Future of Market Transformation

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ABSTRACT

Significant changes in the U.S. energy system are accelerating due to policy, extreme weather, and uncertain economic conditions. In the near term, energy efficiency will remain a critical resource for consumers, businesses, and the entire energy system. This future energy efficiency potential lies in complex market systems that challenge the transactional utility energy efficiency program model. At the same time, the value proposition and drivers for energy efficiency investment are increasingly diverging across the country. Market transformation offers a proven model to address complex market barriers and opportunities.

Utility investment in energy efficiency has long been driven by a need to achieve regulatory targets, deliver customer solutions, and avoid new energy generation investments. There is increasing recognition of energy efficiency co-benefits beyond energy savings, such as extreme weather variability, supporting decarbonization goals and increasing grid resource adequacy. These co-benefits are becoming as important as the energy savings themselves.

Meeting the ambitious goals of an evolving energy system means market transformation efforts must address multiple energy and non-energy benefits, innovate implementation solutions, pursue equitable resource distribution, and consistently evaluate results. The infrastructure supporting market transformation must also evolve and find new mechanisms to address an increasingly global marketplace.

This paper dives into the opportunities for energy efficiency market transformation to help regions across the country meet bold commitments to a clean energy future. It addresses challenges in creating frameworks within the constraints of existing regulatory environments and delivery of energy efficiency for diverse industries and populations.

Historical Context

In the early 1990's, the concept of market transformation was born out of dramatic upheaval in the electric utility industry, which was facing the idea of market competition for the first time in its history. At the same time, groups of energy efficiency program implementers were discovering the power of aggregating resources and the leverage of targeting those resources at decision makers high up in the supply chain. The combination of these unique conditions gave birth to a new program type referred to as market transformation (Eckman, Benner, and Gordon 1992).

In the decade that followed, several organizational efforts to institutionalize market transformation started up across the country. The national Consortium for Energy Efficiency (CEE) was formed by energy efficiency program administrators to influence national markets. Regional organizations such as the Northeast Energy Efficiency Partnerships, California Board for Energy Efficiency, and the Northwest Energy Efficiency Alliance (NEEA) started market transformation programs in the 1990's in their respective regional geography. Other organizations, such as the New York State Energy Research and Development Administration,

Wisconsin Focus on Energy, and Vermont Energy Investment Corporation added market transformation to their portfolios of energy efficiency programs. National organizations such as the American Council for an Energy Efficient Economy supported these market transformation efforts.

Now, in the 2020s, market transformation is having something of a renaissance. New interest in the concepts and practice of market transformation has risen out of a need for a different set of program tools to help capture the next generation of energy efficiency opportunities. Opportunities like deep retrofits that improve whole building performance, HVAC system retrofits, or high-performance glazing systems could cut energy use by 30-50%. However, these opportunities do not easily fit within the traditional programmatic and evaluation frameworks that have served the efficiency community so well for three decades. New imperatives for decarbonization, grid interactivity and equity have added rationale and incentives to pursue energy efficiency while at the same time adding complexity to regulation and measurement of energy efficiency program implementation.

25 Years of Successful Market Transformation in the Northwest

Northwest Energy Efficiency Alliance

In the early 1990s as market transformation approaches were emerging nationally, utilities and energy efficiency administrators in the Northwest adopted a definition of market transformation that includes language about the end goals as well as the "how" of market transformation. This definition was eventually codified in NEEA's 2010-2014 Strategic Plan as "the strategic process of intervening in a market to create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of all cost-effective energy efficiency as a matter of standard practice." (NEEA 2009).

The Northwest Energy Efficiency Alliance was incorporated in 1996 as a 501(c)3 non-profit uniting stakeholders across Idaho, Montana, Oregon, and Washington, including regulators, public and privately-owned utilities, energy efficiency businesses and government representatives in an alliance that could catalyze local markets to increase adoption of energy-efficient products and services. The newly formed organization began with a challenging objective: in a three-year period and a $65 million budget, it was tasked with developing strategies to guide, affect, and disrupt markets—and then proving those strategies out. NEEA quickly began identifying opportunities for region-wide savings, pooling resources to achieve more with less, and partnering with regional partners and the market to marshal in a new era of energy efficiency in the Northwest.

One of the first wins was in 1997, when NEEA began to shift consumer behavior and increase the demand for ENERGY STAR® certified washers. NEEA's market interventions—including manufacturer incentive programs and consumer awareness campaigns—successfully transformed the market by dramatically increasing efficient-washer market share and influencing a new federal standard requiring a 35% increase in product efficiency, ensuring that consumers across the country had access to more efficient washers.

NEEA realized that a model that had stable funding was essential to the long-term nature of market transformation work. It shifted to business cycles that were five years in length, to support its ongoing work in markets and grow its reputation and credibility with regional and national partners. This model has proven effective for nearly 30 years, with plans underway for NEEA's seventh five-year business cycle, which runs 2025 to 2029.

