Matching Objectives with Stakeholder-Driven Metrics for Equitable Power Systems Planning

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Introduction

As governments, utilities, and researchers pursue ambitious clean energy transitions, questions of equity and justice have become increasingly central to energy policy and planning. While energy system planning models play an important role in informing infrastructure investments, technology deployment, and policy decisions, they often struggle to incorporate the diverse priorities and lived experiences of the communities they are intended to serve. As a result, there remains a persistent gap between community-defined understandings of equitable outcomes and the objectives embedded within technical planning processes. At the same time, stakeholder engagement is increasingly recognized as essential to achieving just and inclusive energy transitions. However, traditional engagement approaches can be limited by technical complexity, disciplinary silos, and unequal participation dynamics that make it difficult for stakeholders to meaningfully contribute to discussions about energy planning priorities. These challenges raise an important question: how can energy researchers and practitioners create accessible mechanisms for identifying and incorporating stakeholder-defined equity priorities into energy transition decision-making?

This paper presents a participatory game-based methodology designed to facilitate dialogue around energy equity metrics and energy transition objectives. Developed through the ELEVATE program at the University of Massachusetts Amherst, the game invites participants to match equity metrics with planning objectives and justify their choices through structured deliberation. Beyond fostering engagement, the approach provides a mechanism for eliciting stakeholder values, surfacing competing priorities, and exploring how equity considerations may be translated into decision-relevant metrics for energy planning. We argue that participatory tools such as this can help bridge the divide between community perspectives and technical planning processes, supporting more inclusive and accountable approaches to energy transition decision-making.

Background and Motivation

The transition to cleaner energy systems presents an opportunity to address longstanding inequities in energy access, affordability, environmental burdens, and participation in decision-making. Across the United States, policymakers, utilities, and researchers are increasingly incorporating concepts such as energy justice, procedural equity, and community engagement into energy planning and policy design. Despite

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these efforts, meaningful participation in energy decision-making remains difficult to achieve. Many energy planning processes rely on highly technical language, specialized expertise, and quantitative evaluation frameworks that can create barriers to participation for community members and non-technical stakeholders. While public meetings, surveys, and stakeholder consultations are commonly used to gather input, these approaches may not fully capture the values, tradeoffs, and priorities that shape how different groups define equitable energy outcomes. As a result, engagement efforts can become extractive rather than collaborative, limiting opportunities for stakeholders to influence the goals and metrics that guide energy transition decisions. A growing body of work in energy justice emphasizes the importance of procedural justice—the ability of affected communities to participate meaningfully in decisions that shape energy systems and their associated benefits and burdens. Achieving procedural justice requires more than simply providing opportunities for input; it requires creating engagement processes that are accessible, inclusive, and capable of supporting dialogue across diverse perspectives and areas of expertise.

In response to these challenges, researchers and practitioners continue to explore participatory methods that encourage deliberation, collaborative learning, and shared understanding. Games and other interactive engagement tools have emerged as promising approaches because they can reduce intimidation, foster discussion, and make complex systems more approachable. Building on these ideas, we developed a participatory card-based game that uses energy equity metrics and energy transition objectives to support discussion, reflection, and collective reasoning around equitable energy futures. The game was initially developed within the ELEVATE program at the University of Massachusetts Amherst, an interdisciplinary research initiative focused on the intersection of energy systems and social justice. The diversity of disciplinary perspectives within the program highlighted the challenges of establishing shared understandings of equity and the need for tools that could facilitate dialogue across different forms of expertise. While originally developed in an academic setting, the approach has since been adapted for broader engagement with researchers, students, and practitioners.

Methodology and Game Design

The objective of the game is not to identify a single "correct" answer, but rather to create opportunities for participants to articulate, negotiate, and reflect upon different understandings of equitable energy outcomes. The game draws inspiration from established social card games such as ***Apples to Apples*** and ***Cards Against Humanity*** but adapts these mechanics to support structured deliberation around energy equity. Participants are presented with a predefined energy transition objective and a hand of equity metric cards. Working individually or in groups, participants select the

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metric they believe best aligns with the stated objective and then justify their reasoning to a panel of judges or fellow participants.



