Steering Committee of the Iowa City Climate Action and Adaptation Plan

Thursday, February 15, 2018, 10 a.m. – 12 p.m.
Iowa City Public Library
123 S. Linn Street – Meeting Room B

Meeting #6 Agenda:

1. Call to Order
2. Recap and goals for the meeting (5 Minutes)
3. Review Draft Actions (1.75 Hours)
4. Next Steps/Other Discussion (10 Minutes)
5. Adjourn by 12:00 p.m.

Reminder:
Community Meeting #2
April 26, 2018 – 6pm (tentative time)

If you will need disability-related accommodations in order to participate in this meeting, please contact Brenda Nations, Sustainability Coordinator, at 319-356-6161 or at brenda-nations@iowa-city.org. Early requests are strongly encouraged to allow sufficient time to meet your access needs.

Meeting Minutes

Steering Committee of the Iowa City Climate Action and Adaptation Plan
Thursday, December 7, 2017, 10 a.m. – 12 p.m.
Emma J. Harvat Hall Iowa City City Hall
410 E. Washington Street

Members in Attendance:
Ingrid Anderson
Jesse Leckband
John Fraser
GT Karr
Ryan Sempf
Martha Norbeck
Anne Russett
Matt Krieger
Liz Maas
Charlie Stanier
Eden Dewald

Members Absent:
Eric Tate
Katie Sarsfield

Consultants Present:
Lindy Wordlaw, Elevate Energy
Caty Lamadrid, Inova Energy (Phone)
Anthena Gore, Elevate Energy (Phone)
Eli Corrado, Elevate Energy (Phone)
Jen McGraw, CNT (Phone)

Others Present:
None

City Staff Present:
Brenda Nations, Sustainability Coordinator
Ashley Monroe, Assistant City Manager

1. Call to Order
Meeting called to order at 10:05 a.m. by Ingrid Anderson, Chairperson.

2. Approval of Minutes
Motion to approve Sept. 21, 2017 minutes by Fraser, second by Karr. Approved 7-0. Motion to approve Oct. 12, 2017 minutes by Leckband, second by Krieger. Approved 7-0.

3. Recap and Meeting Goals
Lindy Wordlaw gave a short recap of the activity occurring. 10:07-10:09 She provided a summary of the Community meeting. Wordlaw asked for feedback heard from the Committee. Martha Norbeck said that the general feedback was positive but participants followed it up with, "but now what? How do we make it work?" John Fraser said that the group there was less respresntative of demographics for implementors of the strategies. Wordlaw suggested January as a time to do more outreach. Fraser was not surprised that waste was an area that was popular. Matt Kreiger said that many questions were about who would be implementing the ideas. Liz Maas clarified that the strategies will be identified as performed by which party. Wordlaw confirmed.

4. Review of Strategies
Wordlaw reviewed the idea of what it looks like when individuals decrease their footprints by 80%. Fraser said that our residents should see the footprint image but also need programs and incentives to help make the work happen. Consultant team narrowed the wide span of strategies by looking at high feasibility, high priority first, will be highly researched and detailed. Second tier projects will be included

but perhaps not researched as thoroughly. Wordlaw gave an overview of criteria and introduced the overarching strategies. Charlie Stanier arrived at 10:25. Eden Dewald arrived at 10:27.

Maas asked if will it include the average age of each home, % of buildings built in what year range? Many of the topics will have small details that are specific actions and involvements. Wordlaw shared a draft template of what will be researched for each component. Norbeck thinks that template should add "barriers" as another consideration. Fraser encouraged emphasis on the implementation partners, ensure there is enough time. Liz asked if there will be a permanent body or effort to implement the plan. Ashley Monroe responded that it is up to the Committee as to suggest such a thing or it might be a possible inclusion within the Plan itself.

GT Karr concerned that all the research will be done and then presented to Council without room to modify or have consulted with impacted groups and parties. Want to be sure that strategies are reasonable. Ryan Sempf agreed with Karr; suggested possibility of additional stakeholder interviews to converse about the draft strategies. Wordlaw and Nations emphasized that the drafted strategies in February will be released and discussions will happen before and after May about what actions the stakeholder parties will be able to do.

Anderson summarized: Define who the stakeholders are that haven't been talked to. February will provide more detailed strategies/actions, talk to those people after the details are in place. Detailed implementation plan, such as a permanent committee, how to move implementation forward. Stanier said that he has brought up awards, green labeling (events, meetings), etc. Would like to have models in place to provide to the stakeholders. Wordlaw acknowledged that "Cross-Cutting Programs/Initiatives" potential as a category.

- Energy

Caty Lamadrid stated that net zero was moved to lower priority based on the fact that much of that area is accomplished through new construction and most actions related to energy efficiencies may be accomplished regardless. Wordlaw confirmed the interest in "enforcement with existing codes and incentivizing additional requirements for exceptional performance". Norbeck and Krieger contributed thoughts in agreement with these concepts.

Stanier said if we get to over 80% in Iowa and we move people from natural gas to electric utility, we meet our goal. Suggested we need legislative support to continue to enforce. Maas asked if it doesn't happen, wouldn't it be good to know what that scenario looks like? Someone made a suggestion to include in plan support for Mayor's continued membership in Covenant of Mayors. Jen McGraw described a vision for how the discussion on MidAmerican's strategy impacts the full plan. Some discussion over methane source and amount of emphasis placed on methane use (landfill and renewable).

- Transportation

Stanier said again, cross-cutting incentives should be included to encourage staff experts in transportation, technology, vehicles, etc. Allow organizations to make the best choices for them at that

particular time. Norbeck noted an idea for an environmental checklist used as we walk through decision-making and budget, similar to the equity checklist or as part of the culture. Russell was happy to see the land use component within Transportation section because they go hand in hand. Sempf concerned with the local goods item, goods packaging and consumption. He is unsure of whether we need to keep and research all of the issues. In response to Maas' question, McGraw said that it is possible that strategy could capture economy "holes" and state what opportunities for business development supportive of infrastructure and local needs could be possible.

Stanier said the Plan strategies should elevate parking best practices and incentivize actions for electric and green vehicles.

Norbeck asked for a "consumption" category and include some of the identified strategies within that section.

- Waste

Waste was an area that Nations said is valuable to the City but will consists of little emissions impact compared to the community emissions output. The group agreed to pass over the strategies and will allow for additional feedback.

- Adaptation

Norbeck said that should the strategies should include support for an energy assurance plan to address what happens if grid is down for extended periods. Also suggested more information about biological sequestration and soil as methods of water retention and stormwater planning. She mentioned that Eric Tate should be the person talked to about his research grants in these areas. Nations noted County public health concerns that can be added to this section. Brief discussion of technical committee.

- Value-driven/Community Impact/Yet-to-be-officially-named

Maas would like to see protection of green space. Norbeck asked to separate local foods and plant-based diet. Krieger requested education tool for existing and upcoming financial incentives. Suggested lobbying state and federal government to support financing options.

Norbeck suggested that there be an action item that supports City commitment about what the City is doing to accomplish these goals. Russell was supportive and asked that a summary of what the City is doing, programs available to residents and businesses be included or provided.

6. Other Discussion
Wordlaw reviewed expectations for the upcoming dates, community survey. Monroe provided an update about the Community Partnership Grant.

7. Adjourn
Meeting Adjourned at 12:06 p.m.

MEMO

To: **Steering Committee, Iowa City Climate Action and Adaptation Plan**
From: **Lindy Wordlaw, Project Manager, Elevate Energy**
Date: **February 9, 2018**
RE: **Draft Actions – Review Notes and Directions**

Overview

Attached are 25 (draft) actions for your review in advance of our scheduled February 15th Steering Committee Meeting, where we will focus our discussion on some of these actions. The development of each action is the result of research, calculations and some basic scenario planning. Additional information on how the consultant team performed its analysis is provided below, followed by instructions on how Steering Committee members should review the actions and prepare for discussion during our next meeting.