Today, NEEA as an organization is a regional alliance representing over 13 million consumers in four states with over 140 utilities. NEEA has a comprehensive market transformation practice that includes work in emerging technologies, product development, program development and implementation, codes and standards, market research and intelligence as well as a robust approach to integrated planning and collaborating. These market transformation elements are supported by an array of functions including evaluation, market research, savings assessment and reporting, market modeling and forecasting, data acquisition and analysis, region-wide building stock and end-use statistical research, and stakeholder engagement. Taking this holistic market transformation approach, the Northwest has achieved remarkable results in increasing market adoption of new innovative efficiency technologies.

One example is the Ductless Heat Pump (DHP) program, which demonstrates the resilience, flexibility and staying power of NEEA's market transformation efforts. Starting in 2008, inverter driven ductless heat pumps were a brand-new innovative product category that was virtually unknown in the Northwest with less than three percent market awareness. NEEA overcame a host of market barriers by working with manufacturers and the supply chain to develop efficient products, build product distribution channels, increase market capacity and create consumer demand to accelerate adoption in electrically heated homes.

By the end of 2020, more than 110,000 DHPs had been installed across the Northwest, with 82,702 installations receiving rebates from 108 utilities (Lane 2021). After 12 years of intervention, there is now a sustained market for the technology. Though market transformation objectives have been met, NEEA is continuing to provide market support on this product through long-term monitoring and tracking (LTMT). The DHP program transitioned to LTMT in 2021 but NEEA is staying actively engaged, ensuring market adoption continues to grow by tracking target market progress and technology performance in colder climates.

Beyond continued product advancement, the DHP program has laid the foundation for further market transformation work in the residential HVAC market. For example, NEEA has built upon the lessons learned and strategies sharpened over the years to shape its approach to a new residential HVAC program committed to advancing efficiency in variable speed heat pumps—an effort that could save the region 50 average megawatts (aMW) over 20 years.

DHPs are just one example of successful market transformation efforts that have spanned opportunities across residential, commercial, and industrial/agricultural sectors. NEEA has demonstrated market transformation's power to accelerate market adoption with innovations ranging from individual technologies like efficient motors to service offerings such as building operator certifications to management practices such as strategic energy management to design practices such as integrated design of new commercial buildings. As a result of these successful market transformation efforts, the region has achieved more than 919 aMW of electric energy savings since 1997, the equivalent annual energy production of two coal-fired power plants.

Lessons Learned: Supporting Elements for Current and Future Successful Market Transformation Efforts

Below are some important lessons learned from the experience of existing and newly launched market transformation efforts. These lessons point to a few critical factors necessary for successful launch and operation of a sustained, long-term market transformation effort.

Large-scale aggregation of markets that cross utility service territories and state boundaries. Successful market transformation depends on the ability to influence market actors

and decision makers, many of whom operate at regional, national, and global scales. These market actors are often challenged to sort through a diverse array of voices trying to influence them while maintaining a focus on customers and profitability. Successful market transformation requires an effective engagement with these market actors which in turn requires sufficient scale of market to capture their attention.

For example, CEE aggregates the perspective of utility program administrators across the U.S. and Canada to work with national and international industry partners. NEEA aggregates a diverse market that includes four states and over 140 utilities. Another example can be found in the ENERGY STAR Retail Products Portfolio program, which currently has 11 sponsors that now represent 24.2% of U.S. households. This market share is large enough to enable direct engagement with corporate retailer decision makers. Future successful market transformation efforts will need to find ways to coordinate and collaborate to build aggregated market demand that can effectively influence national and global decision makers.

A comprehensive view of the market adoption process. Market transformation work is based on an understanding of how new innovations (technologies, practices, or services) diffuse throughout a market, from the early development of that technology all the way through to full market adoption and incorporation into codes and standards. Successful market transformation programs aim to understand the full breadth of that landscape, and administrators of market transformation programs can have the most impact when they remove barriers and leverage opportunities to accelerate adoption throughout that whole lifecycle, from emerging technology to codes and standards. NEEA's experience validates the value of a fully integrated market transformation operation that has successfully implemented market transformation activities across the adoption process from emerging technologies through codes and standards.

A supportive policy and regulatory framework. Market transformation is a fundamentally different approach to saving energy than the traditional utility resource acquisition program. To be successful, market transformation needs a policy structure that recognizes critical differences from the existing resource acquisition framework. Market transformation has several inherent characteristics which can put it at odds with traditional resource acquisition programs if the program is to be funded by utilities. These challenges include:

- ***A longer-term timeframe for achieving cost-effectiveness.*** Most utilities have annual savings goals, and rightly place enormous emphasis on achieving their annual savings goals. Efficiency dollars that do not quickly achieve their desired purpose are reallocated to areas that show more promise. Internal advocates for a market transformation approach may find it very challenging to compete for the kind of sustained and deliberative funding that is required for successful market transformation efforts.
- ***Large-scale market aggregation.*** As noted earlier, successful market transformation approaches need to influence supply chain actors that often operate on a larger scale than utility or even state boundaries. A deliberate policy framework that facilitates statewide or regional coordination is optimal for creating the market leverage required to support fully successful market transformation.
- ***Theory-based, market-scale program evaluation and savings estimation.*** Market transformation programs are grounded in market adoption theory and require appropriate, theory-based evaluation methods as distinct from transactional program models typically found in the resource acquisition programs. Further, because market transformation

program savings are measured at the market-level vs the individual transaction level, when multiple utilities are working together on market transformation, policies are needed to provide guidance for this disaggregation.

