

*Increasing Resident Interest in  
Sustainability in the City of  
Worthington, Ohio*

ENR 4567 Capstone

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## **Executive Summary**

Increasing interest in sustainability for the residents of Worthington, Ohio is the primary goal of this proposal. A total of four research objectives were completed in order to be able to recommend a “best option” to the city that was most likely to be implemented. The first research objective began with the process of determining first-tier suburbs that could be used for comparable case study analysis. This analysis focused on resident outreach and engagement in the comparable cities chosen. Cities were chosen using the STAR Communities Rating System as well as deliberately finding a neighboring city for comparison. The goal was to find comparable cities that had as many of the following criteria as possible; mid-western, historic district, population size, income level, city size and makeup with similar social, cultural, financial and political demographics.

The second research objective involved evaluating literature about environmental behavioral psychology, utilizing these principles helped us to understand the underlying motivations of groups of people to adopt new behaviors, as well as the factors that influence their decision making. It also helped identify biases that may exist and how to overcome those biases, and other barriers to adoption of sustainable behaviors. Research then shifted to focused on environmental message framing, by analyzing case studies of comparable cities to determine how behavioral psychology helped to promote their missions, and analyzing the cultural and social structures of Worthington in order to frame any and all future recommendations.

The third research objective was to create a baseline of the current level of interest in sustainability for the City of Worthington. In order to do this a survey was created and disseminated to residents. A total of 391 residents responded to the survey. The survey results showed that respondents did not have an implicit negative reaction to the term “sustainability” as

was previously thought. This meant that a more direct approach to community engagement was possible. The data also suggested that community events would allow for the best opportunity to engage with residents due high levels of participation and support. Worthington residents connected these events to their positive association with the city as well as their identity as residents.

Evaluating viable options for the city and completing a cost effective analysis was the final research objective preformed. First a “best option” was determined based on results acquired via the first three research objectives. This was undertaken to assess the feasibility of final recommendations and consisted of a breakdown of the costs associated with the implementation of the recommendations made to the City of Worthington, contrasted by the cost savings and environmental benefits the implementation could offer to the city as well as its residents. The result from the research objectives is a recommendation for the City of Worthington to run small scale, short-term, community based initiatives. This is a valuable option for the city because it is easy to implement and will have a positive impact on residents. Examples of possible initiatives are referenced below and in the supplementary materials provided. This includes a seasonal flier that could be used to promote message about sustainability in ways shown to be effective by the literature review.

### **Introduction**

All research undertaken had the primary goal of increasing interest in sustainability for the residents of Worthington, Ohio. We interpreted that as finding ways to encourage residents to engage in sustainable behaviors, and identify more with sustainability. This is important for the City of Worthington, because if residents personally identify more with sustainability, they will be supportive of initiatives that the City takes to improve its sustainability. A total of four research objectives were completed in order to be able to recommend a “best option” to the city

that was most likely to be implemented. A total of four research objectives were undertaken. These objectives were: Identifying Comparable Cities and Compiling Case Studies, Evaluating Social Behavior Literature, Create a Baseline Analysis of the City of Worthington, Evaluating Viable Options for the City of Worthington and Conduct Cost-Effective Analysis. The motivation for these objectives was first to identify what comparable cities were doing correctly to engage residents. Then, the social behavior literature would be used to gain an understanding about what made the comparable cities successful, as well as how to craft a message that would promote behavior change. The baseline was created for Worthington in order to better understand where residents currently stood with regards to sustainability. The cost effective analysis was completed in order to evaluate viable options that Worthington could take to encourage resident engagement in sustainable behaviors. Our findings showed that Worthington residents did not have an implicit negative association with the term “sustainability”, which allowed for more direct engagement options to be considered. It also showed that community events would be the good vehicle for outreach. Finally, small-scale, short-term initiatives would be seen as non-intrusive, low commitment, low cost and financially viable options to help increase resident interest in sustainability.

### **Methods and Collection Strategies**

The methods used to complete each of our four objectives varied. Our first objective was to establish comparable cities that Worthington could use as models for their planning. By determining how other cities similar to Worthington currently, or are planning to, engage residents, a better idea can be provided about what steps would be the most effective for Worthington to use. One method we used to meet this objective was to use the STAR rating system to identify cities that had similar demographics to the City of Worthington, and had plans to increase their resident’s interest in sustainability. The STAR Community Rating System is a

tool built for and used by local governments to assess their current levels of sustainability. It helps communities set targets to help them move forward, and it provides methods of measuring the progress communities have made. (*The Rating System*, 2016). We also used online resources to further explore the cities we selected based off of the STAR system and the Ohio cities we selected, such as the city webpages for our selected cities.

