Evaluating Community-Led Energy Transitions: Lessons from the Energy Technology Innovation Partnership Project (ETIPP)

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ABSTRACT

Remote, coastal, and island communities across the United States face persistent energy challenges, including high costs, aging infrastructure, and vulnerability to natural disasters. These issues are compounded by geographic isolation, underinvestment, and limited local capacity. In response, the US Department of Energy launched the Energy Technology Innovation Partnership Project (ETIPP), a community-driven technical assistance program aimed at advancing local energy resilience through co-development, capacity building, and inclusive engagement.

This paper presents findings from an evaluability assessment and early tasks of a process evaluation of ETIPP, examining its design, implementation, and early outcomes across diverse community contexts. A central focus of the study is the challenge of evaluating success in a program where goals, capacities, and conditions vary widely. Standardized metrics often fail to capture the relational and process-oriented dimensions of community transformation, such as trust-building, leadership development, and local agency, that are essential to long-term impact.

To overcome the limitations of conventional evaluation methods, this study applies a developmental evaluation-based approach built for the clean energy economy that supports real-time learning, iterative adaptation, and stakeholder-driven reflection. This approach aligns well with ETIPP's flexible, community-centered model by emphasizing responsiveness to emergent outcomes and valuing process-oriented dimensions such as trust-building, local leadership, and community agency. It enables evaluators and program partners to capture nuanced progress in dynamic environments where traditional metrics may fall short.

The paper concludes by offering recommendations for strengthening evaluation practices in ETIPP and similar initiatives, including the integration of embedded evaluative learning, structured long-term follow-up, and participatory methods that honor community voices. By aligning evaluation approaches with the realities of community-based energy work, ETIPP provides a model for more equitable, adaptive, and effective energy programs.

Introduction

Across the United States, many remote, coastal, and island communities experience chronic energy challenges, including high costs, aging infrastructure, and vulnerability to natural disasters. These issues are compounded by geographic isolation, underinvestment, and limited local capacity. In response, the US Department of Energy launched the Energy Technology Innovation Partnership Project (ETIPP), a community-driven technical assistance program aimed at advancing local energy resilience through co-development, capacity building, and inclusive engagement.

Unlike traditional energy planning efforts that rely on fixed metrics and standardized interventions, ETIPP is intentionally flexible, guiding each community through a locally defined, context-specific process. To reflect this complexity, Opinion Dynamics conducted an evaluability assessment and

is currently leading a process evaluation to assess the program's readiness for future outcomes and impacts evaluation.

Recognizing ETIPP's dynamic and adaptive nature, we apply a developmental evaluation approach. This approach supports real-time learning, iterative adaptation, and stakeholder-driven reflection, features that align closely with ETIPP's flexible, community-centered model.

This paper explores the design and implementation of ETIPP. A key challenge in this work is defining success across projects with widely varying needs, capacities, and goals. We critically examine the limitations of conventional evaluation metrics in such settings and consider the value of process-oriented and developmental approaches that prioritize learning, collaboration, responsiveness, and local ownership metrics. Ultimately, the paper draws insights from ETIPP that can inform the design and evaluation of community-based energy programs. By prioritizing local leadership and applying adaptive evaluation approaches, ETIPP demonstrates how energy resilience can be advanced in remote, coastal, and island communities.

The sections that follow describe ETIPP's program design and goals, its structure and partners, our evaluation framework and data collection to date, and emerging lessons about measuring success in complex, community-driven initiatives.

Program Overview and Goals

The Energy Transitions Initiative Partnership Project (ETIPP) is a federal program designed to support coastal, remote, and island communities as they navigate complex energy challenges. Led by the US Department of Energy (DOE), administered by the National Renewable Energy Laboratory, and implemented in partnership with four national laboratories and a network of regional partners, ETIPP emphasizes community-driven decision-making, energy resilience, and local empowerment. The program builds capacity at the community level while also generating broader insights to inform clean energy planning and implementation across diverse contexts.

Since its launch in 2020, ETIPP has partnered with 32 communities across three cohorts, with a fourth cohort in progress, supporting an additional 25 communities. Participating communities are selected based on their demonstrated interest in advancing energy resilience as well as their need for support, especially those with resource and capacity constraints. Communities typically learn about ETIPP through regional partner organizations, which are key to building trust, fostering relationships, and advising applicants. Once selected, communities receive direct technical assistance, strategic planning support, and access to national laboratory expertise tailored to local conditions. Project scopes are developed collaboratively to ensure alignment with each community's unique goals and context.

