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iGreenCR Evaluation



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A Field Problems Project in Cedar Rapids, IA

Authors: Emily Ambrosy, Matthew Peirce, Kira Stoller, Tom Ten Eyck and Gloria Wenman

Contents

Acknowledgements.....	6
I. IGREENCR INTRODUCTION.....	8
History of Cedar Rapids.....	8
Project Background.....	8
iGreenCR.....	9
Five Principles and Nine Elements.....	9
Steering Committee.....	9
Research Questions, Goals and Objectives.....	10
Conclusion.....	10
II. STUDY APPROACH	11
What is sustainability?.....	11
Selecting the Indicators	11
Criteria for Selecting Peer Cities	12
Best Management Practices	12
Data Sources for Indicators.....	13
Report Card	13
Survey.....	13
Conclusion.....	14
III. INDICATORS AND DATA	15
Energy Management	15
Water Wise	17
Stormwater	19
CleanUpCR	21
Bike CR	24
Transportation.....	27
Community Development.....	30
Forestry	32
Parks and Gardens.....	34
IV. IGREENCR 2020: INVESTING IN CEDAR RAPIDS NEXT GENERATION	36
ENERGY MANAGEMENT	36
Vision Statement for Energy Management.....	36
Energy Management: City Facilities	36
2020 Goals: Investing in Cedar Rapids' Next Generation	36
Accomplishments	37
Challenges	38
Energy Management: Water and Wastewater.....	38
2020 Goals: Investing in Cedar Rapids' Next Generation	38
Accomplishments	40
Challenges	40

Energy Management: Information Technology	40
2020 Goals: Investing in Cedar Rapids' Next Generation	40
Accomplishments	41
Challenges	41
Beyond 2020: Possibilities for the Future	42
WATER WISE	43
Vision Statement for Water Wise.....	43
2020 Goals: Investing in Cedar Rapids' Next Generation	43
Accomplishments	44
Challenges	45
Beyond 2020: Possibilities for the Future	45
STORMWATER	46
Vision Statement for Stormwater	46
Improving Water Quality	47
2020 Goals: Investing in Cedar Rapids' Next Generation	47
Accomplishments	48
Increasing Infiltration.....	48
2020 Goals: Investing in Cedar Rapids Next Generation	48
Accomplishments	49
Challenges	49
Beyond 2020: Possibilities for the Future	49
CLEANUPCR.....	51
Vision Statement for CleanUpCR	51
2020 Goals: Investing in Cedar Rapids' Next Generation	51
Accomplishments	52
Challenges	56
Beyond 2020: Possibilities for the Future	56
BIKECR	58
Vision Statement for Bike CR	58
2020 Goal: Investing in Cedar Rapids' Next Generation.....	58
Accomplishments	60
Challenges	63
Beyond 2020: Possibilities for the Future.....	63
TRANSPORTATION	65
Vision Statement for Transportation	65
CR Transit	65
2020 Goals: Investing in Cedar Rapids' Next Generation	66
Accomplishments	67
Challenges	67
Fleet Services.....	68

2020 Goals: Investing in Cedar Rapids' Next Generation	69
Accomplishments	69
Challenges	70
Beyond 2020: Possibilities for the Future	71
COMMUNITY DEVELOPMENT	72
Vision Statement for Community Development.....	72
2020 Goals: Investing in Cedar Rapids' Next Generation	73
Accomplishments	74
Challenge.....	75
Beyond 2020: Possibilities for the Future	75
FORESTRY.....	77
Vision Statement for Forestry.....	77
2020 Goals: Investing in Cedar Rapids' Next Generation	77
Accomplishments	79
Challenges	79
Beyond 2020: Possibilities for the Future	81
PARKS AND GARDENS	82
Vision Statement for Parks and Gardens	82
2020 Goals: Investing in Cedar Rapids' Next Generation	82
Accomplishments	83
Challenges	84
Beyond 2020: Possibilities for the Future	85
CONNECTIONS BETWEEN ELEMENTS	86
V. COMMUNICATING SUSTAINABILITY.....	88
Goals	88
Survey Methodology	88
iGreenCR Survey Findings.....	89
Knowledge and awareness of sustainability in Cedar Rapids (Goal 1).....	91
Importance of sustainability and their personal sustainability behaviors (Goal 2)	93
Priorities for future City efforts and preference for receiving information from the municipality (Goal 3)	96
Conclusion.....	97
VI. CONCLUSION.....	99
Element Recommendations.....	99
Energy Management	99
Water Wise	99
Stormwater	100
CleanUpCR	101
Bike CR	102
Transportation: CR Transit	102

Transportation: Fleet Services:	103
Community Development.....	104
Forestry.....	104
Parks and Gardens.....	105
iGreenCR Initiative Recommendations.....	107
VII. APPENDIX.....	112
Environmental Health Indicators.....	112
Introduction	112
Toxic Releases to Air.....	112
Permitted Toxic Air Emissions Per Capita	112
Obesity and its Causes.....	114
Percent of adults who are obese by county.....	114
Physical Activity	115
Percent of adults in the county who get the recommended amount of exercise.....	115
Healthy Diets.....	117
Percent of adults in the county who eat an adequate amount of fruits / vegetables.....	117
Percent of the population with low access to food stores	118
Report Card	120
BikeCR	126
Transit Information.....	126
Statistics Table	130
Elements.....	131
Survey.....	137

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iGreenCR Evaluation

A FIELD PROBLEMS PROJECT IN CEDAR RAPIDS, IA

I. IGREENCR INTRODUCTION

History of Cedar Rapids

Cedar Rapids was incorporated in 1849 and is governed by a City Council and City Manager. Located in eastern Iowa, it is an industrialized Midwestern city that houses 126,326¹ residents and several nationwide corporate production facilities. The City experienced severe flooding in 1993 and 2008, from which it is still recovering. Despite flood recovery costs and tough economic times, the City has made a commitment to sustainability and has achievements in litter reduction, curbside recycling and composting, as well as awards for being recognized as a Tree City USA member for the past 35 years and Bronze Level Certification as a bicycle friendly community. The City government seeks to increase public awareness of these achievements and build support for pursuing further investments and programs promoting sustainability.

Project Background

In the summer of 2013, the City of Cedar Rapids partnered with the Iowa Initiative for Sustainable Communities (IISC), housed in the School of Urban and Regional Planning at the University of Iowa, in an effort to examine the City's success in meeting its commitment to sustainability. Cedar Rapids had recently developed an initiative, known as iGreenCR, to promote the City's environmental sustainability actions and wanted assistance in giving the initiative a firm foundation. To do this, a team of University of Iowa Master's students developed a Report Card with specific indicators to establish a basis of measurement on which the City could build. Part of this process included describing the City's sustainability practices and assessing outcomes when possible. Furthermore, our team developed a Sustainability Report to recommend ways in which Cedar Rapids could become more sustainable and communicate its sustainability efforts to the public.

According to a common definition, sustainability is a combination of three pillars: economic, environmental and equity.² The consideration of these three pillars is essential to any sustainability initiative, but because Cedar Rapids has already established a conceptual structure with iGreenCR that focuses exclusively on environmental matters, only the environmental component is examined here. This is because iGreenCR by its very nature is an environmental sustainability campaign and maintaining a focus on environmental matters is important to ensuring the success of the plan.

¹U.S. Census Bureau. (2012)

²Campbell, S. 1996. Green Cities, growing cities, just cities? Urban planning and the contradictions of sustainable development. Journal of the American Planning Association 62 (3): 21-33.

iGreenCR

Cedar Rapids launched its iGreenCR initiative in March of 2012 to demonstrate its commitment to making the City a more sustainable place to live, work and play. iGreenCR is an educational platform that promotes the environmentally sustainable actions of the City. The three goals of the initiative are to: promote sustainability in Cedar Rapids' daily operations, inform residents of the City's sustainability efforts and engage residents in local solutions to environmental problems. The initiative is also focused on organizing educational activities and events that engage the citizens of Cedar Rapids. iGreenCR works to raise environmental awareness about how the community can become more sustainable into the future. "The name 'iGreenCR' emphasizes the responsibility that all Cedar Rapiidians share. The 'i' represents both the city's *investment* in making more sustainable choices for this and future generations as well as the commitment made by each *individual* resident to make more sustainable choices in their daily lives."³

Five Principles and Nine Elements

The Cedar Rapids City Council supported the iGreenCR initiative by adopting the following guiding principles of sustainability on January 10, 2012. The five principles are Community, Growth, Environmental Stewardship, Affordability and Innovation, defined by the Council as follows:

Community – Building a community that embraces its diversity and history;

Growth – Advancing opportunities for businesses, individuals and the community as a whole to thrive;

Environmental Stewardship – Promoting economic and social growth while restoring the relationship between the city and its natural environment;

Affordability – Creating a city that is affordable and accessible to all members of the community and;

Innovation – Serving as a leader in creative, successful strategies to lead the progression towards a sustainable future.

To supplement these five guiding principles of sustainability, City staff identified nine specific elements to represent different departmental efforts in sustainability. The elements are: Energy Management, Water Wise, Stormwater, CleanUpCR, Bike CR, Transportation, Community Development, Forestry and Parks and Gardens. Each element involves many different city departments and their individual sustainability efforts, but collectively the elements represent the comprehensive nature of sustainability as understood by the City of Cedar Rapids.

Steering Committee

Megan Murphy, Utilities Communication Coordinator of Cedar Rapids, was the lead project partner working with The University of Iowa student team to promote sustainability through iGreenCR. A steering committee of City employees, led by Ms. Murphy, was established for iGreenCR for two main purposes. The first was to provide guidance to The University of Iowa students as they worked to establish a Report Card and a Sustainability Report for the City of Cedar Rapids over the course of the 2013-2014 academic year. The second purpose of the steering committee was to create a culture of environmentally

³ City of Cedar Rapids. "iGreenCR."

aware employees who search for ways to be more sustainable in their day-to-day activities within their departments.

Research Questions, Goals and Objectives

Based on Cedar Rapids' current municipal practices the student team investigated how the City could be more sustainable. In doing so, the team developed two research questions to answer by the end of their project. The team also developed goals and objectives to create a Report Card and Sustainability Report for the City of Cedar Rapids.

Research Questions

1. How can the iGreenCR program be enhanced to help Cedar Rapids become more sustainable?
2. How can Cedar Rapids communicate sustainability efforts more effectively to the public?

Goal 1

Help Cedar Rapids become a more sustainable City by developing a set of assessment and progress indicators that the City can utilize and update as the initiative grows.

Objectives

1. Compare the sustainability practices of iGreenCR and relevant indicators to the sustainability practices and indicators of peer cities.
2. Create a report card from indicators that are relevant to Cedar Rapids' sustainability efforts and data provided by City staff and team findings to establish an informative baseline.
3. After identifying the City's 2020 goals, suggest aspirational city programs that Cedar Rapids can adopt.

Goal 2

Assess how Cedar Rapids communicates sustainability practices to the public.

Objectives

1. Identify the effectiveness and potential weaknesses of iGreenCR's current communication tools by gathering data from residents in Cedar Rapids.
2. Recommend ways to effectively communicate sustainability.

Conclusion

As a result of working with the City of Cedar Rapids and more specifically with Megan Murphy, our team provides the City with a Report Card and a Sustainability Report with recommendations as to how sustainability can be enhanced, supported and communicated more effectively. Finally, we intend for our Report Card and Sustainability Report to inform and enrich the Cedar Rapids' Comprehensive Plan as it is updated.

II. STUDY APPROACH

What is sustainability?

For the purpose of this project, sustainability is viewed as supporting the long-term ecological balance of the environment through the protection of the natural environment, water, trees, historic buildings and energy needs. Because the focus is on environmental sustainability within the municipality, the definition does not identify the interconnections with the economy and society. Sustainability is important to making sure that we have and will continue to have, the water, flood management and resources to protect human health and our environment.⁴ Through the implementation of iGreenCR, our hope is that the future of Cedar Rapids will in fact be sustainable according to this definition.

Selecting the Indicators

In order to create a report card for Cedar Rapids, indicators were chosen based on their relevance to the City's sustainability efforts and their comparability to peer cities. Our team obtained a list of potential indicators from the ICLEI (Local Governments for Sustainability USA) STAR Rating System, past Iowa Initiative for Sustainable Communities (IISC) field problems reports and peer cities' sustainability reports. Indicators were chosen for each of the nine elements resulting in a total of 31 indicators. Data for each of these indicators was gathered from publically available sources, steering committee members, Cedar Rapids city staff and peer cities.

The ultimate goal of indicators is to "provide a measuring system to provide information about past trends, current realities and future direction in order to aid decisions making."⁵ While indicator systems have gone through different generations of approval and disapproval in their ability to measure accurately, many in planning have found that indicators are appropriate for raising awareness of environmental needs and issues within the community.⁶

According to research done by the American Planning Association, eight criteria have been established as relevant to the indicator selection process:⁷

1. Validity – well-grounded in sound data and accurately depicts a real situation
2. Relevance – appropriate for and pertinent to the community's important issues
3. Consistency and reliability – data can be researched reliably over a period of time
4. Measurability – data can be obtained for the community
5. Clarity – unambiguous; understandable by a diverse group of people
6. Comprehensiveness – represents many parts of an issue and reduces the need for an excessive number of indicators
7. Cost-effectiveness – data collection is not overly expensive
8. Comparability – sufficiently general that communities can be compared to one another

⁴ "What is Sustainability." EPA.gov. United States Environmental Protection Agency, n.d. Web. <<http://www.epa.gov/sustainability/basicinfo.htm>>.

⁵ American Planning Association. (2003). Phillips, Rhonda. *Community Indicators*. Chicago, IL: Rhonda Phillips.

⁶ Ibid.

⁷ American Planning Association. (2003). Phillips, Rhonda. *Community Indicators*. Chicago, IL: Rhonda Phillips.

The importance of the indicator is that it is a tool—that is, a means to an end. Indicators provide a fact base against which progress can be measured. Indicators are only useful if they are able to help a community see the strengths and weaknesses of its programming and opportunities for improvement. Our team used a systematic approach to find, review and select the final list of indicators that best assess progress in areas of significant importance to Cedar Rapids. We analyzed each indicator based on the seven criteria listed below and their comparability to peer cities. Our team reduced the list of indicators after analyzing them not only as a team but also with the assistance of faculty members, keeping only those with the strongest applicability to the project.

Criteria for Selecting Peer Cities

Five comparison cities were chosen to provide insight on how Cedar Rapids' sustainability efforts compare to peer cities. The University of Iowa team developed criteria for selecting peer cities. These were: a population size of 50,000 to 200,000, a strength in manufacturing, median household income of \$25,000 to \$76,000 and a comprehensive sustainability campaign that included Best Management Practices (BMPs). We applied our criteria to find cities that were the most comparable to Cedar Rapids and cities whose best management practices could be adopted. The cities that met the criteria were Dayton, OH; Decatur, IL; Dubuque, IA; Grand Rapids, MI; and Lee's Summit, MO. Our team worked with the steering committee to confirm that the comparison cities were suitable for the project.

Best Management Practices

Best Management Practices (BMPs) are defined in a variety of ways and are context-dependent. The United States Bureau of Land Management⁸ defines Best Management Practices as, "state-of-the-art mitigation measures applied on a site-specific basis to reduce, prevent, or avoid adverse environmental or social impacts."⁹ BMPs describe ways in which cities, states and agencies can implement a practice that has the most beneficial outcome compared to alternatives. While most BMPs have been assessed from fieldwork for conditions such as water quality, stormwater retention and natural resource use, the same concepts can be applied to sustainability measures taken by municipalities. According to the Bureau of Land Management, there is no "one-size-fits-all" solution and each BMP "must be tailored to meet [specific] needs."¹⁰

For the purposes of our project, BMPs describe either a technology or a practice that follows the definition of a BMP listed by the Bureau of Land Management. Since iGreenCR is comprised of nine elements, definitions as to what constitutes a BMP will vary for each individual element. The team began its search for BMPs by examining Cedar Rapids' municipal operations and by speaking with the experts within the City about municipal functions and their current adoption of sustainability practices. This allowed the team to understand what sustainability efforts Cedar Rapids has undertaken, especially in the recent past with changes that accompanied the flood. Experts include City staff who have years of experience in their respective fields.

⁸ The Bureau of Land Management definition of "Best Management Practices" was selected because it clearly defines the term in a way that is accessible to a general reading audience. It is the definition of BMPs, not the specific practices or purview of this agency that allows this definition to guide our understanding of a BMP.

⁹ "BMP Frequently Asked Questions." *Blm.gov*. Bureau of Land Management, 20 Oct. 2009. Web. 8 Dec. 2013.

¹⁰ Ibid.

Additionally, the team looked into practices in three contexts: those taking place in peer cities, those taking place in aspirational cities¹¹ and those within agencies. By making the peer city comparison, the team hoped to be able to measure the outcomes in Cedar Rapids against the practices of others to establish a baseline. By comparing the BMPs of aspirational cities (those cities with developed sustainability campaigns), the hope was to find practices that could be successful if applied in Cedar Rapids. Lastly, any of the elements that could be connected to an agency or organized group (such as Forestry's connection to the American Public Works Association) were considered for the group's BMPs. This gave the team one more layer of comparability in creating the BMPs for each of the nine elements.

Data Sources for Indicators

Data sources were meant to help establish a baseline of information for Cedar Rapids starting as early as 2008. A majority of the indicator data came from communications with municipal employees in both Cedar Rapids and the identified peer cities. Information gathered for the first round of indicators attempted to measure only sustainable actions at the municipal level. This, however, required that Cedar Rapids and its peer cities collect and maintain the same sets of data, which ended up being impracticable.

Since this process was found to be time consuming and difficult to maintain over time, the group decided to look into data sources that were national in scope. The larger scope, while less precise, also meant that Cedar Rapids would more easily be able to track its indicators in the future. Additional data was collected from national organizations like the Arbor Day Foundation, Walkscore.com, the Iowa Department of Transportation, the 2010 US Census or 2012 American Community Survey 5-year estimates and county-level information from the USDA and Center for Disease Control and Prevention.

Report Card

A Sustainability Report Card was developed using these indicators to track the current level of municipal efforts in sustainability. Baseline metrics were obtained from the year 2008 onward and those metrics will be used as a basis of comparison in 2014 and beyond. Data have been collected for the nine iGreenCR elements of Energy Management, Water Wise, Stormwater, CleanUpCR, Bike CR, Transportation, Community Development, Forestry and Parks and Gardens. The Report Card outlines the indicators associated with each element, states how the City of Cedar Rapids is currently performing on each of the indicators and shows how Cedar Rapids compares to its peer cities. An analysis of the Report Card explains the importance of each indicator.

Survey

In order to determine the efficacy of the City of Cedar Rapids' communication efforts, a resident survey was conducted. The survey focused on residents' awareness and knowledge of the City's sustainability efforts and how they prefer to be contacted about events and activities. Questions related to awareness focused on the communication mediums used by the City of Cedar Rapids and whether respondents were

¹¹ Aspirational cities include Seattle, WA; Portland, OR; New York, NY; Middleton, WI; Madison, WI; Ann Arbor, MI; Chicago, IL; Broward County, FL; San Francisco, CA; Raleigh, NC and St. Paul, MN. These cities have programs that might be attainable by Cedar Rapids in the future.

familiar with sustainability events within the City. The questions also asked about the types of sustainable practices in which respondents personally engaged. The survey utilized opportunity sampling, and participation was conducted through in-person sampling and online sampling. A total of two hundred sixty-eight Cedar Rapids residents participated in the survey.

Conclusion

In conclusion, the study approach was designed to accomplish the goals and objectives outlined above. In defining sustainability, our team identified that iGreenCR is primarily focused on environmental sustainability and this in turn helped us narrow our scope for the project. The indicators and best management practices aided in identifying the current baseline in each of the nine elements. As a result of the survey, our team was able to recommend how Cedar Rapids can effectively communicate sustainability to the public. Furthermore, this sustainability report includes both indicator data for the nine elements, recommends ways the City can be more sustainable and how sustainability can be communicated more effectively to the public.

III. INDICATORS AND DATA

Energy Management

The information presented in Table 1 compares Cedar Rapids to peer cities across four different indicators. The values given indicate a starting point upon which Cedar Rapids can build. It is important to see the areas of relative strengths and weaknesses in selecting strategies for the future. Between 2008 and 2009, Cedar Rapids saw a drop in municipal electricity use from 115.4 million kWh in 2008 to 84.5 million kWh in 2009, a reduction of 30.9 million kWh. This 27% rapid reduction is likely attributable to the flood, which destroyed many of the outdated systems that were in place and allowed the City to install new technology. Since 2009, however, Cedar Rapids has only seen modest reductions when compared to peer cities. Most peer cities only had information between 2008 and 2011, and Cedar Rapids has inconsistent facility data due to the flood. The numbers in Table 1 show the total change in municipal energy use between 2008 and 2011. For Cedar Rapids, the change is shown both between 2008 and 2009 as well as compared to a 2009 baseline. This emphasizes the point that compared to others, Cedar Rapids has seen great reductions when comparing pre-flood electrical use but modest reductions when comparing post-flood electrical use.

Table 1: Energy Management Indicators

Indicators for Energy Management	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Total Municipal Energy Reduction between 2008 and 2011 (million kWh)	-30.9 ('08-'09) -1.7 ('09-'11)	-6.7	-4.0	NA	-6.5	NA
Renewable Energy Production in Municipal Facilities (kWh)	5,861,422	None	960,619	NA	135,032	NA

Data sources: City of Cedar Rapids, City of Dayton, City of Decatur, City of Dubuque, City of Grand Rapids

Energy Management's goal for 2020 is to reduce energy consumption in municipal operations. The following strategies accomplish this goal.

For energy use in municipal facilities:

- Perform energy audits on municipal buildings*
- Prioritize energy upgrades and develop a system to track completed upgrades*
- Develop and implement an employee energy education program*

For energy use in municipal water and wastewater operations:

- Reduce energy consumption by 1% annually over the next five years*
- Improve operator's ability to maximize off-peak energy usage without affecting treatment*
- Maximize the usage of biogas generated at the Water Pollution Control Center (WPC)*
- Reduce fuel usage for municipal vehicles operated by water and wastewater staff employees*

For energy use in municipal information technology (IT)

- Virtualize 80% of Cedar Rapids' desktops*

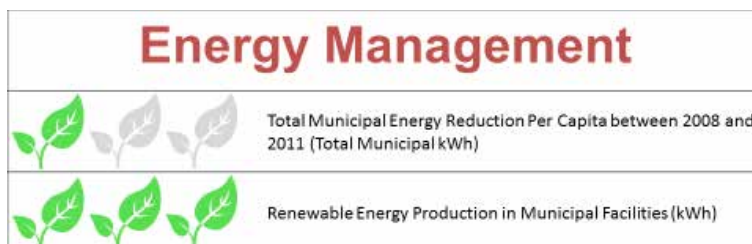
b. *Virtualize 85% of Cedar Rapids' servers*

The strategies identified by the staff across all three sub-categories within Energy Management will help reduce overall municipal energy usage (the first indicator). The biogas usage created from the biosolids produced at the WPC will help increase the levels of municipal renewable energy production (the second indicator).

Dayton and Grand Rapids each have data from 2008 and 2011 while Decatur only has information from 2008 and 2009. All three of these cities have seen smaller total municipal reductions as compared to the reductions between 2008 and 2009 in Cedar Rapids. Decatur had a total municipal reduction of 17% between 2008 and 2009. Dayton saw a total municipal reduction of 5% between 2008 and 2011, while Grand Rapids saw a total municipal reduction of 6% between 2008 and 2011. However, looking at eight top energy-using facilities in Cedar Rapids from 2009 and 2011, Cedar Rapids only saw a total change of 2%, a value much less than that any other peer city. The 27% change between 2008 and 2009 masks Cedar Rapids' accomplishment. If comparing from 2008, Cedar Rapids has the most municipal energy reduction; if comparing from 2009, Cedar Rapids has the least reduction.

Cedar Rapids has a goal to flare 30% less biogas in 2014 as compared to 2013, which would mean having more of the energy for production. Cedar Rapids gets its biogas from the anaerobic digester system that processes biosolids during the wastewater treatment process. As compared to renewable energy in peer cities, the production of biogas in Cedar Rapids is substantially higher. As of right now, Cedar Rapids is currently producing around 20 billion BTUs of natural gas (methane) and biogas from its anaerobic digester process on a yearly basis; this is equivalent to roughly 200,000 therms of energy produced by anaerobic digestion. To put this into perspective, Cedar Rapids used approximately 1.8 million therms of natural gas in FY08¹²; the 200,000 therms produced by the anaerobic digester is equal to roughly 11% of the natural gas usage in Cedar Rapids for FY08. FY09 only saw 1.2 million therms of natural gas used municipally in Cedar Rapids, so the percentage based on anaerobic digestion was marginally higher. This means that Cedar Rapids is currently producing around 11% of its own renewable natural gas from processes that are already in place. With the goal to flare 30% less gas in 2014 as compared to 2013 levels, the percentage of renewable energy will grow even higher for the municipality.

Report Card Scores



¹² Casey, Lauren and David Dechant. "RE: Technical Memorandum 6.4 – Current Municipal Energy Use." 24 Jun. 2010: 1-11. PDF file.

Water Wise

Table 2 displays the indicators for the Water Wise element and gives a baseline of how Cedar Rapids compares to its peer cities for the year 2013, in regards to water consumption.

Table 2: Water Wise Indicators

Indicators for Water Wise		Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Total water consumption (in billions of gallons)		13.15	16.17	6.25	2.10	21.44	3.30
Per capita water consumption by sector (in gallons)	Total	102,676	114,386	81,216	36,110	112,602	35,640
	Commercial	29,856	6,972	12,708	NA	NA	10,158
	Industrial	50,773	23,497	47,810	NA	NA	NA
	Municipal*	189	63,777	2,574	NA	NA	NA
	Residential	21,857	20,140	18,124	NA	NA	24,960

* The extreme variation in per capita municipal water consumption may be attributed to whether or not a city tracks its non-metered water usage.

Source: City of Cedar Rapids, City of Dayton, City of Decatur, City of Dubuque, City of Grand Rapids, City of Lee's Summit

Cedar Rapids' overall goal in regards to water conservation is to extend the existing capacity of the city's water treatment plant. The City established the following strategies to help them achieve this goal:

- Implement a pilot rebate program for residential water efficiency upgrades*
- Identify ways to encourage water conservation in new construction*
- Build customer capacity to respond to drought conditions*

Cedar Rapids might measure its progress in achieving its water conservation goal by tracking the indicator of total water consumption. The City could examine its overall water usage and the commercial, industrial, municipal and residential sectors separately. Implementing a pilot program for in-home water efficiency upgrades is one of the strategies by which Cedar Rapids intends to lower residential water consumption. Incentivizing the installation of water-efficient features in new construction could yield reduced water consumption in each of the four sectors. The city's third strategy of building customer capacity to respond to drought conditions will involve promoting the usage of rain gauges and rain barrels. These efforts will mainly be focused on individual households, so like the first strategy, Cedar Rapids could track per capita water consumption for the residential sector to determine whether or not the City is making progress in this area.

The City of Cedar Rapids adopted a drought contingency plan in February 2013, which outlines actions for customers to take in each of the different stages of drought in order to conserve water (discussed in greater detail in the Accomplishments section).¹³ In the instance that Cedar Rapids has to implement its drought contingency plan, it would be beneficial for the City to monitor the change in water consumption

¹³ "Drought Contingency Plan." *City of Cedar Rapids*, 2013. Web. 21 Oct. 2013. <<http://www.cedar-rapids.org/resident-resources/utilities/water/drought/Documents/Cedar%20Rapids%20Drought%20Contingency%20Plan%20Revised%2020131220.pdf>>.

to determine whether or not the standards that were put in place to deal with a water shortage are sufficient.

Cedar Rapids' total metered water consumption (commercial, industrial, municipal and residential) for fiscal year 2013 was 13 billion gallons, with an average daily usage of 36 million gallons. The per capita figures were 102,676 gallons and 281.3 gallons, respectively. The industrial sector was the largest user at 49.4%, followed by commercial, residential and municipal; the last of which used only 0.2% of the City's metered water.¹⁴ The City of Decatur had a lower total annual per capita water consumption rate, but the break down for each of the four individual categories mirrored that of Cedar Rapids in terms of the industrial sector being the largest user and the municipal sector being the smallest. Dubuque and Lee's Summit also had lower annual consumption rates than Cedar Rapids, while the rates for Dayton and Grand Rapids were larger, both overall and on a per capita basis.

Report Card Scores



¹⁴ Cedar Rapids - Murphy, Megan. "Re: iGreenCR Questions." Message to the author. 16 Nov. 2013. E-mail.

Stormwater

Table 3 displays the indicators for the Stormwater element and gives a baseline of how Cedar Rapids compares to its peer cities.

Table 3: Stormwater Indicators

Indicators for Stormwater	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Impaired water body	Cedar River	Great Miami River	Lake Decatur	None	Grand River	None
Nutrient impairment	Yes	Yes	Yes	No	No	No
Pathogen impairment	Yes	Yes	No	No	No	No
Sediment impairment	No	Yes	Yes	No	Yes	No
Square footage of permeable pavement installed by the city	don't track	don't track	don't track	large project in the works	93,000	NA
Number of rain gardens installed by the city	2	city doesn't manage any	don't track	NA	6	NA

Source: City of Cedar Rapids, City of Dayton, City of Decatur, City of Dubuque, City of Grand Rapids, EPA: MyWATERS Mapper

Cedar Rapids' goal in regards to the Stormwater element is to improve surface water quality by increasing infiltration and reducing the impact of runoff. The specific strategies that support this goal are:

- Increase public understanding and involvement in preventing stormwater pollution*
- Reduce the number and impact of illicit discharges*
- Support the installation of green infrastructure*

The first two strategies are tied to improving surface water quality and the third strategy relates to increasing infiltration. Progress in achieving these strategies can be measured through a number of indicators. One way to evaluate the overall water quality of a body of water is by examining whether it is impaired by nutrients, pathogens or sediment. Since these impairments are often the result of stormwater pollution, eliminating one or more of these types of impairments within a given body of water could indicate an increased public understanding of the importance of preventing such pollution. Alternatively it could be an indicator of the successful installation of green infrastructure. In addition, to measuring the strategy of supporting the installation of green infrastructure by changes in water quality, based on impairments, it can be measured by the square footage of permeable pavement and the number of rain gardens that exist within the city (both those installed by the City and by private entities).

In addition to evaluating overall water quality through impairments, Cedar Rapids could track the concentrations of the substances that are of particular concern to the City. For instance, water monitoring stations within Cedar Rapids have identified the presence of high levels of E. coli bacteria and multiple types of pesticides in the Cedar River. Tracking the level of E. coli and pesticides within the Cedar River overtime could help gauge whether or not an increased segment of the public recognizes the importance of preventing stormwater pollution. Monitoring how many people take part in the "Scoop the Poop"

Pledge and litter collection events each year would be a more specific way to measure this. An additional indicator for the strategy of supporting the installation of green infrastructure would be to track the square footage of impervious surfaces within the city. This would give Cedar Rapids a better idea of how well it is doing at increasing infiltration within the city. The indicators examining rain gardens and permeable pavement are beneficial, but they do not provide a full picture since green infrastructure also includes detention basins, roadside buffers, parkland and more.

When examining impaired waterways, Cedar Rapids is comparable to Decatur because both cities fall into two of the three impairment categories. However, it is worse off than three of the other four cities (Dubuque, Grand Rapids and Lee's Summit). While Cedar Rapids has only installed a small number of rain gardens and does not currently track the amount of permeable pavement within the City, this is also the case for the majority of its peer cities. At this point in time, Grand Rapids is the only city that tracks both the number of rain gardens and the square footage of permeable pavement that it has installed.¹⁵ However, Dubuque recently began an infrastructure project in which the City intends to install permeable pavement in two parking lots and in 40 different alleyways in town.¹⁶

Report Card Scores

Stormwater	
	Nutrient Impairment in Cedar River
	Pathogen Impairment in Cedar River
	Sediment Impairment in Cedar River
	Square Footage of City-constructed Permeable Pavement
	Number of City-managed Rain Gardens

¹⁵ "Stormwater Master Plan." *City of Grand Rapids*. 2013. Web. 25 Nov. 2013. < <http://grcity.us/enterprise-services/Environment-Services/Stormwater/Stormwater%20Management%20Plan%202013-05-31a.pdf>>.

¹⁶ "Bee Branch Watershed Green Infrastructure Summary." *City of Dubuque*, n.d. Web. 16 Nov. 2013. <<http://www.cityofdubuque.org/DocumentCenter/View/15357>>.

CleanUpCR

Table 4 includes data from the City of Cedar Rapids as well as data available from peer cities. These indicators serve to provide data from peer cities' environmental sustainability efforts as a comparison to the City of Cedar Rapids.¹⁷

Table 4: CleanUpCR Indicators Table

Indicators for CleanUpCR	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Percent of Cedar Rapids' households participating in curbside recycling July 2012- June 2013	73%	35%	15%	NA	NA	NA
1-Bag Challenge number of bags collected in 2013 (litter collection)	1,708	85	NA	NA	NA	NA
Policy for Purchasing Recycled and Recyclable Products in 2013	No	NA	Yes	Yes	Yes	NA
Materials' Management Tracking in 2013	No	Yes	Yes	Yes	Yes	NA

Source: City of Cedar Rapids, Iowa; City of Dayton, Ohio; City of Decatur, Illinois; City of Dubuque, Iowa; City of Grand Rapids, Michigan and City of Lee's Summit, Missouri.

The City of Cedar Rapids has developed goals for CleanUpCR which involve increasing the incidence of recycling and composting which will lead to decreases in garbage waste going into the landfill. Focus will also be on increasing litter collection participation through the City Manager's 1-Bag Challenge, instituting city-wide green purchasing program and tracking all materials used by the municipality from purchase through final disposal.

- a. *Decrease amount of waste sent to the landfill by 7% compared to 2013*
- b. *Increase the number of bags of litter collected each year with a goal of 3,000*
- c. *Establish a green purchasing policy for city government*
- d. *Create an internal resource to track municipal materials' management practices*

The indicators in Table 4 above could be used as base measurements to track the progress of environmental sustainability in Cedar Rapids. These indicators are reflective of the goals established by the City. For Goal 1, the indicator provides another measure from which the 7% decrease in garbage waste can be calculated. An increase in recycling (and composting) represents decreases in garbage waste. Over the time period between mid-1997 to mid-2013, increases in recycling and composting rates decreased the amount of garbage waste going to the landfill by 40%.¹⁸

¹⁷ Not all comparison cities had publically available information. These are noted with a NA for not available.

¹⁸ Based on curbside recycling rates obtained from Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids.

In 2013 curbside garbage pickup resulted in 16,880 tons of waste going to the landfill, or 49 percent, when compared to total waste (including recycling and compost). This goal aims to decrease the amount of additional waste sent to the landfill by approximately 608 tons.

Goal 2 is to increase the number of bags of litter collected. In 2013, city-wide efforts resulted in 1,708 bags of litter collected. The goal for 2020 is 3,000 bags of litter collected which equals an increase of 1,292 bags from 2013—an increase of 43% overall or approximately 185 additional bags each year for the next seven years.

Goal 3 is for Cedar Rapids to establish a purchasing policy for city government. Green purchasing policies include the purchase of environmentally friendly products that do not contain as many environmentally harmful substances. While some departments within the City may choose to purchase green products, there is currently no mandated policy in place for all departments and all purchases to be green. This is a goal that the City feels is important for helping the municipality be an example of good environmental stewardship for their residents to follow.¹⁹ For Cedar Rapids to accomplish this goal, City Council will need to vote in the affirmative on a mandated purchasing policy.

Goal 4 for CleanUpCR aims to create an internal resource to track municipal materials' management practices. The tracking mechanism will obtain a base measurement against which future progress for all materials used in providing services to the city may be compared. These measurements initially would be used to contrast the amount purchased against the amount diverted from the landfill or recycled into other products. These materials can be toxic to the environment and pose a health or safety risk to human, plant and animal life. Tracking these materials used to keep city streets clean, maintain the urban forest, provide safe and drinkable water and other services is important to ensure proper use and final disposition.

For landfill diversion, the City of Cedar Rapids is more progressive than its comparison cities. Table 5 shows that not only do more residents participate but they do so in larger amounts. Curbside recycling and composting make it easier for city residents to dispose of waste in a way that promotes environmental sustainability. Litter collection activities within the City are well publicized with good community participation. The 1-Bag Challenge contributes greatly in raising the amount of litter collected compared to other cities that do not have similar initiatives. Comparison cities have green purchasing policies in place and Cedar Rapids seeks to address this issue. By mandating a municipal-wide purchasing policy, including the purchase of recycled products and recycling used materials, the City of Cedar Rapids will close the loop on recycling and exemplify good environmental stewardship. The materials' management practice in Cedar Rapids is on level with these cities, however it is not known if and how these materials are tracked to their end state in the other municipalities.

¹⁹ Based on information received from Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids.

Report Card Scores

CleanUpCR		
	Percent of Cedar Rapids Households Participating in Curbside Recycling (Landfill Diversion) July 2012 – June 2013	
	1-Bag Challenge Number of Bags Collected in 2013 (Litter Collection)	
	Policy for Purchasing Recycled and Recyclable Materials in 2013	
	Materials Management Tracking in 2013	

Bike CR

The following data table shows the results for three indicators of Bike CR created in fall of 2013 and shows how Cedar Rapids compares to peer cities.

Table 5: Bike CR Indicators

Indicators for BikeCR	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Complete Streets Policy	No	Yes	No	Yes	Yes	Yes
Bike to Work (2008-2012 ACS)	0.33%	0.32%	0.12%	0.20%	0.44%	NA
Safe Travel Network (Annual average Major and Minor crashes involving bicyclists) (2008-2012)	Major: 1.6 Minor: 13.2	NA	NA	Major: 1.4 Minor: 7.2	NA	Major: 4.6 Minor: 1.6
Miles of Bike Paths/Trails (10' wide paved and unpaved, on-street bike lanes, sharrows, road shoulder)	43.9			29 ²⁰	57 ²¹	84.05 ²² / 39.06
Miles of Bike Paths/Trails per 1000 population (2012)	0.35					0.91/0.42
Walkability Index	32/100	45/100	33/100	40/100	48/100	19/100

Source: Complete Streets Coalition 2013, American Community Survey 2008-2012, Iowa DOT, City of Cedar Rapids Traffic Engineering Division, Lee's Summit 2012 Bicycle Transportation Plan, Walkscore.com

Bike CR's Goal for 2020 is to increase bike ridership, specifically through increasing trips to work (commuting) by 5%²³, trips to school by 5% and recreational use by 3%. Central strategies to achieve the goal of increasing bike ridership are as follows:

- Achieve League of American Bicyclists (LAB) Silver status by 2015 and Gold status by 2020*
- Add 55 out of the planned 105 miles of proposed trails as outlined in the Comprehensive Trails Plan*

It is important to have a Complete Street policy indicator because it provides a framework that city engineering and planning staff can use when undertaking new road projects or improving existing roads. A complete street gives consideration to how cars, bikes and pedestrians can be accommodated in a new design. Each section of road should be evaluated for its potential to accommodate all users. Some streets may not be able to fully accommodate pedestrians to ADA standards (6' wide sidewalk), while opportunities for inclusion of sharrows (on-street bike lanes) may also be limited. Cedar Rapids has not adopted a Complete Streets policy.

²⁰ City of Dubuque. "Recreational Trails." Web. 14 April 2014. This website only mentions miles of paved trails; no mention of miles of on-street bike lanes, sharrows, or road shoulders. The total mileage of bike infrastructure of Dubuque may be more.

²¹ 41 miles of on-street facilities, and 16 miles of multi-use trails. Tilma, Tom. "Miles of Bike Infrastructure in Grand Rapids." Telephone interview with author. 25 Apr. 2014.

²² Includes 44.99 miles of extra-wide (13-16ft) traffic lanes without bike markings.

²³ As measured by the American Community Survey

The Bike to Work indicator is an important measure of sustainability for all cities. Biking to work promotes environmental sustainability by providing non-motorized personalized transportation, avoiding pollution like exhaust and chemical leaks generated from motorized transportation which negatively affect air and water quality. This indicator reports data from the American Community Survey (ACS 2008-2012) and estimates the number of individuals who bike to work age 16 or older.

The Safe Travel Network indicator provides an objective measurement of reported crashes of bicycle users. Unfortunately, there is no source of data to determine the total number of bike trips made in each year (2008-2012) for all purposes, including leisure, in Cedar Rapids. Instead, the next best option is to use ACS 2008-2012 data, which estimated 443 people biked to work each year. If each bike commuter biked to and from work 136 workdays each year, this equates to about 120,500 bike trips per year, or over 602,000 total bike trips between 2008 and 2012.²⁴ Reported severe accidents average of 1.6 per year, which equates to 1.33 major accidents per 100,000 bike trips (0.001328%). Likewise, reported minor crashes average 13.2 per year, equates to about 11 minor accidents per 100,000 bike trips (0.010955%). It is important to note that these data reflect only officially reported accidents, excluding those which were not reported. With these very small numbers, however, it would take more than 12,000 accidents per year to equate to 1% of all bike trips.