- ***Recognition and flexibility to adaptively manage in response to rapidly changing market conditions.*** Market transformation starts with new innovations that are often rapidly evolving as market conditions change through the adoption process. Market transformation programs need to quickly pivot approaches and interventions as the market actors respond to the changes in these markets. The policy framework needs to recognize these risks and need for adaptability and create accommodations for them. It also needs to recognize that there is inherent risk in engaging new technologies and intervening in market structures.

Long-term, dedicated sustained funding. It takes years, or even decades, for market transformation changes to result in significant energy savings. The five-year funding intervals that have supported the Northwest's market transformation for over 25 years has been critical to enable long-term engagement and commitments with market actors. Both Minnesota and California have now adopted similar long-term funding commitments that support the long-term nature of market transformation and serves as confirmation of the need for long-term funding support.

Supportive, collaboration processes with key stakeholders. Market transformation connects the world of regulated utility programs to the competitive market that creates, distributes, and sells energy consuming products, services, and practices. This creates a complex set of stakeholders with varying interests and needs. Stakeholders can include utilities, regulators, state and federal agencies, advocacy and community groups, manufacturers, distributors, retailers, construction industries, trades, and materials suppliers. A successful engagement with these diverse stakeholders will require a sophisticated and prioritized engagement plan with sufficient resources. Specific lessons learned include:

- Engaging with stakeholders regularly, in a formal structured way (i.e., committees representing key stakeholders) is critical to supporting effective and transparent collaboration and enable energy efficiency work that reflects the diverse needs of its constituents.
- Facilitating conversations between stakeholders is a crucial component for a successful market transformation initiative, to identify crucial go/no-go items early in the process.
- A formalized stakeholder forum allows for co-creation of the effort and a dedicated channel to share knowledge, expertise, and resources to support successful implementation of market transformation programs, including identifying opportunities for leverage among market transformation administrator and local programs, and managing intersecting activities in common markets.
- Collaboration among market transformation organizations can create combined leverage and avoid market confusion and diluted engagement with market actors, who value a single point of contact that represents an entire, larger market. For example, NEEA and the Consortium for Energy Efficiency have long worked together on product specifications.

An appropriate framework for evaluation and attribution of energy savings. Providing an evaluation framework in advance sets up overall success, as cost-effectiveness and other requirements should be long-term due to the time horizon of market transformation. NEEA's work in the Northwest and its work to support other regions' development of market transformation demonstrates that a successful evaluation framework includes:

- **Transitioning to a market transformation evaluation framework takes time – for institutions and individuals.** For institutions, such as regulatory agencies, utilities, and other program funders to successfully conduct market transformation programs, they must transition from a resource acquisition evaluation approach that captures energy savings achieved through discrete transactions to an approach that captures long-term, market-wide changes, where programs have less control and market-level factors introduce uncertainty. This requires that policies and regulatory frameworks are developed or adapted to enable institutions to claim the benefits of market transformation through a theory-based evaluation approach. Further, this transition requires significant investment from individual leaders, program staff, and evaluators whose perspectives have been steeped in the predominant approach to shift their thinking about how market-level influence can be captured. For example, stakeholders must become comfortable with differences in how market transformation evaluation approaches address attribution, counterfactuals (what would have happened without the program's influence), and the long-term nature of a market transformation program's influence, which can take many years to come to fruition.
- **Market transformation is growing, and so is the diversity of frameworks guiding market transformation evaluation.** As the national energy landscape continues to evolve and more regions engage with market transformation, the diversity of voices shaping evaluation frameworks is increasing. For example, in addition to the Northwest there are now market transformation evaluation frameworks established in Illinois, Minnesota, and California. This development brings with it many benefits, including improved market transformation evaluation methodology through continued study and reflection and enabling new perspectives, such as an equity and justice lens, to be included in assessing the benefits of market transformation programs. This greater diversity in approaches may lead to inconsistent evaluation approaches and findings, however, and as discussed below, makes it challenging for collaborating organizations to align on how to design and evaluate programs.
- **Collaboration is key, but it is challenging to meet multiple stakeholders' evaluation needs through one program.** As discussed above, successful market transformation programs often require collaboration outside of an individual organization's territory or region to increase the influence of the program through pooled funds, shared data, and joint influence on market actors, federal standards, and voluntary specifications such as ENERGY STAR. While collaboration can increase programs' influence, aligning on the program's design and evaluation may be challenging if collaborators operate within different regulatory frameworks. For example, contributors may disagree about program design elements if they are trying to capture different benefits from the program or are constrained in how they are able to claim savings. Further, if collaborators are evaluating the same program using different approaches or metrics, their evaluations may yield different or even contradictory findings and recommendations.

