (SCORE)

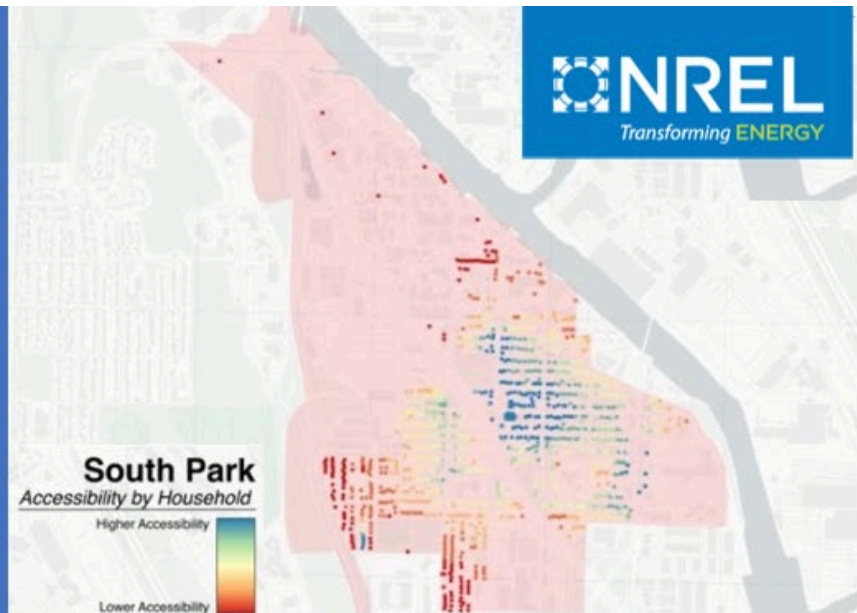
In partnership with Seattle City Light and two communities in Seattle, the SCORE team will develop a process for grid investment planning supported by multiple metrics and capabilities, including social burden metrics.

The team will demonstrate a neighborhood-scale evaluation of the social benefits of solar investment through community-engaged electric utility planning.

*Sponsored by the DOE EERE Solar Energy Technologies Office  
Research by NREL, EPRI, U Washington, U Buffalo, Seattle City Light,  
Seattle Department of Neighborhoods*



<https://www.energy.gov/eere/solar/renewables-advancing-community-energy-resilience-racer-funding-program>

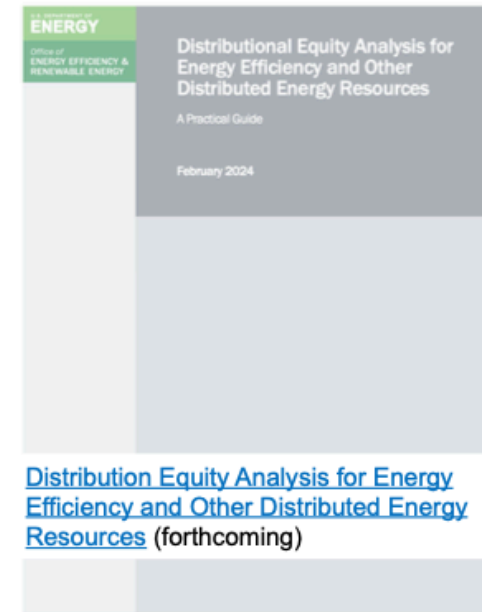


SCORE introduces a first-of-its-kind equity informed, resilience inclusive energy planning approach that can be emulated in other locations.

Timeline: May 2023 – Sept 2025

## Distributional Equity Analysis

- **One sentence summary of project:** Utility customers do not share the burden of the energy system equally and a benefit-cost analysis may not be the appropriate tool to help decision-makers understand if DER investments are equitable.
- **Desired outcomes:** Provide guidance to states, utilities, communities, stakeholders on evaluating the distributional equity impact of utility DER investments
- **Team/partners:** LBNL, e4TheFuture, Synapse Energy Economics
- **Timeline:** Publish report in February 2024



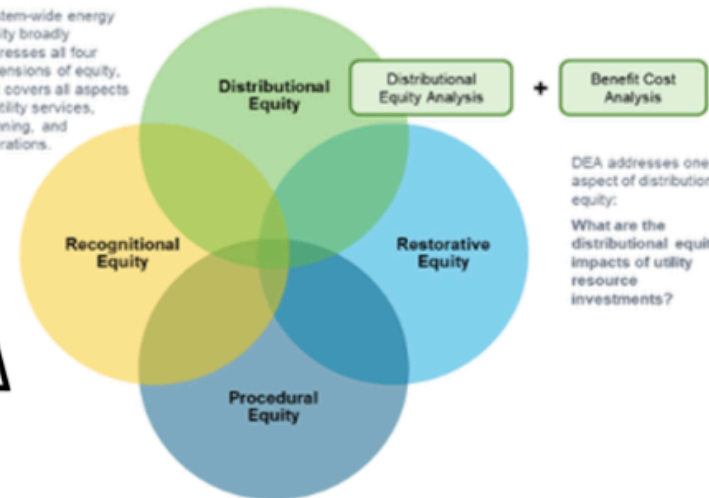
## Piloting Distributional Equity Analysis Framework



