PY2022 EM&V Key Findings and Recommendations: IF & 2021-2024 CDMF Remote First Nations Energy Efficiency Pilot Program (RFNEEPP)

No.	KEY FINDINGS	2022 EM&V RECOMMENDATIONS	IMPACT	IESO RESPONSE
1.	**Tracking of health and safety barriers in project files and tracking data was inconsistent and overly broad.** Tracking data only flagged projects that received funding to address health, safety, and comfort – i.e., no record of specific health and safety concerns. Engineering desk reviews turned up projects with health and safety barriers (e.g., mold, exposed electrical wiring) without a corresponding line item in tracking data, and projects with a flag for health issues in tracking data but no corresponding record in project files. Tracking health and safety barriers is key to understanding the potential for increasing the uptake of high-savings measures like weatherization. Previous evaluations[1] have recommended an emphasis on weatherization upgrades due to high per-unit savings and co-benefits of increased occupant comfort.	Improve the quality and comprehensiveness of health, safety, and comfort data collected on-site and contained in the program tracking data. This could include adding required fields to program tracking data for any projects where auditors and contractors identify a health and safety barrier (e.g., what barrier(s) did they observe, what measures were they unable to install as a result). Develop a participant journey map for homes with observed health and safety barriers. Equip auditors and contractors with the time and resources to provide guidance on how participants can remediate any observed health and safety barriers. This could include referrals to contractors that could conduct the necessary remediation and program incentives specifically tied to these steps. In addition, these journey maps can extend into follow-up plans for participants to receive certain energy-efficiency measures that weren't installed due to health and safety concerns, after remediation has occurred.	High	The recommendation has been incorporated for the Remote First Nations Program (RFNP). Specifically, the IESO's Audit and Retrofit protocols (which outline measure qualification thresholds) for the Remote Program (RFNP) incorporate potential health and safety hazards and mitigations including a process for addressing potential remediation.

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[1] See Finding 1 in the 2021-2024 CDM Framework: PY2021 Energy Affordability Program Evaluation Report; see also Recommendation 2a in the Interim Framework: First Nations Conservation Program Evaluation Report.

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2.	**Auditors and contractors observed whether participants' homes contained heat recovery ventilation (HRV) but rarely recommended maintenance or upgrades.** Auditors and contractors documented the presence of HRV systems in 40% of desk-reviewed projects (n=77). However, only slightly more than one-fourth (29%) of desk-reviewed projects had an operational HRV, and there was no documentation of why non-operational systems were not in use. Engineering desk reviews did not find any evidence that auditors and contractors consulted participants on the overlapping impacts of upgrading building insulation and ventilation systems[2]. Data on HRV were not passed through to the program tracking database.	In participant homes that receive air sealing, add specific incentives for HRV or energy recovery ventilator (ERV) installation and/or upgrade to promote deeper air sealing savings. Program support for HRV/ERV should include balancing, maintenance, and educational materials. While an HRV/ERV represents an additional electric load, the deeper savings from tightening the home, lowering the overall heating and/or cooling load of the home, and potential non-energy benefits in occupant comfort and indoor air quality may outweigh the increased electrical load from any added mechanical ventilation. Create variables in program tracking data that document whether participant homes have an HRV/ERV, and whether it is operational. As part of recommending building envelope upgrades, require that auditors and contractors assess whether ventilation systems are appropriately sized following those upgrades, per industry best practice.	High	The recommendation has been incorporated for RFNP, in which HRV/ERV maintenance and education is included as a prescriptive measure. HRV/ERV tuning presents a strong opportunity for energy savings, while ensuring thermal comfort and indoor air quality for home occupants.

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[2] ASHRAE Standard 62.1 and 62.2 dictate a certain level of ventilation needed per person in a given space for acceptable indoor air quality.

