

Toward Increased Energy Efficiency in Tucson:
Evaluating an Energy Efficiency Workshop for Tucson Businesses

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Executive Summary

On March 27, 2015 City of Tucson Mayor's Office the delivered a half-day workshop hosted by Tucson Electric Power for local organizations to discuss the economic benefits associated with energy efficiency as well as financing options for energy efficiency projects. The primary purpose of this project was to evaluate the impacts of this workshop; specifically, my objectives were to gather feedback from participants to improve future workshops, and follow up with participants through surveys and interviews to determine whether attending the workshop led to the implementation of energy efficiency measures among participating organizations. A control group of non-participating organizations was also surveyed to compare workshop participants with the broader population of Tucson businesses. An additional goal of this project was to collect data related to opinions about energy efficiency in the context of organizations to understand what motivates organizations to increase energy efficiency or invest in renewable energy.

The workshop consisted of: 1) presentations from Tucson's Mayor, Jonathan Rothschild, representatives of Tucson Electric Power and Tucson Water; 2) testimonials from a panel of local businesses and non-profits followed by a question and answer session with panelists; and 3) a keynote presentation by a resource economist on the economic benefits of increasing energy efficiency. About 900 organizations were invited to the workshop and about 130 people participated. Participating organizations varied widely in number of employees, with small businesses showing the greatest representation. The majority of participants came from for-profit businesses, but non-profit organizations and government entities were also represented. Participants represented organizations in more than 15 sectors.

Participant feedback from the workshop was overwhelmingly positive. Survey respondents noted a number of elements they especially liked about the workshop, including the panel of business leaders, discussions on energy audits, presentations from energy experts, presentations on rebate programs, the presentation by the keynote speaker, Skip Laitner, and the opportunity to network with other businesses and government agency employees. Respondents were most enthusiastic about the panel of business leaders, specifically that the panelists offered practical advice from a variety of perspectives and presented a multitude of benefits associated with enhancing energy efficiency, from cost savings to environmental benefits.

Some of the short-term outcomes included encouraging conversation in the workplace about energy efficiency and spurring interest in attending future workshops. Also as a result of the workshop, many participants signed their businesses up for energy audits and some participants had implemented an energy efficiency project within 6 months.



Introduction

There is broad consensus within the scientific community that human actions—namely rapid and unsustainable emissions of greenhouse gases (GHG)—are negatively affecting the climate system. The average global temperature has already increased over the past century, and is projected to rise by between 1.5 and 2.0°C by the end of the 21st century depending on future GHG emissions. The vast majority of scientists also agree that immediate and significant actions are needed to reduce GHG emission to avoid catastrophic and potentially irreversible impacts to the climate system (IPCC, 2013). The consequences associated with increasing GHG emissions and rising temperatures, some of which include melting of sea ice and permafrost, changes in precipitation and increased frequency and severity of storms and extreme weather events, will negatively impact human populations and ecosystems worldwide. Some populations of people are more vulnerable to impacts than others, but there is no doubt that the costs associated with adapting to climate change will disrupt livelihoods and economies globally (IPCC, 2013).

Despite increasing scientific certainty, concern over climate change is decreasing in the U.S and many other Western countries, as is support for mitigation policies (Leiserowitz et al., 2013; Rosentrater et al., 2012). Even where high concern of climate change is reported, the issue ranks relatively low compared to other countries (Pidgeon, 2012); this trend has been frequently observed in recent years and has been dubbed the “climate paradox,” that is, the gap between understanding the problem of global climate change and action taken to mitigate it. In the absence of policies and regulations that impose emission reduction requirements, efforts are needed to facilitate and encourage voluntary actions. However, there are a number of barriers to “converting” deniers and to motivating believers to act, which together reveal the true complexity of the problem (Stoknes et al., 2014). It is important to understand the factors that influence peoples’ perceptions of a given problem, such as climate change, to understand how to appeal to them so that changes in opinions or behaviors might occur.

The concept of “framing” refers to the way information is presented to an audience, which influences the way people subconsciously process and use the information. Different frames and persuasive appeals are widely used to promote energy conservation and other mitigative activities (Bolderjick et al., 2012). Climate change mitigation is often framed as an imperative to avert or reduce impending disaster and as a costly action that requires significant sacrifice (Stoknes et al., 2014). These negative frames have been largely ineffective at convincing climate deniers or motivating believers to change behaviors for a number of reasons; for example, fear is ineffective to motivate sustained behavior change (O’Neill and Nicholson-Cole, 2009) and people are susceptible to “issue fatigue,” whereby hearing about the same issue for extended periods of time can lead to numbness and denial about the problem or one’s ability to change their behavior (Stoknes et al., 2014).