Miles of Bike Paths indicator measures the amount of infrastructure designed specifically to support biking. Nearly half of the total system mileage (20.4 miles) has been added since 2009.²⁵ The Miles of Bike Paths per 1000 population indicator is derived by dividing bike system mileage by 2012 population and creates the ability to make comparisons amongst selected cities.

The Walkability Index is an important measurement showing progress towards the primary goal of increasing bike ridership; as an area or community becomes more walkable, the more likely it is that transportation modes alternative to the personal vehicle will be selected for the daily commute and other activities requiring travel.²⁶

Complete Streets policy: Of the selected comparison cities, Decatur, IL is the only city other than Cedar Rapids that does not have a Complete Streets policy. *Biking to Work:* Grand Rapids, MI (0.44%) has the highest percentage of bike commuters and Decatur, IL (0.12%) had the lowest, a range of 0.32%. The average estimate of bike commuters across all comparison cities is 0.28% between 2008 and 2012. Cedar Rapids has the second highest bike commuter score of 0.33%, which is 17% higher than the average.

²⁴ The weather conditions in Iowa are not generally considered conducive to most bike commuters between November and mid-March (18 weeks) Assumes 50 work weeks per year. $50 - 18 = 32$ $32 * 5 = 160$ workdays * 85% for rain/sick days/PTO = 136 days * 443 * 2 = 120,496 * 5 yrs = 602,480

²⁵ Trail Segment Summary, February 2014; obtained from Ron Griffith, City of Cedar Rapids

²⁶ Litman, Todd. "Evaluating Non-Motorized Transport: Techniques for Measuring Walking and Cycling Activity and Conditions." *TDM Encyclopedia* (2014): n.pag. Web. 4 Apr 2014. <<http://www.vtpi.org/tdm/tdm63.htm>>.

Safe Travel Network: Data for this indicator is collected at the discretion of state DOTs, individual counties or cities. Data was found for Iowa cities (Cedar Rapids and Dubuque) and Lee's Summit. Considering the data obtained, Cedar Rapids has a major injury rate about one third that of Lee's Summit, but a minor injury rate more than eight times higher. Cedar Rapids has a comparable major injury rate to that of Dubuque, but a minor injury rate about twice as large. *Miles of Bike Paths/Trails:* Cedar Rapids has a current system length of 43.9 miles. The average mileage of trail infrastructure across all comparison cities is 42.24 miles.²⁷ The average distance of trail mileage per 1000 population across all cities is 0.3925 miles. In both cases, the figures for Cedar Rapids closely follow the average, within 5% of the average trail system length, and about 10% below the average mileage per 1000 residents. *Walkability Index:* Grand Rapids, MI is the most walkable of all comparison cities, with a walk score of 44 out of 100. Lee's Summit is the least walkable with a score of 19 out of 100. The range is 25 points and the comparison city average is 36.6. Cedar Rapids score of 32 out of 100 is the second lowest amongst selected cities and its score falls 12.56% below the average.

Report Card Scores

Bike CR	
	Complete Streets
	Bike to Work (2008 – 2012 ACS)
	Safe Travel Network (Annual Average Major and Minor Crashes Involving Bicyclists 2008 – 2012)
	Miles of Bike Paths or Trails (10-foot wide paved and unpaved, on-street bike lanes, sharrows, road shoulder)
	Miles of Bike Paths or Trails per 1,000 population (2012)
	Walkability Index

²⁷ Using the smaller number for Lee's Summit.

Transportation

Table 6 displays how Cedar Rapids compares to peer cities for transit operations.

Table 6: CR Transit Indicators

Indicators for CR Transit	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Walkability Index 2014	32/100	45/100	33/100	40/100	48/100	19/100
Transit Ridership by Metro	0.91%	1.66%	1.15%	1.02%	1.35%	NA
Unlinked Passenger Trips per capita 2012 (by Metro)	4.65	2.94	12.17	4.04	14.76	NA
Average Annual VMT per capita (2008-2012) (population 2012)	7,725	5,860 ²⁸	8,582 ²⁹	6,010	7,483 ³⁰	12,262

Source: Walkscore.com, American Community Survey 2008-2012 Tables B08301 and B01003, National Transit Database 2012, Iowa DOT, Ohio DOT, Illinois DOT, City of Lee's Summit

CR Transit's 2020 goal is to increase the number of Unlinked Passenger Trips (UPT) by 5% each year until 2020. UPT describes the number of times passengers board public transportation vehicles and is commonly referred to as "number of boardings."³¹ The most recent data from fiscal year 2013 is 1.2 million UPT or 4.65 trips per person per year. To reach 5% annual growth, UPT of 1.7 million (an additional 498,000 UPT) would need to be attained by 2020. As 5% annual UPT growth exceeds the current recent population growth trends of 0.52% for the Cedar Rapids metropolitan statistical area (MSA),³² an increase in UPT per capita would have to occur. At current population growth rates, UPT per capita would need to increase 6.49, or 39.6% by 2020.

The Walkability Index is as appropriate a measurement tool for transit as it is for Bike CR; a more walkable place encourages alternative modes of transportation. The Transit ridership by metro data is available from the American Community Survey (2008-2012) and estimates the number of individuals riding transit to work age 16 or older. Measuring UPT per capita by MSA³³ enables comparison across peer cities because each bus system serves multiple communities surrounding the central city.³⁴ The Average Annual Vehicle Miles Traveled (AAVMT) indicator is a versatile metric which can be used to approximate many characteristics about a city and its population. In this case, AAVMT/capita can provide some insight into how the population of Cedar Rapids travels within the city. When this indicator is tracked over time, an upward trend would indicate citizens are driving more miles each year; a downward trend

²⁸ Montgomery county data.

²⁹ Macon county data.

³⁰ Kent County data.

³¹ "Fact Book Glossary." American Public Transit Association. Web. 5 Mar 2014.

<<http://www.apta.com/resources/statistics/Pages/glossary.aspx>>.

³² US Census Bureau, MSA population estimates 2010-2013

³³ Defined under: United States. US Census Bureau. "Metropolitan and Micropolitan." Web.

<<https://www.census.gov/population/metro/>>.

³⁴ This figure was calculated by dividing the estimated 2012 MSA population by the total number of UPT in 2012. A larger number indicates higher rates of transit usage in the MSA.

would indicate more citizens are utilizing other forms of transportation—the transit system among those alternatives.

As noted in the Bike CR section, Grand Rapids scored highest in the Walkability Index, Lee's Summit lowest, and Cedar Rapids about mid-range. Cedar Rapids places last among selected cities for transit ridership. Cedar Rapids is the only city to rank below 1% transit commuters. The UPT per capita indicates residents in the Grand Rapids metro took three times as many trips by transit in 2012 compared to Cedar Rapids' metro residents. In 2013, Grand Rapids hit a milestone of 12.5 million UPT in a single year.³⁵ However CR Transit provided more trips per person than Dayton and Dubuque but fell short of the 7.71 UPT per capita. AAVMT per capita average across all peer cities was 7,987 with a range of 6,402. Cedar Rapids' AAVMT is the closest to average of all peer cities, falling just 262 miles (3.28%) below the average.

Indicators and Data Table for Fleet Services

Table 7 displays indicators which can be helpful to the Fleet Services department in tracking their goals as listed below:

Table 7: Fleet Services Indicators

Indicators for Fleet Services	2014 Data
Average age of bus fleet	10.47 years
Total annual fuel consumption in gallons by fuel type	605, 207.00 gallon of diesel 387,451.00 gallon of gasohol ³⁶
Total number of vehicles removed from fleet since 2009	394 vehicles
Average fuel utilization of fleet vehicles by class tracked by GPS	250, 571 gallon of diesel 45,660.00 gallons of gasohol. ³⁷

Sources: "Equipment list, 103113," Cedar Rapids Fleet Services, Tina Wickman

The goals of Fleet Services are by 2020 to:

1. Reduce the age of the bus fleet to less than 8 years
2. Reduce active vehicle inventory by 10%
3. Reduce fuel consumption by 6%

A more modern bus fleet reduces initial maintenance costs and provides an opportunity to achieve greater fuel efficiency. Reducing the average age of the bus fleet also ensures transit riders in Cedar Rapids are provided with a more comfortable riding experience with cleaner interiors. Fleet Services owns and operates three large fueling stations around the city. Long-standing agreements between Cedar Rapids and other government agencies located within the city (e.g. Linn County government, the US Marshals, various ambulance services, etc.)³⁸ authorize direct billing per month based on consumption.³⁹ The third

³⁵ "Breaking the record: 10.7 billion public transportation trips." Get on Board. The Rapid (Interurban Transit Partnership), 12 Mar 2013. Web. 1 Apr. 2014. <<http://blog.ridetherapid.org/10-7-billion-public-transportation/>>.

³⁶ April 2013-March 2014. Figures only reflect fuel purchase and consumption at the primary fuel site, the City Services Center. Wickman, Tina. "RE: Can you help fill in the chart?" Message to Matthew Peirce. Email. 16 April 2014

³⁷ April 2013-April 2014

³⁸ Wickman, Tina. "RE: Can you help fill in the chart?" Message to Matthew Peirce. Email. 16 April 2014.

indicator of removing unused vehicles from the fleet has multiple benefits most significantly on Fleet Services' budget. Some of these cost saving measures come from reducing the number of vehicle licenses renewed each year as well as decreasing the number of oil changes and disposal, parts replacement and replacement tires.⁴⁰

Closely related to the metric above, tracking average fuel consumption by vehicle class (or type), can help Fleet Services to, over time, determine which vehicle types (or engine types, like lawn mowers or snow blowers) are consuming the most fuel. These assessments can support the need for high levels of maintenance on those vehicles and provide training to operators to improve fuel usage to attain the highest level of efficiency. In the future, based on data collected via a tracking system, vehicles that are fuel inefficient can be recommended for replacement sooner than they otherwise may have been. Focusing on practices and equipment where waste has been identified can realize significant fuel consumption reductions and budget savings in the short-term and in the long-run. There are currently 189 vehicles tracked through the global positioning satellite network (GPS) in the Public Works and Water and Solid Waste departments. These range from light duty trucks to garbage trucks.⁴¹ These vehicles are the first to undergo the process of intensive fuel usage data collection, with more to follow in the future. This tracking is essential to identifying wasteful practices.

Report Card Scores



³⁹ Tracking total annual fuel consumption by type has not been actively pursued by the Fleet Services department however this has is in part due to the decentralized nature of purchasing and consumption.

⁴⁰ Vehicle reductions may or may not have a direct impact on air pollution generated from city vehicles, as the vehicles that remain in service will see higher use levels (generating more pollutants per vehicle) than vehicles in the current fleet.

⁴¹ Wickman, Tina. "RE: Can you help fill in the chart?" Message to Matthew Peirce. Email. 16 April 2014.

Community Development

Table 8: Community Development Indicators

Indicators for Community Development	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Urban Density (People per square mile)	1,777.70	2,490.47	1,643.90	1,862.70	4,206.12	1,414.10
Percent of Municipally owned buildings & structures on National Register of Historic Places.	75%	38%	0%	45%	38%	0%

Source: City of Cedar Rapids; City of Dayton; City of Decatur; City of Dubuque; City of Grand Rapids; City of Lee's Summit

Community Development's goals for 2020 are as follows:

- 1. Increase the number of housing units created within the Downtown SSMID and the Medical Quarter SSMID**
- 2. Promote infill development in the Tier 1 neighborhoods within our overlay districts (Kingston, Czech Bohemia and Ellis) and within the SSMIDs (Downtown and Medical Quarter)**
- 3. Increase the number of students enrolled in the Historic Preservation program at Kirkwood Community College**

Two of the indicators shown in the table above are connected to the goals outlined for Community Development. The two indicators are the measure of urban density and the number of housing units approved per year in the Downtown SSMID, Medical Quarter SSMID and Tier 1 neighborhoods. The urban density indicator can be used to measure whether or not the increase in housing units and infill development within the Downtown and Medical Quarter SSMIDs and the Tier 1 neighborhoods have increased density. Secondly, the indicator measuring the number of housing units approved per year in the Downtown SSMID, Medical Quarter SSMID and Tier 1 neighborhoods will determine if goals one and two are being met each year. The percent of municipally owned buildings on the National Register of Historic Places does not measure any of the identified goals for Community Development but is important for sense of place and community identity.

If well located and designed, higher population densities can generate the critical mass necessary to support improved public transportation systems, grocery stores and pedestrian-friendly areas, etc.⁴² At this time, Cedar Rapids is not performing as well as its comparison cities in relation to the people per square mile of 1,778. Grand Rapids has the highest density at 4,206 followed by Dayton at 2,490 and Dubuque with 1,863 people per square mile. Lee's Summit has 1,414 people per square miles, which is the lowest of all the comparison cities. In summary, high-density areas include walkable commercial and employment

⁴² Sharpin, B., Anna and Kos, Paul. "The Social and Environmental Effects of Residential Infill Development in New Zealand." n.p. 2006. Web. <<http://wellington.govt.nz/~media/your-council/projects/files/infill-social.pdf>>.

centers and are better served by local and regional transit.⁴³ Since Cedar Rapids is not currently very dense, techniques such as infill development will assist the City in achieving a higher density.

Report Card Scores

Community Development	
	Urban Density – People Per Square Mile
	Percentage of Local Buildings and Structures on the National Register of Historic Places
	Number of Housing Units approved per year in the Downtown SSMID, Medical Quarter SSMID and Tier I Neighborhoods

⁴³ John Wiley & Sons, Inc. "Density." Planning and Urban Design Standards Quick Notes No. 12. Copyright © 2006 Reprinted by permission of John Wiley & Sons, Inc. < <http://www.planning.org/pas/quicknotes/pdf/QN12.pdf>>.

Forestry

Table 9 shows the comparative values for four different indicators of Forestry. The following information gives a baseline for how Cedar Rapids compares to peer cities and can be used as a launching point for future goals and strategies of Forestry.

Table 9: Forestry Indicators

Indicators for Forestry	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Number of different Tree species within the City Stock (from 2009 – present)	99	NA	NA	33	43	NA
Net New Trees per Year	60	NA	NA	-266	NA	NA
Number of years as a Tree City USA Member	35	22	32	No	15	9

Source: City of Cedar Rapids, City of Dayton, City of Dubuque, City of Grand Rapids, Arbor Day Foundation

Forestry's has three goals for 2020, which are to plant more trees, to increase the survivability of planted trees and to build volunteer support for street trees in Cedar Rapids. The following strategies are in place to meet these three goals:

- Plant 1,200 total trees each year*
- Successfully manage the Emerald Ash Borer (EAB) infestation/replant a diverse stock of trees*
- Work with developers to improve the survivability of trees planted within new development*
- Create a volunteer base to support the maintenance of trees throughout the City*

The first indicator, number of different species within the city stock, is a way to combat EAB by decreasing the percentage of ash trees in the population. Right now, however, there are no indicators from earlier research that would suffice in meeting the second and third goals outlined by Forestry. A useful indicator for the second goal could be the amount of money paid into a tree planting fund by developers, which could show how much a developer is willing to pay to have the city plant trees. An additional indicator of survivability could also be measured by the age of trees in the stock. The third strategy represents a change from having developers do all of their planting to allowing Forestry to assist with planting, so no historical data exists. In order to meet the third goal of building volunteer support for street trees, an indicator for number of people who attended *TreeKeeper* certification programming would be an excellent indicator as would number of participants in tree maintenance events each year. Both of these indicators could show the change over time of participants in programs directly relating to volunteer advocacy of tree maintenance in the City.

Cedar Rapids currently has a stock of 99 different types of tree species according to information gathered from 2009 to the present. Dubuque has a list of 33 different species of trees according to Dubuque's city arborist. Grand Rapids has listed at least 43 different types of trees in a tree inventory report, but does not have an extensive list of all its trees. By comparison, Cedar Rapids has the most diverse variety of trees and the goal is to keep increasing the diversity. Invasive pests such as the Emerald

Ash Borer have made it clear why dependency on one or two types of tree species in any location is a bad idea and Cedar Rapids aims to use the principle of 10-20-30: no more than 10% of one given species, no more than 20% of one given genus and no more than 30% of one given family.⁴⁴ This level of diversity will help prevent imbalance that occurs with shocks to the system in terms of weather, pests and other phenomena that affect the ability of trees to thrive. Cedar Rapids went through a similar experience in the 1960's with Dutch Elm Disease; this, again, reinforces why diversifying the stock is of utmost importance.

According to the iGreenCR website, Cedar Rapids maintains approximately 65,000 public trees.⁴⁵ In 2013, Cedar Rapids planted 1,236 trees. From 2010-2012, there were more trees removed than planted based on the limited staff and budget. In 2013, however, there were 60 net new trees to the stock.⁴⁶ According to the arborist for the City of Dubuque, in 2013, Dubuque saw -266 net new trees in 2013. Much like the work taking place in Cedar Rapids, this is due to mitigation preparation for EAB. While a net new 60 trees is a positive net number in Cedar Rapids, the prior three years saw a net loss of 250 trees on average. Creating a positive number of net new trees is going to take time to deal with the EAB infestation and increased staffing to do all the extra planting.

Report Card Scores



⁴⁴ Fagan, Todd. Personal Interview. 24 Oct. 2013.

⁴⁵ "About the Program." *Cedar-Rapids.org*. City of Cedar Rapids, n.d. Web. 18 Nov. 2013.

⁴⁶ Fagan, Todd. "Tree Replacements for Net New Trees." Message to the author. 11 Nov. 2013. E-mail.

Parks and Gardens

Table 10: Parks and Gardens Indicators

Indicators for Parks & Gardens	Cedar Rapids, IA	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI	Lee's Summit, MO
Park Acreage per 1,000 people	32.56	NA	26.18	15.09	6.3	11.33
Miles of Trails per 1,000 people	0.21	0.5	NA	0.31	0.21	0.17
Square Footage of Community Gardens per 1,000 people	327,000	281,216	NA	49,000	NA	NA
Areas of established and restored prairies and wetlands	NA	NA	NA	42	NA	NA

Source: City of Cedar Rapids; City of Dayton; City of Decatur; City of Dubuque; City of Grand Rapids; City of Lee's Summit

The Parks and Garden's goals and strategies for 2020 are as follows:

1. Develop a new Greenway

- a. Complete and implement greenway planning and development

2. Increase conversion to native plants in Cedar Rapid's parks

- a. Expand volunteer based projects and education

The indicator measuring park acreage per 1,000 people can be used to identify if goal one, the development of a new greenway, has added additional park acreage. The second indicator, miles of trails per 1,000 people, is also a measure for the first goal. The indicator measures the increase in the miles of trails available for recreational opportunities while increasing connectivity.

The strategy of expanding volunteer based projects and education does not relate to any of the indicators identified above. A potential indicator that could be used to measure the outcome of the strategy is to count the number of people in each of the volunteer programs. In regard to the second goal, a supportive indicator for increasing the conservation of native plants into Cedar Rapid's parks could be to measure the acres of restored prairies and wetlands. This could potentially be an added feature to the Geographic Information Systems (GIS) mapping layers.

The two indicators that correspond to the Parks and Gardens goals are the park acreage and miles of trails per 1,000 people. Cedar Rapids has the largest park acreage per 1,000 people when compared with its five peer cities. The acreage of parks is critical in preserving the future of the City's natural environment while enhancing residents' quality of life. Natural resources such as parkland offer benefits to residents that can be enjoyed on a daily basis such as clean air, a lack of noise pollution, and scenic views and sunsets.⁴⁷At this time, Cedar Rapids is not performing as well as its comparison cities in regards to the

⁴⁷ Otto, Daniel, Monchuk, Dan, et. al. "The Economic Vale of Iowa's Natural Resources." Department of Economics: Iowa State University. December 2007.

miles of trails available to residents. Dayton, OH has the largest number of trails per 1,000 people at .495, followed by Dubuque, Grand Rapids, and Lee's Summit. Data was unavailable for Decatur, IL.

Report Card Scores



IV. IREENCR 2020: INVESTING IN CEDAR RAPIDS NEXT GENERATION ENERGY MANAGEMENT

Vision Statement for Energy Management

CEDAR RAPIDS WILL UTILIZE ITS ENERGY MANAGEMENT PLAN TO PROGRESSIVELY IMPLEMENT COST-EFFECTIVE MEASURES THAT REDUCE ENERGY USE OF THE MUNICIPALITY, ALL WHILE EDUCATING THE PUBLIC ON THE IMPORTANCE OF INDIVIDUAL CONSERVATION EFFORTS.

Energy management is important to sustainability because the use and production of energy are significant contributors to greenhouse gases (GHGs). Finding ways to conserve energy so that less is required for day-to-day operations are the first steps in building a sustainability program that benefits all members of the community. For many communities, this starts by focusing on municipal structures and collecting information on the municipal building stock to understand how energy is used and how it can be saved within each facility. The process includes an energy audit, which can be as simple as a walk-through visual inspection of facilities or as complicated as a computer simulation to predict building system performance.⁴⁸ Most energy audits begin by conducting bill audits, an inexpensive investigation that can be performed by municipal workers to track energy usage, peak demand usage and rate schedules.⁴⁹ The benefit of Energy Management is that greater energy efficiency means saving money, so Cedar Rapids has the incentive to make the changes now.

The departments within the Energy Management element have undergone many changes since the flood of 2008, when much of the city infrastructure was destroyed by floodwaters. The City of Cedar Rapids received an Energy Efficiency and Conservation Block Grant of \$1.3 million, \$150,599 of which was used to institute an Energy Management Plan. This presented an opportunity to invest in significant infrastructural changes such as replacing flood-damaged facilities, upgrading HVAC systems, insulating buildings and consolidating many city services into one centralized building, the City Services Center.⁵⁰

The Energy Management element is divided into three distinct categories: City Facilities, Water and Wastewater and Information Technology (IT). Within each category, strategic goals have been set to assist Cedar Rapids with tackling energy efficiency. Many of these issues are similar to what other cities dealing with sustainability face: having to track energy use and consumption, dealing with municipal budgets in planning and prioritizing efforts.

Energy Management: City Facilities

2020 Goals: Investing in Cedar Rapids' Next Generation

The Facilities Maintenance Division maintains and supports all of the municipal buildings. The division is responsible for energy management, facilities assessments, capital improvements, construction and grounds

⁴⁸ New Jersey Department of Environmental Protection. "How to Conduct an Energy Audit: A Short Guide for Local Governments and Communities." Apr. 2006. PDF file.

⁴⁹ Ibid.

⁵⁰ HDR Engineering. "Energy Management Plan Executive Summary." Jun. 2010. PDF file.

maintenance of these buildings, including plumbing, electricity and HVAC.⁵¹ The division has identified three strategies that cover information gathering, data tracking and educating the workforce about energy use habits in an effort to improve its sustainable practices. All of these strategies work towards the overarching goal of reducing energy use by the municipality.

a. Perform energy audits on buildings

This strategy is in recognition of the importance of energy audits to increase energy efficiency. Audits are a key part of moving towards sustainability not only because of reduced energy consumption, but because, “The transformation [to green energy] is a time-consuming process and in order to increase energy preservation during that transition time, energy audits play a vital role.”⁵² The auditing process guides how to tackle efficiency upgrades, considering the factors of time, how energy is currently used and costs vs. benefits of all potential upgrades.

b. Create a prioritized list of energy upgrades and develop a system to track completed energy upgrades

Both of these strategies capture the importance of data gathering and creating a list of priorities. These strategies also utilize the work done by energy audits to determine what key upgrades are both timely and cost-effective. Upgrades can be in both the form of recommendations for more efficient operation and maintenance as well as new energy saving technologies and energy conservation measures.⁵³ Tracking the changes in energy consumption after the implementation of energy upgrades can be done through the current Energy Management System (EMS).⁵⁴

c. Develop and implement an employee energy education program

The purpose of this strategy is to promote energy savings and how individual contributions can lead to greater combined savings. By educating employees about sustainable energy practices, there is greater opportunity for self-accountability and recognition of problems, should they arise. This also helps all employees understand why the City is doing what it is doing, which can then serve as a model for how to educate the rest of the community.

Accomplishments

The Facilities Maintenance Division centralizes their energy use into a single Energy Management System (EMS), which allows for peak load energy adjustments and monitoring facility use in real time. Peak demand describes the highest point of energy use in a system; peak demand also explains the amount of electrical capacity that an electricity utility must be able to provide for equipment to start up and run at full capacity.⁵⁵

1. Adding Facilities to the EMS

⁵¹ “Facilities Maintenance Services.” *Cedar-rapids.org*. City of Cedar Rapids, n.d. Web. 2 Mar. 2014.

⁵² Robinsin, Evelyn. (17 Dec. 2012). Significance for Sustainability in Energy Audits. *ED+C Magazine*. Retrieved from <http://www.edcmag.com/articles/94834-significance-for-sustainability-in-energy-audits>

⁵³ New Jersey Department of Environmental Protection. “How to Conduct an Energy Audit: A Short Guide for Local Governments and Communities.” Apr. 2006. *PDF file*.

⁵⁴ Archer, Dean. “Energy Management Facilities 2020.” 28 Feb. 2014. *Microsoft Word file*.

⁵⁵ “Peak Demand - What is it?” *Energyaction.com.au*. Energy Action, n.d. Web. 17 Nov. 2013. <<http://energyaction.com.au/peak-demand-what-is-it>>.

As new municipal facilities are built in Cedar Rapids, the city has the ability to add them to the EMS, allowing for the automation of regulating controls. Some facilities that previously were not on the EMS, such as the WPC, are also being integrated into the system. By using a central control center running Tridium's Niagara^{AX} software or similar software, the city can make peak adjustments with real-time updates in energy use every five seconds⁵⁶. The system allows the city to monitor many facilities, in addition to the benefit of being able to run a series of reports and track individual building data.

2. Retrofitting Parking Ramps and Street Lights with LED / High-Energy Fluorescent Lighting

Cedar Rapids has invested in two of the most efficient, cost-saving lighting technologies: LEDs and high-efficiency fluorescents. Many of the retrofits in streetlights have been with the LED technology while parking ramps have been a mix of the two; in either case, the kWh usage has dropped by 1.25 million kWh between 2008 and 2012.⁵⁷ The municipal lighting upgrades include 4,175 streetlights and 952 parking ramp lights.⁵⁸ All of the public parking ramps have been retrofitted and around 12% of the streetlights in Cedar Rapids have undergone conversion from high-pressure sodium (HPS) to LED technology.

Challenges

1. Budget to continue improvements

The biggest challenge to the division is budget. Many of the upgrades to the system require substantial upfront costs and while EECBG money from the flood helped to pay for many of the new facilities, there are still more facilities that do not have adequate funding to upgrade.

Energy Management: Water and Wastewater

2020 Goals: Investing in Cedar Rapids' Next Generation

Water and Wastewater treatment plants are essential infrastructure that prepare water for consumption and treat wastewater before discharging it downstream. These operations use a great deal of energy to provide clean and safe water for household, business and industrial consumption and clean the water before returning it back to the river. There are federal and state mandates to ensure the quality of water that is delivered by the City and discharged meets certain criteria. Cedar Rapids uses UV disinfection to kill pathogens that conventional chemical technologies cannot, but UV disinfection is energy intensive.⁵⁹ Since, however, the first goal is public health and safety, the focus of water and wastewater in managing energy can be on times of low-peak energy use, such as during the evening, when facilities are not running at full-capacity. Currently, water works will refill water towers at night whenever possible to capitalize on off-peak energy costs.⁶⁰

⁵⁶ Archer, Dean. Personal Interview. 25 Oct. 2013.

⁵⁷ Clancy, Jennifer. "Parkade info." 11 Jun. 2013. *Microsoft Word* file.

⁵⁸ Ibid.

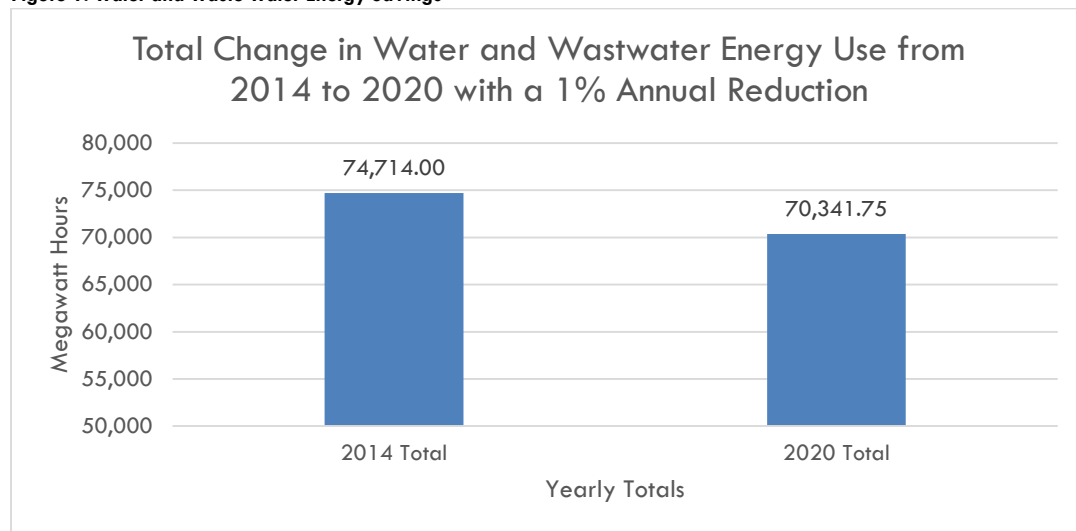
⁵⁹ "Our Process." *Cedar-rapids.org*. City of Cedar Rapids, n.d. Web. 3 Mar. 2014.

⁶⁰ Jensen, Matthew. "Natural Gas Usage at WPC Facility Cedar Rapids, IA." Message to the author. 18 Nov. 2013. E-mail.

a. Reduce municipal energy consumption by 1% annually over the next five years

The two largest municipal energy users in Cedar Rapids are the Water Pollution Control Center (WPC) and the Water Works plant.⁶¹ Thus, even an incremental drop in energy use by these two facilities represents a large reduction in municipal energy use. As seen in Figure 1, a 1% change per year means a collective reduction of 747,140 kWh after one year, resulting in a grand total reduction of 4.4 million kWh between now and 2020, a 6% overall change in energy use.

Figure 1: Water and Waste Water Energy Savings



b. Improve operator's ability to maximize off-peak energy usage without affecting treatment

Right now, there is not an Energy Management System (EMS) in place that oversees the energy use at Water Works or the Water Pollution Control Center (WPC), though the city is working on adding these facilities to the EMS. Working with operators to better understand the electricity used during off-peak times and creating standard operating procedures (SOPs) to best deal with the reductions in energy use will help both plants shift loads towards off-peak hours whenever possible, which will help save the municipality money in energy costs.

c. Maximize usage of biogas generated at the Water Pollution Control Center (WPC)

Biogas is a mixture of methane, carbon dioxide and trace other gasses that result from the breakdown of organic material by bacteria.⁶² Currently, not all biogas produced from biosolids at the WPC is utilized for energy production to run the incinerator, which is used for biosolid disposal. When there is excess biogas, it must be flared so as to not allow methane to escape into the air. The current target is to reduce the amount of flaring by 30% from 2013 levels. Additionally, the City is researching the opportunities to use micro-turbines for electricity production from biogas and to use biogas fuel cells.⁶³

⁶¹ HDR Engineering. "Technical Memo 6.4 – Current Municipal Energy Use." 24 Jun. 2010. PDF file.

⁶² "Frequent Questions." *Americanbiogascouncil.org*. American Biogas Council, n.d. Web. 8 Mar. 2014.

⁶³ Jensen, Matthew. "Cedar Rapids Utilities Energy Management Goals for 2020." 11 Feb. 2014. Microsoft Word file.

d. Reduce fuel usage for municipal vehicles operated by Water and Wastewater staff

Vehicles contribute approximately 28% of the Greenhouse Gas (GHG) emissions in the US.⁶⁴ One option to reduce fuel usage is to pursue vehicles that utilize different types of fuel, such as biodiesel, which is more fuel-efficient than conventional diesel. Another idea that can be enacted immediately might be a blanket policy that ensures a minimum standard of efficiency in all future purchases of cars and trucks.⁶⁵ By doing this, the City creates a standard so that regardless of the vehicle in need of replacement, only the more efficient options will be considered.

Accomplishments

1. Timely Update of Technologies / Variable Frequency Drive Motors

Because of the large capital costs of technology, knowing when to make timely improvements can save money in the long run and can help city operations become more efficient. Cedar Rapids used the flood as an opportunity to replace destroyed motors and equipment with newer, more-advanced technologies.⁶⁶ The American Public Works Association recognizes that updating facilities with new lights, more efficient motors and HVAC systems and building envelope improvements all help save energy, especially in the use of variable frequency drive motors.⁶⁷ These motors function by shifting the amount of energy necessary to complete a task based on the current load instead of running at 100% capacity all of the time.

Challenges

1. Severe Weather Events, Deterioration of Existing Sewer System and Regulatory Changes

The three challenges that Water and Wastewater face are a combination of infrastructure issues and regulatory issues. As severe weather events continue to increase, conditions will either force water to pump more in times of drought or wastewater to run more in times of heavy rainfall. Continued groundwater and wastewater infiltration into the sewer system means pushing the wastewater plant to process more water.⁶⁸ From a regulatory standpoint, if more mandates by the EPA or IDNR require municipalities to perform more energy-intensive treatment processes, then energy reduction goals will come secondary to meeting those standards.⁶⁹

Energy Management: Information Technology

2020 Goals: Investing in Cedar Rapids' Next Generation

Information Technology is a fundamental part of everyday operations, but may be overlooked in terms of the energy use required to run computers and equipment. Electricity is essential for computer, server and the operation of other office equipment. With such a critical need for electricity, the key purpose for these strategies is more efficient use of electricity in both servers and desktop computers.

⁶⁴ "Sources of Greenhouse Gas Emissions." EPA.gov. United States Environmental Protection Agency, 9 Sep. 2013. Web. 3 Mar. 2014.

⁶⁵ National League of Cities. "Alternative Fuel Programs for Municipal Fleets." n.d. PDF file.

⁶⁶ "Energy Management." Cedar-rapids.org. City of Cedar Rapids, n.d. Web. 3 Apr. 2014.

⁶⁷ Gondim, Fabio and Geoff Lupton. "Innovative approaches for sustainable energy management." AWWA Reporter. AWWA Congress, 2010. Web. 10 Dec. 2013.

⁶⁸ Jensen, Matthew. "Energy Management Challenges – Water and Wastewater." Message to the author. 12 Mar. 2014. E-mail.

⁶⁹ Ibid.

a. Virtualize 80% of Cedar Rapids' desktops and 85% of Cedar Rapids' servers

Virtualization allows users to use fewer servers, which saves electricity use and minimizes waste heat produced.⁷⁰ Instead of operating several different servers inefficiently, virtualization allows for the consolidation of these many servers to be run on one 'host' server. Consolidating servers also allows the municipality to decommission old servers, which results in savings for both energy costs and license renewals.⁷¹ Virtualization also has the added benefit of starting up much more quickly than physical servers; in an emergency situation, this means not having to wait for physical servers to reboot.⁷²

Accomplishments

1. Implemented Avaya Networking Switches

These networking switches have allowed Cedar Rapids to schedule power consumption on various IT devices, saving up to 90% of the power previously used to run equipment.⁷³ This program allows the city to adjust the amount of energy needed to meet the demand of its servers and to have scheduled levels of energy based on the time of day.

2. Virtualized 64% of Servers

As mentioned previously, server virtualization saves in energy costs by consolidating the number of servers needed to run programs. As more servers approach the end of their useful lives, the city is working to replace these with virtual servers, which will save money and energy and is more sustainable.⁷⁴

3. User File Server and Backup System Consolidation

Consolidating user file servers and backup systems means taking multiple servers and replacing them with one. This further means that the power used to run several servers has been reduced to only power one, which results in a significant reduction in consumption. The city has condensed 10 user files onto one SAN environment and has condensed 40 separate backup systems into one single backup strategy.⁷⁵

Challenges

1. Budgetary Allowance for Virtual Desktops and Customer / Department Expectations

Budget issues are a significant part of whether departments can meet their goals, especially if the upfront costs are capital intensive. There will need to be continued funding to meet the 85% virtualized server goal by 2020. Additionally, virtualization takes time to adjust to, especially for those municipal employees who are used to having a physical metal box occupy their workspace.

⁷⁰ "Server Virtualization." *Energystar.gov*. Energy Star, n.d. Web. 3 Mar. 2014.

⁷¹ Ibid.

⁷² Ibid.

⁷³ "Avaya Energy Saver." Retrieved from <http://www.avaya.com/usa/documents/mis4512---avaya-energy-saver-white-paper.pdf>.

⁷⁴ Nuehring, Keith. "IT Challenges and Accomplishments." Message to the author. 12 Mar. 2014. E-mail.

⁷⁵ Ibid.

Beyond 2020: Possibilities for the Future

St. Paul, Minnesota

District Energy⁷⁶

St. Paul has been the home to district energy since 1979, heating 80% of its downtown industrial, commercial and residential buildings, including all municipal buildings, with closed-circuit hot water. What started as a public-private partnership has blossomed into a modernized, renewable source of inexpensive energy for the downtown. District energy creates power and heats water from a biomass-fueled power plant that is then circulated through a series of pipes running underground. This heated water then radiates through buildings connected by pipe. In addition to the heated water, the power plant generates around 25 MW of electricity for local consumption. The savings are threefold: First, the efficiency of district energy is twice that of the previous steam heating mechanism. Second, district energy is cost effective, with customers paying less today than they did in 1979 when adjusting price for inflation. Third, recycled wood biomass collected throughout the City is used to fuel the power plant, creating a reduction in GHG emissions and eliminating the need for several hundred smokestacks, chillers and chimneys by centralizing the energy from one biomass power plant.

⁷⁶ "District Energy Saint Paul." *Stpaul.gov*. City of Saint Paul, MN, n.d. Web. 1 Apr. 2014.

WATER WISE

Vision Statement for Water Wise

WATER WISE SUPPORTS WATER CONSERVATION IN CEDAR RAPIDS IN AN EFFORT TO LIMIT THE NEED FOR BUILDING ADDITIONAL WATER TREATMENT CAPACITY AND TO HELP OUR CUSTOMERS TO USE CEDAR RAPIDS' WATER WISELY.

If municipalities are not careful about the rate at which they consume water it may become difficult to adequately provide this resource to residents when it is in short supply. This has been of concern for Cedar Rapids in the recent past during times of drought. The City's drinking water comes from collector wells along the Cedar River.⁷⁷ The quantity of water available to be drawn from these wells is dependent upon the river level. Cedar Rapids' water treatment plant has the capability to distribute 60 million gallons of water per day. Typically the plant operates at approximately 75% of its capacity on summer days. When the region was going through a drought in the summer of 2012, customers' water usage surpassed 50 million gallons a day and at one point the plant reached 89% capacity. Because the City wants to avoid operating near the plant's distribution capacity and having to consider expansion, these circumstances emphasized the importance of water conservation to Cedar Rapids.⁷⁸

2020 Goals: Investing in Cedar Rapids' Next Generation

Cedar Rapids wants to avoid having to increase the capacity of its water treatment plant sooner than necessary and the City has realized that promoting water conservation practices may help delay the need for an upgrade. While the industrial sector consumes the largest amount of water in Cedar Rapids, the City is currently focused on improving its own sustainability efforts and engaging residents in solutions to environmental problems. Therefore, the City's strategies regarding water conservation are aimed at encouraging citizens to reduce their water consumption without significantly impacting the City's revenue stream.

a. Implement a Pilot Project Water Wise Rebate Program

Cedar Rapids intends to establish a pilot program that would offer rebates to residents who install water efficient appliances at home. This could include replacing toilets and shower heads with low flow fixtures or installing faucet aerators. The rebates will likely be applied as a credit to customers' water bills, rather than coming in the form of a check. Initially, Cedar Rapids plans to target low-income residents, in the hopes that the rebates will reduce their utility bills. The City is currently proposing a pilot program, rather than a city wide initiative, to ensure that adequate resources and staff are available to manage the rebates. City staff still need to calculate the quantity of funds that can be allocated to such a program. This determination will in turn influence the amount of the rebates and how many residents will be eligible to receive them.

⁷⁷ "2012 Water Quality Report." *City of Cedar Rapids*, n.d. 18 Oct. 2013. Web. <<http://www.cedar-rapids.org/resident-resources/utilities/water/Water%20Quality/Documents/2012%20Cedar%20Rapids%20Water%20Quality%20Report.pdf>>.