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3.	**RFNEEPP program tracking data lists completed projects under multiple identifiers for the same home and contains inconsistent contact information for verifying unique participants.** In addition, tracking data does not typically include key characteristics that are collected during audits such as building type or mechanical equipment for heating/cooling. Data quality issues such as multiple unique identifiers, inconsistent contact information, and incomplete building/equipment characteristics can adversely affect program planning and evaluation. A single, unique identifier that traces all project work back to one home improves the timeliness of sample development and subsequent data requests to program vendors. Identifiers can also be generated for homes where project work was attempted but not completed, to facilitate follow-up visits and track incomplete audits. These unique identifiers are critical for impact evaluations that encompass multiple program years. Data capturing key building and/or equipment characteristics can be used to better estimate savings impacts, to identify additional energy saving opportunities at existing participant homes, and to provide insights into future program offerings. However, all RFNEEPP participant records were missing data on building type information and had no fields to record mechanical equipment details.	Work with program staff and program delivery vendors to consistently incorporate details collected on-site into the tracking data (e.g., building type, mechanical equipment for heating/cooling, heating fuel, efficiency, capacity, and HRV data (see *Finding 2*)). This could include revising the IESO's Field Audit Support (Fast) Tool program or development of a new uniform electronic data collection form for auditors to upload these data directly into the tracking data. Consolidate the multiple, overlapping sets of application identifiers currently used in tracking data such that each home has a unique identifier. Quantify the number of attempted but incomplete RFNEEPP audits, in addition to tracking program participants. These data can help program staff and program delivery vendors determine where program participation has the greatest growth potential and more quickly identify where there are potential participation barriers. Develop protocols to verify that Measure Lists the IESO provides to delivery agents split out reported savings for measures whose substantiation sheets have different reported savings depending on building type, heating and/or cooling systems, heating fuel, etc. IESO Measure Lists should also flag which demand factor is used to calculate savings. Ensure the MAL also documents these different reported savings.	High	The IESO has incorporated additional data tracking fields into the delivery vendor reporting and will work with them to ensure data is collected accurately and consistently. Community Coordinators are also hired and trained to ensure process is followed, data collection is consistent, and the customer experience is similar across the FN community.

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4.	**Desk review results suggest that the average electric consumption of replaced refrigerators aligns more closely with the federal minimum consumption (UEC$_{base}$) than assumed existing equipment consumption (UEC$_{exist}$).** IESO deemed UEC$_{exist}$ values are reasonable compared with equivalent deemed values in the Illinois Technical Reference Manual (TRM) but overestimate actual existing refrigerator consumption as observed in PY2022 and PY2021 desk reviews.[3] No other TRMs in the cross-jurisdictional scan explicitly listed UEC$_{exist}$ values. No TRMs require blended savings based on existing equipment and federal minimum baselines, as is currently the case in IESO substantiation sheets. Instead, reviewed TRMs list separate savings assumptions depending on whether the refrigeration equipment has a time of sale or early replacement baseline.[4] Separate MAL entries for time of sale and early replacement scenarios would reflect the reality that the IESO is in some cases replacing refrigeration equipment past its effective useful life (EUL). As a result, separate MAL entries could improve the accuracy of claimed savings from refrigeration upgrades.	Create separate MAL entries for time of sale vs. early replacement refrigerators, as well as different refrigerator configurations (e.g., top-freezer, bottom-freezer, side-by-side). Alternatively, conduct an appliance baseline study to update the current assumption in substantiation sheets that the remaining useful life (RUL) of an early replacement refrigerator/freezer is one-third of its effective useful life. Conduct an appliance baseline study to update unit energy consumption values in all appliance substantiation sheets. Make delivery vendors aware of any future changes to appliance baseline assumptions. Verify that vendors are installing refrigeration equipment that consumes less energy than the assumed unit energy consumption of existing (UEC$_{exist}$) and minimally compliant (UEC$_{base}$) refrigerators / freezers.	Medium	The IESO will review the baseline assumptions as part of the annual MAL and substantiation sheet review update to determine whether the blended baseline and/or time of sale baseline is more appropriate. The IESO will communicate with vendors to ensure proper metering of appliances is carried out. The appliances that are replaced should meet the established replacement threshold. This will ensure code-compliant appliances are not being replaced, whenever possible.

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[3] PY2022 includes EAP and RFNEEPP desk reviews, whereas PY2021 only includes EAP desk reviews. Desk reviews are not sufficient for recommending updates to UEC$_{exist}$ because they do not reflect the energy consumption for refrigerators associated with the non-participant population. A representative baseline for appliance energy consumption requires a sample frame containing households with and without prior experience in energy-efficiency programs such as EAP.