Positive or opportunistic framing has also been explored. Promoting mitigation and other pro-environmental behaviors as opportunities to improve the local environment, improve air quality and public health and save money have been met with greater success. Numerous studies have explored the impacts of framing on climate change perceptions and willingness to act in pro-environmental ways; however, many of these studies focus on messaging for a general public to make individual changes. Less understood is the impact of different frames on people or groups of people in the context of the organizations they work in. According to U.S. Energy Information Administration, commercial and residential buildings are responsible for 42% of U.S. energy consumption and 41% of total CO₂ emissions (EIA, 2009); therefore, successful efforts to substantially reduce emission must include organizations and commercial and publicly owned buildings.

With this in mind, the purpose of this project was to evaluate the impacts of an energy-efficiency workshop for Tucson organizations created by the City of Tucson Mayor's Office and hosted by Tucson Electric Power.

Project Purpose and Target Audience

On March 27, 2015 the City of Tucson Mayor's Office and Tucson Electric Power hosted a half-day workshop for local organizations to discuss the economic benefits associated with energy efficiency as well as financing options for energy efficiency projects. The workshop consisted of: 1) presentations from Tucson's Mayor, Jonathan Rothschild, representatives of Tucson Electric Power and Tucson Water; 2) testimonials from a panel of local businesses and non-profits followed by a question and answer session with panelists; and 3) a keynote presentation by Skip Laitner, a resource economist, on the economic benefits of increasing energy efficiency.

Although a key motivation of the workshop was for the Mayor's Office to engage businesses in Tucson in efforts to reduce greenhouse gas emissions, growing the local economy is a top priority among many Tucson politicians, residents, and businesses. Therefore, although some environmental benefits associated with increasing energy efficiency were discussed by speakers and panelists during the workshop, the advertisement flyer did not mention climate change or other environmental concerns and the focus during the workshop was on financial benefits and financing opportunities.

The purpose of my project was to evaluate the impacts of this energy-efficiency workshop; specifically, my goal was to gather feedback from participants to assist the Mayor's Office with planning future workshops and follow up with participants through surveys and interviews to determine whether attending the workshop led to the implementation of energy efficiency measures among participating organizations. An additional goal of this project was to collect data related to participants' opinions about energy efficiency in the context of their organizations.

Through this project, several groups of stakeholders, including the Office of the Mayor, policy advisors and decision makers from the City of Tucson, and local organizations, were engaged in the evaluation process via participation in surveys, interviews and discussions. A key partner for this project was Mr. Ryan Anderson who is the Planning, Transportation, and Sustainability Advisor to the Mayor. The surveys and evaluation metrics were developed out of conversations with Mr. Anderson regarding the goals of the workshop and what he hoped to learn from my evaluation. Importantly, the design of this project was the product of numerous conversations with Mr. Anderson, during which we discussed the ways in which I might provide a product (an evaluation report) that would inform future workshops and aid the Mayor's Office in their efforts to reduce energy consumption in Tucson.

Project Design

Approximately 900 people and organizations were invited to the workshop. Invitees were identified from a list of for-profit, non-profit and government agencies listed in the Tucson Business's Book of Lists, but the workshop was open to anyone interested and people and organizations that did not receive the invitation were encouraged to attend.

Approximately 130 people participated in the workshop. Participating organizations varied widely in number of employees, with small businesses showing the greatest representation (figure 1). The majority of participants came from for-profit businesses, but non-profit organizations and government

entities were also represented (figure 2). Participants represented organizations in more than 15 sectors (figure 3).

Prior to the workshop, participants were invited via email to complete a short, multiple-choice survey regarding their organization's experience and interest in energy efficiency and their personal opinions about energy efficiency. The pre-workshop survey was available online until two days prior to the event and a paper copy was offered to participants upon signing in at the workshop. Two weeks after the workshop, participants were invited via email to complete a second survey, including the same questions from the pre-workshop survey plus additional questions.