Its intentionally flexible program design enables EITPP to meet communities where they are in their energy planning journey. Success varies depending on community context and project scope. For some, success may mean completing early-stage scoping, feasibility studies, or strategic planning; for others, it could involve more advanced technical support and pathway development. This flexibility ensures ETIPP can offer meaningful assistance whether a community is just starting to explore clean energy opportunities or is prepared to implement advanced solutions. Although definitions of success vary, the program advances several overarching goals:

- Responding to local energy priorities and opportunities in ways that respect each community's unique context
- Empowering communities across different stages of the energy journey, from planning to implementation
- Increasing knowledge and technical capacity among participating communities to strengthen self-determination
- Strengthening community capacity for long-term energy planning and execution

- Creating replicable tools, processes, and lessons learned that can benefit communities beyond the program's direct participants

To better understand how ETIPP achieves these goals, it is essential to examine its structural design and the roles of its key partners. This insight allows us to see how the program's flexible approach is operationalized to support diverse communities at various stages of their energy planning journey.

Program Structure and Design

The first ETIPP cohort was launched in 2020 in partnership with DOE's Water Power Technologies Office and Solar Energy Technologies Office. Since then, ETIPP has expanded as a program and increased its reach, iteratively improving the program structure accordingly. Across all cohorts, ETIPP has worked to leverage federal support and national laboratory expertise, as well as local knowledge from place-based organizations, with the goal of empowering community-driven energy solutions.

Communities apply annually to participate in the ETIPP program. Typically, they learn about ETIPP through regional partner organizations that build relationships with communities and provide guidance on the application process. Communities selected for the program can receive technical assistance from national laboratories on a wide range of energy resilience and transition topics. Example areas of support include renewable energy planning, solar, wind, energy storage, microgrids, energy efficiency, high-performance buildings, geothermal, hydropower, marine energy, clean transportation, water systems, and feasibility studies.

In 2024, ETIPP created two distinct technical assistance tracks, a strategic energy planning track and an in-depth technical assistance track. An expanded explanation of the two tracks is provided in Table 1. In addition to in-kind technical assistance, during cohort four, ETIPP expanded its support to include a direct award of $50,000 for each community accepted in fiscal year 2024.

Table 1. Technical Assistance Tracks

Track	Description
Strategic Energy Planning	Selected communities are given 4 to 8 months of support. This track is focused on helping communities develop strategic energy plans that include actionable goals for their energy resilience planning. Communities are supported by and work with regional partners and technical experts from the labs to complete a strategic energy plan.
Deep Dive Technical Assistance	Selected communities with existing energy plans, developed in the last five years, are given 12 to 24 months of technical assistance. Rigorous analysis is undertaken by a national lab technical subject matter expert in support of the communities' goals.

The ETIPP program offers cross-sector technical assistance to communities, drawing on a partner network of local stakeholders, regional organizations, national laboratories, and DOE offices. The program is funded and supported by DOE's Office of Energy Efficiency and Renewable Energy (EERE). DOE and the National Renewable Energy Laboratory (NREL) administer and coordinate the program. Crucial to ETIPP are the regional partner organizations, which serve as consistent touch points for the region and help coordinate technical assistance. Table 2 outlines the different actors and their roles in the program.

Table 2. ETIPP Groups and Roles

Group	Role
Program staff at DOE & NREL	Sponsor, administer, and coordinate the program. Provide program oversight and direction, score applications, and support regional leads.
Regional leads at NREL	Communicate with and support the regional partners, community teams, and technical leads within their region.
Lab leads at NREL, Pacific Northwest National Laboratory (PNNL), Lawrence Berkeley National Laboratory (LBNL), and Sandia National Lab (SNL)	Manage projects at each respective lab and report progress to program staff.
Technical leads at NREL, PNNL, LBNL, and SNL	Provide technical assistance and communicate regularly with the community teams, regional partners, and regional leads.
Regional partner organizations	Maintain a presence in the region, build relationships with communities, advise communities on applications, and coordinate with community teams and lab staff throughout the project.
Community champions	Community champions serve as the primary local points of contact for an ETIPP project. They coordinate with regional partners and national lab staff to guide the focus of the technical assistance (TA) and provide local context. Community champions represent and collaborate with local organizations to build support and share the final TA results with the broader community.

