

Executive Summary

The City of Urbana and the local utility provider, Ameren Illinois, ran a program between August 2010 and December 2012 to encourage improvements in household energy efficiency. Homeowners in Urbana were eligible to participate in free home energy audits. Further, homeowners who chose to upgrade the insulation in their homes received rebates, averaging about one third of the total project cost. The City of Urbana's contribution to this program was funded by an Energy Efficiency and Conservation Block Grant from the U.S. Department of Energy.

The purpose of this research is to understand the different factors affecting the household decision regarding whether to participate in the Urbana-Ameren energy efficiency program. This project was completed as a Master's thesis in the department of Agricultural and Applied Economics at the University of Illinois Urbana Champaign. The results may be useful for city administrators to understand which aspects of the program were most effective, and where future programs could be modified to achieve optimal participation levels. In addition to a summary of the analyses performed in the study, several recommendations for future program design are presented. The general recommendations for future programs, discussed later in more depth, are:

- 1. Address the large number of rental properties in Urbana.*
- 2. Engage the entire population of Urbana by including a variety of incentives for a more diverse set of participants.*
- 3. Utilize strong social networks within the City to spread program awareness.*

These recommendations could be applied to a second stage of the energy efficiency program (for which survey results suggest an interest), or more generally to a variety of programming situations.

The study draws on techniques from spatial, regression, and social analysis to understand the motivation behind household program participation. Spatial analysis methods were used to test the hypothesis that households located near other homes that had already participated would be more likely to also participate because of certain cues, both visual (i.e. contractor sign in the yard) and social (i.e. discussing the program with neighbors). While no distinct patterns of dispersion were found, it is clear the participants were clustered in various neighborhoods, suggesting the cues could play a role.

The regression analysis looked separately at the audit and retrofit subsidy phases of the program to understand the importance of socioeconomic factors and financial incentives on each participation decision. Testing the influence of socioeconomic characteristics and subsidy payments can assist in targeting resources for future programs, and can distinguish the importance of the project rebates from the general effect of the raised awareness the program created. It is found that two important predictors of participation are high income and education levels. The expected subsidy payment appeared to be a significant predictor for retrofit

participation but was not the singular determining factor, leaving open the possibility that raised awareness without payments could also encourage action.

The final analysis relied on data collected through a survey of Urbana residents to determine the relationship between the strength of neighborhood relationships and program participation. The hypothesis was that in areas where neighbors interact more frequently, there is a greater possibility they will discuss the program, and therefore participation might be higher. This analysis found that areas with higher levels of participation in the retrofit stage of the program also had more connected neighborhoods and higher levels of awareness of neighbors' participation and attitudes towards the program. The survey also provided residents with the opportunity to discuss their reasoning for participating, or not, in the program. Issues presented in these responses are addressed in the recommendations.

The program aimed to reduce the town's demand for home heating fuel in the most efficient manner possible given the funding available. The choice to cover the audit costs was extremely effective. Before investing time and money into projects to increase efficiency, it was important for households to know what magnitude of return to expect. Of the 137 households that received a rebate for upgrading their insulation, only 17 did so without first having an audit. Previous studies have shown that information provision greatly reduces the risk of investment. In this case, the information provided to the homeowners through the energy audit reduced the uncertainty of the project, and therefore increased their likelihood of participating in the retrofit stage, where the real reduction in energy demand was realized. The audits also allowed homeowners to realize if it would not be cost effective for them to proceed with an insulation project, thus eliminating inefficient spending.

The program aimed to improve the energy efficiency of 800 homes. While over 800 homes did have some involvement with the program, only 127 of those completed an insulation upgrade through the program. It would not be efficient to expect all audited homes to retrofit, seeing as the objective of the audit is to determine the potential for savings and not all households had cost effective upgrades available. However, there is still an opportunity to reduce energy demand in more households in Urbana. Through the various analyses of this study, several suggestions emerge for the design of future programs:

1. Address the large number of rental properties in Urbana.

Almost two-thirds of Urbana housing units are occupied by renters, rather than by homeowners (compared to a national average of 35%). Rental properties need to be addressed not only because they make up such a large proportion of the city, but also because they present a unique set of challenges in regards to energy efficiency. Often, the landlord has the authority to contract insulation improvement projects and bears the financial costs of the project, while the tenant is responsible for making the utility payments. In such a scenario, the landlord has less incentive to improve the efficiency of the building than they would if they bore the utility payments, and the tenant, who would be willing to pay for a project that increases the efficiency of the home and lowers utility payments, is unable to do so. The City could offer incentives to landlords to correct a market failure. Because these properties have not been previously addressed, there are likely to be many "low-hanging fruits", or old and inefficient buildings that can see large improvements in energy efficiency.

2. Engage the entire population of Urbana by including a variety of incentives for a more diverse set of participants.

Most of the participants tend to live in areas with above average income and education levels. This is to be expected because higher income households are more able to supply the capital needed for the initial investment. Also, studies have shown that people with higher education levels tend to have higher levels of environmental concern and might be further motivated by the environmental benefits of reducing energy demand. Because of the upfront cost of retrofitting, low income households may not have been able to participate even with the available rebates. Similar programs in other cities have had success through providing financing options to low-income households so that they too can realize the long term savings of a more efficient household. Additionally, marketing materials can be targeted more towards the demographic of interest, for example, emphasizing the environmental benefits of an upgrade to high income households, while emphasizing the energy cost savings to households with lower incomes. Finally, many households stated in their survey responses that they were uncomfortable with a stranger coming into their home to perform the energy audit. It is possible that requesting a more diverse group of auditors could mitigate some of this hesitation. Further, training community members to perform the audits in their own neighborhoods might make more homeowners willing to be audited and generate community empowerment.

3. Utilize strong social networks within the City to spread program awareness.

The most frequent response provided in the surveys for why a household did not participate was that they were unaware of the program. In addition to advertising through mailings with energy bills and print or radio media, future marketing could utilize the relationship between neighbors to spread information. This study found that households that knew their neighbors either already participated in the program or would view the program favorably were more likely to participate themselves. This is due to both the value of following socially acceptable behaviors and the reduced risk in participating because of the additional information one can learn through others' experiences. Therefore, introducing program components that would increase the sharing of program information from neighbor to neighbor could greatly improve participation rates. Such aspects could include additional rebates for referring a friend to the program, or higher rebates for the first household in a neighborhood to sign on. The first household in a neighborhood is assuming more risk, both socially and financially, and an additional incentive could lessen this risk and extend the scope of program awareness. Urbana is comprised of a variety of tightknit neighborhoods where this strategy could be effective.

The Urbana-Ameren energy efficiency program was successful in reaching a wide audience and generating interest in household energy efficiency. The survey results indicate that there is a market for further programming, with 43% of surveyed households that did not have an audit or retrofit stating they would be interested in participating in a similar program in the future. If funding became available, a second stage that targeted demographics underrepresented in the

initial group of participants, such as low income and renter occupied households, is likely to be an efficient way to extend the reach of this program. Urbana has proven to be a leader in municipal environmental programs, and these findings can be utilized by city administrators as they continue to develop successful programs.