Fig 1: Sample objective and metric cards

The game employs a "judge and justify" approach in which participants are encouraged to explain the assumptions, values, and tradeoffs underlying their selections. Through this process, implicit understandings of equity become visible and open to discussion. Rather than focusing solely on technical performance measures, participants are prompted to consider broader questions of access, affordability, participation, ownership, representation, and distributional impacts. Each round proceeds as follows: one player acts as judge and reveals an objective card (printed on green cards) describing an energy planning goal, such as expanding distributed energy resources in underserved communities or improving rate affordability for low-income households. The remaining players hold hands of three to five metric cards (printed on red cards) and select the metric they believe best captures the equity dimensions of the stated objective. The judge selects the most compelling match and the selecting player earns a point—but crucially, the selection must be defended. The justify requirement transforms what could otherwise be a simple matching exercise into structured deliberation: players must articulate why a particular metric captures what matters most about a given objective, surfacing assumptions and values that might otherwise remain implicit.

The objectives and metrics used within the game were adapted from the ***"Justice in 100 Metrics: Tools for Measuring Equity in 100% Renewable Energy Policy Implementation."***, developed by the Initiative for Energy Justice. The framework provides a broad collection of indicators related to energy access, affordability, procedural justice, democratic participation, economic opportunity, and community ownership. By translating these concepts into an interactive format, the game creates a structured environment for exploring how equity considerations may be interpreted and prioritized by different stakeholders.

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The game is available as both **printable cards** and a digital display format (**HTML file**), allowing it to be used in classrooms, workshops, conferences, and community engagement settings. While the specific objectives and metrics included in the game reflect the context of equitable energy transitions, the underlying structure is adaptable and can be modified to accommodate different stakeholder groups, policy contexts, and planning challenges. Importantly, the game serves as more than an educational exercise. By encouraging participants to connect desired outcomes with measurable indicators, it provides a mechanism for eliciting stakeholder perspectives on what constitutes equitable progress. The resulting discussions generate insights into how different actors define success, identify priorities, and evaluate tradeoffs within the energy transition.

Insights from Participatory Engagement

The game has been deployed in a variety of settings, including ELEVATE convergence meetings at the University of Massachusetts Amherst, the 2024 Macro Energy Systems Workshop, and the 2023 Equitable Energy Transition in Caribbean Islands Workshop. Across these settings, participants represented diverse disciplinary, professional, and institutional backgrounds, including engineering, economics, policy, social science, and community-engaged research. These engagements revealed several recurring themes regarding participation, equity, and collaborative decision-making.

First, the game facilitated perspective-taking across disciplinary boundaries. Participants were required not only to select metrics but also to defend and justify their choices, creating opportunities to examine how different backgrounds shape understandings of equitable energy outcomes. Discussions frequently revealed that participants could agree on broad energy transition goals while differing substantially in the metrics they believed should be used to assess progress toward those goals. The exercise therefore shifted conversations from abstract commitments to equity toward more concrete discussions about measurement, accountability, and implementation. Second, the game created opportunities for collaborative learning. By framing complex concepts through an interactive format, participants were able to engage with unfamiliar ideas and perspectives in a low-stakes environment. Feedback from participants suggested that the exercise encouraged curiosity, exposed individuals to alternative approaches to problem solving, and increased awareness of how different disciplines conceptualize energy justice and equity. Third, the game helped reduce traditional hierarchies that often shape research and stakeholder engagement settings. Because participants engaged through a common set of objectives and metrics, discussions were less dependent on disciplinary expertise or technical authority. Students, faculty, researchers, and practitioners were able to contribute on more equal footing, creating space for dialogue that might not emerge through conventional presentations or technical workshops.

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Fig 2. A) ELEVATE Team playing the game at the May 2024 convergence meeting, B) Avery (PhD Candidate Princeton University), defending the choice of Metric card to the panel of judges at the 2023 EECIW in St Thomas

Finally, the game demonstrated the potential of participatory tools to make implicit values visible. Many energy planning discussions assume shared understandings of concepts such as equity, affordability, resilience, or community benefit. However, the justification process frequently revealed differing interpretations of these concepts and highlighted the tradeoffs that stakeholders considered important. By surfacing these assumptions, the game created opportunities for more transparent conversations about priorities and decision-making criteria.

Together, these observations suggest that participatory engagement tools can serve as valuable mechanisms for supporting dialogue, reflection, and collective learning around equitable energy transitions. Beyond knowledge sharing, such approaches can help stakeholders articulate priorities, interrogate assumptions, and engage more meaningfully in discussions about energy system futures.

References

1. This game was originally prepared by an ELEVATE task force, led by Dr. Krista Harper and including Anna Goldstein and Nwadiaru Ogechi Vivian. With further revisions by Paola P. Furlanetto, Yiwen Wang and Vivian.

2. "Justice in 100 Metrics Report" from Initiative for Energy Justice is the core technical reference

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