- **Current market transformation evaluation frameworks may be limited when it comes to evaluating systems rather than individual products or practices.** Many of NEEA's market transformation programs have focused on the adoption of specific technologies, such as lightbulbs or refrigerators. Increasingly, however, NEEA finds that there are opportunities to advance the efficiency of systems or products whose performance is intricately tied to other elements of the system in which it operates. The efficiency of an HVAC system, for example, is not only determined by the specific furnace or heat pump installed. The building's size, insulation quality, duct tightness, and climate zone can all have major impacts on performance. This interplay can be challenging for evaluating energy savings achieved by adoption of more efficient products that exist within systems.
- **Current market transformation frameworks were not developed with explicit equity considerations.** Market transformation programs are designed to make sustained changes to entire markets by identifying barriers to adoption of an efficiency product or practice, implementing strategies to overcome those barriers, and tracking market outcomes that should bear out if the program logic is correct. Often these programs are designed to address market-wide barriers and do not seek to identify or address barriers that specific populations may face to engaging with or experiencing the benefits of the efficient product or practice. Further, existing market transformation evaluation frameworks were developed around diffusion of innovation theory and therefore not designed to address the potential inequities of the current market system and resulting inequities on different groups (Harris 2024).

Looking Forward: A Changing Energy System Landscape

As noted earlier, market transformation initially grew out of the need for an alternative to conventional energy efficiency programs when the utility industry was facing a high level of uncertainty in the face of de-regulation. In some ways, the situation today bears a resemblance to those early days when market transformation started. The national energy landscape is facing an unprecedented amount of change driven by regulatory changes as well as broader economic and global policy changes. A necessarily risk-averse industry is being pushed to explore new territory as it responds to a variety of macro-level, interconnected trends that are driving much of this change and will shape the sector over the next five-to-ten years:

- **Decarbonization:** Policy and market trends toward decarbonization are anticipated to drive or have a role in most, if not all, of the major changes to the national energy landscape. State and utility targets for decarbonization and greenhouse gas reduction continue to drive the transition to clean energy resources.
- **Electric Transmission and Distribution Needs:** New and upgraded transmission and distribution resources are needed to serve new electric loads and make the transition to higher levels of renewable generation resources. At the same time much of the existing electric and gas infrastructure is aging and in need of replacement or strategies for life-extension of equipment. Climate driven imperatives such as wildfire risk and extreme weather driven outages are placing new demands on this infrastructure.
- **Federal Funding Opportunities:** Clean energy stakeholders are pushing to leverage federal funding opportunities during the current administration. Expectations are that the U.S. Department of Energy will work to fund an increasing number of new clean energy-

related initiatives in support of climate goals, such as the Inflation Reduction Act and the Bipartisan Infrastructure Law.

- **Increasing and Changing Electric Load:** Vehicle and building electrification are expected to drive load growth. This presents both opportunities for efficiency and questions about grid reliability and impacts to peaks.
- **Uncertain Role for Natural Gas:** While the extent remains unclear, stakeholders expect gaseous fuels to be part of a clean energy future, citing industrial and commercial requirements, cold climates, grid reliability contributions, and progress toward clean gas alternatives. The administration is pushing toward electrification but there is no federal trend to restrict the sale of natural gas.
- **New Electric Planning Imperatives:** Utility planning paradigms will need to appropriately integrate intermittent renewable resources, assess the complimentary value of energy efficiency, and forecast load impacts of transportation and building electrification.
- **Impact of Renewables on Electric Energy Efficiency Cost-effectiveness:** The rapidly decreasing cost of renewable energy sources will undermine the cost-effectiveness of energy efficiency if demand-side resources are viewed as simple offsets for non-time-differentiated generation resources.
- **Electric Energy Storage Technology:** Stakeholders are watching technology development in storage closely with varied expectations for realistic near-term progress, ranging from maintaining the existing four-hour limitations of batteries to storage solutions capable of serving load for days or weeks. In the absence of long-term battery storage capabilities, some stakeholders view gaseous fuels as an energy storage option to support peak loads.
- **Varying Technology Expectations:** The pace of technology commercialization will play a key role in the energy sector landscape over the next decade, but expectations for the timing and success for these technologies varies widely.
- **Equity:** The societal agreement that assures utility cost recovery and appropriate profitability in exchange for a requirement to serve all customers is under new scrutiny, given a rising understanding of historic and structural inequity. Utilities are focusing on equity in all aspects of utility operations, investment, and environmental impacts. This focus includes distributing benefits from efficiency programs to historically underserved communities.
- **Global Market Turmoil:** The last three years have seen an unprecedented amount of disruption in global markets including shut-downs, supply chain disruption, capital markets turmoil and global conflicts. Disruptive technologies such as artificial intelligence are challenging traditional methods and practices across a broad swath of commercial and societal functions. These factors are not likely to disappear anytime soon; in fact, they appear to be growing in intensity. Successful market strategies that can survive these factors will require flexibility, creativity, and adaptability (Belais and Thompson. 2021).