How the consultant team approached the analysis of the actions

Our primary goal in analyzing the proposed actions that we discussed as a group in December has been to figure out how to reach the 80% emissions reduction goal by 2050.

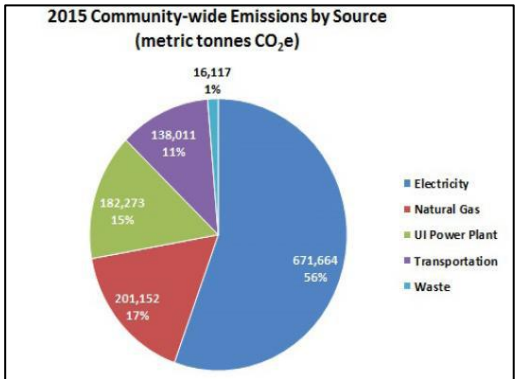

Figure 8. Iowa City Community CO2e totals by source, 2015

While performing our analysis, we identified the following:

- While Iowa City will benefit from significant emissions reductions due to MidAmerican Energy's commitment to providing 100% renewable electricity, that reduction will not be enough to get us to the 80% goal due to other emissions derived from natural gas and transportation sectors as shown to the right
- Because electricity consumption will essentially amount to zero emissions, **the focus for emissions reduction needs to be in other emission sources**—and largely so in the areas of greatest opportunity for impact--natural gas consumption and transportation

Because of these two points above, the consultant team came up with a prioritization scheme for the actions you will review:

High Priority Actions: Emissions-reducing actions with high impact potential, mostly in energy (heating) and transportation. These actions can be deemed critical to meeting the 2050 goal, to the point where if failed to be implemented, the City may not meet its goal.

Other Actions: Actions with less overall GHG impact potential or ones where it is not possible to quantify the reductions against the baseline using accepted protocols. **Please note that classifying these as "other actions" does not mean these are unimportant.** The full set of actions helps develop a well-rounded, comprehensive plan that spans the breadth of all emissions sources, and vital supporting actions like education/outreach or funding.

Emission reduction quantifications

As part of our analysis, the consulting team calculated the emission reductions associated with each action using commonly accepted assumptions and greenhouse gas accounting methodologies. When all of the proposed actions are put together, we believe Iowa City will be on track to meet their emission reduction goals. The charts below show that the renewable electricity supply combined with the right mix of actions will put Iowa City on the path to achieving its 2025 and 2050 goals.

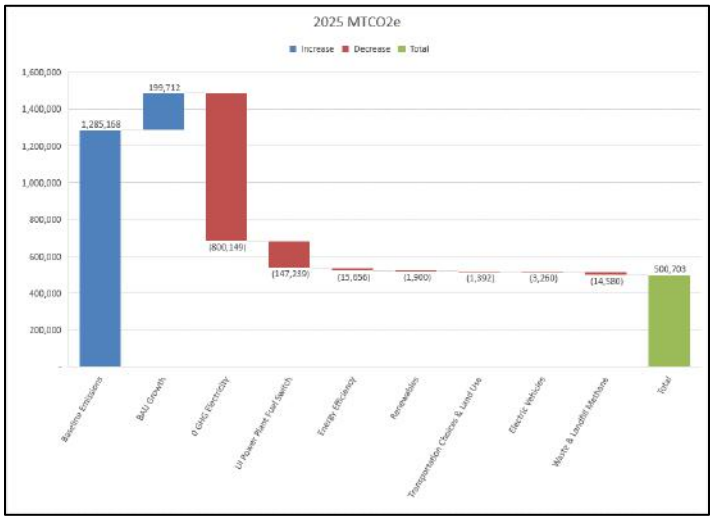

Chart 1. Emissions reductions from BAU Growth through 2025
How to read this waterfall chart: 1) 2015 baseline emissions and projected 2025 BAU (business-as- usual) growth are shown in blue. This is what happens if we take no action. 2) Next, the actions are shown in red, with each incremental emissions reduction resulting in decreased emissions. 3) These reductions bring Iowa City to 500,703 MT CO2e in 2025, shown on the right in green.

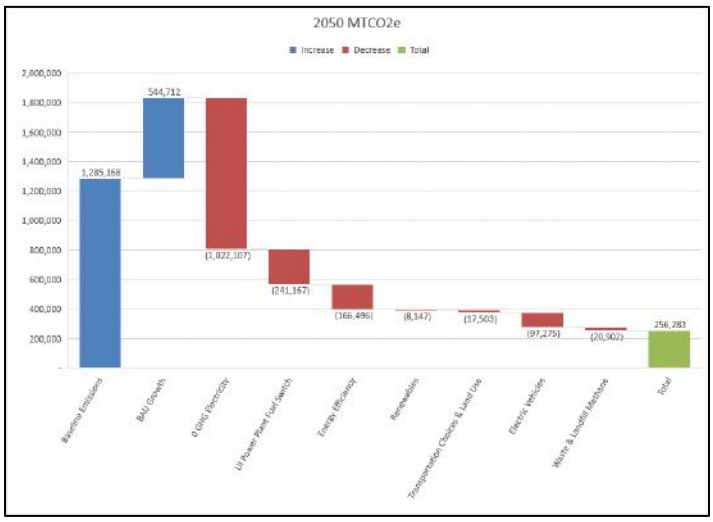

Chart 2. Emissions reductions from BAU Growth through 2050
How to read this waterfall chart: 1) 2015 baseline emissions and projected 2050 BAU (business-as- usual) growth are shown in blue. This is what happens if we take no action. 2) Next, the actions are shown in red, with each incremental emissions reduction resulting in decreased emissions. 3) These reductions bring Iowa City to 256,283 MT CO2e in 2050, shown on the right in green.

Review Instructions

Below is a summary table listing all of the actions attached for your review. Note that some of these will be additions or even modifications from what was discussed in our December meeting, based on the consultant team's analysis. At the bottom of the table is a note about newly added and removed actions, as well as missing ones (adaptation) to come later after that component of the plan is developed.

- Regardless of where your interests might lie, please be sure to have completely read the high priority actions. Please note that because of their criticality in meeting the reduction goals, we will focus our discussion during our next meeting only on the High-Priority actions, *and others only if we have time.*
- For actions that will not be discussed during the meeting, please note that you can submit feedback in written form.
- Think about the extent of what is proposed. Is it feasible? Is anything missing? Are you aware of any background that was not included that informs the status of a strategy?
- Things to keep in mind during your review:
    - Review the basics first
    - Full review/edit/wordsmithing is not the focus of this review
    - These action drafts do not necessarily represent the exact presentation format for the final Climate Action Plan. For instance, as the team works to develop the outline and presentation format, some of this content may be reworked or presented in a different manner, while the minute details will end up in the appendix or supplemental document
    - The actions will continue to be assessed and re-assessed during the next couple of months and through implementation (And that's ok!)

What to expect at the Steering Committee Meeting (2/15/18)

- Meeting Objectives:
    - Steering Committee to provide any additional feedback
    - Get general agreement on whether there is anything missing
    - Leave from that meeting with the consultant team equipped to begin drafting the plan
- Guided review process of high-priority actions
- Instructions for submitting additional feedback on other actions
- We will **not** focus on mechanics/specifics of each action (e.g. we don't know the myriad funding mechanisms will come together to fund XYZ action; who will lead implementation of XYZ action)
- We will **not** focus on the larger planning process at this meeting (e.g. outreach to stakeholders; community meeting; etc); guidance on that will come later with regular communications and likely another online meeting or two for those who can attend
- We **will** discuss next steps and the approach to preparing the first draft of the plan.

