Incorporating Renewable Energy Technology into the Minnesota Weatherization Assistance Program:
Reducing Energy Burden Among Low-Income Households

MS-STEP Professional Paper

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Abstract

Solar photovoltaic (PV) installations within the Minnesota Weatherization Assistance Program (WAP) are not a new effort. In fact, this effort first began as a pilot program in 2020 and has been growing ever since. In the midst of the global energy transition, the Minnesota WAP stands as a pioneering force by aiming to make renewable energy technologies accessible to low-income households across the state. Over the past three years, the initiative has demonstrated a remarkable impact, yielding greater energy savings compared to traditional weatherization measures. Not only does this state-wide effort have the potential to alleviate energy burden among low-income households, but it also allows for increasing renewable energy accessibility for communities that have been traditionally underserved.

As the momentum behind this innovative weatherization measure continues to build, there arises a need for a comprehensive understanding of the current challenges and opportunities for continued implementation of solar PV into Minnesota WAP. Through a series of twenty-one stakeholder interviews ranging from the Minnesota Department of Commerce, local WAP service providers, non-profits, state agencies, local government, the U.S. Department of Energy's National Renewable Energy Laboratory, and the private sector, this paper aims to examine the current landscape of renewable energy technology within WAP by understanding the challenges and opportunities associated with the effort and provide recommendations to relevant stakeholders on how to make this effort more efficient and seamless. Furthermore, this paper can help other WAP Grantees who are considering incorporating solar PV as a new weatherization measure.

Keywords: energy burden, renewable energy, solar PV, Weatherization Assistance Program, Minnesota, energy savings, low-income households

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Introduction

The energy transition refers to the transformation of the global energy sector from fossil fuel-based to zero-carbon sources, otherwise known as "clean energy" sources. The energy transition emerged as a result of efforts to mitigate climate change and its escalating threats to the environment, biodiversity, and humans. In fact, the electricity production sector alone is the primary source of greenhouse gas emissions, accounting for 25% of total global emissions in 2021 (*Sources of Greenhouse*, 2023). To keep up with the Paris Agreement's goal of maintaining global temperature rise within 1.5 degrees Celsius (pre-industrial levels), faster progress is needed in most areas of the world to meet international energy goals.

According to the International Renewable Energy Agency (IRENA), the key pathway for accelerating the energy transition is by placing electrification through renewables and energy efficiency as the key technological avenues for reducing emissions by 2050 (*World Energy Transitions Outlook 2023*, 2023). The focus on renewable energy technologies has become central in today's energy transition not only for their capability to mitigate climate change, but also for their ability to be replenished, as opposed to fossil fuels. Most importantly, the cost of renewable energy has significantly decreased, which creates great market incentives.

Energy Justice

The term "energy justice" has emerged as a way to apply principles of justice to energy-related policies. The Initiative for Energy Justice defines energy justice as:

> "achieving equity in both the social and economic participation of the energy system, while also remediating social, economic, and health burdens on those disproportionately harmed by the energy system… Energy justice aims to make energy accessible, affordable, clean, and democratically managed for all communities" (*Justice in 100*, 2023, p. 6).

While the energy transition is an inevitable movement that is already taking place globally, the justice components, that is, the distributional, procedural, and recognition components of justice are not always taken into consideration. These three justice principles involve examining where injustices occur, identifying individuals who may be marginalized or overlooked, and ensuring fairness in the decision-making processes (Jenkins et al., 2016).

Energy Poverty and Energy Burden

Energy is a fundamental necessity, yet many individuals worldwide are unable to adequately heat or cool their homes. In the United States alone, one in three households faces energy insecurity, which means they are unable to meet basic energy needs (Lewis et al., 2020). On a more global

scale, approximately 3 billion people lack access to essential energy sources. Tragically, this lack of energy access contributes to millions of deaths each year due to poor living conditions (Roser, 2021). Energy poverty and energy burden are two related concepts within the energy justice framework since high energy burdens further perpetuate the cycle of energy poverty.

Energy burden is estimated by the percentage of gross household income spent solely on energy costs. The Low-Income Energy Affordability Data (LEAD) Tool calculates the national average energy burden for low-income households to be 8.6%, which is three times higher than for non-low-income households However, the energy burden in some areas in the U.S. can be as high as 30% (US DOE, n.d.) (*LEAD Tool*, n.d.). This issue, rooted in historical factors such as redlining and housing policies, disproportionately impacts low-income and minority households, particularly African Americans, linking energy poverty with poor housing conditions. Examples of poor housing conditions include poor insulation, poorly maintained heating, cooling, and ventilation systems, and outdated appliances - all of which lead to inefficient use of energy that further increases the household's energy burden (Lewis et al., 2020). As low-income households are left with limited coping mechanisms to confront high energy burdens, they frequently encounter significant economic, physical, and behavioral challenges.

a. Economic impacts

Economic energy poverty impacts refer to the financial hardships that high energy bills impose on disproportionately affected, low-income households. One study that conducted a total of 72 low-income household interviews found that interviewees' energy bills ranged from $30 a month to as high as $650 a month, depending on the season. A $200 utility bill per month would equal nearly 30% of a low-income household's total income, putting the household at the federal poverty line (using the 10% threshold). There are several consequences that come with such economic impacts, including a household's shift to prioritization of basic needs, with some having to choose between forgoing food, clothing, among other essential needs and facing multiple trade-offs along the way. Many households are faced with thousands of dollars in debt to utility companies, which limits their ability to maintain good credit scores that in the long-term can, for example, impact their ability to purchase a home. Economic impacts also come with shut-off threats that disrupt individuals' lives. One interviewee from the same study noted that they had $5,000 in utilities accumulated debt (Hernández, 2016).

b. Physical Impacts

Physical energy impacts include challenges that low-income households face in terms of inadequate physical infrastructure of their home environment that threatens their thermal comfort, as well as their overall health and well-being. Malfunctioning heating and cooling systems, poor lighting, inefficient appliances, and outdated plumbing and electrical systems are all examples of poor infrastructure that can result in harmful exposures, as well as increased energy bills. Physical impacts often arise from the lack of maintenance and upgrades to the

appropriate materials, or can also be attributed to the very limited housing options when renting or purchasing a home. Renters in particular face more challenges, as the landlords often have very few incentives to upgrade their appliances. Physical impacts are a ripple consequence from economic hardships that lead to health impacts and poor overall living conditions (Hernández, 2016).

c. Behavioral Impacts

Behavioral energy impacts are an additional consequence of both economic and physical energy impacts. More than half of all low-income households engage in behavioral or coping strategies - particularly acquiring utility debt, having to forgo expenses on food, and the use of space heaters or ovens to warm their homes. In fact, more than half of all low-income households engage in at least one coping strategy, if not multiple at once, specifically by households with vulnerable members like elderly occupants and young children (Carley et al., 2022). Some of these coping strategies can be unsafe for household members. For instance, the use of space heaters alone are the leading cause of home fires, responsible for 86% of deaths in domestic fires (Graff et al., 2021). Furthermore, research also shows energy insecure households face adverse mental and physical health effects, experiencing stress, depression, disrupted sleep, and increased risk of arthritis and asthma (Hernández, 2016).

Part 1: Background

Energy Transition in Minnesota

Minnesota's (MN) journey towards clean energy has been remarkable. MN continues to make steady progress toward energy independence, with a total of 55% of the state's energy being generated from zero-carbon sources. In the year 2022 alone, renewables accounted for 31% of the state's electricity generation (*Minnesota State Profile*, 2023). MN also added 228 MW of new wind and solar generation in 2022, where renewables made up a total of 81% of all new capacity built in the last decade (Stricklin, 2023). Moreover, the incorporation of clean energy sources has led to a direct decrease in greenhouse gas emissions of 50% from 2005-2020 – a reduction rate that is much faster than the U.S. average (*Greenhouse Gas Emissions in MN*, 2023; Stricklin, 2023). The state's workforce is also growing steadily, employing about 58,000 workers in the clean energy industry (Stricklin, 2023).

MN's on-track efforts towards a clean energy economy has been supported by Governor Tim Walz' One Minnesota Path to Clean Energy; 100% Clean Energy policy, where MN joined ten other states, the District of Columbia, and Puerto Rico in establishing 100% clean energy goals. This initiative requires all electric utilities to generate or produce 100% of electricity from carbon-free sources by the year 2040. The new law also requires all electric utilities to generate or procure 55% of their electricity from renewable technologies by 2035, a change from the previous goal of 25% by 2025. Additionally, the bill determines environmental justice metrics for a just transition (Minn. Stat. §Sec. 216B.1691).

Energy Burden in Minnesota

The Minnesota Department of Commerce (COMM) considers households that allocate more than 6% of their income to energy bills as having a high energy burden. COMM also stated that approximately 500,000 households in MN are eligible for income-based energy assistance - only 25% of which receive assistance from energy assistance programs. It was estimated that it would take 291 years to serve all income-eligible households (*Woking Group*, 2021). This leaves 75% of low-income eligible Minnesotans struggling to pay their monthly energy bills. The low percentage of households served can be attributed to many reasons, such as low levels of funding, high deferral rates, workforce issues, limited program services, among others.

A recent campaign led by Clean Energy Resource Teams (CERTs) has proposed a goal of reducing the energy burden of all Minnesota households to under 5% by the year 2025. This effort to address high energy burdens aims to enhance comfort, safety, and efficiency of homes through local projects and various technical support resources available in various languages to reach a diverse population (Donahue, 2021).

Although the county with the highest energy burden in Minnesota is Renville County, located on the southern side of the state (19% energy burden), some of the most affected counties are located on the Northwest side of the state, also containing high Native American populations. See Figure 1 for the distribution of energy burden across the state.

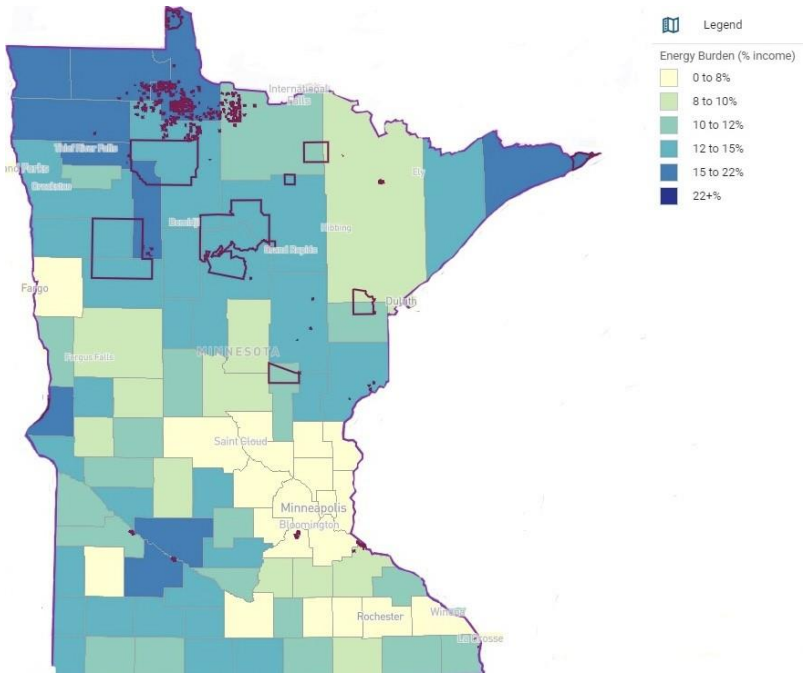

Figure 1. Distribution of energy burden among low-income households in MN, where the areas in dark red show Tribal Area Boundaries.
Data extracted from the U.S Department of Energy's LEAD Tool (*LEAD Tool*, n.d.).

