

Energy Efficiency is Part of the Solution

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ABSTRACT

Regulatory requirements drive energy programs to focus exclusively on achieving energy savings targets. Consequently, programs may ignore related community issues and deprioritize non-energy impacts. Individuals and communities may experience non-energy challenges as greater threats to wellbeing relative to high energy costs. For overburdened communities, this mismatch compromises the relevance of energy efficiency (EE) programs. This paper highlights programs that support community priorities while also meeting energy savings targets. We show how energy programs can offer holistic solutions that save energy while equitably providing quality of life benefits. Case studies show two different program approaches to addressing diverse community challenges.

First, we describe how a regional energy network is connecting its multifamily program with public health agency strategy. It is creating a single structure that improves the conditions of housing by enabling upgrades for households of people living with asthma and in high pollution areas. Their approach integrates energy improvements with mold mitigation, trigger removal, and tenant empowerment.

Second, we highlight a study that investigates how a Midwestern state could use EE programs to support food sovereignty initiatives led by 11 Indigenous nations. The research highlights the interconnectedness of energy, food access, health, and economic opportunity and proposes how utility programs can benefit multiple priority areas.

While addressing different sets of community challenges, the case studies both show how energy programs can amplify their impact by working to understand community needs and pursuing opportunities to align ratepayer funds with these objectives, while also advancing energy efficiency. This paper shows how ratepayer-funded EE programs can achieve greater impact through alignment with community needs.

Introduction

Resource Acquisition Program Context and Consequences

Evaluation of resource acquisition programs seeks to determine whether the value of the energy savings achieved by the utility's investment in energy efficiency (EE) exceeds the cost of obtaining power from other sources. Administrators focus incentive funds and marketing efforts on building improvements that realize energy savings which exceed the costs of incentives and administration, maximizing energy savings per dollar of ratepayer investment.

A positive evaluation for a resource acquisition program does not require a utility to pursue holistic solutions to challenges that face the communities that they serve. Consequently, this combination of regulations and key performance indicators can lead EE programs to focus on narrowly calculated cost-effective ways to reduce overall energy consumption. This paper offers case studies of how EE programs are seeking to use ratepayer funds to respond to the

needs of overburdened communities set in different geographies - rural Minnesota versus the San Francisco Bay Area - and who encounter different barriers – high pollution burden and housing costs versus poor food access. The paper then outlines how energy programs can increase the societal benefit of the ratepayer funds that they manage by inserting EE as one layer in community-led holistic responses to local challenges.

Energy Burden and Community Needs

Energy burden is a reality for many people categorized as low and moderate income (LMI) earners, often living in disadvantaged communities¹. Households with fewer financial resources face a greater burden than other utility customers in paying for home energy expenses. While the median U.S. household spends 3.1 percent of its gross income on energy expenses, households with income at or below 200 percent of the Federal poverty level spend an average of 8.1 percent on energy costs (Drehobl 2020). However, while energy costs are relevant to the wellbeing of households in disadvantaged communities, energy burden may be one of multiple concerns that confront a LMI household.

Food security and medical expenses are urgent problems for some households that are also energy burdened. Sherman et al. (2021, 3) found that, over a three-year period, 23 percent of U.S. households were food insecure for at least one of the years; 15 percent were unable to pay their rent or mortgage; 43 percent of households with children included at least one person without health insurance coverage; and 21 percent could not pay for utilities. The pandemic may have exacerbated some of these challenges, as Coleman-Jensen (2021) inferred from their finding that the percentage of individuals living in food insecure households increased from 10.9 in 2019 to 11.8 in 2020.

In addition to financial stress, low-income households are often also burdened with health concerns. For example, 7.8 percent of Americans currently have asthma and asthma prevalence increases to 11.8 percent for individuals with household incomes below the Federal poverty level (CDC 2019). Maintaining good health is more challenging without access to healthy food and 12.8 percent of Americans live in food desert² census tracts (USDA 2017).

Services and resources to assist with some of the challenges that LMI households face are available outside of energy programs. However, to access available resources, households in overburdened communities may need to navigate multiple application processes, each of which may have unique eligibility requirements. In a study of barriers to individuals in economic hardship obtaining assistance, Lens, Nugent, and Wimer (2018) identified bureaucratic and psychological barriers, which deter individuals from accessing available assistance and found that these barriers resulted in low-income households not receiving available support. The authors also identified survival fatigue as a distinct barrier, in which the sustained cognitive demands that overburdened individuals must meet in order to avoid crises impair the individual's ability to take steps needed to receive services. Survival fatigue may, "leave less time and less

¹ The US Department of Energy's working definition of *disadvantaged* is based on cumulative burden and includes data for thirty-six (36) burden indicators collected at the census tract level.
<https://www.energy.gov/diversity/justice40-initiative>

² The USDA defines a rural food desert as a census tract that has both low-income households and does not have ready access to healthy food. Low income is defined as a census tract in which the poverty rate is at least 20% or in which the median income is less than 80% of state or area median income. Low access to healthy food is defined as a census tract in which at least 500 people or 33% of the population live at least 10 miles from a supermarket.
<https://www.ers.usda.gov/amber-waves/2011/december/data-feature-mapping-food-deserts-in-the-us/>

cognitive bandwidth with which to search out resources, or it can make it less likely that people will follow through even when those resources are known.”