Actions Summary Table

		Action Title	Assumptions/Metrics	2050 GHG Reduction MT CO2e
High Priority	1	Increase Residential Energy Efficiency	**2025:** 10% of units retrofitted **2050:** 90% of units retrofitted	108,831
	2	Increase Commercial/Industrial Energy Efficiency		
	3	Improve Energy in New Construction	**2025:** 45% ,48% (Res, C/I) savings via improved code enforcement **2050:** 80% energy savings through path to net zero	57,456
	4	Increase On-Site Renewables	**2025:** 3% buildings w/ on-site renewable **2050:** 25% buildings w/ on-site renewable	8,147
	5	Implement Employer/Commuter Solutions	**2025:** 6% share of work trips **2050:** 15% share of work trips	2,753
	6	Embrace EVs/Alt Fuel/Emerging Technology	**2025:** 2% share of total vehicle miles traveled **2050:** 50% share of total vehicle miles traveled	97,275
	7	Improve and Enhance Mass Transit	**2025:** 10% transit ride increase **2050:** 800% transit ride increase	10,447
	8	Enhance Bicycle and Pedestrian Options	**2025:** 12% share of work trips **2050:** 15% share of work trips	2,182
	9	Increase Composting	**2025:** 95% capture rate **2050:** 95% capture rate	9,198
	10	Increase Recycling		
	11	Increase Multifamily Recycling		
	12	Implement Building Deconstruction Policy		
	13	Harness Landfill Methane Energy	**2025:** 95% capture rate **2050:** 95% capture rate	10,922
Other Actions	14	Establish Community Solar	**2025:** 1-3 pilot projects **2050:** To be determined	0
	15	Integrate Parking Management	**2025:** 1% of drivers avoid/combine 1 trip per week **2050:** 5% of drivers avoid/combine 1 trip per week	66
	16	Promote Compact Contiguous Development	**2025:** 3% of new residential units are location efficient **2050:** 25% new residential units are location efficient	2,015
	17	Encourage the Purpose of Local Goods	**2025:** 3% of households reducing 1 shipment/week **2050:** 50% of households reducing 1 shipment/week	39
	18	Create a Waste Management Plan	No specific metrics associated with this action.	0
	19	Capture Wastewater Methane (NEW!)	Specific metrics to be determined.	TBD
	20	Encourage a Plant-Rich Diet	No specific metrics associated with this action.	0
	21	Expand Community Gardens	No specific metrics associated with this action.	0
	22	Explore Climate-related Funding Mechanisms & Financial Tools	No specific metrics associated with this action.	0
	23	Implement a Communications Plan	No specific metrics associated with this action.	0
	24	Implement a Green Certification Program	No specific metrics associated with this action.	0

REMOVED	**Explanation**
Water efficiency	Embedded in other energy actions
Fuel switching	Embedded in other energy actions
Waste Education and Outreach	Renamed/embedded in “Increase Recycling”
Public/Private Partnerships/Revolving Loan Fund/Information Clearinghouse	Combined into one action: Explore Climate-related Funding Mechanisms & Financial Tools
Climate Action Toolkit	Deliverable to be completed by consultant
MISSING ACTIONS – coming later	**Explanation**
Adaptation actions	Smaller sub-committee to work on Adaptation plan/actions

Increase Residential Energy Efficiency

Action Description

Getting to 2025

In order to achieve ambitious reductions in greenhouse gas emissions related to housing, the City should partner with MidAmerican Energy, as well as community groups and local non-profits, to support retrofits of single family, small multifamily, and large multifamily dwellings.

The number of retrofits can be increased substantially by using a community organizing model which provides education, resources, and quality control from cradle to grave. Organizers can provide necessary information on priority improvements, anticipated savings, existing MidAmerican rebates, qualified contractors, and available funding. The participation of Iowa City in a community challenge is one way to further incentivize retrofits. Information can be effectively communicated through presentations at community meetings, workshops, and house party gatherings for single family/small owners and through 1:1 meetings and landlord groups for larger owners.

Retrofit measures should include:

- Air sealing and insulation
- Installation of energy efficient heating and cooling equipment
- Direct installation of programmable thermostats, LEDS, smart power strips, etc. through MidAmerican Energy's free "Homecheck"
- Replacement of gas appliances with electric appliances

In order to finance these improvements, the City should advocate for a Pay As You Save (PAYS) Program that attaches the cost of improvements directly to a meter and allows residents to pay off their retrofits through savings from reduced energy use. In this way, energy bills are kept flat or nearly flat while paying for the cost of improvements. Low-income residents should have supplemental sources of funding through City or other sources. The City should work with private or non-profit lenders to establish low-interest loans for large multifamily buildings similar to the Community Investment Corporation's Energy Savers Loan.

Areas of Iowa City that are at the greatest disadvantage-- low-income and heavily impacted by pollution and flooding-- should be prioritized. Older buildings and those that use electricity for heat may have particularly high energy use or costs and should also be targeted for energy audits and improvements. Retrofits should focus on the most cost-effective improvements, such as air sealing and insulation.

In order to reach 2025 goals, residential energy use must be reduced by 3 percent. This could mean that 10 percent of units are retrofitted with 30 percent savings on average or it could be differently distributed.

Getting to 2050

The City should consider an ordinance requiring that multifamily properties meet energy-benchmarks at the point of rental or sale beginning in 2025. In order to reach 2050 goals, residential energy use must be reduced by 50 percent.

GHG Reduction Potential

108,831 MT CO2e (shared with commercial/industrial energy efficiency)

Background

Based on the research, one of the most impactful avenues to reaching the 80% emission reduction goal by 2025 is to reduce energy usage in the Iowa City's building stock. Residential buildings make up the largest percentage of the building stock and, according to the Iowa City Community-wide Inventory, accounted for 19% of the community-wide emissions in 2015 with 188,872 MMtCO_2e.

The current Iowa City Housing Rehabilitation Loans offer forgivable loans totaling half of project's cost in specific disadvantaged geographies, in addition to low or no interest loans available across the city. Expanding the forgivable loan to cover the full cost of improvements would put the program in reach for a greater number of people. In addition, utility incentives are available through MidAmerican Energy to supplement the cost of several measures; braiding incentives with other sources of funding will help to bring down costs.

Timing

Short to mid-term.

Implementation Partners

Iowa City should connect with MidAmerican Energy, U.S. Green Building Council – Iowa, landlord groups and lenders to design and implement programming that allows residential building owners to retrofit their homes and multifamily buildings.

Next Steps for Action

Given the urgency required for this action, Iowa City should immediately identify which City staff are best suited to lead this work—it may likely be a combination of staff that includes administrators from home rehabilitation funds/loans, zoning, building and permits, and surely occasional input from the Equity Director, neighborhood programming and others. Second, the City should establish a working group to begin prioritizing action and matching financial incentives internally and with the appropriate program staff at MidAmerican Energy and other implementation partners.

Costs

Implementing energy efficiency programs of a large-scale results in costs for the program administrator both in terms of the incentive value that is passed through to the customer[1] as

[1] Note: this incentive cost, however, can be quantified as a benefit for the customer.

well as administrative costs associated with running the program. In aggregate, these programs can be costly depending on their scope and extent but ultimately energy efficiency is a cost-effective resource when compared to other alternatives. In Iowa, as in other states around the country, investor-owned utilities are required to offer energy efficiency programs to their customers and therefore the structure to offer incentives for residential energy efficiency in Iowa City is already in place.

In addition to program administration and implementation costs, there would be a cost associated with undertaking of the project for the residential property owner, part of which could theoretically be subsidized by available incentives.