[4] "Time of sale" refers to cases where the replaced equipment is past its effective useful life (EUL), so the baseline equipment meets the minimum regulatory requirements for energy consumption (UEC$_{base}$). "Early replacement" refers to cases where the existing equipment is not past its EUL. In these instances, the baseline equipment is the existing refrigerator for the assumed remaining useful life (UEC$_{exist}$), then the "time of sale" baseline (UEC$_{base}$) until the end of its effective useful life (EUL). Refer to entry 5.1.6 in the 2022 Illinois TRM for additional details. Some jurisdictions may adjust their baseline and/or EUL assumptions based on the region, income levels, etc. of the populations they serve.

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5.	**The energy consumption thresholds for refrigerators and freezers listed in Audit & Retrofit Protocols do not align with the equipment age used to determine eligibility for replacement (i.e., manufactured in 2011 or earlier) as listed in auditors' data collection forms.** A cross-jurisdictional scan of technical reference manuals (TRMs) determined that for refrigerators and chest freezers, the Audit & Retrofit protocol thresholds for energy consumption (925 & 615 kWh, respectively) imply that only models older than 2001 would be eligible for replacement. However, data collection forms list 2012 as the threshold for auditors and contractors to use when determining eligibility.	Lower the audit protocol thresholds for refrigerators and chest freezers to the NY TRM LMI baseline consumption for a refrigerator manufactured in the latest year IESO has determined is still eligible for replacement (2011) per the data collection forms included in project files. Specify separate minimum refrigerator and freezer consumption thresholds in Audit & Retrofit Protocols based on appliance configuration (e.g., upright vs. chest freezers).	Medium	The IESO will review the governing Audit and Retrofit Protocol document thresholds, as well as the Energy code requirements for appliances to assess the appropriateness of separating savings assumptions by appliance configuration.
6.	**Building trust, developing relationships, and directly engaging with the community is critical to the success of the program.** Distrust of government agencies and outside organizations or individuals was a major barrier to program participation mentioned by both IESO and program delivery vendor staff. IESO staff stated that this distrust often stems from the many issues generated by historical colonialism. To help address this barrier, the program worked to build relationships with community leaders and enlist the support of local delivery staff (see Finding 14 for more details on the program delivery model). One program contractor stated that building relationships was highly valuable and could positively impact customers' perceptions of the program and upgrades. The program delivery vendor reported the greatest determinant of whether the program would be successful in a community was having a local champion to work with community leaders and drive the program forward. The delivery vendor and IESO staff also stressed the importance of receiving buy-in from Chiefs and/or band councils to confirm the program's legitimacy and to build trust. Finally, IESO staff stressed the importance of providing continuous funding to First Nations programs, noting that it becomes difficult to build trust when the funding's timeline is uncertain.	Continue to hire local champions who are enthusiastic about the program's goals and continue to hire and train local auditors and contractors. Doing so will help to build local knowledge and provide a base from which to build trust. Receive buy-in from Chiefs and/or band councils to confirm the program's legitimacy. Consider a longer-term funding approach for First Nations programs to offer assurance that the program will be a continued presence in supporting remote First Nations communities.	Medium	The IESO will seek to ensure local champions are hired from within the community and provide training to local auditors and contractors. The IESO will also continue to develop relationships with both the Chiefs and/or band councils to establish support from the community for the program. As per the Mid-Term Review recommendations, the IESO supports a longer-term funding approach for CDM programming. In the government's Powering Ontario's Growth report, the government also acknowledges this; the IESO understands that this is ultimately a policy decision and that it is a consideration for the post-2024 CDM model.

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7.	**Additional opportunities exist to support program outreach and marketing.** In contrast to other Save on Energy programs, most RFNEEPP participants (12 of 15) heard about the program directly from someone in their community. One contractor thought that communication could be improved and encouraged the program to find ways to boost visibility. The interviewed Community Coordinator stressed that one of the most effective strategies for driving community awareness was through trusted community members who directly contacted their community through popular local pathways (e.g., community Facebook groups, radio, community events). The interviewed Community Coordinator also indicated that they found it most effective to have a community member reach out about the program, especially to avoid language barriers. Program delivery vendors said that while most in-person events and door-to-door canvassing were cancelled due to the pandemic, they are recommended as important ways to build relationships and to better understand the unique needs of each community.	Continue to reach out to communities through existing and popular communication pathways to share information about the program (e.g., social media, such as through community Facebook pages, or local radio). Provide communities with an array of customizable marketing materials to meet a community's needs, such as outreach scripts for social media and radio, or video or audio clips with testimonials from community members who have participated. Consider offering social media training sessions to Community Coordinators and/or Community Energy Champions to help them maximize the program's social media presence. Consider employing local staff (e.g., Community Coordinators, Community Energy Champions, or others as needed) to translate marketing materials into the communities' preferred languages. Future versions of the program are encouraged to increase the program's presence in group settings, such as lunch and learns, door-to-door canvassing, First Nations symposiums, and other local community events. Doing so will help to build relationships while informing communities members about the program and its benefits.	Medium	The IESO will continue its active marketing and outreach strategies that include launch events and symposiums. Collaborative efforts with First Nations communities are also being undertaken to foster more strategic opportunities. More specifically, the IESO is planning the 2023 First Nations Symposium which will help promote the program as well as provide trust among the communities. There is continuous collaboration with the IESO's Indigenous Relations group to continue to look for more strategic outreach and marketing opportunities and to develop launch events. There are also dedicated translated marketing materials created for the First Nations Programs that are shared on the IESO's social media feeds, website and other promotional materials.