Regions and Regional Partners

Regional partners function as a bridge between the national laboratories and the local communities, providing support before, during, and after ETIPP projects. Regional partners are experienced in supporting communities and helping communities throughout their ETIPP journey, from application to program completion. The regional partner model allows the ETIPP program to implement federal funds and national laboratory technical assistance while still engaging at the community level. Because regional partners are crucial to ETIPP, only communities in eligible regions can apply for the program. ETIPP currently engages Regional Partners across eight regions: Alaska, Caribbean Territories, Great Lakes, Gulf Coast, Hawaii/Pacific Territories, Northeastern Seaboard, Pacific Northwest, and Southeastern Seaboard.

National Laboratories

In addition to the support provided by NREL in administering ETIPP in coordination with DOE, national laboratories provide hands-on technical assistance to communities in support of their goals. Four national laboratories provide technical assistance:

- Lawrence Berkeley National Laboratory (LBNL)
- National Renewable Energy Laboratory
- Sandia National Laboratory (SNL)
- Pacific Northwest National Laboratory (PNNL)

National labs are engaged based on community need and project type, aligning the community's needs with the national labs' skills and capabilities. To further capitalize on the expertise provided by this consortium of national labs, the program has created a Knowledge-Sharing Network, which compiles tools, documents, and resources used in the ETIPP program. This platform allows communities and individuals beyond those engaged in the program to gain valuable insights.

This layered structure underpins ETIPP's theory of change, which we capture in the logic model below. The model serves as the basis for defining metrics and guiding data collection.

Community Champions

Community champions serve as the primary local points of contact for ETIPP projects, anchoring the connection between external technical experts and the lived realities of the community. In practice, champions coordinate closely with regional partners and national laboratory staff to guide the scope and focus of technical assistance (TA), ensuring that project activities remain aligned with local priorities and conditions. They provide essential local context, drawing on their knowledge of community history, governance structures, and cultural dynamics to help technical teams navigate sensitivities and avoid one-size-fits-all solutions.

Program Theory Logic Model (PTLM) and Data Collection

To date, most data collection has occurred at the regional partner level, where partners track engagement metrics, technical assistance delivered, project-specific impacts, project highlights, and community member quotes. At the program level, DOE and staff also monitor applications received each year, publications produced, knowledge-building activities such as webinars, and social media impressions.

As part of the evaluability assessment, we developed an ETIPP logic model to clarify pathways from inputs (federal funding, lab expertise, regional networks) to activities (outreach, relationship-building, technical assistance), outputs (recruited communities, engaged stakeholders, shared resources), and outcomes (knowledge gains, risk identification, project implementation, long-term resilience). This framework also enables the systematic identification of key performance indicators and corresponding data collection methods, ensuring that evaluation efforts are both structured and aligned with ETIPP's theory of change. The logic model is presented in Figure 1 below.