Benefits

The benefits of reducing GHG emissions through residential energy efficiency and conservation accrue to individual households and this strategy has the potential to keep more dollars in the community. For an individual household, implementing energy efficiency retrofits such as the ones recommended in this action could lead to an annual reduction of $393 between both the household's natural gas and electricity bills. In addition to the cost savings, energy efficiency and conservation measures can also improve home health, safety, and comfort for residents.

Ultimately, utilities also benefit from energy efficiency improvements, as energy efficiency is oftentimes referred to as the cheapest method to providing electricity to customers. Collectively, energy efficiency savings can help the utility avoid the costs of having to develop new generation capacity as well as additions to transmission and distribution systems.

Additional Information

Current Iowa City Programs

MidAmerican Energy Rebates: https://www.midamericanenergy.com/ia-res-forms.aspx

Iowa City Housing Rehabilitation Loans: https://www.icgov.org/city-government/departments-and-divisions/neighborhood-and-development-services/neighborhood-9

Iowa City Historic Preservation Handbook (energy efficiency pp.18-19): https://www8.iowa-city.org/weblink/0/doc/1486760/Electronic.aspx

Iowa City Historic Preservation Fund Program: https://www8.iowa-city.org/weblink/0/edoc/1586459/2017%20HP%20Fund%20web%20application.pdf

Models for future actions

CIC Energy Savers Loan: http://www.cicchicago.com/energy-savers/

A Perspective of Energy Codes and Regulations for the Buildings of the Future: http://solarenergyengineering.asmedigitalcollection.asme.org/article.aspx?articleid=2565042#Background%E2%80%94WhereAreBuildingEnergyCodesToday

Community organizing for energy efficiency: https://www.elevateenergy.org/wp/wp-content/uploads/AAG_HousePartiesForEnergyEfficiency.pdf

Arkansas PAYS http://efc.web.unc.edu/2017/08/15/arkansas-electric-co-op-tripled-efficiency-program-participation/

Increase Commercial and Industrial Energy Efficiency

Action Description
Efficiency and conservation measures for industrial and commercial buildings will be addressed in partnership with MidAmerican Energy. Existing programs such as the Industrial Partners program, which provides systems and facilities audits, may also play a role in achieving GHG reductions.

Measures will include:

- Energy efficient system improvements (where equipment is inefficient, or cost/benefit analysis assures significantly quick payback scenario)
- Installation of energy efficient heating and cooling equipment
- Installation of energy efficient office and other equipment
- Installation of efficient lighting
- Requiring the use of informational tools that may include but are not limited to benchmarking and energy assessments
- Direction installation of efficient lighting
- The installation of sensors and monitors to automatically adjust processes based on time and needs

Additionally, available sources of funding should be highlighted (eg. utility incentives) and new funding possibilities (eg. PACE) explored. The City should incentivize voluntary actions for continued sustainability initiatives, such as acquiring a green building certification that focuses on reducing energy use (WELL, etc).

Commercial and industrial energy efficiency and conservation measures reduce greenhouse gas (GHG) emissions while lowering operating costs and improving occupancy comfort for employees. For broad community-wide penetration rates, opportunities should be established for all size businesses with appropriate incentives that encourage small “mom and pop” shop business owners to larger ones. Retrofits should focus on the most cost effective improvements and should take a two pronged approach, addressing building inefficiencies and system inefficiencies in manufacturing.

Getting to 2025
By 2025, 10 percent of buildings should see improvements that reduce energy use by an average of 30 percent (a 3 percent savings). Requiring benchmarking for all commercial and industrial buildings by 2025 will help in the identification of building priorities to meet the 2050 goal.

Getting to 2050
By 2050, commercial and industrial buildings should reduce energy use by 50 percent.

GHG Reduction Potential
108,831 MT CO2e (shared with commercial/industrial energy efficiency)

Background
Like its residential counterpart, commercial and industrial buildings account for a significant amount of Iowa City's emissions, at 20% (196,646 $MMtCO_2e$) and 25% (251,901 $MMtCO_2e$), respectively. Reducing energy consumption in these buildings, most of which will still be in operation in 2050, is key to Iowa City reaching its climate goals.

Timing
Short to mid-term.

Implementation Partners
The City should coordinate local partners across the business community and those in the energy and climate industries. Iowa City Area Chamber of Commerce, Iowa City Downtown District and the Iowa Association of Business and Industry can offer insight and access to building owners and their needs, while MidAmerican Energy, USGBC-Iowa, and local program implementers and energy professionals can provide guidance on energy efficiency.

Next Steps for Action
The City's first steps should be to engage MidAmerican in a conversation on current program participation in the utility's existing efficiency programs for small business, commercial and industrial building owners, and from that conversation begin to identify efficiency success areas and potential for growth, while also examining gaps that may benefit from more targeted efforts.

Costs
Implementing energy efficiency programs of a large-scale results in costs for the program administrator both in terms of the incentive value that is passed through to the customer[1] as well as administrative costs associated with running the program. In aggregate, these programs can be costly depending on their scope and extent but ultimately energy efficiency is a cost-effective resource when compared to other alternatives. In Iowa, as in other states around the country, investor-owned utilities are required to offer energy efficiency programs to their customers and therefore the structure to offer incentives for commercial and industrial energy efficiency in Iowa City is already in place.

In addition to program administration and implementation costs, there would be a cost associated with undertaking of the project for the commercial or industrial property owner, part of which could theoretically be subsidized by available incentives.

[1] Note: this incentive cost, however, can be quantified as a benefit for the customer.

Benefits

Industrial and commercial energy efficiency and conservation measures reduce greenhouse gas (GHG) emissions while lowering business operating costs and improving occupancy comfort for employees. For an average business, implementing energy efficiency retrofits such as the ones recommended in this action could lead to an annual reduction of almost $4,000 in natural gas and electricity costs.

Ultimately, utilities also benefit from energy efficiency improvements, as energy efficiency is oftentimes referred to as the cheapest method to providing electricity to customers. Collectively, energy efficiency savings can help the utility avoid the costs of having to develop new generation capacity as well as additions to transmission and distribution systems.

Additional Information

MidAmerican Energy Industrial Partners: https://www.midamericanenergy.com/ia-bus-industrial-partners.aspx; https://www.midamericanenergy.com/content/pdf/ee/ee_industrial_partners_brochure.pdf

MidAmerican Energy Assessments for Small Commercial Customers https://www.midamericanenergy.com/content/pdf/ee/ee_ces_assess_fact_sheet.pdf

MidAmerican Energy Assessments for Large Commercial Customers https://www.midamericanenergy.com/content/pdf/ee/ee_ces_assess_large_fact_sheet.pdf

"How to Create Big Opportunities to Save Energy for Small Businesses." American Council for Energy Efficient Economy. November 21, 2016. Accessed on February 1, 2017: https://aceee.org/blog/2016/11/how-create-big-opportunities-save

"Increasing Participation in Utility Energy Efficiency Programs." American Council for Energy Efficient Economy. August 2015. Accessed on February 1, 2017: http://aceee.org/local-government-utility-partnerships-increasing

Improve Energy in New Construction

Action Description

Iowa City's built environment is growing—and while a large focus on addressing energy consumption is in existing buildings, it is crucial to ensure that new buildings are built to high efficiency standards since they too are likely to remain a part of the city's landscape for many, many decades. Further, the easiest and cheapest way to improve energy efficiency is at the time of construction. While energy code improvements are an often-relied upon strategy, the impact of a strong energy codes can vary depending on reliable enforcement of the code. Through 2025, the actions to be undertaken will focus on improving enforcement to increase compliance with the city's energy code, thereby eliminating lost efficiencies.[1]

Getting to 2025

In 2025, new buildings must demand less energy by 30% less than today's buildings through a mix of code enforcement and some inherent building and technology improvements. The City will:

- Identify key areas where enforcement of the city's energy code can lapse and develop steps to close those gaps
- Identify and/or develop improved energy code training opportunities for code enforcement staff and implement them
- Invest in developing and implementing free or nominally-priced training and educational opportunities for builders on the sustainable code related topics
- Review and consider adoption of each International Energy and Conservation Code (IECC) revision with a goal to adopt at least every other revision cycle, or once every six years.[2]
- Partner with relevant agencies to develop a Net Zero Energy phase-in plan that embraces a mix of strategies through code, renewables, design, site selection and consumption habits

Getting to 2050

In order to meet the aggressive emissions reduction goal for 2050, building code alone is not enough to help meet energy emissions reductions. The city will need to implement additional actions to transform the way our buildings consume energy—and this transformation can include many technologies that exist today, plus those that are on the horizon in the coming years. "Net Zero" buildings are those that produce enough on-site renewable energy to sustain itself without reliance on traditional fossil fuels. [3] While not feasible to immediately enact a net zero energy policy, the City will take steps towards achieving this monumental goal for new buildings.