⁷⁸ Kasparie, Jill. "Cedar Rapids water treatment plant coping with high demand." *The Gazette*, 6 Aug. 2012. Web. 1 Apr. 2014. <<http://thegazette.com/2012/08/06/cedar-rapids-water-treatment-plant-coping-with-high-water-demand/>>.

b. Identify Ways to Encourage Wise Water Usage in New Development

Cedar Rapids recognizes that encouraging water conservation in new construction will reduce the need to build additional water treatment capacity as the city grows. Thus, the City plans to explore ways of rewarding builders who make water efficiency a priority in their developments. Additionally, Cedar Rapids' uniform plumbing code will be examined in order to identify sections that could promote water conservation.

c. Build Customer Capacity to Respond to Drought Conditions

Encouraging citizens to adopt water conservation practices now could help reduce the strain on the city's water resources when they become scarce, such as during times of drought. Cedar Rapids intends to promote the usage of devices like timers and rain gauges for irrigation systems, as well as rain barrels, to reduce the amount of potable water (water that is safe for human consumption⁷⁹) used for landscaping. Rain gauges prevent automated sprinklers from watering the lawn if a certain amount of rain has fallen within the past week, while timers regulate when watering occurs and for how long. As a substitute to watering lawns and gardens with potable water, rain barrels can be used to collect rainwater for this purpose. The City is considering implementing an additional pilot program in order to promote the usage of these devices.

Accomplishments

1. Drought Contingency Plan

The City of Cedar Rapids made a number of presentations to the public about water conservation during the summer of 2012, when the state experienced a period of drought.⁸⁰ After going through such a dry summer, Cedar Rapids decided to be proactive about planning for how to utilize its water when the resource is in short supply. In February 2013, the City adopted its drought contingency plan, which outlines both required and voluntary actions for customers (residential, commercial, industrial and municipal) to take in each of the different stages of drought in order to conserve water. For instance, in a drought emergency, when water demand reaches 85% of the city's well capacity, customers will be required to reduce their water usage by 25%. During this stage landscape watering is only permitted once a week with handheld hoses or buckets and residents are encourage to limit their showers to five minutes. If customers violate the required action steps, they will be issued a warning notice. A continual failure to comply will result in a fine(s) of up to \$900 and could bring about the termination of one's service. This plan was created with community input and will be updated with regularity based on public feedback.⁸¹ At this point in time Cedar Rapids has not yet had to put the drought contingency plan into action.

⁷⁹ Office of Water/Office of Ground Water and Drinking Water. "Drinking Water Glossary." *U.S. Environmental Protection Agency*, 2009. Web. 12 Apr. 2014. <<http://water.epa.gov/drink/>>.

⁸⁰ Murphy, Megan. Personal interview. 25 Oct. 2013.

⁸¹ "Drought Contingency Plan." *City of Cedar Rapids*, 2013. Web. 21 Oct. 2013. <<http://www.cedar-rapids.org/resident-resources/utilities/water/drought/Documents/Cedar%20Rapids%20Drought%20Contingency%20Plan%20Revised%2020131220.pdf>>.

Challenges

1. Monitoring Compliance of Rebate Programs

One of the challenges that Cedar Rapids may face in pursuing the strategies outlined above is monitoring compliance of the proposed rebate programs. If the City decides to require more than a purchase receipt to issue rebates for water efficient appliances, rain barrels and sprinkler rain gauges or timers, the program may necessitate additional staffing. For instance, some rebate involve verification that fixtures are properly installed, to ensure that water is being conserved. Confirming this would either increase the responsibilities of existing staff or would require hiring additional employees.⁸²

Beyond 2020: Possibilities for the Future

Middleton, Wisconsin

Water Conservation Challenge

During the 2013 calendar year Middleton organized a water conservation challenge for city residents. Residents could choose whether or not to participate in the challenge, the overall aim of which was to reduce their water usage in comparison to the previous year.⁸³ A total of 148 households participated in the challenge and collectively reduced their 2012 water usage by 26%.⁸⁴ It is too early to determine whether these households continued to limit their water consumption after the challenge ended. The City of Middleton did not report upon the manner in which residents conserved water, however, similar events in other cities involved a number of innovative methods. For example, in Monona, Wisconsin, some people flushed their toilets with water they collected from the shower and others watered their house plants with the water that accumulated in rain barrels they placed in their basement.⁸⁵

⁸² Meeting with City Water Department Staff. 28 Feb. 2014.

⁸³ "Water Conservation Challenge." *City of Middleton*, n.d. Web. 12 Feb. 2014. <<http://www.ci.middleton.wi.us/index.aspx?NID=310>>.

⁸⁴ "2013 GTLC Annual Report." *City of Middleton*, n.d. Web. 2 Apr. 2014. <http://greentiercommunities.org/wp-content/uploads/2013/2014/03/Middleton_Annualreport_2013_GTLC.pdf>.

⁸⁵ "Water Conservation Challenge Celebration." *The Natural Step Monona*, 2013. Web. 2 Apr. 2014. <<http://tnsmonona.org/wcc-celebration/>>.

STORMWATER

Vision Statement for Stormwater

STORMWATER ACTIVITIES IN THE CITY OF CEDAR RAPIDS FOCUS ON WAYS TO PREVENT STORMWATER RUNOFF FROM WASHING HARMFUL POLLUTANTS INTO LOCAL WATERWAYS.

The Stormwater element is composed of two subcategories: Improving Water Quality and Increasing Infiltration, in order to reduce the impact of runoff. Stormwater runoff is not treated by the wastewater treatment plant, which means that any pollutants that end up in the City's stormwater drains flow straight into nearby streams and ultimately impact the water quality of the Cedar River. Increasing infiltration reduces the amount of stormwater runoff that contaminates local waterways which in turn can help improve water quality.

According to the EPA, the portion of the Cedar River that flows through Cedar Rapids is impaired by pathogens and nutrients. The Iowa Department of Natural Resources (DNR) water quality monitoring station downstream of Cedar Rapids⁸⁶ has detected high levels of *E. coli* in the river, which indicates that there is fecal matter present in the water.⁸⁷ Water quality standards dictate that the average concentration of *E. coli* should not be greater than 126 colony forming units (cfu) per 100 milliliters (mL) over the course of a month and that the maximum value of a sample is not to exceed 235 cfu/100mL.⁸⁸ While the DNR monitoring station upstream of the city recorded *E. coli* values above these standards (an average concentration of 1,229 cfu/100mL and a maximum value of 16,000 cfu/100mL), this disease-causing pathogen was detected three times as frequently and recorded substantially higher concentrations (an average concentration of 1,413 cfu/100mL and a maximum value of 82,000 cfu/100mL) at the downstream station.⁸⁹ This indicates that a significant amount of this bacteria is originating within the city limits of Cedar Rapids. However, not all of the pollutants can be attributed to the city since there are eight creeks that feed into the Cedar River between the two monitoring points, but whose source falls outside the city's boundaries.⁹⁰

A comparison of the upstream and downstream monitoring station data also found that concentrations of multiple types of pesticides (which are applied in parks and gardens on both public and private land) are entering the Cedar River between the two sites.⁹¹ This is of concern because pesticides can poison fish and other aquatic organisms.⁹² The presence of both *E. coli* and pesticides in streams and rivers is often the result of stormwater runoff washing animal feces and lawn chemicals into nearby waterways when rain water is unable to infiltrate the ground.

⁸⁶ Based on data collected between 1999 and 2012 for IA STORET Site 10570001.

⁸⁷ "My WATERS Mapper." U.S. Environmental Protection Agency, 2013. Web. 2 Apr. 2014. <<http://watersgeo.epa.gov/mwm/>>.

⁸⁸ "E. Coli and enterococci." U.S. Environmental Protection Agency, n.d. Web. 10 Apr. 2014. <<http://www.epa.gov/region9/water/tribal/training/pdf/Ecoli.pdf>>.

⁸⁹ Based on data collected between 1999 and 2012 for IA STORET Site 10570002.

⁹⁰ My WATERS Mapper." U.S. Environmental Protection Agency, 2013. Web. 2 Apr. 2014. <<http://watersgeo.epa.gov/mwm/>>.

⁹¹ Ibid.

⁹² "After the Storm." U.S. Environmental Protection Agency, 2013. Web. 8 March 2014. <<http://water.epa.gov/action/weatherchannel/stormwater.cfm>>.

Improving Water Quality

2020 Goals: Investing in Cedar Rapids' Next Generation

Cedar Rapids has identified two strategies in regards to Improving Water Quality. A major component of this strategy is educating the community about the necessity of reducing stormwater pollution. The City wants to reach out to both citizens and businesses by various means to inform them of ways by which stormwater pollution can be decreased.

a. Increase Public Understanding and Involvement in Preventing Stormwater Pollution

In addition to continuing to provide new residents with stormwater information in the utilities welcome packet, Cedar Rapids wants to present community groups and local businesses with knowledge of how stormwater pollution can be avoided. The goal is to make a minimum of five presentations on this topic each year and to participate in at least five community events to distribute informational materials. Educating the public about the importance of picking up after pets, as well as presenting proper techniques for disposing of yard waste and applying pesticides, could help reduce the number of pollutants that end up in the city's stormwater runoff.

Cedar Rapids has already established two programs that are aimed at reducing stormwater pollution. In August of 2012, the City created a "Scoop the Poop" pledge to encourage residents to pick up after their dogs. This program was the result of water quality testing which found high levels of E. coli in a number of local waterways, indicating that a significant amount of feces were present in the water.⁹³ Cedar Rapids would like to see the number of people who sign the pledge increase by 10% every year. The second program related to the prevention of stormwater pollution is the City Manger's 1 Bag Challenge. This litter collection program not only makes streets and neighborhoods cleaner, but also reduces the amount of trash that enters stormwater drains. The City aims to increase the number of people participating in litter collection by 3% each year.

b. Reduce the Number and Impact of Illicit Discharges

In order to reduce the incidence of illicit discharges, businesses such as carpet cleaners that regularly dispose of wastewater will receive annual instruction regarding proper dumping techniques and existing construction sites will be examined on a quarterly basis to ensure that they are managing stormwater runoff correctly. Cedar Rapids is also concerned with the practices of individual citizens that might add pollutants to stormwater, such as washing cars or dumping hazardous materials like oil in the street. Following the report of an illicit discharge the City intends to mail neighborhood residents an educational letter noting the environmental damage that can result from such actions. The City also plans to raise awareness of the issue by publishing a press release if an illicit discharge results in biological damage.

⁹³ Carros, Adam. "Cedar Rapids launches 'pick up the poo' campaign." The Gazette, 14 Aug. 2012. Web. 8 March 2014. <<http://thegazette.com/2012/08/14/cedar-rapids-launches-pick-up-the-poo-campaign/>>.

Accomplishments

1. Winter Weather Brine Roadway Application

One of the ways that the City has worked to reduce its environmental impact is by investing in winter weather brine application systems. Such systems reduce the usage of rock salt, which is harmful to the environment.⁹⁴ Rock salt consists of sodium chloride, a substance that can inhibit the growth of roadside plants and lead to the contamination of water supply sites.⁹⁵ While brine also contains sodium and chloride, it adheres to the road better than rock salt and therefore has a lower environmental impact because it is less likely to contribute to stormwater runoff.⁹⁶

2. Erosion Control

The City's erosion control specialist has helped inform builders of how to implement Best Management Practices (BMPs) at construction sites. These practices include confining construction debris to a specific area of the site in order to prevent these materials from contaminating waterways and the general environment. Construction sites that disturb more than an acre of land are also required to complete a major erosion control permit application and must submit a stormwater pollution prevention plan (SWPPP). A component of the SWPPP involves describing the practices that will be used to manage the site's stormwater after construction is complete.⁹⁷ This includes providing a drainage plan and report that show that the proposed sediment and erosion control measures should not have an adverse impact on any neighboring properties.⁹⁸ Seeing as the Cedar River is not impaired by sediment, these practices seem to be proving effective.

Increasing Infiltration

2020 Goals: Investing in Cedar Rapids Next Generation

Cedar Rapids has one strategy that pertains to increasing infiltration by implementing practices that reduce stormwater runoff.

a. Support the Installation of Green Infrastructure

Green infrastructure can help improve water quality and it is for this reason that Cedar Rapids aims to encourage its installation and usage. In residential areas, the City would like to incentivize the installation of rain gardens on private property by creating a cost sharing or rebate program. While rain gardens are only a small component of green infrastructure, their installation and maintenance tends to be less

⁹⁴ "Stormwater." City of Cedar Rapids, n.d. Web. 29 Aug. 2013. <<http://www.cedar-rapids.org/resident-resources/igreenr/Pages/Stormwater.aspx>>.

⁹⁵ Wegner, William and Marc Yaggi. "Environmental Impacts of Road Salt and Alternatives in the New York City Watershed." Stormwater, n.d. Web. 16 Nov. 2013. <<http://www.newyorkwater.org/downloadedarticles/environmentalimpact.cfm>>.

⁹⁶ "Materials." Iowa Department of Transportation, n.d. Web. 13 March 2014. <<http://www.iowadot.gov/maintenance/materials.html>>.

⁹⁷ "SWPPP Outline." City of Cedar Rapids, n.d. Web. 7 Apr. 2014. <[http://www.cedar-rapids.org/government/departments/public-works/engineering/stormwater/Documents/SWPPP%20Outline%20\(Final\).pdf](http://www.cedar-rapids.org/government/departments/public-works/engineering/stormwater/Documents/SWPPP%20Outline%20(Final).pdf)>.

⁹⁸ "Chapter 71: Erosion and sediment control for construction sites." Cedar Rapids Municipal Code, 2013. Web. 12 Apr. 2014. <<http://library.municode.com/index.aspx?clientId=16256&statelId=15&stateName=Iowa>>.

complex than that of permeable pavement or detention basins and they have the added benefit of being aesthetically pleasing. These factors make rain gardens a viable option for individual households to implement.

Accomplishments

1. Green Infrastructure

A number of City facilities have already implemented forms of green infrastructure. The City Services Center has multiple rain gardens, the City bus center has pervious surfaces and the newly completed City library has a green roof, cisterns and multiple pervious surfaces.⁹⁹ Additionally, Cedar Rapids' vast park system helps reduce the impact of runoff by providing large amounts of open space in which stormwater can infiltrate the ground. There are also approximately 800 private detention basins within Cedar Rapids. Detention basins can help manage stormwater by reducing runoff volumes and allowing certain pollutants to settle, thereby preventing them from entering waterways.¹⁰⁰ The City plans to perform inspections of 12% of these basins annually to evaluate whether they are functioning efficiently.

Challenges

1. Budget and Staffing

Stormwater management can be a difficult issue to tackle on account of the fact that impervious surfaces, which result in stormwater runoff, exist in various forms and countless locations that are mainly on private land. Impervious surfaces include buildings, paved roads and parking lots, and lawns with overly compacted soil. Implementing stormwater improvements, even minimal ones such as rain gardens, requires certain resources. At this point in time, Cedar Rapids does not have the budget or staffing needed to be able to invest in stormwater management upgrades because these resources are currently devoted to maintaining the City's existing stormwater infrastructure.¹⁰¹

Beyond 2020: Possibilities for the Future

Chicago, Illinois

Green Alley Program

In 2006, Chicago launched its Green Alley program in order to improve the City's resource management and in turn benefit the environment. The Green Alley Program helps to manage stormwater runoff, reduce the urban heat island effect, recycle construction materials and conserve energy.¹⁰² The program utilizes a variety of sustainable techniques. One is permeable pavement, which allows stormwater to infiltrate the ground, rather than flowing into sewer drains or settling on impervious surfaces. The light-colored surface of high-albedo pavement, which has been installed in many of the green alleys, can decrease the urban heat island effect because it reflects sunlight. And in order to reduce waste, the alleyways have been

⁹⁹ Prucha, Tera. "iGreenCR." Message to the author. 2 Feb. 2014. E-mail.

¹⁰⁰ "Dry Detention Ponds." U.S. Environmental Protection Agency, 2006. Web. 11 Apr. 2014. <<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>>.

¹⁰¹ Wallace, Dave & Tera Prucha. Personal interview. 22 Oct. 2013.

¹⁰² "The Chicago Green Alley Handbook." City of Chicago, n.d. Web. 23 Feb. 2014. <http://www.cityofchicago.org/content/dam/city/depts/cdot/Green_Alley_Handbook_2010.pdf>.

constructed with repurposed materials such as ground tires and concrete aggregate. Between 2006 and 2010, more than 100 green alleys were installed throughout Chicago.¹⁰³

Chicago, Illinois

Green Roof Program

Chicago also promotes stormwater management through its Green Roof Program. Green roofs reduce the amount of stormwater that flows to sewers and streams and provide additional benefits such as conserving energy and reducing the urban heat island effect.¹⁰⁴ The City incentivizes the installation of green roofs by offering density bonuses to developers who incorporate them into the design of their buildings. Additionally, the permit fee is waived and the length of the permitting process is reduced to 30 days for buildings with proposed green roofs, which is a major advantage for developers since it usually takes around three months to obtain a permit.¹⁰⁵ These incentives have proven to be quite effective. As of late 2010, there were 359 green roofs in Chicago that covered an area of approximately 125 acres.¹⁰⁶

¹⁰³ "Green Alleys." City of Chicago, 2010. Web. 23 Feb. 2014. <http://www.cityofchicago.org/city/en/depts/cdot/provdrs/street/svcs/green_alleys.html>.

¹⁰⁴ "Sustainability Section." City of Chicago, n.d. Web. 10 May 2014. <https://www.cityofchicago.org/city/en/depts/dcd/supp_info/sustainable_development.html>.

¹⁰⁵ Taylor, David. "Growing Green Roofs, City by City." *Environmental Health Perspectives*, 115.6 (2007): A306-A311. Web. 10 May 2014. <<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1892107/>>.

¹⁰⁶ "Chicago Green Roofs." City of Chicago, n.d.. Web. 10 May 2014. <http://www.cityofchicago.org/city/en/depts/dcd/supp_info/chicago_green_roofs.html>.

CLEANUPCR

Vision Statement for CleanUpCR¹⁰⁷

CLEANUPCR IS A COLLABORATIVE PROGRAM DESIGNED TO PROVIDE RESIDENTS AND BUSINESSES WITH THE RESOURCES TO KEEP CEDAR RAPIDS A CLEAN, HEALTHY PLACE TO LIVE.

The CleanUpCR element addresses many different aspects of waste management from increasing recycling to green purchasing. Curbside pick-up of recyclables and compost within the city limits of Cedar Rapids prevents half of all household waste from reaching the landfill.¹⁰⁸ As a result of retreading tires on municipal fleet vehicles, tires are prevented from ending up in the landfill as well. Recycling also occurs in the form of used oil and transmission fluid in city vehicles, and washing and re-using winter road sands. Litter collection is part of CleanUpCR as a municipal activity and also at the individual and household level in the form of City sponsored programs. A City ban on illegal dumps and removal of nuisance structure are also part of this aesthetic component of CleanUpCR as well as a measure of safety.

2020 Goals: Investing in Cedar Rapids' Next Generation

The four goals for CleanUpCR focus on environmental stewardship. The strategies listed are methods designed to meet these goals.¹⁰⁹

1. Decrease the amount of waste sent to the landfill by 7% compared to 2013

Currently, garbage comprises 51% of total curbside pickup waste—decreasing this amount an additional 7% results in a decrease of 608 tons per year.¹¹⁰ Increasing recycling and composting has a direct impact on the incidence of garbage waste and the necessity for increased landfill space thus supporting sustainability. Strategies for meeting this goal include:

- a. *Increase awareness of recycling and composting options through better communication between the City and residents*
- b. *Increase use of current online venues such as the iGreenCR website, Facebook page, CR Talks and the City cable channel and the eNews forum to publicize events and efforts*
- c. *Expand programs like the Elite Recyclers¹¹¹ program—a voluntary training program that offers in-depth knowledge on recycling and offers resources to promote it*

2. Increase the number of bags of litter collected each year with a goal of 3,000

Litter collection activities support environmental sustainability by removing waste that pollutes runoff into waterways. The City Manager's 1-Bag Challenge and the Adopt-A-Road Program are activities in which individuals and groups can contribute to litter collection through physically picking-up litter throughout the city. The Adopt-A-Road program is specifically for roadway pick-up of litter.

¹⁰⁷ Derived from CleanUpCR website: <http://www.cedar-rapids.org/resident-resources/igreencr/Pages/CleanUpCR.aspx>

¹⁰⁸ Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids

¹⁰⁹ Based on information received from Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids

¹¹⁰ Based on curbside pickup rates obtained from Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids

¹¹¹ "Elite Recyclers Program." Cedar-rapids.org. City of Cedar Rapids, n.d. Web. <<http://www.cedar-rapids.org/resident-resources/utilities/solidwaste/recycling/Pages/Elite-Recyclers.aspx>>.

- a. *Publicize these activities throughout the city and recognizing the communities' contribution helps to inform residents of the Cities' efforts*
- b. *Use community outreach through the communication venues mentioned in Goal 1 to inform residents of upcoming clean-up events opens opportunities for volunteerism*
- c. *Conduct a resident survey to establish how effective these communicative efforts are and how residents prefer to be informed*

3. Establish a Green Purchasing Policy for City Government

A green purchasing program specifies that whenever possible a department will purchase recycled or recyclable products. Through the purchase of recycled and recyclable materials, the City shows its commitment to good environmental stewardship practices. This goal supports environmental sustainability through reducing the need for raw materials in products purchased and used by the City. A decrease in raw materials translates to fewer vehicles transporting materials and fewer machines to reduce it to usable forms. Recycled materials also generally use less energy to produce.¹¹²

- a. *City staff will work with the City Council to develop a green purchasing policy to guide future purchasing decisions for all City departments*

4. Create an internal resource to track municipal materials' management practices

Many toxic materials such as hydrocarbons, barium and cadmium found in motor oil are used in the routine duties of city maintenance and transport vehicles. When contact is made with the environment, these toxins evaporate into the air or bind with water carbons where they are breathed in or ingested by humans and animals.¹¹³ Many departments track these activities but there is no central database of activities or number and use of toxic substances.¹¹⁴

- a. *Recycle products and refurbish others, such as tire retreading, to keep these products out of the landfill and avoid contaminating surface water runoff which leaches into the surrounding ground and ground water¹¹⁵*
- b. *Create a tracking mechanism to support and report on these materials' management practices¹¹⁶*

Accomplishments

Within the Element of CleanUpCR there have been several accomplishments that exist to keep Cedar Rapids hygienically and aesthetically clean while promoting a sustainable environment.¹¹⁷ Several of these accomplishments have been recognized by outside entities resulting in state and national awards to the municipality.

¹¹² "NASPOGreen Purchasing Guide." n.d. Web. <http://www.naspo.org/content.cfm/id/green_guide>.

¹¹³ Rowson, Jackie. "What Chemicals are in Motor Oil?" ehow.com. n.d. Web. <http://www.ehow.com/list_7530158_chemicals-motor-oil.html>.

¹¹⁴ Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids

¹¹⁵ "Landfill Leaching Contaminates Your Water Supply." Prlog.org. 2009. Web. <<http://www.prlog.org/10304841-landfill-leaching-contaminates-your-water-supply.html>>.

¹¹⁶ Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids

¹¹⁷ Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids

1. Residential Waste

Residential waste includes automated curbside pick-up of garbage, recycling and composting. Bins (Figure 2) are sized according to purpose and express the preference of the municipality to reduce the amount of garbage sent to the landfill.¹¹⁸ ‘Yardy’ for yard waste and household compost is 95 gallons, ‘Curby’ for single stream recycling is 65 gallons and ‘Garby’ for garbage is the smallest at 35 gallons. Landfill diversion is an important aspect of creating an environmentally sustainable city. By limiting the amount of material going in, the landfill decreases the need for additional land space to contain more garbage and decreases the amount of methane produced through decaying garbage.

Figure 2: Curbside Pick-up Bins



Source: City of Cedar Rapids

Cedar Rapids received the Iowa Recycling Association (IRA) Award 2011 for Best Local Government Recycling Program. The IRA is a “state-wide group comprised of individuals, businesses and industries, local governments, institutions and organizations dedicated to a healthy environment and economy through promotion of recycling and recycling related activities.”¹¹⁹

Between 1997 and 2013, Cedar Rapids decreased the amount of garbage waste going to the landfill by 40%. During the same time period, rates of diverted items increased 240% for recycling and 50% for composting. Total landfill diversion over the past sixteen years amounted to 325,399 tons kept out of the landfill.¹²⁰ Figure 3 displays convergence of the types of waste leading to the current levels which have remained in the 47 to 51% range for garbage compared to 49 to 53% for recycling and composting for

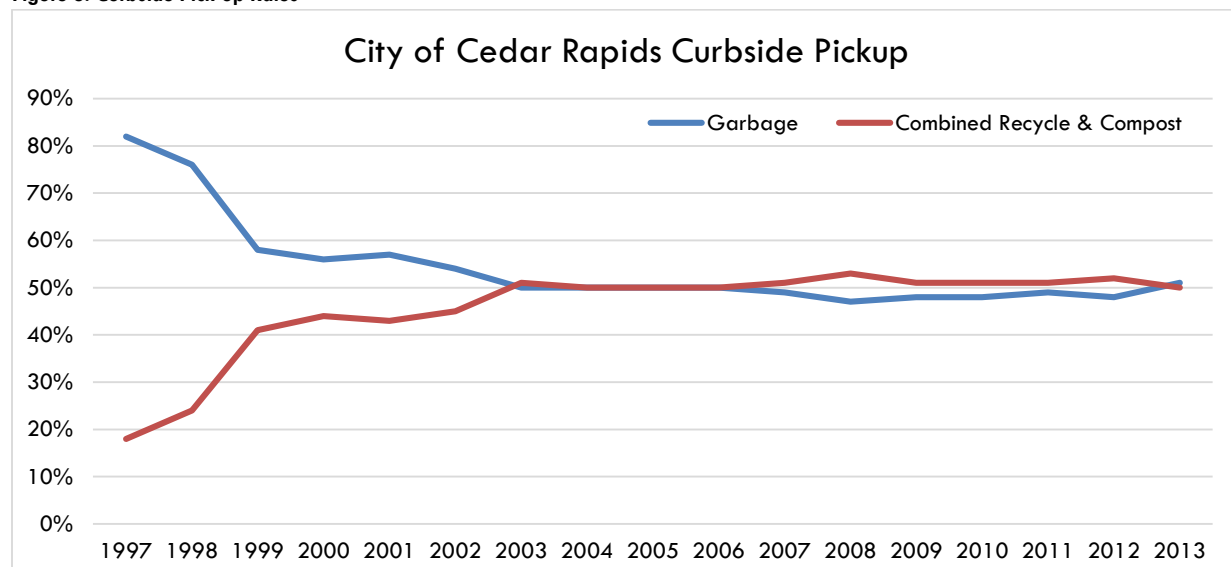
¹¹⁸ Retrieved from CleanUpCR website-- <http://www.cedar-rapids.org/resident-resources/utilities/solidwaste/collection/pages/carts.aspx>.

¹¹⁹ “About.” [Iowarecycles.org](http://www.iowarecycles.org). Iowa Recycling Association, n.d. Web. <<http://www.iowarecycles.org/content.asp?ID=4666>>.

¹²⁰ The City of Cedar Rapids has been participating in curbside compost pick-up since 1989. Numbers to show increase in composting and decrease in garbage are not available prior to 1997. Curbside recycling was initiated in 1999. Data obtained from Megan Murphy, Utilities Communications Coordinator, City of Cedar Rapids.

the past ten years.¹²¹ Altering this plateauing of the three types of waste is one of the goals for 2020. Because a change in one results in change for the other two, a goal of decreasing garbage waste by 7% would work to break this stalemate. This reduction to 47% garbage waste would equal 2008 rates—the lowest numbers seen in the past sixteen years. Another method of calculating these percentages includes measuring the amount of recycling through volume rather than mass as items cleaned for recycling typically weigh less than garbage or compost.¹²²

Figure 3: Curbside Pick-up Rates



Source: City of Cedar Rapids

2. Litter Collection

Litter collection activities are encouraged by the City of Cedar Rapids through several initiatives. The City Manager's 1-Bag Challenge is an easy to use kit (collection bag, gloves and instructions) that enables individuals, families and groups to pick up garbage wherever they see it. Some use it as team building and competition, others are just happy to participate in removing unsightly trash. The bags are free to pick-up and free to dispose of. By placing the bags on top or beside the garbage collection bin, the City can track how many bags have been collected. The *City Manager's 1-Bag Challenge* received the Silver Circle Award from the City-County Communications and Marketing Association (3CMA) in a national competition against other cities and counties of similar size.¹²³ Winners of this award are recognized as providing benchmark best practices for all local governments. Awards are given to professionals with innovative ideas that have been creatively implemented and been shown to be highly effective.¹²⁴

¹²¹ Ibid.

¹²² "Garbage and Recycling." *Nanaimo.ca*. City of Nanimo, n.d. Web. <<http://www.nanaimo.ca/EN/main/departments/Engineering-Public->>.

¹²³ "City Manager's 1-Bag Challenge Wins National Award." *Cedar-rapids.org*. City of Cedar Rapids, 2013. Web. <<http://www.cedar-rapids.org/city-news/media-releases/Lists/Releases%20and%20News/DispForm.aspx?ID=2479>>.

¹²⁴ "Leaps & Bounds in Communication." *3cma.org*. City-County Communications and Marketing Association, n.d. Web. <<http://www.3cma.org/index.aspx?NID=59>>.

In addition to the above litter collection initiative, the City has roadway clean-up activities (I-380 Clean Up and Adopt-a-Street) and river / waterway clean-up events. A ban on illegal dumps keeps unsanitary conditions from arising through accumulation of garbage in abandoned buildings and lots. Additionally, the City has an ordinance for tearing down structures that are deemed too dangerous or unsafe to remain.¹²⁵ The City has an average of 8-10 unsafe structures demolished every year.¹²⁶ Figure 4 provides visual representation of the destruction of an unsafe structure and what one illegal dump looked like. The demolition of these involves deconstruction of some of the materials for re-use, re-purposing, or recycling.¹²⁷ Litter, illegal dumping and abandoned buildings are unsightly giving the impression of carelessness, irresponsibility and reduced security. Pride of place is important and shows the efforts that are made to keep it well maintained and cleaned up.

Figure 4: Pictures of nuisance structure removal and illegal dumps

Destruction of Abandoned House

Inside of Structure used as Illegal Dump



Source: City of Cedar Rapids

3. Green Purchasing Policy

Green purchasing involves the purchase of recyclable and recycled materials but also through selecting services and products that minimize environmental impacts.¹²⁸ Many departments within the municipality participate in environmentally responsible purchasing. Based on staff preferences, individual departments may purchase recycled office and cleaning products; however, there is currently no municipal-wide policy for green purchasing in the City of Cedar Rapids.¹²⁹ Contracts are managed centrally but purchases are

¹²⁵ City of Cedar Rapids Code of Ordinances – Municipal Code 24.15 –

<http://library.municode.com/index.aspx?clientId=16256&stateId=15&stateName=Iowa>

¹²⁶ “Nuisance Abatement.” Cedar-rapids.org. City of Cedar Rapids, n.d. Web. <<http://www.cedar-rapids.org/government/departments/building-services/nuisance-abatement/pages/default.aspx>>.

¹²⁷ ReStore is a part of the Cedar Valley Habitat for Humanity non-profit organization. Goods are donated to the store where they can be purchased and re-used in other homes—<http://www.cvhhabitat.org/cvhfh/restore/#.UopQOqHna70>

¹²⁸ “Strategies & tools.” iisd.org. International Institute for Sustainable Development, n.d. Web.

<http://www.iisd.org/business/tools/bt_green_pro.asp>.

¹²⁹ This is one of the City of Cedar Rapids’ stated 2020 goals.

made by individual departments. By mandating the use and purchase of recycled products for consumers and the municipality across all City departments, the City of Cedar Rapids will close the loop on recycling and demonstrates commitment to considering and minimizing environmental consequences thereby exemplifying good environmental stewardship.

4. Materials' Management

Materials' management involves the municipality's recycling and environmentally conscious efforts beyond those offered city-wide to residents. Such management includes re-treading tires, recycling sand used for winter road conditions and recycling oil and transmission fluids used in municipal fleet vehicles. In addition to road sands for winter traction, brine is used to melt snow on roads rather than chemical salt because it has been found to be less damaging to plants and animals in runoff.¹³⁰

Challenges

1. Perceptions of green products being expensive

There is a perception by many that green products are more expensive. Educating residents and city staff on facts can help promote acceptance of the new policy. Sometimes these products may have higher initial costs but result in less over the life of use.¹³¹ Buying 'green' offers cost savings in the form of longer lasting, less waste producing and more easily recycled products such as paper. The North American Security Products Organization (NASPO) offers a guide to green purchasing that includes concepts, benefits and implementation strategies.¹³²

2. Public participation has not changed in the past several years

Encouraging greater public participation in recycling efforts as well as increased litter pickup can be difficult because many people do not understand that small contributions, when added to many other small contributions, can add up to large contributions. Additional challenges are presented in increasing not just the amount but the incidence of recycling and composting. Public education and recognition can have a positive impact. Increasing the willingness of residents to keep items out of the waste stream should also address consumer preferences for how they might contribute.

Beyond 2020: Possibilities for the Future

Broward County, Florida

Recycle Bank Program

The Recycle Bank Program¹³³ rewards Broward County residents with points that can be used for discounts on groceries, entertainment and gift cards. Points are earned through an online site that tracks participants recycling activities. Activities include learning about recycling and how it impacts the environment, pledging to recycle and thinking before throwing, reusing items and using fewer raw

¹³⁰ McLendon, Russell. "De-icing dilemma: Do streets need salt?" *mmn.com*. Mother Nature Network, 2011. Web. <<http://www.mnn.com/earth-matters/translating-uncle-sam/stories/de-icing-dilemma-do-streets-need-salt>>.

¹³¹ "Strategies & tools." *iisd.org*. International Institute for Sustainable Development, n.d. Web. <http://www.iisd.org/business/tools/bt_green_pro.asp>.

¹³² "NASPOGreen Purchasing Guide." n.d. Web. <http://www.naspo.org/content.cfm/id/green_guide>.

¹³³ "Explore Green Actions." *Livegreen.recyclebank.com*. Recyclebank, n.d. Web. <<https://www.recyclebank.com/how-to-earn/category/learning/?p=1>>.

resources, green purchasing and tracking their own recycling. Tracking is through computer input from the participants. The County has seen an increase of 130% in their recycling rates from 2012 to 2013.

San Francisco, California

Precautionary Purchasing Ordinance

The Precautionary Purchasing Ordinance¹³⁴ is based in part on the NASPO Green Purchasing Guide.¹³⁵ The ordinance requires City staff to buy environmentally green products. Product ingredients are reviewed for recycled content, energy efficiency, product performance and other specifications to create an approved vendor and product list for staff and other large institutional buyers. Green purchasing is mandated at the local level but the preference is to reuse or repair products rather than purchasing.

¹³⁴ "File NO. 050595." City of San Francisco, 4 Apr. 2005. Web.

<http://www.sfenvironment.org/sites/default/files/policy/sfe_th_precautionarypurchasing_ord.pdf>.

¹³⁵ "NASPO Green Purchasing Guide." n.d. Web. <http://www.naspo.org/content.cfm/id/green_guide>.

BIKECR

Vision Statement for Bike CR

BIKE CR SEEKS TO FOSTER A COMMUNITY WHERE ALL CITIZENS FEEL THEY CAN CHOOSE TO COMFORTABLY AND CONVENIENTLY TRAVEL THE METRO AREA ON TWO WHEELS TO ACCOMPLISH MOST OF THEIR DAILY ACTIVITIES, SUPPORTING THEIR PHYSICAL HEALTH AND THE SOCIAL AND COMMERCIAL HEALTH OF THE COMMUNITY.

Riding a bike promotes environmental sustainability by providing non-motorized personalized transportation. Motorized transportation produces environmental pollution in the form of exhaust and chemical leaks which negatively impact air and water quality. Gases in automobile exhaust include carbon dioxide (CO₂), carbon monoxide (CO), methane (CH₄) and nitrogen oxides (NO₂).¹³⁶ These are harmful pollutants for people to breathe and contribute to climate change. Leaks of toxic chemicals from automobiles like motor oil, anti-freeze and transmission fluid and heavy metals like copper, lead and zinc from disc brake pads, fall onto roadways and are carried directly into our waterways by runoff.¹³⁷ Choosing to ride a bike as transportation in place of driving a car reduces an individual's contribution to climate change and limits the discharge of toxic chemicals into our waterways.

Table 11 shows values on selected trip distances reported on the NHTS. Note that trips of less than two miles make up 30% of all trips, but for distances of greater than ½ mile, over half of people choose to drive. Biking is the choice for less than 3.5% or less of respondents at any distance.

Table 11: Mode of Travel

Trip Distance (miles)	Driving (%)	Biking (%)	Transit (%)	Walk (%)	Of all Trips (%)
0 – 0.5	34	3.1	1.5	61	10
0.51 – 1	51	3.5	4.7	40	9
1 – 2	84	1.8	5.0	9.2	11
5 – 10	95	0.30	4.0	0.3	19

Adapted from Table 4, “Short and Sweet; Analysis of Shorter Trips Using National Personal Travel Survey Data”

2020 Goal: Investing in Cedar Rapids' Next Generation

1. **Bike CR's Goal for 2020 is to increase bike ridership in commuting by 5%,¹³⁸ trips to school by 5% and recreational use by 3%**

According to the US Census, 0.33% of daily work commutes in Cedar Rapids were made by bike from 2008-2012.¹³⁹ Presently, Cedar Rapids has no historical data on number of trips to school, nor on

¹³⁶ Automobile Association Developments Limited. 23 February 2012. Exhaust emissions: What comes out of your car's exhaust?" http://www.theaa.com/motoring_advice/car-buyers-guide/cbg_toxics.html

¹³⁷ Nixon, Hillary, and Jean-Daniel Saphores. Impacts of Motor Vehicle Operation on Water Quality in the United States - Clean-up Costs and Policies. University of California, Irvine. Web. 28 March 2014. <<http://www.uctc.net/papers/809.pdf>>.

¹³⁸ As measured by the American Community Survey

recreational trail usage. City staff will be initiating programs in the coming year to establish baseline metrics on which progress toward these goals can be measured.¹⁴⁰ To grow bike ridership in each focus area, the City will use plans and programs implemented under Bike CR according to five main focus areas from the League of American Bicyclists (LAB).¹⁴¹

a. Achieve League of American Bicyclists (LAB) Silver status by 2015; Gold status by 2020

Each year, the League of American Bicyclists evaluates policies, infrastructure and education and outreach activities for every state in the nation.¹⁴² Every June, rankings are released and each state is assigned a ranking; in 2013 Iowa placed 21st. The League also accepts voluntary applications from cities, businesses and universities nationwide under its *Bicycle Friendly America* program. The League evaluates applications based on the same criteria as states (Engineering /Infrastructure, Education, Encouragement, Enforcement and Evaluation/Planning) and may award a Bronze, Silver, Gold or Platinum status based on fulfillment of biking goals and completeness of programs.¹⁴³

b. Work toward the completion of the 2012 Comprehensive Trails

Cedar Rapids' 2012 Comprehensive Trails plan is targeted for completion by 2040. Adding 55 of the total proposed 105 in-town trail miles by 2020 keeps the City on track for this date (Figure 5). These additional miles include on-street bike lanes, sharrows (short for "shared roadway"), bike boulevards, road shoulders and off-street trails. These 55 miles have been identified as the most critical to linking residential areas with places of work and recreation, and strengthening the trail system within the city. The location of this infrastructure is intended to encourage residents to consider biking for transportation and recreation. The plan includes construction of 46 individual segments inside Cedar Rapids of varying lengths from 0.9 to seven miles. Many are improvements to existing streets, but some call for the creation of new trails.

¹³⁹ United States. Census Bureau. "B08301 Means of Transportation to Work." *American Community Survey 2008-2012*. Web. 5 Feb. 2014.

¹⁴⁰ Whyte, Brandon. "RE: Clarifications?" Message to Matthew Peirce. 11 Apr 2014. E-mail.

¹⁴¹ League of American Bicyclists. "Feedback report: Bicycle Friendly Community Application; Cedar Rapids, IA." Spring 2012. <http://bikeleague.org/>

¹⁴² "Bicycle Friendly America." League of American Bicyclists, n.d 2013. Web. 7 March 2014. <<http://www.bikeleague.org/bfa>>.

¹⁴³ In May of 2012, Cedar Rapids was awarded Bronze status recognizing solid progress on these metrics.

