



Identifying Barriers to Linden Energy Saving Programs

Project Report

AEDECON 4567: Assessing Sustainability

In Response to: City of Columbus RFP Solicitation Number EEDS009

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Executive Summary

The goal of our project was to provide focus to the Community Energy Savers (CES) program being administered through AEP Ohio and Columbia Gas by identifying barriers to resident participation in the program. The CES program incentivizes energy efficiency through in-home energy audits and various rebate programs. Each time a resident participates in one of these programs they earn points for the community that go towards a goal set for the entire neighborhood. The CES program is currently being implemented in Linden, a neighborhood in the Northeast area of Columbus. After speaking with contacts at AEP Ohio and Columbia Gas, along with the Linden Energy Savers working group (a subset of the CES program), our team created a survey to identify possible barriers to participation that residents in Linden may face when participating in energy saving programs.

Despite our team having limited survey results thus far (n=15), some compelling preliminary findings have emerged. Most notably, residents are unaware of the many energy efficiency programs offered by both AEP and Columbia Gas. Without sufficient knowledge of these programs, residents are very unlikely to participate. An additional barrier to participation exists when looking at in-home audits. The suggested amount of time for an energy audit conducted by Columbia Gas is four hours, but our findings indicate that residents are unwilling to dedicate any more than two hours to this process. Our results also suggest that Linden residents have a very short time horizon for cost-saving programs. That is, if residents do not see quick savings, they are less likely to participate in the program. Finally, residents expressed frustration with being

over studied, “poked and prodded,” and the subject of many socio-economic programs that fail to come to fruition. This history of unfulfilled commitments has led to a strong sense of distrust in the community toward outside researchers that are unfamiliar with or not from the area. This high level of distrust makes Linden residents reluctant to engage with researchers and participate in programs.

To get more participants to complete in-home energy audits, our team suggests using a tiered system where residents can choose options that vary in intensity and time commitment. We also suggest that the CES emphasize increased comfortability over efficiency savings since a number of low-income residents participate in the Ohio PIPP (Percentage of Income Payment Plan) assistance program where a percentage of annual income is paid to utilities regardless of actual use. The PIPP program was established as a way for low-income individuals to avoid paying utility bills based on usage as this would result in a large proportion of their income being spent on energy. To increase trust between the community and CES, we suggest making allies with individuals in the community that speak Somali, Arabic, or Spanish. Our team also suggests hiring advocates of the CES program from within the community to strengthen trust and improve participation. These individuals would not only be more trusted in the community but would have a greater understanding of specific challenges for residents face. Lastly, our team identified the necessity of having trusted champions from within the community who could vouch for the character and sincerity of outside researchers and program staff to establish support from residents.

Introduction

The purpose of our research was to identify barriers to participation for the CES program in the Linden neighborhood. Energy savings programs by AEP Ohio and Columbia Gas will improve the quality of life for residents in target neighborhoods by increasing comfortability within the home and freeing up financial capital to be spent on other necessities. Many home efficiency upgrades are available to low-income residents by AEP Ohio and Columbia Gas at a free or reduced cost, but participation in these energy savings programs continues to be low. By surveying the Linden community, our team identified the most significant barriers to adoption so that these can be targeted in future strategies and plans.

Increased energy efficiency not only benefits residents, but also aids the city in reaching their sustainability goals in the area of “Climate & Energy.” The 2018 Franklin County Energy Study proposes a 20% reduction in energy consumption, and Columbia Gas has reported that average cost-savings from home weatherization is 28% annually.

Successful implementation of AEP Ohio’s CES program can contribute significantly to achieving the city’s sustainability goal of energy reduction and climate change mitigation.

Our project goal was to provide focus to the Linden Energy Savers working group, so it can improve and enhance its work with low income neighborhoods and affect meaningful change in these communities. To achieve this goal, our team outlined and completed four key actions.