New buildings must demand less energy by 80% less than today's buildings through a combination of building code enforcement, renewable energy, building design and site selection, fuel switching and consumption habits (behavior change). The City will:

- Implement a phased-in process (as determined by the Net Zero Energy Plan) that results in an 80% reduction of energy demand

[1] Source: Pacific Northwest National Laboratory

[2] Iowa City's adopted the International Code Council's 2015 International Energy Conservation Code (IECC 2015).

[3] U.S. Department of Energy "A Common Definition for Zero Net Buildings." September 2015.

- The City will continue to update its energy code every three to six years per the International Energy Conservation Code (IECC) for gained efficiencies that promote using energy more efficiently, regardless of its source—renewable or not.

GHG Reduction Potential
57,456 MT CO2e

Background
Iowa City's current energy code is the 2015 International Energy Conservation Code (IECC), which is higher than the State's adopted 2012 IECC. The IECC Codes are developed and updated every three years by the International Code Council in an iterative process that includes the voices of many different stakeholders. While the City can certainly examine the new revisions of 2018 IECC, efficiencies in residential and commercial/industrial may only represent incremental opportunities for Iowa City at this time. For the immediate future, the City should strongly consider focusing the Iowa State Energy Plan's call to improve building code compliance as a strategy to increase overall energy savings. "To realize the full benefits associated with building energy codes it is important to ensure that compliance verification is carried through…local jurisdictions often lack sufficient resources to support compliance activities, such as inspections and trainings, at the community or county level." [4] In addition to energy savings, the City can improve employee satisfaction and build stronger relationships with its partners in the construction industry through the development of well-designed internal and external training/educational programs.

As the City improves code compliance, it is also important to note that the best opportunity to achieve the highest energy efficiencies in buildings is at the time of construction—it is cheaper to build a building more efficiently and to implement renewable energy features during construction as opposed to retrofitting a building later on. Net zero buildings are proof that buildings can be built today in such a manner that they can create enough energy to sustain itself and not rely on the electric grid or other fossil fuel consumption. Net zero and in general, any effort to increase on-site renewable energy reduces emissions and annual energy expenditures for the owner, while promoting reliability and resilience strategies.[5]

Lastly, in recent years the City adopted rules that require LEED certification for any building receiving public funds. The metrics in this action do not account for these rules, since LEED certification is a mix of sustainable metrics not specific to just energy, and thus, more difficult to pinpoint average energy savings. Further, it applies only to a small number of publicly funded buildings.

Timing
Code Compliance: Short Term
The Road to Net Zero: Long Term

Next Steps for Action
Establish a task force to review all potential gaps in enforcement by gathering and reviewing input from staff, builders, architects and other potential stakeholders. Begin developing set of next steps. Establish team of partners to set forth Net Zero Energy Plan interim targets and goals.

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[4] Iowa State Energy Plan http://www.iowaenergyplan.org/docs/IowaEnergyPlan.pdf
[5] "Benefits of Renewable Energy Use" Union of Concerned Scientists https://www.ucsusa.org/clean-energy/renewable-energy/public-benefits-of-renewable-power#bf-toc-5

Implementation Partners
Iowa City can tap into local resources that engage builders include Greater Iowa City Home Builders Association[6] and the Iowa City Area Chamber of Commerce[7], who are likely able to assist in gathering input, and also provide other suggestions on who to engage. Technical assistance partners in developing training and education materials may include The Building Codes Assistance Project[8], the Midwest Energy Efficiency Alliance[9] and U.S. Department of Energy's Building Energy Codes Program[10]. Net zero partners should include I-RENEW (Iowa Renewable Energy Association), Midwest Renewable Energy Association, New Buildings Institute (NBI) and Net-Zero Energy Homes Coalition.

Costs
Implementation of the actions described herein will have moderate costs to the city associated with the review and enforcement of building code activities. While sometimes designing an efficient building can have higher initial costs than a "non-efficient project" for the builder, the benefits outweigh the costs over the lifetime of the building.

Benefits
Energy-efficient building designs not only result in significant energy savings compared to a baseline building for its occupants and owners, over the lifetime of the building, but also provided additional benefits in terms of comfort and durability.[11] Efficient buildings can also help increase tenant demand for comfortable working environments, and attract investors wishing to acquire responsible investment.[12]

Additional Information
U.S. Department of Energy's Building Energy Codes Program: code compliance training catalog https://www.energycodes.gov/resource-center/training-catalog

The Building Codes Assistance Project: compliance portal that covers compliance planning assistance, a local planning implementation kit, case studies and other resources http://bcapcodes.org/compliance-portal/

"Successful Strategies for Improving Compliance with Building Energy Codes" research presented at the 2012 ACEEE Summer Study on Energy Efficiency in Buildings by Ryan Meres, Institute for Market Transformation; Jeremy Sigmon, U. S. Green Building Council; Mike DeWein, Building Codes Assistance Project; Ken Garrett, B&F Technical Code Services; and Jim H. Brown, City of Gillette, Wyoming http://bcapcodes.org/wp-content/uploads/2015/12/Strategies-for-Improving-Compliance-with-Building-Energy-Codes.pdf

Net Zero Energy Communities: Three Cities Leading the Way: http://aceee.org/files/proceedings/2016/data/papers/10_1034.pdf

[6] http://www.iowacityhomes.com/
[7] https://www.iowacityarea.com/
[8] http://bcapcodes.org/
[9] http://www.mwalliance.org/
[10] https://www.energycodes.gov/
[11] https://energy.gov/energysaver/energy-efficient-home-design
[12] http://www.nrcan.gc.ca/energy/efficiency/buildings/eenb/4033

Maharishi University of Management Net Zero Building, Fairfield, Iowa
https://www.iowasource.com/2012/04/18/eco2012_04_mum/

California Residential New Construction Zero Net Energy (ZNE) Action Plan
http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy/Energy_Programs/Demand_Side_Management/EE_and_Energy_Savings_Assist/ZNERESACTIONPLAN_FINAL_060815.pdf

Increase On-Site Renewables

Action Description

On-site renewable energy allows single users/owners of homes, businesses or major industry to tap into renewable resources and remove some or all reliance on traditional fossil fuels. The visionary leadership at MidAmerican Energy expressed their intent to be a 100% renewably sourced electric utility in the near future and is diligently working towards this goal. As such, the more established and commonly seen electric-based renewable energy kinds of strategies will not result in advancing Iowa City's emissions goals – because the City's electric consumption will already benefit from the utility's 100% renewable energy sourcing.

Getting to 2025

To that end, Iowa City will focus its efforts on renewable heating and cooling strategies that reduce natural gas consumption for reducing emissions through renewable energy and in some cases electrification—also known as thermal decarbonization.[1] Actions fall into three categories: application, funding and legislation/rule changes.