While services may be available to assist with some challenges faced by overburdened households, the time and coordination required to benefit from each program may present an obstacle to participation. Additionally, when services are available, financial and technical assistance for these housing interventions may be offered through different agencies and service providers, increasing the risk of survival fatigue. Consequently, potential synergies between interventions may be missed, such as not installing wall insulation, air sealing, and ventilation measures simultaneously with implementing mold mitigation.

Case Study 1: Serving Underserved Communities: Holistic Solutions

In 2021, CPUC (California Public Utilities Commission) decision 21-05-031 authorized the creation and designation of Equity Programs, as an addition to resource acquisition programs and market transformation programs. Equity programs are evaluated based on both cost-effective program delivery and on their success in delivering services to underserved customer segments.

StopWaste administers the Bay Area Multifamily Building Enhancement (BAMBE) program on behalf of the Bay Area Regional Energy Network (BayREN)³. BayREN’s program delivery complements programs offered by PG&E but focuses on underserved customer segments. The BAMBE program provides rebates of \$750 per unit and free energy assessments and technical assistance for EE retrofits to owners of 5+ unit multifamily properties in the nine-county Bay Area. BayREN obtained approval to designate BAMBE to be an equity program because it strives to enable energy upgrades to hard-to-reach properties, including properties that are naturally occurring affordable housing (NOAH). BAMBE has not defined NOAH as a targeted property type and does not have a program-definition of NOAH in the Bay Area. However, the hard-to-reach multifamily property types that BAMBE prioritizes include older, smaller, unsubsidized class B or C rental properties, which offer rents that are below average market rates. Multifamily properties with these characteristics are loosely defined as NOAH in this paper.

Affordable Housing Crisis and the Role of NOAH

Increases in rent levels in the Bay Area have outpaced income growth. The average monthly rent in San Francisco is \$3,244 (Rent Café 2022), while 2019 area median household income in the city was \$112,449 (Census 2022). Consequently, a household in San Francisco that earned 80 percent of the area median income would need to pay 43.3 percent of its income for an average 740 sf unit, underscoring that market-rate rents are not affordable⁴ for LMI households.

In the context of rents that are unaffordable to LMI households and a shortage of subsidized affordable units, many LMI households in the region rely on NOAH buildings for housing. While NOAH property characteristics vary, the NOAH Impact Fund finds that NOAH properties are frequently Class B and C buildings that were built 30 or more years ago (Greater Minnesota Housing Fund 2022).

³ BayREN is a CPUC-authorized collaboration of the governments of the nine counties in the San Francisco Bay Area (Bay Area), which administers ratepayer funded EE programs to customers in PG&E electricity and natural gas service territory.

⁴ The U.S. Department of Housing and Urban Development (HUD) defines affordability as housing costs being no more than 30 percent of a household’s income (PD&R Edge 2017)

As older buildings that have not recently been improved, NOAH properties may benefit significantly from the types of EE improvements that BAMBE incentivizes. Additionally, due to regular updates to California's energy code, older properties were built under less stringent energy codes, with lower building envelope performance requirements. For those NOAH buildings that have not undergone recent energy upgrades, natural degradation over 30, or more, years of use is likely to have further reduced the integrity of the building envelope.

Taylor et al. (2014) showed that permeability of the building envelope, as well as window opening by occupants to control temperature, were key influences on building occupant exposure to external air pollution. Therefore, occupants of NOAH buildings that are located near pollution sources may enjoy less protection by the building envelope from polluted external air, especially if those buildings are not equipped with cooling systems, thus requiring occupants to open windows to control temperature, leading to increased exposure to pollution.

Due to the combined effects of a shortfall of available subsidized housing units and high market-level rent costs, NOAH properties are essential in addressing the need for more affordable housing in the area. Upgrades to NOAH properties could address both the EE needs of the property and improve the building's capacity to protect inhabitants from external air pollution.