Addressing Evolving Energy System Needs: NEEA's 2025-2029 Strategic Plan

As an example of how market transformation can address the needs of the changing energy landscape, NEEA recently completed a multi-year strategic planning process that

incorporated the lessons learned from 25 years of market transformation and then looked forward to the future needs of the evolving energy system.

Future Northwest market transformation efforts will be guided by four strategic goals that align with NEEA's core purpose, which is to pool resources and share risks to transform the market for energy efficiency to the benefit of all consumers in the Northwest. In addition to the primary goal focused on energy efficiency, NEEA added three additional strategic goals to help the Northwest address the changing needs of the energy system.

Goal 1: Transform Markets for Energy Efficiency

NEEA will continue to leverage the collective market power of the Northwest region and its more than 25 years of market transformation experience to create lasting market change that results in measurable energy savings for consumers and utilities. As regional priorities continue to evolve, NEEA will intervene in markets to identify new efficiency opportunities as well as to influence adoption of existing energy-efficient end-use products, services, and practices. These interventions support dialogue and coordinate activities among stakeholders interested in accelerating efficiency through market transformation. NEEA also recognizes that engagement and collaboration with other market transformation organizations is a key element for future success.

Goal 2: Accelerate the Adoption of Grid-Enabled End-Use Technologies through Market Transformation

NEEA will explore opportunities for market transformation to support the region's ability to dynamically manage electric loads to maximize the efficient use of energy while advancing efficiency within these products. Specifically, NEEA will prioritize opportunities to 1) leverage existing market relationships and product development expertise to accelerate the integration of features that enable end-use flexibility, and 2) promote standardized protocols that enable products to communicate with other end uses and the grid. These end-use technologies and/or practices must integrate within the broader electric utility system operations. This will require understanding of, and collaboration with, electric utility system operations and systems.

Goal 3: Advance Strategies to Reduce Greenhouse Gas Emissions through Market Transformation

Energy efficiency will play an important role in helping the Northwest achieve its emissions reductions goals. However, diverging policy drivers and decentralized approaches to decarbonizing the electric grid and natural gas system are creating uncertainty within the supply chain. Due to this uncertainty, some manufacturers are hesitant to invest significant dollars in product technologies, while others are investing in technologies that may or may not provide long-term value to a decarbonized system. At the same time, some states are also adopting very accelerated timeframes for achieving decarbonization goals, adding additional pressure to a very uncertain market.

Meeting these challenges will require major investments in manufacturing and construction as well as infrastructure to support them. These investments will only be successful if they are leveraging the capital and resources available within markets. Market transformation will need to harness the capability of the market to support decarbonization goals while reducing

market confusion and uncertainty by preparing the market to meet accelerated policy goals. Market transformation can help align product development roadmaps with the current and future policy needs. NEEA will need to leverage its core competencies by 1) convening the region to bring multiple parties and perspectives together, 2) identifying and filling regional research and data gaps, and 3) working with market partners to accelerate the development and market adoption of low-carbon technologies and strategies.

Goal 4: Advance the Equitable Delivery of Energy Efficiency Benefits to Northwest Consumers through Market Transformation

Market transformation efforts often focus on bringing innovations to market by targeting early adopters – usually households and businesses with resources to invest in new, efficient technologies. And then when possible, locking in those savings for everyone through more efficient codes and standards. Theory predicts that as market share of an efficient technology grows it becomes more widely available and more affordable for all. However, it can take years, if not decades, to directly experience those benefits, and even then, benefits are not guaranteed to all consumers. NEEA will undertake research to identify which customer segments are not directly benefiting from NEEA market transformation activities or benefiting much later. NEEA will also work with stakeholders and the market to identify and implement strategies to accelerate the equitable delivery of energy efficiency benefits to Northwest consumers.

These strategic goals serve as examples of one market transformation organization's strategic response to the changing energy system. There are other elements needed at a broader level that will need concerted effort by all of those working and using the tool of market transformation (Mersereau 2023).

Increasing Market Influence through Collaboration across New and Existing Market Transformation Organizations

As noted earlier, a key component of successful market transformation is the aggregation of market demand at a scale that can attract the attention of national and global market actors and decision makers. After many years of leading the development of full-service market transformation organization in the U.S., NEEA is being joined by new organizations formed to implement market transformation and capture the next generation of efficiency opportunities. Starting up a new organization from scratch is a difficult and complex effort that requires multiple, key components necessary to succeed.