APPLICATION

- Partner with University of Iowa and key interest groups/organizations to conduct a citywide thermal decarbonization viability study that examines citywide potential for heat pump water heaters, air source heat pumps and geothermal
- Complete an internal municipal study to assess thermal decarbonization opportunities across the city's building stock and develop a prioritized action plan to implement it

FUNDING

- Work with a local lending partner to develop a comprehensive home loan program for larger renewable energy projects
- Partner with like-minded municipal partners and organizations across Iowa to lobby the state for adoption of commercial (and possibly residential) PACE (Property Assessed Clean Energy) enabling legislation

LEGISLATION OR RULE CHANGES

- Remove or revise current limits on Iowa City's Housing Rehabilitation loan program specific to energy efficiency projects, such as date windows, maximum amount, and possibly income qualifications
- Amend the zoning ordinance to incorporate the principles of passive solar building design in all zoning districts
- Develop a process by which to require all new planned development residential and mixed- use construction to address passive solar design as a part of the planning and development process

Getting to 2050

In order to meet the aggressive emissions reduction targets for 2050, the city will need to implement actions in its own operations while supporting communitywide uptake across all building sectors. While all electricity consumption will come from renewable sources due to MidAmerican's commitment, this still does not come close to meeting the City's 80% emissions reduction target for 2050. To aid in

[1] "Renewable Heating and Cooling Best Practices." Urban Sustainability Directors Network and the Carbon Neutral Cities Alliance Innovation Funds. December 2017.

reaching that target, renewable energy strategies must address an aggressive approach at citywide natural gas consumption, and particularly so in existing buildings since they represent the largest percentage of buildings in Iowa City.

The city must strive to help convert 25% of the city's existing building stock to include on-site renewable energy systems, converting 50% of electricity consumption and 30% of total natural gas consumption to renewable energy. The most likely measures will be heat pump water heaters, air source heat pumps and/or geothermal.

- After 2025, target those building owners deemed most likely to adopt the prescribed renewable hot water and heating/cooling strategies as outlined in the study, combined with those who could benefit the most from the cost savings in order to aggressively reach a 25% penetration rate as quickly as possible
- By 2030, the City achieves a 30% reduction in natural gas consumption across its municipal buildings through the application of heat water pumps/solar PV hot water, air source heat pumps and/or geothermal
- By 2030 Require all new and renovated buildings to supply 100% of the hot water demand through heat pump water heaters (or other approved renewable energy technologies)
- By 2035, require that at the time of sale, all buildings be renovated to include heat pump water heaters (or other approved renewable energy technologies), with assistance or considerations made for low income building owners

GHG Reduction Potential
8,147 MT CO2e

Background
The City has already investigated its zoning ordinance to remove regulatory restrictions that unintentionally prohibit onsite renewable energy systems such as height restrictions, side yard rules and accessory uses. However, Iowa City must do more to encourage the procurement of on-site renewable energy, and do so with systems that reduce natural gas consumption in order to capture the most emissions savings.

In Iowa City, 26% of total emissions in 2015 are from natural gas consumption, with the majority of that consumption (38%) occurring in residential buildings, followed closely behind by commercial buildings (31%). It is the second largest source of emissions after electricity, which shrink and all but disappear once MidAmerican Utility achieves its 100% renewable goal in the very near future.[2] There are cities in this similar situation that have also come to this realization and have begun focusing on developing communitywide strategies to initiate renewable energy solutions for natural gas consumption—which essentially means addressing heating and cooling in buildings.

Iowa City already has several installations of geothermal that fit this category. For example, Iowa City Fire Station #4 boasts over 50% energy savings with a geothermal HVAC system and the Iowa City Animal Care and Adoption Center also has geothermal heating and cooling.

In addition to geothermal, cities have identified two additional best practices:

[2] Iowa City 2015 Greenhouse Gas Emissions Inventory.

Heat Pump Water Heaters (HPWH): Water heaters are the second highest source of energy consumption in homes across the United States. Instead of generating direct heat through natural gas, HPWHs use electricity to move heat. from one place to another.

Air Source Heat Pumps (ASHP): ASHPs is a system that transfers heat from outside a building to the inside, or vice versa, for heating and cooling purposes. It can be used to offer solutions for full heating and deomestic hot water usage, meaning a building owner would not likely install both ASHP and HPWH.

Difference between Air Source Heat Pumps and Geothermal: ASHPs are different from geothermal, though they both are installed to heat and cool buildings. Geothermal or "ground source heat pumps" (GSHPs) are underground and tap into a far more stable temperature than what is experienced across Iowa City's four seasons. Other differences include cost, maintenance and in some cases, product lifetime.

Timing
Mid to long term.

Next Steps for Action
First, Iowa City should establish the team to conduct the viability assessment and begin that work. Second and coinciding with this work, the City should begin a two-pronged approach at identifying financial products that can aid consumers in the installation of on-site renewable energy systems while mobilizing local partners to engage the state on supporting legislation to allow municipalities to construct PACE programs. This work may take years to put in place, and the need to reduce emissions is urgent.

Implementation Partners
Iowa City should reach out to agencies already strategizing on renewable energy in the community Johnson County and Midwest Renewable Energy Alliance (Solarize Johnson County), I-RENEW (Iowa Renewable Energy Association), Iowa Solar Energy Trade Association and any other like-minded nonprofit organizations. To delve deeper into financial products and the development of programs to increase renewable energy penetration in Iowa City, key partners to engage include State of Iowa (Iowa Economic Development Authority), PACE Nation and/or other PACE supporting organizations, and local banks and other lending institutions.

Costs
Implementation of the actions recommended herein will have minimal to moderate costs, particularly for initiatives related to the development of the decarbonization viability studies and any ordinance and rule changes. Beyond that, moving forward with the implementation of technology such as geothermal systems, passive solar design of buildings, or solar thermal systems will have costs that range from small to moderate depending on the scale of the project, incentives and tax credits available at the time of implementation and varying costs of equipment.

Benefits
In addition to lowering its carbon's footprint, reducing a building's reliance on natural gas for heating by using technologies such as the ones mentioned in this action can decrease the ongoing costs associated

with natural gas bills. Depending on the technology being implemented users can decrease their heating costs between 15-50 percent.[3]

Additional Information

"Renewable Heating and Cooling Best Practices Guide." December 2017. Urban Sustainability Directors Network and Carbon Neutral Cities Alliance Fund (No link available as of 2/8/18.)

HeatSmart/CoolSmart Somerville: A Massachusetts city's program to encourage installation of air source heat pumps. The program includes negotiated pricing with partner contractors and consumer information on available incentives, etc.
https://www.somervillema.gov/departments/programs/somerville-energy-efficiency-now-seen/heatsmart-coolsmart-somerville

General Information on Heat Pump Water Heaters, U.S. Department of Energy, as accessed on 2/6/18
https://www.energystar.gov/products/water_heaters/heat_pump_water_heaters

Commercial PACE (Property Assessed Clean Energy) Assessment Fact Sheet for Local Governments, by U.S. Department of Energy https://energy.gov/sites/prod/files/2017/10/f39/FL1710_WIP_CPACEv2.PDF

Implementation Model:
Property Assessed Clean Energy (PACE) Program, (Milwaukee, WI) by Better Buildings Challenge/U.S. Department of Energy https://betterbuildingssolutioncenter.energy.gov/implementation-models/property-assessed-clean-energy-pace-program

PACENation, a membership-based organization that provides assistance in developing successful PACE legislation across the country; website includes good resources http://pacenation.us/

"Iowa Energy Assessment and Planning for a Cleaner Future" by Iowa Renewable Energy Association
https://irenew.org/wp-content/uploads/2016/02/Iowa-Energy-Assessment-Report.pdf

Barcelona Solar Ordinance requiring all new and renovated buildings supply 60% of hot water demand via solar thermal or other renewable energy source
http://www.iea.org/publications/freepublications/publication/cities2009.pdf

[3] http://www.envirotechgeothermal.com/geothermal_advantages.html

Implement Employer and Commuter Solutions

Action Description

Getting to 2025

For this action, the City will focus on providing solutions for commuters by coordinating with large employers and prioritizing:

- Strategies that improve multi-modal access to large employment centers.
- Prioritize public transportation projects that enhance connections between existing neighborhoods and jobs.
- Expanding the existing Zipcar sharing program beyond university limits.
- Encouraging the establishment of carpool or ridesharing programs, starting with city employees.
- Collaborating with large employers to explore options for providing incentives in the form of parking at reduced monthly rates for carpools or priority parking spots.
- Encouraging businesses to offer telecommuting, teleconferencing, and flexible work schedule options to their employees.