Area Median Income, or AMI, is the midpoint of a region's income distribution, where half of families in a region earn more than the median, and half earn less than the median (*AMI and Housing Affordability*, 2018). Typically, households whose income is between an AMI of 0-30% are considered "Very Low Income" whereas the "Low Income" AMI category refers to households that fall in between 30-60% of the AMI. AMI can be estimated in many areas of a state. However, for the state of Minnesota as a whole, the Median household income was $77,706 in 2021 (*U.S. Census Bureau*, 2021).

A total of 640,113 homes compose the Very Low and Low household AMI categories, where the average household faces a 6% energy burden and pays an average $1,699 in electricity per year from their average annual income of $26,640 (*LEAD Tool*, n.d.). The majority of those homes were built between the years 1960-1979, making them about 44-63 years old.
Figure 2 below shows the distribution of renters and owners of both Very Low and Low AMI categories in Minnesota. Interestingly, the majority of Very Low AMI households are renters (162,025 renters vs 98,729 owners), whereas most Low AMI households are homeowners

(168,235 renters vs 211,124 owners). In both categories, owners seem to face the most energy burden.

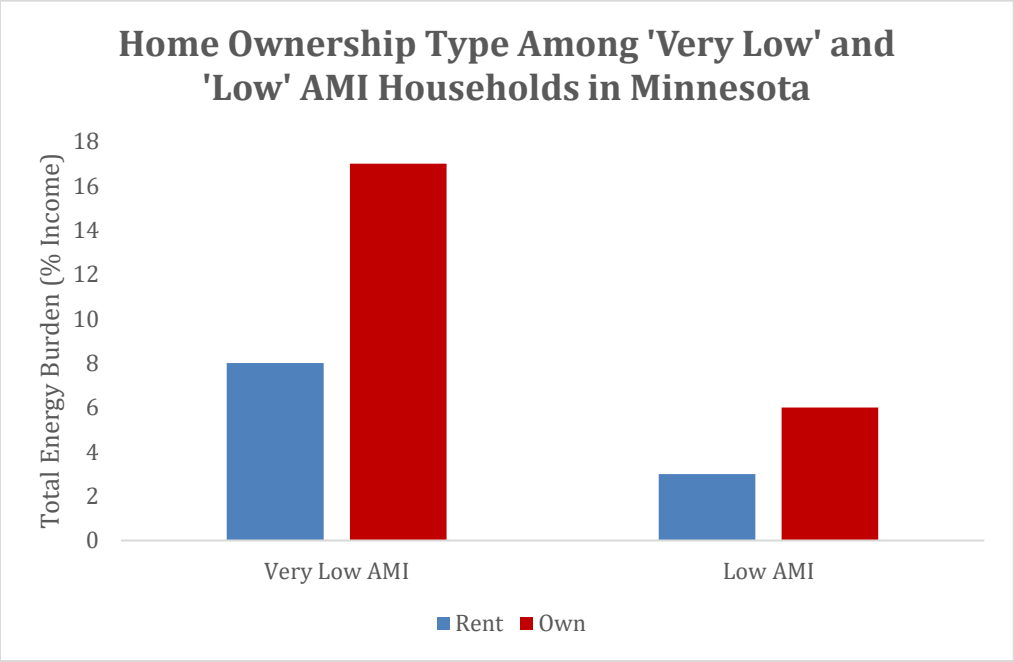

Figure 2. Distribution of renters and owners among 'Very Low' and 'Low' AMI households in Minnesota (*LEAD Tool*, n.d.)

Part 2: Addressing Energy Burden Through Weatherization Assistance Program (WAP)

Weatherization Assistance Program - An Overview

Current government action towards energy justice and reduction of energy burden was historically driven by geopolitical and economic crises that affected energy prices. These presented some challenges that ignore the long-term approaches to address disparities in energy affordability and accessibility. For instance, back in 1973, the oil crisis had a huge impact on low-income and elderly households as it became more challenging to meet their energy demands. In response to this challenge, the state of Maine's Office of Economic Opportunity first recognized the impact of this oil crisis and in turn, applied federal funds towards the Project Fuel implementation. Project Fuel had the goal of weatherizing homes and promoting energy conservation at the national level. The program also distributed fuel vouchers to those in need. Eventually, the oil crisis led to the understanding of the need for nation-wide energy-related departments and programs. Shortly after the oil crisis, a federal energy assistance program emerged: the Weatherization Assistance Program (WAP) (Bednar & Reames, 2020) (*The History*, n.d.) . The establishment of this program marked a substantial step forward that showed the importance of federal action and accountability. It also demonstrates the great need to address the root causes of energy poverty and the underlying systems that contributed to it in the first place.

The Weatherization Assistance Program (WAP), managed by the U.S. Department of Energy (DOE), was created in 1976 by Congress under Title IV of the Energy Conservation Act. Its mission is to enhance the energy efficiency of residences occupied by low-income individuals, with the goal of reducing energy expenditures and improving their overall health and safety by prioritizing those that face heavy energy burdens. At first, WAP was focused on essential air sealing measures like cellulose insulation and caulking, but as the program continued to expand during the 1980s and 1990s, there began a comprehensive understanding of the building as an interconnected system. WAP continued to advance in many ways. For instance, new technologies were incorporated such as diagnostic equipment for energy audits like blower door air sealing, Building Performance Certifications and Standard Work Specifications were also introduced, and new measures were added to the program such as electric baseload measures and eligibility criteria for renewable energy systems (*WAP Timeline*, n.d.).

As the benefits of weatherization upgrades continue to become widely recognized, WAP began to evolve into one of the most successful federal programs in fostering an energy-efficient economy. Today, DOE and its partner National Labs provide financial grants, guidance, and support to Grantees, which are the weatherization programs managed by each of the 50 states,

the District of Columbia, territories, and select Native American tribes. Grantees have the responsibility to oversee a network of over 900 local weatherization agencies, known as Subgrantees. Subgrantees typically include community action agencies, nonprofit organizations, and local government. Subgrantees' job is to identify eligible households, evaluate energy efficiency opportunities, implement energy-saving measures, and inspect the work performed. Figure 3 presents the flow of weatherization dollars from the federal government to the individual households served (*About the WAP*, n.d.).

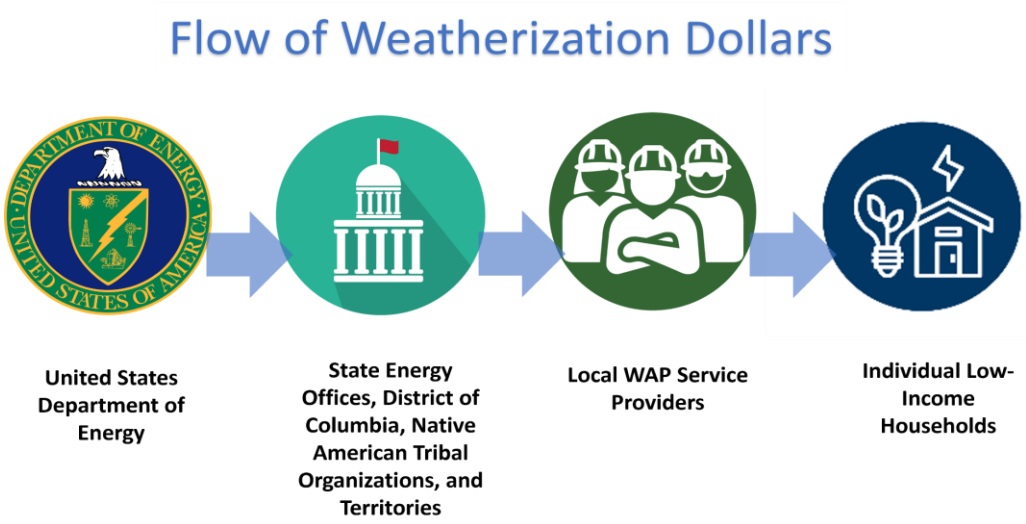

Figure 3. Process for distribution of WAP federal dollars.

Funding Appropriations

The current process for allocating funds to WAP was established in 1990 through congressional reauthorization. This process involves the use of a formula that takes into account recent data and factors such as heating and cooling costs. As a result, some funding has shifted from colder-weather states to warmer-weather states. However, the *new formula*, developed by DOE in 1995, is only applied when appropriations for WAP exceed approximately $210 million. When funds surpass this threshold, DOE will calculate state and territory allotments using both a base allocation and a formula allocation.

> **Base allocation** is a fixed amount for each state and territory that reflects historical funding levels.
> **Formula allocation** consists of three components: a population factor, climatic factor based on heating and cooling degree days, and a residential energy expenditure factor that approximates the energy burden on low-income households (*WAP Allocation*, 2022)

In the 2023 Federal Government Fiscal Year, the Grantee that received the highest WAP allocation was the state of New York with a $26.6 million allocation, and the lowest being American Samoa with just over a $213,000 allocation (*Weatherization Program Notice 23-2*,

2023). Refer to Appendix 1 to see details on the Grantee allocation of WAP funds for the 2023 Fiscal Year.

Although each Grantee manages its weatherization programs uniquely, for the purposes of this paper, the focus will remain on Minnesota WAP.

Are Formula Allocations Accurate?

The Congressional Research Service argues that this appropriation approach raises questions for Congress, as this approach is dependent on whether the annual appropriation for WAP meets or exceeds a specific threshold as mentioned above. Some of these questions revolve around the need to accommodate changes in heating and cooling, since that consumption ratio has significantly changed over the past years as climate change effects are aggravated. That ratio, which is determined by the National Oceanic and Atmospheric Administration (NOAA), uses a 30-year average of heating and cooling degree days. Such averages may not reflect current and future conditions accurately. Congress has the ability to direct DOE to modify the authorizing language to address these concerns (Clark & Cunningham, 2021).

Minnesota WAP

MN has been serving low-income households through WAP for over 40 years. Today, weatherization services alone have the potential of reducing annual energy costs by 30% in a home (MN Department of Commerce, n.d.). In order for a home to qualify for weatherization services, clients must be residents of MN and their household income is at or below the 200% of the Federal Poverty Income Guidelines or at or below 50% of the State Median Income (whichever results in lower income and greater need for assistance). DOE also allows categorical eligibility when at least one member of the household has received Supplemental Security Income (SSI) or Temporary Assistance to Needy Families (TANF) benefits. Prioritization of households is given to those with the highest energy consumption, the greatest energy burden, and those with elderly, disabled, or child members (*MN WAP Policy Manual*, 2023).

The Minnesota Department of Commerce (COMM) administers WAP through 23 Subgrantees or local weatherization service providers (Figure 4). For the Federal Fiscal Year 2023, MN WAP received an allocation of about $12 million (Appendix 1). The distribution of all Grantee funds to its Subgrantees is detailed in Appendix 2.