Intersection of Health, Wellbeing, and Energy Efficiency

Onset of new asthma cases, as well as triggers causing asthma attacks can be caused by high levels of air pollution. Madaniyazi and Xerxes (2021, 100) established that short term exposure to air pollution can trigger onset of asthma symptoms and that long term exposure to traffic-related air pollution can lead to the onset of asthma in both children and adults. While many Bay Area residents are regularly exposed to high levels of air pollution, the EPA (2019) found that a disproportionately high number of low-income households and people of color live in areas with increased levels of air pollution.

Bay Area neighborhoods with higher percentages of residents of color experience double the rate of asthma from traffic-related air pollution compared with predominantly white neighborhoods (EDF 2021). An example of the unequal impact of air pollution is that asthma-related emergency department visits in Contra Costa County (CA), are 2 to 3 times higher among African Americans, when compared to statewide averages, higher among children, and 1.5 to 2 times higher among low-income households (Green and Healthy Homes Initiative 2017).

The same communities that face a severe affordable housing shortage and consequent housing cost and energy burdens also suffer from the effects of localized air pollution. Recommended treatment of air pollution-related asthma includes avoiding exposure to outdoor air emissions, in addition to any other asthma triggers. Lanphear et al. (2001b) estimated that eliminating home-based asthma triggers, if causally associated, would reduce up to 39% of asthma diagnoses among children and 44% in adolescents (Lanphear et al. 2001a).⁵

As described in the preceding section, when NOAH properties are located in areas with high levels of air pollution, residents may be exposed to increased pollution inside their homes. BayREN identified health effects from exposure to air pollution and housing affordability as issues for which BAMBE could support holistic solutions, as described in further detail below.

⁵ Adapted from Bay Area Healthy Homes Initiative proposal submitted by Bay Area Air Quality Management District, BayREN, Contra Costa County, and Alameda County StopWaste.

Solution 1: Layer Programs to Benefit Health and Efficiency

BayREN responded to the opportunity to support solutions for negative health outcomes resulting from indoor air pollution by identifying partner agencies with aligned objectives and developing coordinated approaches to these problems.

In its most recent business plan filing, BayREN set an objective to, “Meet holistic health, resiliency, and equity goals in underserved communities through improving access to multi-benefiting energy efficiency upgrades.” (Proceeding A. 22-03, 2022, 152) BayREN acknowledged that while reducing adverse health outcomes in underserved communities is important to achieving the intent of an equity program, available ratepayer funds and regulatory requirements prevent BAMBE from unilaterally accomplishing the goal. Instead of focusing exclusively on maximizing energy savings, BayREN recognized that it could leverage adjacent programs and funding streams to collaboratively achieve shared objectives. BayREN is implementing a multi-pronged strategy to achieve these objectives, in which it structures program incentives to both increase energy savings and achieve significant non-energy benefits, while simultaneously partnering with other programs to layer funding to expand program impacts. Three of these initiatives are described below.

Bay Area Healthy Homes Initiative

BayREN partnered with the Bay Area Air Quality Management District (BAAQMD), the Alameda County Public Health Department’s Asthma Start program, and the Contra Costa County Asthma Mitigation Project to obtain a grant from California’s Automobile Emissions Research and Technology Fund for the Bay Area Healthy Homes Initiative. Through the partnership, BayREN will combine non-ratepayer grant funds with BAMBE incentives and technical assistance to reduce asthma onset and triggers, while also delivering energy benefits, in overburdened communities.

Participants may be referred from Alameda County’s Asthma Start program or Contra Costa Health Services, or may first enter BAMBE and then be selected for the program if the building is located within 1000 feet of a significant source of traffic or industrial air pollution and within a disadvantaged community.

For pilot participants, BayREN and its partners will complete an enhanced home assessment, which will build on the no-cost energy assessment that BAMBE provides and will identify IAQ risks, including mold and external air leakage. The program will offer enhanced rebates and technical assistance to the owners of the properties to enable them to complete both EE upgrades and air quality remediation measures.

The pilot also seeks to improve IAQ through electrification of heating, hot water, and cooking equipment. Recognizing that installing electrification measures could push a property toward gentrification, BayREN and its partners are also incorporating safeguards into the pilot to ensure that low-income tenants who benefit from IAQ improvements realized through electrification do not suffer from increased energy costs, or displacement due to gentrification.

BAMBE’s Focus on Health, Equity, Resilience, and Emissions Reduction

BayREN is revamping BAMBE to maximize the community-level impact of the ratepayer funds that it deploys. BayREN filed plans to restructure BAMBE in program year 2024 to support holistic solutions for multifamily housing. BAMBE will continue to coordinate with aligned partner agencies, as shown in the Healthy Homes Initiative and will also shift its incentive structure to prioritize projects that deliver significant non-energy benefits (NEBs), in

addition to achieving energy savings.. As shown in Table 1, the restructured program will offer a base incentive for qualifying EE projects in multifamily buildings and will further incentivize projects and measures that also achieve objectives related to IAQ, service to underserved communities, tenant resilience to extreme weather, and GHG emissions. To ensure that the improved buildings continue to benefit low- and moderate-income households, BayREN is investigating options for adapting the affordability covenant model used in the Low Income Weatherization Assistance Program to be used for properties that complete BAMBE projects.