Pre- and post-workshop surveys:

- To get a sense of the organizations represented in the study, survey respondents were asked questions about the sector and size of their organization.
- To measure the impact of the workshop on actions or plans to increase energy efficiency, respondents were asked about their organization's interest in, plans to do or experience implementing energy efficiency projects.
- To measure whether the workshop had an effect on perceptions of energy efficiency, respondents were asked about the barriers that have prevented or might prevent them from implementing energy efficiency measures and the benefits associated with energy efficiency.
- To understand what participants gained from the workshop and to improve future workshops, survey respondents were asked to evaluate the workshop on specific measures and to leave feedback.

A control survey was sent to approximately 800 people and organizations who were invited to the workshop but did not attend. This survey also asked respondents about their interest in and experience implementing energy efficiency projects in their organizations.

Finally, post-workshop survey respondents who indicated they would be willing to be contacted for additional information were asked to take part in brief interviews. A total of 8 interviews were conducted in October, 2015, about 6 months after the workshop. During these interviews participants were asked follow-up questions based on the surveys they completed; for example, one participant indicated "interest in installing energy efficient lighting" on their survey, so this person was asked whether they had completed this project, and if not, whether they still planned to. Participants were also asked why they attended the workshop, whether their informational needs were met by the workshop, if they had encountered any unexpected barriers to implementing their projects since the workshop, and what they would be especially interested in learning about during future workshops.

Outcomes of the Workshop Evaluation

The surveys and interviews indicate three **key impacts of the workshop**. First, the workshop spurred conversations about energy efficiency among participating organizations. For example, one month after the workshop, 85% (N=27) of survey respondents reported that since attending the workshop they had talked with supervisors, employees and/or co-workers about opportunities to increase energy efficiency in their organization. Second, the workshop gave participants valuable information that they were able to share within and outside of their organizations. One participant who was interviewed had given a number of presentations to various community groups and had incorporated much of what he learned about saving money through energy efficiency. And third, the workshop spurred actions. Of the 8 participants interviewed, two of their organizations have used the information learned at the workshop to install for efficient lighting; two other organizations are now planning equipment upgrades; and one

organizations has discussed behavior changes (i.e. no-cost strategies) among staff and has begun implementing these.

Many of the survey respondents indicated changes in behavioral intentions as well. When asked, “which of the following measures does your organization plan to take or has your organization taken to increase energy efficiency or increase use of renewable energy,” the most notable changes between the pre- and post-workshop survey responses were related to installing energy efficient lighting and replacing equipment (figure 4). This likely reflects the fact that several of the panelists discussed their positive experiences taking these low-cost actions and the fast rate of return they saw from doing so. This finding indicates that follow-up may be needed in these areas in particular so that participants can follow through with their plans to take these actions if they haven’t done so already.

The surveys and interviews also uncovered important **challenges businesses face** when trying to reduce their energy use, namely the high-cost of some energy efficiency measures. Survey responses suggest that after the workshop, lack of information was perceived as less of a barrier, while time and job limitations were perceived as greater barriers. Nearly 80% of both pre- and post-workshop survey respondents named cost as a significant barrier (figure 5), indicating that information alone was not enough for organizations to invest in energy efficiency; rather, organizations often need assistance with financing projects and they want to be sure their investment will pay-off in the near term.

Finally, the surveys and interviews revealed **informational needs** that will help participants determine if and how they can implement energy efficiency measures in their organizations. A number of participants said they would like more detailed information about rebate and incentive programs offered by TEP and the government. Although there was a presentation about this during the workshop, participants expressed interest in a “break-out” session that provided more thorough information with more time for questions. Participants also indicated that they needed more detailed information about costs vs. benefits of various projects. This would likely require energy auditors to assess projects plans, but future workshops could address this need by bringing in energy auditors to answer participants’ questions and potentially set up appointments.

Despite lingering informational needs, participant feedback from the workshop was overwhelmingly positive, which is also useful for planning future workshops. Survey respondents noted a number of elements they especially liked about the workshop, including the panel of business leaders, discussions on energy audits, presentations from energy experts, presentations on rebate programs, the presentation by the keynote speaker and the opportunity to network with other businesses and government agency employees. Respondents were most enthusiastic about the panel of business leaders, specifically that the panelists offered practical advice from a variety of perspectives and presented a multitude of benefits associated with enhancing energy efficiency, from cost savings to environmental benefits. 100% of survey respondents (N = 27) said they would like to attend similar workshops in the future, and 93% (N = 27) said they would recommend this workshop to friends, co-workers, or other organizations (figure 6). 85% of respondents in the control group (N = 88) said they would like to attend future workshops, and many listed specific topics they would like to learn about, such as solar energy, energy efficient appliances and windows, low- and no-cost improvements, and water conservation. This indicates that there is a strong interest among Tucson organizations in learning more about energy efficiency and renewable energy, and potentially in taking action to reduce energy use within organizations.