Our second objective was to explore ways in which environmental psychology could apply to increasing resident interest in sustainability. Our research for this objective was performed in part through the evaluation of environmental psychology literature. One resource that was extraordinarily helpful was the book *Fostering Sustainable Behavior: An Introduction to Community Based Social Marketing*, by Doug McKenzie-Mohr and William Smith. This book focuses specifically on how to create messages that will get communities to increase sustainable behaviors through the use of community-based social marketing (CBSM). CBSM combines the knowledge of psychology with social marketing strategies (McKenzie-Mohr & Smith, 1999). We also used online research to further explore environmental behavioral psychology as it applies to communities.

Our third objective was to establish a baseline for the existing perception of sustainability in Worthington. Because different levels of receptiveness to an idea affect what messaging and action strategies are most effective, establishing a baseline provides a more accurate depiction of the steps needed to implement a behavioral change. We completed this objective through the use of a survey that was shared with other groups within the ENR 4567 course. This survey was generated using Qualtrics and was administered via email. This survey aimed to uncover information regarding events and organizations with high levels of participation, attitudes toward sustainability, and the level of value placed on different community development options.

Our fourth objective was to evaluate viable options and perform a cost effective analysis of these options for the City of Worthington. The methods used to complete this objective involved the combination of the first three research objectives to discover key overlaps found in the actions of the comparable cities, the environmental psychological research, and the baseline data for the Worthington residents. Based on the information gathered from these objectives, online resources were used to determine the potential costs of implementing ideas that would meet the same criteria as the actions suggested by the previous three objectives.

### **Data Collected**

Data from the literature review revealed information about a specific component of environmental psychological research known as community based social marketing. This research provided information about how to form an effective message capable of persuading a group (Mckenzie-Mohr & Smith, 1999). The online research was used to supplement the literature review, and provide information about the comparable cities. Aside from the information gathered via online research and literature review, the bulk of the data collected originated from the survey. We prompted respondents to answer to the questions listed below in Table 1. We also asked residents two free response questions, which were “what are your favorite Worthington community events,” and “what formal Worthington organizations do you participate in?”

Table 1: Survey Questions and Potential Response Options

Question	Answer Options
What is your immediate reaction to the word sustainability?	<ul style="list-style-type: none"> <li>• Extremely positive</li> <li>• Positive</li> <li>• Slightly positive</li> <li>• Neither positive nor negative</li> <li>• Slightly negative</li> <li>• Negative</li> <li>• Extremely negative</li> </ul>
How knowledgeable do you consider yourself to be when it comes to local issues?	<ul style="list-style-type: none"> <li>• Extremely knowledgeable (I attend as many community meetings as I can to keep abreast of local issues and initiatives)</li> <li>• Very knowledgeable</li> <li>• Moderately knowledgeable (It comes up when I chat with friends and I try to pay attention when I can)</li> <li>• Slightly knowledgeable</li> <li>• Not knowledgeable at all (I don't really pay attention)</li> </ul>
If you had \$100 to devote as you wish to the issues below, how would you divide it up?	<ul style="list-style-type: none"> <li>• Expanding bike paths</li> <li>• Reducing water use and preventing water pollution</li> <li>• Investing in renewable energy</li> <li>• Promoting a diverse economy through city planning and business attraction</li> <li>• Preservation of the historic district and its surrounding area</li> <li>• Promoting small businesses, especially within the historic district</li> <li>• Infrastructure improvements (roads, etc.)</li> <li>• Promoting art/cultural events within the community</li> <li>• Eliminating hunger within the community through support of the Worthington pantry and other initiatives</li> <li>• Ensuring equal access to education across the community through the support of local schools</li> </ul>
Which would you choose if only one option were possible?	<ul style="list-style-type: none"> <li>• Expanding police presence to increase safety or making Worthington School buildings more energy efficient</li> <li>• Organizing an annual festival to generate economic activity in the historic district and build a sense of community or investing in the development of a strategic framework that would allow Worthington to be carbon neutral by 2035</li> <li>• Investing in renewable energy sources (wind, solar, etc.) to power 25% of Worthington or granting a tax break to a large company to place its headquarters in Worthington</li> <li>• Renovating infrastructure in and around local watersheds to protect Worthington's drinking water or Expanding K-12 after-school programs at Worthington Schools and Rec Centers</li> </ul>

## **Results**

### **Survey Analysis**

Overall, our survey received 391 responses. It was distributed via primarily faith-based groups and environmental-based groups. Thus, the potential for survey bias is present. However, a baseline was created and conclusions were made from the responses that were received. The answers to these questions not only helped to determine the best option for engaging residents, but also how to frame the promotion of it. Through the series of four questions, shown in Table 2, that asked residents to choose a sustainable option or other city improvement, it was determined that Worthington residents do care about improving the sustainability of their



community. In addition, the responses to the question that theoretically gave residents \$100 to allocate to the ten different areas of community improvement indicated that residents would opt to fund some sustainable improvements. This result is shown in Table 3. These two questions indicated that, while not at the top of their list, environmental issues and creating a more sustainable community were both things they were interested in as a whole.