Table 1. Restructured BAMBE Incentives and Intervention Bonuses

Bonus Incentive Category	Sample supported interventions
Health	• Sealing • Windows • Induction cooktops
Equity	• Service to Disadvantaged Communities (DACs)⁶
Resilience to Heat Exposure	• In-unit air source heat pumps with air conditioning • Insulation
GHG Emissions Reduction	• Air Source Heat Pumps • Heat Pump Water Heaters • Electric Cooktops

The new program structure will prioritize overburdened communities by providing a higher incentive level to communities facing health, equity, and resilience related burdens. The new incentive structure will encourage owners of buildings in disadvantaged communities, and elsewhere, to comprehensively address building improvements and to pursue projects that will create health benefits for occupants, while also achieving energy and emissions reduction goals. BayREN is also implementing an enhanced technical assistance (“TA+”) service to facilitate program accessibility for owners of NOAH properties. In TA+, program staff will help property owners layer incentives and assistance from multiple energy and non-energy programs, while also supporting owners in project management and contractor selection.

Adjacent Electrification

California set a goal to achieve 80% GHG emissions reduction by 2050 and is working to decarbonize buildings and transportation to accomplish this goal. In addition to climate benefits, eliminating fossil fuel combustion in homes improves IAQ and corresponding health outcomes. Similarly, in addition to reducing GHG emissions, transitioning to electric vehicles is expected to reduce local pollution from diesel particulate matter, PM_{2.5}, and ozone.

Electrifying cooking, space heating, water heating, and transportation offers potential health benefits; however, building infrastructure gaps may deter, or prevent, owners of NOAH properties from eliminating natural gas appliances and enabling electric vehicle charging.

BayREN recognized that residents in overburdened communities may benefit from the cost and health attributes of electrifying cooking and heating equipment, as well as transportation. However, BayREN also observed a risk that building owners and residents in

⁶ California SB 350 directed the CPUC to create environmental and economic benefits for disadvantaged communities. A task force created by the CPUC identified environmental and socioeconomic criteria to be used to define a DAC and uses CalEPA’s CalEnviroScreen 4.0 tool to identify DACs. BayREN is using information from CalEnviroScreen to identify disadvantaged communities in the Bay Area.

overburdened communities may encounter extra challenges in funding the building improvements, such as electrical panel upgrades and electric vehicle (EV) charging infrastructure, needed to support these transitions.

Regulatory requirements prevent BAMBE funds from being used for the needed infrastructure. Therefore, BayREN is pursuing partnerships with other organizations and units of government to leverage aligned funding streams that can be used for these purposes. BayREN will seek to support property owners in layering multiple sources of funding and technical assistance that owners may use to enable properties in overburdened communities to transition toward electrifying cooking, heating, and transportation equipment and systems.

Solution 2: Engage Overburdened Communities

Challenges faced by overburdened communities, such as health effects from exposure to air pollution and housing affordability, may be intertwined and overlapping. Issues that resonate most strongly with members of underserved communities may not match conventional program messaging created by energy programs. To align program delivery with the community's greatest needs, BayREN has undertaken a three-step approach to better support historically underserved communities.

Step 1: Mapping Underserved Communities

The Bay Area is home to extremely diverse communities and has a broad array of multifamily building types. As a first step toward better serving overburdened communities, BayREN is collaborating with Slipstream to analyze program data, census data, and property data to identify census tracts in the region that have high need for EE program benefits but have been historically underserved. The analysis will support a multi-layered map showing areas that are underserved, with overlays of demographic, property, and pollution data, revealing communities where BayREN may target its outreach efforts to maximize the impact of the program.

Step 2: Bi-Directional Program Outreach

Conventional program outreach frequently centers on web-based messaging; program-sponsored bill inserts and mailings; and in-person communication by a program representative, who delivers a presentation and marketing materials at an event.

Within the communities that it targets using its map of underserved areas, BayREN will replace the conventional program outreach model with strategies that encourage community members to talk with program representatives about their interest, and challenges faced, in reducing energy costs. As part of this strategy, BayREN collaborates with CBOs to host roundtable events for multifamily property owners and tenants. These conversations, led by a trusted community partner, uncover opportunities to improve buildings and reduce energy use, while developing multi-party support for the work. BayREN also works with the host CBO so that these conversations can cultivate ideas to improve BAMBE, resulting in community-led co-creation of the program, focused on supporting community-identified priorities.