### Background

In 2019, Washington passed the Clean Energy Transformation Act (CETA), establishing a statewide goal of carbon-free electricity by 2045. CETA also required each investor-owned utility to file a clean energy implementation plans (CEIP) a **distributional equity analysis (DEA)**. The Berkeley Lab is working with Puget Sound Energy to conduct a pilot DEA, as required by Washington Utilities and Transportation Commission (UTC) order.

System-wide energy equity broadly addresses all four dimensions of equity, and covers all aspects of utility services, planning, and operations.



### Pilot Application: Community Solar Projects



#### Olympia High School

- Retrospective analysis (installed in 2021)
- Comparing priority population with the base population both before the project and following enrollment

#### Nooksack Indian Tribe

- Prospective analysis (expected groundbreaking in 2024)
- Comparing distributional equity of installation on a local apartment complex versus the administrative building

Source: Forthcoming Distributional Equity Analysis for Energy Efficiency and Other Distributed Energy Resources: A Practical Guide



# Planning sustainable fuel production pathways, considering disadvantaged communities

## Summary

- Analyzed pathways to maximize herbaceous and woody biomass mobilization to decarbonize thermal combustion generation and transportation
- Establishing biorefineries in or adjacent to disadvantaged communities can bring range of economic opportunities, but also produce negative environmental burdens

## Intended Outcomes

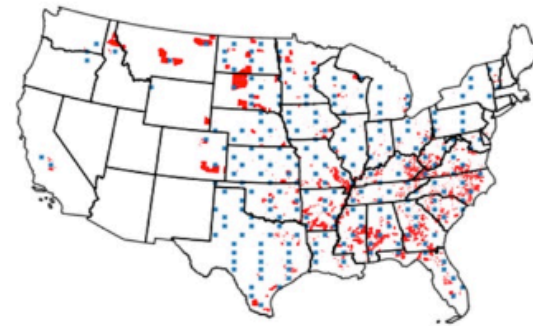
- Aid DOE in developing strategy for creating sustainable transportation fuel supply chain that provides economic opportunities for disadvantaged communities

Report in-review

INL team: **Pralhad Burli**, Damon Hartley, Yingqian Lin, and Rajiv Paudel

Timeline: May 2022 through December 2022

## Potential locations for herbaceous biomass biorefineries within 50 miles of disadvantaged community



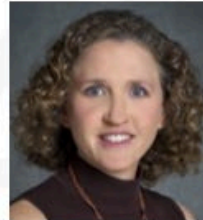
Funded by EERE's DECARB 2b lab call  
Overall co-leads: Troy Hawkins (ANL)  
and Ling Tao (NREL)

IDAHO NATIONAL LABORATORY

## Round 2 Lightning Presentations



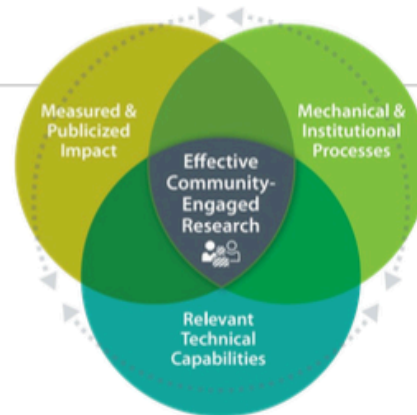
- ▶ Bobby Jeffers, NREL; Jennifer Yoshimura, PNNL; Abraham Ellis, Sandia
- ▶ Summer Ferreira, Sandia
- ▶ Margaret Taylor, LBNL
- ▶ Andrew Satchwell, LBNL
- ▶ Thomas Mosier, Idaho National Lab
- ▶ Miguel Heleno, LBNL
- ▶ Murali Baggu, NREL
- ▶ Rebecca Tapio, PNNL
- ▶ Abraham Ellis, Sandia
- ▶ Sarah Awara, NREL



# National Labs Directors' Council (NLDC) Working Group on Community Engaged Research: What is Fundamental to Effective CER?