<b>Table 2. Which would you choose if only one option were possible?</b>			
	Answer Choices	Percent of Respondents (%)	Number of Respondents
1	Expanding police presence to increase safety	36.03%	89
	Making Worthington School buildings more energy efficient	63.97%	158
2	Investing in renewable energy sources (wind, solar, etc.) to power 25% of Worthington	63.67%	156
	Granting a tax break to a large company to place its headquarters in Worthington	36.33%	89
3	Organizing an annual festival to generate economic activity in the historic district and build a sense of community	61.73%	150
	Investing in the development of a strategic framework that would allow Worthington to be carbon neutral by 2035	38.27%	93
4	Renovating infrastructure in and around local watersheds to protect Worthington's drinking water	61.13%	151
	Expanding K-12 after-school programs at Worthington Schools and Rec Centers	38.87%	96

<b>Table 3. If you had \$100 to devote as you wish to the issues below, how would you divide it up?</b>		
Answer Choices	Average Amount Devoted (\$)	Number of Respondents
Expanding bike paths	7.82	255
Reducing water use and preventing water pollution	3.51	255
Investing in renewable energy	5.3	255
Promoting a diverse economy through city planning and business attraction	7.54	254
Preservation of the historic district and its surrounding area	14.05	254
Promoting small businesses, especially within the historic district	10.67	255
Infrastructure improvements (roads, etc.)	12.11	254
Promoting art/cultural events within the community	9.72	255
Eliminating hunger within the community through support of the Worthington pantry and other initiatives	9.86	255
Ensuring equal access to education across the community through the support of local schools	14.15	255

The other questions aimed to discover which organization and events Worthington residents were most involved in and enjoyed. These included two open-ended questions. The first asked what formal Worthington organizations do residents participate in. Although the most

Answer Choices	Percent of Respondents (%)	Number of Respondents
Extremely Positive	28.2%	70
Positive	40.3%	100
Slightly positive	12.1%	30
Neither positive nor negative	10.5%	26
Slightly negative	6.9%	17
Negative	1.6%	4
Extremely negative	0.4%	1
Total	100.0%	248

frequent answer was none, faith-based, PTA, and community development organization topped the list. This question was less helpful due to our knowledge of our sample population. The second question asked residents what are their favorite Worthington events. Top responses included the farmers market, holiday events, the arts festival, and library hosted events. This response data helped to determine where residents were committed and enjoyed spending their time.

Answer Choices	Percent of Respondents (%)	Number of Respondents
Extremely knowledgeable (I attend as many community meetings as I can to keep abreast of local issues and initiatives)	10.3%	31
Very knowledgeable	30.9%	93
Moderately knowledgeable (It comes up when I chat with friends and I try to pay attention when I can)	50.5%	152
Slightly knowledgeable	7.3%	22
Not knowledgeable at all (I don't really pay attention)	1.0%	3
Total	100.0%	301

Finally, two questions were asked that would help frame how to promote the engagement of residents. The first asked for residents' immediate reaction to the word "sustainability."

We found that residents largely reacted positively, as shown in Table 4. The other question asked residents how knowledgeable they felt they were on local issues, initiatives, and city programs related to community and community development in the City of Worthington. Our data suggests Worthington residents have an awareness of information being presented to them about the city, as shown in Table 5.

### **Cost Effective Analysis**

The final research objective included a cost effective analysis of the best option for increasing resident interest in sustainability developed through the previous objectives. This analysis consisted of a breakdown of the costs associated with the implementation of the recommendations made to the City of Worthington in, contrast to the cost savings and environmental benefits a program could offer to the city as well as its residents. Although the recommendations can be done on a larger, more intensive or smaller, less frequent scale depending on the interest and success, the cost savings and environmental benefits can be represented by two example scenarios. These two examples show possible applications of the best option program recommended, and include a switch to LED lights for holiday lighting, rain barrel events, and featured environmental artists at the annual arts festival.

These two examples were developed based on survey data of what events and organizations in the City of Worthington that residents most enjoy and participate. All holiday events were extremely popular, which called for focusing on the holiday tree lighting. The annual arts festival was found to be the most popular event of the survey group, and the library and its events are heavily attended and allow for a great space for environmental education events such as a rain barrel workshops.

The costs associated for the City of Worthington to plan, promote and execute are estimates based on ten to twelve events over the course of a year. If the city felt a marketing consultant would be needed, the cost, based on average Ohio rates, would be approximately \$100 an hour and to design a year-long marketing plan it would take approximately 200 hours to complete the job (Falls, 2015). This would bring the total to \$20,000. However, this approach may be excessive and can be scaled down due to the fact that survey data suggests that many Worthington residents are already in tune with the initiatives and events in Worthington.