Step 3: Advancing Co-Benefits

BayREN will use the information that it gathers through community engagement to understand the barriers that deter and prevent communities from benefiting from BAMBE. Feedback on non-energy issues facing communities will help BayREN identify opportunities to

partner with outside programs and agencies that are positioned to respond to these community issues. These partnerships will enable communities to both benefit from building energy improvements and optimize the health, safety, and other NEBs enabled by the project.

Where community members advise BayREN that challenges that could be mitigated by the NEBs identified in **Error! Reference source not found.** are more important to them than energy burden and emissions reductions, BayREN will use that information to adapt program communications accordingly. BayREN will customize communication of the benefits of program participation to highlight both the value of the potential energy savings of a BAMBE upgrade and the prioritized NEBs that a customer can access by participating in the program. When community members express that their most urgent concerns are unrelated to energy or to the NEBs in **Error! Reference source not found.**, BayREN will use this information to inform ongoing efforts to layer BAMBE with other, more relevant, programs and resources in the Bay Area.

Case Study 2: Energy Program Support for Community Priorities

Eleven federally recognized Indigenous nations have reservations that share the same geography as the State of Minnesota. Fourteen electric utilities and three natural gas utilities serve reservation and at least seven of the 11 nations have active food sovereignty initiatives.

Minnesota's Department of Commerce (Commerce) manages the state's Conservation Improvement Program (CIP), under which utilities in the state are required to achieve annual EE targets. Commerce funded a study in which Slipstream, with partners Indian Land Tenure Foundation (ILTF), St. Croix Institute (SCI), and Our Healthy Share, investigated strategies through which CIP and the utilities that serve Tribal reservations can leverage CIP to support Indigenous food sovereignty and eliminate food deserts.

This second case study discusses a different region and customer sector than those that BayREN engaged. Despite these differences, this case study similarly describes an energy program's work to align ratepayer-funded programs with solutions to community needs in a way that amplifies the impact of program funds beyond direct energy benefits.

Food Deserts, Indigenous Food Sovereignty, and Energy

Through colonization, Indigenous nations were forcibly displaced from their lands. Treaties between the United States government and Indigenous nations affirmed limited sovereignty, but greatly restricted the land area controlled by the Indigenous nations.

In addition to physical displacement, aggressive acculturation conducted through institutions, such as Indian boarding schools, disrupted Indigenous traditions and ways of life (Blakemore 2021). The policies and practices of colonization eroded Indigenous food systems by preventing access to land, disconnecting Indigenous children from traditional knowledge, and introducing a wage economy (Joseph and Turner 2020). As a result of external interventions, Indigenous communities that were previously food self-sufficient frequently found themselves living on reservations in which there are food deserts. Kaufman, Dicken, and Williams (2014, 13) found that 74.4 percent of all households in Tribal areas were more than one mile from a grocery store, versus 41.2 percent for all U.S. households and that 67.1 percent of households in Tribal areas that live more than one mile from a grocery store did not own a vehicle versus 20.1 percent for all U.S. households.

Households with low access to healthy food may struggle with related health issues, including Type 2 diabetes, obesity, heart disease, and certain cancers (CDC 2022b). The CDC

(2022a) estimates that the annual cost of treating Type 2 Diabetes in the U.S. is \$327 Billion, which does not include the cost of lost worker productivity due to the disease. Type 2 Diabetes is an especially significant health issue among Native Americans and Alaska Natives. O’Connell (2012) found that 10.9% of Native American adults have been diagnosed with Type 2 diabetes and care for this population consumes 37.0% of the Indian Health Service’s total treatment budget. Additionally, individuals who face food insecurity suffer an increased risk of developing Type 2 diabetes when compared to individuals who are food secure (Berkowitz et al. 2018).

Indigenous communities throughout the United States undertake initiatives to revitalize traditional food systems to provide healthy foods to Indigenous households, reduce dependence on conventional global food systems, and support connections with traditional knowledge and ways. While each community’s location and available resources influence how it engages with local food systems, the broader movement is known as Indigenous food sovereignty.

Interviews with Indigenous producers revealed that participants in this work frequently view food systems and food sovereignty holistically. Food systems include food production and distribution both directly supported by the Tribal government and by separate Indigenous producers. Indigenous food systems also depend on the economic and logistical ability of members to access healthy foods. A holistic view of food systems acknowledges that members must be both economically and physically able to access food. Therefore, due to the need for members to be able to afford healthy foods, high energy burden among members may impair the success of Indigenous food sovereignty work.