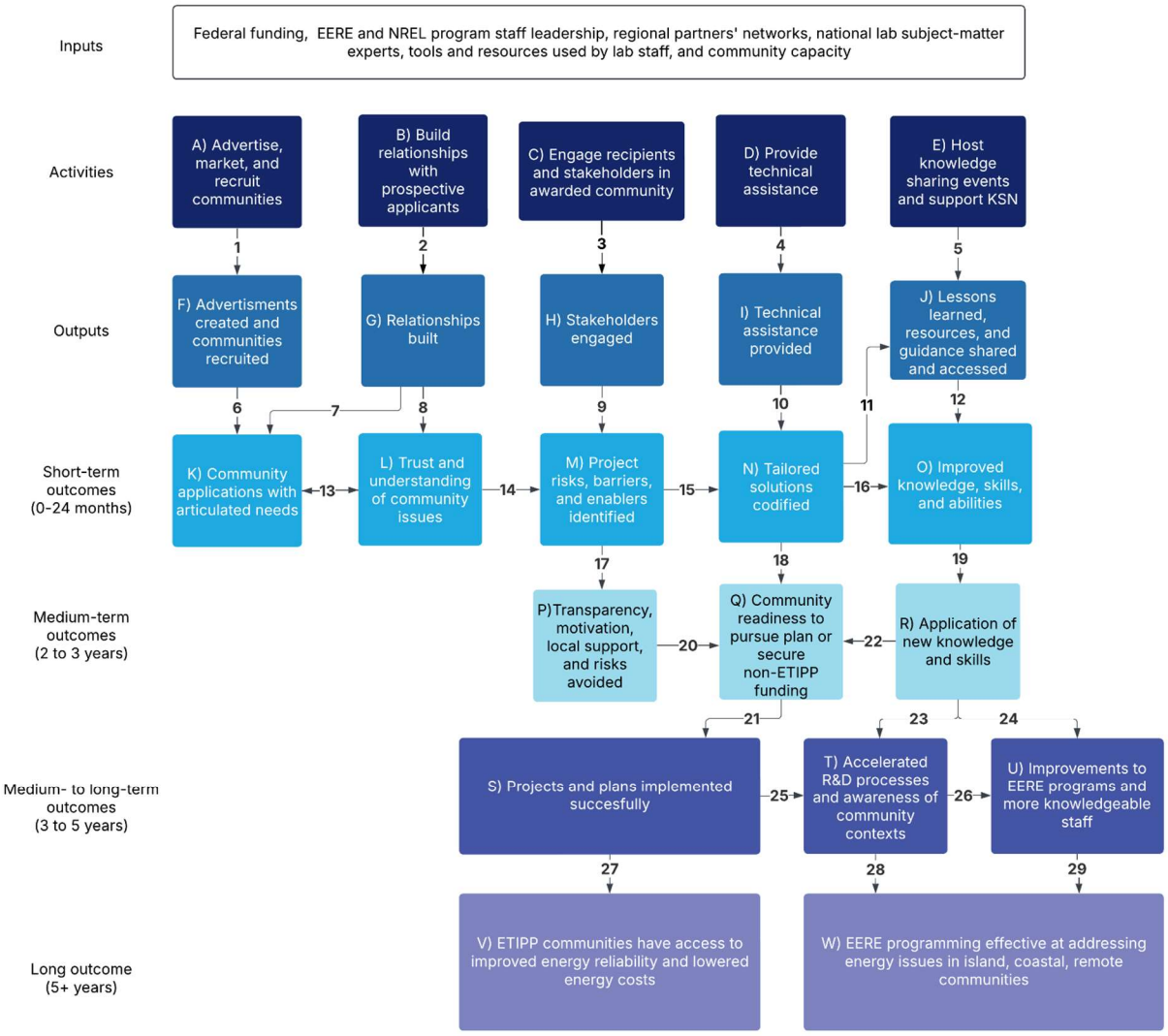

Figure 1. ETIPP logic model

While the logic model outlines the intended pathways, it is equally important to explore how ETIPP actively engages communities in practice. This understanding draws from the broader literature on participatory and community-based approaches, emphasizing the practical application of stakeholder involvement.

Community/Stakeholder Engagement

ETIPP's emphasis on community-defined goals, trust-building, and flexible, capacity-sensitive design offers important contributions to the theory and practice of community engagement, particularly in the context of energy transitions in remote and underserved communities. This approach reflects and reinforces several key principles highlighted in the community engagement literature.

First, ETIPP's model aligns strongly with Arnstein's Ladder of Participation (1969), a foundational framework in participatory planning literature that distinguishes between tokenistic and empowering forms of community involvement (Figure 2). The lower rungs are essentially non-participatory, often involving engagement that aims to educate stakeholders or guide them toward a specific goal or

viewpoint. The middle rungs can be seen as tokenistic forms of participation that may seem inclusive from the outside but ultimately do not give communities meaningful influence. In contrast, the higher rungs represent deeper levels of participation, where communities are given more power and decision-making authority, ensuring their voices significantly impact outcomes. ETIPP's model more closely aligns with these higher rungs, focusing on partnership, delegated power, and community leadership in energy planning and decision-making.