PLAN DEVELOPMENT



60

1. Increases in Miles of Bike Trails, both On- and Off-Street

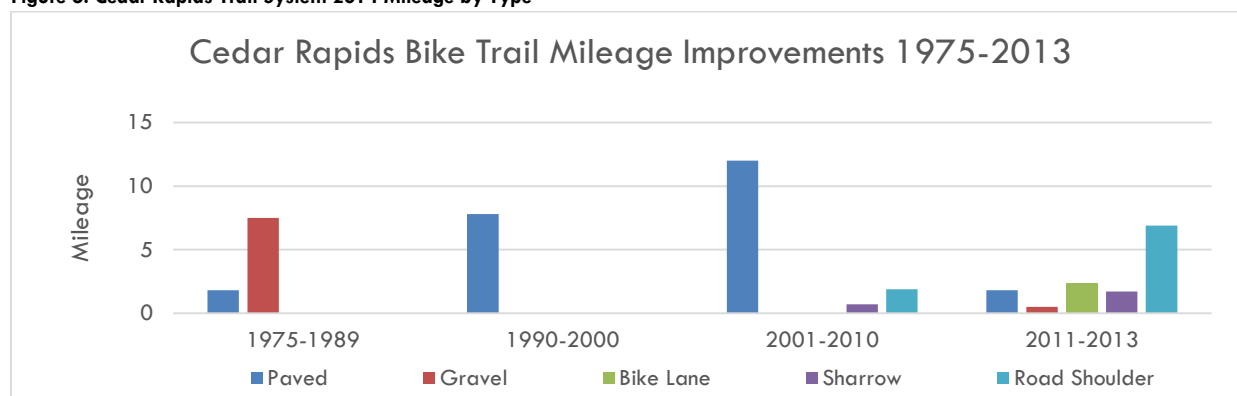
Cedar Rapids has spent several decades constructing the existing bike network. The first trails were laid in the mid-1970s. Table 12 displays the amount and type of build-out of the trail system by decade. In the 1990s, the network roughly doubled in size by exclusively adding miles of paved trails. The network doubled again in the 2000s, also by adding nearly exclusively more paved trails. Developments since 2011 have been more diverse, adding bike lanes, road shoulders and sharrows. The number of projects has also increased however the average number of miles per project has decreased (Figure 6).

Table 12: Cedar Rapids Trail Network Build Out by Decade

Time Period	Total System Miles	New Miles of Infrastructure	Percent Increase in total system	Number of Projects	Average project mileage
1975-1989	9.3	9.3	NA	2	4.7
1990-2000	17.1	7.8	83%	6	1.3
2001-2010	31.6	14.5	85%	16	0.9
2011 – 2013	43.9	12.3	39%	22	0.6
2009-2013		20.4		30	0.7

Source: Trail Segment Summary, Cedar Rapids Traffic Engineering Division

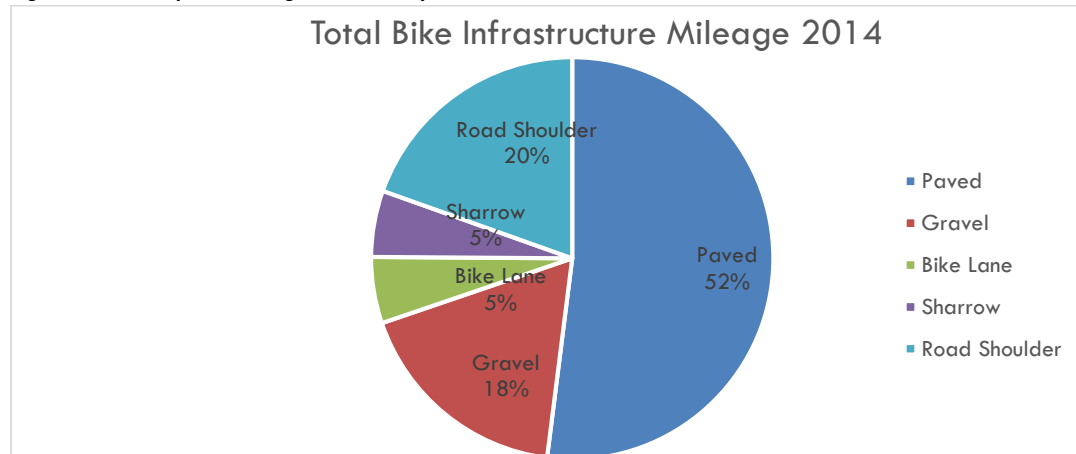
Figure 6: Cedar Rapids Trail System 2014 Mileage by Type



In the 1970s, mostly gravel trails were created, but over the next twenty years, almost exclusively only paved trails were constructed. Since 2011, the City has diversified its investment in trails, providing riders with new trail miles in five different types of surface covering. The most notable increase is in road shoulder improvements located on the west side of the Cedar River. Figure 7 shows the composition of Cedar Rapids' trails network in 2014 by infrastructure type. Over half of the bike network is composed of paved trails with gravel trails and road shoulder improvements each sharing roughly a fifth of the remainder. Bike lanes and sharrows are new to the infrastructure mix and split the remaining 10% evenly.¹⁴⁴

¹⁴⁴ The Cedar Rapids Trail Segment Summary from March 2014, shows the complete trail system that exists in Cedar Rapids as of February 2014 and displays the location of all five infrastructure types.

Figure 7: Cedar Rapids Trail Segment Summary, March 2014



2. Increases in Bike Parking Infrastructure

Achievements in this area are primarily due to the large number of public and private facilities that have been rehabilitated or newly constructed in the downtown. Cedar Rapids had a limited number of bike racks downtown prior to the 2008 flood, but post-flood several groups, like the Cedar Rapids Downtown District, and businesses realized the necessity of bike trails in Downtown Redevelopment.¹⁴⁵ Investments made by grants secured and administered by the Linn County Trails Association (LCTA), have more than doubled the number of bike racks in the downtown from 15 pre-2008 to more than 35 in 2014, with a total estimated current capacity of more than 150 bikes. Ten bike rack projects were undertaken in 2011 alone,¹⁴⁶ and capacity continued to grow with the addition of the NewBo bike racks.¹⁴⁷ Using the technology of Google Maps,¹⁴⁸ the Linn County Trails Association (LCTA) created a map showing the locations of the bike racks. The map can be found on LCTA's website www.linncountyltrails.org/maps/interactive-google-map/.

3. New Dedicated Bicycle Coordinators

In 2009, the Traffic Engineering Division of the Public Works Department created a part-time Bicycle Coordinator position to coordinate efforts and dedicate time to planning, researching and implementing biking improvements across the city. Staff has worked with local businesses, local advocacy groups¹⁴⁹ and other city agencies (such as police and fire) to collect ideas to improve the bike system and raise awareness of the benefits of biking. The Corridor Metropolitan Planning Organization (CMPO) which works closely with the City of Cedar Rapids' staff hired a Multimodal Transportation Planner.¹⁵⁰ The CMPO is an inter-governmental agency made up of mostly transportation planners and governed by appointed

¹⁴⁵ Mullin, Brad. "Re: Bike Rack totals?" Message to Matthew Peirce. 14 Apr 2014. E-mail.

¹⁴⁶ Mullin, Brad. "The Cedar Rapids Downtown Bike Rack Project." *Trail Connections* 4 (Apr. 2011): 10. Print.

¹⁴⁷ Mullin, Brad. "Re: Bike Rack totals?" Message to Matthew Peirce. 13 Apr 2014. E-mail.

¹⁴⁸ Linn County Trails Association/R. Griffith. "Cedar Rapids Bike Facilities." November 14, 2013. Web. 5 February, 2014. <<https://maps.google.com/maps/ms?vp=2&ie=UTF8&hl=en&oe=UTF8&msa=0&msid=204454117400040153791.000463cc215cbc5c4d0f8>>.

¹⁴⁹ I.E. Linn County Trails Association (LCTA) and Linn Area Mountain Bike Association (LAMBA)

¹⁵⁰ Corridor Metropolitan Planning Organization. "Home." Web. 10 October, 2013. <<http://www.corridormpo.com/>>.

representatives of member communities¹⁵¹ and is responsible for the dispersal of federal infrastructure dollars for use in the design and construction of transportation infrastructure. As each entity now has a bike coordinator, Cedar Rapids and the CMPO can work together to further improve the bicycling experience through coordination of funding, collaborative trails planning and enhanced public outreach and educational programming.

Challenges

1. Communication

The success of biking in a community is judged by the number of citizens who choose to use their bikes for transportation. Expanding the biking infrastructure and increasing staff positions to plan trails and educate citizens are steps to support biking. Outreach efforts, combined with infrastructure improvements, convey to the public the ways in which they can incorporate biking to work, school or shopping locations into their daily lives.

2. Securing Funding

Secure and steady funding sources must be found to keep the facilities in good condition and inviting to all users. Trail construction, maintenance and upkeep of pavement markings and other signage come at a financial cost. Implementation of the 2012 Comprehensive Trails plan has been estimated to cost about \$56 million (\$2.24 million annually) to construct and \$1.7 million annually to maintain. The 2015 City budget allocates \$1.4 million for trail improvements. This amount is sufficient to cover either 80% of the estimated annual maintenance costs or about one third of the total estimated annual cost of the Comprehensive Trails Plan.¹⁵² The CMPO, voting in April 2012, designated 80% of their budgets for trail improvements between 2016 and 2020. Around \$4.1 million has been allocated for fiscal years 2016 and 2017, and another \$5.75 million in fiscal year 2018.¹⁵³ While these funding sources seem sufficient, it is important to remember that the CMPO funds trails in five communities in addition to Cedar Rapids, as well as rural Linn County. It is important to note that CMPO funding cannot be used for trail maintenance.¹⁵⁴

Beyond 2020: Possibilities for the Future

Portland, Oregon

Online Trip Planning Tool ByCycle

Google Maps revolutionized the trip making experience for automobile travel by making it very easy to compare various routes to the same destination and their associated relative time costs. The website *ByCycle.org* attempts to give the cyclist in Portland access to the same information. Any web-based service or mobile device app which provides bikers with up-to-the-minute information about weather, construction,

¹⁵¹ Primarily city council members from Cedar Rapids, Marion, Hiawatha, Robins, Ely, Fairfax and Linn County. Cedar Rapids has the largest representation on the governing board.

¹⁵² \$3.94 million

¹⁵³ Federal requirements mandate that the CMPO make funding available a minimum of three years after approval to allow for trail planning, the design process and land acquisition.

¹⁵⁴ Whyte, Brandon. "RE: Bike Budget?" Message to Matthew Peirce. 10 Apr 2014. E-mail.

traffic, road conditions, safety and topography of the different routes, is a powerful service which can give greater confidence to bikers and encourage biking for all sorts of trips.¹⁵⁵

Portland, Oregon

Providing Incentives - TRIP (Trip Reduction Incentive Program)

The City of Portland offers its employees the opportunity to earn an extra amount on their paychecks each month if they ride their bikes to work. Equal to the transit subsidy, in 2011 employees could receive up to \$41 per month if they rode their bike at least 80% of their scheduled workdays (about 16 days) a month. The biking subsidy and the transit subsidy are not mutually exclusive¹⁵⁶ so employees are provided incentive for using either sustainable mode of transportation.

¹⁵⁵ "News." *Bicycle.org*. byCycle, 13 Feb. 2014. Web. <<http://bicycle.org>>.

¹⁵⁶ "Trip Reduction Incentive Program." *Portlandoregon.gov* City of Portland, 2011. Web. <<https://www.portlandoregon.gov/auditor/article/12007>>.

TRANSPORTATION

Vision Statement for Transportation

CR TRANSIT SEEKS TO MAINTAIN A SUSTAINABLE TRANSPORTATION SYSTEM IN CEDAR RAPIDS WHICH USES PUBLIC RESOURCES WISELY. INVESTMENTS MADE TO FLEET AND STAFF WILL DELIVER A SUPERIOR TRANSPORTATION EXPERIENCE AT A REASONABLE COST TO ALL CITIZENS WHO HAVE NEED OR DESIRE TO UTILIZE THE SYSTEM. FLEET SERVICES SEEKS TO PROVIDE COMPREHENSIVE VEHICLE AND EQUIPMENT SERVICES TO ALL CITY CUSTOMERS, DELIVERED IN A COST-EFFECTIVE, TIMELY, AND FRIENDLY MANNER WHICH RESPECTS OUR NATURAL ENVIRONMENT.

The transportation element combines the Cedar Rapids' bus system (CR Transit) with all other City-owned vehicles (Fleet Services). CR Transit provides service to residents of Cedar Rapids, Marion and Hiawatha six days a week for about one million passenger trips each year. Fleet Services is a consolidated department responsible for maintaining roughly 1,300 pieces of equipment (both motorized and non-motorized) across all City departments. Fleet services' equipment covers a broad spectrum including police cruisers, fire trucks, skid loaders, waste and service vehicles, lawn mowers, dump trucks, all-terrain vehicles (ATV) and rescue boats.

CR Transit

CR Transit provides an opportunity for citizens to reduce their time behind the wheel, cut their fuel costs, reduce congestion on Cedar Rapids' roads and contribute to air pollution reduction across the region. The Cedar Rapids' bus system runs 14 different routes within the metro area, including two routes to Marion (Routes 5N and 5S) and two routes to Hiawatha (Routes 6 and 5B). The service area¹⁵⁷ is 22 square miles with a population of more than 97,000.¹⁵⁸

Public transit currently reduces direct fuel consumption across the United States by 760 million barrels of oil each year and reduces CO₂ emissions by 6.9 million metric tons annually.¹⁵⁹ Nationwide, transit has also saved Americans money and time through \$20.8 billion in reduced fuel costs and 865 million fewer hours stuck on congested roadways.¹⁶⁰ In Cedar Rapids over 90.6% of commuting trips are made by personal vehicle¹⁶¹ and traffic congestion is a constant concern of residents.¹⁶² On the other hand, public transit accounted for only 0.91% of all commuting trips in Cedar Rapids.¹⁶³ For households nationwide, commuting

¹⁵⁷ Defined as "a corridor surrounding the routes 3/4 of a mile on either side" "NTD Glossary." National Transit Database. Federal Transit Administration. 18 October, 2013. Web. 3 March, 2014.

<<http://www.ntdprogram.gov/ntdprogram/Glossary.htm>>

¹⁵⁸ "Cedar Rapids Transit (CRT)." National Transit Database, n.d. 2012. Web. 15 September 2013.

<http://www.ntdprogram.gov/ntdprogram/pubs/profiles/2012/agency_profiles/7008.pdf>.

¹⁵⁹ Neff, John and Dickens, Matthew. 2013 "Public Transportation Factbook." ed. 64. *American Public Transportation Association*. October 2013. pg 24. Web. 10 November, 2013.

¹⁶⁰ Ibid.

¹⁶¹ United States. Census Bureau. "B08301 Means of Transportation to Work." *American Community Survey 2008-2012*. Web. 5 Feb, 2014.

¹⁶² Staff Reporter. "Will Congestion on Cedar Rapids' Collins Road ever ease up?" *Cedar Rapids Gazette* 29 March, 2014: Web. <<http://thegazette.com/2013/12/12/will-congestion-on-cedar-rapids-collins-road-ever-ease-up/>>.

¹⁶³ United States. Census Bureau. "B08301 Means of Transportation to Work." *American Community Survey 2008-2012*. Web. 5 Feb, 2014.

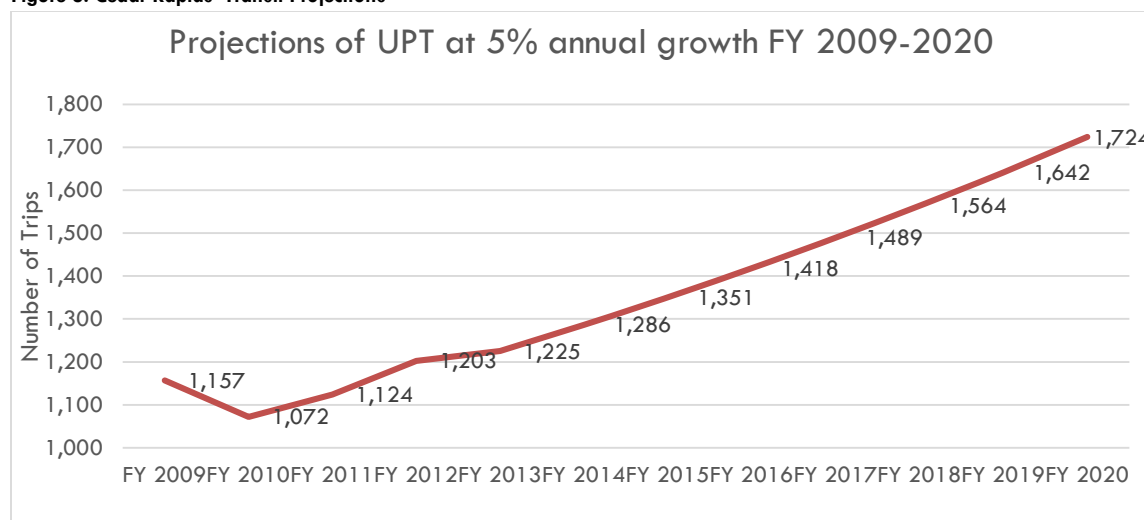
by car accounted for 22.1% of annual car trips. Car trips for personal errands (24.2%), social purposes (21.1%) and shopping (22.6%) accounted for 67.9% of all other vehicle miles traveled,¹⁶⁴ with driving accounting for nearly 85% of all travel. In Cedar Rapids, vehicle trips averaged nearly a billion (981.6 million) miles per year between 2008 and 2012.¹⁶⁵ This equates to every resident of Cedar Rapids (including children and the elderly) driving alone to Los Angeles and back twice each year.¹⁶⁶ Drivers of passenger cars consumed 317 gallons of gas—spending \$965.32 on gas alone¹⁶⁷ and producing 6,217 pounds of CO₂ each year. Drivers of SUVs, pickup-trucks and other large passenger vehicles consumed 443 gallons of gas, spent \$1,349.02 on fuel alone,¹⁶⁸ and produced 8,665 pounds of CO₂ each year.¹⁶⁹

2020 Goals: Investing in Cedar Rapids' Next Generation

1. Increase the number of Unlinked Passenger Trips by 5% each year beginning in 2014

UPT counts the number of people who step on the bus and ride it for any length of time. This is one of the simplest measures of transit ridership. Figure 8 shows that Cedar Rapids' transit ridership has been on the increase in recent years, growing at an average pace of 1.6% per year between 2009 and 2013. To reach 5% annual growth in UPT, ridership must increase an average of 71,000 UPT per year from 2013 (1.2 million). New UPT of 61,000 would be required by 2014 and 82,000 new UPTs per year in 2020.

Figure 8: Cedar Rapids' Transit Projections



Source: Derived from Cedar Rapids' transit ridership data.

¹⁶⁴ Santos, Adella, Nancy McGuckin, et al. United States. Department of Transportation. *Summary of Travel Trends: 2009 National Household Travel Survey*. pg 21. Washington, D.C.: Federal Highway Administration, 2011. Web.

¹⁶⁵ Iowa Department of Transportation. "VMT by City For 2008-2012." Web. 1 November, 2013. <http://www.iowadot.gov/maps//msp/vmt/VMT_by_city.htm>.

¹⁶⁶ An average 7,661.4 miles per person per year.

¹⁶⁷ Based on the average price of regular fuel in Conventional Areas in the Midwest region 2008-2012 (\$3.0452/gal); Source: "Petroleum & Other Liquids." 14 April, 2014. United States. Department of Energy. Energy Information Administration. Web. 2 April, 2014. <http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_r20_a.htm>.

¹⁶⁸ Ibid.

¹⁶⁹ Fuel consumption and CO₂ emission generation totals calculated from data tables found in: "Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks." United States. Environmental Protection Agency. October 2008. EPA Office of Transportation and Air Quality. pg 5. Web. 3 March 2014.

Accomplishments

1. Modernizing the Bus Fleet

CR Transit received grant funding from the Federal Transit Administration to replace buses damaged in the 2008 flood. From 2009 to 2012, the \$1.5 million annual grant funding enabled the City to purchase four to five buses per year. To date, a total of 18 buses have been purchased. These purchases reduced the average age of the bus fleet from 21 to 10.2 years. Each replaced bus was more than 30 years old. Continuing this effort, in FY 2013, the city purchased five new Clean Diesel technology buses. The new buses have a clean diesel engine that meets the 2010 EPA clean air standards.¹⁷⁰

2. Free Transit Usage

The City Council took action in early November 2013 to allow all Saturday service to operate free of charge with the hope of increasing ridership during the work week through familiarizing citizens with the bus system.¹⁷¹ The change became effective in December, but considering the unusually harsh winter and the recent implementation of this policy, it is too early to tell whether this change has had the intended outcome. Upgrading the bus fleet, developing a real-time bus arrival information mobile application and expanding free ridership are encouraging steps for CR Transit.

Challenges

1. Communication

The challenge is increasing ridership through communication. The success of CR Transit will be measured by how many citizens choose to ride the bus every day and realizing how bus travel can serve their daily travel needs. This requires creative and effective education efforts to communicate the personal financial savings, traffic congestion reductions and environmental benefits that higher rates of transit usage can provide.

2. Structural

Transit usage in the United States ranks well below that of every other industrialized nation in the world.¹⁷² One of the primary reasons for this is the low residential and employment densities of most American cities, which makes the personal vehicle the most viable alternative for reaching destinations spread miles apart.¹⁷³ Public perception of distance is skewed as land use types (commercial, industrial and residential), have been strictly segregated in most post-World War II American land development.¹⁷⁴ Cedar Rapids fits this model with a population density of 2.78 residents per acre¹⁷⁵ and an employment density of 2.3¹⁷⁶

¹⁷⁰ DeBrower, Brad. "RE: Specs on "Clean Diesel" Buses". Message to Matthew Peirce. Email. 11 November 2013.

¹⁷¹ Rick Smith. "Cedar Rapids council approves free Saturday bus rides." *Cedar Rapids Gazette*: 8 November 2013. Print.

¹⁷² "Metro systems by annual passenger rides." *Wikipedia*. N.p. 13 April 2014. Web. 3 March 2014.

¹⁷³ In actuality, over half of US daily trips are actually less than 5 miles. Litman, Todd. "Short and Sweet Analysis of Shorter Trips Using National Personal Travel Survey Data." Victoria Transport Policy Institute, 26 Jul 2012. Web. 1 March 2014. <http://www.vtpi.org/short_sweet.pdf>.

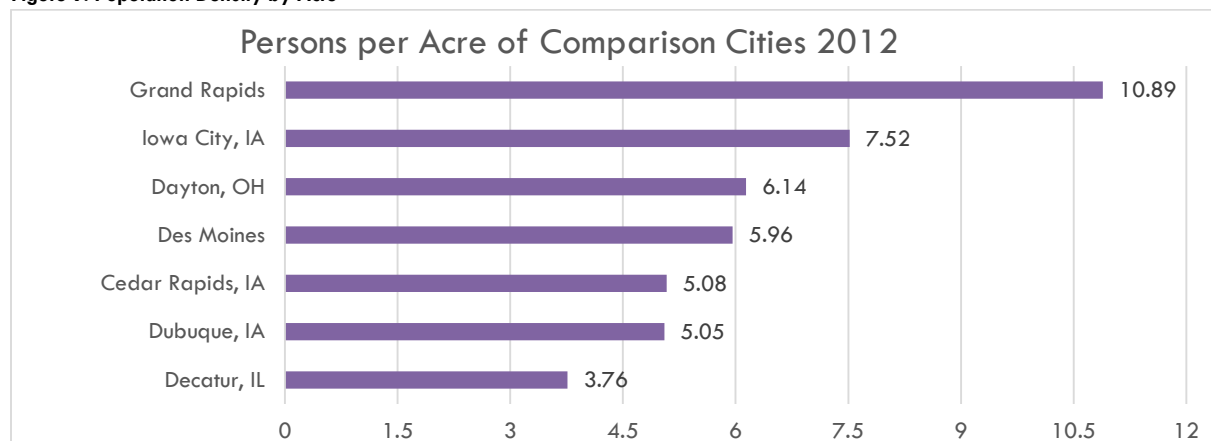
¹⁷⁴ Peterson, Del. "Transit and Small Urban Sprawl." Upper Great Plains Transportation Institute. October 2009. pg 3 Web. April 12, 2014. <<http://www.ugpti.org/pubs/pdf/DP217.pdf>>

¹⁷⁵ 128,119 population /72 sq mi /640 acres/sq mi.

¹⁷⁶ 106,160 jobs/72 sq mi/640 acres/sq mi.

workers per acre—totaling 5.1 people per acre. Figure 9 considers the total number of persons per acre—population density—of the comparison and selected cities.

Figure 9: Population Density by Acre



Source: US Census Bureau 2012 population estimates; US Census Bureau “On the Map” web application

Studies have shown transit begins to be effective at reducing car dependence when total density (population and employment) exceeds 14 people per acre.¹⁷⁷ While no comparison cities have reached this density, it makes sense that Grand Rapids, with the highest population density, has the highest percentage of trips to work by transit.¹⁷⁸

The other structural problem is that at nearly every destination in Cedar Rapids, parking costs are not factored in. Nationwide, parking is free for 99% of all automobile trips,¹⁷⁹ and with fewer restrictions on parking, the national trend is mirrored in Cedar Rapids. Free parking effectively lowers the cost of driving so that drivers feel they are making the best financial decision, (i.e. saving the most money) by using their personal vehicle.¹⁸⁰ Free parking makes riding transit appear to be more expensive considering out-of-pocket cost, time cost, and ease of access to points of interest, like shopping and work.

Fleet Services

Before the creation of Fleet Services in 2007 each City department was responsible for acquiring and maintaining its own vehicles. Fleet Services, created to achieve efficiency in purchasing and reducing the overlap of maintenance costs, is now responsible for all motorized vehicles and equipment such as generators and lawn mowers and accessory vehicles (e.g. flatbed trailers and golf carts) in all City departments.

¹⁷⁷ Newman, Peter and Kenworthy, Jeffrey “Urban Design to Reduce Automobile Dependence.” *Opolis: An International Journal of Suburban and Metropolitan Studies*: Vol. 2: No. 1, Article 3. N.d. 2006. Web. 15 February 2014. <<http://repositories.cdlib.org/cssd/opolis/vol2/iss1/art3>>.

¹⁷⁸ (1.44% as reported in Section 3)

¹⁷⁹ Shoup, Donald C. “The Trouble with Minimum Parking Requirements.” *Pergamon Transportation Research Part A*. (1999): pg 550. Web.

¹⁸⁰ Shoup, Donald C. “The Trouble with Minimum Parking Requirements.” *Pergamon Transportation Research Part A*. (1999): pg 550. Web.

2020 Goals: Investing in Cedar Rapids' Next Generation

1. Reduce average age of bus fleet to less than eight years

The Flood of 2008 required the replacement of a large number of city buses lost to flood damage. The average age of the current bus fleet is 10.5 years. As stated in the CR Transit section, replacing aging buses will result in a more efficient bus fleet. Newer buses are more fuel-efficient and can handle newer and cleaner types of fuel. Fuel mixtures with a high-percentage (15% or more) of bio-diesel burn cleaner than the diesel used in older buses.

- a. Buy new buses to replace aging bus fleet*

2. Reduce fleet by 10% from 2013 inventory level

The Fleet Services department achieved administrative efficiency and the focus has shifted to assessing whether the City needs every vehicle it.

- a. A program of vehicle evaluation is being developed to identify unused or underused vehicles. The department will determine if the City can use the vehicles more efficiently or if they need to be removed from the fleet.*

3. Reduce fuel usage by 6% from 2013 baseline

Cedar Rapids vehicles consumed more than 3.5 million gallons of diesel and E-10/15 blended fuel between 2008 and 2012. The largest user of E-10 was the Police Department (almost 144,000 gallons on average per year) and the largest consumer of diesel was the Transit Department (more than 201,000 gallons on average per year). In order for the City to meet the 6% reduction goal, an annual reduction of roughly 2,100 gallons of E-10/15 (or 12,500 gallons by 2020) and 5,000 gallons of diesel (or 30,000 gallons by 2020) will be necessary.

- a. Increase average fuel economy of the fleet so that more miles can be driven on less fuel*
- b. Phase in the purchase of higher 'miles per gallon' vehicles*
- c. Target wasteful practices through the increased use of GPS tracking devices*

Accomplishments

1. GPS Tracking

In 2010, Fleet began installing GPS trackers in its vehicles in the Public Works, Solid Waste and Water departments. As of March 2014, units were installed in 189 vehicles. The units enable department managers to track travel patterns, idle time and mileage of any equipped vehicle, enabling the identification of unnecessary vehicle use.

2. Oil Recycling

Since 2010 all Fleet departments have been required to recycle used oil and filters. The City is seeking vendors from which re-refined (i.e. recycled) oil can be purchased. Buying re-refined oil will complete the process of recycling. The policies and procedures for purchasing re-refined oil are expected to be in place by fiscal year 2015.¹⁸¹

¹⁸¹ Wickman Tina. "RE: Following up on Fleet Services." Message to Matthew Peirce. Email. 7 April 2014.

3. Retreaded Tires

On average, Fleet Services utilizes 200 retreaded tires per calendar year. All drive axle tires (i.e. rear-wheel, front-wheel, or all-wheel) today are required to be retreads.¹⁸² Fleet Services has a purchasing agreement to buy retreaded tires as often as possible. It is the policy of Fleet Services to use the same tire three times; once when the tire is new and after the tire has been retreaded twice. This results in decreased number of new purchases and disposal of hundreds of used tires each year.^{183, 184}

4. Multi-Purpose Trucks

Fleet Services owns 175 single purpose dump trucks, sand/salt spreaders and asphalt patching trucks. Although the base body designs of these trucks are the same, their cargo and function are different. Multi-purpose trucks have interchangeable body types. A dump truck one day can be turned into a sand spreader the next day resulting in lower maintenance costs.¹⁸⁵ Between 2012 and 2013, Fleet Services saved \$255,000 by reducing the number of medium duty chassis by three—at a market cost of \$ 85,000 each. In fiscal year 2015 three more multi-purpose trucks will be purchased to replace and perform the function of five single-purpose trucks.¹⁸⁶

Challenges

1. Long-Term Fuel and Infrastructure Change

From the beginning of fleet operations, petroleum-based fuels have been the go-to source of energy because of their reliable supply and low annual infrastructure distribution costs. As global oil prices have increased and supplies are less reliable than in previous decades, Fleet Services is beginning to consider ways to diversify its fuels.¹⁸⁷ Fleet Services is committed to becoming less dependent on petroleum-based fuels and is open to examining alternatives for future implementation.¹⁸⁸ Fleet Services has seeks to do this without placing a significant burden on the City's budget.¹⁸⁹ While vehicle technologies are one part of the solution needed for a more environmentally sustainable fleet operation, a secure, long-term source of fuel to power that fleet may play a larger role. Making correct projections regarding fuel availability and price on a long time horizon can be difficult. In the early 1990s, E-85 ethanol blend was marketed as the alternative fuel solution of the future. That market never became as strong as predicted. Today, compressed natural gas (CNG) is being marketed in the same way. However, the future of supplies and infrastructure is hard to predict.¹⁹⁰

¹⁸² Ibid.

¹⁸³ Ibid.

¹⁸⁴ Exact figures for tires are also unavailable.

¹⁸⁵ Wickman Tina. "RE: Following up on Fleet Services." Message to Matthew Peirce. Email. 7 April 2014. Exact maintenance cost savings will not be known until the units see another two years of use.

¹⁸⁶ Ibid.

¹⁸⁷ Wickman Tina. "RE: Following up on Fleet Services." Message to Matthew Peirce. Email. 7 April 2014.

¹⁸⁸ Hogan Dennis. "RE: Following up on Fleet Services." Message to Matthew Peirce. Email. 5 March 2014.

¹⁸⁹ Ibid.

¹⁹⁰ Ibid.

Beyond 2020: Possibilities for the Future

CR Transit

Madison, Wisconsin

WiRover: Free Wi-Fi Internet Access on Transit

One major advantage that transit has over driving is the ability for riders to engage in activities other than paying attention to traffic, road conditions and traffic controls. Transit riders can read books or newspapers while traveling. This is also a logical place for riders to access the internet however service reliability while mobile can be an issue. In the fall of 2010, researchers at the University of Wisconsin—Madison implemented available technology to build a dependable internet connection free and available to all transit riders. Between September 2010 and March of 2012, over 22,000 individual users connected to the network and created more than 450 GB of internet traffic. Providing internet access on CR Transit could provide a substantial incentive for some drivers to become bus riders.¹⁹¹

Fleet Services

Ann Arbor, Michigan

Michigan Clean Fleets Program: Schwan's¹⁹²

In 2011 and 2012, the non-profit group Clean Energy Coalition, based in Ann Arbor, partnered with Schwan's food delivery service in Southeastern Michigan to pursue a project which would result in "significant cost savings and environmental benefits." Schwan's and the Clean Energy Coalition split the \$3.72 million project cost to convert eighty (80) new Ford E450 gasoline trucks to use liquid propane gas (LPG) instead of diesel fuel. This program makes a good model for both public and private entities. CNG systems are well designed for vehicles that are always parked at the end of the day in the same place. Fleet Services has hundreds of vehicles that do not travel outside the city limits (or leave Linn County in the extreme case) and return to a city-owned storage facility each night. This include lawn mowers (110 units), generators (22 units), ATVs (69 units) and backhoe tractors (85 units). If all 35 city buses were converted to CNG, more than 200,000 gallons of diesel could be conserved and 2,238 tons of CO₂ not released into the atmosphere every year.¹⁹³

In the Schwan's example, each truck travels about 36,000 miles per year. Their fuel efficiency using propane is about 6 mpg. In two years the project has produced significant results, "a 26% reduction in fuel costs (\$316,935 annually); 348,947 gallons of gasoline displaced in each year; 14% reduction in greenhouse gas emissions (583 tons annually); and 58% reduction in petroleum consumption (4,620 barrels annually)."¹⁹⁴ The success of this pilot project makes it a model for converting all delivery vehicles in Schwan's national fleet.

¹⁹¹ "The WiRover Project." *Research.cs.wisc.edu*. University of Wisconsin, 2012. Web. <<http://research.cs.wisc.edu/wings/projects/wirover/index.html>>.

¹⁹² "Michigan Green Fleets Project Summary." Clean Energy Coalition. Web. 8 March 2014. <<http://cec-mi.org/wp-content/uploads/2012/01/Schwans-Summary-Report1.pdf>>.

¹⁹³ "How much carbon dioxide is produced by burning gasoline and diesel fuel?" 18 April 2013. United States. Department of Energy. Energy Information Administration. Web. 2 April, 2014. <<http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11>>.

¹⁹⁴ "Michigan Green Fleets Project Summary." Clean Energy Coalition. Web. 8 March 2014. <<http://cec-mi.org/wp-content/uploads/2012/01/Schwans-Summary-Report1.pdf>>.

COMMUNITY DEVELOPMENT

Vision Statement for Community Development

“COMMUNITY DEVELOPMENT FACILITATES ECONOMIC DEVELOPMENT OPPORTUNITIES AND REGIONAL PLANNING STRATEGIES THAT MAINTAIN AND ENHANCE THE QUALITY OF LIFE TO ENSURE PHYSICAL, ECONOMIC AND SOCIAL BENEFITS FOR CEDAR RAPIDS.”¹⁹⁵

The Community Development element includes the promotion of infill development, the preservation of the historic nature of neighborhoods and building to LEED certified standards, while ensuring smart growth. “The conservation and improvement of the city’s existing built resources, including re-use of historic and older buildings, greening the existing building stock and reinvesting in underutilized and unused land, is crucial to making urban places more livable, healthier and sustainable.”¹⁹⁶

Infill development is a growth management approach that directs growth to existing urban areas. It is sustainable because it can help improve the quality of neighborhoods and commercial centers, stimulating development in such areas while also conserving natural resources. Infill development can also reduce greenfield development and the urban sprawl that is associated with it.¹⁹⁷ Other benefits of infill development include increased population densities, enhanced access to and efficiency of public transportation and other public services such as water and sewer. Higher population densities have the potential to generate the critical mass necessary to support improved public transportation systems, grocery stores and pedestrian-friendly areas, etc.¹⁹⁸ In general, higher population density is a strong indicator of sustainability because a thriving urban core enables better public transportation and conservation of land outside the urban region.¹⁹⁹ As a result of infill development, land is used more efficiently and outlying open spaces are conserved.

“Preserving older and historic buildings is an essential means by which a community can achieve greater sustainability.”²⁰⁰ The study, *The Greenest Building: Quantifying the Environmental Value of Building Reuse*, concludes that, “when comparing buildings of equivalent size and function, building reuse almost always offers environmental savings over demolition and new construction.”²⁰¹ “The construction, operation and demolition of buildings accounts for over 40% of the United States’ carbon dioxide emissions.”²⁰² “Reusing and retrofitting existing built resources is the first step to cutting these emissions and ensuring Cedar Rapids’ communities are greener, healthier and have historic value and character.”²⁰³

¹⁹⁵ “Community Development.” City of Cedar Rapids. n.d. Web. October 15, 2013. <<http://www.cedar-rapids.org/government/departments/community-development/Pages/default.aspx>>.

¹⁹⁶ “Sustainable Communities.” National Trust for Historic Preservation. 2014. Web. 10 March 2014. <<http://www.preservationnation.org/information-center/sustainable-communities/#.UxDsFf1tdO1>>.

¹⁹⁷ Sharpin, B., Anna and Kos, Paul. “The Social and Environmental Effects of Residential Infill Development in New Zealand.” Feb. 2006. Pdf. 10 March 2014. <http://wellington.govt.nz/~media/your-council/projects/files/infill-social.pdf>.

¹⁹⁸ Ibid.

¹⁹⁹ Mayes, Elisa. “Land Use: Density.” Infrastructure and Sustainability. n.d. Web. 10 March 2014. <<http://www.unc.edu/~shashi/Infrastructure/landusedensity.html>>.

²⁰⁰ “Sustainable Communities.” National Trust for Historic Preservation. 2014. Web. 10 March 2014. <<http://www.preservationnation.org/information-center/sustainable-communities/#.UxDsFf1tdO1>>.

²⁰¹ Ibid.

²⁰² Ibid.

²⁰³ Ibid.

2020 Goals: Investing in Cedar Rapids' Next Generation

1. Increase the number of housing units created within the Downtown SSMID and the Medical Quarter SSMID

The 2008 flood diminished the shortage of residential housing in downtown Cedar Rapids. The recent success of the Water Tower Place and Bottleworks housing developments has demonstrated the appeal of the downtown residential opportunities.²⁰⁴ The Economic Alliance Downtown Housing Group has tracked the current occupancy rate for downtown housing properties in Cedar Rapids. According to information gathered from the owners of the largest downtown housing property, the occupancy rate is 93-95%, which means there are not many openings for the growing list of potential downtown residents.²⁰⁵ A survey distributed at the Economic Alliance's Urban Living event showed that approximately 46% of 117 attendees had a high level of interest in potentially living in downtown Cedar Rapids.

2. Promote infill development in the Tier 1 neighborhoods within the City's overlay districts (Kingston, Czech Bohemia and Ellis) and within the SSMIDs (Downtown and Medical Quarter)

To replace the housing and commercial units lost in the 2008 flood, the City plans to promote infill development in order to support a more sustainable and walkable downtown. Infill development utilizes existing infrastructure already in place, rather than incurring the cost of providing new infrastructure and services on the periphery of city. In 2009, the City conducted a neighborhood planning process to gather resident feedback about the rebuilding of flood-impacted neighborhoods and the development of neighborhood commercial amenities. Residents expressed interest in the rebuilding and development of the Tier 1 neighborhood and SSMIDs and many residents have already rebuilt their homes.²⁰⁶

The City evaluates each project to determine what incentives might be appropriate based on the project's characteristics and financial need. Examples of past mechanisms used by the City to promote infill development include Tax Increment Financing, Urban Revitalization Tax Exemption, contributions of land, and in the case of housing, Community Development Block Grant Disaster Recovery program funds.²⁰⁷

3. Increase the number of students enrolled in the Historic Preservation program at Kirkwood Community College.

The City has partnered with Kirkwood Community College to offer a Historic Preservation Program beginning in the fall of 2014. The program includes nine courses, which relate to the care and maintenance of historic properties. In order to ensure the program will remain viable in the long-term at least eight students need to enroll in the course. The City's aim is to increase the number of students enrolled from all over Eastern Iowa with the hope that these students will take what they learn back to their communities. The City of Cedar Rapids is devoting some funding to assist the college with marketing efforts, scholarships and other solutions to promote the program to the community. Increasing the number of people educated in the care and maintenance of historic properties will help promote the reuse and preservation of existing buildings.

²⁰⁴ "Community Development: Housing." Cedar Rapids Metro Economic Alliance. 2014. Web Applications by Informatics, Inc. 28 March 2014. <<http://www.cedarrapids.org/Content/Community-Development/Quality-of-Life/Housing.aspx>>.