The creation of a logo would greatly help to reinforce to repetitive sustainability messages; and help residents recognize these messages as such. The modest way to go about this would be to hire a graphic designer to create a logo as branding used to promote the sustainability focus at each event. The costs associated with this are far less than a marketing consultant. Average rates in Ohio suggest it would cost approximately \$65 an hour to hire a graphic designer, and logo creation would only take approximately five hours totaling \$325 (Falls, 2015). This logo can then be used to create signage to promote each event or the sustainability focus, in addition to its use in newsletters, emails, social media and newspapers. Signage, such as yard signs, banners, and pamphlets for one event per month would cost approximately \$2000 for the year based on disposable products, but would ultimately depend on the size and amount of promotion the city feels is needed (Falls, 2016). Finally, the City of Worthington would have to factor in the cost of 60 to 100 additional hours of its employees' time over the course of a year to organize one event per month. However, the implementation of the Green Team could greatly reduce these hours due to better organization and cohesiveness among all departments. The information regarding the organization of a Worthington Green Team can be found in the report produced by Ohio State's ENR 4567 Group 2. Overall, the costs of carrying out this program in the City of Worthington can be kept low.

The first of the two specific examples of an awareness campaign focuses on the fact that events in the City of Worthington that center around a holiday are very popular among residents according to survey data. The annual holiday tree lighting is a very good opportunity to promote the use of LED bulbs for holiday lighting among residents. Although the initial investment can be three times more than incandescent light strands, LED light strands are longer lasting at an average rating of 75,000 hours compared to the 3,000 hours rating of incandescent light strands

(Energy Check, 2016). They also use less electricity, and thus cost far less to run. The cost to run one 100 bulb incandescent light strand for one hour costs approximately 0.09 cents, compared to the 0.015 cents to run one 100 bulb LED light strand for one hour. Multiply these amounts to reflect 10 strands of lights, the United States household average, used for 6 hours a day for 30 days and LED lights can save residents \$135 over the course of the holiday season (Appendix B). In addition, switching to LED lights can save over a half of a pound of carbon dioxide from the environment every hour of operation for ten, 100 bulb light strands when compared to incandescent light strands (EPA, 2016). Sharing this information with residents and businesses through signage and pamphlets can greatly improve the energy efficiency of the community. In addition, the City of Worthington should look into making the switch to LED lighting for community decorations to further promote and motivate residents to do the same. This could be a costly approach, however. The average LED 100 bulb strand cost approximately ten dollars; if the City of Worthington uses 100 light strands total, that would be a \$1000 investment. Overall, this example shows the benefits that could arise from the information sharing and promotion of a sustainable alternative to Worthington residents.

Finally, workshops that promote sustainability or environmental friendliness could easily be orchestrated in the City of Worthington. The Franklin County Soil and Water Conservation District offers workshops, online educational programming and cost-share program management for residential rain barrel distribution, as well as outreach to small businesses through the Water Quality Partner Program and workshops and cost-share program management for residential rain garden installation (FCSWCD, 2016). In the summer, residential irrigation may account for up to 40% of water consumption (EPA, 2016). Rain barrels help alleviate some of the need for irrigation water by storing rainwater from your rooftops for use in your garden, watering lawns,

or even washing cars (FCSWCD, 2016). According to the EPA, if a homeowner with a roof totaling 1,000 square feet owns one rain barrel and fills it with 50 gallons of water during each of 25 separate rain events that homeowner will save 1,250 gallons of water from the stormwater system. (Appendix B). The City of Worthington is already a partner of the Franklin County Soil and Water Conservation District, but has not utilized the partnership to provide workshops for residents. Helping residents and businesses gain access to information about rain barrels and rain barrels themselves can lower water costs and decrease the amount of stormwater that would need treatment by the City of Worthington.

Overall, the City of Worthington would experience cost effective benefits from implementing either example. For the minimal price of pamphlets and information sharing, the energy efficiency of the City of Worthington could be greatly improved. Predominantly, the city would receive direct benefits from resident use of rain barrels through a decrease in stormwater runoff, approximately 1,250 gallons per homeowner per rain barrel. The City of Worthington does not charge a stormwater fee, and provides services such as leaf collection and street sweeping to reduce the pollution that enters into the stormwater, and in turn, the water system. The effectiveness of these services could be increased, while simultaneously decreasing the burden of providing residents with the use of green infrastructure such as rain barrels. In addition, a decrease in potable water used from city sources for outdoor irrigation would decrease the need for treated water. Furthermore, homeowner collection of stormwater can decrease road maintenance costs due to decreased erosion, as well as prevent overflow of Columbus' combined sewer system (EPA, 2016). If events are properly evaluated and planned based on cost effectiveness, the City of Worthington could further these benefits.