## MEASURED & PUBLICIZED IMPACT

- Develop and share relevant rigorous impact measures to both researchers and communities
- Structuring longitudinal impacts across multiple research projects



## MECHANICAL & INSTITUTIONAL PROCESSES

- We already implement CER through technical assistance, cost share partnering, SPP, STEM pipeline, direct community engagement
- DOE's core mission space is unchanged

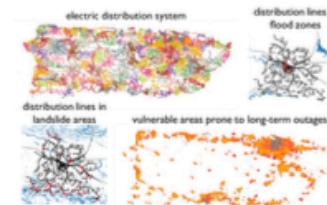
## RELEVANT TECHNICAL CAPABILITIES

- Ensuring we have the right disciplinary expertise funded on the project teams (social and physical science)
- Ensuring our tools are integrating broad definitions of community benefits

## EQUITABLE GRID PLANNING PROJECTS AND RESOURCES



- Equitable grid planning through specific TA projects leveraged with place-based R&D in the field to move the needle forward to desired outcomes of equity informed resources.
  - **Cordova, Alaska** full-scale regional deployment of advanced technologies and methods for resiliency-enhanced operation
  - **US. Virgin Islands** microgrid design and grid integration impact analysis to foster recovery and resilience of the electric system.
  - **Puerto Rico** Sandia is supporting efforts focused on electric power system design and operation enhancements to build resilience against future threats.
  - Distributed energy planning resources ecosystem focused on microgrids and resilience.
  - Workforce development with over 35 interns and two faculty sabbaticals from PR alone since 2017.
- <https://energy.sandia.gov/programs/electric-grid/place-based-work/Team/partners>
- 2017-2024



Microgrid Design Methodology guidebook and workshops

Resilience Node Cluster Analysis Tool (ReNCAT)

Microgrid Design Toolkit (MDT)



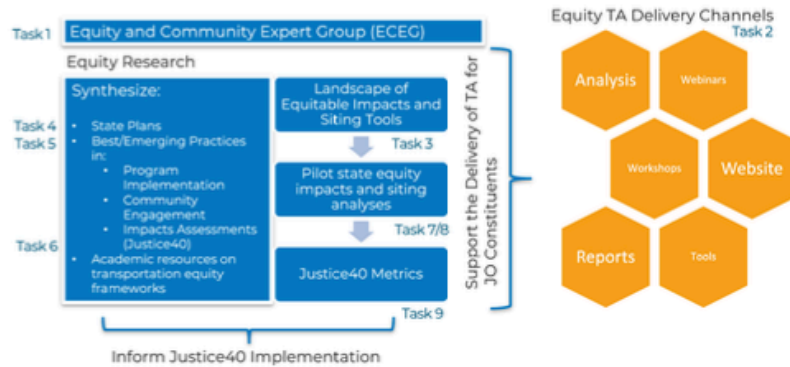
# ENERGY STORAGE FOR SOCIAL EQUITY (ES4SE)

- **Summary** – DOE-OE Energy Storage program designed to empower disadvantaged communities to consider energy storage technologies and applications as a path to achieve community prosperity, well-being, and resilience.
- **Desired outcomes** – Bridging TA and PDDA to implement solutions co-developed with communities that integrate equity and social benefit goals with energy storage systems.
- **Link**
  - <https://www.energy.gov/oe/energy-storage-social-equity-initiative>
  - <https://www.pnnl.gov/projects/energy-storage-social-equity-initiative/technical-assistance-participants>
- **Team/partners** – PNNL, SNL, 14 diverse communities (urban, rural, tribal, indigenous)
- **Timeline**
  - Phase 1 (PNNL): Technical Assistance (TA), completed March 2023
  - Phase 2 (SNL): Project development and deployment assistance (PDDA), started April 2023. Deployment projects estimated to be in-service in 1-3 years.
    - Continuing community benefits, workforce and equity support (PNNL)



# Equity and the Publicly Funded EV Infrastructure Rollout – JUST Lab Consortium and BILD AQ

## The JUST Lab Consortium: Research for an equitable transportation transition



### More on Task 3:

- State Equity Capacity-Building Needs
- JUST Taxonomy of Equity Technical Resources (JET)



4 of these tools were piloted in **Task 8** in TX, CA  
BILD-AQ is one of these tools

## BILD AQ

- **One sentence summary of project:** BILD-AQ is a modeling framework for evaluating the environmental, health, and equity impacts of large-scale U.S. charging infrastructure deployment.
- **Desired outcomes:** Evaluations and analyses of air quality, health and equity outcomes of federal and state investments and policies in the transportation energy transition (notably, the publicly-funded EV infrastructure rollout)
- **Team/partners:** Lawrence Berkeley National Laboratory (PI: C. Anna Spurlock); National Renewable Energy Laboratory (PI: Eric Wood)
- **Timeline:** Current project ends Spring 2024, with likely continuation work to be determined.