From a research standpoint, I found evidence that in the context of organizations, whether public or private sector, the factors that most strongly influenced whether people planned to implement energy efficiency were economic, rather than environmental (figure 7)—and this was despite the fact that the vast majority of survey respondents agreed that climate change is a serious problem and that the government

should regulate GHG emissions. This finding contradicts previous studies that say economic framing is less effective than environmental framing at creating pro-environment behavioral intentions and actions.

Conclusions and Lessons Learned from Use-Inspired Research

The most valuable lesson I learned from this project is the importance of two-way, ongoing conversation in use-inspired research. Without frequent discussions with Mr. Anderson, the evaluation metrics and end-product would not have met his needs. Ultimately, I created a tailored product in the form of workshop report (below), supplemented with presentation materials and additional data, which Mr. Anderson requested so that he can gain support for future workshops and engage a broader audience in discussions about energy efficiency.

ENERGY EFFICIENCY WORKSHOP FOR TUCSON AREA BUSINESSES

On March 27, 2013 the City of Tucson Mayor's Office and Tucson Electric Power hosted a half-day workshop for local organizations and discussed the economic benefits associated with energy efficiency as well as financing options for energy efficiency projects.

The event was a great success with more than 150 participants. Participants included 44 business and more than 50 speakers, panelists and vendors. Local business owners were the focus of the workshop, and they were given the opportunity to share their experiences implementing energy efficiency and the benefits of these projects.

Figure 1: Percent of participants by sector

Figure 2: Percent of participants from each sector

Opening remarks by Mayor Rothschild

Tucson Mayor Jonathan Rothschild highlights some key benefits associated with increasing energy efficiency:

- Saves money: energy efficiency measures can lead to a 20-25% return on investment with almost no risk.
- Creates a safer, more comfortable environment for employees and customers.
- Improves air and environmental quality.

Workshop participants identified additional benefits, such as:

- Attracting and retaining the company.
- Enhanced local economic development.
- Health benefits associated with a cleaner environment.
- Educational opportunities for the organization and the local community.

Energy in Tucson

Jonathan Rothschild, Mayor of Tucson, gave the opening remarks and set the tone for the workshop. He emphasized the importance of energy efficiency in the city of Tucson and the role of local businesses in achieving these goals.

He noted that energy efficiency is not just about saving money, but also about creating a more sustainable and resilient community. He highlighted the city's commitment to energy efficiency and the role of local businesses in this effort.

He also mentioned the importance of energy efficiency in reducing greenhouse gas emissions and improving air quality. He encouraged local businesses to take action and invest in energy efficiency measures.

He concluded his remarks by thanking the workshop organizers and participants for their interest in energy efficiency.

Raytheon

Raytheon is a major employer in Tucson and has implemented several energy efficiency measures. The company has installed LED lighting, energy-efficient HVAC systems, and water-saving devices. These measures have resulted in significant energy savings and cost reductions.

Raytheon's energy efficiency program is a key part of its sustainability strategy. The company has set ambitious goals for reducing energy consumption and greenhouse gas emissions. Raytheon's energy efficiency program has been recognized by the U.S. Green Building Council (USGBC) and the International Brotherhood of Electrical Workers (IBEW).

Raytheon's energy efficiency program has also resulted in improved indoor air quality and a more comfortable work environment for employees. Raytheon's energy efficiency program is a model for other businesses in Tucson and the region.

Buffalo Exchange

Buffalo Exchange is a retail store in Tucson that has implemented several energy efficiency measures. The store has installed LED lighting, energy-efficient HVAC systems, and water-saving devices. These measures have resulted in significant energy savings and cost reductions.

Buffalo Exchange's energy efficiency program is a key part of its sustainability strategy. The store has set ambitious goals for reducing energy consumption and greenhouse gas emissions. Buffalo Exchange's energy efficiency program has been recognized by the U.S. Green Building Council (USGBC) and the International Brotherhood of Electrical Workers (IBEW).

