The Minnesota Model – Electrification

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ABSTRACT

Minnesota's energy community has a reputation for leading uniquely productive stakeholder engagement efforts and collaborative policy making. From electric utility infrastructure efficiency, to potential studies, to advances in cost-benefit testing, "Minnesota Nice" has yielded productive, creative, and innovative answers to some of the stickiest energy and efficiency issues – and in turn has played an outsized role in shaping the national conversation.

The Minnesota Department of Commerce, Division of Energy Resources (Commerce), by way of a U.S. Department of Energy grant, is now directing stakeholder engagement efforts on a new big sticky topic: Electrification of the Built Environment. Throughout 2020, Commerce is convening a series of stakeholder and technical working group meetings. These groups are tasked with informing a state electrification roadmap development process by answering key how-to questions that will determine the potential role for electrification within Minnesota's Conservation Improvement Program (CIP)—the implementation of the State's energy efficiency resource standard—and beyond as an efficiency and decarbonization tool.

This engagement process follows on from the State's development and dissemination of an electrification white paper and a vigorous stakeholder examination of the State's current fuel switching prohibition within its EERS. This paper outlines the stakeholder engagement process and describes expectations from future dialogue around electrification technologies, metrics, policy and grid impacts.

Background

The Minnesota Department of Commerce, Division of Energy Resources (Commerce) has a long-standing history of developing and implementing energy efficiency and renewable energy initiatives to achieve Minnesota's statewide public policy goals.

Minnesota has several statewide energy policy goals established by law and codified in statute and rules, including:

- Energy-saving goals for electric and natural gas utilities (1.5 percent of annual retail sales) that operate in the state of Minnesota through the Conservation Improvement Program (CIP) (216B.241 Energy Conservation Improvement, 2019).
- A goal that twenty-five percent of electric utilities' total retail sales be met from renewable energy resources by the year 2025 (216B.1691 Renewable Energy Objectives, 2019)
- A requirement that all public utilities generate or procure 1.5 percent of electric generation through solar energy by the year 2020 (206B.1691 Solar Energy Standard, 2019).

- GHG emission reduction goals of fifteen percent across all sectors by 2015, thirty percent by 2025, and eighty percent by 2050 (216H.02 Greenhouse Gas Emissions Control, 2019).

Since the above energy policy goals were established, Minnesota has not only achieved but exceeded many of its performance metrics. Renewable electricity generation has increased from eight percent in 2007 to twenty-five percent in 2017, putting Minnesota on track to exceed its twenty-five percent goal (Minnesota Department of Commerce, 2018). Through utilities' consistent achievement of the 1.5 percent energy efficiency resource standard, Minnesotans have saved an estimated $3.5 billion on their energy bills, since 2008, with an independent review determining that for every one dollar spent on efficiency four dollars are returned to the state's economy (Cadmus, 2015).

In addition to these policy achievements, market factors are also rapidly changing how energy efficiency and renewable energy provide a grid resource and help optimize the energy system. Cost reductions for distributed resources such as solar energy and storage technologies are allowing for increased implementation by individual consumers; however, mature markets, new energy codes, lower avoided fuel costs due to cheaper natural gas and renewables, and increasingly stringent federal appliance and lighting standards make cost effective energy savings at the state level more difficult to find. A recent Minnesota statewide energy efficiency potential study concluded that over the next decade these trends are poised to significantly change how the State approaches future energy policies, infrastructure investments, and the tools available to continue to create a modern and efficient energy system (Carl Nelson, 2018).

Related Minnesota Policy

Current Minnesota policy regarding fuel-switching within CIP provides important context for electrification stakeholder engagement. Fuel-switching in this context refers to use of CIP funds to incentivize a conversion from any fuel from any source to the fuel provided by a utility participating in CIP. On March 7, 2005, following a multi-year fuel-switching stakeholder discussion, Commerce issued an Order stating that "targeted fuel-switching projects are not allowed in the [CIP]," essentially prohibiting electrification within the CIP program. At the time, carbon reduction was not a state-legislated priority, nor was renewable electricity common, therefore the primary justification for the prohibition was to limit utilities using CIP for load buildings (Garvey, 2005).