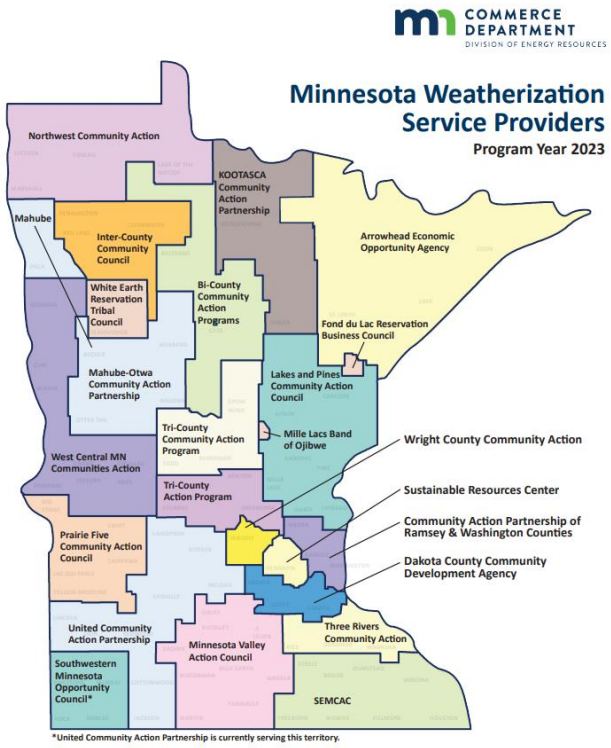

Figure 4. Distribution of weatherization service providers across MN for Program Year 2023 (*WAP Providers "Map,"* 2023)

Subgrantees, or the MN local weatherization providers, then utilize these funds to provide weatherization assistance to low-income households. The energy audit event is the main method of delivering services. Each audit focuses on measures that are aimed at reducing energy burden while protecting the health and safety of homeowners. MN currently uses the following weatherization measures in its program: a) Energy Conservation Measures, b) Incidental Repair Measures, and c) Health & Safety Measures (*MN WAP Policy Manual*, 2023). Figure 5 summarizes each type of eligible WAP measure.

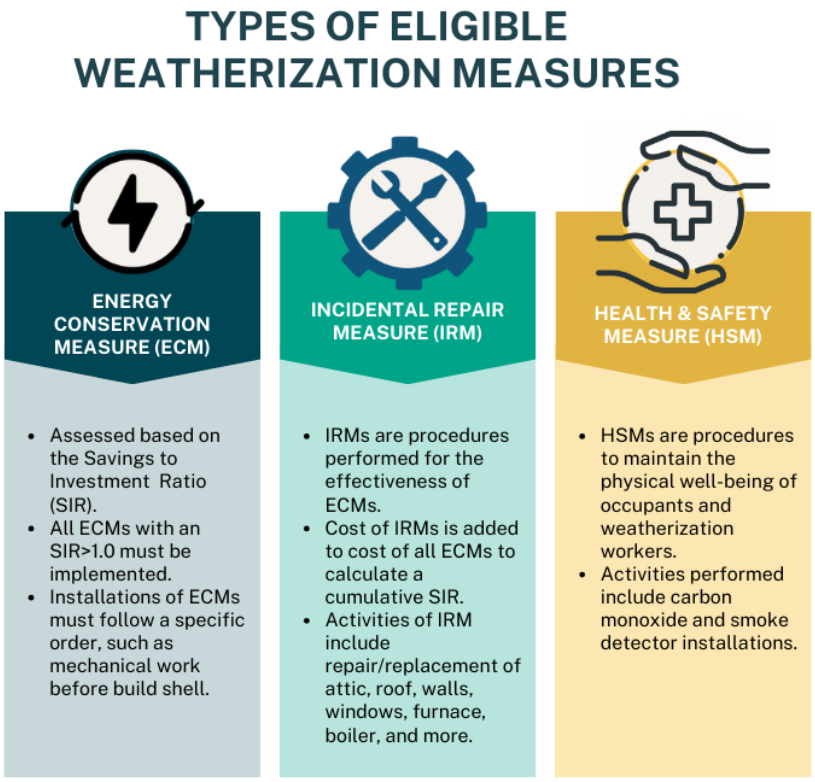

Figure 5. Summary of the types of eligible measures within Minnesota WAP

Renewable Energy within WAP

DOE allowed the eligibility of specific renewable energy systems into WAP for the first time in 2006, which included solar, biomass, and geothermal technologies. This was a result of the 2005 Energy Policy Act (42 USC §13201 et seq.), which required DOE to study and report on existing natural energy resources, including solar and wind. The bill also allocated 60% of funds towards tax credits for the production of electricity from wind, solar, biomass, geothermal, among other technologies (changes also reflected under Code of Federal Regulations Title 10, Appendix A to Part 440). An important distinction is that an allowable measure is not always required by every Grantee to adopt within their own weatherization programs.

Because of the cost-prohibitive nature of solar photovoltaics (PV) in the years following the Energy Policy Act, several WAP Grantees did not begin exploring the idea until 2016 and later. For example, Puerto Rico was the first Grantee nationwide to use WAP funds for the installation of solar systems that also included battery storage. This was done shortly after Hurricane Maria, which started with a small pilot project that installed six PV systems with battery storage on previously weatherized homes. The goal of this effort was to provide both energy savings and resiliency on future extreme weather events in Puerto Rico (*State and Community*, 2023).

Although Puerto Rico was the first Grantee to use WAP funds for solar installations, Colorado was the first Grantee to receive approval from DOE for solar PV to become an official eligible weatherization measure within Colorado WAP after its pilot program. Their pilot program took place in 2016 and resulted in the installation of four solar PV systems (*Low-Income Solar*, n.d.) (Harry, 2019). Until today, Colorado continues its implementation of solar PV within WAP.

Renewable Energy in Minnesota WAP

In 2017, Minnesota began to explore implementing solar PV into WAP through a pilot program. The pilot program consisted of three stages:

Stage 1: Pilot Program Approval and Planning

While planning for the process of launching a solar PV pilot program, COMM began with pre-implementation efforts from 2017-2019 through stakeholder meetings and webinars. This involved educating stakeholders such as service providers and solar installers to understand how solar PV technology fits with WAP requirements.

<u>Funding:</u>

DOE's guidelines for the limit on the Average Cost Per Unit (ACPU) that can be spent in a household through WAP for solar PV was $3,699 in Program Year 2019, which was part of the overall home ACPU of $7,541 at the time (*Weatherization Memorandum 047*, 2019). This meant that other funding sources were needed in order to cover the remaining cost of a solar system installation within WAP. Xcel Energy's Income Qualified Solar*Rewards Program was an important source of leveraged funding for MN WAP's pilot program. At the time, Xcel's Solar*Rewards program provided $2.00 per Watt for solar installation costs upfront to help offset the total installation cost that was estimated to be $3.70 per Watt. Additionally, they provided a payment of $0.07 for every kilowatt-hour (kWh) of electricity produced by the solar panels. The greatest limitation is that this rebate program is only available for households located within Xcel's service territory. Part of leveraging funding sources also needed to include a ten-year installation warranty that could protect clients' installed systems from operation and maintenance costs. To address the remaining funding shortfall, COMM reached out to its Energy Assistance Program partners, where they provided a solution in the form of EAP Transfer

Funding, which covered a substantial portion of the projects' cost (60-65% of projects) (J. Lindal & R. Kellye, personal communication, 2023).

The Minnesota Energy Assistance Program (EAP) is a federally funded program by the U.S. Department of Health and Human Services that is also administered by COMM. Although both programs are administered by COMM, they serve different purposes and receive funding from different sources. As opposed to WAP, which focuses on weatherization measures and energy efficiency upgrades, EAP primarily helps with direct payments towards home energy costs for low-income households as well as energy shutoff assistance (*Energy Assistance Program*, n.d.). Annually, as per the EAP annual plan, EAP allows up to 10-15% of its funds to be transferred over to WAP (*MN WAP Policy Manual*, 2023). Because of the EAP transfer of funds, COMM was able to receive final DOE approval of its solar into WAP pilot program on September of 2019.

Stage 2: Pilot Program Deployment

MN WAP began to work on its first pilot home in early 2020. These efforts, however, were quickly delayed by the COVID-19 pandemic, which resulted in the extension of the timeline for pilot completion to July of 2021 (*Patience Is a Virtue*, 2021).

Stage 3: Post-deployment and Lessons Learned

At the end of the pilot program, PV systems were installed on a total of 15 homes by one solar provider, each home averaging a system cost of $18,000 and resulting in 54 kW capacity. On average, Xcel Energy's Solar* Rewards Program covered $4,335, DOE/WAP funds covered $3,740, and EAP Transfer funds covered $3,423 per home (Table 1). The total pilot program cost was $166,177, of which $56,097 were DOE/WAP funds (33.7%).

Although the addition of a new weatherization measure presented complications in terms of funding sources, timelines, project management, among other challenges, solar installations showed to deliver the biggest impact compared to most other WAP measures (Lindall, 2022) (*Patience Is a Virtue*, 2021). The numbers have inevitably shown a great reduction in households' electricity bill savings, of nearly $600 per year. Table 1 represents additional results of the pilot program.

Table 1. Solar into WAP Program Results and Savings Forecast of the 15 piloted homes (Lindall, 2022).

Average System Size (kW)	3.581
Average Cost per Watt	$3.03
Average Amount of Contractor Bids Accepted per Home	$10,878
Average Cost Paid by Xcel Energy per Home	$4,335
Average Cost Paid through DOE/WAP Funds per Home	$3,740
Average Cost Paid through EAPWX Transfer Funds per Home	$3,423
Estimated Average Production (kWh)	4418
Estimated Average Bill Decrease per Year	$587 or 45%

COMM outlined several lessons learned from this pilot program, which included the need for mission-driven partnerships, stakeholder education and communication, realistic timelines, attention to program details, and gradual expansion while addressing issues (*Patience Is a Virtue*, 2021).

Present Day: MN Solar Into WAP Efforts

After successful implementation of the pilot program, COMM requested and received approval from DOE for solar PV installations to be an official eligible measure within WAP going forward. This experience allowed COMM for the integration of a new role within the organization, a Solar Technical Assistance Liaison (STAL) to coordinate with stakeholders, train service providers, communicate with solar installers, and expand WAP solar offerings statewide. Additionally, COMM requested and received approval of solar as an official eligible EAP measure in its annual EAP plan. Specifically, it allowed for EAP weatherization (EAPWX) funds to *not* count towards WAP's Average Cost per Unit limit set forth by DOE every year and may pay for measures with a Savings-to-Investment Ratio (SIR) of 0.75, as opposed to meeting DOE's SIR requirement of 1.0 or greater. With a combination of WAP, EAPWX, and utility funds, Minnesota continues to work towards solar PV installations in WAP while passing the SIR requirements and also qualifying for the National Environmental Policy Act (NEPA) categorical exclusion, which would require additional documentation and compliance processes.

As of October 2023, solar into WAP efforts continue to gain momentum, as there are currently 16 homes in various stages of development for solar PV installation, managed by five different solar providers across the state. Three additional MN weatherization providers have just joined the effort of incorporated solar into their services. Moreover, the budgets that were submitted for

WAP's 2022 Program Year indicate commitments for 61 new jobs as a result of such efforts (Lindall, 2022) (J. Lindal & R. Kellye, personal communication, 2023).

Today, MN is one of the few Grantees in the country that has incorporated solar PV as a WAP-eligible measure. Various rules and regulations still apply for the installations to take place:

Eligibility:

- The eligibility for solar installations includes client-owned buildings and rental properties with 1-4 units, and landlords with 2-4 unit rental properties are mandated to contribute to the project.
- Manufactured homes are currently not eligible for solar PV installations.
- A thorough site evaluation is conducted, assessing roof conditions, electrical service, and preliminary qualification work based on household electrical bills and analysis of solar suitability

Size:

- The solar PV project depends on the dwelling type, ranging from 1.8 kW to 3.6 kW for single-family households and up to 15.0 kW for multi-family residential facilities of 2-4 units.