### **Environmental Psychology Behavior Literature Analysis**

Through our environmental behavioral psychology research, we found that through the use of community based social marketing strategies, programs and messaging strategies can be created that simultaneously reduce barriers to the adoption of sustainable concepts and highlight the perceived benefits of the behavior change (Mckenzie-Mohr & Smith, 1999). Even though the survey's results may be skewed to reflect more positive perceptions, the baseline data suggests that Worthington has a positive perception of sustainability. A positive perception of a topic suggests that members of the group are more likely to make behavior change related to that topic. Furthermore, an ideal way to persuade a group of people with a positive perception of a behavior to make a behavior change would be to promote changes that are low in risk and high in reward. In other words, these behaviors should be small in scale in order to encourage higher rates of adoption. (J. Bruskotter, personal communication, 30 August, 2016). Thus, targeting individual behavioral fixes would be an effective approach, as it would encourage many people to shift their behavior slightly.

When selecting a behavior change to propose to individuals, it is important to frame the message about the change in a way that will simplify the adoption of the behavior. The selected behavior should be specific, non-divisible, and end-state. This means that the behavior should not require multiple steps, and not require subsequent action. In addition, the message about the behavior change should be vivid, concrete, and personal, so that people can easily remember and implement the behavior (Mckenzie-Mohr & Smith, 1999). For example, if one were trying to persuade a person to buy LED lights instead of incandescent Christmas lights, the message promoting the behavior change should specifically show that switching to LED lights is the only activity they have to engage in as shown in Attachment 1. Also, by showing the savings in terms of daily use the message is made more memorable. (Bruskotter, J. personal communication, 10

November 2011). In addition, framing messages in ways that highlight the losses that people would experience by not engaging in sustainable behaviors is more effective than portraying gains alone, as perceived losses have a higher impact on people than perceived gains (Bruskotter, J, personal communication, 10 November, 2016).

Several steps can also be taken to enforce selected behaviors. Prompting people can encourage them to engage in a certain behavior. For example, putting a sign by a trash bin stating “we recycle” would increase the likelihood that people recycle the appropriate materials. Although this relies somewhat on social norms, in places that have favorable perceptions of the idea in general this sort of message would be effective at promoting a behavior (Mckenzie-Mohr & Smith, 1999). Providing feedback about progress towards individual and community goals can also have significant impacts on the adoption of sustainable behavior. One example showed that when houses received daily feedback about energy use, they reduced their energy consumption by 11%. Gathering commitments has also been shown to increase the likelihood that people will engage in a particular behavior, especially if the commitment is gathered in writing (Mckenzie-Mohr & Smith, 1999).

When tailoring a message to a community, understanding the attitudes and beliefs of the group can help increase the effectiveness. For example, liberals tend to favor messages aimed at fairness between all individuals, whereas conservatives tend to respond more to messages aimed at groups, favor loyalty, and the idea that people get what they earn (Haidt, 2012). When addressing the community, it is also important that sources seen as credible deliver the message. This could be a local government body, or a group revered by the community (Mckenzie-Mohr & Smith, 1999). Trust in local community governing bodies can be increased by including the members of the community in the creation of plans. Additionally, including community members



in the creation of community goals can increase the resident's willingness to act in ways to meet the proposed goals (*Making a Difference in Your Neighborhood*, 2011). Thus, finding ways to incorporate the opinions of residents in community sustainability planning would make them more receptive to sustainable ideas.

### **Comparable City Analysis**

By identifying cities with similar qualities to Worthington that have methods of increasing the level of interest their residents have in sustainability, a more accurate idea can be given about what practices could be effective for Worthington. The cities selected for analysis were Park Forest, Illinois, Northampton, Massachusetts, Upper Arlington, Ohio, and Olmsted Falls, Ohio. The demographics for our selected cities are shown in Table 6 below.

<b>City</b>	<b>Population</b>	<b>Median Household Income (\$)</b>	<b>Median Age of Residents (years)</b>	<b>STAR Reporting Status</b>
Worthington	14,384	87,850	42	NA
Park Forest	22,034	47,655.00	35	3
Upper Arlington	34,609	98,950.00	41	NA
Olmsted Falls	8,880	70,870.00	42	NA
Northampton	28,554	61,745	40	5

In addition to some demographic similarities, Park Forest, Illinois was selected because of their ranking as a 3-STAR certified community, meaning that they are viewed as sustainability leaders (reporting.starcommunities.org). Park Forest hosts monthly workshops that encourage sustainable behaviors, ranging from educating people about rain barrels to discussing sustainable land development. They often partner with outside groups, who come in to host the workshops. Their sustainability plan was created based on community input, which was gathered via town meetings (*Going Green: Park Forest Sustainability Plan*, 2012).

Like Park Forest, Northampton, Massachusetts was selected because of its similarities to Worthington and because it was the first 5 STAR reporting community. This means that they are a top tier achiever of sustainability amongst communities. They scored an 84.7 out of 100 in the climate and adaptation area due in part to their plan to create an education and outreach campaign to engage local business and citizens ([reporting.starcommunities.org](http://reporting.starcommunities.org)). Although Northampton received their STAR status in 2014, they are still currently in the process of implementing their plans. However, several of their key strategic points for engaging residents are workshops that will teach people about sustainable behaviors, quarterly meetings with neighborhood associations, and creating a shared vision based on community input. They also aim to create a program that utilizes schools to educate the community about sustainability (Sustainable Northampton Comprehensive Plan, 2008).