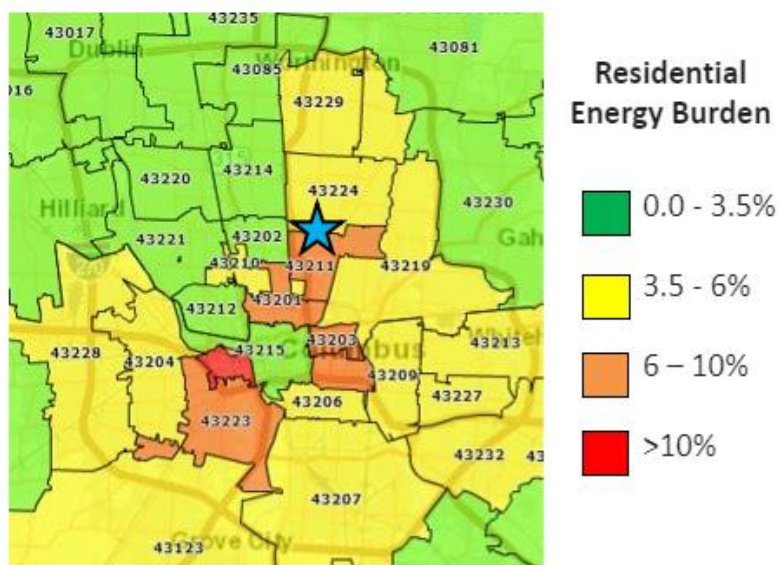
Key Action Items

1. We attended weekly meetings with the Linden Energy Savers working group led by AEP Ohio's Mike Lascola. Attending these meetings in person, or calling in, kept us connected to key stakeholders in the Linden community.
2. We developed a survey tool (available in Appendix as "Attachment 1: CES Survey Instrument") that was distributed to Linden neighborhood residents. Our survey was designed to explore which energy savings programs residents are familiar with and identify barriers to participating in such programs.
3. We analyzed the survey data and reflected on various conversations with community members to make recommendations to the Linden Energy Savers working group. Survey and field data (available in Appendix as "Dataset #1: Linden Survey Responses") provided a more refined marketing and implementation strategy for the CES program in opportunity communities.
4. We conducted a number of informal interviews with the Linden Energy Savers Working Group, key community leaders in Linden, and with Linden residents. These interviews helped us identify potential barriers to participation and influenced the design of our survey

Study Area

Linden is a neighborhood located in the northeast portion of Columbus and has been the focus of many economic development efforts. The median household income in Linden is \$29,000 (in comparison to Columbus which is \$63,700), and more than 30% of households in this area are below the poverty line, which is almost 2.5 times the national average.

Figure 1: Residential Energy Burden



This map (Figure 1) shows the residential energy burden of Columbus and surrounding areas by ZIP code. Residential energy burden is a measure that compares average annual residential energy costs to median household income and has an accepted national average of 3.5

percent; a level of 6-10 percent is considered to be “unaffordable,” and greater than 10 percent to be “energy poverty.” Individuals in the Linden neighborhood (indicated by the blue star) are more likely to spend a disproportionate amount of their income on utilities due to the overall lack of sufficient energy-savings measures such as LED lighting and efficient insulation present in the community.

Thus, given the neighborhood’s high energy burden and lack of energy savings measures, administering a program designed to save energy, and consequently money,

would benefit Linden residents immensely. AEP Ohio is currently implementing its CES program in the Linden community, and our team was tasked with identifying barriers to participation in the program. The CES program partners with a community to incentivize residents to participate in energy saving programs provided by both AEP Ohio and Columbia Gas. Each time a resident participates in one of the programs, they earn points for the community that go towards an end goal. Linden's success in the program will be rewarded with improved exterior lighting on the playground of the Hamilton STEM Academy in addition to water heater upgrades for other schools in the community.

Data Collection

Conducting a survey was our team's primary method for gaining more information about the Linden Neighborhood and the barriers that may exist in adopting the energy saving programs, more specifically, the CES program offered by AEP and Columbia Gas.

Before implementing the survey, it was vital for us to reach out to several companies and organizations that are familiar with the Linden Neighborhood and understand the unique challenges of operating in the area. Establishing these relationships helped us to better focus the project and allowed us to develop more effective research methods.