Buffalo Exchange's energy efficiency program has also resulted in improved indoor air quality and a more comfortable work environment for employees. Buffalo Exchange's energy efficiency program is a model for other businesses in Tucson and the region.

eegees

eegees is a restaurant chain in Tucson that has implemented several energy efficiency measures. The restaurant has installed LED lighting, energy-efficient HVAC systems, and water-saving devices. These measures have resulted in significant energy savings and cost reductions.

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Hispanic

Hispanic community organizations in Tucson are working to improve energy efficiency in homes and businesses. These organizations are providing education and training on energy efficiency measures and helping to finance these measures. This work is important for improving the quality of life and reducing energy costs for the Hispanic community.

Hispanic community organizations are also working to promote energy efficiency as a key component of sustainable development. They are encouraging the Hispanic community to take action and invest in energy efficiency measures. This work is important for creating a more sustainable and resilient community.

Acknowledgements

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Figures

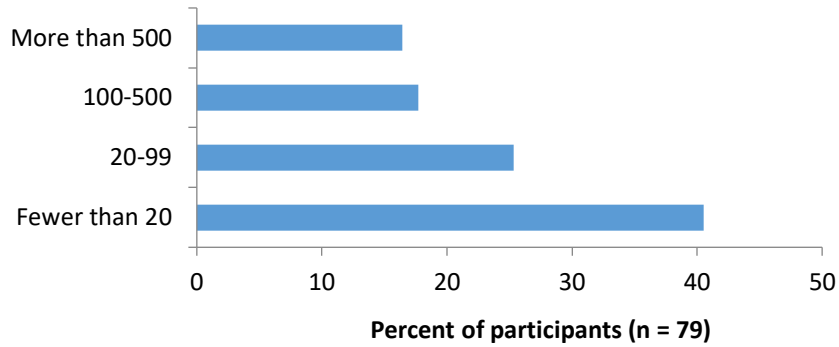


Figure 1. Percent of workshop participants representing organizations with fewer than 20 employees, 20-99, 100-500, and more than 500 employees.

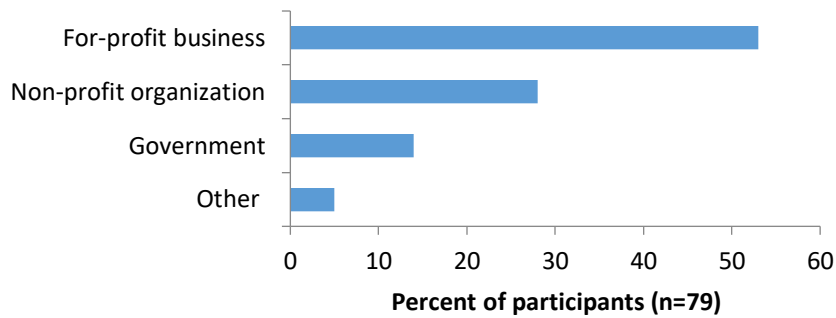


Figure 2. Percent of workshop participants representing for-profit, non-profit, government and other organizations.

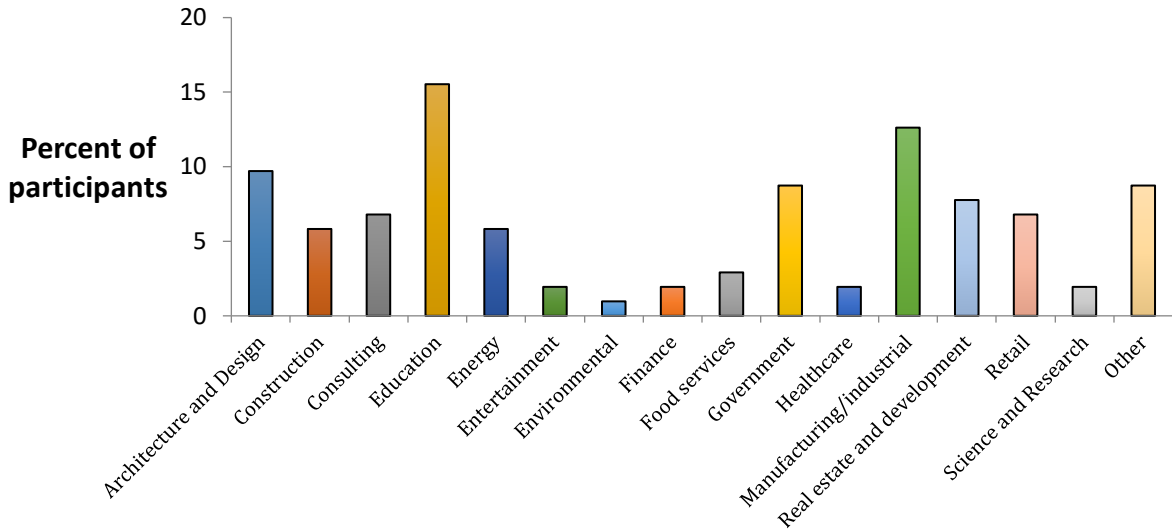


Figure 3. Percent of workshop participants representing organizations in different sectors.