A very narrow exception to this prohibition was outlined for low-income customers through additional Commerce guidance issued on August 3, 2012. Commerce determined that "electric utilities may provide direct space heating and domestic hot water energy savings measures to low-income delivered fuel customers and low-income small natural gas municipal utility customers offered in conjunction with the Weatherization Assistance Program." (Division of Energy Resources, 2012)

Legislation attempts to accommodate "efficient fuel-switching" were introduced in 2019 and in 2020, but not passed. The legislation would have updated the CIP statutory framework in a number of ways, including: revisions to utility energy savings goals and low-income spending requirements; greater flexibility for the inclusion of load management programs; and, the ability,

under certain circumstances, for utilities to include efficient fuel-switching activities in CIP portfolios. Efficient fuel-switching as proposed in legislation would replace any fuel with either electricity or natural gas served by a utility that participates in CIP (small utilities are exempt from participation in the efficiency programs in Minnesota). Improvements would have had to meet these four criteria: 1) result in net reduction in the amount of source energy consumed on a fuel-neutral basis; 2) result in a net reduction of state greenhouse gas emissions; 3) be cost-effective for participants and society; and 4) be installed in a way that improves systems load factors (does not unduly increase peak demand) (HF 4502, 2020). Despite not passing, this legislation garnered a significant amount of bi-partisan support. The authors believe it likely that some form of this legislation will be reintroduced in future legislative sessions.

Through its fuel-switching stakeholder process started in 2019, Commerce has been working with stakeholders to explore administrative options to either modify or eliminate the current fuel switching prohibition. This process has run parallel with the electrification stakeholder process but was placed on hold in order to avoid complications or confusion during the 2020 legislative session, and, at the time of writing, the future of this process is uncertain.

Expectations for Electrification

In response to the changing efficiency landscape, strategic (or "beneficial") electrification is increasingly being discussed and put forward as a tool that can be used for grid optimization, resulting in system efficiency gains, increased emission reductions, and additional flexibility within the grid. By definition, electrification is the process of electrifying end-uses historically served by the direct combustion of fossil fuels, and positively contributes to environment benefits, costs reductions, and grid impacts (David Farnsworth, 2018). Electrifying equipment and processes historically powered by fossil fuel resources (for example, space and water heating, and gasoline/diesel vehicles) could result in significant emissions reductions as renewable energy generation continues to represent a larger percentage of the generation mix in Minnesota.

A 2018 White Paper commissioned by the Department of Commerce explored stakeholder perspectives on electrification (Carl Samuelson, 2018). Stakeholders (which included gas and electric utilities, advocates, and trade groups) agreed that electrification could be a path to reducing carbon emissions, specifically within the transportation sector. Many stakeholders were also interested in the potential market growth of residential heat pumps for space and water heating. Stakeholders agreed that the current CIP fuel switching prohibition limits a utility's role in supporting consumer adoption of these new technologies. Stakeholders also agreed that regulators should be considering this topic, especially as a part of broader grid modernization effort.

Stakeholders did not agree whether electrification belongs as part of CIP. Because CIP is a highly successful efficiency regulatory model, which has effectively coordinated utility-led energy efficiency in Minnesota, it could serve as a model of a utility-led electrification program. However, stakeholders warned that the goals of efficiency and electrification are not identical. Stakeholders commented that the status quo prohibition on fuel switching within CIP was put in place in part to remove the risk of a utility using a conservation program to promote the sale of its product, and this risk still exists. For electrification to be beneficial, stakeholders believe that

the grid must continue to de-carbonize and projects must be evaluated based on actual grid emissions, in addition to tradition metrics like energy and cost savings.

Stakeholders agreed that there are challenges facing electrification. Market adoption and consumer interest in technologies like heat pumps were seen as a challenge, as well as contractor familiarity. Other challenges lie with grid infrastructure and electricity supply, especially in meeting the winter heating peak. Many saw challenges in pursing electrification cost-effectively, without impacting Minnesotans' energy costs. One challenge that remains to be addressed is the technical methodology for determining when and how electrification or fuel switching would be beneficial.