The companies and organizations we regularly communicated with included: AEP Ohio, Columbia Gas, Sustainable Columbus, GreenSpot, Mid-Ohio Regional Planning Commission (MORPC), and The Ohio State University.

Figure 2 provides an illustration of the specific companies and organizations we collaborated with throughout the project. The green color represents groups that have collaborated with the CES program, and red represents groups that the program has not successfully collaborated with. The four categories of groups our team contacted were educational organizations, governmental organizations, faith organizations and cultural organizations. Sustainable Columbus, the Department of Neighborhoods and Hamilton STEM Academy have all successfully collaborated with the CES program. Saint Stephen’s Community House, New Salem Baptist Church, Ohio Hispanic Coalition, Somali Community Association of Ohio, and The Ohio State University are organizations that have yet to collaborate successfully with the program and build a meaningful relationship. These are respected organizations and we see great potential

Figure 2: Social Network Map



in the value they could bring to the CES program in Linden. It was through our collaborations with our various points of contact that we were able to distribute our surveys at the Linden Community Meeting and AEP and Columbia Gas' CES Kick-Off Event.

The Linden Community Meeting had a great turnout but was surprisingly comprised of mostly non-Linden residents. The individuals that attended were mostly people who grew up in Linden or had once lived in the neighborhood and have since moved out to the surrounding communities. Despite this unexpected occurrence, the data gathered from this meeting was still useful in gaining an understanding of peoples' barriers to the energy saving programs in general and was helpful in creating more collaboration efforts for our team. The Energy Savers Kickoff Event was held at Hamilton STEM Academy just before one of their intramural basketball games. In addition to having people participate in our survey as they passed through the entryway to the game, our team assisted AEP Ohio and Columbia Gas associates with sign-ups for the Energy Savers Program, which is shown in Images 1 and 2.

A key takeaway from our research is that Linden has been over-studied with surveys and focus groups. Companies and organizations continue to promise results but fail to deliver the meaningful change that the community was expecting. This has resulted in residents feeling skeptical toward new initiatives. This lack of trust was apparent to our

Image 1: CES Kickoff Event



Morgan helping a community member sign up for the Energy Savers program.

team through the failed collaborations we attempted to establish. Stronger trust must be established between residents and staff if the CES program is to be successful.

Research Findings

Though we lacked a statistically-significant volume of survey responses, our results and interviews showed similarities in the barriers residents are facing. We found that residents lack knowledge of the programs, have short time horizons for cost savings, high opportunity costs for their time, and are unwilling to share knowledge of the program with their neighbors. In addition, renters are less likely to participate in the program compared to home owners.

Preliminary results from our surveys showed residents of Linden lacked knowledge of AEP Ohio and Columbia Gas energy efficiency programs. Residents also displayed an unfamiliarity with the types of appliances they had in their homes and what kind of upgrades they could make to improve energy efficiency. This baseline knowledge is necessary to give residents a reason to participate in the program.

We also found that residents had comparatively short time horizons for cost-saving programs. Residents were less likely to participate in an energy efficiency program if the

Image 2: CES Kickoff Event



Jessie sharing information and materials at the CES Kickoff Event in Linden

program had a high upfront cost or if savings were small and accrued over a long period of time. AEP Ohio and Columbia Gas energy efficiency programs do offset most of the upfront cost, but many of the programs operate on a rebate system meaning residents must still have financial resources available to participate in the programs.

Residents also displayed high opportunity costs for their time. While the financial costs of these programs were mitigated, many of the programs required participants to invest time in familiarizing themselves with the energy appliances in their home and completing applications. Since many residents have no prior knowledge of these energy efficiency programs, they must invest a significant amount of time researching the program to understand its benefits. Because of these factors, the benefits of the programs can seem very distant, so investing that time into an area that will reap immediate benefits is often a more attractive alternative.

The CES program originally planned to rely on word of mouth to spread knowledge of the program, but residents have expressed an unwillingness to share information about the program without incentives. This could be a result of past programs not fulfilling promises made and thus leading to a general distrust for outside organizations attempting to create change in the community. Willingness to share information may increase as the program becomes more established in the community and more residents adopt, but for now alternative means of disseminating information must be pursued.