²⁰⁵ Ibid.

²⁰⁶ Mitchell, J., Paula. Personal Email. 16 April 2014.

²⁰⁷ Ibid.

Accomplishments

1. Green Building Criteria

Green building guidelines have been adopted for new housing construction projects that receive funding assistance from the City. A combination of guidelines such as Energy Star requirements, Build it Green: Multi-family Green Building Guidelines and LEED™ for new construction and major renovations make up the requirements. A few of the mandatory exterior requirements are soil and erosion control, required in all building codes, as well as advanced requirements such as landscaping with at least 50% native species.²⁰⁸ The mandatory interior guidelines include energy efficient HVAC, lighting, water systems and appliances, as well as low or no Volatile Organic Compounds (VOCs). VOCs are emitted as gases from certain solids or liquids such as paints, cleaning supplies, building materials, furnishings and office equipment and can cause both short and long term adverse health effects.²⁰⁹ The green building guidelines help reduce a home's environmental footprint, but more importantly they make homes more efficient and affordable to maintain.²¹⁰

After the 2008 flood, the City had an opportunity to rebuild or replace a significant number of city-owned buildings.²¹¹ Taking into consideration the costs and benefits associated with the rebuilding effort, the City evaluated the green building standards and gathered public input about the standards. In November of 2009, the Cedar Rapids City Council directed City staff to implement LEED™ Gold certification as the standard for all new construction and major renovation projects.²¹² LEED™ stands for, "Leadership in Energy and Environmental Design and is a nationally accepted benchmark for the design, construction and operation of high performance green buildings."²¹³ "The LEED™ standard addresses the environmental impacts of design and construction choices related to the site and materials selection, water usage, energy efficiency and indoor environmental quality."²¹⁴ Since 2009 the Cedar Rapids Public Library, the Central Fire Station and the City Service Center have all been rebuilt and have applied for LEED™ certification. The Central Fire Station was recently awarded LEED™ Platinum certification. Building to LEED™ standards is sustainable because the long-term benefits include lower utility bills, decreased maintenance costs and decreased operating expenses on account of more efficient use of resources and fewer materials being used overall.²¹⁵

²⁰⁸ "Single Family New Construction Program: Mandatory and Optional Green Building Guidelines." City of Cedar Rapids, Iowa. n.d. Web. 28 March 2014. <<http://www.cedar-rapids.org/government/departments/community-development/housing/ROOTs/Documents/SFNC-4%20Green%20Building%20Guidelines.pdf>>.

²⁰⁹ "An Introduction to Indoor Air Quality (IAQ): Volatile Organic Compounds (VOCs)." United States Environmental Protection Agency. 9 July 2009. Web. 2 March 2014. <<http://www.epa.gov/iaq/voc.html>>.

²¹⁰ Kurby, Erika. "Re: iGreenCR ROOTs Program". Message to Erika Kurby. 31 October. E-mail.

²¹¹ "LEED Implementation Guide." City of Cedar Rapids, Iowa. n.p. and n.d. PDF. 3 March 2014. <http://www.cedar-rapids.org/resident-resources/utilities/energy_management/want-to-achieve/Documents/CR%20LEED%20Guidebook%20FINAL_4-14-10.pdf>.

²¹² Ibid.

²¹³ Ibid.

²¹⁴ Ibid.

²¹⁵ Partee, Josh. Quantifying Sustainability." U.S. Green Building Council. 2009 Web. 10 March 2014. <http://www.usgbc.org/sites/default/files/StoriesfromPractice_QuantSustain.pdf>.

2. Building Salvage Program with Habitat for Humanity

Between August 2012 and August 2013, the City worked with Habitat for Humanity to salvage items from homes that were being prepared for demolition. The City's goal was to help build a sustainable program that Habitat could continue independently in the future. During the year-long trial, items such as wood flooring, doors, windows, decorative woodwork and appliances were salvaged from 31 properties. The items that were collected were diverted from the landfill and sold for reuse at Habitat for Humanity's ReStore shop. The profits from resale were directed back into Habitat's programs to help build homes and provide for families in need.

Challenge

1. The City cannot control market forces or construction trends

Cedar Rapids faces the external challenge of not being able to control market forces or construction trends in the area. Therefore, the number of potential infill housing units within the downtown and Medical SSMDs is unpredictable. Overcoming this challenge will incentivize land to be used more efficiently and outlying land to be conserved.

Beyond 2020: Possibilities for the Future

Portland, OR

Urban Growth Boundary

Portland, Oregon is a leader in concentrating urban development within a specific area and discouraging development in rural areas outside of what is known as an urban growth boundary.²¹⁶ An urban growth boundary is a land use planning tool that protects rural lands and focuses investment in existing downtowns, main streets, and employment areas. In 1980 the Land Conservation and Development Commission approved the urban growth boundary as consistent with statewide planning goals in Oregon. The boundary also controls urban expansion onto farm and forest lands.

"Every five years, the Metro Council is required to conduct a review of the land supply and, if necessary, expand the boundary to meet that requirement."²¹⁷ The urban growth boundary was not designed to be static and has been moved more than 30 times to accommodate the growing population and increasing demand for housing. Under this system, Portland has become a nationally acclaimed model of effective urban planning, and Oregon's agricultural land continues to be preserved despite the growth of the city. "As a result of the urban growth boundary, proponents say, cities in Oregon are more compact and have avoided being connected by miles of low-density suburbia."²¹⁸

Phoenix, AZ

Infill Development

In March of 2002, Phoenix, AZ created an infill policy that provides incentives for developing in vacant or underutilized land, through redevelopment area programs and a broader area single-family infill housing

²¹⁶ Managing Growth in American communities.

²¹⁷ "Urban Growth Boundary." *Oregonmetro.gov*. Oregon Metro, 2014. Web. <<http://www.oregonmetro.gov/index.cfm/go/by.web/id=277>>.

²¹⁸ Oates, David. "Urban Growth Boundary." *Oregonencyclopedia.org*. The Oregon Encyclopedia, n.d. Web. <http://www.oregonencyclopedia.org/entry/view/urban_growth_boundary/#.U3UAVNJdV8E>.

program.²¹⁹ “Among the incentives the city offers are the waiving of a number of development-related fees; city participation in the cost of off-site improvements; focused blight control efforts adjacent to infill development sites; and the assistance of a city staff “Infill Development Team” that has the explicit mission of shepherding infill projects through the city planning and development process.”²²⁰ “Since the program’s inception, 3,175 new single family homes have been built in designated areas of the city; about 1/3 of these are affordable for low- and moderate-income families.”²²¹

²¹⁹ Maricopa Association of Governments: Regional Development Division. Growing Smarter Implementation Project Infill Development. 2003. PDF. May 5, 2014.

²²⁰ Policy Link. Infill Incentives: Tools in Action. N.d. Web. May 5, 2014.

<http://www.policylink.org/site/c.lkIXLbMNJrE/b.5137455/k.9CC5/Tool_in_Action.htm>.

²²¹ Ibid.

FORESTRY

Vision Statement for Forestry

CEDAR RAPIDS WORKS TO CREATE AN URBAN FOREST BY ENCOURAGING TREE PLANTING IN ALL AVAILABLE RIGHT OF WAYS AND OTHER PUBLIC SPACES TO SAVE ENERGY AND PRESERVE A NATURAL AESTHETIC.

Forestry is an important element in sustainability because of the way it connects people to the natural environment within an urban setting in addition to the economic, ecological and environmental benefits derived from tree cover. Some benefits to maintaining a vibrant urban forest include increased shading and water retention, a reduction in greenhouse gases (GHGs), reducing the urban heat island effect and improved ecosystem maintenance.²²² All of these functions also play into the aesthetic appeal of having tree-lined streets and natural beauty mixed within an urban context.

But it is not only trees in public places that have quantifiable economic benefits.²²³ Trees on private property have the potential to increase home values by 10% - 20% and businesses in tree-lined areas tend to attract more customers who tend to spend more money on purchases.²²⁴ So there is a very compelling economic argument for why trees should be included as a part of the sustainability equation in both the public right-of-way, parks, urban forests as well as within private yards.

Tree-lined streets offer a more walkable pathway, buffering noise from traffic. In areas of compact development, they provide 'breathing room' for residents and visitors. Urban forests create an interconnected corridor of wildlife and human interaction.²²⁵ In their most basic sense, urban forests are places that calm people and provide balance with the built environment. In his research of the human interaction with nature, Richard Louv cites numerous studies where human interaction with the natural world has the capacity to improve people's lives. One case included the healing power of nature, where patients whose hospital rooms gave views of nature had shortened hospital stays compared to those whose view was a brick wall. In another case, he showed that joggers running through a greener natural setting had reduced levels of depression as compared to those who had jogged in an urbanized setting.²²⁶ The evidence seems to suggest that urban forests and street trees can help create both a more sustainable and more livable and healthy community.

2020 Goals: Investing in Cedar Rapids' Next Generation

1. Plant More Trees

a. Plant 1,200 trees a year

This first strategy acknowledges that with the available budget and staff, planting 1,200 trees a year is the optimal gross planting number. This number is roughly the number of trees that are being taken down

²²² "Urban and Community Forestry." *Fs.fed.us*. US Forest Service, 9 Jan. 2014. Web. 5 Mar. 2014.

²²³ Trees on any private property can be given an economic value based on the National Tree Benefit Calculator, a free tool created by Casey Trees and the Davey Tree Expert Co. (<http://www.treebenefits.com/calculator/>).

²²⁴ *Ibid.*

²²⁵ *Ibid.*

²²⁶ Louv, Richard. "Ten Reasons why Children and Adults need Vitamin N." 24 Jun. 2011. Web. 13 Mar. 2014.

annually and logistically what can be planted with current staff levels.²²⁷ However, planting 1,200 trees in 2013 represents an increase in of 35% from the 2012 planting levels.

b. Successfully manage the Emerald Ash Borer (EAB) infestation / replant a diverse stock of trees

In dealing with the removal of ash trees, replanting trees with a greater diversity of species will allow the entire tree population to be more disease and pest resistant. This will allow for the future urban canopy to be less susceptible to outbreaks from diseases and pests. The EAB infestation has the potential to decimate the ash tree population in Cedar Rapids and as such, current actions are in place to stop planting ash trees and to strip bark off of a large number of ash trees, effectively removing the breeding habitat for EAB. During the removal process, the first step is to remove trees that are categorized as unhealthy or those with structural deficiencies. The second step will be the removal of larger trees that pose more risks to the public because of their size and potential for injury.²²⁸

While there is currently no code to deal with EAB, the City is working on revising the municipal code so that all tree diseases have a protocol in place to react as soon as there is a threat. Combining this code revision with greater tree species diversity will help avoid pest and disease problems with the future urban canopy, minimizing the risk of a crisis by practicing responsible management.

2. Increase the survivability of planted trees

a. Work with developers to improve survivability of trees planted within new development

The City has devised a plan where instead of requiring developers to plant trees before final occupancy is permitted, developers will pay into a fund that allows city staff to plant trees in the spring or fall. Developers will not feel rushed to have trees planted before final approval, so trees will not be planted haphazardly. With the City planting the trees, more trees will have a higher likelihood of being planted correctly. This saves the City time and money and supports the longevity of trees.

3. Build volunteer support for street trees in Cedar Rapids

a. Create a volunteer base to support the maintenance of trees throughout the City

The city wants to build on the *TreeKeepers* program, the primary citizen steward program in Cedar Rapids that is free for all who join. As of now, building upon the program includes (1) holding two classroom events each year, (2) holding two on-site training events each year and (3) holding two volunteer tree maintenance events each year for *TreeKeeper* graduates.

Cedar Rapids realizes the importance of maintaining and building upon its relationship with volunteer groups to help maintain the forest and act as public stewards. Trees Forever is a non-profit organization that provides advocacy, classes and events for Iowa communities. The *Treekeepers* program teaches citizens how to properly plant and maintain trees, how to identify trees, how to understand tree issues and advocate for them and how to act as a steward for trees. Graduates of the program walk away with hands-on experience and knowledge of basic care for street and park trees, in addition to knowing what to look for in unhealthy or damaged trees.²²⁹

²²⁷ Fagan, Todd. "Quick Questions." Message to the author. 28 Feb. 2014. E-mail.

²²⁸ Fagan, Todd. Personal Interview. 21 Feb. 2014.

²²⁹ "TreeKeepers." *Treesforever.org*. Trees Forever, Inc., n.d. Web. 26 Feb. 2014.

Accomplishments

1. Mandatory One-for-One Tree Replacement Policy

The Cedar Rapids Municipal Code lists a mandatory one-for-one tree replacement planting in the public right-of-way.²³⁰ According to the code, trees must be planted in the public right-of-way before a final occupancy permit is granted in all new developments and if a street tree is removed, then it must be replaced by another tree. This codification of the policy ensures that trees will be replaced if removed by the City or by developers as they build new homes in the right-of-way. The American Public Works Association specifies the importance of such policies in having a legal backing for municipal leverage in both protection measures and continued maintenance of an urban forestry program.²³¹

2. Tree City USA for 35 Years

Cedar Rapids has been a member of Tree City USA for 35 years, the longest running record in the State of Iowa. Tree City USA, a program started by the Arbor Day Foundation, is national in its scope, allowing for a cross comparison among cities across the country. Participants in the Tree City USA program are obligated to follow four core standards: establishing a Tree Board or Department, establishing a Tree Care Ordinance, maintaining a Community Forestry Program with at least \$2 per capita and an Arbor Day Observance and Proclamation.²³² Cities can renew their designation as a Tree City USA on an annual basis by maintaining these four core standards.

3. Tree Maintenance Program

Cedar Rapids has implemented a maintenance program, which tracks trees for two years after they are planted to ensure that they develop correctly. This proactive program offers greater assurance of the survival rate of newly planted trees, saving the municipality labor, time and money by monitoring trees in the formative years after planting. According to the American Public Works Association, one of the best ways to improve an urban forestry management plan is to “include analysis and recommendations for preventative maintenance cycles.”²³³

Challenges

1. Funding

Budgetary constraints have forced the Forestry program to undergo staff reductions since its inception in the late 1940's. It currently operates with twelve full-time employees and requires funding from both CIP funds as well as from national grants.²³⁴ Funding is essential to move forward with planting more trees, developing a comprehensive urban forest inventory and preparing for the EAB infestation.

²³⁰ “Section 32.05 Dimensional, Parking and Development Standards.” *Library.Municode.com*. Municode, n.d. Web. 26 Feb. 2014.

²³¹ American Public Works Association. *Urban Forestry Best Management Practices for Public Works Managers: Ordinances, Regulations, & Public Policies*. 2011. PDF file.

²³² “Tree Cities around the Nation.” *Arborday.org*. Tree City USA, Apr. 2013. Web. 18 Nov. 2013.

²³³ American Public Works Association. *Urban Forestry Best Management Practices for Public Works Managers: Urban Forest Management Plan*. 2011. PDF file.

²³⁴ “About the Program.” *Cedar-Rapids.org*. City of Cedar Rapids, n.d. Web. 18 Nov. 2013.

An opportunity already underway in Cedar Rapids is the incorporation of a forestry utility. The forestry utility, in essence, is a small monthly fee added to utility bills that would fund Forestry. The utility could range anywhere from \$.80 to \$2.25 a month, depending on what type of funding is needed to combat problems like EAB or to restructure the program to plant more trees per season.²³⁵ At \$1.00 a month, the Forestry utility would have enough money to complete all the necessary tree planting and maintenance, conduct a first-year tree inventory, hire interns to work on code issues and tree care and have a cushion to address emerging issues.²³⁶ While the focus of pursuing this option has the short-term goal of preparing for EAB, the long-term thinking is that this can help Forestry move into its own department with sufficient staff to continue building the urban canopy and to have funds prepared for future infestations or complications.

2. Emerald Ash Borer (EAB) Infestation

While EAB has not yet been confirmed in Cedar Rapids, there is a plan to deal with the threat, though it requires city council approval for adequate funding.²³⁷ Some of the proactive measures taking place right now are removing ash trees, stopping the planting of ash trees and removing the bark from ash trees, but the actual plan to combat EAB requires a confirmed siting before action can take place. The City is also committed to diversifying the species of newly planted trees within the urban canopy.

Preparing to deal with Emerald Ash Borer will require significant removal of the ash tree population in Cedar Rapids. In fifteen states east of Iowa, EAB has already decimated 60 million ash trees and is considered “uncontainable,” making the future of 8 billion ash trees in the US uncertain.²³⁸ Experts at Michigan State University and Ohio State University consider EAB more destructive than Dutch Elm Disease and have stated that, “We literally cannot keep up with it.”²³⁹ Ash trees currently comprise about 30% of the city’s tree stock, indicating that the stock is not diverse enough to deal with EAB. Short-term efforts are being placed in removing ash trees and presently, more trees will be removed than planted. This represents a net negative number of trees to the total stock. Because of the one-for-one replacement policy in Cedar Rapids, these trees will be replaced in coming years. Having a positive net new number of trees—that is, planting more than what is being removed—will only be possible after removing all affected ash trees from the City’s stock.

3. Tree Preferences on Right-of-Way

Perceptions of trees in the public right-of-way is a matter of opinion; some people like them and others do not. While there will always be advocates for and against trees, educating the public on the benefits of trees in the urban environment will be an ongoing effort. While there are many who have complained to the city about the presence of street trees, these voices are only a fraction of the larger population. What needs to be considered in countering this opposition is how trees, when properly placed in the right-of-way, provide a host of benefits related to infiltration, energy savings, ecosystem maintenance and mitigation of the urban heat island effect.

²³⁵ Fagan, Todd. Personal Interview. 21 Feb. 2014.

²³⁶ Ibid.

²³⁷ Ibid.

²³⁸ Hamilton, Anita. (2011). Deadlier than Dutch Elm: U.S. Trees Stricken by a Plague of Ash Borers. Time U.S. Retrieved from <http://content.time.com/time/nation/article/0,8599,2073835,00.html>.

²³⁹ Ibid.

Beyond 2020: Possibilities for the Future

Raleigh, North Carolina

NeighborWoods Program²⁴⁰

In an effort to build partnerships with the public, the City of Raleigh, NC began the *NeighborWoods Program*, which gives free trees for residents to plant in the public right-of-way. Residents must promise to care for and maintain them and are given specific instructions by the municipality on how to properly plant these trees. The project is funded completely by donations and has three simple requirements: citizens must live within Raleigh city limits, trees must be planted in the City's right-of-way as a street tree and citizens must pledge to plant, water and mulch the tree for at least 2 years.²⁴¹ While people may request to have a planting located in their neighborhood, the city searches for neighborhoods that contain the fewest number of trees so as to ensure equitable distribution. As of autumn 2013, the *NeighborWoods Program* has delivered over 14,240 trees.

Portland, Oregon

Tree Inventory Project²⁴²

Since its inception in 2010, the *Tree Inventory Project* has educated residents with the necessary tools and information to properly assess the health of trees in neighborhoods across Portland. The project now includes 17 neighborhoods and allows residents to not only learn about what to look for in a healthy urban canopy, but also provides an opportunity for them to offer their input at an annual Tree Summit. Here, residents address concerns and work with the Urban Forestry department in coming up with action plans to address problems and maintain healthy urban forests. From this, the city gains a much broader scope of knowledge about health of trees in many neighborhoods across the city; citizens walk away from the process educated about how to identify healthy trees, in addition to having participated in the action planning process.

²⁴⁰ "NeighborWoods Tree Planting Program." *Raleighnc.gov*. City of Raleigh, 13 Sep. 2013. Web. 28 Feb. 2014.

²⁴¹ Ibid.

²⁴² "Tree Inventory Project." *Portlandoregon.gov*. City of Portland, Oregon, n.d. Web. 5 Mar. 2014.

PARKS AND GARDENS

Vision Statement for Parks and Gardens

CEDAR RAPIDS IS A HISTORIC, URBAN, FORESTED ENVIRONMENT WHERE EXISTING PARKLAND, TRAILS AND GARDENS ARE DESIGNED TO CREATE AN INVITING, EDUCATIONAL AND UNIQUE PLACE FOR PEOPLE TO LIVE, WORK, PLAY AND VISIT.

Parks are important to sustainability because they serve recreational purposes, provide aesthetic beauty, connect residents to their environment, support biological diversity, improve water quality and provide wildlife corridors.²⁴³ Cedar Rapids' parks and open spaces are of importance to resident's quality of life in addition to the recreational opportunities offered. "A growing body of research shows that contact with the natural world improves physical and mental health."²⁴⁴ Already stated in a study published by the Centers for Disease Control and Prevention, "creation of or enhanced access to places for physical activity led to a 25.6% increase in the percentage of people exercising three or more days per week."²⁴⁵ Parks also provide contact with nature, which is also known to confer certain health benefits such as lowering blood pressure and stress levels.²⁴⁶ Cedar Rapids has over 96 parks and trails on over 3,434 acres of land. The City also has many acres of land held in reserve for future park expansion and flood control.²⁴⁷

In Cedar Rapids, the term 'garden' is used to describe both ornamental landscaping and areas where food can be grown. The sustainable benefits of community gardens relate to health, community development and the environment.²⁴⁸ In regard to health, community food gardens create opportunities for physical exercise, stress relief and healthy food. Both food and landscaping gardens can provide a sense of community by encouraging social and cooperative interactions. Finally, an environmental benefit of community gardens is that they allow stormwater to infiltrate the ground better than compact turf, reducing the impact of runoff.²⁴⁹

2020 Goals: Investing in Cedar Rapids' Next Generation

The goals set forth for the Parks and Gardens element are consistent with the Parks and Recreation Master Plan as well as the Cedar Rapids' Comprehensive Plan. The goals and strategies outlined below are focused on education, enhancing the ecological health of the environment and initiating and/or improving community partnerships. The strategies listed for each goal were developed to creatively manage resources by doing more with reduced budgets and staff.

²⁴³ "iGreenCR: Parks and Gardens." City of Cedar Rapids. n.d. Web. October 15, 2013. < <http://www.cedar-rapids.org/resident-resources/igreenCR/Pages/ParksandGardens.aspx> >.

²⁴⁴ Benedict, Mark A. and Edward T. McMahon 2002. "Green Infrastructure: Smart Conservation for the 21st Century." *Renewable Resources Journal* 20:3:12-17.

²⁴⁵ Ibid.

²⁴⁶ "How Cities Use Parks to Improve Public Health." American Planning Association. n.d. 2003. <<http://www.planning.org/city/parks/briefingpapers/pdf/physicalactivity.pdf>>.

²⁴⁷ City of Cedar Rapids, Iowa. 2014. Web. 26 Jan. 2014. <<http://www.cedar-rapids.org/Pages/home.aspx>>.

²⁴⁸ Wormsbecker, Candace. "Benefits of Community Gardens to the Built Environment." Together 4 Health. 2008. Web. 3 Feb. 2014. <<http://www.together4health.ca/workgroups/benefits-community-gardens>>.

²⁴⁹ Dow, C. 2003. Benefits and Barriers to Implementing and Managing Well Rooted Community Gardens in Waterloo Region, Ontario. <<http://www2008.waterlooregion.ca/Environment/CHERYLFINAL.pdf>>.

1. Develop a new Greenway

a. Complete and Implement Greenway Planning and Development

Cedar Rapids plans to construct 110 acres of greenway on the western riverfront of the Cedar River. Greenways are areas of undeveloped land set aside for recreational use or environmental protection. This goal supports sustainability because the greenway will include elements that provide improved active recreational opportunities and stormwater management, as well as native prairie and wetland habitat. “The greenway also provides flood protection that will not only reduce the likelihood of significant environmental damage taking place if another flood occurs, but will improve environmental quality by establishing systems to protect wildlife, water and air quality.”²⁵⁰

2. Increase conversion to native plants in Cedar Rapid’s parks

Reintegrating native prairie into city landscaping through the use of a Geographic Information System (GIS) mapping layer will help determine the amount of turf, prairie and woodland areas that currently exist. The City of Cedar Rapids will then identify strategic areas to transition from mowed lawn to native plantings. Every year, over 6,500 plugs for the native prairie are cultivated in the Noelridge greenhouse, which costs substantially less than buying the plugs wholesale. Plant plugs are, “young plants with well-established, complete and independent root systems.”²⁵¹ Increasing areas to native prairie plantings offers many benefits. The areas no longer require regular mowing; the plants need little to no irrigation and are resistant or tolerant of most insect pests and diseases. Prairie is also hardy so it can survive the seasons of Iowa and the plant’s deep roots allow stormwater to infiltrate the ground quickly and restore soil quality.²⁵² Because native prairie is so beneficial to the landscape of Cedar Rapids, educating community partners about the benefits of native prairie through the use of educational signage is a fundamental component that will be incorporated in the future.

a. Expand volunteer based projects and education

This strategy is focused on how to better communicate and educate the public about environmental volunteer events along with increasing volunteer hours. The current volunteer projects include the yearly river, trail and parkland cleanups. The City plans to create a *Prairie Keepers* volunteer program to help install and maintain native prairie landscape. With increased education and volunteer projects the City of Cedar Rapids can install and maintain future native prairie landscapes that support the environment in a cost-effective manner.

Accomplishments

In the past five years, Cedar Rapids has been successful in protecting the natural environment through the preservation and management of parks and gardens. The City’s Parks and Recreation Master Plan and Parks Finder application are both tools that are essential in planning for the future of this element. The

²⁵⁰ “Flood Protection: Both Sides of the River.” City of Cedar Rapids, Iowa. 2014. Web. Feb. 20, 2014.

<<http://www.cedar-rapids.org/city-news/flood-recovery-progress/floodmanagementsystem/Pages/default.aspx>>.

²⁵¹ “Plug Plants – the successful gardener’s short cut to satisfying, efficient and economical gardening.” The Garden Centre Group. n.p. 2014. Web. <<http://www.thegardencentregroup.co.uk/plug-plants/about-plug-plants>>.

²⁵² Payne, M., Jack. “Sustainable Urban Landscapes. Cooperative Extension work.” Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Iowa State University of Science and Technology, Ames, Iowa. Web. November 16, 2013. <<https://www.extension.iastate.edu/publications/SUL18.pdf>>.

City has also been proactive in planting native prairie and advocating for community garden plots.²⁵³ Currently native prairie is located along the Cedar River Trail, the Sac and Fox trail, Prairie Park Fishery, the Amphitheater, Festival Grounds, City golf courses, K9 Acres Dog Park, Five Seasons Plaza, City Hall and Huntington Ridge Park.

1. Parks and Recreation Master Plan

Cedar Rapids created a Parks and Recreation Master Plan in April of 2010. The plan establishes clear goals and strategies to enhance the community's parks, recreation programs, services and facilities and provides direction to department staff and elected officials on how the goals and strategies might be achieved.²⁵⁴ The plan is meant to aid in the development of Cedar Rapids' parks, gardens and recreation for the next fifteen years.

2. Parks Finder Application

Because Cedar Rapids is home to over 96 parks, an interactive Parks Finder application (available via the internet) was developed to help inform residents and visitors about the amenities of each individual park. Examples of potential amenities include playgrounds, baseball fields, splash pads and drinking fountains. The Parks Finder application allows both citizens and visitors to locate a park or recreation facility and provides general information about recreational activities in Cedar Rapids.²⁵⁵

3. Supporting Gardening²⁵⁶

The City has implemented vegetable garden plots in the Ellis, Time Check and Tuma neighborhoods. The community gardens offer 327,000 square feet of planting space. These community garden plots have been very successful thus far, with a 100% lease rate in 2012 and a 99% lease rate in 2013.

The Noelridge Greenhouse in Cedar Rapids supports floral and native landscaping efforts for the City of Cedar Rapids and also serves as an educational center for residents. Educational opportunities such as school field trips to the Greenhouse allow for students to learn about the environment. Because the Greenhouse supports such gardening efforts within in the City, it is very cost-effective.

Challenges

1. Budgets, funding sources and reduced maintenance staffing levels.

The two major challenges that the City faces are lack of funding and reduced maintenance staffing levels. More specifically, the Parks Division is facing increasing responsibilities and static budgets despite seeing significant staff reductions during the last 10 years.²⁵⁷ In order to improve park maintenance with current budgets, the department is working towards implementing operational efficiencies. For example, to overcome the challenge of reduced maintenance staffing levels, the City has proposed increasing volunteer involvement to help with trail and park maintenance.

²⁵³ Gibbins, Daniel. Personal Interview. 22 October 2013.

²⁵⁴ "Parks and Recreation Master Plan." City of Cedar Rapids. April 2010. Web. PDF. November 8, 2013.

²⁵⁵ "Cedar Rapids Parks Finder." City of Cedar Rapids. n.p. Web. GIS. <<http://crgis.cedar-rapids.org/ParksFinder/default.htm>>.

²⁵⁶ Gibbins, Daniel. Personal Interview. 22 October 2013.

²⁵⁷ "Parks and Recreation Master Plan." City of Cedar Rapids. April 2010. Web. PDF. November 8, 2013.

Beyond 2020: Possibilities for the Future

Seattle, WA

Volunteer Naturalists Program

The Seattle Volunteer Naturalist Program was established approximately 20 years ago to help connect Seattle residents with their outdoor spaces for the purposes of stewardship, education and civic engagement.²⁵⁸ The program is primarily an adult education program. The volunteers apply their skills and knowledge by teaching programs to the public, school children, families, etc. “Volunteer naturalist’s backgrounds are as varied as the people they teach - the common thread is their passion for nature.”²⁵⁹

Similar to Cedar Rapids, there have been budget cuts in the Seattle Parks and Recreation department resulting in a significant reduction in staff who oversee the volunteer naturalist program. Adjusting operations relative to the smaller numbers of staff has been a challenge for the department but the program has received ongoing fiscal support from the Associated Recreation Council (ARC).²⁶⁰ The ARC chapter for the volunteer naturalist program is the Discovery Park Advisory Council. The volunteer naturalist program has been fortunate to have the ongoing support of the Discovery Park Advisory Council, even during the worst of economic times.²⁶¹

²⁵⁸ Belinda, Chin. “RE: Seattle Volunteer Naturalist Program.” Message to Penny Rose. 26 March 2014. E-mail.

²⁵⁹ City of Seattle. Seattle Volunteer Naturalists. 2014. N.p. Web. March 2014.
<<http://www.seattle.gov/parks/environment/naturalists.htm>>.

²⁶⁰ Belinda, Chin. “RE: Seattle Volunteer Naturalist Program.” Message to Penny Rose. 26 March 2014. E-mail.

²⁶¹ Ibid.

CONNECTIONS BETWEEN ELEMENTS

ENERGY MANAGEMENT AND FORESTRY

Two subsidy programs in Cedar Rapids are offered by the electric and gas utilities to encourage trees on private property. These include *Operation ReLeaf* by Alliant Energy and *Plant Some Shade* by MidAmerican Energy. Each of these programs sells trees from \$25 to \$30 to utility customers.²⁶² While Forestry participates in these programs, Energy Management could help support the programs by advertising the potential energy savings that comes from trees on private lawns. The benefit of these programs are that they save on the capital cost of purchasing a new tree and over time, homes may save on heating and cooling bills because of the presence of the trees that provide shade in the summer and wind breaks in the winter.

WATER WISE AND ENERGY MANAGEMENT

By promoting Water Wise conservation efforts to the public, less water needs to be treated before sending it out for citywide consumption and less water needs to be retreated before discharging it back into the environment. Water and wastewater represent the processes through which the water supply of Cedar Rapids is cleaned for consumption, and both must consider the responsible use of that water. Both of these systems require a substantial amount of energy, and conserving water can help reduce the energy usage that goes into these processes. Efficient allocation and use of water are important to maintaining a sufficient supply of clean water and properly preparing the water for consumption and discharge are essential to avoiding negatively impacting the health of citizens and the environment.

CLEANUPCR AND COMMUNITY DEVELOPMENT

Community Development and CleanUpCR are connected in their aim to reuse and recycle materials salvaged from homes being prepared for demolition. Currently, an ordinance is in place for the City to tear down structures that are deemed too dangerous or unsafe to remain standing.²⁶³ The City also helped build a sustainable program to salvage items from homes that were being prepared for demolition that Habitat for Humanity could then continue independently over the long term.

BIKE CR AND PARKS AND GARDENS

The Comprehensive Trails Plan provides a road map to improve connectivity in Cedar Rapids. The Parks and Recreation Master Plan identifies the need to increase, expand and improve trails for recreational uses such as bicycling. Parks can be focal points in the creation of a connected bike network which encourages residents to ride. By sharing information and planning collaboratively, Parks and Gardens and BikeCR can make parks and trails focal points in the creation of a connected network which encourages residents to ride and enjoy the natural environment.

COMMUNITY DEVELOPMENT AND TRANSPORTATION

Infill development increases residential and employment densities per acre in targeted areas. Developing vacant land or redeveloping low-density areas to higher density within the city will increase residential and employment populations. A density of 14 people/acre is needed to decrease dependence on

²⁶² "Forestry." *Cedar-Rapids.org*. City of Cedar Rapids, n.d. 17 Feb. 2014.

²⁶³ City of Cedar Rapids Code of Ordinances – Municipal Code 24.15 – <http://library.municode.com/index.aspx?clientId=16256&statelid=15&stateName=Iowa>

personal automobiles and achieve substantial gains in transit ridership.²⁶⁴ Increased population and employment densities, achieved through infill development, are necessary to support urban activity centers, like walkable commercial districts, or community celebration space. Residents who locate along transit corridors will benefit from convenient access to jobs, shopping and other daily needs, especially if redeveloped land is built as mixed-use districts offering complementary land uses.²⁶⁵

FORESTRY AND PARKS AND GARDENS

Trees help improve air quality by removing pollutants from the atmosphere and decreasing the urban heat island effect. Since urban neighborhoods have especially high concentrations of pollutants related to traffic and other sources, trees are especially important to filter the air.²⁶⁶ Studies have shown that in one urban park, tree cover removed 48 pounds of particulates, 9 pounds of nitrogen dioxide, 6 pounds of sulfur dioxide, 0.5 pounds of carbon monoxide and 100 pounds of carbon – daily.²⁶⁷ According to the University of Washington's Center for Urban Horticulture, a mature tree canopy "reduces air temperature by about five to ten degrees." Because trees help to cool the environment, it is a simple and effective way to reduce the urban heat island effect.²⁶⁸ With an increase in the number of trees in parks and in the public right-of-way across Cedar Rapids, the city will become more environmentally sustainable.

PARKS AND GARDENS AND STORMWATER

Parks and gardens contain large open spaces where stormwater can infiltrate the ground, reducing the impact of runoff. Rain gardens specifically, allow for rainfall and stormwater runoff to infiltrate the ground in their design and plant selection. Native vegetation and plants with deep fibrous roots are often utilized in rain gardens because they provide the largest cleaning and filtration benefits to the environment.²⁶⁹

²⁶⁴ Newman, Peter and Kenworthy, Jeffrey "Urban Design to Reduce Automobile Dependence." *Opolis: An International Journal of Suburban and Metropolitan Studies*: Vol. 2: No. 1, Article 3. N.d. 2006. Web. 15 February 2014. <<http://escholarship.org/uc/item/2b76f089>>.

²⁶⁵ Municipal Research & Services Center of Washington. *Infill Development Strategies for Shaping Livable Neighborhoods*. June 1997 – Report No. 38. Web. May 2014. <<http://www.mrsc.org/publications/textfill.aspx#E19E6>>.

²⁶⁶ "How cities use parks to...Improve Public Health." American Planning Association. 2003. Web. <<http://www.planning.org/cityparks/briefingpapers/physicalactivity.htm>>.

²⁶⁷ Bordelon, Bianca. Urban Forestry Network. *Trees Improve Our Air Quality*. Boyles, Alyene. Web. May 2014. <<http://urbanforestrynetwork.org/benefits/air%20quality.htm>>.

²⁶⁸ United States Environmental Protection Agency. *Trees and Vegetation*. 2013. Web. May 2014. <<http://www.epa.gov/heatisland/mitigation/trees.htm>>.

²⁶⁹ "What is a rain garden?" *Rain Garden Design Templates: Low Impact Development Center*. 2007. Web. Feb. 15, 2014. <http://www.lowimpactdevelopment.org/raingarden_design/whatisaraingarden.htm>.

V. COMMUNICATING SUSTAINABILITY

Goals

The survey designed and administered by the team had three specific goals:

1. Assess residents' knowledge and awareness of the City's sustainability efforts and communication methods
2. Assess importance of sustainability to residents of Cedar Rapids and their sustainability behaviors and choices
3. Assess residents' priority for future efforts and preference for receiving information from the City regarding local sustainability efforts

We only reported on data obtained from Cedar Rapids' residents. Data from any respondents living outside the City limits was not included. The survey consisted of questions in three parts to determine respondents':

- Knowledge and awareness of sustainability efforts and communication in Cedar Rapids
- Importance of sustainability and personal sustainability behaviors
- Priorities for future City efforts and preference for receiving information from the municipality

Survey Methodology

Target population: Respondents of zip codes 52401, 52402, 52403, 52404, 52405, and 52411 were included as being within the City limits. All races and ethnicities, genders, income levels, and ages 18 and older were included.

Survey distribution: The in-person surveys were collected from four locations within Cedar Rapids between Thursday, February 13th and Saturday, February 22nd. Locations were the Johnson Avenue Hy-Vee, NewBo City Market, Cedar Rapids City Hall and the Public Library. A link to the web-based survey was made available on the homepage of Cedar Rapids' website, the CRTalks homepage, both the iGreenCR and City of Cedar Rapids Facebook pages through March 7th, and was announced via a press release on February 12th.

Sampling strategy and bias: A total of 268 responses were obtained, 82 in person and 186 online. Survey responses were collected by the means of opportunity sampling because both Hy-Vee and the library required our team to sit behind a table and wait for people to approach us. This meant that respondents self-selected to take the survey and therefore there was no randomization. There was also no randomization for the online survey because of self-selection.

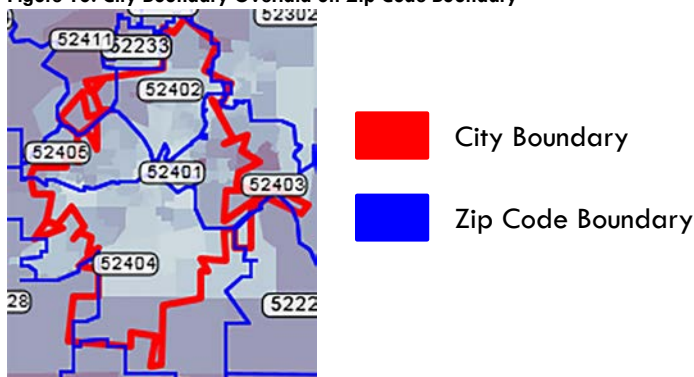
Survey Analysis: We calculated statistics to describe the data in terms of percentages of respondent choices for given questions. In addition to examining these, a test of proportions was run to compare respondent proportions against the true population proportion of Cedar Rapids. The likelihood of one demographic group answering a question in one particular way was also calculated (such as how one income group answered a given question versus another income group answering the same question). This was used to provide findings for determining who the City of Cedar Rapids might focus on for future

sustainability communications. The statistically significant demographics were compared with all responses to determine the frequency of selections.

iGreenCR Survey Findings

The zip codes of Cedar Rapids correspond with different regions of the city: 52401 is the downtown area, 52402 is to the North, 52403 is to the East, 52404 is to the South and 52405 is to the West (Figure 10). The survey sample also included 52411, the Northwest region, because a portion of this zip code falls within the municipal city limits of Cedar Rapids. Because respondents self-selected, there is an oversampling in some areas and under sampling in others. The sample population overrepresented zip codes 52411 and 52403, and underrepresented 52404. According to the US Census, the northwest region (52411) is predominately Caucasian (94.5%) and wealthy (median household income of \$120,614). The east region (52403) has a greater percentage of African Americans (8.4%) as compared to Cedar Rapids as a whole (5.6%) with above average household income (median household income of \$56,915) as compared to Cedar Rapids as a whole (median household income of \$52,242). The South region (52404) most resembles the demographic makeup of Cedar Rapids, although the income is below average (median household income of \$46,713).

Figure 10: City Boundary Overlaid on Zip Code Boundary



Source: City-Data.com. <<http://www.city-data.com/zipmaps/Cedar-Rapids-Iowa.html>>.

The test of proportions revealed statistical significance for zip code, age and household income. This means that for each of these three categories, the proportions of the demographic information from the survey are significantly different from the proportions found in reality. Table 13 shows the comparison for zip codes across Cedar Rapids. Only zip codes 52401, 52402 and 52405 are closely represented for respondents.