The conclusion of the 2018 White Paper included a series of questions requiring further consideration during future stakeholder meetings:

- **The programmatic relationship between electrification and energy efficiency:** Should fuel switching and electrification exist within CIP or be promoted within its own standalone program? What are the advantages of a parallel program for carbon reductions versus incorporating more measures into CIP? If the measures fall within CIP, how are utilities compensated and how does it affect savings goals?
- **Utility and grid impacts of electrification:** What are the goals of CIP and will electrification help advance those goals? This discussion dovetails with the topic of electrification and fuel switching, but it is much larger than this topic. What is the value of baseline energy efficiency savings versus more responsive demand shifting and storage? Beneficially electrified technologies could play a larger role in demand response scenarios.
- **Measuring the benefits of electrification:** How do we calculate the costs and benefits? Specifically, work needs to be done around building nuance into accounting for carbon emissions. Are they calculated using the MISO mix or the utility's generation mix? What is an accessible approach to calculating marginal emissions impact? What are the real costs of electrification, and will it achieve carbon reductions at the lowest cost for society? It would be useful to develop side-by-side example comparisons for technologies with different fuel mixes, baselines, and controllability using high-resolution emission data.
- **Making electrification equitable:** What needs to be done to make this process equitable? How can beneficial electrification give opportunities for participation to low-income ratepayers? Does beneficial electrification offer sufficient benefits to non-participant ratepayers? What consideration should be given to the remaining ratepayers of the abandoned fuel who cannot afford to or choose not to convert?

Goal of Stakeholder Engagement

In order to help address the questions listed above, Commerce, along with team member, Michaels Energy, applied for and received funding from the U.S. Department of Energy through its State Energy Program Competitive Grant Funding program to pursue further engagement and planning around electrification's benefits and challenges in Minnesota. The goal of the project is to examine the possible benefits and concerns of using electrification as a tool for energy

efficiency, carbon reduction, and grid optimization in Minnesota, informed by in-depth research, stakeholder engagement, and the development of an action plan.

To accomplish this goal, a series of stakeholder meetings is being held in 2020 to provide information, facilitate discussion, and solicit recommendations on key electrification topics. The stakeholders invited include utilities, efficiency organizations, business organizations, tribal representatives, low-income representatives, multifamily housing and renters, environmentalists, trade-allies, and equipment manufacturers. The stakeholder meetings are public, so any interested party is welcome. Topics addressed throughout the overall process will include:

1. ***Electrification Regulatory and Policy Review***. Review of current regulatory frameworks and requirements (federal, state, and local levels). Evaluation of policies guiding the implementation of Minnesota's 1.5 percent energy efficiency resource standard and the opportunities and barriers these policies present for greater electrification. Examination of Minnesota's renewable energy resource standard, progress to date and forecasted progress, and implications for future electricity emission levels. Determination of where and how electrification fits into existing and/or future policy frameworks.
2. ***Electrification Technologies***. Review of electrification technologies and strategies by residential, commercial, and industrial sectors. Examination of cold climate heat pump performance, with a focus on suitability for water and space heating in Minnesota. Evaluation of electric vehicle technologies, applications, and storage capabilities.
3. ***Electrification Metrics***. Review of energy grid optimization metrics in relation to electrification and how they can be accurately and consistently measured. Examination of emissions efficiency and grid optimization based on a utility's overall generation mix and generation mix for a specific time of day or day of the year.
4. ***Electrification and Grid Optimization***. Examination of grid modernization benefits associated with greater electrification (e.g., greater opportunity to integrate variable renewable electricity through thermal storage). Evaluation of electrification as a tool to achieve system optimization by increasing energy efficiency and renewable energy integration. Evaluation of any potential risks associated with increased use of existing electric infrastructure as a result of electrification.

Based on the outcomes of this stakeholder engagement, including stakeholder recommendations, the project team will develop an action plan, detailing whether and how Minnesota can most effectively leverage and support electrification as a tool to achieve grid optimization. Specifically, the action plan will detail metrics, policies, and tools needed to ensure that electrification is indeed beneficial for Minnesota.