# Electric Vehicle Program Designs and Strategies to Enhance Equitable Deployment

## Objectives and approach



- Provide a resource for policymakers, federal and state officials, community leaders, and program managers seeking more equitable sharing of benefits from transportation electrification.
- Summarize common themes and strategies from more than 60 electric vehicle supply equipment (EVSE) publications, focusing on equity.

## Project details



- Funded by Joint Office of Energy and Transportation.
- Developed as part of the [Joint Office United Support for Transportation \(JUST\) Lab Consortium](#).



Report available at: <https://emp.lbl.gov/publications/electric-vehicle-program-designs-and>



# Transit Bus Electrification Needs Assessment

## Summary

- Transit bus electrification is important component of extending the benefits of net-zero emissions transportation technologies to disadvantaged populations
- The Joint Office of Energy and Transportation is funding INL to conduct a transit bus electrification needs assessment

## Intended Outcomes

- Aid transit agencies to plan and overcome barriers to zero emissions transit vehicle deployment
- Better understand equity considerations in transit agency decarbonization planning and investment



Relevant Links: <https://driveelectric.gov/transit-agencies>

Team (all INL): **Torrey Lyons** (PI), Dawn Davis, Casey Quinn

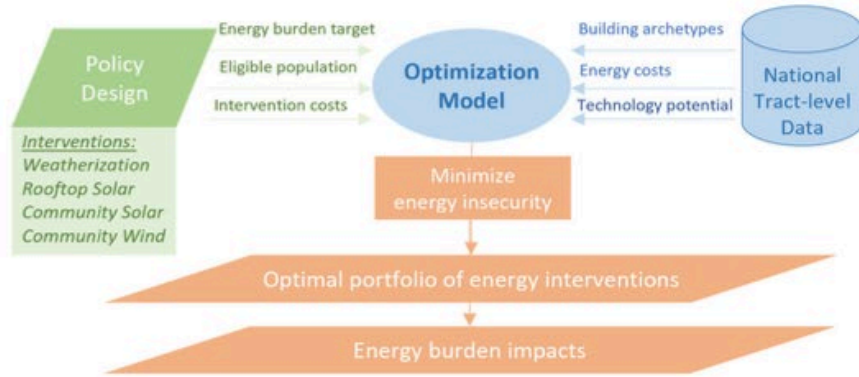
Timeline: December 2023 to June 2024

IDAHO NATIONAL LABORATORY

# Justice40 Model

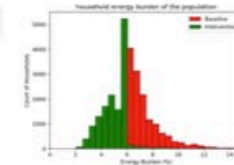
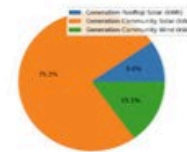
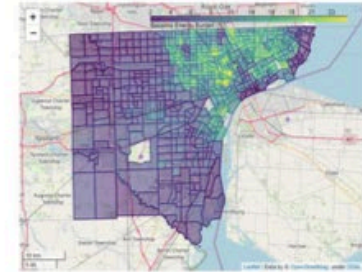
[eta.lbl.gov/justice-40](https://eta.lbl.gov/justice-40)

A model to support equitable deployment of energy interventions, by determining the least-cost portfolio of place-based energy investments to reduce energy insecurity of vulnerable populations.



```
pip install j40model
```

[github.com/LBNLgrid/j40model](https://github.com/LBNLgrid/j40model)



## LA100 Equity Strategies

How can Los Angeles improve equity in its transition to 100% clean energy?

Best-in-class analysis and engineering was combined with social science and justice theory to prioritize equity outcomes in processes and infrastructure (e.g., rates, buildings, transportation, solar, and grid)

*Supported by Los Angeles Department of Water and Power  
Research developed in partnership with UCLA*



<https://maps.nrel.gov/la100/equity-strategies#home>



Analysts modeled 50,000 households and 1.57 million LADWP customers across 100 household characteristics using 50 terabytes of data.