Getting to 2050

In addition to the actions listed above, reaching the 2050 goals will require a further push for transferring long-range travel that currently occurs on personal vehicles to public transportation. The primary action that would help achieve this goal is to identify solutions for passenger rail service between major cities in the area.

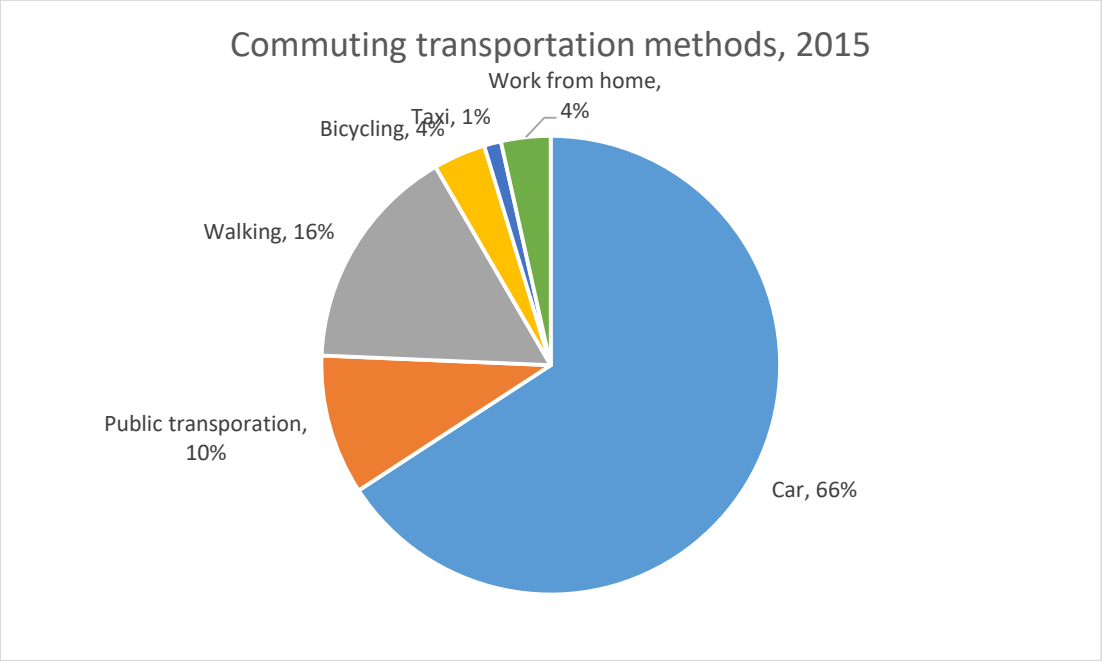
GHG Reduction Potential

2,753 MT CO2e

Background

As of 2010, nearly 8,900 Johnson County residents commute to adjacent counties on a daily basis. The greatest number of inter-city- commuters travel from Coralville to Iowa City (4,611), followed by Iowa City residents who commute to Coralville (3,038), and North Liberty residents who travel to Iowa City on a daily basis for work (1,325).[1] The 2015 American Community Survey estimates that 66% of workers who live in Iowa city commute by personal vehicle, and of those, 57% drive alone while approximately 9% carpooled. A further 10% uses public transportation, while almost 20% walk or bike to work – Figure 1.

[1] Page 25 and 26 of Future Forward plan.



Source: American Community Survey, 2015

While Iowa City's average commute time is lower than the national average, 15.8 minutes compared to 24.8 minutes,[2] there are significant opportunities to reduce commute time while finding cleaner transportation options to complete this commute. As an example, the State of Iowa has begun undertaking efforts to promote more efficient commuting through has a web-based statewide rideshare program (iowarideshare.org) that allows Iowans to find viable commute options including carpool partners, cycling buddies, transit routes, and more.[3] The program has been adopted by the University of Iowa where it is estimated that faculty, staff, and students have the potential to cut commuter costs in half. The University has also worked to introduce car sharing to Iowa City with Zipcar, a car share program that allows anyone to reserve a car online or by phone. Zipcar stations are currently provided at three locations on the University's campus with a total of 6 cars.[4]

Recognizing that more alternatives may been needed in the future to support regional travel, several local stakeholders in coordination with the Iowa Department of Transportation recently completed a Feasibility Study to explore options for an Iowa City to Cedar Rapids Passenger Rail. The study recognizes that there are approximately 3,634 commuter trips from Cedar Rapids to Iowa City per day on I-380,[5] and considered potential types of passenger rail service, general capital, operating and maintenance costs, service frequencies, regulatory issues, and funding options.[6] A second phase of the study also looked at the feasibility of rail service operating between Iowa City and North Liberty. In the next few years, future additional studies will be completed with the objective of identifying funding and developing a plan for moving forward with project implementation.

Timing

Short term implementation (1 year) for employer strategies, longer term exploration for rail.

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[2] page 31 of Future Forward plan
[3] Iowa State Energy Plan
[4] http://www.zipcar.com/universities/university-of-iowa
[5] Page 105 Future Forward plan.
[6] Page 107 Future Forward plan

Implementation Partners
Increasing education and awareness of residents and businesses requires collaboration with multiple stakeholders including large employers based in the City, community-based organizations, the University, Iowa Department of Transportation and other interested groups.

Next Steps for Action
Create communication points to encourage employers to adopt practices recommended in the action description and identify potential opportunities for the development of a program for city-employees.

Costs
Establishing programs to offer alternatives to commuters can range from low-cost for educational initiatives, to high-cost for the public transit and infrastructure projects. On the longer term, implementing a regional passenger rail system would have significant cost and require funding from multiple local, regional, and federal agencies.

Benefits
Commuting strategies such as carpooling and ridesharing help increase mobility around the city due to less traffic congestion, while reducing greenhouse gas emissions and particulate air pollution. Programs for employees that afford more flexibility also have the potential to reduce trips while increasing employee satisfaction and therefore retention. Furthermore, with car sharing and ride sharing options, households have the benefits of having a car for occasional trips without the burden of full-time car ownership, and they can save thousands of dollars per year in car payments, insurance and other maintenance costs.

Additional Information
Blue Indy is an all-electric car-sharing service that was piloted in 2014 in Indianapolis, Indiana. By joining this program, citizens have the option to rent an EV and pay for the time used. This program is the largest U.S. test of plug-in car-sharing, and was developed in partnership between the City of Indianapolis, the local utility company and the French company Bollore Group.

Minneapolis, Minnesota is making care sharing convenient by reducing sales tax on car sharing services and differentiating the from traditional car rental models.[7]

Through a creative combination of alternatives to ownership and technology, the City of Loveland Colorado implemented a program in 2013 to reduce its fleet of vehicles without reducing vehicle availability for the employees that use them. The City replaced aging city vehicles with a reduced number of shared vehicles equipped with automated rental technology used in Enterprise Rent-A-Car's popular car-sharing program, WeCar by Enterprise[8].