The two cities from Ohio were selected because their similarities of place reflect Worthington's location in Ohio. Upper Arlington has established the UA Green Team ([www.uaoh.net](http://www.uaoh.net)). The Green Team has established sustainability objectives for Upper Arlington, one of which is to encourage more public involvement. The ways they plan to do this include using open meetings and conversations, using social media sources, and through their annual newsletter (*2013 Master Plan*, 2013). Olmsted Falls is currently working on community education programs that stem from the school students. In addition, they held a middle school sustainability fair for the city in association with the Northeast Ohio chapter of the United States Green Building Council's Green School Committee. Students hosted and presented projects about sustainability, and professional vendors that attended provided information about living sustainably (Geiselman, 2013).

Overall, several trends occur within the comparable cities. Northampton, Park Forest, and Upper Arlington all explicitly mention generating a plan based on community input. This supports the community based social marketing concept that resident input is important to increasing engagement. Additionally, Park Forest and Northampton both plan to use workshops as a means of educating their residents. The environmental behavioral psychology research would suggest that this would be effective, because it would make information more memorable and easier to understand. (Mckenzie-Mohr & Smith, 1999). The use of students to teach the community about climate change and newsletters could be effective because they encourage communication about sustainability (Mckenzie-Mohr & Smith, 1999).

Although these cities provide good suggestions about actions that could be taken in order to increase resident interest in sustainability, data about the effectiveness of their strategies is lacking. This is due in part because approaching community sustainability from this perspective is relatively new, and also because measuring the effectiveness of these programs is difficult due to the individualized focus on residents. It is also possible that cities are choosing to allocate money to different sources than measuring the effectiveness of these plans and may have other priorities. However, since baseline data already exists for the City of Worthington, Worthington could administer another survey establishing whether or not people are engaging in the recommendations Worthington chooses to promote.

### **Recommendations**

The baseline survey of the City of Worthington has illuminated that Worthington residents do not have a negative response to the idea of sustainability. This finding opened up the opportunity to directly encourage individual behavioral fixes and prompt specific behavior changes (Mckenzie-Mohr & Smith, 1999). Based on this information we recommend short-term,

small-scale initiatives throughout the year. The results of the comparable city analysis also support this idea, as events such as workshops and other demonstrations were utilized by multiple comparable cities. These initiatives include branding, so that each of the initiatives are connected and the sustainability movement is familiar to the residents. This branding will include newsletters, as used in Upper Arlington, and signage for residents, and can be used to market sustainable choices the city makes for community events.

Along with branding, we recommend assigning this project to the Green Team to establish cohesive initiatives that coincide with events and seasons throughout the year. Each small initiative should have a clear goal, such as reducing energy consumption, and be presented in a clear one step format. One step makes changing a behavior simple, easy to remember, and more likely to be adopted when compared to complex actions without a clear start and ending to the required action (Mckenzie-Mohr & Smith, 1999).

A specific short-term, small-scale initiative Worthington can start with is centered around the holiday lighting at the end of the year designed to encourage switching to LED holiday lights. We recommend that the City of Worthington switch to LED lighting and market the city's 'green choice' through signage during the holiday season. If the city were to make this switch it would be setting a standard of modern day holiday lighting in Worthington. The city will be able to increase resident interest in sustainability and influence behavior through their own action and by advertising their choice throughout the city.

In order to make this a reality the purchase of LED lights to replace current lighting will need to be budgeted. As a cost-estimating tool, using the lighting supplier, 1000Bulbs.com, every 1,000 feet of "warm white" LED holiday lights would cost \$857 (1000Bulbs.com). In the scenario that lighting for the whole city decor does not fit into the budget, making the change for

the tree lighting would still bring attention to the sustainable change since Worthington residents value community events. In the case of LED tree lighting, we suggest displaying signage outlining how much money residents can save by making the change in order to peak resident interest and influence this simple change.

### **Limitations**

While developing these recommendations for the City of Worthington, we have been mindful of possible limitations to our research as well as achieving an overall increase in resident interest in sustainability. One limitation that has been present in our research is one that is difficult to avoid; survey biases. Although the Qualtrics survey was distributed to residents through various avenues, we are not able to control the diversity of persons who respond. It is possible to format questions in a way to decrease response bias. However, this does not address non-response bias (Ganhinhin. 2014). Non-respondents may have chosen not to respond due to low interest in the topic. This produces a limitation in the survey results, which could generate skewed responses in the community's views and feelings, community development priorities, and/or interests and involvement.