Study informed by 100+ community members, 14 organizations, and 32 city agencies

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# Clean Energy to Communities (C2C)

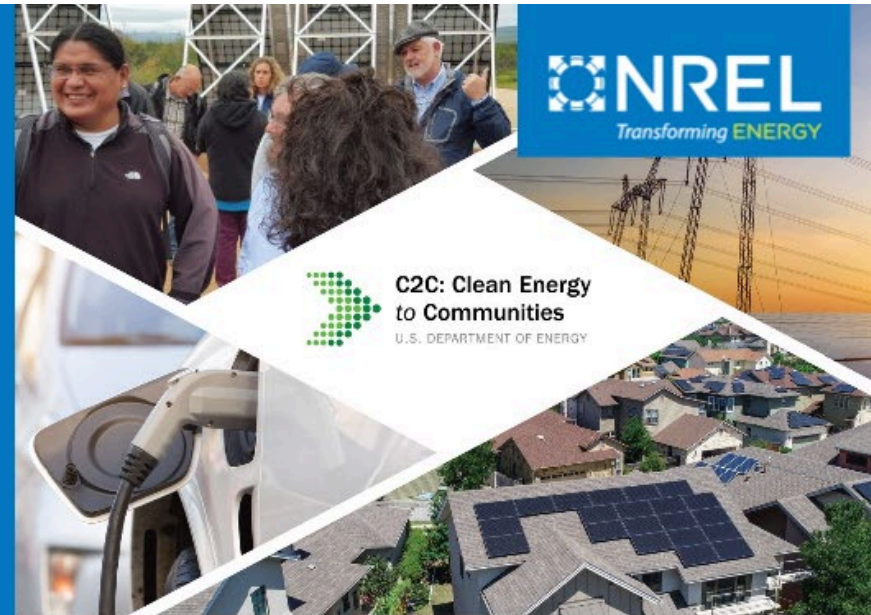
Communities across the United States want to **transition to clean energy**—but they don't know where to start.

C2C, a technical assistance program, brings tailored solutions to help communities achieve clean energy goals at a rapid pace.

*Supported by the U.S. Department of Energy  
Office of Energy Efficiency and Renewable Energy*



[bit.ly/DOE-C2C](https://bit.ly/DOE-C2C)



**C2C: Clean Energy  
to Communities**  
U.S. DEPARTMENT OF ENERGY

C2C offers three types of support to communities: **in-depth partnerships, peer-learning cohorts, and expert match.**

**200+ communities have been supported** with customized, cutting-edge analysis from national laboratory experts.



## Considerations for Resilience Guidelines for Oregon Utilities' Clean Energy Plans For the Oregon Public Utility Commission and Oregon Electricity Stakeholders

Oregon House Bill 2021, Section 4, requires the Oregon Public Utility Commission to establish reasonable and prudent industry resilience standards and guidelines that state investor-owned utilities will address in Clean Energy Plans.

The U.S. Department of Energy Grid Modernization Laboratory Consortium prepared a report summarizing risk-based approaches for power system and community resilience planning with an emphasis, established by the PUC, on **customer-centered resilience planning**, and developed an analysis process.

**Partners:** Juliet Homer, Karyn Boenker, **Rebecca Tapio**, and Kostas Oikonomou (Pacific Northwest National Laboratory), Alice Lippert (Argonne National Laboratory), and Hope Corsair (Oak Ridge National Laboratory)



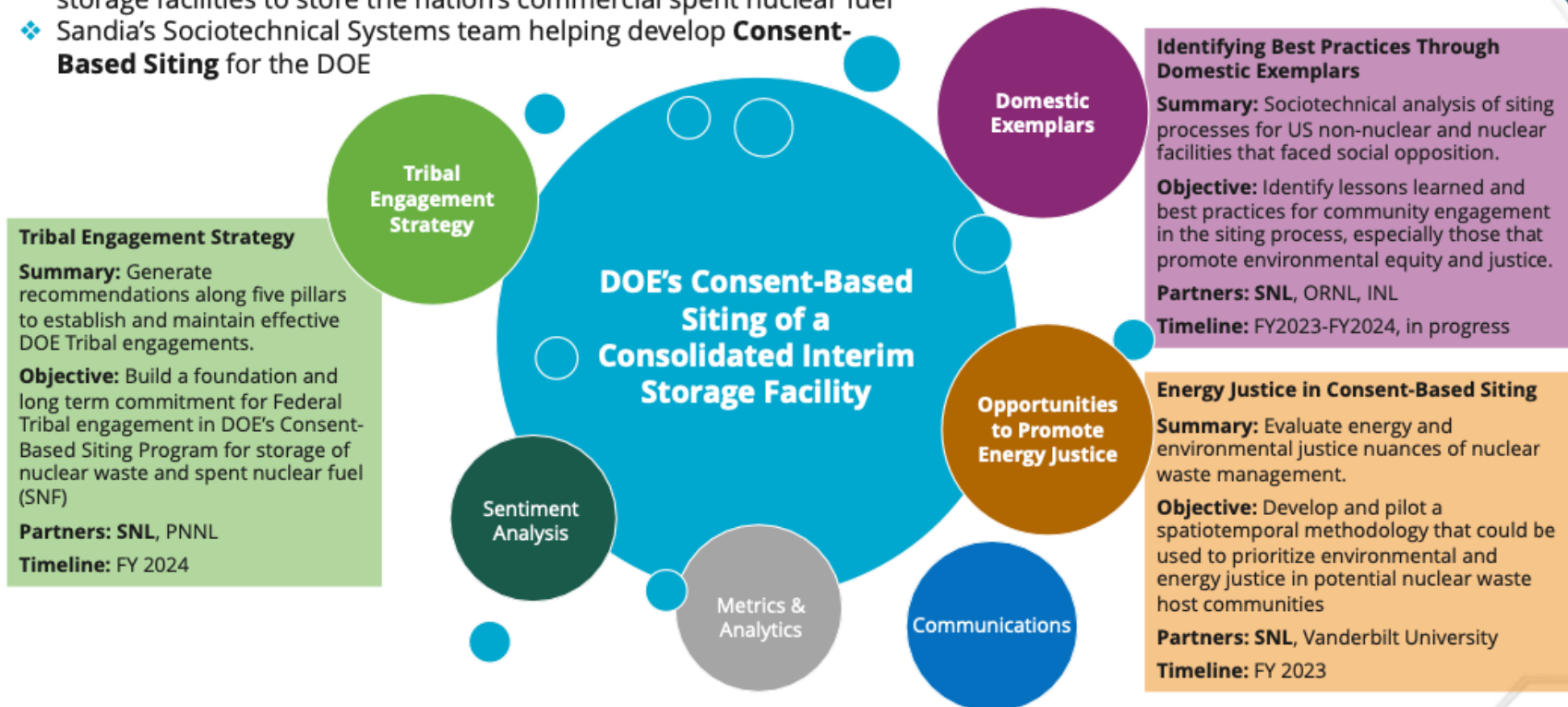
For the full report, please scan the QR code or visit <https://www.osti.gov/servlets/purl/1905600>