Table 13: Zip comparison between Cedar Rapids residents and survey respondents

Zip Code	52401	52402	52403	52404	52405	52411
Percent of Population	2%	30%	18%	28%	18%	5%
Percent of Respondents	3%	30%	25%	13%	17%	12%

The median age of residents in Cedar Rapids is 35.2 years including those younger than 18.²⁷⁰ The median age for survey respondents is 50 years; this is based on an assumed median age derived from the age ranges given in the survey. Table 14 provides a visual representation of the breakdown between age groups of the population of Cedar Rapids and survey respondents. The closest comparison is in the 65 and over age group.

Table 14: Age range comparison between Cedar Rapids residents and survey respondents

Age	18 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 or over
Percent of Population	13%	11%	20%	16%	24%	17%
Percent of Respondents	6%	21%	21%	21%	21%	11%

According to the 2012 American Community Survey, median household income for Cedar Rapids²⁷¹ was \$52,242 (+/- 1,429), while average household income was \$67,252 (+/- 1,872). Data from survey respondents are skewed upward suggesting that there are outliers with significantly higher incomes. Because of this, the average household income is \$15,000 higher than the median household income. The difference between Cedar Rapids' population and survey respondents for annual household income is displayed in Table 15 below. This shows the under and over sampling of the different income groups.

Table 15: Household income comparison between Cedar Rapids residents and survey respondents

Household Income	\$24,999 or less	\$25,000 to \$49,999	\$50,000 to \$74,999	\$75,000 to \$99,999	\$100,000 to \$149,999	\$150,000 or more
Percent of Population	22%	26%	21%	13%	12%	6%
Percent of Respondents	5%	17%	24%	19%	22%	13%

According to the 2010 US Census, 50.9% of the population of Cedar Rapids identifies as female compared to 49.1% as male. More of the survey respondents were female (55%) than male (45%). The racial make-up of Cedar Rapids is predominately Caucasian (Table 16)²⁷². The findings for gender and race are not statistically significant. Therefore, for each of these categories, the proportions of the demographic information found in the survey are not significantly different from the proportions found in reality.

²⁷⁰ US Census Bureau. n.d. Web. <<http://www.census.gov/2010census/>>.

²⁷¹ American Fact Finder. US Census Bureau, n.d. Web. <http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_5YR_S1901>.

²⁷² The race data obtained from the US Census Bureau contains the total population of Cedar Rapids including those below the age of 18. Our survey screened out this group. This could account for some of the disparity that exists between the percentages of the overall population with the percentage of the survey respondents.

Table 16: Race dispersion comparison between Cedar Rapids residents and survey respondents

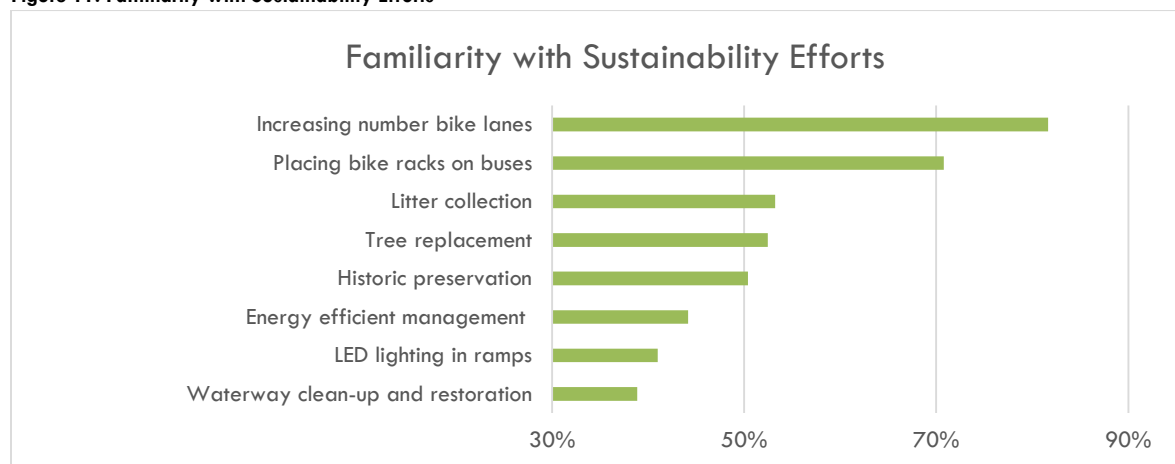
Race	African American	American Indian / Alaskan Native	Asian	Caucasian	Hispanic / Latino	Native Hawaiian / Pacific Islander	Other Race	Two or more races
Percent of Population	6.0%	0.2%	2.0%	87.7%	3.5%	0.0%	1.2%	2.8%
Percent of Respondents	1.9%	0.0%	1.1%	92.4%	2.3%	0.0%	1.1%	1.1%

Descriptive statistics provide percentage comparisons for respondents' answers. The following charts display respondents' knowledge of Cedar Rapids' sustainability efforts and communication methods, the importance respondents' place on the environment and their personal sustainability habits, and their preference for where Cedar Rapids should focus its sustainable efforts and how they prefer to be informed of these.

Knowledge and awareness of sustainability in Cedar Rapids (Goal 1)

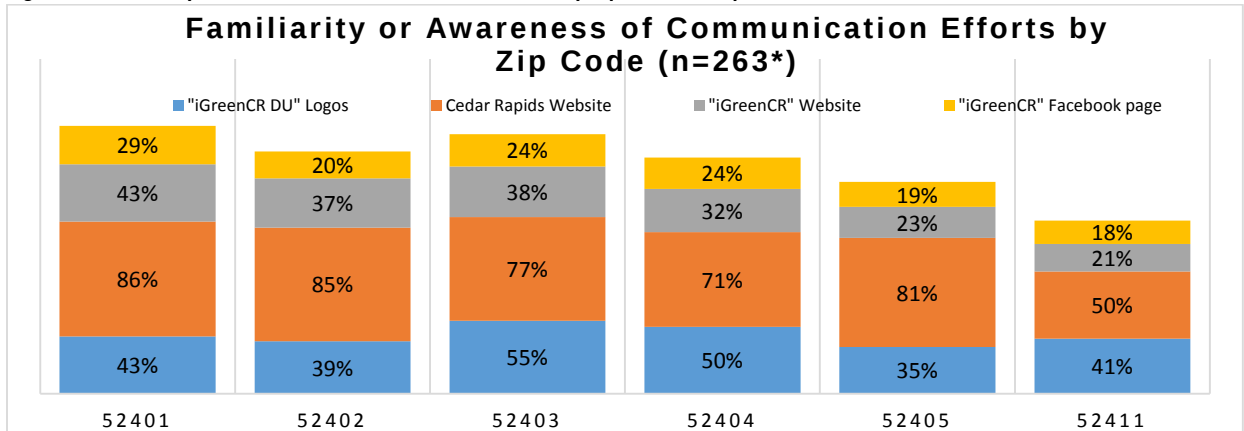
The survey asked how familiar or aware respondents were of the City's sustainability efforts. We found that respondents were more familiar with visible efforts and less familiar with internal City efforts. Figure 11 shows that 82% of respondents were familiar with increases in the number of bike lanes and 71% were familiar with bike racks on buses. Energy efficient management was familiar to 44% of respondents and 41% were familiar with LED lighting in parking ramps.

Figure 11: Familiarity with Sustainability Efforts



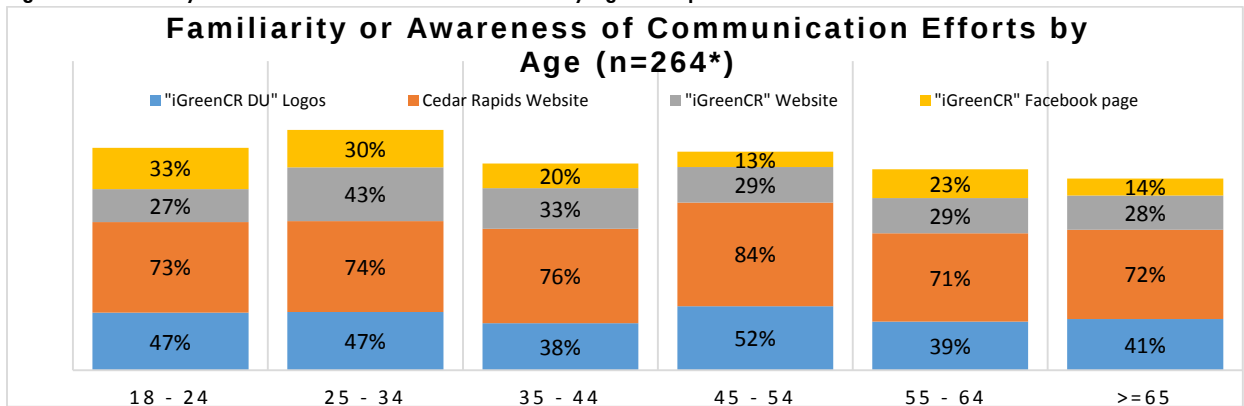
We then compared familiarity and awareness across zip code, age and household income to determine if there were differences between these demographics. For zip code (Figure 12), on average 75% of respondents selected the Cedar Rapids' main webpage as their way of obtaining information about the City's sustainability efforts. For the iGreenCR DoU logo, 44% on average were aware of this around the city, 22% were aware of the iGreenCR website, and 22% were aware of the iGreenCR Facebook page. Overall, respondents in the 52411 zip code have the least familiarity or awareness of any of the communication methods while the 52401 and 52403 zip codes have the most.

Figure 12: Familiarity or Awareness of Communication Efforts by Zip Code of Respondent



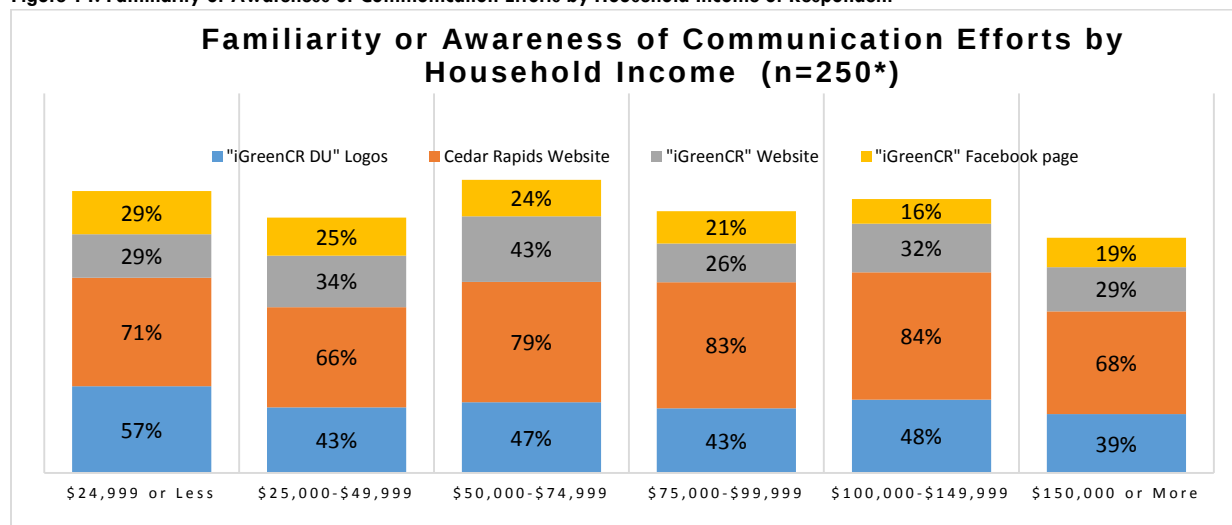
For age (Figure 13), the 65 and older age group have the least familiarity or awareness of any of the communication methods while the 25-34 age group have the most.

Figure 13: Familiarity or Awareness of Communication Efforts by Age of Respondent



For household income (Figure 14), the \$150,000 and over income group have the least familiarity or awareness of any of the communication methods while the \$50,000 to \$74,999 income group have the most.

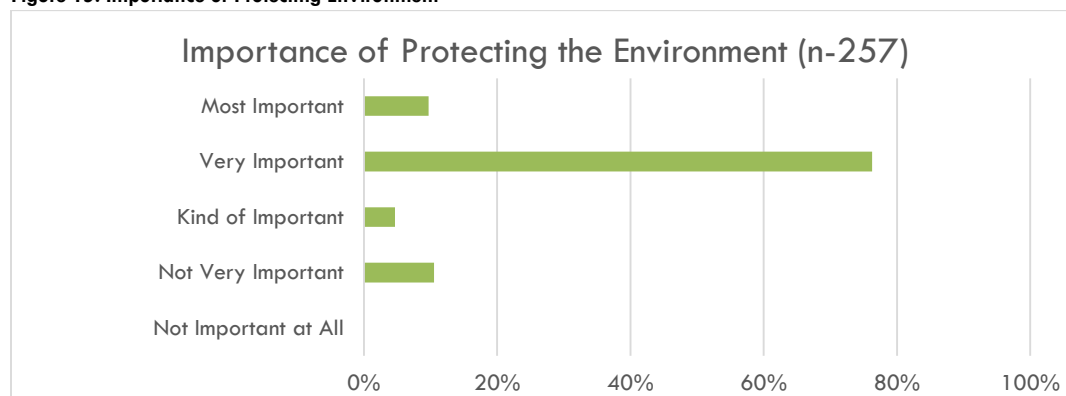
Figure 14: Familiarity or Awareness of Communication Efforts by Household Income of Respondent



Importance of sustainability and their personal sustainability behaviors (Goal 2)

The majority of survey respondents indicated that they place a high level of importance on protecting the environment (Figure 15). Eighty-six percent of respondents chose protecting the environment as 'most important' or 'very important.' None of the respondents found protecting the environment to be not important at all.

Figure 15: Importance of Protecting Environment

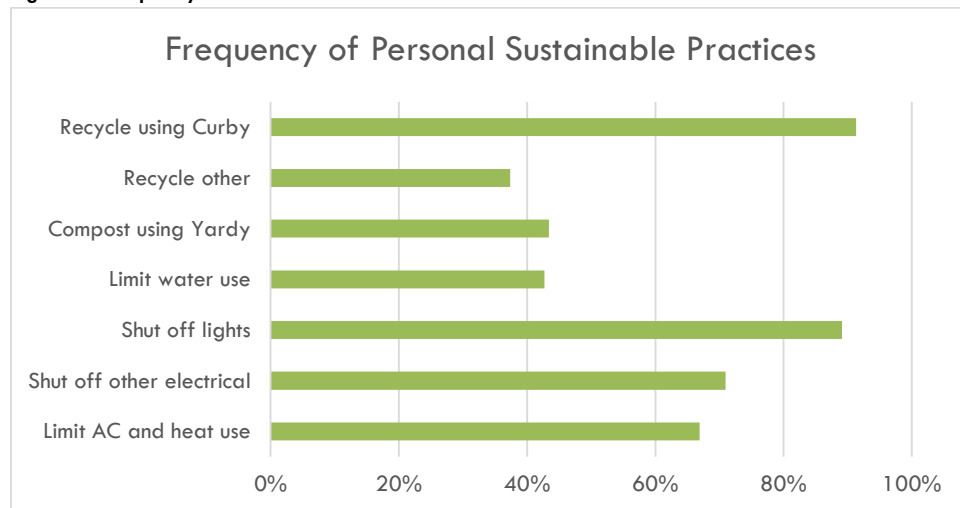


The majority of respondents practice environmental sustainability activities (Figure 16) mainly through curbside recycling (91%), shutting off lights (89%) and other electrical devices when not in use (71%) and limiting AC and heat use (67%). In calculating the likelihood of one demographic group practicing sustainability habits more than another group, we found there were differences between older and younger respondents.²⁷³ The 65 and older age group was 15 times more likely to use curbside recycling

²⁷³ The statistically significant demographics were compared with all responses to determine likelihood of selection.

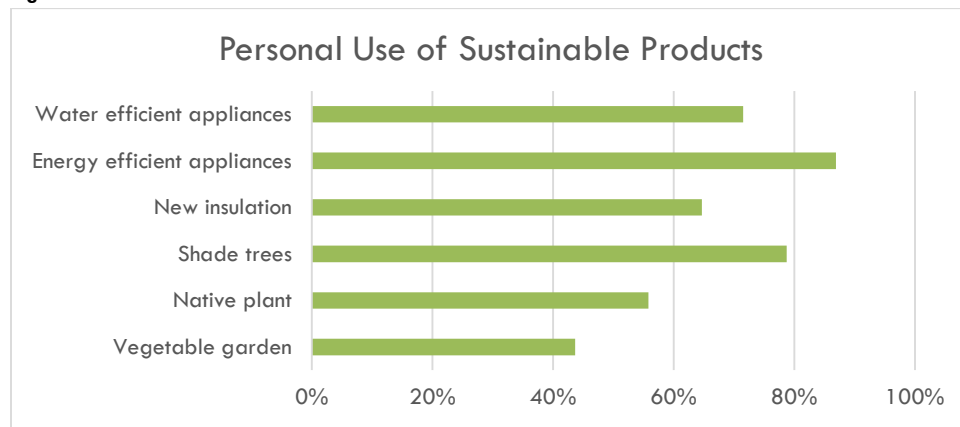
than the 25 to 34-year-olds. Higher income households were nearly 20 times more likely to use Curby than those in the lowest income group.

Figure 16: Frequency of Sustainable Practices



Respondents use sustainable goods and products in their home and yard. Figure 17 shows that 87% have energy efficient appliances, 79% have shade trees, 72% have water efficient appliances and even for the lowest category, nearly half of respondents have a vegetable garden. Again we see the division between age groups and income levels with the 65 and older age group being 13 times more likely than the 18 to 24 age group to have new insulation and 15 times more likely than the 25 to 34 age group. Those in the highest income range were also more likely than those in the lowest income range to have new insulation. We did not ask about home ownership, so there is no way of knowing whether younger or less affluent people would install new insulation if they owned their home.

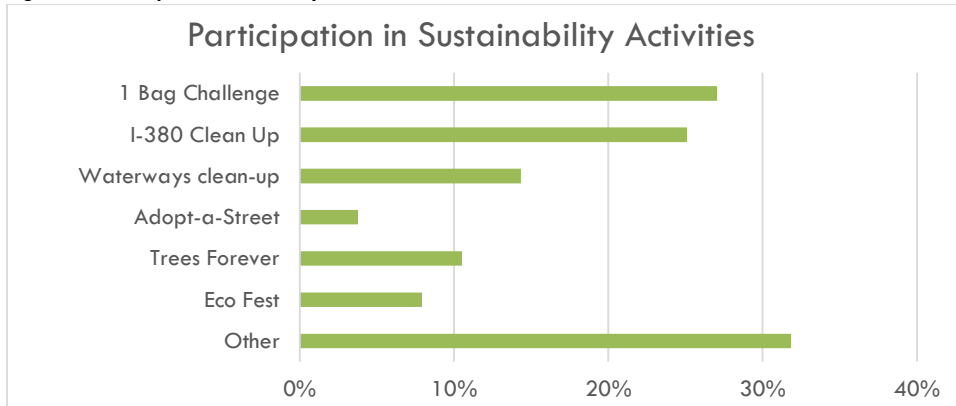
Figure 17: Personal Use of Sustainable Products



Included in the iGreenCR initiative are a number of citywide sponsored community events. These events are open to all residents with the purpose of keeping the public open areas, roadways and waterways clean. They are also opportunities to educate residents on how to be more sustainable and to inform them

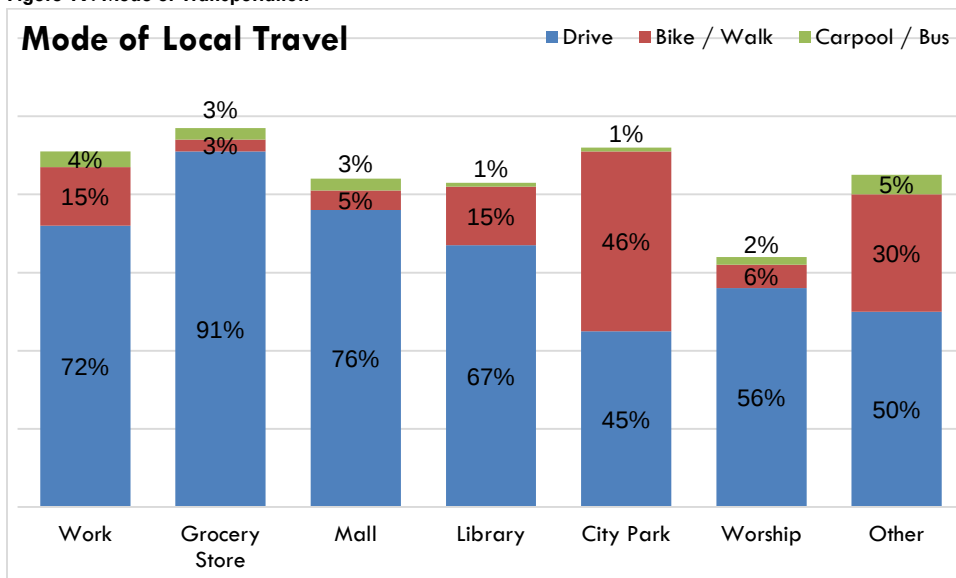
how to participate in sustainable activities. These events include once a year programs (Eco Fest) as well as individual and group events that occur simultaneously throughout the year (1 Bag Challenge). The majority of respondents (62%) answered that they had never participated in any of these events. Another 21% answered that they had never heard about them. Of the remaining 17% who answered that they had participated at least once, the City Managers' 1 Bag Challenge was the second highest sustainability event that respondents participated in (27%) (Figure 18). The highest category was 'other' (32%). Write-in comments for this category included participation in school, church, group and neighborhood events and gardens, and individually picking up trash and recycling on walks.

Figure 18: Participation Rate in City-wide Efforts



Driving was the mode of choice for the majority of respondents regardless of the destination (Figure 19). Non-motorized transportation was the second choice, followed third by carpool or bus. Based on respondent comments, transportation choice and mode were both impacted by the timing and location of bus routes (there are no buses after 5:30 pm or on Sundays, or in respondents' area) and by those who work close to or at home.

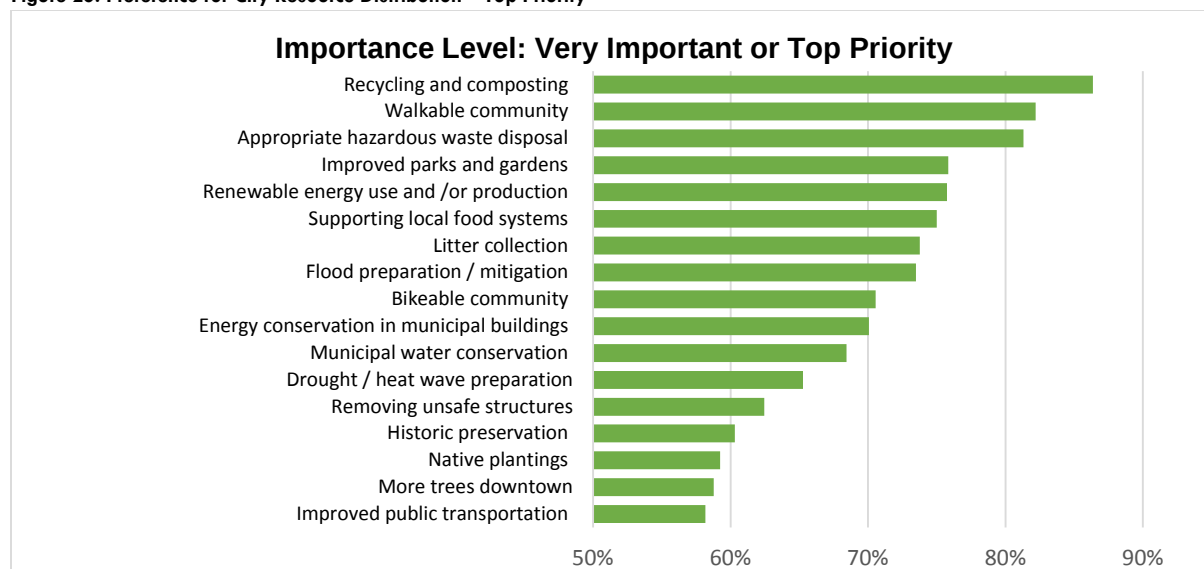
Figure 19: Mode of Transportation



Priorities for future City efforts and preference for receiving information from the municipality (Goal 3)

Respondents indicated that the three categories that were the most important to them were Recycling and Composting (86%), a Walkable Community (82%) and Appropriate Hazardous Waste Disposal (81%) (Figure 20). Although recycling and composting are combined, many respondents commented that they do not usually use ‘Yardy’ for kitchen composting due to the incidence of rapid breakdown of organic matter when the carts sit out during hot summer months. The overall lowest priorities ranked by respondents were Native Plantings (59%), More Trees Downtown (59%) and Improved Public Transportation (58%). According to the survey, age played a factor in likelihood of ascertaining priority²⁷⁴ with the oldest age group being ten times more likely than the youngest to find drought preparation an important issue.

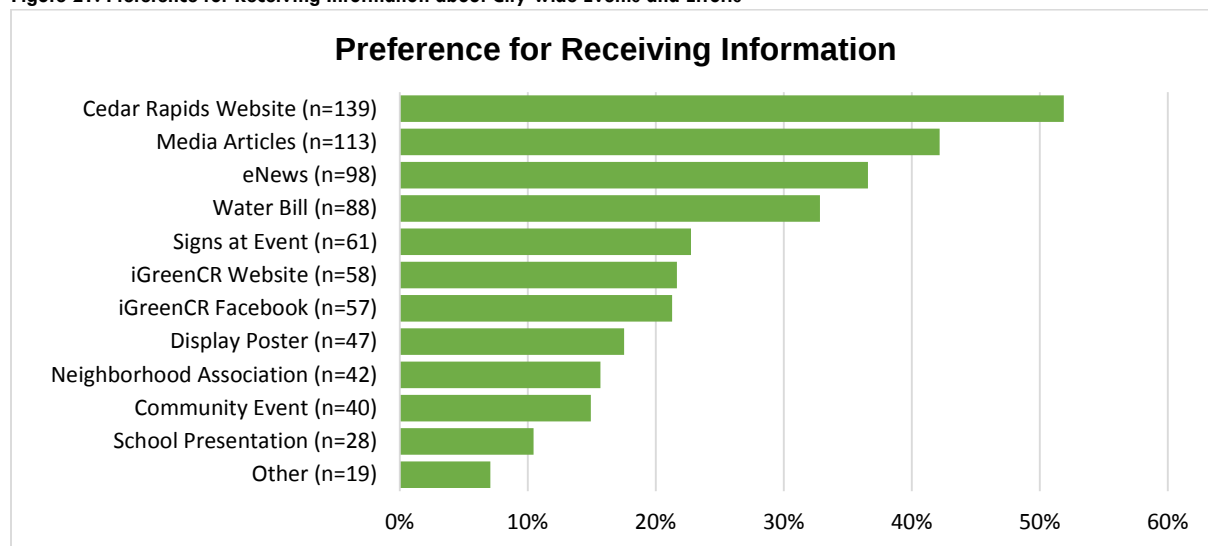
Figure 20: Preference for City Resource Distribution—Top Priority



The majority of respondents prefer to receive information about the City’s environmental sustainability efforts and citywide events through Cedar Rapids’ main city website (Figure 21). Of those who responded ‘other,’ ads at movie theaters, displays at the airport, specific types of media notifications (radio, newspaper, television), other people and a mailed newsletter were stated as preferences. After the Cedar Rapids’ main website, preferences were for various media (42%), the city e-newsletter (37%) and water bill inserts (33%). The ‘n’ shown in the figure indicates how many respondents chose this contact method. This question allowed respondents to check as many preferences as they desired, and averaging calculations were based on how many respondents chose a particular method.

²⁷⁴ The statistically significant demographics were compared with all responses to determine likelihood of selection.

Figure 21: Preference for Receiving Information about City-wide Events and Efforts



The importance placed on protecting the environment seems to match personal sustainability efforts, but not for mode of local travel. Respondents chose driving as the preferred mode for all destinations. Combining biking and walking to the local park was the only time when a non-motorized personal vehicle surpassed driving (46%). The majority of respondents had also never participated in a citywide sustainability event or had ever heard of one; on average, only 17% had ever participated. Because the survey did not differentiate between renters and home owners, there is no way to determine any connection between responses and whether respondents were home owners or renters.

Conclusion

Cedar Rapids now knows that environmental sustainability is an important issue to the community. The survey shows that many people are practicing sustainability at home and are cognizant of recycling, shutting off lights and considering energy efficiency in their appliances. Based on the priorities stated by the respondents, the City has a list of what needs further action and publicity and what is not important to residents. In addition to recycling and composting, people care most about having a walkable community and knowing that hazardous wastes are disposed of properly. Even though most residents drive to their destinations, walkability is important, which presents a unique opportunity for the City. Residents want to see parks and gardens continue to improve and renewable energy produced and used within the city. The evidence from the survey points to continuing these efforts and expanding on these successes. Further growth in these areas will require continued investment in these areas by the municipality and other community members alike.

Cedar Rapids knows as well that the preferred method of communication is the City of Cedar Rapids main website, but that there are still large populations that prefer communication in the form of more traditional media (42%), e-newsletters (37%) and water bill inserts (33%). Diversifying the medium of messages will allow the City to reach out to more members of the community and to inform more people of its practices. It will also allow the municipality to reach out to people who have been less aware of the

efforts already underway. This communication can help residents become more informed, and more informed residents can help support the sustainability of the municipality.

VI. CONCLUSION

Element Recommendations

Based on indicators, goals, challenges, accomplishments, aspirational city programs and survey results our team outlined recommendations for each of the nine elements. We recommend ways in which each element can be more sustainable and ways to better communicate sustainable practices.

Energy Management

With the overall goal of citywide energy savings, Cedar Rapids might consider a way to precisely measure energy use for the treatment of water and wastewater. There is work being done now to install more precise sub-metering so that the City can know the per-unit costs of treating both water and wastewater.²⁷⁵ While this would provide information on the costs of water treatment, a policy decision to reduce the demand for water would also be necessary. As it exists, the City is unable to change the structure of their utility rates; they would need to appeal to the Iowa Utility Board to do this, and changing this poses the possibility of pushing away large industries that are large consumers of Cedar Rapids' water supply.²⁷⁶ However, if facilities such as the WPC and Water Works plants are unable to change the amount of energy that goes into the treatment processes, then sustainability will only be possible through efforts to conserve citywide water use.

Currently, the EMS tracks municipal building energy use, but there is no tracking device for IT. In order to better understand both how much of the municipality's energy use goes into IT as well as how much energy would be saved by moving towards 80% virtualized desktops and 85% virtualized servers, a tracking program is needed. Knowing this information would be conducive to future goal setting and would provide the baseline for measuring success against current IT energy use.

According to the survey results, energy conservation in buildings was considered as important or a top priority to 70% of the respondents while renewable energy use and production was considered important or a top priority by around 75% of respondents. While there is information on the iGreenCR website that shares the laudable efforts of using biogas in the incinerator, this information is minimal. Now that the municipality is aware that there is a keen level of interest by residents in energy management, more efforts need to be made public across many different communication mediums, and efforts to include more renewable energy should be considered as a priority.

Water Wise

At this point in time Cedar Rapids is focused on improving its own sustainability efforts, rather than attempting to influence changes in the commercial and industrial sectors. However, based on the fact that the industrial sector consumes the largest amount of metered water in Cedar Rapids, the City may want to examine whether these entities can reduce their water usage, as it works to conserve this resource. Although Cedar Rapids has viewed its excess water capacity as a way to attract additional industries to the area, one of the city's utility engineers indicated that the water treatment plant would quickly

²⁷⁵ Jensen, Matthew. "Water and Wastewater Energy Use." Message to the author. 9 Apr. 2014. E-mail.

²⁷⁶ Ibid.

approach its capacity if another high water usage industry were to locate within the city.²⁷⁷ Since Cedar Rapids has set the goal of extending the existing capacity of its water treatment plant, some level of water conservation needs to take place if it also wants to allow for additional industrial development within the City.

There are a variety of ways by which industrial and commercial users can conserve water. For instance, treated wastewater can be reused for landscape irrigation or industrial cooling processes.²⁷⁸ These practices are especially beneficial for cities, such as Cedar Rapids, that experience droughts with some frequency because they reduce the potential of a water shortage occurring. Considering that 65% of survey respondents indicated that drought/heat wave preparation was either very important or a top priority to them, it would be wise for Cedar Rapids to examine whether or not it would be feasible for the City and/or any local industries to adopt either of the aforementioned practices; especially since water reuse can be particularly effective in reducing a city's need to increase the capacity of its water treatment plant.²⁷⁹

Based on the survey results, 68% of respondents indicated that municipal water conservation was either very important or a top priority to them. While 72% of respondents stated that they have water efficient appliances at home, only 42% reported that they often or always limit their water usage. This suggests that it may be beneficial for the City to increase educational efforts regarding how water can be conserved in the residential sector. Additionally, because water capacity is currently only a concern for Cedar Rapids during times of drought, the City may want to examine measures that are specifically aimed at encouraging water conservation in such circumstances. One option would be to institute higher water rates that would be assessed to customers when drought conditions arise. This is one of the strategies that the city of Seattle has successfully utilized in order to conserve water.²⁸⁰

Stormwater

While supporting the installation of green infrastructure is definitely a good strategy for reducing stormwater pollution, Cedar Rapids should consider promoting more than just rain gardens and rain barrels. Although these devices are beneficial, other forms of green infrastructure, such as roadside buffers, detention basins and wetlands, can have a much greater influence in managing stormwater runoff. If the City is able to allocate additional funds towards stormwater management projects, it should evaluate which forms of infrastructure would bring about the largest benefit in reducing runoff, rather than settling for the cheapest option. Additionally, Cedar Rapids should track all green infrastructure within the city, on both public and private property, in order to form a more complete picture of the City's progress in increasing infiltration.

²⁷⁷ Smith, Rick. "Officials: Cedar Rapids needs to expand water system." *The Gazette*, 19 Sept. 2012. Web. 12 May 2014. <<http://thegazette.com/2012/09/19/officials-cedar-rapids-needs-to-expand-water-system/>>.

²⁷⁸ "Water & Energy Efficiency in Water and Wastewater Facilities." U.S. *Environmental Protection Agency*, 2012. Web. 23 Feb. 2014. <<http://www.epa.gov/region9/waterinfrastructure/water-conserv.html>>.

²⁷⁹ "How to Conserve Water and Use It Effectively." U.S. *Environmental Protection Agency*, 2012. Web. 12 May 2014. <<http://water.epa.gov/polwaste/nps/chap3.cfm>>.

²⁸⁰ "Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs." U.S. *Environmental Protection Agency*, 2002. Web. 8 May 2014. <http://www.epa.gov/WaterSense/docs/utilityconservation_508.pdf>.

The City may also want to consider incentivizing low impact development. This type of development prioritizes stormwater management in its design by preserving existing landscaping and utilizing various types of green infrastructure. Additionally, low impact development can help to reestablish the ecological and hydrologic functions of a watershed.²⁸¹ Based on the survey results, 73% of respondents stated that flood preparation/mitigation was very important or a top priority to them. Improving stormwater management can not only reduce pollution, but can also potentially lessen the severity of future flood events, especially if such efforts are concentrated in close proximity to the river. Since Cedar Rapids never again wants to experience the level of destruction that it did as a result of the Flood of 2008, the City should consider every possible manner of avoiding such a catastrophe in the future. Improved stormwater management and the installation of additional green infrastructure are two viable options.

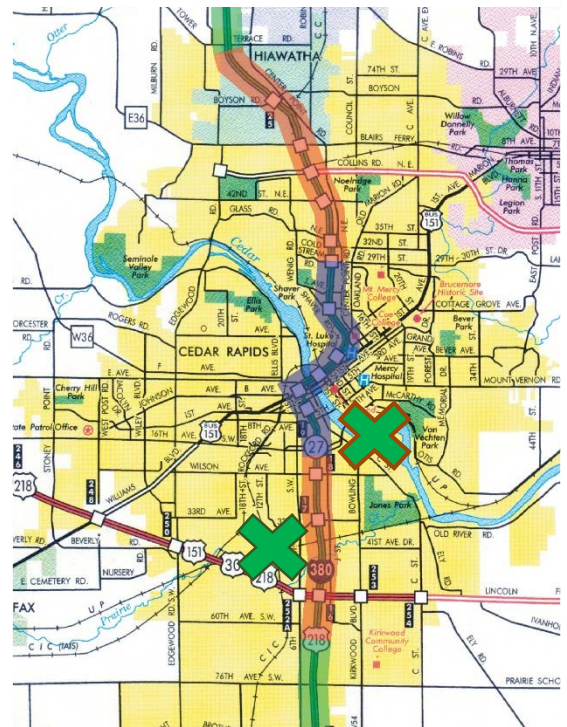
CleanUpCR

Landfill diversion is the first goal of waste management in Cedar Rapids. A large part of diverting waste from the landfill is increasing the incidence of recycling and composting. Currently 73% of Cedar Rapids' households participate in curbside recycling. Ninety-one percent of the survey respondents say they recycle using curbside recycling often or always. Only 37% say they recycle at another location. Curbside recycling is limited to single family houses and apartment complexes with four or fewer units. For larger apartment complexes, condominiums, and businesses there is no municipally supplied curbside pick-up. They must arrange their own or use one of the three drop-off locations. The green 'X's on the map of Cedar Rapids in Figure __ show two of these locations. The third location is the Cedar Rapids-Linn County Solid Waste Department located on County Home Road—approximately ten miles north of downtown Cedar Rapids and outside the city limits.

Three recommendations can be made for increasing recycling rates: Increasing the number of drop-off locations for those households not eligible for curbside pick-up; Adding the larger apartment complexes and condominiums to the curbside pick-up routes; and adding businesses to the curbside pick-up routes. The last two can contract on their own with private haulers to recycle but it is unknown how many actually do. Adding drop-off location sites may increase the incidence of recycling by making it more convenient to do so.

The second goal is to increase the number of litter bags collected. The purpose of picking up litter around the city's public spaces, roadways, and waterways is to provide a cleaner and healthier environment in which to live and to

Figure 22: Cedar Rapids Drop-Off Recycling Locations



Source: http://www.iowadot.gov/images/cedar_rapids_map.jpg

²⁸¹ "Low Impact Development." U.S. Environmental Protection Agency, 2014. Web. 17 Apr. 2014. <<http://water.epa.gov/polwaste/green/>>.

show that the residents take pride in the way their city looks. Contrary to this is the idea of educating the public on proper litter disposal so that not as much waste lands on the ground, roads, parks, and waterways. Providing education on zero waste at community events is one way to achieve this. Another way is to use the communication methods shown in the survey as being most known and preferred: the Cedar Rapids' main webpage, as well as media articles, eNews and the residents' water bill. Eighty-six percent of survey respondents indicated that protecting the environment was the important to them. Zero percent indicated that it was not important at all. The shows that residents of the city are aware of the need to protect the environment. One way to do that is to not only pick-up litter but to not drop it in the first place.

Bike CR

Develop and implement a Complete Streets Policy to "make roads safer and more accessible for everyone who uses them, and provide for the safe access to destinations for everyone...no matter how they travel."²⁸² The City should make every attempt in the future to diversify the travel choices for as many members of the public and include as many roads in the evaluation process as possible. Each new segment of road, and each rebuilding of an existing roadway, is an opportunity for Cedar Rapids engineers and planners to think and act differently regarding the choices travelers can make every day.

To address the need to secure funding for biking projects, continue the strong relationship that has been cultivated between the City and activist groups, like Linn County Trails Association (LCTA), Linn Area Mountain Bike Association (LAMBA), and a number of the prominent bike retail stores in the city. As city budget allocations for trails appear insufficient to construct and maintain a world-class bicycle network and trail system in the long term, it is best for the City to find other sources of funding. When faced with similar situations, many communities turn to grant funding.

There have been more than 40 grant possibilities identified by staff for construction and education projects, and closer ties with business and non-profit entities can harness human resources and augment the capacity of City staff to pursue these grant opportunities. Potential grant opportunities include state, federal, local, private non-profit and national and local corporate sources such as the Rockwell Collins grant program, REI Sports Bike Friendly Communities grant program, New Belgium Brewing grants, The National Trails Endowment, the Linn County Supervisors; Witwer Trust and the Iowa Department of Natural Resources.²⁸³ Additionally, Bike CR is seeking citizen support to raise matching funds for a number of these grant opportunities. In 2010, LCTA raised over \$96,000 to pave a portion of the Cedar Valley Nature Trail.²⁸⁴

Transportation: CR Transit

One way to potentially increase the number of people riding the bus each year would be through technology improvements such as creating a mobile app that tells riders when and where the next bus will

²⁸² Seskin, Stefanie, and Colin, Murphy. "The Best Complete Streets Policies of 2013." Complete Streets Coalition. National Complete Streets Coalition, 2 February 2014. Pg iv. Web. 2 Apr 2014.