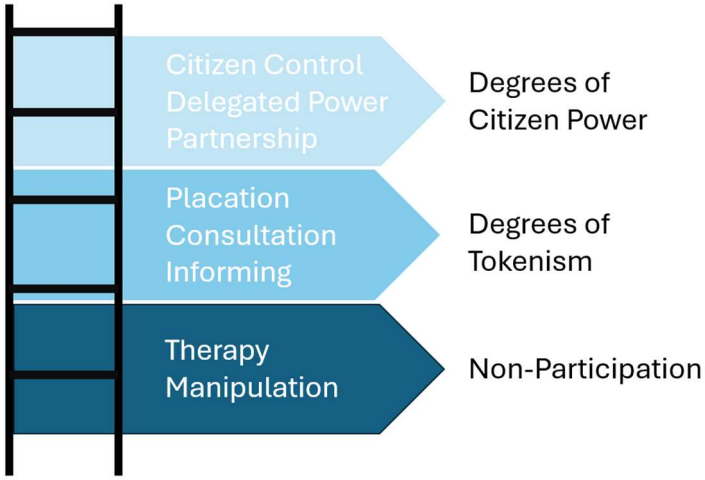

Figure 2. Arnstein's Ladder of Citizen Participation

By allowing communities to define their own energy challenges and co-develop project scopes, ETIPP operates closer to the top rungs of the ladder, partnership and delegated power, than many traditional technical assistance models. This approach aligns with literature that advocates for moving beyond consultation toward shared decision-making and community leadership. (Fung, 2006).

Through its early cohorts, ETIPP learned that communities enter the program with widely varying levels of readiness for energy transition work. Some communities bring substantial technical knowledge, established governance structures, and strong political will, while others are only beginning to explore energy planning. This variation has reinforced the importance of tailoring support to the community context. The program's learning echoes insights from the capacity-building and place-based development literature. Scholars such as Chaskin (2001) and Emery & Flora (2006) highlight that successful community-driven initiatives must start from where the community is, not where planners expect them to be. ETIPP's differentiated tracks and evolving support mechanisms respond directly to this lesson by recognizing diverse starting points.

This flexibility in program design is also consistent with best practices in adaptive capacity-building (Pahl-Wostl, 2009), which emphasize iterative, context-specific approaches to developing energy resilience. Moreover, the role of community champions identified by ETIPP is strongly supported in community development and implementation science literature. Champions serve as key intermediaries, bridging technical experts and local stakeholders while navigating the cultural, political, and bureaucratic landscapes that shape community energy transitions. Their importance is echoed in studies of successful community-based energy and environmental initiatives (e.g., Middlemiss & Parrish, 2010), which find that champions are often the critical glue holding cross-sectoral partnerships together

Where ETIPP adds nuance to existing literature is in its layered implementation structure—national laboratories, regional partners, program staff, and communities—which offers a practical case study in multi-scalar governance (i.e., coordination and decision-making that spans multiple levels of authority, from federal agencies to regional intermediaries to local communities). The collaboration

between federal actors and locally embedded intermediaries (i.e., regional partners) supports what the literature refers to as “bridging organizations” (Cash et al., 2006). Such organizations play a vital role in translating knowledge across scales, that is, adapting technical expertise and policy guidance generated at the federal or laboratory level into information that is clear, relevant, and actionable for communities, while also conveying local needs and priorities back to higher levels of governance. These entities broker trust among diverse actors and help navigate differences in language, institutional timelines, and expectations.

ETIPP’s reliance on regional partners to translate highly technical assistance into culturally and contextually relevant forms illustrates this bridging role in action. For example, regional partners not only adapt technical concepts into accessible language but also ensure that recommendations are framed in ways that resonate with local governance structures, political realities, and community priorities. This multi-layered structure reduces the risk of federal programs being perceived as externally imposed and instead positions them as co-owned locally.

In doing so, ETIPP demonstrates how bridging organizations can sustain engagement across diverse geographies, mitigate power imbalances, and foster conditions for long-term capacity building. The program thus expands existing theory on bridging organizations by illustrating how they can operate within a federally funded technical assistance model while preserving community trust and ownership—an insight particularly useful for other large-scale energy transition projects aiming to balance national policy goals with local needs.

Despite ETIPP’s strengths in fostering deep community engagement and building multi-scalar governance structures, these very features also create challenges for evaluation. Programs that prioritize local agency, relationship-building, and adaptive design often generate outcomes that are difficult to measure with standardized tools. Relational gains such as trust, leadership development, and capacity-building are essential to long-term resilience but are rarely captured through conventional metrics. At the same time, the diversity of community contexts and the layered program structure complicate efforts to define and compare progress. These dynamics point to a broader set of obstacles in measuring the success of community-based projects like ETIPP.