# SOCIOTECHNICAL SYSTEMS (STS) ANALYSIS, ENGINEERING, AND DESIGN IN SUPPORT OF ENERGY JUSTICE

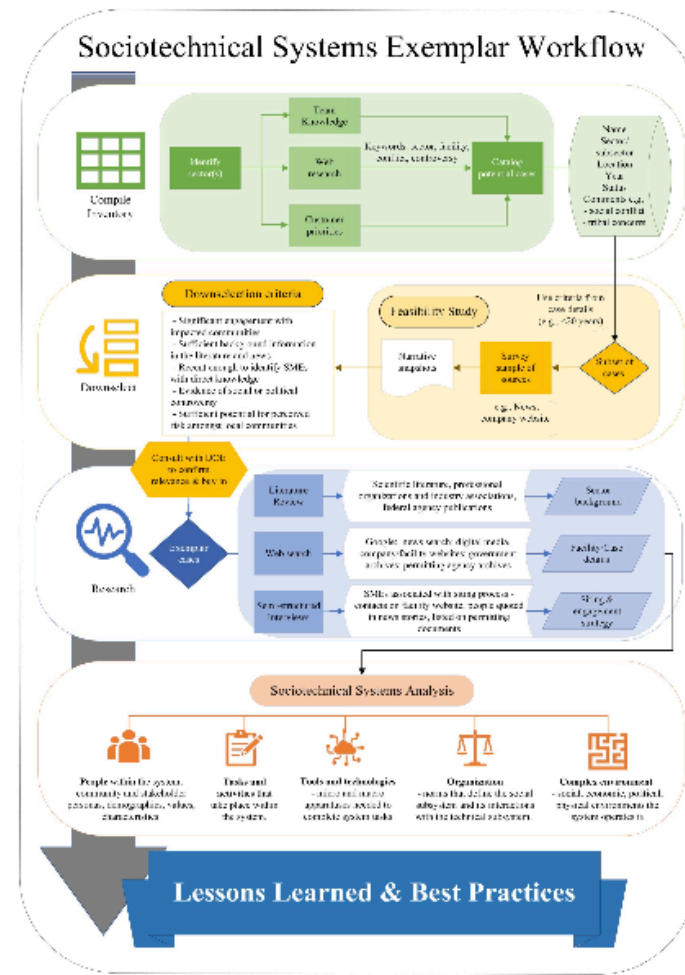


- ❖ The DOE is pursuing one or more federal consolidated interim storage facilities to store the nation's commercial spent nuclear fuel
- ❖ Sandia's Sociotechnical Systems team helping develop **Consent-Based Siting** for the DOE