²⁸³ "Grant Info" document, received Feb 27, 2014 from Gina Weaver, City of Cedar Rapids

²⁸⁴ Mullin, Brad. "Pave the Trail 2010 Fundraiser a success." *Trail Connections* 4 (Apr. 2011): 6. Print.

arrive. As the bus service area²⁸⁵ in the Cedar Rapids metro includes almost 100,000 people, a mobile device app would be able to provide these residents with information about bus arrival times at stops within a 15 minute walk²⁸⁶ from their homes.²⁸⁷ Another method would be to offer free rides to select groups, such as city employees, students at Kirkwood Community College, Coe College or other educational institutions. The City could also form partnerships with large employers such as Quaker Oats or Rockwell Collins with the employer providing transit subsidies to some or all workers. These methods are likely to achieve a more significant increase in ridership if they are conducted in tandem and supported by multi-faceted information and marketing campaigns from the City and the private sector.

A more efficient, but longer-term, way to increase transit ridership is to change the availability of free parking for drivers. Currently in Cedar Rapids, as in nearly every city in the United States, city planners set minimum parking requirements in the city code requiring developers to set aside land for parking.²⁸⁸ This is most apparent in developments of strip-malls, shopping malls and “big box” retailers, but is also included for multi-family dwelling structures. This creates an over-supply of, and thus a very low price for parking. The problem is that developers generate their profits from the structures they build, not the land surrounding those structures. If the developer wants to maximize profits, the developer must recoup losses from constructing parking space, increasing the price of the structure. This results in higher priced housing or more expensive commercial buildings whose costs are ultimately pushed off to the consumer.²⁸⁹

Transportation: Fleet Services:

Reductions in fuel usage can be accomplished in many ways. While driving less is one way to reduce fuel consumption, this is not a practical option for many city vehicles (e.g. police cruisers cannot be constrained in their miles driven, and the waste trucks and transit buses have set routes to follow). An alternative solution is to increase the average fuel economy of the fleet, so that more miles can be driven on less fuel. By phasing in the purchase of higher mileage vehicles, Cedar Rapids would be well positioned to make progress towards its goal of decreasing fuel usage.

Another way to reduce fuel consumption is to diversity the types of engines, which power vehicles and other Fleet Services equipment. As in the program undertaken by Schwan’s Delivery Service® in Ann Arbor, MI shows, both financial and environmental benefits can be realized from implementing newer engine technologies. Cedar Rapids’ Fleet Services has hundreds of vehicles that do not travel outside the city limits (or leave Linn County in the extreme case) and return to a city-owned storage facility each night. The include lawn mowers (110 units), generators (22 units), ATVs (69 units), and backhoe tractors (85 units) and CR Transit buses. If all 35 city buses were converted to compressed natural gas (CNG),

²⁸⁵ Defined by the National Transit Database as: the area within ¾ mile on either side of a bus route. Source: “NTD Glossary.” <http://www.ntdprogram.gov/ntdprogram/Glossary.htm>

²⁸⁶ Time required to walk ¾ mile at an average pace of 3 mph.

²⁸⁷ The BONGO system in Iowa City, which coordinates the transit systems of Iowa City, Coralville and the University of Iowa, through a mobile app is an example of an established system which has implemented this technology.

²⁸⁸ Shoup, Donald C.. “The Trouble with Minimum Parking Requirements.” *Pergamon Transportation Research Part A*. (1999): pg. 550. Web.

²⁸⁹ Ibid.

more than 200,000 gallons of diesel could be conserved and 2,238 tons of CO² not released into the atmosphere every year.²⁹⁰

Community Development

Our team recommends that Cedar Rapids continue to invest in the preservation of historic buildings and publicize the positive benefits of such buildings. Reinvesting in Cedar Rapids, whether it be preserving historic buildings or encouraging infill development, creates a sense of pride in the community. Dubuque and Grinnell, IA are two example cities that have renovated and preserved historic landmarks. Dubuque has taken a proactive approach in revitalizing the Historic Millwork District in order to recreate a vision of mixed-use. This district was designed to preserve the millwork history of Dubuque, create an urban, mixed-use neighborhood, become a model for redevelopment by incorporating sustainable practices and attract and retain a quality workforce for Dubuque's growing economy.²⁹¹ Grinnell is home to one of the eight Midwestern "jewel-box" banks designed by Louis Sullivan.²⁹² The building hosts thousands of visitors from around the world who come to appreciate the bank's architectural and historical significance.²⁹³ Like Grinnell, a Louis Sullivan bank is located in Cedar Rapids and is currently the People Savings Bank. Communicating the successes of Community Development to the public is an important step in making the City more sustainable.

Based on survey results, when asked how important historic preservation was approximately 60% of respondents indicate that it was very important or a top priority. In comparison to all other categories, historic preservation is one of the lowest ranked categories along with Native Plantings (59%), More Trees Downtown (59%) and Improved Public Transportation (58%). Founded in this result, we recommend improvement of the communication efforts related to the importance of historic preservation.

Forestry

Forestry might consider more programs and that support planting trees on private property. While this could either take the form of policy, a subsidy for those investing in private trees or a campaign run by volunteers, private property is the only avenue currently not being directly addressed by Forestry's efforts. One way might be to supply more online tools to the residents of Cedar Rapids, like the National Tree Benefit Calculator, which allows individuals to see the amount of money that trees in their yards provide on a yearly basis.²⁹⁴ While this is not a panacea, it does offer people the ability to look at trees as financial investments with positive returns.

²⁹⁰ "How much carbon dioxide is produced by burning gasoline and diesel fuel?" 18 April 2013. United States. Department of Energy. Energy Information Administration. Web. 2 April, 2014.

<<http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11>>

²⁹¹ The City of Dubuque. Sustainable Dubuque: Historic Millwork District Revitalization. N.p. Web. April 28, 2014. <<https://ia-dubuque.civicplus.com/index.aspx?NID=116>>.

²⁹² City of Grinnell: Merchants National Bank Building. N.p. Web. May 2014. <<http://www.grinnelliowa.gov/DocumentCenter/Home/View/835>>.

²⁹³ City of Grinnell: Merchants National Bank Building. N.p. Web. May 2014. <<http://www.grinnelliowa.gov/DocumentCenter/Home/View/835>>.

²⁹⁴ The National Tree Benefit Calculator is available at <<http://www.treebenefits.com/calculator/>>.

According to the survey, ‘more trees downtown’ ranked second to last (56%) in being considered highly important or a top priority. In order to make people more aware of the benefits of street trees and urban forests, more publically available information is needed. Since Forestry has goals of more public engagement, one activity might be to have tree advocates—perhaps graduates of the *TreeKeepers* program—do a campaign for the City. This might include a door-to-door or a neighborhood campaign that gives people an awareness of what the City is doing with street trees, parks and urban forests and how individual private efforts can help. Additionally, there is an abundance of information widely available that could be converted into talking points for the campaign, including the aesthetic, the economic and the social benefits of having street trees.²⁹⁵ While it may not be possible to have entire community support for street trees, having more volunteers spread the message of tree benefits can only help reach out to those who were otherwise unaware.

Parks and Gardens

Parks and Gardens should consider applying for environmental certifications. According to the specified indicators, Cedar Rapids is performing above peer cities in regard to park acreage and miles of trails per 1,000 people. Because the Parks and Gardens element is performing well above or at the same standard as peer cities, the City may want to seek further certifications or awards. The ISO 14001 Environmental Management Certification²⁹⁶ is one example the City may want to pursue. Certification for the International Organization for Standardization’s (ISOs) management systems standards (ISO 14001 Environmental Management Systems) addresses various aspects of environmental management. All ISO standards are the result of international, expert consensus. Therefore, by implementing a management system standard, the City of Cedar Rapids can benefit from global management experience and good practices. Benefits of using the ISO 14001 can include reduced costs of waste management, savings in consumption of energy and materials, lower distribution costs and improved corporate image among customers and the public. For more information visit, <http://www.iso.org/iso/home.htm>.

The Parks and Gardens element should also diversify the mediums used to communicate the benefits of native prairie. Based on the survey results, 76% of respondents indicated that improved parks and gardens was very important or a top priority to them. Likewise, 75% of respondents indicated that supporting local food systems was very important to them. In comparison, native plantings were one of the lowest priorities ranked by respondents at 59%. This may be because other components of iGreenCR are more important or that respondents do not know the value of native prairie. We recommend the City continue to communicate the importance of native plantings while also improving the content and/or distribution of communication techniques.

One example of an organization that effectively educates citizens about native prairie is Project GREEN.²⁹⁷ Project GREEN is a citizen-volunteer nonprofit organization that invests in public landscaping projects and promotes environmental awareness in the greater Iowa City area. Project GREEN also

²⁹⁵ Burden, Dan. “Urban Street Trees: 22 Benefits Specific Applications.” Aug. 2006. Web. <http://www.michigan.gov/documents/dnr/22_benefits_208084_7.pdf>.

²⁹⁶ ISO: International Organization of Standardization. ISO 14000- Environmental Management. n.p. April 11, 2014. Web. <<http://www.iso.org/iso/home.htm>>.

²⁹⁷ Project Green. n.p. Web. April 11, 2014. <<http://www.projectgreen.org>>.

supports Johnson County's efforts to educate its citizens about native prairie restoration and offers assistance in reestablishing areas of native Iowa prairie. Project GREEN has invested over \$1.8 million to complete more than 30 city and county landscaping projects. The organization is also recognized by the Iowa Urban Forestry Council for its urban reforestation and landscaping efforts.

iGreenCR Initiative Recommendations

In conclusion, our team identified six recommendations that could improve the iGreenCR initiative. The importance of each recommendation is explained and supported by evidence-based examples based on our findings, peer and aspirational city research and the survey results.

1. Establish a Sustainability Coordinator Position

During our study we recognized many of the elements to be department specific. For example, the Forestry and Parks and Gardens elements are based on specific departments. These two elements are connected in their aspirations to increase the tree canopy and the numbers of trees in parks, but their efforts are not effectively communicated between departments or to the public. As a result of this finding, the team recommends creating a sustainability coordinator position within the City of Cedar Rapids. A coordinator would aid in the communication between departments in order to streamline efforts.

Every city that has developed and implemented a successful sustainability plan has had a dedicated staff person, committee or group of people who have extensive knowledge of sustainability and who are at the forefront of planning. According to the EPA's guide for local governments, *Planning for a Sustainable Future*, "Strong leadership is essential to the success of a sustainability plan. The role can be taken on by an elected official, a planning or community development department in the local government, a community-based commission, a prominent local business or a hybrid approach that combines all of these combinations."²⁹⁸ Our team had to contact multiple individuals in over a dozen departments in order to obtain data for all the different elements; this made it clear that a coordinator could simplify communication and coordination of the data for each element in Cedar Rapids. Establishing such a position could increase the efficiency of information gathering and provide the City with assistance in goal setting and progress monitoring of its sustainability efforts.

2. Incorporate Climate Change

Based on our team's research and expertise on the subject of climate change, we recommend the City frame iGreenCR as an initiative to mitigate climate change. Climate Change is an important issue in the Midwest because average annual temperatures have been increasing over the last several decades. This has resulted in more frequent heat waves and heavy downpours occurring twice as often as they did a century ago.²⁹⁹ Precipitation in the Midwest is likely to become more intense during the summer months, which will lead to increased flood damage, strained drainage systems and reduced potable water availability.³⁰⁰ This change in climate will have an impact on the Cedar Rapids, and it is important to consider ways of implementing best management practices to mitigate these effects.

The team was able to consider how aspects from each of the nine elements contribute to climate change and how the goals of each element could work to protect and improve the climate. For example, the Water Wise element addresses the difficulty Cedar Rapids may have in adequately providing resources

²⁹⁸ U.S. Environmental Protection Agency. *Planning for a Sustainable Future: A Guide for Local Governments*. 2010. PDF file.

²⁹⁹ "Climate Impact in the Midwest." United States Environmental Protection Agency. September 09, 2013. Web. n.p. November 8, 2013. <<http://www.epa.gov/climatechange/impacts-adaptation/midwest.html>>.

³⁰⁰ "Midwest." *Epa.gov*. United States Environmental Protection Agency, 2013. Web. <<http://www.epa.gov/climatechange/impacts-adaptation/midwest.html>>.

to residents when water is in short supply. It is important for Cedar Rapids to emphasize the importance of water conservation and the effects of Climate Change, even if these subjects have not traditionally been issues. Energy Management is another example of how climate change can guide the initiative. Energy Management aims to reduce natural gas usage, which in turn reduces methane production. Successes in each of the nine elements will result in some form of climate change reduction leading to a more sustainable City. Both the sustainability plans of peer and aspirational cities include adaptation to climate change and planning for future impacts as being a fundamental priority.³⁰¹

Grand Rapids, MI

Like Cedar Rapids, the peer city of Grand Rapids, MI has been experiencing extreme weather-related events, which has increased their commitment to climate resiliency.³⁰² As a result of community-wide resiliency planning key recommendations for confronting climate change have surfaced. A few of the recommendations³⁰³ are as follows:

1. "Improve the quality of the Grand River and its tributaries by restoring it to a more natural state. This should involve improving riparian buffers, day lighting tributary streams, and continuing the development of greenways, softening channels, and more."
2. "Adopt a strong urban tree canopy goal—at least 40%—and implement a forestry program that addresses heat island, air quality, and other resiliency values delivered by a diverse, healthy urban tree canopy."
3. "Preserve and grow mixed-use and dense development neighborhoods, making essential services and businesses accessible through multimodal means of transportation."

Seattle, WA

The aspirational city of Seattle, WA also addresses climate change as a top concern and recognizes that it is rooted in focus areas such as, "land use, transportation, energy use and consumption patterns."³⁰⁴ Programs and policies such as complete streets, the bicycle program and neighborhood planning are a few examples of how the focus areas are being implemented. "The City of Seattle is pursuing a goal of carbon neutrality by 2050 and recently adopted the Seattle Climate Action Plan as the first step toward achieving the goal."³⁰⁵ In considering the future of iGreenCR, it is important to identify how each of the nine elements contributes to the mitigation of climate change.

3. Develop Planning and Implementation Programs to Build on Successes

Since our team has already recorded the vision, goals, accomplishments and challenges for each of the nine elements of iGreenCR, the next priority for the steering committee should be to identify a structure that is implementable as the program moves forward. The planning and implementation processes of

³⁰¹ City of Grand Rapids. "Sustainability Plan." 2013. n.p. 2014. Web. <<http://grcity.us/enterprise-services/officeofenergyandsustainability/Documents/NEW%20OES%20Document%20Updates/Amended%20Sustainability%20Plan.pdf>>.

³⁰² City of Grand Rapids. "Sustainability Plan." 2013. n.p. 2014. Web <<http://grcity.us/enterprise-services/officeofenergyandsustainability/Documents/Sustainability%20Plan%20Progress%20Report%20FINAL%20FY20131.pdf>>.

³⁰³ Ibid.

³⁰⁴ City of Seattle. Office of Sustainability and Environment: Climate Change. 2014 n.p. Web. May 2014. <<http://www.seattle.gov/environment/climate-change/programs-and-policies>>.

³⁰⁵ Ibid.

Cedar Rapids' peer and aspirational cities include the development of actions, strategies, priorities, funding sources and partners. Without identifying how, when and who will implement the goals of the initiative, they may not be completed. Funding, for example, needs to be prioritized towards the efforts that will help the City achieve its goals. Utilizing an existing plan outline could help give structure to actions or strategies that might otherwise seem unclear. We recommend that Cedar Rapids begin tracking its programs and goals with the indicators our team developed, and build upon these indicators with ones that target other goals the City sets for itself. Our group also recommends Cedar Rapids create an action plan, such as the one below, to track the implementation process.

Sustainable Decatur, IL³⁰⁶

Table 17: Decatur Action Plan

Category	Strategy	Project	Actions	Priority	Time Frame	Funding Source	Partners
Water Goal 1: Ensure that Decatur has an adequate water supply to allow for both population growth and economic development.	Improve Drought Preparedness	Develop a Drought Preparedness Plan	Work with State water survey to draft detailed drought preparedness plan.	High	Short	Current Resources	ISWs, Large Users
	Expand public water supply to provide a sustainable source for the future.	Develop use of shallow aquifer	Support City's effort to expand water capacity by determining efficient, sustainable means to ensure adequate water is available to support the population and economic development.	High	Short	Water Use fees	Large Users, Mt. Zion, Macon County Health Department
		Work with ADM on water supply enhancement					

"The Sustainable Decatur Plan is a policy document that requires City officials and residents to undertake further actions to implement the policies and recommendations of sustainability over the long term."³⁰⁷ In order to implement the plan, Decatur created an action plan for each of their sustainability categories as shown in the table above. "The implementation action plan identifies and defines each strategy and project/action to be carried out during a particular timeframe, and the parties responsible for each activity."³⁰⁸ "The Implementation Action Plan is designed to provide a starting point for prioritizing projects and strategies and considers how the actions proposed by the plan will be funded."³⁰⁹ A timeframe for each activity is also suggested in order to define a general implementation phase. Similar to Decatur, Cedar Rapids could develop an action plan for each of the nine elements in which the indicators could be used as the outcome measurements. Goals and strategies have already been developed for most of the iGreenCR elements, so the next steps would require identifying corresponding projects, actions, priorities, time frames, funding sources and partners.

³⁰⁶Sustainable Decatur, TESKA. 2010. Web. 15 April 2014.

<<http://www.teskaassociates.com/sustainabledecatur/documents/Sustainable%20Decatur%20Plan%2011-15-10.pdf>>.

³⁰⁷ Sustainable Decatur, TESKA. 2010. Web. 15 April 2014.

<<http://www.teskaassociates.com/sustainabledecatur/documents/Sustainable%20Decatur%20Plan%2011-15-10.pdf>>.

³⁰⁸ Ibid.

³⁰⁹ Ibid.

4. Monitor and Evaluate iGreenCR as a Continuously Evolving Initiative

In order to evaluate the sustainability initiative of Cedar Rapids, the City needs to utilize indicators to measure and track the goals of each element. As stated earlier, “the ultimate goal of indicators is to provide a system of measurement to present information about baseline data, current realities and future direction, in order to guide decision making.”³¹⁰ The proposed indicators for each of the nine elements assess the progress in areas of significant importance to Cedar Rapids. If the indicators are not tracked, Cedar Rapids can only monitor success based on the achievement of goals within each element. For example, one of the goals for Parks and Gardens is to develop a greenway. Without indicators, the City can only track whether or not the Greenway is developed. However, tracking an indicator such as park acreage per 1,000 people, allows the City to also monitor its increased park acreage that results from working towards this goal.

The monitoring and evaluation of iGreenCR is essential in ensuring the City’s sustainability efforts are on course. According to the Local Governments for Sustainability USA (ICLEI), “the monitoring and verification of the implementation process is ongoing and important in identifying whether or not the initiative has accomplished what it set out to do and whether any of the activities or programs should be revised.”³¹¹ The Sustainability Plan of Lee’s Summit is an example of how evaluation can and should be incorporated into the planning process.

Evaluation of Sustainability Action Plan: Lee’s Summit, MO³¹²

The Sustainability Action Plan of Lee’s Summit has incorporated ways to evaluate the plan over time to ensure that the strategies are effective and the City is on track to achieve its sustainability goals. “The program utilizes two types of performance evaluation: evaluation of the Plan as a whole and evaluation of the individual component action steps.”³¹³ “The City’s Planning Department, in conjunction with their Sustainability Coordinator, coordinates evaluation of the action steps on the same schedule as the communitywide inventories and summarizes the progress towards meeting the goals in a report that highlights the estimated annual GHG reduction to date, as well as the achievement of progress indicators or interim progress indicators, participation rates and remaining barriers to implementation.”³¹⁴

5. Diversify ways of Communicating Sustainability

The second goal of this project was to assess how Cedar Rapids communicates sustainability practices to the public. Our objectives were to: identify the effectiveness and potential weaknesses of iGreenCR’s current communications efforts by gathering data from Cedar Rapids residents in the form of a survey and recommend ways that Cedar Rapids can effectively communicate sustainability. The team’s recommendations, based on the survey results, are outlined below.

³¹⁰ American Planning Association. (2003). Phillips, Rhonda. Community Indicators. Chicago, IL; Rhonda Phillips.

³¹¹ ICLEI Local Governments for Sustainability USA, 2014. Web. 15 April 2014.
<<http://www.icleiusa.org/sustainability/five-milestones-for-sustainability>>.

³¹² Lee’s Summit, MO. “City of Lee’s Summit Sustainability Action Plan.” May 2012. Web. 15 April 2014.
<<http://cityofls.net/Environment/Sustainability.aspx>>.

³¹³ Ibid.

³¹⁴ Ibid.

The survey results indicated that Cedar Rapids residents are more familiar with the City's sustainability efforts that are easily visible rather than the internal efforts. For example, 82% of respondents were familiar with the increased number of bike lanes and less familiar (44%) with energy efficient management. Because there is high awareness of visible efforts, the City should place more focus on communicating the internal accomplishments of the initiative to the public.

According to the survey, the most preferred media to gather information about iGreenCR events was the Cedar Rapids website at 52%. Others prefer a variety of media sources (42%), the e-newsletter put out by the City (37%) and water bill inserts (33%). Respondents indicated that they prefer to be communicated with through various forms of media. Based on these findings we recommend that Cedar Rapids continue to utilize the Cedar Rapids website along with a variety of communication mediums to inform citizens of its sustainability efforts. Diversifying the media sources can only help reach a larger subset of the population. This can include placing ads on local television, radio and in the newspaper to reach out to people who do not frequently use the internet in addition to further use of e-newsletters and water bill inserts.

6. Incorporate iGreenCR into the development of the Comprehensive Plan

Additional sustainability components such as climate change and air quality may be more easily implemented within Cedar Rapids if the City were to integrate them into its comprehensive plan update. On March 26th, 2014 the City of Cedar Rapids launched the public input phase of the City's new comprehensive plan. The new plan will be developed with the community's support and feedback, casting a new vision for the physical, economic and social fabric of the community for the next 20 years.³¹⁵ We intend for our Report Card and Sustainability Report to inform and enrich the Cedar Rapids' Comprehensive Plan as it is updated. By including sustainability in the Comprehensive Plan, the intention is that the goals and objectives of the initiative will be implemented over the next 20 years. Portland, Oregon is an example of an aspirational city that included sustainability in its Comprehensive Plan.

Comprehensive Plan: Portland, OR

The Portland Plan was adopted in April of 2012 and focuses on making the city more prosperous, educated, healthy and equitable. Portland intends to make improvements in these areas by integrating the following three strategies: "thriving educated youth," "economic prosperity and affordability" and "a healthy connected city."³¹⁶ Improving access to housing, increasing neighborhood business vitality and reducing the city's carbon emissions are all components of the "economic prosperity and affordability"³¹⁷ strategy. The "healthy connected city strategy"³¹⁸ includes increasing access to healthy food and parks and encouraging forms of development that can benefit public health.³¹⁹ Integrating sustainability matters into overarching city goals, like Portland did, might enable Cedar Rapids to broaden its efforts.

³¹⁵ City of Cedar Rapids, Iowa, 2014. Web. 15 April 2014. < <http://www.cedar-rapids.org/Pages/home.aspx>>.

³¹⁶ City of Portland. "The Portland Plan Summary." 2012. Web. 16 Apr. 2014.
<<http://www.portlandonline.com/portlandplan/index.cfm?c=58776&a=405753>>.

³¹⁷ Ibid.

³¹⁸ Ibid.

³¹⁹ Ibid.

VII. APPENDIX

Environmental Health Indicators

Introduction

The environmental health indicators described below are important in planning for sustainability on the communitywide level. These indicators are a part of both peer and aspirational city sustainability programs. iGreenCR does not address air quality or health in the current plan, so our team created these indicators in hopes that Cedar Rapids would be able to incorporate them into the future development of iGreenCR.

Toxic Releases to Air

Permitted Toxic Air Emissions Per Capita

Why is this important?

Air quality determines the quality of life for all people but especially those with respiratory issues. Because air quality is a concern for all people, it is important to consider the level of permitted emissions of toxic waste substances in municipalities. According to the EPA, the benefits of clean air are twofold, both reducing the cost for medical treatment related to illnesses and reducing the number of days of work missed by the workforce.³²⁰ Manufacturing cities are likely to see more emissions because of the link between industrial processes and the byproducts of those processes. Many industrial processes use substances that are linked to cases of cancer. Knowing these levels is important for all members of a community.

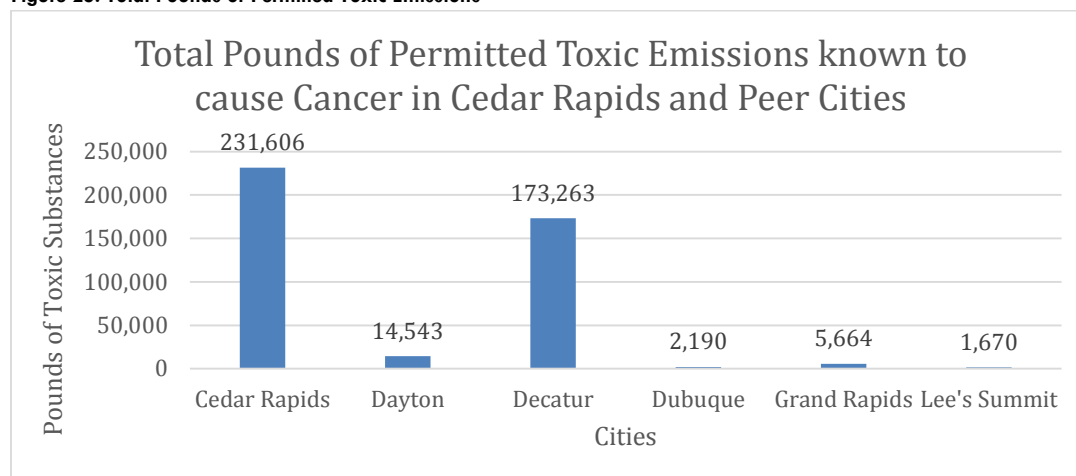
How does Cedar Rapids compare?

Looking specifically at data from the Toxic Releases Inventory (TRI) Program, one can find information about various permitted industries by city, state, or zip code. While it is possible to find the total amount of all chemicals that are permitted to the air, the focus of this indicator is to look specifically at emissions that have been linked to causing cancer (Figure 23). In Cedar Rapids, the total number of permitted firms is twelve, expelling a total of 231,606.11 pounds of toxic emissions.³²¹ These industries are predominately producers of food products, paper products, milled animal feed and nickel/copper metal finishing.

³²⁰ "Progress Cleaning the Air and Improving People's Health." EPA.gov. United States Environmental Protection Agency, 22 Apr. 2014. Web. 8 May 2014.

³²¹ "Toxic Release Inventory (TRI) Program." EPA.gov. United States Environmental Protection Agency, n.d. Web. 16 Nov. 2013.

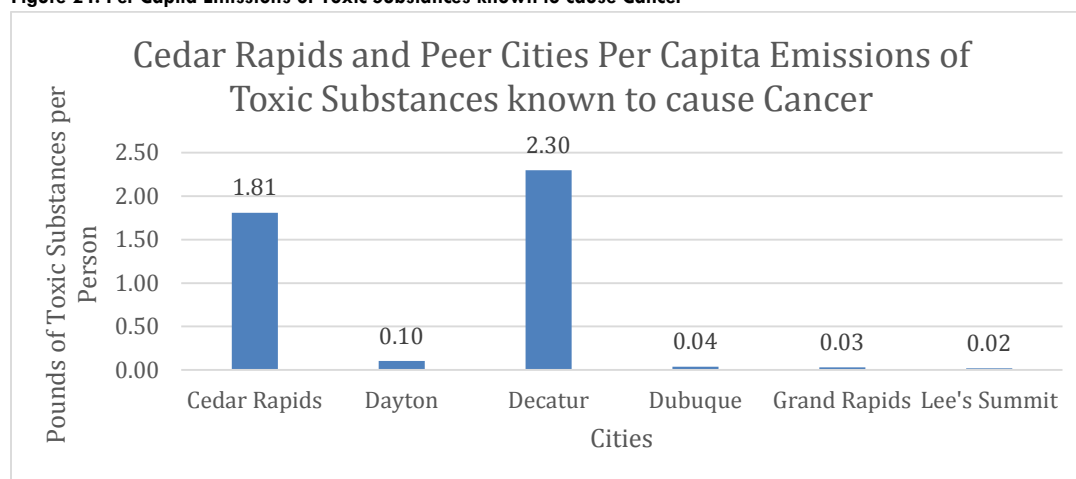
Figure 23: Total Pounds of Permitted Toxic Emissions



Source: US Environmental Protection Agency, US Census Bureau

The TRI website was also used to track the number of permitting firms and amount permitted in peer cities. Dayton has nine firms, Decatur has five firms, Dubuque has six firms, Grand Rapids has nine firms and Lee's Summit has one firm. The pounds of toxic substances emitted by air are in the above chart and show that Cedar Rapids and Decatur, IL are the two largest emitters in the peer city group.

Figure 24: Per Capita Emissions of Toxic Substances known to cause Cancer



Source: US Environmental Protection Agency, US Census Bureau

Per Capita emissions are created by dividing the pounds of emitted substances by the total population of the city. The goal is to see how many pounds are emitted per person. Cedar Rapids has an emission rate of 1.81 pounds per person; of the five peer cities, only Decatur IL has a higher per capita emission rate of 2.3 pounds per person. All of the other peer cities have 0.10 pound per person or less. There could be a number of factors contributing to this statistic including the very low emissions in Grand Rapids, MI and Lee's Summit, MO or the smaller population of Decatur, IL.

Summary

Awareness of air quality is something that should be tracked and reported on for the knowledge of all Cedar Rapiidians. The double-edged sword is that many of the firms that are producing these emissions are also many of the major employers in Cedar Rapids, and it is therefore disadvantageous to propose creating more stringent standards. Cedar Rapids municipal government, however, could continue to track the air quality of the metropolitan area and report changes as time progresses, especially if there are changes with the level of permitted emissions.

Obesity and its Causes

Percent of adults who are obese by county

Why is this important?

Obesity is the fifth leading cause of global deaths.³²² In comparison to the rest of the nation, the prevalence of obesity among U.S. adults is the highest in the Midwest (29.5%). Obesity risk factors include poor nutrition, minimal physical activity and socioeconomic factors. Obesity is linked to individuals' area of residence, resources, as well as the community's walkability, land use, sprawl and level of deprivation.³²³ This indicator is important because the way communities are planned indirectly affects the health of residents who live there.

Cedar Rapids is in the progress of becoming a Certified Blue Zone Community, which indicates their proactive approach towards the general health of their community. "Blue Zones Project™ is a community well-being improvement initiative designed to make healthy choices easier through permanent changes to environment, policy and social networks."³²⁴ On average, people living in Blue Zones™ areas live twelve more good years than U.S. citizens.³²⁵ In order to reach this standard a Blueprint was designed to identify specific actions for the year that will engage the community's residents and lead to improved longevity and well-being for the community.³²⁶ The Blueprint identifies ways to decrease obesity through school, restaurant and walking initiatives. Identifying ways to attempt to decrease obesity through land development may significantly improve community health. Strategies to increase land-use mix and distance walked, while reducing the amount of time spent in a car can be effective health interventions related to the Blue Zones Project™. This indicator measures the percent of adults who are obese by county.

How is Cedar Rapids doing?

The percentage of adults in Linn County (Cedar Rapids) who are classified as obese is the same as the State of Iowa's average, of 28%. In response to this percentage, Linn County has taken a proactive

³²² "Obesity and Overweight." World Health Organization: WHO. March 2013. Web. n.p. November 5, 2013. <<http://www.who.int/mediacentre/factsheets/fs311/en/index.html>>.

³²³ J Am Diet Assoc. "Obesity and the Built Environment." 2005 May, 105(5 Suppl 1):S110-7. Web. November 5, 2013. <<http://www.ncbi.nlm.nih.gov/pubmed/15867906>>.

³²⁴ Blue Zones Project. (2013). Healthways Inc. This website contains copyrighted material of Blue Zones, LLC and Healthways, Inc. Web. December 7, 2013. <https://www.bluezonesproject.com/about_bluezones_project>.

³²⁵ Cedar Rapids Blueprint. (2013). Wellmark Blue Cross and Blue Shield is an Independent Licensee of the Blue Cross and Blue Shield Association.

Zones, LLC.

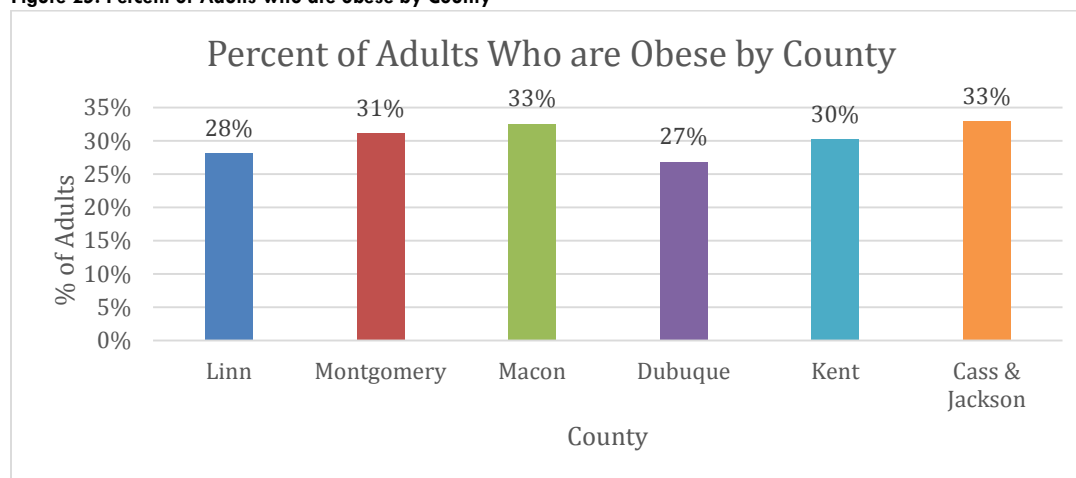
³²⁶ Ibid.

approach to identify ways of decreasing the prevalence of overweight and obese residents. “One example of the County’s efforts is that they have increased community outreach and education to encourage policy changes associated with establishing a healthier environment and decreasing barriers to healthy decision making.”³²⁷ Data for this indicator was retrieved from the U.S. Department of Agriculture (USDA).

How does Cedar Rapids compare?

In comparison to its peer Counties, Linn County has one of the lowest percentages of adult obesity. Macon (Decatur) and Cass/Jackson (Lee’s Summit) Counties have the highest percentage, both are at 33%.³²⁸

Figure 25: Percent of Adults who are obese by County



Source: USDA, US Census of Agriculture, County Food Systems

Summary

The City of Cedar Rapids should work with the Blue Zones Project to streamline efforts to decrease the percentage of adults who are obese and to encourage healthy activities. For example, based on survey results, our team found that 65% of respondents drive to locations such as work, the grocery store and the library. Because the Blue Zones Project™ has identified reducing the amount of time spent in a car to be effective health interventions, the partnership would be mutually beneficial. The City of Cedar Rapids can begin conversations with the Blue Zones Project to determine if a partnership would be effective.

Physical Activity

Percent of adults in the county who get the recommended amount of exercise

Why is this important?

The percentage of adults who participated in leisure-time physical activities or exercised in the past month is an important health indicator. As with eating healthy, the amount of participation in physical activity is

³²⁷ Hearn, Ann and Koch, Dave. “Community Health Needs Assessment Snapshot.” n.d. Web. Linn County Community Services. November 5, 2013. < <http://www.idph.state.ia.us/IDPHChannelsService/file.ashx?file=5D3C34AA-16CD-4529-96B8-E6C795A5CF7B>>.

³²⁸ “Community Health Status Indicators: CHSI 2009.” U.S. Department of Health and Human Services. Web. November 6, 2013.

influenced by behavior and the built environment. “Adults need at least 2.5 hours of moderate intensity activity per week in addition to doing muscle-strengthening activities two days a week.”³²⁹ Linking health indicators with the design of a community can increase physical activity. The planning approach such as the availability of trails, recreation centers and grocery stores, influence the health of its residents.³³⁰ This indicator measures the percent of adults who get the recommended amount of exercise.

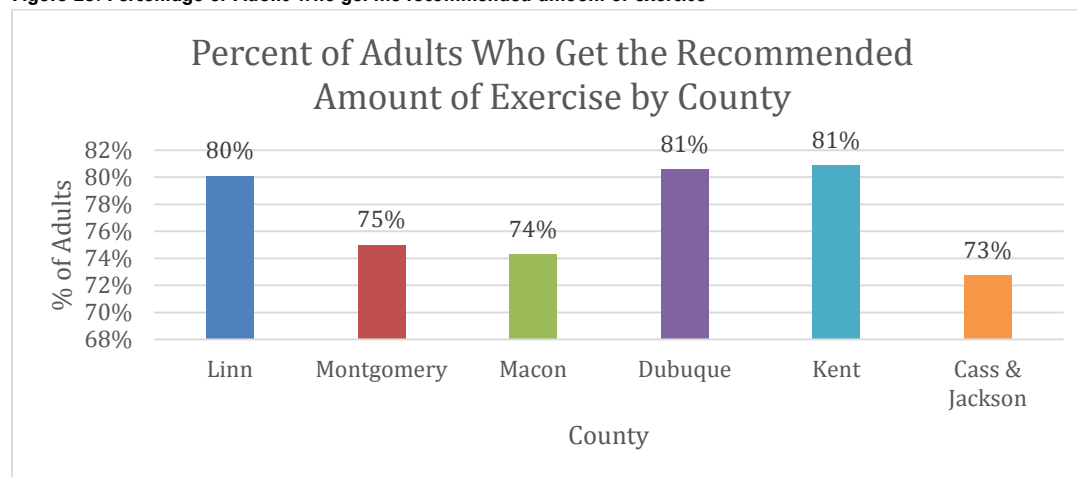
How is Cedar Rapids doing?

Eighty percent of adults in Linn County (Cedar Rapids) get the recommended amount of physical exercise. This means that 20% of adults are not getting the recommended amount of exercise. “The data for this indicator was obtained from the Community Health Status Indicators (CHSI) website from the U.S. Department of Health and Human Services.”³³¹ “The website provides county-level data from surveys conducted in 2008 and 2009 of adults 18 years or older.”³³² The survey asked adults to specify the amount of physical activity that they participated in per week.

How does Cedar Rapids compare?

Linn County is doing better than three of its peer counties. Dubuque (Dubuque) and Kent (Grand Rapids) County both have 81% of adults participating in physical exercise while the other three Counties are below 80% as shown on the graph below.

Figure 26: Percentage of Adults who get the recommended amount of exercise



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System

³²⁹ Centers for Disease Control and Prevention. “Physical Activity.” December 1, 2011. Web. November 6, 2013. <<http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html>>.

³³⁰ American Planning Association (APA). “Planning and Community Health Research Center.” 2013. Web. November 6, 2013. <<http://www.planning.org/nationalcenters/health/>>.

³³¹ “Community Health Status Indicators: CHSI 2009.” U.S. Department of Health and Human Services. Web. November 6, 2013.

³³² “Community Health Status Indicators: CHSI 2009.” U.S. Department of Health and Human Services. Web. November 6, 2013.

Summary

Physical activity is an essential component of a healthy lifestyle because it reduces the risk of cardiovascular disease, type II diabetes, some cancers and improves the chance of living a longer life.³³³ In regards to physical activity, Linn County and more specifically the City of Cedar Rapids can work to improve its performance by acknowledging public health in future planning of the connectivity between trails, roads and sidewalks. This could be done by working with public health officials, City leaders and residents to identify current barriers that prevent residents from being physically active.

Healthy Diets

Percent of adults in the county who eat an adequate amount of fruits / vegetables ³³⁴

Why is this important?

“Social, economic and environmental factors determinants of health influence the health of a community.”³³⁵ Two of these determinants of health, personal and environmental factors, may be the levers to enhancing quality of life.³³⁶ Eating a variety of fruits and vegetables as part of an overall healthy diet reduces one’s risk of heart disease, as well as the chances of having a heart attack or stroke.³³⁷ A county with a high percentage of adults eating an adequate amount of fruits and vegetables may indicate that healthy foods are easily accessible. Food access and nutrition are indicative of a city that facilitates healthy choices. “This indicator measures the percent of adults in the county who eat an adequate amount of fruits and vegetables, which is classified as an average of at least 5 servings per day.”³³⁸

How is Cedar Rapids doing?

According to the U.S. Department of Health and Human Services only 18.10% of adults in Linn County (Cedar Rapids) eat an adequate amount of fruits and vegetables. “County-level data from surveys conducted in 2008 and 2009 of adults 18 years or older was used in determining the percentage of adults who eat an adequate amount of fruits and vegetables.”³³⁹ While Cedar Rapids is the county seat of Linn County, the survey likely included respondents from some of the smaller cities throughout the county. Therefore the results of this indicator may not be an accurate representation of the City of Cedar Rapids.