Canning et al. (2010) estimated that food production accounted for 15.7 percent of total energy consumption in the U.S. in 2007 and that this sector’s share of U.S. energy consumption was increasing. Reflecting high energy use in food systems, many utilities include energy efficiency program offerings directed at the agricultural and food service sectors; however, it is unclear whether ratepayer-funded energy efficiency programs focused on maximizing program cost-effectiveness align with the energy consuming activities in food sovereignty initiatives.

Slipstream, ILTF, SCI, and Our Healthy Share identified options for utility support for food sovereignty, utility support of food desert mitigation, and energy program offerings directed at agricultural and food production activities that are relevant to food sovereignty in Minnesota. Next, the team interviewed individuals in four states who manage or support food sovereignty projects. Lastly, the team reviewed CIP offerings of the utilities that serve the 11 reservations and interviewed representatives from three of these utilities.

Examples of utility food system support

Food access and food security are objectives of many food sovereignty initiatives. Utilities could therefore support Tribal efforts through programs that mitigate food deserts, as well as with programs that reduce rates of food insecurity within their service territories. The project team’s literature review sought case studies showing utility support for Indigenous food sovereignty, food desert mitigation, and increased food security, which could inform corresponding recommendations to modify CIP offerings.

Food Desert Mitigation

The North Dakota Association of Rural Electric Cooperatives (NDAREC) member cooperatives serve exclusively rural areas. The organization recognized that lack of food access for rural communities contributed to a net outflow of residents from its service territories. Persistent erosion of the customer base poses an existential threat to NDAREC and its members.

NDAREC learned that when food distribution companies evaluate the cost of transporting food to sparsely populated rural areas compared to the low purchasing capacity of these areas, the food distributors determine that they cannot cost effectively serve these areas. If food distributors are unable to profitably deliver food to rural grocery stores, the stores close and community members must commute long distances to purchase groceries, which diminishes quality of life for these residents.

To mitigate rural food deserts in the service territories of its members, NDAREC obtained funding for a pilot project to deploy mobile cold storage units at rural hubs. Using the mobile cold storage units, food distributors could make larger, more cost-effective, deliveries to fewer locations and rural grocers could access these units, through which they received a regular supply of healthy foods to stock their stores.

NDAREC identified rural food deserts as a key issue for its members and as a threat to its ongoing viability as an organization. In response, NDAREC layered outside grant funding with its interests in the advancement of energy efficient technology to work towards counteracting a non-energy issue facing its members.

Support for Food Security

Great River Energy (GRE) is a wholesale electric power cooperative that serves distribution cooperatives in Minnesota. GRE participated in a non-ratepayer funded grant that supported a pilot project deploying modular indoor agriculture units. GRE purchased modular mobile indoor agriculture units and offered a \$10,000 incentive to member cooperatives to purchase one of the modules. Four member cooperatives purchased the units and partnered with local institutions to place the units in service to the communities. Two cooperatives manage the units themselves and donate the produce to local food shelves. One cooperative created an education and training opportunity by partnering with a local high school to manage the module. A fourth cooperative gives the produce to a health system within its service territory that uses the vegetables in its “Food Farmacy,” which dispenses healthy foods to households recommended by health care providers.

Indoor agriculture requires significant energy inputs for grow lighting and temperature control and therefore both the financial and environmental performance of an indoor agriculture facility depend upon operating the module as energy efficiently as possible. As mobile, self-contained systems, the modules offer a versatile strategy to combat food insecurity and food deserts. Through this pilot, GRE demonstrated and deployed an innovative technology in a way that showed how EE can support progress on other community needs.

Barriers to Utility Support for Food Sovereignty

While the examples above show utility support for food access, and many utilities currently offer conventional agricultural and food service sector EE programs, the team found no examples nationally of utility energy programs directly engaging with the specific needs of food sovereignty initiatives. Our lack of findings raises the question of whether this gap results from utilities not viewing food deserts as being relevant to their EE programs, whether utilities do see food deserts as relevant to their work but have not identified opportunities to use EE programs to counteract food deserts; or whether a different factor influenced this finding.

Interviews with members of Indigenous nations and private Indigenous producers sought to understand the objectives of each food sovereignty initiative. Interviews also catalogued the categories of energy-consuming equipment and processes used in the various food systems;

inquired about existing connections between the producer's work and the local electricity or natural gas utility; and sought recommendations. We compiled recommendations for how the local utility's CIP offerings could support the food sovereignty work. Indigenous producers cited multiple objectives for undertaking food sovereignty initiatives. Common themes included: 1) Remediating the lack of fresh produce that is available to members living on reservations; 2) Reducing the negative health impacts, such as Type 2 diabetes and elevated rates of cardiovascular disease, that are suffered by people who live in food deserts; and 3) Fostering connections of members to the Indigenous nation's traditions and culture. Some Indigenous nations in Minnesota have also established clean energy goals or projects. However, most interviewees did not view energy use as a significant expense in their food systems and had not explored opportunities to use CIP to benefit their food sovereignty work.