Requirements:

- Solar PV projects must generally be installed on the household roof, and installations on detached garages or other buildings may be considered on a case-by-case basis.
- As of Program Year 2022, DOE allows an average cost per unit (ACPU) of $4,047 for the solar PV portion of WAP work, which is part of the overall ACPU.
- Solar measures must achieve a Savings-to-Investment Ratio (SIR) of 1.0 or greater, and a solar-specific review by the State Historic Preservation Office (SHPO).
- Solar installers must meet various requirements such as ensuring proper commissioning and operation of the system, provide proper documentation of component materials, etc.

Funding:

- When combining DOE/WAP funds with EAPWX funds, different timelines and SIR requirements apply. For example, the portion funded by EAPWX must have a 25-year timeline and make a 0.75 SIR, which is less than the required 1.0 SIR set forth by DOE using DOE/WAP funds alone.
- Utility or other non-federal leveraged funding can be used. Each project must apply for acceptance in utility or leveraged-fund programs like Xcel Energy's Income-Qualified Solar*Rewards Program (*MN WAP Policy Manual*, 2023).

Part 3: Stakeholder Interviews

In order to gain a better understanding of what the future of solar PV within MN WAP looks like, stakeholder interviews were conducted to better understand perceived challenges and opportunities of the continued effort.

Significance

The findings of this study will help shed light on the future of integrating renewable energy technology within WAP. Understanding what efforts currently exist to increase accessibility to renewable energy technologies towards low-income communities is crucial in order to achieve a just transition while continuing reducing energy burden. These results will also inform other Grantees who are interested or considering the incorporation of solar PV into their own weatherization programs. The 2020 pilot program proved to be a successful effort, but continued success is all dependent on the support from stakeholders involved in the process. Interviewing them to understand where they stand on this process as we look into the future is the only way we can get a clear understanding of what a path forward looks like.

Research Questions

Looking specifically at the challenges and opportunities for continued successful implementation of solar PV into MN WAP, the following questions were considered in the study: 1) **What are some of the major challenges, trade-offs, or potential negative consequences of implementing solar into WAP?** This question aims to understand the overall perceived barriers of the state-wide effort. 2) **Is there potential for these challenges to be overcome?** Specifically understanding what stakeholders would need to be involved and what resources they would require to support them. 3) **What are some of the most important reasons why MN *should or should not* continue working towards this effort?** This question gathers individual perspectives of the importance of this effort.

Study Design and Data Collection

To address the research questions previously highlighted, two major stakeholders were identified:

1. **Minnesota Department of Commerce -** COMM is responsible for coordinating, managing, and supervising Minnesota's WAP. As a state Grantee, COMM allocates annual appropriations to Service Providers. COMM plays the most important role in the state's efforts to continue implementation of solar PV as an eligible measure within WAP.
2. **State WAP Subgrantees, Minnesota Local Service Providers -** The 23 state local providers are responsible for delivering WAP services to low-income households.

Service providers decide whether or not to implement a new measure within their scope of weatherization measures.

Other important stakeholders that were identified include professionals in the renewable energy field within the U.S. Department of Energy's National Renewable Energy Laboratory (NREL), local government, state agencies, non-profit organizations, and the private sector.

After identifying the stakeholders involved, the recruitment process began in early October of 2023. The only criteria element that participants needed to meet was that they have expertise in the energy field. The types of organizations from which participants were interviewed are shown in Figure 6. A total of 21 interviews were conducted between October 16th, 2023 and November 10th, 2023.

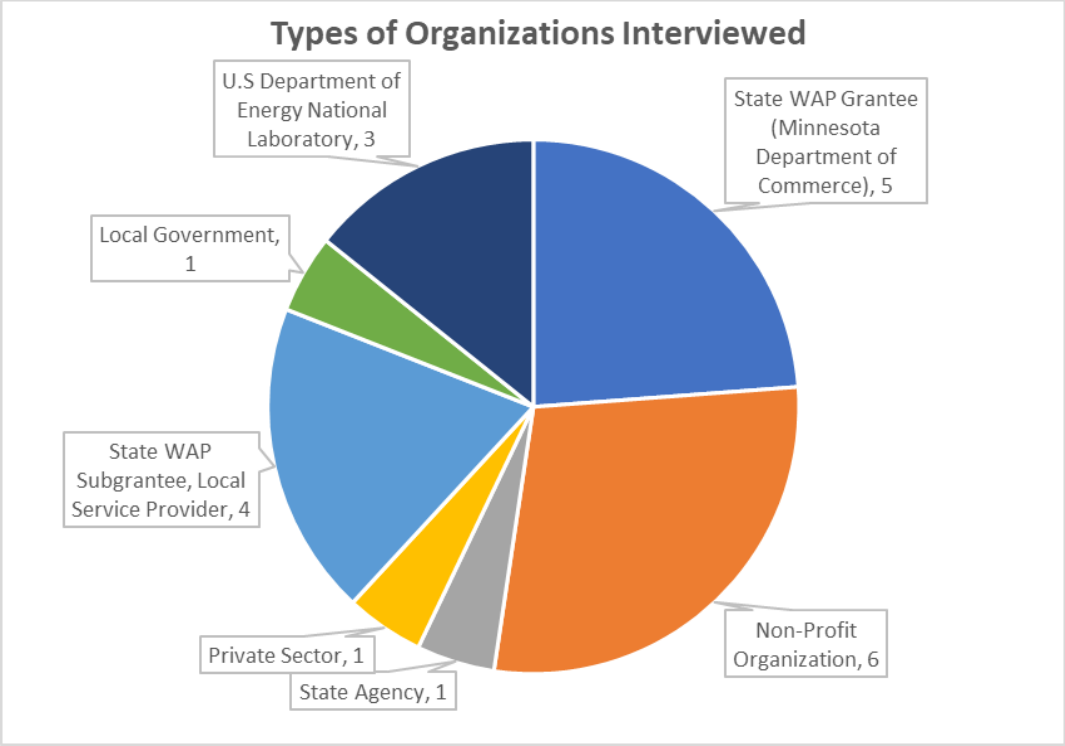

Figure 6. Organizations that were interviewed along with the number of participants from each organization, participants ranged from executive level staff to field staff working directly with clients.

To recruit participants, a snowball sampling recruitment technique was pursued, where participants were asked either at the end of each interview or as a follow-up email after the interview took place to identify other potential candidates that they thought would bring additional insights to the study. Participants were recruited via email, and the list of questions was sent at least five days ahead of the scheduled interview date. Appendix 3 contains recruitment materials, including the list of interview questions. All interviews took place over a

virtual format through Zoom and Microsoft Teams platforms, with the exception of two participants who opted to answer questions via email. Each interview lasted no more than 30-minutes and were all recorded with the permission of the participant.
Each interview began with a brief introduction, summarizing the goals of the study as well as providing general context of the solar into WAP efforts that Minnesota has previously done. Upon obtaining consent to record the call, the interview would begin. Both structured and semi-structured interview methods were performed in order to allow for great flexibility to ask follow-up questions based on their responses.

Although the majority of participants were purposely recruited because they are based in MN, one participant was based in another state, which was found to be an advantage as this gathered opportunity for comparison of other states' solar into WAP efforts.

Research Ethics

This research study has been conducted with a commitment to ethical integrity. While fully acknowledging my professional and educational background in the field of energy justice and the potential for bias in the study, several efforts were made to remain open-minded during interviews. The use of open-ended questions and probing for detailed responses has helped ensure a comprehensive understanding of the participants' perspectives. Asking the participant if there is anything they would like to add at the end of each interview also allowed room for the participant to speak freely. Additionally, the comfort of participants was prioritized throughout the interviews. For example, if a participant was struggling with a particular question, this was quickly recognized and followed by a different question for them to answer. Lastly, the interview was first piloted to obtain feedback in regard to any ethical considerations, and approval of the methodology was sought by the Committee members of this Professional Paper.

Data Analysis

The interviews conducted were coded in order to further analyze the contents of the conversations and identify any themes and sub-themes among the participants' answers. The transcription took place using Rev Max online services. After generating transcripts for each of the twenty-one interviews, each transcription was read thoroughly for coding and theme identification. For the goals of this paper, three overarching themes were identified: Challenges, Opportunities, and Views on Significance of Initiative. Several sub-themes were further identified, summarized in Figure 7 below. Reasons for choosing these themes include frequency of mention among participants, relevancy to the topic of energy justice, participants explicitly stating that it is important, and those that were found to be surprising.

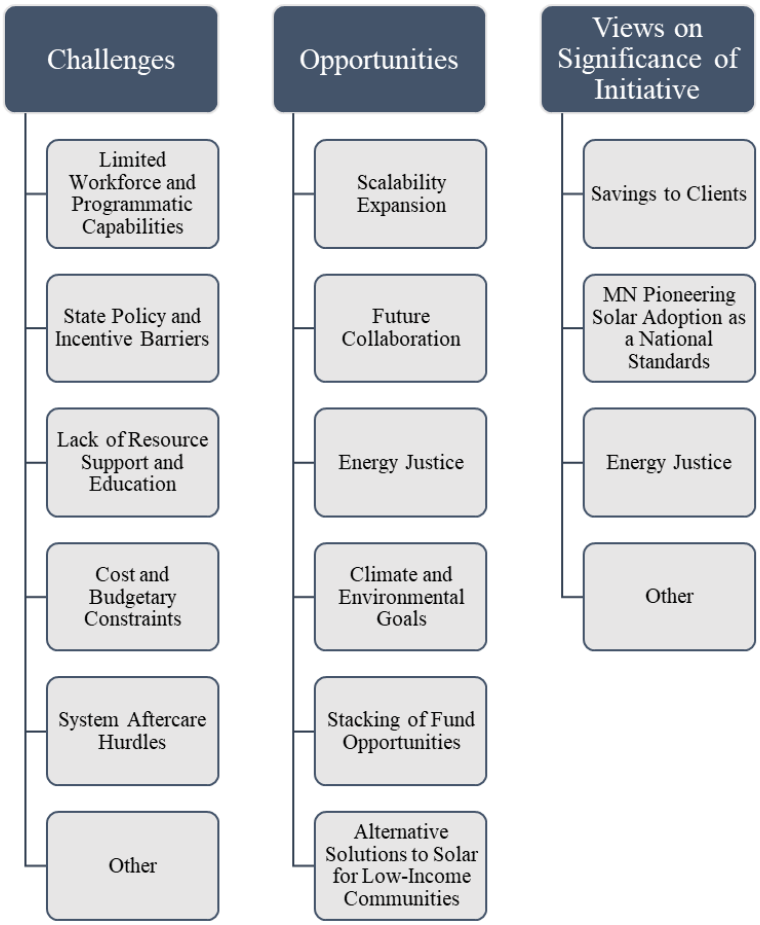

Figure 7. Themes and sub-themes created through the thematic analysis of data collected through interviews.

Challenges, Implications, and Limitations

One of the major challenges or limitations of this study was the inability to reach certain organizations/participants. For example, only 3 of Minnesota's 23 WAP Service Providers were interviewed, one of which was involved in the 2020 pilot implementation program. The three WAP Service Providers that were interviewed are also based in the Twin Cities metro area. A crucial set of stakeholders that are missing in this study include the Minnesota utilities - not just Xcel Energy, but other utilities that serve broader areas of MN who are also key stakeholders of this effort. Although at least one individual from each of the types of organizations mentioned in Figure 6 was interviewed, additional stakeholders from various parts of Minnesota would have resulted in the best outcomes. Another limitation is that this study focuses on installations of solar PV in single family homes only through WAP. Ideally, further studies would need to be conducted that include a larger set of stakeholders across the state that also investigate the implementation of solar PV among multifamily low-income homes.