Our initial interviews with AEP Ohio employees identified a likely barrier to participation would be the high rate of renters in the Linden neighborhood. Renters have been found to be less likely to invest in energy efficiency programs as they are unsure of how long they will be residing in their current units. Targeting property owners in the Linden community could prove advantageous since investing in high-efficiency appliances for their units would reduce utility bills for either themselves or their renters. The willingness to invest in these programs may be higher for property owners than residents that reside in the homes or apartments.

Recommendations

To better understand barriers to energy savings programs in the Linden neighborhood, more conclusive survey results are required. Our team expects that additional time and/or incentives dedicated to this project would result in greater survey participation in the future. However, preliminary survey data and a wide variety of personal conversations have identified several key recommendations for the Linden Energy Savers working group and others pursuing engagement in the Linden neighborhood.

Our team recommends utilizing best practices for distributing the barrier assessment survey tool we developed in addition to the home auditing surveys used by AEP Ohio and Columbia Gas. It has proved beneficial to administer these surveys in-person rather than sending them out virtually to be taken individually. This allows survey-takers to ask questions if they are unsure about survey content or wording. Administering the survey

in person also puts a face to the program and builds trust with members of the neighborhood.

Establishing trust with a well-attended community organization allows for further survey distribution. Trust is a critical concern in Linden given its history of intense study by the Ohio State University and other well-intentioned organizations. Once trust and a point of contact has been established, we recommend that survey distributors either: 1) Identify established community events within the organization where time can be dedicated to filling out a survey or, 2) Hold informal, public events for the community where residents can engage with surveyors. In either case, incentives of some sort, most likely food, are recommended for the greatest participation. Furthermore, program participation can be encouraged by utilizing social media to reach residents and incentivizing participants to post about the program.

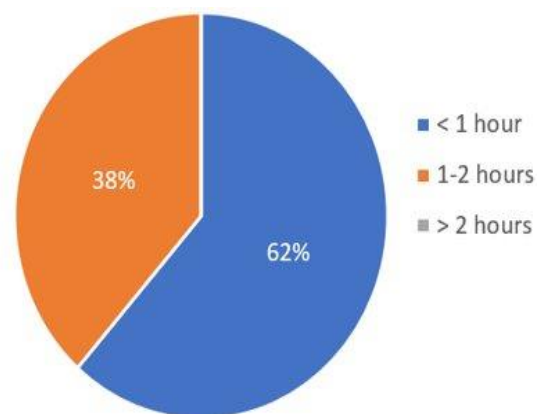
We have several recommendations specific to the CES program. One of the point-earning programs offered by Columbia Gas is an in-home energy audit that covers both safety and efficiency inspections. These inspections involve trained energy auditors reviewing and installing free energy-efficiency upgrades, and the full audit takes three to four hours. For residents that are deterred by a complex online survey, in-home audits could prove to be a much better option. However, despite the audit benefits, none of the Linden residents surveyed in our research were willing to spend more than two hours of their time on an energy efficiency audit (see Figure 3).

For this reason, we recommend that Columbia Gas offer shorter versions of their in-home audit.

The current three to four-hour audit awards one point toward the CES goal. If a less-detailed audit that only takes 1.5 hours is made available for half a point, greater participation and overall energy savings may be achieved. This shorter audit could increase the willingness of residents to eventually participate in a more comprehensive audit by building trust with auditors through observable gains in efficiency and comfort. Thus, a tiered auditing system that offers inspections which vary in intensity and time may be the solution to the time barrier assessed for this specific program.

More generally, our team suggests that marketing for the CES program emphasize increased home comfortability and safety over energy efficiency. Energy saving upgrades can reduce the amount of heated or cooled air that escapes a home, creating a more comfortable living area. Regulating indoor air temperature is especially important when experiencing extreme weather events like a heat wave or polar vortex. Safety can be improved by upgrading old boilers and air conditioners with newer energy-efficient models that are more reliable and less likely to fail under added operational stress. Furthermore, many residents of Linden already receive low-income

Figure 3: Amount of Time Willing to Spend on an Energy Audit



Preliminary results from our survey showing the amount of time residents are willing to spend on an energy audit of their home. Columbia Gas energy audits take 4 hours to complete.

related energy cost reductions and thus pay a proportion of their income for energy every month, regardless of actual usage. Therefore, efficiency and cost-savings may not then be a priority for these individuals.