Much of the energy that is consumed in seed-to-table food systems is not provided by a regulated electricity or natural gas utility. This research did not quantify energy consumption by food production step or energy source but did catalogue energy-consuming processes. The inventory of energy-related processes suggested that a significant share of the total energy used in food sovereignty work, as well as key sources of GHG emissions in these processes are tractors and other field equipment, as well as trucks used for food distribution. Additionally, most reservations in Minnesota are rural and therefore natural gas is not available throughout the reservation. Consequently, firewood or propane, rather than natural gas, may fuel key equipment in food sovereignty work in Minnesota, such as maple syrup evaporators. Because a significant share of the total energy use in these food systems is outside the scope of CIP, efficiency upgrades in many of these processes are not eligible for CIP incentives.

When asked about energy use in food sovereignty work and about how utilities could support that work, multiple interviewees suggested that utilities could enable improved energy use by funding photovoltaic systems on greenhouses and commercial kitchen facilities. A second idea was for utilities to fund EV charging infrastructure, as well as electric food distribution trucks and field equipment. Also, because power outages create the risk of food spoilage when refrigeration equipment is inoperable or crop failure when greenhouse lighting and HVAC systems are offline, interviewees suggested utility support for battery storage back up.

Within the current CIP structure, utilities are not allowed to claim savings toward CIP requirements for renewable energy systems. Despite Minnesota having a relatively clean energy grid, the utilities may not claim savings toward CIP requirements for emissions reductions from spending on electric vehicles and EV charging infrastructure. Similarly, while energy storage can be used for load shifting and CIP allows incentives for certain load management measures, applying battery backup for indoor agriculture, and refrigeration can increase resiliency, but does not meet load management requirements for CIP.

Opportunities to Increase Impact

The research identified two categories of solutions to increase the opportunity for CIP to benefit food sovereignty initiatives in Minnesota: comprehensive customer engagement and including non-energy benefits in cost benefit calculations.

Strategy 1: Comprehensive Customer Engagement

The research revealed several opportunities for utilities to adapt existing CIP offerings and enable new measures that Indigenous producers could access to support their food

sovereignty work. Beyond these additions to program offerings, Minnesota's utilities and policy makers may consider leading by following.

Energy use may not be a key factor in the success of food sovereignty, but EE can be one component of a successful project. In the same way, CIP funding may not be able to provide primary financial support for a community's food sovereignty work, but the CIP incentives can be layered with other funding streams to create a financially sustainable model that assumes a holistic approach to project management.

As discussed above, Indigenous nations consistently described the need for community engagement and education to reorient the palates and food preparation habits of households that live in food deserts toward traditional, fresh, and healthier foods. Many utilities recognize the need to educate, and engage with, community members to achieve energy saving goals. To engage with their customers, utilities incorporate EE educational materials and messaging into their sponsorship of community events.

Engagement between an Indigenous nation and a utility may reveal that the nation needs funding to enable it to provide traditional foods for community events or to hold cooking classes on preparation of traditional foods. If sought by the community, the utility could work with that community to incorporate training on EE in home energy use or in commercial kitchen operation into its food preparation education. If the supplemental curriculum could be aligned with the utility's CIP offerings, the utility may justify its investment in the traditional foods training through increased adoption of efficiency measures among attendees.

Strategy 2: Non-Energy Benefits in Cost-Benefit Evaluations

As indicated above, Indigenous food sovereignty initiatives are generally not centered on optimizing energy use. Instead, nations primarily focus on improving health outcomes in the community, creating access to healthy foods, and enhancing connections with traditional ways.

Policymakers may develop a framework in which the medical cost savings of disease prevention, the documented effectiveness of an intervention and the influence of the CIP funding in enabling the project, would be calculated and used as an input for the cost benefit analysis of the program that supported the intervention.

Multiple communities align food sovereignty work with diabetes management and prevention programs or with food security programs, which reflect the significant NEBs of the work. Governments may receive funding for diabetes prevention or food security programs from the CDC, the USDA, and the Minnesota Department of Human Services, among others.

The CIP offerings of Minnesota's utilities are evaluated based on a societal cost-benefit analysis, the inputs for which are defined by regulations. Currently, the analysis only considers benefits from participant energy bill savings, rebate dollars paid to customers, and a valuation of the reduction in GHG emissions from electricity generation that the energy saving enabled.