As with any proposed plan, there are limitations that could potentially slow the implementation of these recommendations. There is currently no team in place to take on the ongoing production of informational flyers addressing sustainability initiatives of the city. In order for these recommendations to succeed there will need to be a team in place to develop the informational flyers and market sustainable practices throughout the community. One possible way to address implementation limitations is the formation of a Green Team in the City of Worthington.

## **Conclusion**

To conclude, the primary goal of this research is to provide insights into how to increase interest in sustainability among the residents of Worthington, Ohio. A total of four research objectives were completed in order to be able to recommend a “best option” to the city that was most likely to be implemented. These were Identifying Comparable Cities and Compiling Case Studies, Evaluating Social Behavior Literature, Create a Baseline Analysis of the City of Worthington, Evaluating Viable Options for the City of Worthington and Conduct Cost-Effective Analysis. The result was a recommendation for small-scale, short-term community event based initiatives, as they would be the best vehicle for outreach. They would be seen as non-intrusive, low commitment, low cost and financially viable options to help increase resident interest in sustainability.

The implementation of a ‘sustainability initiative’ brand at City of Worthington events as well as newsletters and informational flyers will help the City of Worthington to achieve its goal of increasing resident interest in sustainability. By incorporating sustainability into events that are already widely loved by the community, sustainability will be paired with pleasant experiences. By simply being added to events instead of creating new sustainability- specific ones, the signage and simple step suggestions for sustainable action at home, will be easily adoptable by the residents of the City of Worthington.

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### **Appendix A: Annotated Bibliography**

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This report describes the Upper Arlington sustainability plan. It included information about how Upper Arlington plans to engage residents, as well as what agencies they are planning to use to carry out their initiatives. This is a chapter of Upper Arlington's overall development plan.

Cleveland.com, B. G. (2013). Olmsted Falls students study sustainable living; high school students stage play: Community news. Retrieved November 21, 2016, from [http://www.cleveland.com/olmsted/index.ssf/2013/11/olmsted\\_falls\\_students\\_study\\_s.html](http://www.cleveland.com/olmsted/index.ssf/2013/11/olmsted_falls_students_study_s.html)

This article contained the information about Olmsted Falls plans to host their sustainability fair. It stated that local professionals were going to work with the school groups, and also have a presence at the fair.

Coffee, T. (2016). Energy Check Will LED Christmas Lights Really Save You Money? Retrieved from [http://www.wecheckenergy.com/pdf/Energy\\_Check\\_Holiday\\_Lights\\_12\\_11.pdf](http://www.wecheckenergy.com/pdf/Energy_Check_Holiday_Lights_12_11.pdf)

This data set contains the data and calculations used to perform the cost effective analysis for residents switching to LED Christmas lights. The exact numbers used in the calculations can be found in Appendix C.

EPA (2016). Soak Up the Rain: Rain Barrels. Retrieved from <https://www.epa.gov/soakuptherain/soak-rain-rain-barrels>

This data set contains the data and calculations used to perform the cost effective analysis for residents switching to water saved from stormwater systems as a result of rain barrel use. The exact data can be found in Appendix C.

Ganhinhin, N. (2014). *7 Tips To Minimize Response Bias*. Retrieved on November 20, 2016 from <http://www.supersimplesurvey.com/blog/post/7-Tips-To-Minimize-Response-Bias>

Ganhinhin's article *7 Tips to Minimize Response Bias* defines what response and non-response biases are. The article outlines ways to mitigate avoidable biases when possible.

Going Green: Park Forest Sustainability Plan. (2012, May 14). Retrieved November 21, 2016, from <http://www.villageofparkforest.com/DocumentCenter/View/653>

This document contained information about Park Forest, Illinois sustainability plan. It provides an overview of what they plan to do in the future. It describes what they believe they



need to complete in order to get their residents more involved in sustainability, as well as other steps they believe they need to take.

Haidt, J. (2012). *The Moral Foundations of Politics. The Righteous Mind: Why Good People are Divided By Politics and Religion*. Pantheon Books.

This reading describes how different political groups have different moral foundations. Liberals tend to be more concerned with the moral foundations of care and fairness, while conservatives tend to favor loyalty, sanctity, and authority. By understanding that different groups have different values, it is suggested that messages meant to reach certain audiences must be tailored in ways that the audience will be receptive to. Thus, it is important to understand your target audience when creating messages about sustainability.

McKenzie-Mohr, D., & Smith, W. A. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*. Gabriola Island, BC: New Society.

This book describes the fundamentals of community based social marketing strategies. It discusses selecting a target audience, understanding what type of behavioral approaches to use, and how to craft effective messages. It also discusses the steps needed to gather accurate data about the target audience. This book provides a checklist for crafting a message about sustainability, and describes ways in which these messages can be strengthened.