Over the past several years, new or re-invigorated market transformation efforts have started up in several states. This sets the stage for the possibility of larger-scale market aggregation that can have more influence with market actors. These newer market transformation efforts can serve as examples for other states and regions that would further the market aggregation resulting increased market influence. Some examples include the following efforts in Minnesota, California, and Illinois.

Minnesota Efficient Technology Accelerator. Energy efficiency has long been a core pillar of Minnesota's energy policy, and Minnesota utilities have been running efficiency programs since the early 1980s with a strong track record of success. However, the need for evolving Minnesota's approach became apparent as Minnesota adopted ever-higher efficiency goals just

as traditional stalwart measures of efficiency programs (e.g., lighting) were vanishing from efficiency portfolios.

The Efficient Technology Accelerator (ETA) was created to help replenish the well of new technologies that utilities could claim savings from, as well as more rapidly advance critical technologies that have more entrenched barriers. It resulted from several years of stakeholder discussions about the need for evolving the traditional efficiency approach in ways that would supplement and deepen the impacts of Minnesota's traditional energy efficiency programming (Nelson et al. 2021). The program is funded by Minnesota investor-owned utilities, administered by the Minnesota Department of Commerce, and implemented by the non-profit Center for Energy and Environment.

In early 2024, the ETA launched its first four initiatives into the market, which includes critical electrification technologies: dual-fuel air-source heat pumps, dual-fuel roof-top units, luminaire-level lighting controls, and high-performance windows.

In total, should these initiatives achieve their full energy-savings potential, they would reduce energy usage in the state by 13 percent, and achieve significant decarbonization of residential and commercial space-heating in the state (Nelson et all 2021).

California Market Transformation Administrator (CalMTA). In 2018, the California Public Utility Commission (CPUC) began working on a concept to start-up a statewide market transformation effort in California. This led to a Decision in 2019 to launch a multi-year program effort that would be managed directly by the CPUC staff, over an eight -year period that formally launched in 2023. CalMTA is working on their initial portfolio of initiatives and has selected three technologies for the first batch: induction cooktops, portable/window room heat pumps, efficient roof-top units for commercial buildings. CalMTA is administered by Resource Innovations under contract to the CPUC (Public Utilities Commission of California. 2019).

Illinois Utility Market Transformation Programs. Illinois utilities have been developing and implementing market transformation initiatives since the passage of the Future Energy Jobs Act (FEJA) in December of 2016. FEJA enabled a new element of market transformation to be a part of the utilities energy efficiency portfolios beginning in 2018. ComEd, Ameren and Nicor Gas have all been including some market transformation initiatives within their portfolios since then. The Illinois statewide advisory group has formalized an evaluation and energy savings methodology and incorporated it into the Technical Reference Manual.

Supporting and Facilitating Cross-organization Collaboration

With an increasing number of organizations implementing market transformation programs there is a risk of misalignment in approaches and requirements targeting specific products, services, or practices. While some regional or state-level differences are necessary, prioritizing alignment will create a more powerful aggregated market signal to manufacturers, distributors, and retailers. Conversely, if there is a fragmented, misaligned set of requirements, there is a risk of dilution of leverage and a greater likelihood of industry choosing least-common denominator products, services, or practices.

NEEA has been working in collaboration with each of these new market transformation efforts to try and align respective organizational efforts for increased market aggregation. NEEA will continue to dialogue with other market transformation organizations on important areas including:

- Best practice development and continuous improvement for market transformation planning, design, implementation, and evaluation.
- Collaboration on common market approaches and messaging to national markets and actors, and on evolving how to support equitable delivery of efficiency benefits.
- Development and alignment around key elements of common market transformation program elements such as product definitions and specifications.
- Co-funding of specific elements of common market transformation activities such as market characterizations of national or global market, incremental cost analysis, laboratory testing, and sales data analysis and trends.
- Development and funding of scaled national market transformation programs such as ENERGY STAR Retail Products Portfolio.
- Development of standardized policies that support market transformation for use by new and existing market transformation organizations to create a more stable policy foundation on which to implement programs, including cost-effectiveness mechanisms.

A New Cost-Effectiveness Paradigm

Traditional resource acquisition program cost-effectiveness tests were developed to compare demand side resources to supply side generating resources through an integrated planning process that, by definition, looks at the problem from a utility-centric perspective. This has been tremendously helpful in launching efforts to substantially reduce energy demand at lower costs than an alternative of building additional generating resources with associated costs for transmission and distribution. In this context, a comparison of the energy efficiency opportunity costs and energy savings makes sense as the utility program paradigm is seeking to purchase the energy benefits of the energy efficient device in lieu of spending the money on a generating resource.

In contrast, market transformation seeks to align energy savings elements with pre-existing market drivers for products and services in such a way that the market itself will pay for the increased adoption out of its own self interests. This often means that the efficient components of a product (or service) are subsumed into an overall cost structure that provides many other benefits to the end purchaser. In the market transformation context, it may be difficult or even impossible to assess the incremental cost of the efficient elements in isolation; therefore, the traditional cost-effectiveness tests are ultimately either misapplied or incorrect in their results.