## BEST PRACTICES AND LESSONS LEARNED: DOMESTIC EXEMPLARS

- **Summary:** Sociotechnical analysis of siting processes for US non-nuclear and nuclear facilities/infrastructure that faced social opposition in the US.
  - FY23 sites: Nuclear Waste Negotiator office site, Biohazard R&D site, Solar PV plant, Petrochemical plant
  - FY24 sites: Nuclear facilities (e.g., WIPP)
- **Objective:** Identify lessons learned and best practices for community engagement in the siting process, especially those that promote energy/environmental equity and justice.
- **Partners:** SNL, ORNL, INL     • **Sponsor:** NE
- **Timeline:** FY2023-FY2024, in progress
- **Sandia POC:** Carmen Mendez, cmmende@sandia.gov



## Energy Justice Metrics and Methods in Early TRL

This project drives transformation of how we do clean energy research and deployment, at NREL and beyond.

### Key Outputs:

- Need-finding survey of existing practices and barriers for applying EJ to research
- Literature review on metrics for late-TRL & new metrics for early-TRL
- New methods for early-TRL & assessment of NREL case studies.

*Sponsored by NREL through the Laboratory Directed Research and Development program*



[doi.org/10.1016/j.joule.2023.01.007](https://doi.org/10.1016/j.joule.2023.01.007)



This project developed metrics and methods for integrating energy justice (EJ) from early research through deployment, to realize NREL's vision of clean energy for all.

# Energy Justice Constrained Power System Dispatch and Planning (Just Dispatch)

Most grid planning tools only dispatch based on cost and reliability without taking into consideration health impacts on communities.

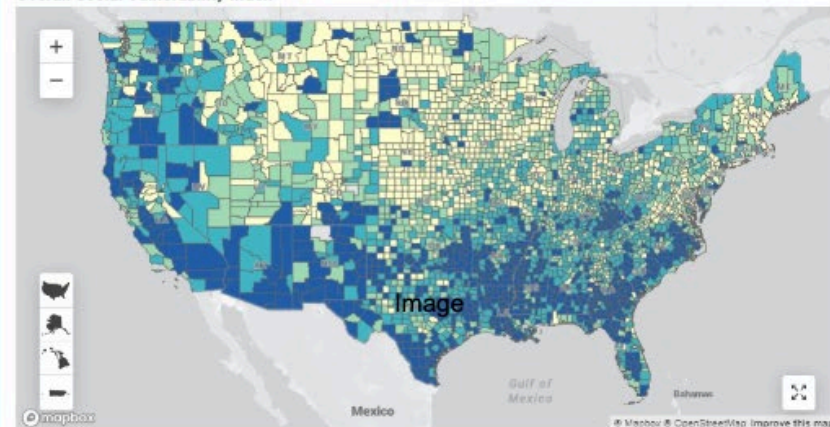
This project will develop a novel, scalable, high-fidelity representation of the emissions and health impacts of power systems operations, specifically to evaluate and improve the justice of future electric systems.

*Sponsored by NREL through the Laboratory Directed Research and Development program*



<https://maps.nrel.gov/slope/data-viewer?filters=%5B%5D&layer=e.ej.svi&year=2018&res=county>

Overall Social Vulnerability Index



Map Legend

(Overall Percentile Ranking)



Just Dispatch introduces a module in Sienna, NREL's production cost modeling tool, to dispatch power generators taking into consideration health impacts (as part of the optimization problem).

Timeline: October 2023 – September 2025

Map: National Renewable Energy Laboratory. "Social Vulnerability Index," State and Local Planning for Energy, accessed 1/30/2024, <https://maps.nrel.gov/slope>.

# NASEO and NARUC

## National Association of State Energy Officials and National Association of Regulatory Utility Commissioners



### **NASEO, NARUC, NGA, NASUCA Regional Equity Roundtables**

Midwest, June 2023	Mid-Atlantic, May 2024
West, September 2023	Southeast, June 2024
Northeast, December 2023	Central, Fall 2024

#### **NASEO Energy Equity Publications**

- Stakeholder Engagement
- Workforce Development
- Equity-focused Building Energy Code Activities

#### **NASEO Energy Equity Committee**

##### **Forthcoming in 2024**

- Equity in Clean Energy Research and Development
- Stakeholder Engagement in Transmission Planning

**[www.naseo.org/issues/equity](http://www.naseo.org/issues/equity)**

#### **NARUC Energy Equity Publications**

- Energy Justice Series
  - Metrics
  - Affordability and Arrearages
  - Participation in Decision Making
- Intervenor Compensation
- Stakeholder Engagement
- Equity in Transportation Electrification