Results

An understanding of the challenges and opportunities associated with the integration of solar PV as a weatherization measure within MN WAP was shaped by the detailed answers provided by the 21 participants interviewed for this study. Insights were provided on the following themes and subthemes:

Challenges

1. **Limited Workforce and Programmatic Capabilities**

One participant expressed concerns on the overall feasibility of the effort, particularly on how such efforts would align with the overall social and economic equity goals of the state:

> *"Efforts to integrate solar into WAP are even worse than community solar—both are more aligned with the financial self-interest of the providers or developers and detract from actual investments (utility scale solar) to mitigate climate change. All of the social and economic equity arguments for low-income PV or community solar ring hollow to me because so few can participate, it costs all the low-income non-participants (vast majority) more, and doesn't alleviate the actual, disproportionate impacts of fossil fuel use in low-income communities"* - Non-Profit Organization

Other participants expressed concerns particularly about the additional hurdles that weatherization service providers need to overcome in order to include a new measure, which would add great complexities in terms of management and staffing capabilities:

> *"I think it is slow to get started potentially because many of those weatherization service providers are extremely busy with their core functions of getting the contractors and going into the homes and doing the things that they've been doing for years. I feel that some of them are a little slow on the uptake of the solar part just because it's this whole other additional set of things. They have to learn, paperwork they have to do. And so I can understand they're reticent when they're saying things like, look, we're already overwhelmed and overworked with just our stuff that we normally have to do. And now you're adding solar to that."* - Non-Profit Organization

The limited number of solar installers that are willing to bid on or undertake installations poses another significant obstacle to the success of the effort. Finding qualified workers for inspections, audits, and weatherization material installations has been challenging, and participants stated that the solar PV measure requires far more hands-on management and a longer timeframe. A weatherization service provider noted that they currently cannot keep up with the number of households that are waiting to participate in solar PV installations through their services:

> *"The number of homes that would like to participate and are waiting to participate is outnumbering our capacity to serve them. I wish we had more capacity to focus on that because it's a great opportunity for the homes that meet the requirement, the potential for*

solar. And we'd rather provide that opportunity while we can." - MN Weatherization Service Provider

It was noted that some contractors have even opted out after initial participation of solar PV installations due to the perceived complexity:

"We have one of the contractors through the hiccups of the pilot said 'you know what? This is too complex, it's not really worth it' and bowed out and hasn't bid on any of the work since" - Minnesota Department of Commerce

Lastly, participants emphasized the geographical disparities, noting the lack of accessibility to such weatherization measures in more rural parts of the state, who also face the most energy burden.

2. State Policy and Incentive Barriers

A key concern expressed by participants was how to involve major utilities, and smaller utilities as COMM continues to expand the solar into WAP effort. The complexities of interconnection and navigating the permitting process of solar projects both represent new interactions with governments and that can impact broader participation in solar programs.

"If you try and say, go into one area with a lot of WAP recipients and a lot of LMI housing and install a whole lot of solar, because you do get that sort of cost buydown of just bulk purchasing and the scale, you may not have the hosting capacity on the actual grid to even interconnect it." - National Renewable Energy Laboratory

Concerns over the financial stability of the solar contractors were also raised. Due to funding constraints, payment to contractors was said to be contingent on the utility company commissioning the system and confirming the functionality of the installed system. This waiting period can last about six to eight weeks and can lead to frustration among installers.

"Once we gather all the documents and we're ready to go, then we tell a contractor, okay, we've received your bid, go ahead and proceed. Then they install it because of our funding source, we can't pay the contractor until the utility company commissions the system and it's working. So, then the installer gets frustrated because they're waiting six, eight weeks for payment." - WAP Service Provider

3. Resource Support and Education

In terms of resource support and education, participants expressed that there exists a significant lack of understanding and training regarding the benefits of solar and the available options for customers.

A negative connotation was also identified that views low-income households as "incapable" of owning a solar system:

> *"People can say, 'oh, they're getting solar, but they can't afford to pay their gas bill.' So, I think just that negative connotation on low-income households, it's going to be there, but we just need to educate the population or the neighbors or the communities and talk about solar energy and more green energy and energy savings."* - National Renewable Energy Laboratory

There was also a great emphasis on community empowerment, allowing community members to have a voice in determining how solar energy can best suit their needs in becoming a part of their energy mix.

> *"I think it's important that communities have a voice about how solar will assist them or be part of their energy mix. It's got to be something that they want and it's got to be in a way that works for them. There will be instances in which rooftop solar makes the most sense on a case-by-case basis. And then there are going to be instances where community solar or other ways of rolling out solar will make more sense. I think people first need to understand what those options are"* - Minnesota Department of Commerce

A conversation on the historic exclusion of low-income communities and communities of color participation also raised concerns on how this effort can further become more geographically accessible:

> *"If you think about the solar market, it has largely targeted people who can afford to put a huge system on their house and then they have the tax appetite to then recoup some of those costs through tax rebates. Low-and moderate-income residents largely have been left out of the market because they don't have that tax appetite. They haven't had the same length of engagement in understanding how the market works, how solar works, what it can and can't do for you as others."* - National Renewable Energy Laboratory

4. Cost and Budgetary Constraints

Almost every participant mentioned financial concerns about the effort, specifically the high cost of solar PV implementation within WAP. Although solar PV is a weatherization measure that has proven to provide the most significant household savings, it was also recognized as the single most expensive option within WAP as it compares to DOE's allowable ACPU.

Furthermore, participants highlight that an estimated 10-20% of low-income households are suitable candidates for solar PV installations through WAP, but the financial constraints limit the number of households that can be served. More broadly speaking, this is an issue that persist in WAP beyond just solar installation:

> *"We don't have enough money to repair and weatherize low-income housing. And I'm not just talking about subsidized housing, but privately owned low-income housing units. The walkaways with respect to just being able to insulate are just vast. So we need more*

money for repairs. We need to weatherize more fully than we are right now and at a faster pace." - Non-Profit Organization

Another concern raised by participants is whether WAP can balance incorporating solar PV without shifting away from priorities of installing other traditional WAP measures:

> *"The biggest challenge is the expense of solar installation, which far exceeds the budget for WAP. And if you're going to spend $20,000 installing solar in one home, you've not installed four different $5,000 retrofits on the building envelope and the structure to enable the customer to have a reasonable level of electricity."* - *Local Government*

> *"10 to at the very most 20% of [low-income] households would be good solar candidates. Thus that high sticker price of $18,000 to $19,000 per installation is not going to happen at every house. It might be one out of every five or ten, which might and would if you did it in every potential case, reduce the number of total units you could weatherize in a year."* - Minnesota Department of Commerce

5. System Aftercare Hurdles

The question of whether installing solar adds additional burden to already financially challenged households was raised throughout interviews. Issues such as system malfunctions, damage from extreme weather events like hailstorms, and the responsibility for system repairs raised concerns for participants. Moreover, while warranties may cover parts of the system damage, labor costs or workmanship are noted as one of the main challenges COMM is currenlty working through:

> *"My biggest concern is the workmanship and the warranty piece. So these systems are supposed to last 20, 25 years and be low maintenance, but that's not no maintenance. And if something fails, it's typically the inverter. And if you have a good warranty that includes the labor to replace the inverters, that's great. But I think my sense is the state has the weatherization provider stay in contact with that household over time so that when things fail, they can get connected to the resources to quickly repair it as opposed to just having it sit there on the roof not producing because there's a thousand dollars inverter that needs to be replaced and they don't have the money or they don't know what's wrong"* - Local Government

> *"We can install, but we do not have funding for repair. When we partnered with the utility, we made an agreement with the installer that as they received the production incentive that was turned over to them, that would be a fund for an extended warranty. And as it stands now when we're funding with our LIHEAP partners funds, there is no backend incentive [...] so say an inverter fails, well the part is covered under warranty, but the labor dollars, we don't have a source. So there is that potential downfall that, if the homeowner wanted that to be repaired, it would fall on them."* - Minnesota Department of Commerce

Opportunities

After discussion of each of the challenges, participants were asked about potential solutions and opportunities for continuation of this state-wide effort. The following are some of the major sub-themes identified among participants:

1. **Scalability Expansion**

A common point of discussion among participants was the opportunity for DOE to increase the limit on the PV system size. Another idea that participants were excited to discuss was the possibility of installing solar PV systems in other household locations aside from the roof, which would help alleviate the challenge of inadequate roof conditions. This could include solar installations through WAP that are pole-mounted or ground-mounted:

> *"We are now installing systems up to five kilowatts with promises of more, which we now have the potential through our program. We'd install a five-kilowatt system, but in some cases, we're hoping to install an additional five kilowatts in that same system through other funding at that same household, but yet to be done, but it's on the horizon."* - Minnesota Department of Commerce

> *"If one homeowner has a house where the roof orientation doesn't work well or the valleys or the hips of the roof doesn't allow for the solar, then unfortunately they don't meet the criteria and they lose that opportunity where maybe they have space and availability for a pole-mounted system. I believe there are efforts to try to loosen that up for those households also."* - WAP Service Provider

One participant suggested the opportunity to include solar PV as a required weatherization measure as opposed to being an optional measure:

> *"It's a little bit problematic that this is an optional measure. I have had discussions a number of times now in the past couple of years about saying instead, we now know that where solar is appropriate, it will be cost effective. And furthermore, it'll save our low-income clients more than any other single weatherization measure. And in fact, more than all other weatherization measures combined in virtually every case. It's a tremendous, missed opportunity if it's not done. Therefore, it should be a required measure that for each weatherization client, solar be evaluated."* - Minnesota Department of Commerce

Another participant suggested that additional financial support, specifically towards on-site and off-site management of the program, would be an opportunity that can help alleviate the programmatic challenges.

> *"I think there is probably some additional paperwork and pieces along the way, so I know you can't throw money at everything, but it would be nice if they had additional financial support to help them with the admin of this and the site assessments and procuring the solar installers and all that stuff."* - Non-Profit Organization

2. Future Collaboration

The potential for increased collaboration between other utility companies across the state was discussed as an opportunity to ensure success of the expansion of this effort:

> *"Some of these homes, as you know, are in pretty bad condition, and the roof for solar needs to be relatively new and in good condition. So, I think that's also a key barrier. It would be wonderful if they can ask the Department of Energy for this permission of 'could it be a ground mount next to the home? Could it be potentially the garage or a shed or something that's not the home?' And I don't think that they've got that clarification yet."* - Non-Profit Organization

A Non-Profit Organization mentioned its support for the effort in the future, specifically in promoting the effort to help it grow state-wide.

> *"We really take our job seriously of making sure consumers are aware of all the options in front of them. So, if it's to a point where Commerce wants more promotion or an outside more unbiased third party to be talking about stuff, we'd be happy to be talking about the program."* - Non-Profit Organization

Coordinated efforts for providing solar training were emphasized in order to overcome workforce challenges, focusing on the need for practical, hands-on training rather than virtual sessions. Additionally, opportunities for federal government coordination and collaboration with Community-Based Organizations (CBOs) were also mentioned to increase inclusivity efforts and bring in crucial players into the decision-making conversations.