In addition, as a comprehensive paradigm over the entire life cycle of an innovation, market transformation should be assessed for cost-effectiveness using a cumulative, net present value analysis over this entire market transformation program life cycle, often 20 years or more.

For the future, these misalignments between traditional cost-effectiveness tests and the market transformation paradigm must be recognized and a new, distinct approach must be developed that is as comprehensive and inclusive of the full life cycle of the innovation. That approach must also recognize the difficulties of separating out incremental costs of efficiency from non-efficiency fundamental product costs that consumers are willing to pay for. This new approach must also be recognized by regulators as an appropriate mechanism to assess the prudency of market transformation as a rate-payer expense if that is the primary funding source.

The previously discussed effort in ductless heat pumps provides an example which was the target of a ten plus year market transformation program in the region. In many jurisdictions,

traditional utility cost-effectiveness tests indicate that these products are not cost-effective, yet over 50,000 of these products are sold every year. Large numbers of consumers find them to be a cost-effective solution for their comfort needs, yet the value of this comfort is completely ignored in traditional cost-effectiveness models. A different approach is clearly needed that recognizes these non-energy benefits and values a decade long market transformation effort that has yielded 50,000 consumer purchases every year.

Equity Implications for Market Transformation

Context Within Utility Funded Energy Efficiency

Market transformation holds a unique and distinct role in the universe of utility funded energy efficiency programmatic efforts. In the Northwest, market transformation has accounted for approximately 10% of the total utility funds spent on energy efficiency with the bulk of the rest going to resource acquisition programs that are focused on end-customer transactions. Many utilities are examining their programs through an equity lens; seeking to better design programs to serve communities that have often been excluded from participation due to systems that have prohibited their ability to take advantage of utility offerings (Amann, Tolentino, and York 2023). Many utilities have had weatherization programs and other offerings targeting low-income customers for decades, but income is not the only barrier for many customers who would benefit from participation in utility programs. Utilities have an opportunity to take a systems approach to equity: they can work with organizations in other sectors such as housing to better understand the holistic needs of energy consumers.

The process of understanding barriers to full participation and overcoming systemic obstacles through innovative program and implementation design is ongoing and much is still to be learned. Through their already existing focus on individual customer engagements, utility programs have an opportunity to address equity concerns through approaches such as partnering with community-based organizations and expanding the equipment and reach low-income programs (Amman, Tolentino, and York 2023). The role of market transformation within this broader utility funded program context is still evolving.

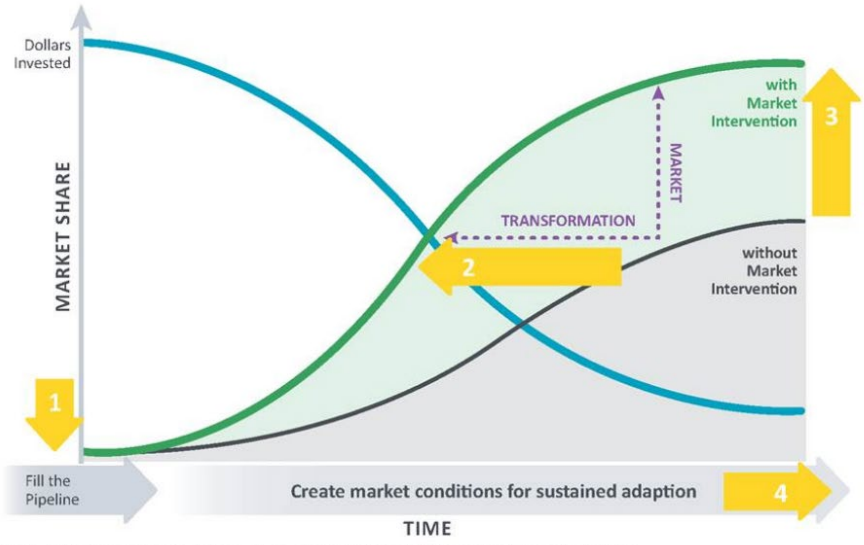
Potential Roles for Market Transformation within the Innovation Adoption Process

Historically, market transformation has focused more on supply side market actors who are looking for large scale market opportunities and ways to meet corporate goals of profitability and market share. Market interventions have also tended to be weighted towards the early stages of market adoption because removing early barriers to market adoption can help leverage private investment and grow scale, which brings down costs and sets the innovation on a path of accelerated adoption. These early interventions frequently target getting traction with “innovator” and “early adopter” groups. The theory of diffusion of adoption makes assumptions about characteristics of these innovators or early adopters. Rethinking and challenging these assumptions and how the tool of market transformation is applied could open opportunities to apply an equity lens to the work.