##### **Forthcoming in 2024**

- Equity and Transmission

**[www.naruc.org/cpi-1/energy-customers/energy-justice/](http://www.naruc.org/cpi-1/energy-customers/energy-justice/)**

# Equity Informed Power System Planning

**TODD LEVIN**

Electricity Markets Team Lead  
Center for Energy, Environmental, and Economic Systems Analysis (CEEESA)  
Argonne National Laboratory

# Problem Statement



## Procedural

- ▶ Power systems are currently planned, operated and evaluated from a system perspective  
System least-cost, system reliability metrics, global emissions, etc.
- ▶ Minimal consideration for how costs and benefits are distributed  
Particularly across marginalized communities
- ▶ Definitions and metrics for assessing equity are unclear and not standardized

## Technical

- ▶ Power system models drive investments, operational strategies, policies and regulations
- ▶ Current models are largely based on least-cost optimization  
Do not explicitly consider social equity objectives
- ▶ There is no standardized approach to either:
  - A) monetize equity considerations for least-cost modeling
  - B) address equity considerations through alternative modeling frameworks
- ▶ Result is a **lack of equity consideration in real world planning and operations**  
Resulting in inequitable social outcomes in practice

# Enhanced Modeling to Ensure Equitable Power System Operations and Planning



## Project Objectives

- ▶ Build upon team's experience assessing the challenges associated with ensuring energy equity across several dimensions of power systems
- ▶ Review key equity metrics, modeling methods, and data needs for improving equity outcomes
- ▶ Identify a prioritized list of model enhancements to capture equity considerations
- ▶ Implement model enhancements to demonstrate impacts through case study analysis
- ▶ Disseminate findings to key stakeholders and incorporate feedback

## Project Description:

- ▶ Identify and prioritize new metrics, datasets and modeling methodologies to improve consideration of energy equity in power system models.
- ▶ Implement a subset of these enhancements to demonstrate their importance
- ▶ Work with stakeholders to ensure that our technical advancements can inform decision-making to improve real-world equity outcomes.

## Project Impact:

- ▶ Advance the state-of-the-art in power system modeling
- ▶ Ensure systems are planned and operated in a reliable and equitable manner.

## Principal Investigators:

**Todd Levin**

Argonne National  
Laboratory

**Sarah Awara**

NREL

## Collaborators:

**Destenie Nock**

Carnegie Mellon  
University

**Maxwell Brown**

Colorado School of Mines

# Objectives



*We will advance power system modeling to incorporate equity objectives and improve equity outcomes*

## Subtopic 1

- ▶ Review key equity metrics, modeling methods, and data needs for improving equity outcomes  
Building upon our previous work<sup>1</sup> that established modeling challenges and potential innovations across nine dimensions)
- ▶ Establish a set of standardized and transparent equity metrics across different system dimensions  
That can be readily integrated into PSM objective functions and formulations to improve outcomes  
Assess system cost-benefit tradeoffs associated with improved equity outcomes
- ▶ Identify a prioritized list of model enhancements to address equity consideration
- ▶ Disseminate a power system modeling fact sheet for regulators and policy makers

## Subtopic 2

- ▶ Implement model enhancements  
Conduct corresponding case study analyses to demonstrate impacts of model enhancements
- ▶ Disseminate findings to key stakeholders through a Technical Review Committee  
Ensure that modeling advancements translate into practice  
Incorporate feedback and refine prioritization, methods and processes accordingly

<sup>1</sup>Goforth, T., Levin, T. and Nock, D. "Incorporating energy justice and equity into power system models: a review of current practices and paths forward", under review, R&SER, 2023.

## Technical Tracks

*We are planning to pursue 4(+) largely independent technical tracks*



### Distributional Reliability

How can system planning improve to consider how reliability is distributed across populations?

### EVs and Grid Planning

How does rapid deployment of EVs and charging infrastructure intersect with power system equity?

### Emissions and Health

What are the distributional health impacts of different electricity decarbonization futures?

### Heterogenous Objectives

How can system planning improve to consider diverse community objectives, beyond system least-cost?

## Stakeholder Advisory Committee



- ▶ Please consider joining our Stakeholder Advisory Committee
- ▶ Quarterly meetings for the team to discuss progress and receive feedback  
1<sup>st</sup> meeting will be on Feb. 13<sup>th</sup>.
- ▶ Opportunities to review work and reports prior to publication
- ▶ Help us ensure that our early research is able to inform real-world decision making
- ▶ Contact me if interested!

**Todd Levin**

**Electricity Markets Team Lead**

**ARGONNE NATIONAL LABORATORY**

Energy Systems and Infrastructure Analysis Division

Center for Energy, Environmental & Economic Systems Analysis (CEEESA)

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<https://www.anl.gov/esia/electricity-markets-team>





<https://gridmod.labworks.org/>