In addition, survey data suggests that residents who rent their homes have short time horizons and may not value the cost-saving benefits of energy efficiency upgrades. However, comfortability during hot summer and cold winter months is important to residents and can be improved if a home is properly weatherized. In addition, safety may also be more tangible and foremost in the minds of Linden residents. Furthermore, preliminary survey data showed that residents prefer programmable thermostats and LED light bulbs in their homes over other energy efficiency upgrades. Emphasizing the availability of these upgrades being “free” could encourage residents to take part in either the online or in-home energy audits available through the CES program.

Next, our team recommends that AEP Ohio and Columbia Gas contribute funds to hiring additional community advocates to work for the CES project. IMPACT community action, a local nonprofit group, has donated \$75,000 to hire Linden residents as community advocates for the CES initiative. As a community advocate, residents will be trained to perform in-home audits among other things. The original donation will allow for three advocates per community and will pay a reasonable wage of \$15 per hour for 20 hours a week until the program ends in July. Any additional contribution to this fund will be put towards hiring more community advocates, a “boots on the ground” effort that may be wholly necessary for a successful CES campaign in the Linden neighborhood.

Not only does this effort help the community by hiring the residents it is trying to reach, it also makes the program more tangible as the selected advocates provide information about their jobs and program benefits to their friends and families.

Furthermore, our team recommends that at least one Somali and/or Arabic speaking and one Spanish speaking community advocate be hired. Both North and South Linden are home to significant populations of foreign-born residents primarily from African countries including Ghana, Somalia, Kenya, and Morocco. Certain census tracts, such as tract 007722 on the northern edge of Linden, have a population of more than 16% being foreign-born. The CES working group has taken measures to work with different cultural groups by collaborating with the Somali Community Association of Ohio (SCAO) to translate their promotional materials (including flyers and handouts). However, our experience has suggested that a “boots on the ground” community engagement is far more effective in these neighborhoods. Therefore, we believe that hiring multilingual residents to reach these areas and attend networking events on behalf of the CES group may increase participation from these important populations.

We strongly recommend an extension or partial award should Linden not reach its energy savings goal by July 15th, 2019. Unlike CES programs of the past, Linden is a low-income neighborhood rather than a community. It diverges from past programs in that the area lacks a central governing body specific to the area— such as the mayor and council of successful previous project location North Canton. It is reasonable then

to assume that additional investments in time and allocated funds must be made to make trustful connections and ensure the CES program success here.

Residents invested in the program, including community leaders at Hamilton STEM academy, are expecting to receive the promised \$35,000 for exterior lighting upgrades and water heater upgrades. If the goal is not met in July, and the schools are let down, residents will likely place blame on AEP and Columbia gas for the failure. While the Linden CES program is just beginning, there should still be a management plan in place to preserve trust if this challenging goal is not met.

Conclusion

The Community Energy Savers program has encountered new challenges with adoption in the Linden community. After preliminary surveying of the Linden community, we found five key barriers to participation in the CES program:

1. Lack of knowledge of the programs offered,
2. Short time horizons,
3. High opportunity costs of time,
4. Unwillingness to share knowledge of the program with neighbors,
5. Renters less likely to participate in the program.

We recommend forming allies within the community who speak Somalian, Spanish, and Arabic who could help educate individuals on available energy efficiency programs and the benefits of participating. Offering residents less intensive energy audits would also reduce barriers to participation. The tiered approach would allow residents to choose

how long they are willing to spend on an audit. The stipulation to this approach would be that if a person chooses to spend less time on an audit, they may not earn as many points within the CES program toward the community goal.

The Linden community has been over-studied and under-invested in, with residents lacking trust in the ability of outside organizations to create change. The CES program will need to adapt its methods to encourage better adoption in Linden, and in future neighborhoods. Our recommendations, while preliminary, suggest that several key barriers will need to be addressed quickly. We encourage the Linden Energy Savers working group to adopt our suggested changes and expand upon our research.