Sustainable Northampton: Comprehensive Plan. (2008, January). Retrieved November 21, 2016, from <http://www.northamptonma.gov/DocumentCenter/View/838>

This document provided the sustainability plan for Northampton, MA. It discussed how they plan to engage residents, as well as other initiatives they are planning to take. In this article, they discussed the importance of creating a shared vision for Northampton using community input, as well as using demonstrations, and incorporating schools into the resident engagement process.

## Appendix B: Cost Effective Analysis

Dataset #1: Cost Effective Calculations

Sources:

Coffee, T. (2016). *Energy Check Will LED Christmas Lights Really Save You Money?* Retrieved from [http://www.wecheckenergy.com/pdf/Energy\\_Check\\_Holiday\\_Lights\\_12\\_11.pdf](http://www.wecheckenergy.com/pdf/Energy_Check_Holiday_Lights_12_11.pdf)

### Resident Cost Savings from Switching to LED Christmas Lights

	<i>Operating Costs</i>	<i>Hours per Day</i>	<i>Number of Days</i>	<i>Number of Strands</i>	<i>Total Cost</i>
<i>Incandescent</i>	.09 cents/hour	6	30	10	\$ 162.00
<i>LED</i>	.015 cents/hour	6	30	10	\$ 27.00
<b>Total Savings</b>					<b>\$ 135.00</b>

### **Water Saved from the Stormwater System as a Result of Rain Barrel Use**

EPA (2016). *Soak Up the Rain: Rain Barrels*. Retrieved from  
<https://www.epa.gov/soakuptherain/soak-rain-rain-barrels>

Description: This data set contains the data and calculations used to perform the cost effective analysis for residents switching to LED Christmas lights and water saved from stormwater systems as a result of rain barrel use.

Known Information:


- Average rain barrel holds 50 gallons of water
- 1” of rain on 1,000 square foot home generates 250 gallons of rainwater, filling an average rain barrel
- Average annual rainfall in Ohio is 39 inches

Calculation:

- $50 \text{ gallons collected} \times 25 \text{ rain events with at least 1 inch of rainfall} = 1,250 \text{ gallons collected}$
- In conclusion, if a homeowner owns one rain barrel and fills it with 50 gallons of water during 25 separate rain events with at least 1” of rainfall that homeowner will save 1,250 gallons of water from the stormwater system.

**Attachment 1**

This attachment shows samples of what a seasonal newsletter might look like.

Season	Flier cover	Message Inside
Spring	 <p><b>RAIN BARRELS</b> GET READY FOR APRIL SHOWERS</p> <p><b>DID YOU KNOW...</b> In the summer, residential irrigation may account for up to 40% of water consumption.</p>	 <p>Roof runoff into barrel Screen/cover keeps out mosquitos, leaves, etc... Overflow spout Spigot</p> <p><b>Help alleviate this need by storing rainwater from your rooftops for use in your garden, watering lawns, or even washing cars!</b></p> <p>A homeowner with a roof totaling 1,000 square feet will save 1,250 gallons of water from the stormwater system with just one rain barrel!</p>

Winter

**DECK THE HALLS WITH LED LIGHTS**

Replace your old holiday lights and save on your electric bill!

**LIGHT LIFETIME**

LED light strands are longer lasting at an average rating of 75,000 hours compared to the 3,000 hours rating of incandescent light strands!

**COSTS**

Running one 100 bulb incandescent light strand for one hour costs approximately 0.09 cents compared to 0.015 cents to run one 100 bulb LED light strand for the same amount of time!

**SAVINGS**

If you use 10 strands of lights 6 hours a day for 30 days... LED lights can save you \$135 over the course of the holiday season!

Summer

LET THE SUMMER ACTIVITIES BEGIN!  
**SCHOOL'S OUT!**

Turn off your ignition if you're waiting more than 10 seconds

LET THE SUMMER ACTIVITIES BEGIN!  
**SCHOOL'S OUT!**

All of these activities mean driving here and there to make it from soccer practice to ballet class to play dates. The mom-shuttle never ends!

**SAVE GAS BY TURNING OFF YOUR CAR INSTEAD OF IDLING**

Contrary to popular belief, restarting your car does not burn more fuel than leaving it idling. In fact, idling for just 10 seconds wastes more gas than restarting the engine.

**Every 10 minutes prevents 1 pound of carbon dioxide emissions!**

Fall



**WORTHINGTON**

# WINTER IS COMING

AS THE TEMPERATURE STARTS TO DIP, DON'T LET YOUR ENERGY PRICES START TO RISE!

## WINTER IS COMING

**WORTHINGTON**

**ACCORDING TO THE DEPARTMENT OF ENERGY...**

The average home has enough cracks in its window and door sealant to add up to a two-foot square hole. That's like leaving a medium-sized window open all day!

**HOW TO SAVE**

Performing a home energy audit can find cracks in sealants and other ways your home is losing energy.

...

Ask your local energy service provider about how you can save up to 30% on your energy bill with a low cost energy audit!