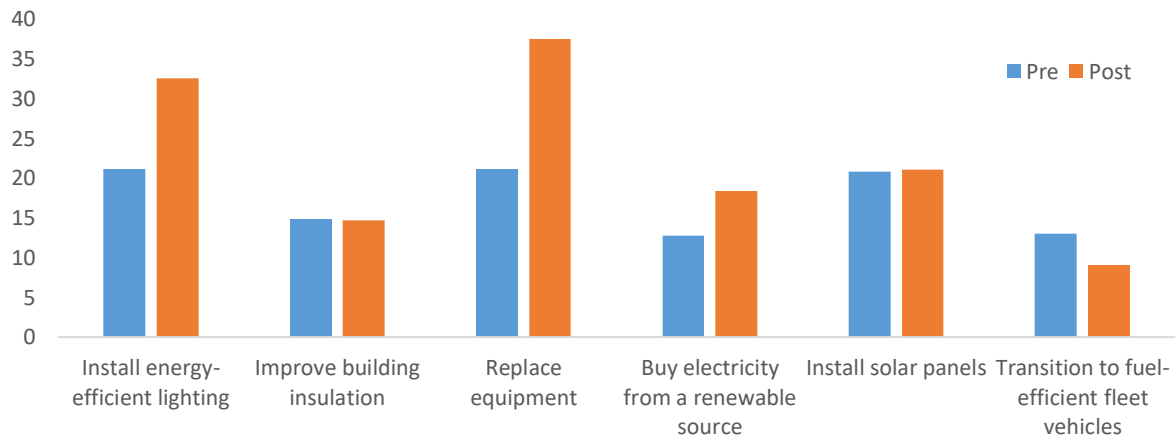


Figure 4. Percent of pre- and post-workshop survey respondents answering yes to the following question: Which of the following measures does your organization plan to take or has your organization taken to increase energy efficiency or increase use of renewable energy?