> *"I know there is a training site in Minneapolis that is starting to provide solar training, so maybe somebody like that. I don't even know how to say what that is, but a training facility, I guess would be how you'd answer that. A lot of times our trainings are just virtual and they talk to us about it, but we need to know leading to show them how to do it"* - WAP Service Provider

> *"Your CBOs [...] they are the ones who are best able to provide support and decision-making support on the ground, helping people know who to go to, who is trusted, who is maybe predatory in their practices, those CBOs, and really training those CBOs and how they support WAP is really important."* - National Renewable Energy Laboratory

A participant mentioned an area in which DOE and the National Renewable Energy Laboratory can specifically play a role is by providing technical assistance to Grantees and continuing to support them to make paperwork and other administrative tasks more efficient.

> *"If you can make something easier and less difficult, that's obviously something that we all should be interested in and bring forward recommendations to DOE as they become*

available." - National Renewable Energy Laboratory

"This takes coordination at a level that we historically haven't seen, right? We're starting to see that, and we see that in certain areas. So, for example, in rural areas, there's this whole White House rural task force. It's looking at how we can bring all of the rural funding together. We've got some initiatives in the very urban space for that. And so you really need that whole government perspective." - National Renewable Energy Laboratory

3. Energy Justice

Participants see great opportunities to increase energy justice efforts across the state through this solar PV integration within WAP. More specifically, participants acknowledged that beyond being able to afford energy bills, there is also a need to distribute renewable energy technologies more equitably for equal opportunities of energy democratization. This also allows for individuals who were traditionally left behind to have participation in the decision-making efforts of their energy sources.

"I don't see any reason to not pursue ways to get renewable energy onto more homes. That's really what WAP was always core to their mission, was helping people. If you can put solar on someone's roof and you can lower their electric bill, it just feeds into the greater mission at WAP to help low-income clients." - National Renewable Energy Laboratory

4. Stacking of Fund Opportunities

Several new and upcoming funding opportunities that could be tied into the solar into WAP efforts were discussed during interviews. WAP recently secured a $2 million grant "Weatherization Innovation Through Roofing and Electrification." This opportunity, separate from the central WAP funding, is designed for roofing upgrades specifically tailored for weatherization houses and preparing them for electrification. Other funding opportunities are through the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA), where participants were excited to see the potential for stacking these funding opportunities with solar into WAP efforts. EPA's Solar for All is another grant opportunity that recently emerged where solar into WAP efforts could fit in. Participants were hopeful that the stacking of these existing and upcoming grants can offer great opportunities for solar into WAP efforts to continue in the future:

"I love the idea of additional pilot programs with the additional resources that are coming in via Solar for All, or the climate pollution reduction grants through the EPA or the Inflation Reduction Act, particularly the low income adder for elective pay or direct pay, or thinking creatively about the green bank that's being rolled out and how can that play a role in low-income or loans to nonprofits, for example, that work with low-income residents. Also, loans that are backed up by a loan loss reserve or revolving loan account, something like that, that you can provide really low interest or zero interest

loans to community action programs or other entities out there that are working with low-income people that can make this more affordable." - Non-Profit Organization

5. Alternative Solutions

Participants also discussed the opportunity to consider alternative solutions outside of WAP to increase accessibility of renewable energy technologies to low-income communities. The most mentioned alternative was community solar gardens:

> *"There are also now opportunities for low-income people to participate in solar through community solar projects, which again, might be somewhat more cost effective for them than rooftop solar on their own homes."* - Minnesota Department of Commerce

Others said an alternative solution would be to install solar systems wherever possible in order to reach climate goals:

> *"I think we should buy solar cheap in competitive bids and install it wherever we can and pay for it through generation supply utility rates. It's three to four times cheaper than rooftop solar. So, I've never seen the point of it, to be honest with you, and to take this amount of money for a program that's horribly underfunded anyway. I don't get it. I'll be honest with you. I would argue against it if it came up in our state."* - Private Sector

Innovative opportunities were also discussed, such as ballasted mounted systems:

> *"An example out of Colorado of a very low-cost ballast system that's, again, on the ground. It's basically a plastic bucket, and you fill it with gravel and then you put a solar panel on it, and you can do hundreds of them next to each other, or you can do two, or you can do five. What's kind of interesting is that they can be moved really easily. So, when you think of some of these homes out in the countryside that might have a propane tank next to the home, it'd be easy to put two or three or four of these right next to there."* - Non-Profit Organization

Conversely, others still emphasize the importance of continuing Minnesota's efforts to incorporate solar into WAP:

> *"Community solar gardens are wonderful, but they're not the same as having a solar array in your home, right in your neighborhood. Having an onsite array just makes it so much more real for folks living in that home or in the neighborhood."* - Non-Profit Organization

Framing Views on Significance of Effort

Lastly, one of the last questions sought to understand reasons why participants find it important for Minnesota to continue working towards this effort, if any. This question was encountered with mostly positive and supportive responses. Participants' answers were categorized into three sub-themes:

1. **Savings to Clients**

Almost every participant mentioned that Minnesota should continue pursuing this effort because of the importance of delivering bill savings to clients:

> *"It is the single measure that brings the greatest savings to our clients in our weatherization suite. In fact, in many cases the solar installation accounts for more savings than all of the other measures we do combined. And that's not taking into account the non-energy benefits that are brought by the full weatherization audit and installation like indoor air quality and increases there in moisture mitigation, things like that. But in terms of just energy savings, there isn't another measure that can even come close to what solar can do to offset our client's bills."* - Minnesota Department of Commerce

> *"You can replace light bulbs, maybe get a new refrigerator, but the biggest chunk of the savings is going to come from that heating piece. And so solar PV is a good way to get additional savings on the electric side. You want to do the efficiency first for sure. That's almost the only way you can get a big chunk of savings is through solar PV."* - National Renewable Energy Laboratory

2. **Minnesota Pioneering Solar Adaption as a National Standard**

Another reason why some participants would like to see MN continue pursuing solar into WAP efforts is because MN would be paving the way for nationwide solar integration:

> *"I think that it's really important that we continue to push on this, that we get as comprehensive adoption of solar as a standard measure as possible in Minnesota, and that we show the way for others statewide, so this becomes standard practice nationwide."* - Minnesota Department of Commerce

3. **Equity and Energy Burden Reduction**

Lastly, other participants addressed the need for continuing solar into WAP efforts as a means of a much longer-term vision to reduce energy burden across the state:

> *"It is helping address energy burden. We've already done the energy efficiency improvements, and now we're going to take a longer term approach to reduce energy burden. And then if you can justify and say, because we're doing the solar panels and*

> *we're reducing their bills by X whatever amount per month, they don't need as much energy assistance. And then more homes can be helped. Creating the storyline of this is a long-term vision and what it's trying to achieve."* - Non-Profit Organization

Equity considerations were also voiced as important reasons for continuation of the effort in order to create positive social impacts which can be justifications for the program beyond purely economic factors:

> *"I think if there's a positive social impact, then you can justify maybe the economics not being super clear or obvious because there's these other social benefits that can be worth it too. It's not all about cost."* - Non-Profit Organization

Others mentioned the importance of this effort to enhance the quality of life of low-income households by alleviating energy poverty and freeing up financial resources for essential needs like food, education and medicine for households:

> *"I think one of, if not the key reason to be working on this is because so many of our neighbors have such an extensive energy burden [...] we need people to be paying for their food, paying for their prescriptions, paying for their education, and bettering themselves. And they have a real hard time doing that when 30% of their income is going to the utility."* - Non-Profit Organization

Part 4: Path Forward

Discussion and Recommendations

The purpose of this study was to understand what challenges Minnesota needs to overcome in order for continued, seamless integration of solar PV as a measure within WAP. This study sheds light on the challenges perceived by stakeholders, as well as opportunities and general perspectives on what continuation of this effort means for the future of Minnesota. Based on the findings of this study, a total of 16 recommendations were developed, aimed at state stakeholders as well as federal government to take into consideration for successful continuation of solar PV technology as a weatherization measure. Recommendations are based on two factors: 1) the frequency of concerns or challenges listed by participants during the stakeholder interviews, with emphasis placed on those repeatedly raised and prioritized for immediate attention, and 2) the discussion gathered from participant discussions on the viable and realistic opportunities to overcome these challenges, as detailed in the Results section above.

Recommendations are summarized in Tables 3 and 4, categorized into short-term, medium-term, and long-term solutions, where:

- **Short-term** recommendations are aimed at addressing less complex challenges than medium and long-term recommendations. Stakeholders should aim to implement short-term solutions within the next year.
- **Medium-term** recommendations are slightly less straight-forward than the short-term recommendations but apply more permanent solutions to short-term recommendations. Stakeholders should aim to implement medium-term solutions within the next three years.
- **Long-term** recommendations are aimed to be achieved within the next few years due to their slightly more complex solutions. Stakeholders should aim to implement long-term recommendations within the next 3-10 years.

Federal-Level

Table 2. Summary of short-term, medium-term, and long-term federal-level recommendations

Policy Area	Short-Term	Medium-Term	Long-Term
Administrative Support to WAP Grantees	**Recommendation 1:** Federal entities (DOE and NREL) such should consider providing additional general guidance on administrative support for WAP Grantees.		
Workforce Development		**Recommendation 2:** NREL should work to refine their Standard Work Specifications on Solar Photovoltaics.	
Flexibility Around DOE/WAP Requirements			**Recommendation 3:** DOE should consider incorporation of more flexible rules of renewable energy technologies within WAP.

Administrative Support to WAP Grantees

Recommendation 1: Federal entities such as the U.S. Department of Energy, the National Renewable Energy Laboratory, and other relevant technical support organizations like the National Association for State Community Service Programs should consider providing additional general guidance on administrative support for WAP Grantees, especially as the number of interested WAP service providers in incorporating solar PV measures grows. Such guidance can include the development of an updated Savings to Investment Ratio (SIR) calculator specifically for the solar PV weatherization measure, and an energy burden reduction estimator tool to help WAP Grantees understand which areas would benefit the most from solar PV installations through WAP and prioritize those.

Workforce Development Efforts

Recommendation 2: NREL should continue to work to refine their Standard Work Specifications on Solar Photovoltaics

As of October 2023, the National Renewable Energy Laboratory (NREL) drafted a new set of Standard Work Specifications for the installation of solar photovoltaics. These specifications are aimed to be best practices for industry stakeholders to follow during a solar PV installation. These draft new specifications walk through details ranging from obtaining construction permits to warranty guidelines (NREL, n.d.). Having just created a draft of specifications for solar PV installations, as a next step, NREL should continue working to refine those specifications through stakeholder feedback on refining them and obtaining stakeholder feedback on those specifications to benefit the broader industry.

Flexibility Around DOE/WAP Requirements

Recommendation 3: U.S. Department of Energy should consider incorporation of more flexible rules of renewable energy technologies within WAP. There is a great need for WAP rules and regulations to allow for greater flexibility when it comes to the location of where the solar system is installed, and the system size. First, a PV system of 3 kW may not seem like an appealing bid for some developers. DOE should consider increasing this limit, and instead, allow for individual WAP solar providers to determine what is the best size for an individual household while still adhering to SIR and all WAP other requirements. Second, the condition of the roofs seems to be a great challenge for a lot of low-income households. One of the biggest reasons for deferral when it comes to solar PV installations is the inability for a roof to host the PV system due to various reasons such as roof age or roof orientation and tilt. Alternatively, DOE should consider allowing ground-mount or pole-mount system installations within WAP.

DOE should also make an amendment to its appropriation rules by allowing Grantees to spend a portion of the total appropriation on solar (to be determined by Grantees), rather than capping the ACPU for solar. This will allow Grantees the flexibility to strategically allocate funds based on the unique needs and priorities of both Grantees and Subgrantees.