Anticipated Barriers for Stakeholder Engagement and Action Plan Development

Any action plan for beneficial electrification could significantly impact the future direction of Minnesota's energy system for all users of the system. As such, an immediate barrier to a successful stakeholder engagement process and meaningful action plan would be the perceived or actual marginalization of a particular stakeholder or stakeholder group. Therefore, Commerce needed to discuss and address varied perspectives in order to develop sufficient

alignment and momentum to overcome vested financial and political interests. Constructive stakeholder engagement can only take place if all stakeholders are confident that their input will be given due consideration and that the process is seen as impartial, data-driven, and transparent in how diverse values are considered and incorporated into planning and decision-making. To ensure that this took place, the project team[1] selected by Commerce was deliberately comprised of organizations that have significant energy experience and expertise but no overt policy positions concerning electrification or political affiliations that would otherwise create the perception of bias. Additionally, to encourage meaningful discussion and robust participation, during the development of the stakeholder process, Commerce worked to develop research and stakeholder meeting content that illuminated and addressed all viewpoints.

A second possible barrier is the perceived complexity of electrification. Minnesota has 213 electric and natural gas utilities, 176 of which are electric utilities (3 investor owned, 47 cooperatively owned, and 126 municipally owned) with a variety of generation fuel mixes. One investor owned utility serves both natural gas and electric customers, and a few municipal utilities are duel-fuel utilities. Given statutory customer and member thresholds for municipal and cooperatively owned utilities, (216B.241 subdivision 1b(a)) approximately 120 electric utilities are required to participate in CIP. The electric utility service territory map below shows the geographic distribution of the electric utility types.

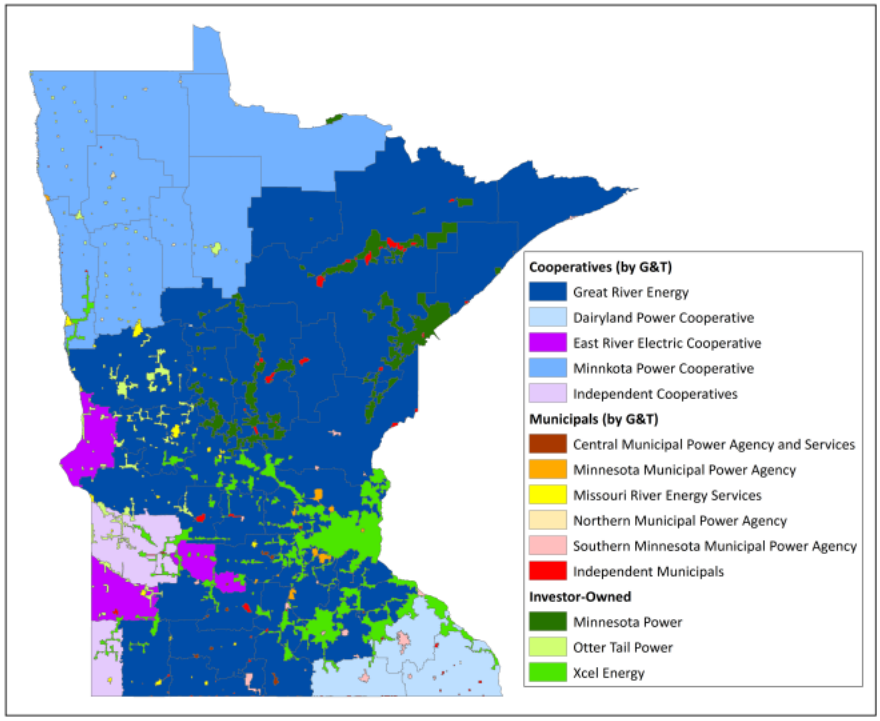

Figure 1: Map of Minnesota Utility Coverage

[1] The project team consists of the Minnesota Department of Commerce staff and staff from Michaels Energy, an energy efficiency engineering and consulting firm who completed the 2018 white paper gathering electrification stakeholder perspectives.