Policymakers could amend the CIP framework to allow utilities to maximize both the societal benefits and the energy savings that CIP achieves. The societal test currently accounts for the cost of externalities from GHG emissions produced during electricity generation. GHG emissions from combustion of natural gas, delivered fuels, and transportation fuels create parallel impacts as those produced from electricity generation. Amendments to the CIP regulations could authorize utilities to claim savings from utility-incentivized GHG reductions created by non-utility fuel savings. Additionally, the analysis currently accounts for benefits to participants from rebates and energy cost savings, as well as benefits to all ratepayers due to reduced generation needs. CIP could be further amended to recognize that the finances of ratepayers are affected by other factors, in addition to energy cost savings and that certain measures create financial

benefits for participants that extend beyond those energy cost savings. The quantifiable value of NEBs, such as medical cost savings, also benefit the larger community, which may alternatively be viewed as the universe of all ratepayers. CIP's cost-benefit analysis could correspondingly be altered to account for the economic value of NEBs of utility program activities that benefited all ratepayers.

For example, under the contemplated revised CIP structure, a utility could financially support energy efficiency improvements related to food sovereignty work, such as building shell, HVAC, and indoor grow lighting for greenhouse measures. In addition to the energy savings created by those measures, the utility could claim a proportional share of the value of health-related NEBs produced by that food systems. Broader consideration of the benefits of the utility intervention could provide a basis for offering incentives for measures that would yield high NEBs, but for which cost-effective incentives could not be approved based on the energy savings alone.

Creating a system that considers both the value of the energy savings and the value of the NEBs would lead utilities to pursue strategies that maximize both the societal benefit from, and energy savings generated by, ratepayer funds.

Discussion: Energy Efficiency in a Supporting Role

Energy costs represent an above-average percentage of income for LMI households; however, energy costs may be secondary to concerns such as accessing healthy food, reducing asthma triggers, and securing affordable housing. Regulations require ratepayer-funded incentive programs to generate benefits that exceed the cost of implementing those programs. Through the interventions in buildings and equipment that they support, as well as through the investments they make in community engagement, these programs are positioned to amplify the benefits that ratepayer funds enable by expanding program-level views of the areas where the public funds at their disposition can create impact. We discuss how utilities can work within existing regulatory contexts to increase the impact of their EE programs by working with overburdened communities to layer EE benefits to achieve community-identified objectives. We also explore how policy makers may re-frame EE program cost-effectiveness analyses in ways that will maximize the societal benefits achieved by ratepayer dollars.

As a society, we use energy to support our health, comfort, and well-being. As ratepayers, we help fund programs that seek to maximize energy savings, but these program should also be considered as components of a spectrum of services provided to address community priorities. Layering ratepayer funded programs with efforts to respond to other community needs can improve outcomes in both focus areas.

As described in the case studies above, BayREN and the Minnesota Department of Commerce are exploring how traditional ratepayer-funded programs can accomplish more by applying their resources to address broader community needs. Both BAMBE and Minnesota CIP offerings must meet regulatory requirements to spend ratepayer funds to achieve meaningful energy savings. In connection with BAMBE's CPUC designation as an equity program and in support of Commerce's objectives to ensure equitable deployment of CIP funds, these programs explored different, but potentially complementary, strategies to increase the holistic benefits delivered by ratepayer dollars.

BayREN defined BAMBE's purpose as improving the health and wellbeing of underserved and overburdened community members. It determined that it could more effectively pursue this purpose by collaborating with aligned partners than it could by working

independently. By coordinating BAMBE program implementation with the Bay Area Healthy Homes Initiative, BayREN showed how programs can achieve greater societal benefit by layering ratepayer dollars with outside funding that supports related community needs, rather than narrowly focusing on maximizing energy savings.

Similarly, in the Midwest, GRE and NDAREC viewed the objectives of their programs more holistically than delivering efficient electrical services and therefore decided to support access to healthy food for their customers, along with efficient equipment. These utilities provide examples of innovatively deploying energy efficient technologies and demonstrating commitment to benefit the regions they serve.

Connecting EE programs and aligned community efforts can catalyze development of centralized resources, thereby reducing bureaucratic barriers that overburdened communities encounter and mitigating instances of survival fatigue.

While EE programs can adapt incentive offerings to advance their impact within existing regulatory requirements, policy makers can also take steps to enable programs to further increase the levels of impact that they achieve.

NEBs of programs that pursue holistic community wellbeing may include reductions in morbidity, health care cost savings; and reduced demand for other public assistance as a result of reductions in energy burden for LMI households, among many other possibilities. Measures that reduce energy consumption may also improve the wellbeing of program participants in complementary ways.

Including non-energy impacts in program cost-benefit analysis would support utilities in designing and implementing programs to best meet community needs, while also saving energy, thereby optimizing the overall impact of the ratepayer dollars. Policymakers can enable higher-impact use of ratepayer funds by restructuring cost-benefit calculation formulas to account for non-energy impacts of the efficiency programs that they oversee.

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