State-Level

Table 3: Summary of short-term, medium-term, and long-term state-level recommendations

Policy Area	Short-Term	Medium-Term	Long-Term
Stacking of Funds			**Recommendation 4:** MN should continue to leverage different sources of funding for continued implementation of solar PV into WAP through the stacking of upcoming and existing federal funds flowing into the state.
Administrative Support to		**Recommendation 5:**	

WAP Subgrantees		COMM should develop guidance materials for MN WAP service providers to aid in the process of incorporating a new weatherization measure within their program capabilities.	
COMM Staff Capacity		**Recommendation 6:** COMM should consider the addition of at least one more Solar Technical Assistance Liaison (STAL) position.	
Statewide Workforce Development Efforts			**Recommendation 7:** MN should work to increase workforce opportunities across the state through incentives in the Inflation Reduction Act (IRA).
Collaboration and Communication Efforts	**Recommendation 10**: COMM should encourage additional participation from service providers.	**Recommendation 9:** COMM should consider increasing efforts of collaboration with additional utility companies across the state and partner organizations.	**Recommendation 8:** Consider investments in local communities through CBOs to work towards building trust between state government and WAP participants.
Accessibility to Rural Areas of MN		**Recommendation 11:** STAL and COMM's WAP staff should consider leading efforts of putting together rotating crews of WAP solar developers.	
Training and Education			**Recommendation 12:** Expand the state's solar workforce by promoting vocational training and education programs in solar technology across the state.
Accountability	**Recommendation 13:** COMM should consider setting realistic goals through their yearly WAP Program Year Plan.		
Prompt Worker Compensation		**Recommendation 14:** COMM should work with relevant authorities to reduce delays in payments to installers.	
Expansion of MN WAP requirements		**Recommendation 15:** COMM should consider requiring that solar PV be evaluated for each weatherization client.	
Solar PV System Warranty and Workmanship			**Recommendation 16:** COMM should work with relevant authorities to include labor costs in post-installation repairs.

Alternative Solar Options	**Recommendation 17:** COMM should require WAP Service Providers to have a streamlined process for referring households to alternative solar options, specifically for community solar programs.		

Stacking of Funds

Recommendation 4: MN should continue to leverage different sources of funding for continued implementation of solar PV into WAP through the stacking of upcoming and existing federal funds flowing into the state. Such funds can and should also apply for the implementation of any of the below recommendations. Refer to Appendix 4 for a list of upcoming federal opportunities that the state should be on the lookout for.

Administrative Support to WAP Subgrantees

Recommendation 5: COMM should develop guidance materials for MN WAP Service Providers to aid in the process of incorporating a new weatherization measure within their program capabilities. Overcoming hurdles of integrating a new measure within WAP was perceived as one of the biggest challenges for WAP service providers. Therefore, it is recommended that the Minnesota Department of Commerce leads several workshop sessions with the WAP service providers that are currently installing solar PV as a WAP measure and gather information to develop guidance materials for other subgrantees that may want to join in on the effort but might not know where to start. This guide can include lessons learned, a Q&A section, pathways on how to identify potential candidates for solar PV installations, and how to identify solar installers.

COMM Staff Capacity

Recommendation 6: COMM to consider the addition of at least one more Solar Technical Assistance Liaison (STAL) position that can support COMM with administrative tasks such as stakeholder coordination and communication, training service providers. The addition of another administrative role within COMM that can focus on the solar into WAP effort will help spread awareness and continue increasing statewide efforts of solar PV installation within WAP. This additional support within COMM will help increase efforts among rural areas of MN where solar PV into WAP should be explored.

Statewide Workforce Efforts

Recommendation 7: MN should work to increase workforce opportunities across the state through incentives in the Inflation Reduction Act (IRA).

Considering that one of the biggest challenges with continuing the implementation of solar PV within WAP is the shortage in Minnesota's solar industry workforce, COMM has the opportunity to increase workforce opportunities across the state through IRA opportunities. For example, the

Environmental Protection Agency's Solar for All opportunity through the IRA prioritizes workforce development and entrepreneurship. More specifically, it focuses on investing in high-quality jobs and workforce training programs like apprenticeship programs (*Solar for All*, 2023). This is a great opportunity for the state to grow its solar workforce industry while simultaneously supporting WAP's efforts with solar PV installations.

Another incentive through the IRA is the addition of 10-20% points of additional tax credits in addition to the Investment Tax Credit (ITC) incentive for solar and wind projects under 5MW located in low-income communities and Indian land (Bourg-Meyer, 2023). Such tax incentives could make solar projects more appealing and attract additional contractors in solar into WAP efforts.

Collaboration and Communication Efforts

Recommendation 8: Consider investments in local communities through CBOs to work towards building trust between state government and WAP participants. Community-Based Organizations (CBOs) are specialized in addressing unique needs within the community they serve. For low-income households that are looking to install solar PV through WAP, CBOs are crucial in bridging the knowledge gap. For instance, CBOs can provide educational resources, workshops, and informational sessions to help low-income individuals understand the available options of solar PV installations and how to navigate the process with WAP. By offering local insights and empowering the voices of the community, a greater trust can be built between the solar industry and the local communities to create awareness on whether solar through WAP is the right option for them. Lastly, the role of CBOs in the solar into WAP effort allows for voice empowerment of the involved communities and increases inclusivity efforts in decision-making processes. This community engagement ensures that solar initiatives are culturally sensitive and aligned with the community's vision for sustainable development. In order for CBOs to thrive, continuing to financially support them through the various new and upcoming funding opportunities for the state is essential to moving forward in this effort in a just and equitable way (See third grant opportunity in Appendix 4).

Recommendation 9: COMM should consider increasing efforts of collaboration with additional utility companies across the state and its partner organizations. Although Xcel Energy's Solar*Rewards Program continues to be a great source of funding for the continued success of the solar PV into WAP effort, COMM should continue spreading the word about the effort, for example through national conferences, news articles, and other communication efforts. This way, more utility companies can be made aware of the ongoing effort and begin conversations on how they can be involved.

Additionally, COMM could consider a potential future partnership with the state's Solar for All opportunity (if granted funding) to incorporate participation of WAP deferrals (including solar PV installation deferrals) within its Solar for All program capabilities. That way, reasons for

deferral, such as inadequate roof conditions, could potentially be addressed through the Solar for All program.

Recommendation 10: COMM should encourage additional participation from service providers that might have the bandwidth to implement the solar PV measure within their services areas. For the service providers that do not have the bandwidth, COMM should continue to take the responsibility of listening and addressing their service providers' needs and concerns.

Accessibility to Rural Areas of MN

Recommendation 11: STAL and COMM's WAP staff should consider leading efforts of putting together rotating crews of WAP solar developers that currently serve the twin cities metropolitan area, and work to install solar within more rural/remote WAP service communities across MN. The frequency of the rotating crews traveling to those remote areas can be decided based on the unique capabilities of those solar installers.

This recommendation aims to address the issue of solar PV installations being less accessible to remote parts of the state due to the shortage of solar contractors. Considering that energy burden is the highest in the northwestern parts of Minnesota, COMM can prioritize those service areas first. Although this offers a medium-term solution to the workforce shortage in the current solar industry, as the volume of projects increases in remote areas, a longer-term solution (Recommendation 11) must be considered in conjunction with this recommendation.

Training and Education Resources

Recommendation 12: Expand the state's solar workforce by promoting vocational training and education programs in solar technology across the state. The academia and industry sectors should increase collaboration efforts for collegiate competitions such as the Solar District Cup, where students design and model optimized distributed energy systems for a campus or urban district (*Solar District Cup*, n.d.). Universities and community colleges can potentially require student participation as part of their curricula to increase awareness and interest of solar career options for students.

Another opportunity for collaboration is with the Interstate Renewable Energy Council (IREC). IREC is an organization that focuses on building a clean energy workforce. IREC develops many tools that can be incorporated into high schools, colleges, and universities' career exploration efforts such as the Green Building Career Map (*Green Buildings Career Map*, n.d.) and the Solar Career Map (IREC, n.d.). Such tools are meant to create long-term career growth across the state, while also bridging the education gap for students that might be interested in a renewable energy career but don't know about their available options.

Accountability

Recommendation 13: COMM should consider setting realistic goals through their yearly WAP Program Year Plan that is submitted to DOE, specifically including goals for the number of

households that they intend to install solar PV through different subgrantees. This is a great way of encouraging accountability within COMM and its service providers.

Prompt Worker Compensation
Recommendation 14: COMM should work with relevant authorities to reduce delays in payments to installers. In some instances, the solar contractors do not receive their payments until 6-8 weeks after installation. This is because the utility company needs to ensure that the system is working properly. COMM should discuss alternative options with the utility company to ensure workers are compensated promptly.

Expansion of MN WAP Requirements
Recommendation 15: COMM should consider requiring that solar PV be evaluated for each weatherization client. This will allow for subgrantees to take note of which households have already received weatherization benefits and may be ready for future solar installation.

Solar PV System Warranty and Workmanship
Recommendation 16: COMM should work with relevant authorities to include labor costs in post-installation repairs into the warranty aspect of the system. Ensure that contractors provide the clients with full knowledge of what the warranty does and does not include, and any potential future risks that need to be taken care of by the customer.

Guidance on Alternative Solar Options
Recommendation 17: When solar PV installations are not possible, COMM should require WAP Service Providers to have a streamlined process for referring households to alternative solar options, specifically for community solar programs. This can be communicated in person, via email or mail through a brochure with compiled community solar information. Some of these sources can include but are not limited to:

- Xcel Energy, Solar*Rewards Community – This site offers information on the process of subscribing to a nearby third-party community solar garden, the eligibility requirements, and how to locate a community solar garden.
- The Office of Minnesota Attorney General Keith Ellison, Community Solar Garden – This site offers information on what community solar is and addresses commonly asked questions for potential participants.
- Minnesota Department of Commerce, Tips About Community Solar – This site is aimed at households that are thinking about subscribing to community solar, and answers ten commonly asked questions that help customers decide if community solar is right for them.
- Clean Energy Resource Teams, Community Solar Gardens – This site contains an interactive map with information for community solar subscriptions offered by different

utilities (cooperatives, municipal, and investor-owned utilities) across the state. It also includes sections on FAQs, calculators, stories, and downloadable fact sheets in both English and Spanish.

Conclusion

The integration of renewable energy technologies in Minnesota has been remarkable. However, the benefits of such technologies have been disproportionately spread out across the state, leaving certain communities without access to them. Low-income households that face high energy burdens across MN could greatly benefit from renewable energy technologies, such as solar PV installations that have shown to have significant energy savings. The Minnesota Weatherization Assistance Program is a means to reach the low-income population with a mission to help reduce energy burden through weatherization measures. The incorporation of solar PV as a new weatherization measure presents a win-win opportunity for Minnesota to continue working towards a just energy transition, without leaving low-income communities behind.

The implementation of renewable energy technology into WAP is not an easy, straightforward effort. After the Minnesota Department of Commerce had a successful completion of its 2020 pilot program that incorporated solar PV into 15 WAP homes, solar PV became an official optional measure within Minnesota weatherization providers. Ever since then, the effort has been slowly growing, from installing solar PV on 15 homes, to a total of 38 homes today.

Along the way, Minnesota has learned and grown quite a lot. However, the continued successful implementation of solar PV within MN WAP will require overcoming several challenges that involve great collaboration amongst various state and federal stakeholders. Minnesota continues to pave the way to integrate renewable energy technology into WAP, showcasing its commitment to fostering innovation and reducing energy burden across the state.