Appendix

Figure 1: Residential Energy Burden

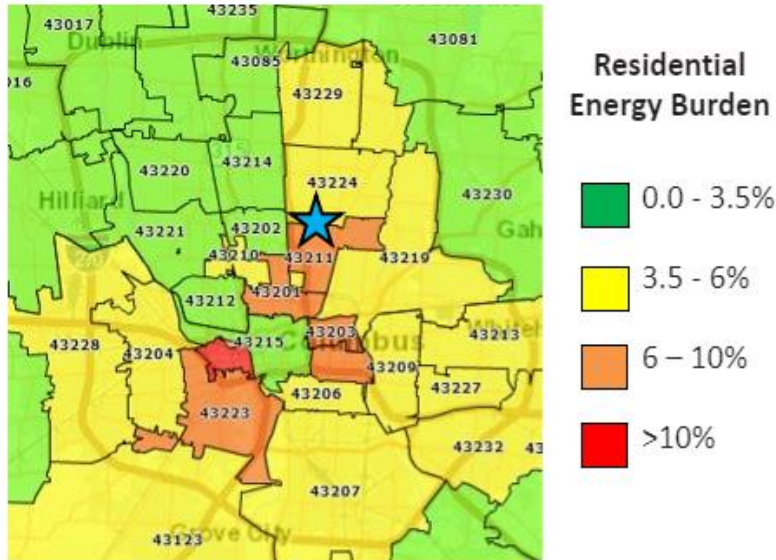
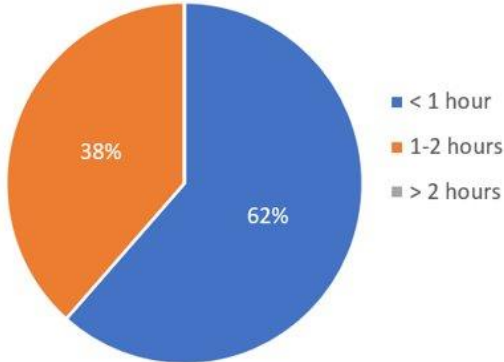


Figure 2: Social Network Map



Figure 3: Amount of time Willing to Spend Time on an Energy Audit



Attachment 1: CES Survey Instrument**Community Energy Savers Survey****1. Are you a Linden resident?***Mark only one oval.*

- Yes
 No

2. What best describes your living situation?*Mark only one oval.*

- Rent
 Own
 Live with parents/family

3. How many people currently live in your household?

4. Please select the AEP Ohio residential energy savings programs with which you are familiar.*Check all that apply.*

- Appliance Recycling- AEP pays you to have your old, inefficient refrigerator or freezer picked up & recycled
- Rebates for Your Home- Cash-back for purchasing an ENERGY STAR certified appliance
- Free Home Energy Profile- Answer questions online about your energy use & get recommendations for saving energy and a free energy efficiency kit
- Multifamily Direct Install- If you are the owner or manager of a multi-family building with five or more units, receive a free energy assessment and free installation of energy-saving products in all units.
- Community Assistance Program- Provides free energy efficiency and repair services to income eligible customers.
- I have not heard of any of these programs

5. Please select the Columbia Gas residential energy savings programs with which you are familiar.*Check all that apply.*

- WARMCHOICE- Provides no-cost energy efficiency services and natural gas appliance repair or replacement to income eligible homeowners and renters
- Product Rebates- Instant rebates on programmable and smart thermostats, showerheads and faucet aerators.
- Appliance Rebate Program- Provides rebates for high efficiency residential natural gas furnaces, boilers, water heaters and tankless water heaters
- Home Energy Audits and Rebates Program- includes comprehensive draft and cold air leakage testing, a safety check of your natural gas furnace, a personalized home report and access to generous rebates
- EfficiencyCrafted Homes Program- Columbia Gas helps you to build a home that is at least 30 percent more energy efficient than code-built homes
- I have not heard of any of these programs

6. If you were given a high-efficiency LED light bulb, would you use it in your home?

- Yes
 Maybe
 No

7. For the following statements, please tell us how much you disagree or agree with each by selecting the corresponding answer. I am comfortable with...