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8.	**Expanding the scope of equipment offerings was a common improvement suggestion.** While most participants (12 of 15) indicated that the equipment and services provided through the program adequately met their needs, two recommended the program consider adding exterior lighting and ovens. The interviewed delivery vendor staff and auditors and contractors expressed a desire for additional ventilation equipment. The Community Coordinator recommended providing A-shape bulbs with cool white coloring, Styrofoam baffles (instead of carboard), and adequate funding for insulation updates. Two auditors suggested including additional equipment in the program, including heating equipment (such as heat pumps), upgrades to woodstoves, exterior lighting, and lighting controls. Both the program delivery vendor and the Community Coordinator reported participants were often very interested to learn that the program offered appliances. The program delivery vendor noted that the addition of freezers was welcomed by many community members who often store provisions for the winter.	Consider the feasibility of offering additional ventilation improvement support (see Recommendation 2a). Continue to explore the possibility of offering additional types and varieties of equipment. Examples provided by respondents included heating equipment (including cold climate heat pumps following grid connection), lighting in a variety of light color choices, Styrofoam baffles, ovens/stoves, exterior lighting, and lighting controls. Ensure that adequate funding is provided to insulation contractors for insulation upgrades. Continue to offer freezers in any future versions of the program, as they help remote community members store provisions.	Medium	The recommendation is accepted. IESO will conduct 1) annual reviews of the proposed new measures and product categories; 2) reviews of the weatherization measure cost caps; and 3) updates to program measures list and MAL, where relevant and appropriate.
9.	**Additional budget for health, safety, and other improvements is recommended.** Participants indicated that one of the most influential factors in their decision to participate in the program was to increase safety and reliability (average rating of 4.2 on a scale from 1 to 5 where 1 is "not at all influential" and 5 is "extremely influential"). The program delivery vendor reported that the budget for health and safety improvements enabled them to address some structural issues related to mold and mildew damage, to improve indoor air quality, and to reduce fire risk. However, the program delivery vendor and two auditors recommended that the program provide additional funding for health and safety upgrades because the existing funding was often not able to address all issues. They also recommended addressing other upgrades not currently covered by the health and safety budget, such as broken windows and repairs to roofs and floors, with one auditor stressing that it is important to treat the home as a system to ensure it is as safe and efficient as possible.	Consider increasing the budget for the health and safety upgrades in First Nations communities where housing stock may need more extensive health and safety upgrades. Consider expanding the range of improvements that can be made under the health and safety budget, to include structural upgrades (e.g., broken windows, or roof and floor damage).	Medium	The program does strive to address health and safety measures and balance this with improving efficiency. The IESO can analyse re-aligning the measure mix to balance assigned program measures with health and safety measures in the RFNP.

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10.	**Opportunities exist to improve the training and support provided to auditors and contractors.** To improve RFNEEPP, auditors and contractors most commonly (2 respondents) suggested creating standard operating procedures for the program, ensuring auditors and contractors are well trained and informed about all aspects of the program, and that program delivery vendor staff frequently check in to answer questions and provide support. Of the 15 participants who had either an at-home or virtual audit, only four said the auditor discussed additional ways to save energy in their home and five were offered guidance about additional upgrades for which they may be eligible. In addition, respondents were least satisfied with the professionalism of the post-audit contractor (average rating of 3.8). One program auditor stressed the importance of building local capacity through continuing to hire and train local auditors and contractors, recommending that new staff shadow experienced staff while they grow their knowledge base.	Ensure the program delivery vendor is offering training and education with regularity to ensure new auditors and contractors are well-informed about all aspects of the program and to provide refreshers to others. Ensure auditors are helping participants identify additional ways to save energy during the initial site visit. To improve the professionalism of auditors and contractors, consider offering training on customer service and relationship building tactics. Additionally, stress the importance of being responsive to any questions/concerns raised by participants during the visits. Ensure that new locally hired auditors and contractors are given the opportunity to shadow more experienced staff to help them quickly get up to speed.	Medium	Vendors currently provide auditors access to videos and training materials. The IESO will review the materials available for training and how they are currently being used to determine if there are additional opportunities to build upon the training and/or refresh the training.