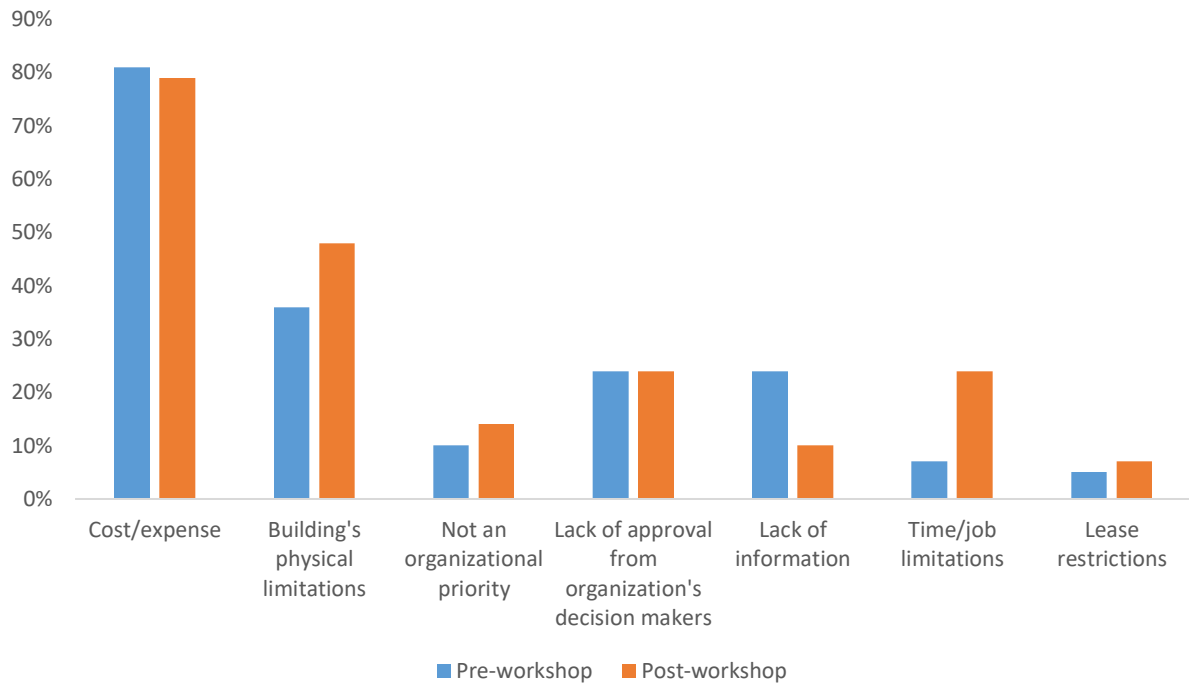


Figure 5. Percent of pre- and post-workshop survey respondents answering yes to the following question: Which of the following factors have prevented you or might prevent your from implementing energy efficiency measures?

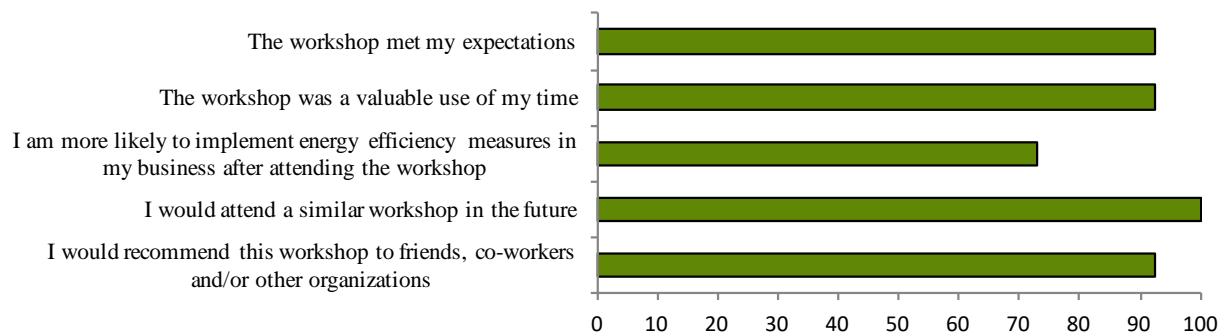


Figure 6. Percent of survey respondents answering “agree” or “somewhat agree” to statements about the workshop

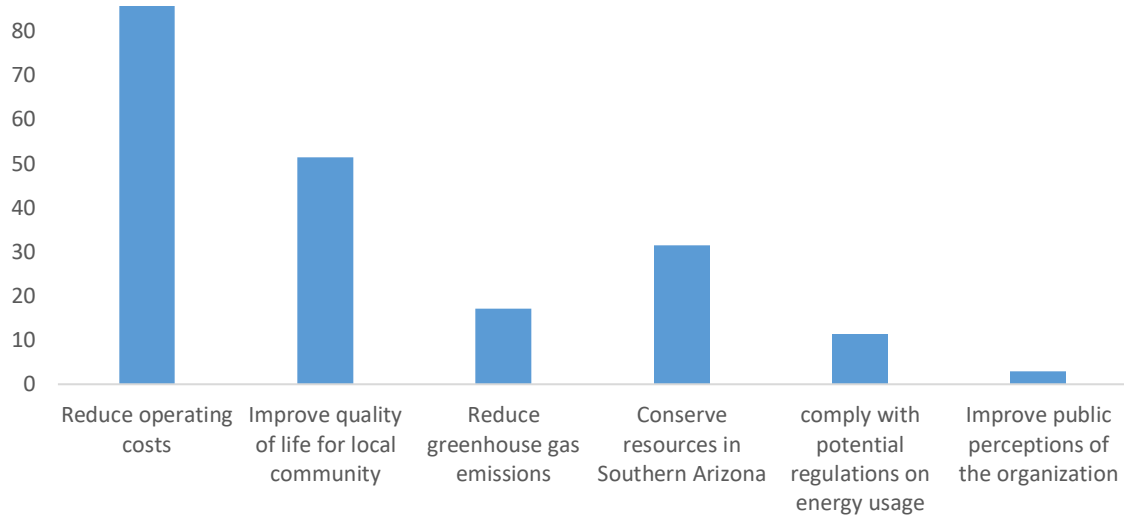


Figure 7. Percent of post-workshop survey respondents ranking each option as one of their top two priorities