Mark only one oval per row.

	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
letting a professional survey my home to provide a personalized report of my home's efficiency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
letting a trained member of my community survey my home to provide a personalized report of my home's efficiency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
taking an online survey that will assess my home's efficiency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Would you prefer:

- Taking an online survey
- Having a professional come into my home to identify where I'm losing energy
- None of the above

9. How much time would you be willing to spend to participate in an energy efficiency program if it saved you money on your utility bills in the future?

- Less than an hour
- 1-2 hours
- 3-4 hours

10. Which of the following energy-efficiency upgrades would you most like to see in your home?

Please choose 3.

- More energy efficient shower heads
- Programmable thermostat
- Door draft stopper to stop heat from escaping your home
- LED light bulbs
- More energy efficient faucet fixtures
- Insulation wrapped around pipes to decrease heat loss

11. Choose the response that most accurately describes your relationship with your landlord.

Mark only one oval.

- My landlord is responsive.
- My landlord is nonresponsive.
- My landlord is difficult to contact.
- My landlord has previously denied requests to repair things.
- I have minimal contact with my landlord.
- I do not have a landlord.
- Other: _____

12. Would you be willing to speak with your landlord about energy efficiency upgrades in your home?

- Definitely yes
 Probably yes
 Might or might not
 Probably not
 Definitely not
 I do not have a landlord

13. How likely are you to talk to your neighbors about getting a free energy efficiency survey of their home?

- Very likely
 Likely
 Somewhat unlikely
 Highly unlikely

14. Please select any factors that would prevent you from seeking out a free professional home energy audit (Select all that apply).

- Takes too much time
 I do not want a stranger in my house
 I do not own my house
 I don't have money to upgrade my home
 I do not know how to install upgrades
 My landlord will not let me make upgrades
 I do not want to know how to make my house more energy efficient
 No factors prevent me from seeking a professional audit
 Other: _____

15. Please select any factors that would prevent you from seeking out a free online home energy survey. (Select all that apply)

- Takes too much time
 I do not own my house
 I do not have access to the internet
 I am worried about my personal information being on the web
 I am afraid of inputting the wrong thing
 I do not want to know how to make my house more energy efficient
 No factors prevent me from seeking an online audit
 Other: _____

16. Please indicate your annual household income before taxes?

- Under \$15,000
 \$15,000 to \$24,999
 \$25,000 to \$34,999
 \$35,000 to \$49,999
 \$50,000 to \$74,999
 \$75,000 to \$99,999
 \$100,000 or more

Data Sources

Dataset #1: Linden Survey Responses.xlsx

Source: Responses from residents in the Linden area

Description: Excel file containing questions and results of conducted survey. This data was used to identify barriers to participation in energy-saving programs to guide future strategy of the CES program. Surveying was completed in a variety of locations in the area, including the Linden Columbus Metropolitan Library, Linden Community Center, and the Hamilton STEM Academy. The survey was administered using both electronic and paper formats.

Dataset #2: 2018 Franklin County Energy Study.pdf

Source: MORPC website; accessible at: <http://www.morpc.org/wordpress/wp-content/uploads/2018/06/2018-Franklin-County-Energy-Study.pdf>

Description: Energy Study conducted by the Mid-Ohio Regional Planning Commission (MORPC) in 2018 on behalf of Franklin County. This report was used to understand historical energy accessibility issues in Linden and understand what is currently happening in the area. Data from this report was also used to generate "Figure 1: Residential Energy Burden".

Dataset #3: 2018 Franklin County Energy Study Recommendations.pdf

Source: MORPC website; accessible at: <http://www.morpc.org/wordpress/wp-content/uploads/2018/06/2018-Franklin-County-Energy-Study-Recommendations.pdf>

Description: Recommendations based on Energy Study conducted by the Mid-Ohio Regional Planning Commission (MORPC) in 2018 on behalf of Franklin County. This report was used to inform best practices for reducing energy burden in low-income areas. Data from this report was also used to generate "Figure 1: Residential Energy Burden".

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