How does Cedar Rapids compare?

In comparison to its peer counties, Linn County (Cedar Rapids) has the lowest percentage of adults who eat an adequate amount of fruits and vegetables and Macon County (Decatur) has the highest

³³³ Centers for Disease Control and Prevention. “Physical Activity and Activity.” February 16, 2011. Web. November 5, 2013. <<http://www.cdc.gov/physicalactivity/everyone/health/index.html>>.

³³⁴ “Community Health Status Indicators: CHSI 2009.” U.S. Department of Health and Human Services: CDC. Behavioral Risk Factor Surveillance System, 2000-2006. Web. n.p. November 4, 2013. <<http://wwwn.cdc.gov/CommunityHealth/homepage.aspx?i=1>>.

³³⁵ Wilkinson R, Marmot M, editors. Social determinants of health: The solid facts. 2nd ed. Copenhagen: World Health Organization; 2003. Accessed 2010 May 26. <<http://www.healthypeople.gov/2020/about/DOHAbout.aspx>>.

³³⁶ “Health Impact Assessment: The determinants of health.” World Health Organization: WHO. Web. 2013 n.p. November 6, 2013. <<http://www.who.int/hia/evidence/doh/en/>>.

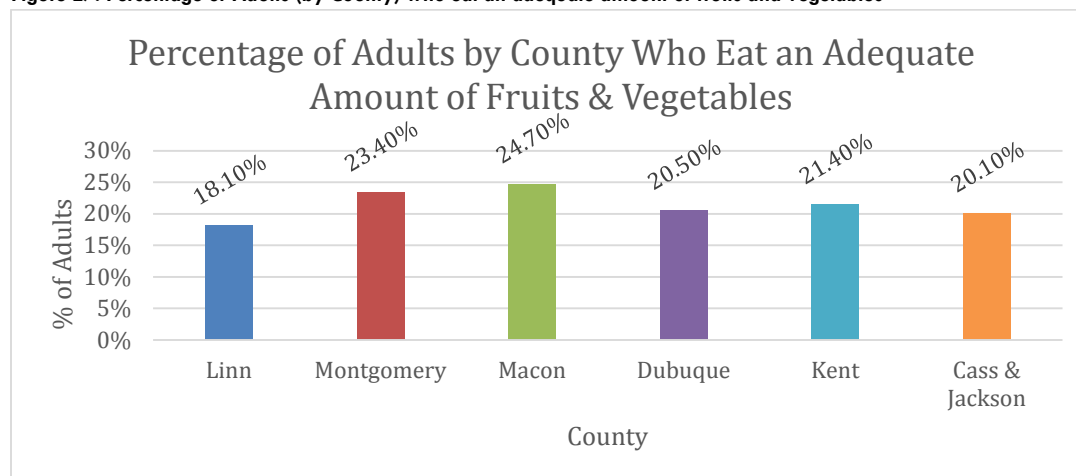
³³⁷ United States Department of Agriculture (USDA). “Why is it important to eat fruits and vegetables?” Web. n.d. November 5, 2013. <<http://www.choosemyplate.gov/food-groups/vegetables-why.html>>.

³³⁸ “Community Health Status Indicators: CHSI 2009.” U.S. Department of Health and Human Services. Web. November 6, 2013.

³³⁹ Ibid.

percentage. As shown on the graph below, the counties are all within an eight percentage point range for the number of adults who eat an adequate amount of fruits and vegetables.

Figure 27: Percentage of Adults (by County) who eat an adequate amount of fruits and vegetables



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System³⁴⁰

Summary

Because Linn County has the lowest percent of adults consuming an adequate amount of fruits and vegetables, our team recommends the City identify why consumption is so low. One possible explanation may be low access to food stores. An explanation of low access to food stores is as follows.

Percent of the population with low access to food stores

Why is this important?

Food access is related to the number of food stores in a community in addition to the affordability of shopping in food stores. Limited access to supermarkets and farmers markets can make it more difficult for people to eat a healthy diet and increasing food access can increase the intake of nutritious food.³⁴¹ “Planning for improvement in overall community health should include access to affordable and healthy food. Planners, local government officials, food retailers and food policy councils are among those who can help ensure a healthy food environment in their community.”³⁴² This indicator only looks at the accessibility to sources of healthy food, as measured by distance and does not address individual-level resources such as income and vehicle accessibility.

³⁴⁰ Centers for Disease Control. Behavioral Risk Factor Surveillance System, 2000-2006. Web. n.p. November 6, 2013. <<http://wwwn.cdc.gov/CommunityHealth/homepage.aspx?i=1>>.

³⁴¹ United States Department of Agriculture (USDA). “Healthy Food Access: Know your Farmer Know your Food.” n.d. Web. PDF. November 5, 2013. <<http://www.usda.gov/documents/7-Healthyfoodaccess.pdf>>.

³⁴² Centers for Disease Control and Prevention (CDC). (2010) Healthy Food Environment. Web. November 5, 2013. <http://www.cdc.gov/healthylives/healthtopics/healthyfood_environment.htm>.

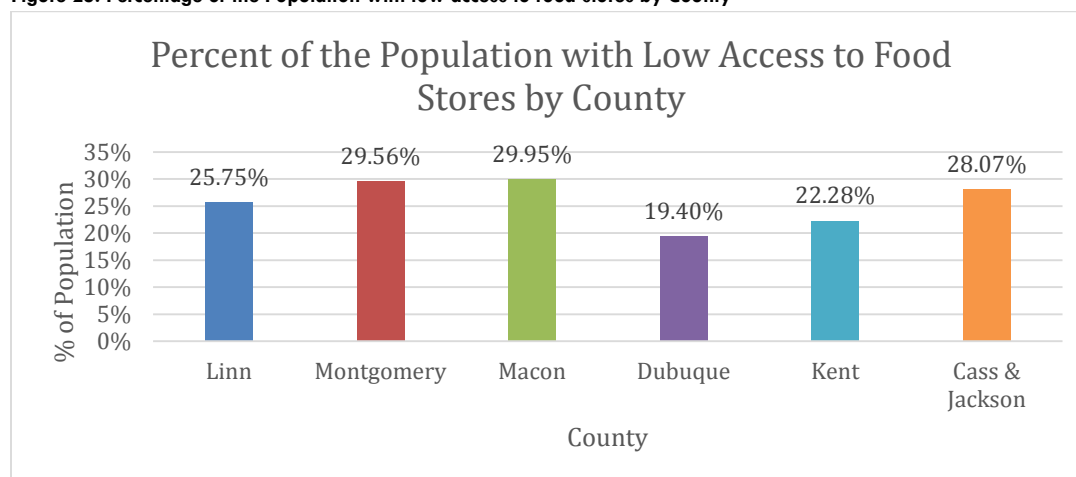
How is Cedar Rapids doing?

According to the USDA, 25.75% of Linn County's population has low access to food stores.³⁴³

How does Cedar Rapids compare?

In comparison to its peer counties, Linn County has the third lowest percentage of the population with low access to food stores. While having a low percentage of the population with low access to food stores is ideal, Linn County could work to improve this number through community planning. The county with the highest percentage is Macon County (Decatur) at 29.95%. Macon County also had one of the lowest percentages of farmers markets per 1,000 population, but on average had about the same number of grocery stores per 1,000 people as its peer Counties.

Figure 28: Percentage of the Population with low access to food stores by County



Source: USDA, US Census of Agriculture, County Food Systems

Summary

In order to increase food access, our team recommends a few strategies that will make it easier for residents to buy food. Firstly, zoning regulations can help bring supermarkets to low-income neighborhoods and limit fast-food restaurants in areas where there are already too many.³⁴⁴ For example, zoning can give incentives to lure supermarkets and farmers' markets to "food deserts," or encourage corner stores to stock fruits and vegetables. Cedar Rapids can even create "healthy food zones" near schools to ban the fast-food restaurants that so often tempt students to skip school meals.³⁴⁵

³⁴³ Todd, Jessica and Breneman, Vince. (2013). U.S. Department of Agriculture (USDA): Food Environment Atlas. Web. November 5, 2013. <<http://www.ers.usda.gov/data-products/food-environment-atlas/go-to-the-atlas.aspx#.UqUOa6VgzR0>>.

³⁴⁴ The President and Fellows of Harvard College. *Healthy Food Environment*. 2014. Web. May 2014. <<http://www.hsph.harvard.edu/obesity-prevention-source/obesity-prevention/food-environment/>>.

³⁴⁵ The President and Fellows of Harvard College. *Improving Food in the Neighborhood*. 2014. Web. May 2014. <<http://www.hsph.harvard.edu/obesity-prevention-source/obesity-prevention/food-environment/supermarkets-food-retail-farmers-markets/>>.

Report Card

iGreenCR Metrics		
A quick glance below provides one with metrics the UI students used to measure Cedar Rapid's progress in achieving environmental sustainability when compared to its peer cities.		
	Ahead of Peers: Data or subjective evidence indicates Cedar Rapids is as top achiever when compared to its peer cities.	
	With Peers: Data or subjective evidence indicates Cedar Rapids is achieving sustainable efforts that are similar to its Peers.	
	Behind Peers: Data or subjective evidence indicates the progress of Cedar Rapids is below its peer cities.	
	Neutral: No data currently available.	

Energy Management	
	Total Municipal Energy Reduction Per Capita between 2008 and 2011 (Total Municipal kWh)
	Renewable Energy Production in Municipal Facilities (kWh)

Water Wise



Total Per Capita Water Consumption by Sector



Commercial Per Capita Water Consumption by Sector



Industrial Per Capita Water Consumption by Sector



Municipal Per Capita Water Consumption by Sector



Residential Per Capita Water Consumption by Sector

Stormwater



Nutrient Impairment in Cedar River



Pathogen Impairment in Cedar River



Sediment Impairment in Cedar River



Square Footage of City-constructed Permeable Pavement



Number of City-managed Rain Gardens

CleanUpCR



Percent of Cedar Rapids Households Participating in Curbside Recycling (Landfill Diversion) July 2012 – June 2013



1-Bag Challenge Number of Bags Collected in 2013 (Litter Collection)



Policy for Purchasing Recycled and Recyclable Materials in 2013



Materials Management Tracking in 2013

Bike CR



Complete Streets



Bike to Work (2008 – 2012 ACS)



Safe Travel Network (Annual Average Major and Minor Crashes Involving Bicyclists 2008 – 2012)



Miles of Bike Paths or Trails (10-foot wide paved and unpaved, on-street bike lanes, sharrows, road shoulder)



Miles of Bike Paths or Trails per 1,000 population (2012)



Walkability Index

Transportation



Transit Ridership by Metropolitan Area



Unlinked Passenger Trips Per Capita 2012 by Metropolitan Area



Average Annual Vehicle Miles Travelled (VMT) Per Capita (2008 – 2012)

Community Development



Urban Density – People Per Square Mile



Percentage of Local Buildings and Structures on the National Register of Historic Places



Number of Housing Units approved per year in the Downtown SSMID, Medical Quarter SSMID and Tier I Neighborhoods

Forestry



Number of Different Tree Species within City Stock



Net New Trees Per Year



Number of Years as a Tree City USA Member

Parks and Gardens



Park Acreage per 1,000 People



Miles of Trails per 1,000 People



Square Footage of Community Gardens per 1,000 People

Additional Indicators	
	Permitted Toxic Air Emissions Per Capita
	Acres of Established and Restorative Prairies and Wetlands
	Invasive Species
	Percent of Adults in the County who eat an Adequate Amount of Fruits and Vegetables
	Percent of Adults in the County who get the Recommended Amount of Exercise
	Percent of Adults who are Obese by County

Additional Indicators	
	Farmers Markets per 1,000 population (2012)
	Grocery Stores per 1,000 population (2009)
	Percent of the Population with Low Access to Food Stores

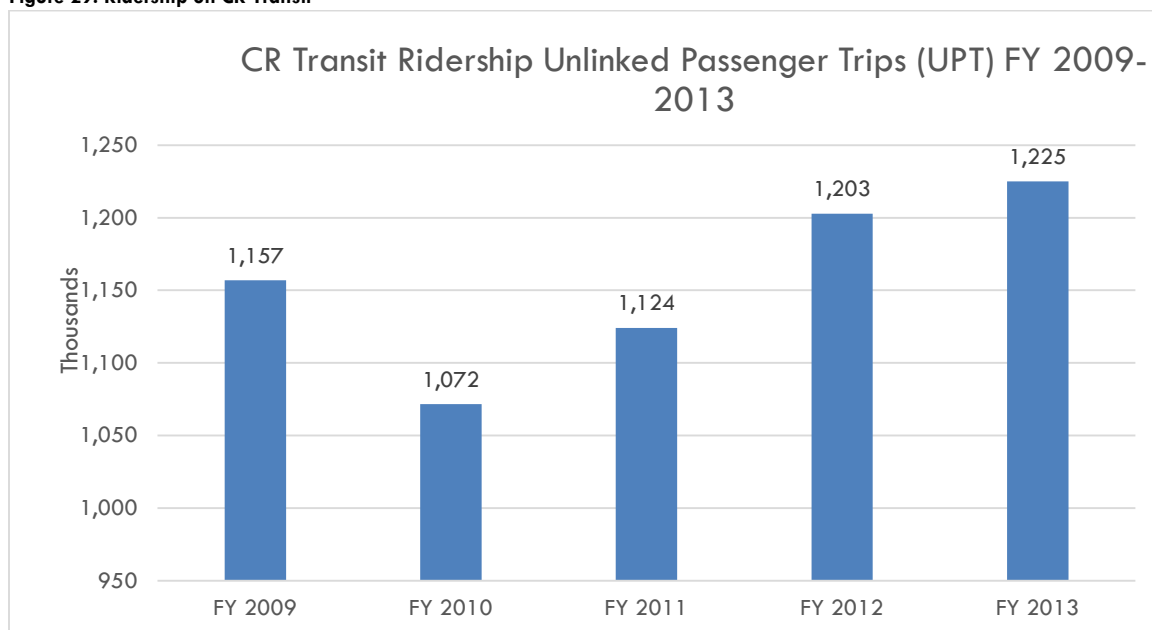
BikeCR

The Five Focus Areas of improving the safety of bike riding and the usage of bike infrastructure by all age groups according to the League of American Bicyclists (LAB). Possible recommended activities, policies or action steps are listed under each category:³⁴⁶

- I. Engineering: infrastructure like trail expansion, repairs, painting bike lanes and crosswalks, road diets, shoulder bike lanes;
- II. Education: bike curriculum in schools, and seminars, including motorist education, and tabling at public events to reach general population;
- III. Encouragement: encourage or require bicycle parking for employers, hold bicycle-focused celebrations of infrastructure improvements;
- IV. Enforcement: pass specific traffic ordinances protecting bikers; appoint a police officer point-of-contact for bikers;
- V. Evaluation/Planning: conduct an economic impact study of biking; make space for bikes in road plans and encourage mixed-use development.

Transit Information

Figure 29: Ridership on CR Transit

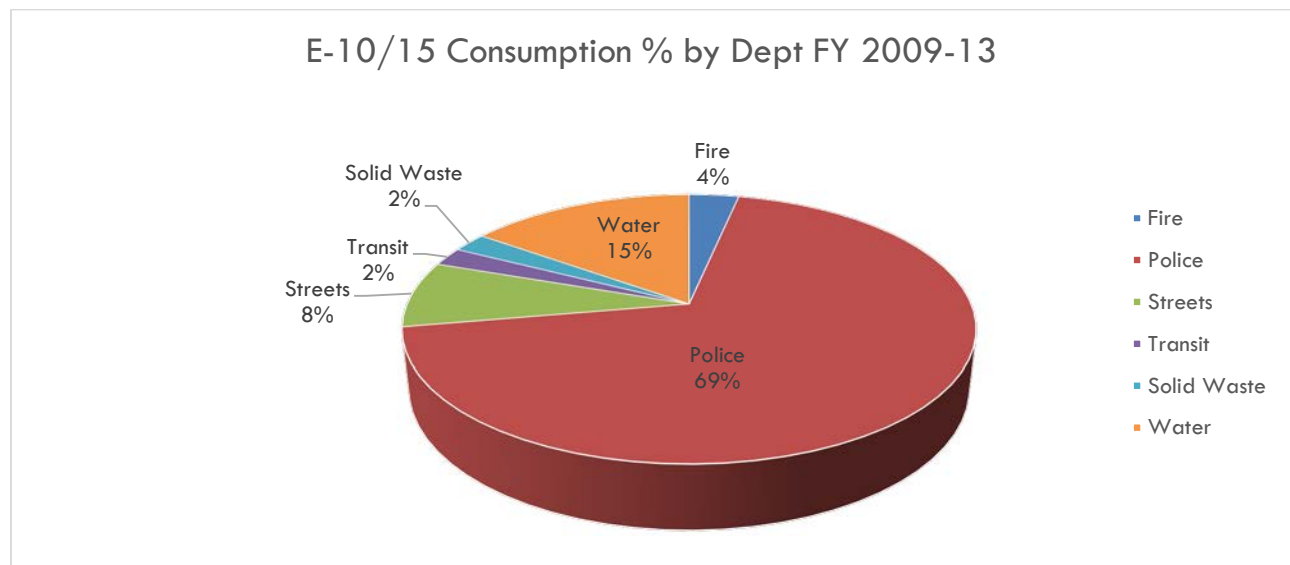
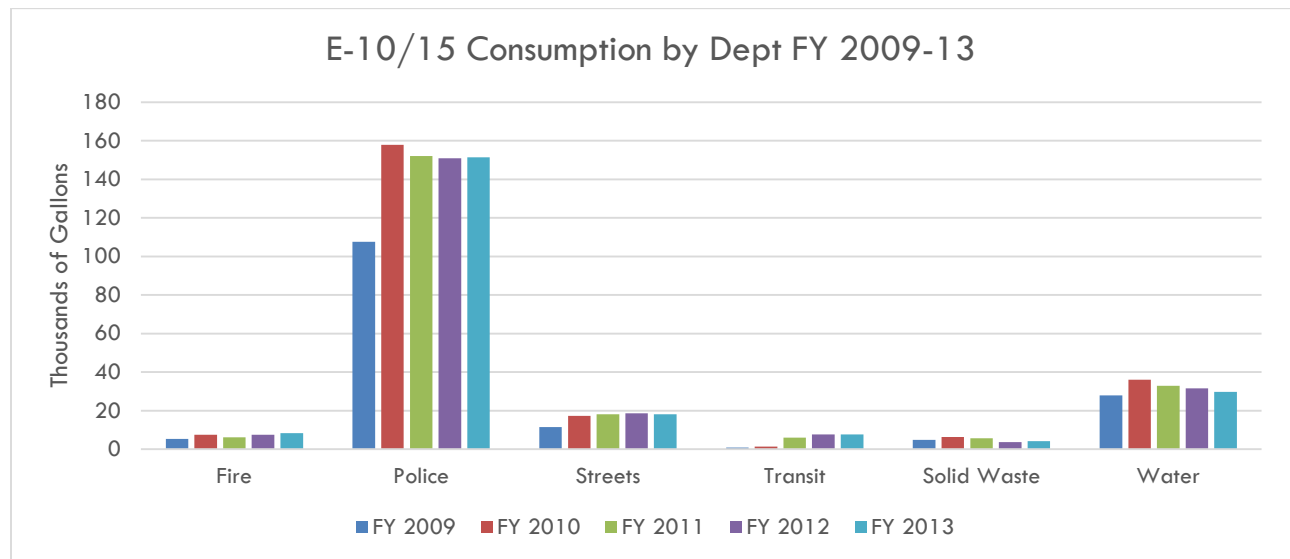


Fleet Services Fuel Consumption Trends

From July 1, 2008 to June 30, 2013, Fleet Services vehicles and equipment used over 1 million gallons of ethanol blended standard gasoline (regular E-10/15 unleaded) and nearly 2.5 million gallons of diesel

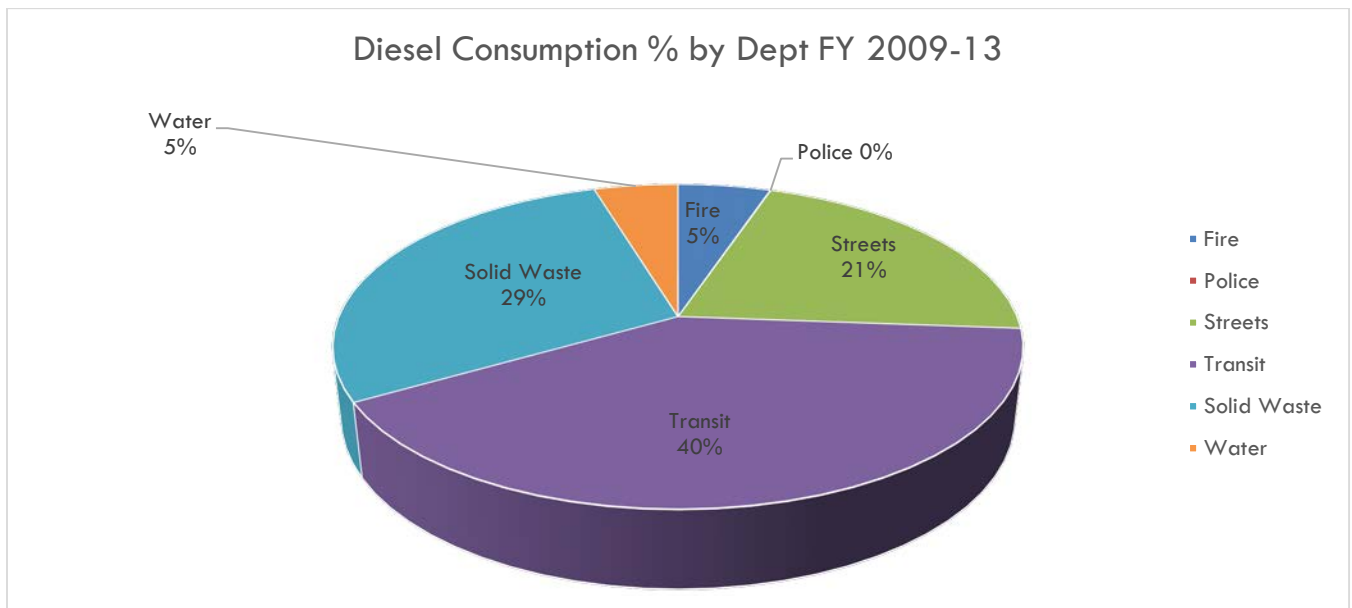
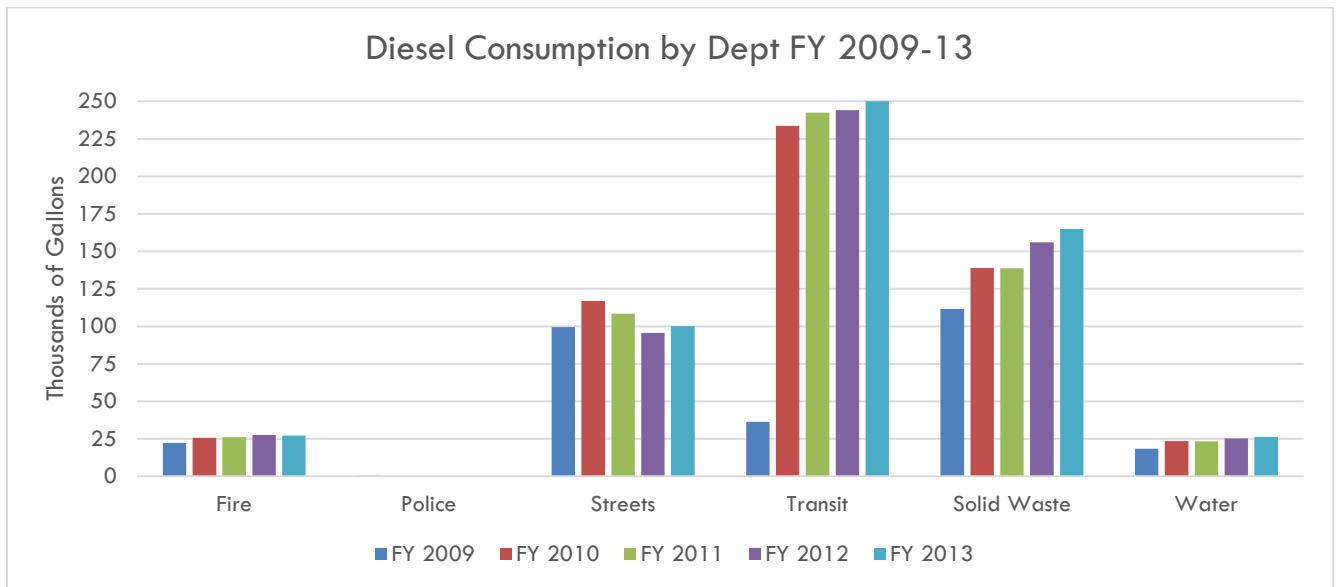
³⁴⁶ League of American Bicyclists. "Feedback report: Bicycle Friendly Community Application; Cedar Rapids, IA." Spring 2012.

fuel. The following figures detail fuel consumption patterns across city departments by fuel type: E-10/15 gasoline blend (referred to here as gasohol) or unblended diesel.



The Police Department is clearly the largest user of gasohol fuel among all city departments. Police has roughly 140 active vehicles, most of which are police cruisers, primarily of the 4-door sedan model type which exclusively use this kind of fuel. The Water Department is the second largest consumer using 15% of all gasohol, mostly for vehicles used to read water meters which are driven to specific locations to enable a meter reading to be recorded to generate that user's/facility's water bill. The Streets department (also

known as Public Works) consumes about half as much gasohol as the Water department. The Fire, Transit and Solid Waste departments each consume less than 5% gasohol.



Diesel consumption is more evenly divided amongst the various departments than is gasohol. Nevertheless, Transit consumes 40% of all diesel, followed by the Solid Waste department (comprised almost exclusively of waste collection trucks). The Public Works Department consumes roughly a fifth of the remainder. Of the 62 active vehicles registered to the Transit division, 35 of those are the buses which provide transit service. Solid Waste has the same number of vehicles as Transit, and all but six are not

waste collection trucks. Solid Waste consumes less fuel than Transit however, as waste collection trucks are used to collect waste in only one area of the city each day of the week (Mon-Sat) and make only one pass per street. Transit buses run their routes about 12 hours per day, six days per week, and complete several trips throughout the city each day.

Table 18: Population Density of Comparison Cities and Other Large Cities in Iowa

	Des Moines	Iowa City	Cedar Rapids	Dayton, OH	Decatur, IL	Dubuque, IA	Grand Rapids, MI
Land Area Sq. Mi.	90.741	25.986	72.071	56.517	46.925	31.547	45.265
Land area acres	58,074.2	16,631.0	46,125.4	36,170.9	30,032.0	20,190.1	28,969.6
2012 Population Estimate	206,688	70,133	128,119	141,359	75,407	58,155	190,411
Pop Density/acre	3.56	4.22	2.78	3.91	2.51	2.88	6.57
Jobs	139,248	54,869	106,160	80,714	37,474	43,871	125,130
Jobs/acre	2.40	3.30	2.30	2.23	1.25	2.17	4.32
Total person density/acre	5.96	7.52	5.08	6.14	3.76	5.05	10.89

Source: US Census Bureau 2012 population estimates; US Census Bureau “On the Map” web application

Statistics Table

Statistics by Zip Code (2010 Census Data and 2012 American Community Survey Data)						
	52401	52402	52403	52404	52405	52411
Percent of city population	2%	30%	18%	28%	18%	5%
Male	58.4%	48.9%	48.9%	49.7%	48.2%	50%
Female	41.6%	51.1%	51.1%	50.3%	51.8%	50%
Median age	35.8	33.5	40.4	32.4	38.5	42.1
Race						
Caucasian	70%	88.2%	86.1%	88.4%	91.5%	94.5%
African American	20.3%	4.4%	8.4%	5.2%	3.8%	1%
American Indian/Native Alaskan	0.5%	0.3%	0.3%	0.3%	0.3%	0.1%
Asian	2.5%	3.6%	0.9%	1.8%	1.4%	2.6%
Native Hawaiian/Pacific Islander	0%	0.1%	0.1%	0.2%	0.1%	0%
Hispanic or Latino	3.4%	3.5%	3.2%	3.8%	2.1%	1.5%
Two or more	5.4%	2.5%	3.4%	2.9%	2.5%	0.3%
Other	1.3%	0.9%	0.8%	1.2%	0.5%	1.6%
Median household income	\$19,575	\$54,833	\$56,915	\$46,713	\$55,094	\$120,614
Average household income	\$43,578	\$70,116	\$79,815	\$57,017	\$66,704	\$137,720

Elements

Elements

	Goals	Strategies	Indicators	Accomplishments
Forestry	Plant more trees	Plant 1,200 total trees per year	Net new trees per year	Tree maintenance program
	Increase survivability of planted trees	Successfully manage the Emerald Ash Borer infestation and replant a diverse stock of trees	Number of different tree species within City stock	Mandatory 1-for-1 tree replacement policy
	Build volunteer support for street trees	Work with developers to improve survivability of trees planted within new development	Number of years as Tree City USA member	Tree City USA member for 35 years
		Create a volunteer base to support the maintenance of trees throughout city	Amount of money paid into tree planting fund by developers	
Bike CR	Bike CR's Goal for 2020 is to increase bike ridership in commuting by 5%, trips to school by 5% and recreational use by 3%	Achieve League of American Bicyclists (LAB) Silver status by 2015; Gold status by 2020	Miles of Bake Paths/ Trails per 1K Population	Increases in miles of bike trails--on-and off-street
		Work toward the completion of the 2012 Comprehensive Trails	Bike to Work	Increases in bike parking infrastructure
			Safe Travel Network	
			Miles of Bake Paths/Trails	
			Complete Streets Policy	
			Walkability Index	

	Goals	Strategies	Indicators	Accomplishments
Community Development	Promotion of infill development		Urban density	Green building guidelines adopted for new housing construction
	Preservation of historic nature of neighborhoods		Percent of municipally owned buildings and structures on National Register of Historic Places	
	Building to LEED certified standards		Number of housing units approved per year in downtown, medical quarter, and Tier 1 neighborhoods	Building salvage program with Habitat for Humanity
Energy Management	Flare 30% less biogas resulting in more energy for production	Improve operator's ability to maximize off-peak energy usage without affecting treatment	Municipal Energy Reduction per Capita	Centralizing energy use into Energy Management System: Allows for peak load adjustments and monitoring in real time
	Public health and safety	Reduce energy consumption 1% annually over next five years	Renewable Energy Productions	Implemented Avaya networking switches enabling scheduling of power consumption on IT devices--saving up to 90% of power
		Employee energy education program		
		Perform energy audits		
		Prioritize energy upgrades and develop system to track		
		Maximize usage of biogas generated at Water Pollution Control Center		
		Reduce fuel usage for municipal vehicles operated by water staff employees		
		Virtualize 80% of Cedar Rapids' desktops		
		Virtual 85% of Cedar Rapids' servers		

CleanUpCR	Goals	Strategies	Indicators	Accomplishments
	Decrease amount of waste sent to landfill by 7%	Increase awareness of recycling and composting options through better communication	Percent of households participating in curbside recycling	Iowa Recycling Association Award 2011 for Best Local Government Recycling Program
	Increase the number of bags of litter collected each year with a goal of 3,000	Use community outreach to inform residents of upcoming clean-up events opens opportunities for volunteerism	Number of bags of litter collected	
	Establish a Green Purchasing Policy for City Government	Expand Elite Recyclers program	Policy for purchasing recycled and recyclable products	City-County Communications and Marketing Association's Silver Circle Award for City Manager's 1-Bag Challenge litter collection
	Create an internal resource to track materials' management practices	Publicize activities throughout the city and recognize communities' contribution helps to inform residents of Cities' efforts	Materials' management tracking	
		Increase use of current online venues to publicize events and efforts		
		Conduct a resident survey to establish how effectiveness of communicative efforts and residents' preference		
		Develop green purchasing policy to guide future purchasing decisions		
		Recycle and refurbish products to keep products out of landfill		
		Create a tracking mechanism to support and report on these materials' management practices		

	Goals	Strategies	Indicators	Accomplishments
Water Wise	Extend life of City's Water Treatment Plant	Implement a pilot rebate program for residential water efficiency upgrades	Per Capita Water Consumption by Sector	Drought contingency plan
		Identify ways to encourage water conservation in new construction		
		Build customer capacity to respond to drought conditions		
Stormwater	Improve Water Quality	Reduce the number and impact of illicit discharges	Impaired Water Body	Green infrastructure: rain gardens, pervious surfaces;
		Support the installation of green infrastructure	Nutrient, Pathogen, and Sediment Impairment	stormwater infiltration in parks; 800 private detention basins
		Increase public understanding and involvement in preventing stormwater pollution	Square footage of permeable pavement installed by City	
			Number of rain gardens installed by City	
Parks and Gardens	Develop new greenway	Complete and implement greenway planning and development	Acres of established and restorative prairies and wetlands	Parks & Recreation Master Plan
	Increase conversion to native plants	Expand volunteer based projects and education	Number of people participating in volunteer programs	Parks Finder internet application
			Square Footage of Community Gardens per 1,000 people	Community gardens
			Park Acreage and Miles of Trails per 1,000 people	
			Grocery Stores per 1,000 population 2009	
			Percent of the population with low access to food stores	
			Farmers Markets per 1,000 population 2012	

	Goals	Strategies	Indicators	Accomplishments
Transportation	Increase number of unlinked passenger trips by 5% a year until 2020	A program of vehicle evaluation is being developed to identify unused or underused vehicles	Walkability Index	18 new bus purchases reducing average age of fleet
	Reduce age of bus fleet to less than 8 years	Determine if City can use the vehicles more efficiently or if they need to be removed them from the fleet	Transit Ridership by Metro	Free transit usage on Saturdays
	Reduce active vehicle inventory by 10%	Buy new buses to replace aging bus fleet	Unlinked Passenger Trips per capita	Oil recycling and retreaded tires
	Reduce fuel consumption by 6%	Increase average fuel economy of the fleet so that more miles can be driven on less fuel	AAVMT per capita	Multi-purpose trucks replace single-use
		Phase in the purchase of higher 'miles per gallon' vehicles	Average Age of bus fleet	GPS tracking on fleet vehicles to reduce unnecessary vehicle usage
		Target wasteful practices through the increased use of GPS tracking devices	Total number of vehicles removed from fleet	
			Total annual fuel consumption in gallons by fuel type	
			Average fuel utilization of fleet vehicles by class tracked by GPS	

Survey

Environmental Sustainability

This survey gauges how important the environment is to you, your awareness of the City of Cedar Rapids' sustainability efforts, and how you prefer to be informed about City initiatives. Your answers are confidential. This survey is conducted by graduate students in Urban and Regional Planning at The University of Iowa for the City of Cedar Rapids. If you have any questions or concerns about this survey, please contact Gloria Wenman at gloria-wenman@uiowa.edu. Your answers are very important and we thank you for your time!

Q1: How important is protecting the environment to you personally?

- ☐ It is the most important thing to me
- ☐ It is very important to me
- ☐ It is kind of important to me
- ☐ It is not very important to me
- ☐ It is not important to me at all

Q2: At home, how often do you do the following?

	Never	Rarely	Sometimes	Often	All of the Time
Recycle using curbside recycling, "Curby"	☐	☐	☐	☐	☐
Take recycling to other locations	☐	☐	☐	☐	☐
Compost fruit and vegetable using curbside composting, "Yardy"	☐	☐	☐	☐	☐
Limit household water use	☐	☐	☐	☐	☐
Shut off lights when not in use	☐	☐	☐	☐	☐
Shut off other electrical devices when not in use (such as TVs, computers)	☐	☐	☐	☐	☐
Limit AC and heat use	☐	☐	☐	☐	☐

Q3: In your home or yard do you have:

	Yes	No	Don't Know
Water efficient appliances	☐	☐	☐
Energy efficient appliances	☐	☐	☐
New insulation (such as double pane windows, roof insulation)	☐	☐	☐
Shade trees	☐	☐	☐
Native plants	☐	☐	☐
A vegetable garden	☐	☐	☐

Q4: How do you usually get to the following places in good weather?

	Drive	Carpool	Bus	Bike	Walk	Don't Go
Work	☐	☐	☐	☐	☐	☐
School	☐	☐	☐	☐	☐	☐
Grocery Store	☐	☐	☐	☐	☐	☐
Mall	☐	☐	☐	☐	☐	☐
Library	☐	☐	☐	☐	☐	☐
City Park	☐	☐	☐	☐	☐	☐
Place of Worship	☐	☐	☐	☐	☐	☐
Other frequent destination <i>Please specify:</i>	☐	☐	☐	☐	☐	☐

Q5: Are you aware of the following sustainability efforts in Cedar Rapids?

	Yes, I am familiar with it	I have heard about it but not familiar	Have not heard about it
Increasing number of bike lanes	☐	☐	☐
Placing bike racks on buses	☐	☐	☐
Tree replacement	☐	☐	☐
Historic preservation	☐	☐	☐
Energy efficient management in municipal buildings / facilities	☐	☐	☐
LED lighting in parking ramps	☐	☐	☐
Creek / riverfront clean-up and restoration	☐	☐	☐
Litter Collection	☐	☐	☐

Q6: Are you aware that Cedar Rapids has received the following recognition?

	Yes	No	Don't Know
Bronze Level Certification as a Bike Friendly Community	☐	☐	☐
Member of Tree City USA for 35 years	☐	☐	☐

Q7: In the last year, have you participated in the following:

	Never	Once	Twice	Three or More Times	Didn't know about
1 Bag Challenge	☐	☐	☐	☐	☐
I-380 Clean Up	☐	☐	☐	☐	☐
River / Waterways Clean Up	☐	☐	☐	☐	☐
Adopt-a-Street	☐	☐	☐	☐	☐
Trees Forever Symposium	☐	☐	☐	☐	☐
Eco Fest	☐	☐	☐	☐	☐
Other environmental programs:	☐	☐	☐	☐	☐

Q8: The City of Cedar Rapids is involved in many areas of sustainability. How important are each of these to you? Place an 'X' in the box that indicates your level of importance.

	Not important at all		Not very important		Somewhat important		Very important		Top priority	
	1	2	3	4	5	6	7	8	9	10
Bikeable community										
Walkable community										
Improved public transportation										

Recycling and composting										
Litter collection										
Removing unsafe structures										
Appropriate hazardous waste disposal										

Historic preservation										
-----------------------	--	--	--	--	--	--	--	--	--	--

Energy conservation in municipal buildings										
Renewable energy use										

Having trees downtown										
Improved parks and gardens										
Supporting local food systems										
Native prairie plantings										

Municipal water conservation										
Drought/heat wave preparation										
Flood preparation/ mitigation										

Q9: Have you learned about Cedar Rapids environmental programs/efforts through any of the following?

	Yes, I'm familiar with it	I'm aware of it but haven't learned anything from it	Never seen/ visited it
"iGreenCR DU" logos around town	☐	☐	☐
City of Cedar Rapids' website	☐	☐	☐
"iGreenCR" website	☐	☐	☐
"iGreenCR" Facebook page	☐	☐	☐

Q10: How would you prefer to learn about what is happening in Cedar Rapids?

Please check all that apply.

- ☐ City of Cedar Rapids' website
- ☐ "iGreenCR" website
- ☐ "iGreenCR" Facebook page
- ☐ Email
- ☐ Water bill
- ☐ Media notices
- ☐ Posters around town
- ☐ Signage at events
- ☐ School presentations
- ☐ Community workshops
- ☐ Neighborhood Association
- ☐ Other _____

Q11: Do you live within the city limits of Cedar Rapids?

- ☐ Yes
- ☐ No

Q12: What is your zip code?

- ☐ 52401
- ☐ 52402
- ☐ 52403
- ☐ 52404
- ☐ 52405
- ☐ 52411
- ☐ I do not live in Cedar Rapids

**Q13: Please answer the following demographic questions:
What is your gender?**

- ☐ Male
- ☐ Female

Q14: What is your age?

- ☐ 18 to 24
- ☐ 25 to 34
- ☐ 35 to 44
- ☐ 45 to 54
- ☐ 55 to 64
- ☐ 65 or Over

Q15: What is your race or ethnicity?

Please check all that apply.

- ☐ African American
- ☐ American Indian / Alaskan Native
- ☐ Asian
- ☐ Caucasian
- ☐ Latino / Hispanic
- ☐ Native Hawaiian / Pacific Islander
- ☐ Other

Q16: What is your gross annual household income?

- ☐ \$24,999 or Less
- ☐ \$25,000 to \$49,999
- ☐ \$50,000 to \$74,999
- ☐ \$75,000 to \$99,999
- ☐ \$100,000 to \$149,999
- ☐ \$150,000 or More