Determining the tipping point for when electrification becomes beneficial for a particular end use when considering energy consumption, cost, and carbon emissions is daunting for just for one utility. The goal of this project, however, is not to determine if electrification is beneficial for all 176 of Minnesota's electric utilities, rather, it is to educate stakeholders on electrification policies, end uses, metrics, and grid optimization opportunities, and to begin to develop an action plan identifying instances where it could be in the best interest of the public to use electrification as a tool to meet or exceed existing public policy goals.

A final barrier for stakeholder engagement is the challenge of maintaining project relevance. The conversation around electrification is ubiquitous and continues to intensify. State policies concerning electrification and fuel switching could change before or during the project timeframe, local NGOs are becoming more vocal in their support of electrification, and electric utilities are already piloting electrification programs. Therefore, it was essential that while Commerce develops a structure for stakeholder engagement, the most current technical, policy, and programmatic information is incorporated. To do this, as part of the project Commerce constructed the specifics, or foundations, of stakeholder engagement, and continued to review and update the project approach to ensure that it reflected the most current and relevant developments in Minnesota.

Stakeholder Engagement Plan

The action plan to be created by this project required broad engagement with stakeholders. Electrification is a topic that excites, motivates, and causes concern among stakeholders. There are economic impacts from selling more electricity and other impacts of potentially decreasing sales of other fuel types. There is earnest commitment from some stakeholders to electrification as a carbon emissions reduction strategy that needs to be deployed widely across Minnesota (and elsewhere). There are facets of this topic that are confusing, technical, and not part of wide-spread best practice or existing policy among peers and other states.

The stakeholder engagement strategy for this effort has two components: Open meetings focused on education, building discernment capacity, and listening to all stakeholders, and a technical advisory process focused on refining key question and choice points. The goal of the open meetings is to share information, build a shared understanding and common baseline amongst a wide set of interests and perspectives, and gather feedback on proposed options and pathways to electrification.

The Technical Advisory Committee (TAC), is comprised of a small team tasked with identifying key questions around electrification, their implications, and suggesting paths for possible action. Interest in membership in the TAC was solicited from all attendees of the first public stakeholder meeting, but additional TAC members may need to be recruited to balance representation and expertise of the group. The TAC will serve to digest and present information for the larger electrification stakeholder meeting attendees to better understand how their interests and perspectives can be addressed through particular choices faced by the State and its partners. The TAC is charged with answering these questions:

1. What do stakeholders need to understand?
2. What needs more research and/or clarity?
3. What are the policy implications?
4. Does the TAC have any recommendations? Recommendations needed to include:
    - The key choice points considered
    - The TAC's understanding of the choices' implications
    - A description of a process by which a decision could be reached

The stakeholder engagement map provides an overview of the process and the flow between various meetings. The process map describes two tracks, a series of public stakeholder meetings and a second track for the Technical Advisory Group. The process flows from left to right, first from the Stakeholder Meetings #1 and #2, then to a series of three TAC meetings. The results from the three TAC meetings are shared back to the public stakeholder group in meeting #3, which allows for review and oversight of the TAC's outcomes. Comments from meeting #3 as well as written comments collected after the third public meeting will be provided to the TAC in their final meeting (TAC #4) for them to review and respond to.

Following the TAC meeting process, the program team will work on writing an outline of the Action Plan which will be presented to the public stakeholder group for initial feedback and comments during the Stakeholder #4, and presented in a final, public format, during Stakeholder #5.