Obstacles to Measuring the Success of Community-based Projects

Measuring the success of community-based projects like ETIPP presents a complex set of challenges. One of the most fundamental difficulties lies in defining what "success" actually means. In initiatives like ETIPP, success is perceived differently by various stakeholders. For instance, technical staff from national labs may view a project as successful if the planned deliverables are completed and technically sound. In contrast, community members may define success based on how well the project aligns with their lived experience, values, and local needs. This divergence in expectations can lead to situations where a project that is deemed successful according to certain prescribed metrics leaves communities feeling underserved or misunderstood. Misalignment between community expectations and project deliverables has, in fact, led to frustration in some ETIPP projects, underscoring the need for early and ongoing dialogue to co-define goals and metrics for success.

Another major challenge is the difficulty in capturing intangible outcomes. Community-based work often aims to build trust, improve relationships, strengthen local leadership, and increase community knowledge. These are essential precursors to long-term success but are inherently hard to quantify. For example, ETIPP regional partners emphasized that building trust with remote and tribal communities was central to their work, yet these kinds of relational and process-based gains are rarely captured through standard reporting metrics. To fully account for these impacts, the evaluation of ETIPP goes beyond numbers and incorporates qualitative data, including program group interviews, stakeholder

workshops, and participant reflections, that provide deeper insights into the lived experience of those involved.

Long-term impact measurement presents yet another hurdle. The effects of technical assistance or capacity-building efforts often unfold over years, particularly in under-resourced communities where the implementation phase may depend on future grants or shifting political conditions. This is why ETIPP is conducting an evaluability and process evaluation now to ensure the appropriate data systems are in place to support a longer-term evaluation of future outcomes and impacts.

Complicating all of this is the fact that participating communities vary widely in their baseline conditions. Some enter the program with strong institutional capacity and technical knowledge, while others are only beginning to explore energy planning. This diversity makes cross-community comparisons difficult and can obscure progress made by lower-capacity communities, whose relative gains may be quite significant even if their absolute deliverables appear modest. Evaluations that ignore starting conditions risk reinforcing inequities by favoring already-advantaged communities. Thus, we have incorporated success metrics adapted to recognize relative progress and capacity development.

A further evaluation challenge involves attribution. In complex community settings, it is rarely possible to attribute all outcomes solely to one program. Communities often engage with multiple initiatives, funding sources, and external partners simultaneously. In addition to just seeking to prove that ETIPP directly caused certain outcomes, the evaluation is also implementing metrics that focus on contribution, understanding the role ETIPP played in broader trajectories of community change. This approach aligns with current thinking in evaluation science, which acknowledges the systemic, interconnected nature of most community development work.

Finally, there is a risk of oversimplifying complex social processes. When evaluation is reduced to counting deliverables or calculating cost savings, it overlooks the nuances of community change and the iterative process of building resilience. Simplistic metrics can even distort priorities, pressuring communities to demonstrate “success” in ways that don’t align with their values or needs.

Given these challenges, developmental evaluation offers a promising alternative. Rather than attempting to define and measure a single version of success across diverse communities, developmental evaluation emphasizes learning and responsiveness. For example, one ETIPP community entered the program with very limited technical capacity and little prior experience in energy planning. Traditional evaluation methods might have judged the progress as modest because the community’s tangible outputs were smaller compared to higher-capacity peers. We framed the evaluation by defining metrics focusing on relative progress and capacity-building milestones, including qualitative indicators such as increases in local knowledge and improved trust between the community and technical experts.

What is Developmental Evaluation?

Developmental evaluation is an approach to evaluation specifically designed for complex, adaptive, and innovative initiatives. Rather than judging success based on fixed metrics or pre-established goals, developmental evaluation supports real-time learning, adaptation, and strategic decision-making as a program unfolds. It is especially useful in settings where the path forward is not fully known and outcomes evolve over time.

Coined by evaluation theorist Michael Quinn Patton (2011), developmental evaluation embeds an evaluator or evaluative thinking directly into the team or system being studied. This allows stakeholders to gather and reflect on data continuously, respond to emerging challenges, and adjust strategies while staying grounded in evidence and context.