In 2020 NEEA, in collaboration with Marti Frank of Efficiency for Everyone (E4E), began investigating the equity implications of market transformation and possible approaches to integrate equity and justice considerations into market transformation initiatives, based on the

theoretical work of Everett Rogers, who developed the theory of the diffusion of innovations. Roger's theory reflects human response to change, i.e., introduction of change to any group of people will elicit different responses from different individuals in the group. In a large enough group, regardless of abilities or resources, there are likely to be some individuals that are more inclined to try something new and embrace the change versus those that will be more cautious and averse to change. In addition, systemic inequities create barriers to adopt technologies that are irrespective of their predisposition to change. In all communities, including those that have been historically underserved by efficiency programs, there are likely to be those who have characteristics of "innovators" and "early adopters," venturesomeness, daring, opinion leaders, who are unable to act as such due to a lack of resources or other conditions necessary to participate.

During NEEA's strategic planning process, NEEA and E4E identified some equity implications of market transformation initiatives occurring at each stage of the diffusion "S" curve. Figure 1 illustrates this.



Equity implications of market transformation created by Marti Frank, Efficiency for Everyone (April, 2021)

	1	2	3	4
Goal	Introduce innovative product	Speed adoption of innovation	Increase final saturation of adoption	Increase minimum performance standards to lock in innovation
Directly Impacted	Innovators/early adopters	Early adopters/early majority	Late majority/laggards	Late majority/laggards
Equity Implications	Requires substantial cost and risk subsides and supply chain support to benefit lower-income, less risk-tolerant adopters	Requires substantial cost and risk subsides to benefit lower-income, less risk-tolerant adopters	Requires moderate cost and risk subsides to benefit lower-income, less risk-tolerant adopters	Primarily benefits lower-income, less resourced adopters who are the primary buyers of baseline-efficient technologies

Figure 1. *Source*: Equity Implications of Market Transformation created by Marti Frank, Efficiency for Everyone, April 2021

Other strategic opportunities to address equity explored by NEEA and E4E include balancing a portfolio of market transformation initiatives to ensure investment across the adoption lifecycle, assessing each initiative to tailor activities to increase equitable outcomes, the development of equity metrics to evaluate impacts, and engaging communities in decision-making processes (Dorsch, Frank, and Colgrove 2021).

Another area that NEEA and others have been exploring is the potential for efficiency innovations at entry-level price point to increase accessibility. In some cases, the incremental financial costs of the efficiency technologies may be small but are typically bundled with non-energy related features that result in an overall cost increment that represents an insurmountable burden for some customers.

References

NEEA 2010-2014 Strategic Plan. April 2009. Portland, OR: NEEA. https://neea.org/img/documents/NEEA-2010-2014-Strategic-Plan.pdf.

Amann, J., C. Tolentino, and D. York. 2023. Toward More Equitable Energy Efficiency Programs for Underserved Households. Washington, DC: ACEEE. aceee.org/research-report/b2301.

Belais, J., and K. Thompson. 2021. *2025 Strategic Planning Briefing Paper: National Trends.* Portland, OR: NEEA. neea.org/resources/2025-strategic-planning-briefing-paper-national-trends.

Dorsch, K., M. Frank, and M. Colgrove. 2021. *2025 Strategic Planning Briefing Paper: Diversity, Equity, and Inclusion Trends.* Portland, OR: NEEA. neea.org/img/documents/NEEA-Strategic-Planning-Briefing-Paper-Diversity-Equity-and-Inclusion-Trends.pdf.

Eckman, T., N. Benner, and F. Gordon. 1992. *"It's 2002: Do You Know Where Your Demand Side Management Policies and Programs Are?"* Proceedings of the 1992 ACEEE Summer Study on Energy Efficiency in Buildings 5: 1–17. Washington, DC: ACEEE. aceee.org/files/proceedings/1992/data/papers/SS92_Panel5_Paper02.pdf.

Harris, J. 2024. *2025 NEEA Fundamentals of Market Transformation.* Portland, OR: NEEA. neea.org/img/documents/NEEA-Fundamentals-of-Market-Transformation.pdf.

Lane, S. 2021. *NEEA 2020 Annual Report.* Portland, OR: NEEA. neea.org/annual-report/2020/2020-dhp.

Mersereau, V. 2023. *Draft Cycle 7 (2025-2029) Strategic Plan.* Portland, OR: NEEA. neea.org/img/documents/Draft-2025-2029-NEEA-Strategic-and-Business-Plan.pdf.

Nelson, C., E. McPherson, I. Smith, G. Diller. 2021. *How the Minnesota Efficiency Technology Accelerator Will Advance Market Transformation.* In Proceedings of the 2022 ACEEE Summer Study on Energy Efficiency in Buildings 7:868. Washington, DC: ACEEE.

Public Utilities Commission of California. 2019. *Order Instituting Rulemaking Concerning Energy Efficiency Rolling Portfolios, Policies, Programs, Rulemaking 13-11-005 Evaluation, and Related Issues.* Decision 19-12-021. docs.cpuc.ca.gov/PublishedDocs/Published/G000/M321/K383/321383533.pdf.