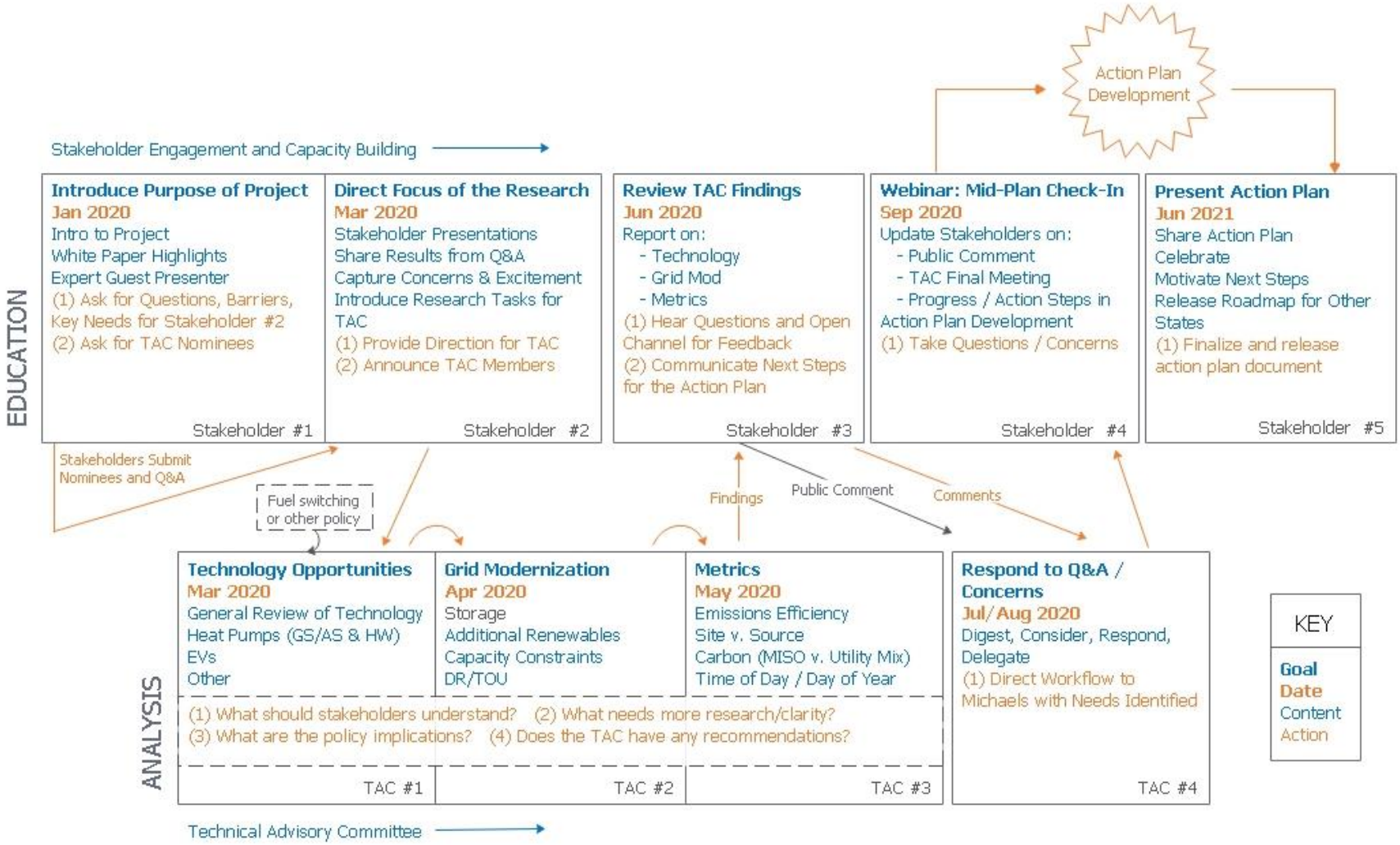

Figure 2: Stakeholder Engagement Plan Process Diagram

Conclusions

The electrification stakeholder engagement work in Minnesota is in its infancy. An initial stakeholder meeting was held in January 2020, but subsequent meetings were delayed because of proposed legislation that would have significantly altered the future of electrification in Minnesota. As of the end of June 2020, the legislative attempts appear to be unsuccessful at this time, so the stakeholder process will resume in a physically distanced medium (to address concerns around large group gatherings spreading COVID-19).

At this point, based on the first stakeholder meeting, interest in this topic is high and awareness around equity and representation among stakeholders is of particular concern. Furthermore, despite no new legislative outcome this session, bi-partisan support among legislators for an electrification solution appears to be growing. This stakeholder process will proceed with the aim of better understanding the potential role electrification could play in Minnesota if key regulatory barriers were removed. Considering this issue in the hypothetical will hopefully build consensus now so that if future legislation is passed, Minnesota is poised to move quickly to implement innovative electrification strategies to reduce carbon emissions, decrease costs, and improve grid reliability.

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