Opinion Dynamics has built on Patton’s developmental evaluation principles to address the distinctive requirements of the emerging clean energy economy and provide valuable insights for innovative program design and market engagement. Our approach combines traditional process, impact, and market transformation evaluations with developmental evaluation to support learning and

adaptation in real time. Unlike conventional summative evaluations, this model takes a proactive approach by generating actionable insights from the very beginning of program implementation. This hybrid approach strengthens our ability to assess not only what works but also how and why, providing a more holistic and responsive framework for accelerating clean energy transitions. The UTOPIA principles (Figure 3) enable timely program optimization in complex and changing landscapes.

Utilization-Focused	Actionable insights enable program iteration and optimized results
Timely	Concurrent monitoring facilitates course correction and progress without pause
Systems Outlook	Embeds analysis within larger ecosystem context, with methodologies reflecting interconnected dynamics of baseline and emerging conditions
Equity Perspective	Actively considering how different people and groups are affected by and engage with programs, policies, or systems
Independent	Independent, implementer-agnostic third-party evaluation oriented toward outcomes and with no vested interests
Adaptive	Leading insight delivery through changing conditions

Figure 3. UTOPIA principles

The developmental evaluation approach is especially relevant for initiatives like ETIPP, where local conditions, capacities, and goals differ significantly across participating communities. In such cases, the focus shifts from proving impact in a traditional sense to also improving practice and deepening understanding over time. This approach allows us to

- Emphasize real-time feedback and iterative learning,
- Support program adaptation in dynamic environments,
- Recognize the value of emergent outcomes,
- Prioritize use-oriented insights over rigid accountability, and
- Align with complex systems thinking and community-led innovation.

Rather than attempting to define and measure a single version of success across diverse communities, developmental evaluation emphasizes learning and responsiveness. It helps program teams and partners engage with complexity rather than control for it, offering tools to surface what's emerging, make sense of shifts in direction, and iteratively refine the program.

In practice, developmental evaluation provides ETIPP with structured mechanisms for learning, success tracking, and continuous improvement**.** For example, it draws on a mix of qualitative and quantitative methods, such as stakeholder reflections and participatory workshops, to document not just deliverables but also the relational and capacity-building outcomes that precede long-term impacts. These insights can then be fed back into ETIPP's logic model and data systems, helping the program refine its metrics and identify where additional support is needed.

Developmental evaluation enables evaluators and implementers to capture and validate these emergent outcomes**,** while also providing a systematic structure for tracking them over time. This dual

emphasis, on structured tracking and adaptive learning, ensures that ETIPP can both respond to evolving community contexts and build an evidence base for longer-term outcomes.

This flexibility is particularly important for ETIPP, where community-driven energy planning requires space for evolution, iteration, and ongoing reflection. By embedding evaluative thinking throughout program implementation, developmental evaluation strengthens ETIPP's ability to document progress, learn in real time, and continuously improve its approach to supporting energy resilience.

Conclusion

In conclusion, measuring success in community-based energy projects requires a nuanced, flexible, and participatory approach, one that recognizes diverse community contexts, values both tangible and intangible outcomes, and commits to long-term follow-up. ETIPP exemplifies this approach by incorporating community-defined goals, adaptable program tracks, and expert technical support, thereby implementing engagement principles that focus on access, capacity, and trust. Through this design, ETIPP moves beyond transactional federal technical assistance toward transformative engagement, where local ownership and knowledge are valued alongside technical expertise.

To address the challenges inherent in community-based energy transitions, we recommend greater integration of developmental evaluation into similar initiatives. As demonstrated by ETIPP, embedding developmental evaluation frameworks provides a practical way to combine adaptive, real-time learning with equity and community-focused innovation. Developmental evaluation complements traditional methods by encouraging ongoing reflection, adapting to changing circumstances, and iterative program design. In practice, this approach can help ETIPP teams monitor evolving community goals, modify support mechanisms based on local needs, and record intangible progress, such as trust-building or leadership development, which often comes before measurable results.

Ultimately, the key to meaningful evaluation lies beyond mere metrics; it requires approaches that embrace the complexity, diversity, and human aspect of this work. By integrating developmental evaluation with participatory and process-oriented methods, programs can more genuinely reflect community realities and effectively advance goals of energy resilience and affordability. This comprehensive approach ensures that efforts are not only measured but truly understood and impactful.

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