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11.	**Opportunities exist to improve the training and support provided to Community Energy Champions and Community Coordinators.** Participants frequently learned about the program from a Community Energy Champion (three respondents) or Community Coordinator (two respondents), indicating that these staff serve important roles in informing communities about the program. The delivery vendor, auditors, and contractors reported several challenges when working with Community Coordinators including unreliable communication, language barriers, and insufficient knowledge about the program. Some of these challenges were likely greatly exacerbated by the impacts that the pandemic had on local communities and their members. One surveyed auditor said that better training for Community Coordinators could help the program overcome barriers to participation. The program delivery vendor reported that in communities where local support staff such as Community Coordinators were more engaged, there was typically higher program uptake. The interviewed Community Coordinator recommended that the program delivery vendor provide all Community Coordinators with more information to help them better explain energy savings associated with program upgrades.	To ensure that Community Coordinators and Community Energy Champions are best able serve remote First Nation communities in the future, provide them with in-person training and education early and often. If language barriers exist, enlist local community members to serve as translation support. Ensure there is frequent coordination between Community Energy Champions, Community Coordinators, auditors, contractors, and program delivery vendors. To help facilitate communications, set up frequent check-in meetings with key staff to reiterate messaging and check in about any challenges. To help Community Energy Champions and Community Coordinators better explain program savings opportunities to community members, provide them with pamphlets that explain energy savings estimates for program-eligible equipment and/or share methods for calculating customers' potential monetary savings after participation.	Medium	Training videos and in-person training to Community Coordinators is available. Additionally, vendors and Community Coordinators meet weekly to discuss workload, participation and any issues they are having.
12.	**Using shipping containers to send equipment to communities was a more cost-effective delivery approach than sending equipment via air.** The program delivery vendor explained that the program handled shipping issues well by sending shipping containers to remote communities in advance of the start of the program, while the ice roads were still operational. Doing so involved advance planning given that ice roads to ship the equipment on are available for a limited time during the year. They also reported that it was a more cost-effective approach than sending equipment by air.	Future versions of the program should continue to consider preparing and trucking in shipping containers with program equipment while the ice roads are still operational.	Medium	The IESO confirms this is included as part of RFNP.

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13.	**Virtual audits can collect the same information as in-person audits and can be more cost-effective, but they are much less effective at building relationships and keeping community members engaged with the program.** Auditors and contractors indicated that virtual audits, introduced to the program in some communities during the COVID-19 pandemic, are a viable option, but that whenever possible, in-person audits should be performed to help build relationships with the local communities. One participant who provided feedback about the audits suggested that audits only be done in-person.	Perform audits in person as often as possible, only offering virtual audits when in-person interactions are not feasible or when customers request them.	Medium	The IESO agrees in-person audits are preferred. Virtual audits were agreed to during the RFNEEPP because communities were closed to limit the spread of COVID-19. Virtual audits continue to remain as an alternative if needed.
14.	**The COVID-19 pandemic heavily impacted many of the program's planned activities and its overall reach.** The program delivery vendor reported that RFNEEPP had been off to a strong start before it was upended by the COVID-19 pandemic. They explained that they had a good delivery model in place based on building relationships through in-person interactions and close coordination with local communities. The program delivery vendor reported having hired a strong technical team to work with local staff to perform audits and installations. Additionally, the program delivery vendor had initiated local partnerships in participating communities (e.g., through hiring Community Coordinators and enlisting the support of Community Energy Champions). However, once the pandemic took hold, different communities implemented varying COVID-related policies and restrictions, and priorities shifted to ensure lockdowns were observed. Once restrictions were lifted, some work was able to resume, but many communities had been severely impacted and were not able to participate to the same degree that was initially planned.	N/A	Medium	