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Appendix 1: FY23 Grantee Allocations of Weatherization Assistance Program Funds. Cells highlighted in red represent the top 5 Grantees that received the highest allocation (*Weatherization Program Notice 23-2*, 2023)

State / Territory	FY 2023 Program Allocation	FY 2023 T&TA Allocation	FY 2023 Total Allocation	FY 2023 Readiness Fund
Alabama	$2,785,126	$609,162	$3,394,288	$357,188
Alaska	$1,844,907	$420,397	$2,265,304	$253,486
Arizona	$1,936,680	$438,822	$2,375,502	$263,608
Arkansas	$2,203,925	$492,476	$2,696,401	$293,084
California	$7,435,566	$1,542,818	$8,978,384	$870,114
Colorado	$5,698,267	$1,194,025	$6,892,292	$678,496
Connecticut	$2,996,244	$651,548	$3,647,792	$380,474
Delaware	$652,802	$181,061	$833,863	$122,001
District of Columbia	$603,026	$171,068	$774,094	$116,511
Florida	$3,103,745	$673,130	$3,776,875	$392,331
Georgia	$3,917,626	$836,531	$4,754,157	$482,099
Hawaii	$207,122	$91,583	$298,705	$72,845
Idaho	$2,057,564	$463,091	$2,520,655	$276,941
Illinois	$14,337,411	$2,928,482	$17,265,893	$1,631,360
Indiana	$7,283,994	$1,512,387	$8,796,381	$853,396
Iowa	$5,042,431	$1,062,355	$6,104,786	$606,160

Kansas	$2,673,077	$586,666	$3,259,743	$344,830
Kentucky	$4,816,099	$1,016,915	$5,833,014	$581,197
Louisiana	$1,666,297	$384,538	$2,050,835	$233,786
Maine	$3,205,253	$693,510	$3,898,763	$403,527
Maryland	$3,057,092	$663,764	$3,720,856	$387,185
Massachusetts	$6,978,497	$1,451,053	$8,429,550	$819,701
Michigan	$16,597,459	$3,382,225	$19,979,684	$1,880,634
Minnesota	$10,012,063	$2,060,094	$12,072,157	$1,154,291
Mississippi	$1,769,046	$405,166	$2,174,212	$245,119
Missouri	$6,425,237	$1,339,977	$7,765,214	$758,678
Montana	$2,508,101	$553,544	$3,061,645	$326,634
Nebraska	$2,570,131	$565,998	$3,136,129	$333,475
Nevada	$1,193,787	$289,673	$1,483,460	$181,670
New Hampshire	$1,614,893	$374,218	$1,989,111	$228,116
New Jersey	$5,862,784	$1,227,055	$7,089,839	$696,642
New Mexico	$2,029,053	$457,367	$2,486,420	$273,797
New York	$22,155,886	$4,498,175	$26,654,061	$2,493,707
North Carolina	$5,033,819	$1,060,626	$6,094,445	$605,210

North Dakota	$2,421,799	$536,218	$2,958,017	$317,115
Ohio	$14,694,891	$3,000,252	$17,695,143	$1,670,789
Oklahoma	$2,858,272	$623,847	$3,482,119	$365,256
Oregon	$3,021,339	$656,586	$3,677,925	$383,242
Pennsylvania	$15,807,875	$3,223,703	$19,031,578	$1,793,546
Rhode Island	$1,227,844	$296,511	$1,524,355	$185,426
South Carolina	$2,170,567	$485,779	$2,656,346	$289,405
South Dakota	$1,876,070	$426,653	$2,302,723	$256,923
Tennessee	$4,795,395	$1,012,758	$5,808,153	$578,913
Texas	$7,283,255	$1,512,239	$8,795,494	$853,314
Utah	$2,187,245	$489,127	$2,676,372	$291,244
Vermont	$1,353,557	$321,750	$1,675,307	$199,292
Virginia	$4,535,886	$960,657	$5,496,543	$550,290
Washington	$4,849,188	$1,023,558	$5,872,746	$584,846
West Virginia	$3,223,080	$697,089	$3,920,169	$405,493
Wisconsin	$9,245,317	$1,906,156	$11,151,473	$1,069,722
Wyoming	$1,129,910	$276,849	$1,406,759	$174,625
American Samoa	$135,886	$77,282	$213,168	$64,990

Guam	$148,004	$79,714	$227,718	$66,324
Puerto Rico	$1,073,450	$265,514	$1,338,964	$168,397
Northern Mariana Islands	$138,180	$77,742	$215,922	$65,241
Virgin Islands	$156,980	$81,516	$238,496	$67,314
Total	**$246,609,000**	**$52,311,000**	**$298,920,000**	**$30,000,000**

Appendix 2. PY22 Weatherization Funds Allocation to Minnesota Subgrantees (*WAP Annual File*, 2022)**.**

Subgrantee (City)	Planned Funds/Units
Arrowhead Economic Opportunity Agency, Inc. (Virginia)	$4,021,867.00 335
Bi-County Community Action program, Inc. (Bemidji)	$2,142,496.00 177
Community Action Partnership of Ramsey & Washington Counties (Saint Paul)	$7,414,064.00 620
Dakota County Community Development Agency (Eagan)	$2,656,844.00 220
Fond Du Lac Reservation Business Committee (Cloquet)	$162,017.00 11
Inter-County Community Council (Oklee)	$1,104,023.00 90
KOOTASCA Community Action, Inc. (Grand Rapids)	$1,123,698.00 92
Lakes and Pines Community Action Council, Inc. (Mora)	$3,168,678.00 263
Mahube-OTWA Community Action Partnership, Inc. (Detroit Lakes)	$3,687,793.00 307
Mille Lacs Band of Ojibwe Indians (Onamia)	$184,404.00 13
Minnesota Valley Action Council (Mankato)	$2,656,420.00 220
Northwest Community Action, Inc (Badger)	$727,208.00 59
Prairie Five Community Action Council, Inc. (Montevideo)	$782,412.00 63
Semcac (Rushford)	$3,574,288.00 297
Southwestern Minnesota Opportunity Council, Inc. (Worthington)	$891,262.00 73
Sustainable Resources Center (Minneapolis)	$8,283,394.00 693
Three Rivers Community Action, Inc. (Zumbrota)	$1,124,910.00 92
Tri-County Action Programs, Inc. (SC) (Waite Park)	$3,083,937.00 256
Tri-County Community Action, Inc. (LF) (Little Falls)	$2,120,626.00 176
United Community Action Partnership (Marshall)	$2,455,360.00 204
West Central Minnesota Communities Action, Inc. (Elbow Lake)	$2,457,974.00 204
White Earth Reservation Tribal Council (Waubun)	$439,529.00 35
Wright County Community Action, Inc. (Maple Lake)	$1,005,254.00 82
Total:	**$55,268,458.00** **4,582**

Appendix 3. Recruitment Materials

Email Recruitment Template:

To:

Subject: Interview Request - Solar into MN WAP Efforts

Dear ____,

My name is Alexa Carrera, I am a second year M.S Science, Technology, and Environmental Policy student at the Humphrey School of Public Affairs at the University of Minnesota.

I am currently in the process of writing my Professional Paper, focusing on the feasibility of the integration of solar PV as an eligible measure in the Minnesota WAP. I am particularly interested in learning more about the challenges and opportunities for the state to continue working towards this effort effectively and efficiently.

I believe your perspective could greatly help me achieve the goals of my Professional Paper. I am interested in delving deeper into your insights about this effort, and discuss this further with you through a 30-minute virtual meeting via Zoom. If this is of interest to you, please let me know if any of these days and times work for you to schedule a call:

- Mon ___
- Tues ___
- Wed ___
- Thurs ___
- Fri ___

If none of those times work for you, please propose a time and I can work around your schedule.

Please note that the questions will be sent to you ahead of time. If you have any questions, please do not hesitate to reach out to me by replying to this email.

I am eager to connect with you!

Best,

[email signature]

Interview Questions:

1. Can you briefly introduce yourself and your role within your organization/program?
2. Can you provide an overview of your organization's involvement in the effort to incorporate solar into WAP as an eligible measure, if any?
3. What do you see as some of the major challenges WAP and stakeholders face when implementing solar into WAP? Do you see any major trade-offs or potential negative consequences of implementing solar into WAP?
4. How do you think stakeholders can collaborate more effectively to address the challenges we just mentioned to expand solar PV accessibility to underserved communities in MN?
5. What do you think are some of the most important reasons MN should be working towards this effort of incorporating solar PV?
6. In your opinion, what resources do you think WAP and any organization involved in this process (energy consultants and developers, etc), need to support them and make this effort more seamless?
7. Do you see any interest within your organization to continue working towards this effort? If so, what role do you see your organization playing?
8. Are there any other people that you think I should talk to?
9. Are there any areas that you think I should focus on?
10. Are there any resources that you can share with me?
11. Is there anything else you'd like to add or any additional thoughts that come to mind?

Appendix 4. Existing and upcoming federal funding opportunities that the state is eligible to apply, with opportunities of increased solar into WAP efforts.

Opportunity	Summary
Renewable Energy Siting through Technical Engagement and Planning	U.S. Department of Energy launched a $10 million grant opportunity. This program supports the establishment of new, or expansion of existing, state-based programs focused on enhancing renewable energy siting process at the state and local levels.
Climate Pollution Reduction Grants	This program provides $5 billion in grants to states, local governments, tribes, and territories to develop and implement plans for reducing greenhouse gas emissions and other harmful air pollution.
Community Change Grants Program	This opportunity supports community-driven environmental and climate justice initiatives and aims to enhance community climate resilience and build the capacity of disadvantaged communities. Eligibility requires a partnership with a Community-Based Organization (CBO).
Energy Improvement in Rural or Remote Areas	This program received $1 billion from the Bipartisan Infrastructure Law. It aims to enhance the resilience, reliability, and affordability of energy systems for communities across the U.S. with populations of 10,000 or fewer people
Energy Efficiency and Conservation Block Grant Program	This $550 million program aims to assist states, local governments, and Tribes in implementing energy efficiency and reduction of fossil fuel emissions strategies.
State Energy Program	The State Energy Program is a $500 million program that supports states in the deployment of clean energy technologies and overall planning of activities that help reduce carbon emissions.
Advanced Equity Through Workforce Partnerships	This program awards $10 million for the development of collaborative workforce programs that aim to facilitate solar energy technologies while increasing workforce opportunities for union membership. This program encourages members of disadvantaged communities and energy justice populations to pursue solar energy industry careers.

Enhancement and Innovation Funding Opportunity Announcement (FOA)	The U.S. Department of Energy has $25 million in Bipartisan Infrastructure Law (BIL) funds available for WAP Grantees and Subgrantees for projects that drive program coordination and service delivery. Specifically for projects that drive collaboration and strengthen community partnerships
Sustainable Energy Resources for Consumers (SERC) Grants	This grant opportunity allows for WAP Grantees to install renewable energy and energy efficiency technologies over what they can install through their traditional WAP funds.
Solar for All	Environmental Protection Agency (EPA), through the Greenhouse gas Reduction Fund, announced a $7 billion opportunity for states, territories, Tribal governments, municipalities, and nonprofits for the investments in residential solar investments on low-income and disadvantaged communities.
Low-Income Communities Bonus Credit (LMI Adder)	The Low-Income Communities Bonus Credit Program enhances energy investment tax credits for clean energy projects in low-income communities, including on Indian land and within affordable housing developments. The program provides 10-20% points of additional tax credits on top of the Investment Tax Credit (ITC) for solar and wind projects under 5MW.