Other references:
https://www.icgov.org/city-government/departments-and-divisions/transportation-services/transit/zipcar
https://now.uiowa.edu/2016/10/ui-rideshare-save-commuters-time-money

[7] http://www.minneapolismn.gov/www/groups/public/@citycoordinator/documents/webcontent/wcms1p-113598.pdf
[8] http://www.cityofloveland.org/Home/Components/News/News/1122/

Embrace Electric Vehicles/Alternative Fuel Vehicles/Emerging Technologies

Action Description

Getting to 2025

As a critical transportation strategy for meeting greenhouse gas reduction goals, it is important for Iowa City to facilitate the transition of traditional-fuel vehicles to greener technologies such as electric-vehicles[1], alternative fuel vehicles,[2] and automated vehicles. The actions to be undertaken are two-fold: those that apply to the city's vehicle fleet and others that encourage transition of personal vehicles to cleaner technologies.

For its non-emergency City fleet, the city can implement several strategies to lead by example and reduce greenhouse gas emissions:

- Increase the number of electric vehicles in the City's fleet by 2025. The City can explore options to group with other Iowa or Midwestern cities to negotiate purchase of electric cars with manufacturers in bulk. Other options include developing municipal EV car sharing program as an expansion of the current car share program available through Zipcar.[3]
- Analyze the option to convert all city buses to biodiesel fuel blends or even battery-electric buses the next time that the City is looking at replacement.
- Provide electric vehicle charging stations and other alternative fueling options at City-owned facilities.[4]

Other city efforts to be undertaken include:

- Education: The city can play a major role in removing informational barriers that exist amongst citizens to help them understand alternative-fuel capabilities and their associated benefits through the development of informational materials and educational programs and events.
- Policies: requiring commercial and multi-family properties to provide EV charging and requiring new developments to be "electric vehicle-ready", therefore helping mass quantities of people access critical infrastructure.
- Incentives: explore incentives for electric vehicles through the waiving of registration fees, purchase subsidies, and designated parking benefits.
- Planning: Undertake effective planning efforts for other emerging technologies, such as automated vehicles. Planning will ensure that the city is ready to take advantage of the technology once it becomes viable for market deployment.
- Automated Vehicles: Continue to support the Iowa Department of Transportation in the implementation of the Automated Vehicle Technologies Project.

Getting to 2050

In order to meet the aggressive emissions reduction goal for 2050, the city will need to implement additional actions to transform the cars we drive and the fuel we use away from petroleum. The city must strive to help convert over 50% of the city's vehicle to cleaner fuel vehicles.

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[1] Note: electric vehicles can be green to the extent that the electricity used to power the vehicle has been generated with clean energy resources such as wind and solar energy. Given that the majority of the electricity provided by MidAmerican Energy will be generated from wind energy, electric vehicles are poised to help the City reduce their emissions considerably.

[2] The sustainability and emissions of an alternative fuel must be further examined from a lifecycle perspective. However, the use of biodiesel typically helps lower GHG emissions from vehicle exhaust resulting from gasoline combustion.

[3] http://www.zipcar.com/press/releases/zipcar-partners-with-houston-for-ev-fleet-sharing-program

[4] Note: the city has set aside funds in 2018's budget to add two EV charging stations to visible public parking facility locations.

- Complete replace all municipal fleet vehicles, including all public transit buses, with electric vehicles that are powered through clean electricity, or other non-carbon emitting technologies such as hydrogen fuel-cells.
- Enact an ordinance that bans diesel vehicles from transiting within the city limits.
- Develop an enact policies that support the expansion of electric vehicle charging around the city, including requirements for new developments to be "charge-ready".
- Encourage the private sector to move away from gasoline vehicles by potentially offering incentives to residents and businesses who purchase clean vehicles and implementing requires tor medium and heavy-duty vehicles.

GHG Reduction Potential
97,275 MT CO2e

Background
The City has a fleet of vehicles that is used for municipal operations. The city currently only has one hybrid electric vehicle, no compressed natural gas vehicles, and four used electric "trucks" that the wastewater plant uses to drive around their facility.[5] Efforts in past year have also included the use of biodiesel for fleet and buses, but due to recent price increases of the fuel it became unfeasible for the city to continue this practice.

In terms of private vehicles, as of March 2016, the city had 48 electric vehicles registered with the State, ranking four in the state in terms of total electric registered vehicles.[6] While these numbers are still small, the market for electric vehicles is expected to continue growing worldwide, and in fact, a study commissioned in 2016 by the Iowa Economic Development authority forecasts the EV market in Iowa to grow as well.[7] Through analysis of current and future demand, the plan identifies Iowa City/Coralville as one of seven areas of priority for location of public EV charging stations.[8]According to Plugshare.com[9], there are currently 15 electric vehicle charging stations located within a 10- mile radius of Iowa city (both public[10] and private) and an additional 11 charging stations within a 30-mile radius.[11]

While the costs of electric vehicles continue to decrease due to advances in technology and increased demand, there are still several informational barriers to adoption that can be addressed through educational programs, as well as local policy barriers that can encourage adoption.

In addition to electric vehicles, there are newer connected and automated vehicle technologies that are in early development stages and that have the potential to significantly reduce greenhouse gas emissions through a shared-economy approach and more efficient routing. Connected vehicles are vehicles that communicate with the driver, other vehicles, and roadside infrastructure, while fully automated vehicles would be labeled as self-driving. There are differing opinions on how quickly this new technology will become mainstream but it will likely occur within the timeframe of this Climate Action Plan, and therefore it is important to monitor progress in these technologies. As of March 2017, the Iowa Department of Transportation, in partnership with the University of Iowa, Iowa State

[5] Source: city staff
[6] Advancing Iowa's Electric Vehicle Market Report, page 4
[7] https://www.iowaeconomicdevelopment.com/userdocs/documents/ieda/AdvancingIowasElectricVehicleMarketReport.pdf
[8] page 30, Figure 15.
[9] Note: Plugshare.com allows EV drivers and users to upload station locations with a companying information.
[10] http://www.afdc.energy.gov/locator/stations/
[11] https://www.plugshare.com

University, local jurisdictions, and other stakeholders was undertaking the Automated Vehicle Technologies Project to initially deploy technologies that support automated vehicles regionally along several project locations in Iowa in the Cedar Rapids-Iowa City transportation network[12, 13].

Timing
Mid- and long- implementation (2-7 years) due to the early stages of the technologies.

Implementation Partners
Iowa City can be a focal point for collaboration with state government, MidAmerican Energy, nonprofit groups, and local businesses. On topics related to automated vehicles, implementation partners will include the Iowa Department of Transportation and the University. The Clean Cities Coalition at the Iowa Economic Development Authority can also provide support with outreach and public education of electric vehicles.

Next Steps for Action
Review city fleet for identification of priority actions based on the age of infrastructure, replacement cycles, and budget available. Begin developing educational campaigns.

Costs
Replacing the entire city fleet with electric vehicles and adequate infrastructure for operation will have moderate costs that need to be planned and budgeted out. According to recent estimates, the average price of an electric vehicle in 2017 was $39,500,[14] with the cost of installation of Level 2[15] charging station ranging from $1000 to $19,200.[16]

Benefits
Despite the high initial cost of purchasing, electric vehicles have the potential to deliver significant economic benefits to riders. Assuming a typical efficiency for an electric vehicle and comparing against regular gasoline vehicles, a household in Iowa City traveling 20,000 miles per year, can save approximately $1,600 in fueling costs when replacing a gasoline vehicle with an EV.[17]

In addition to saving on the cost of fuel, owners of electric vehicles experience benefits such as low-cost of maintenance. Individuals who also install solar panels on their properties have the added benefit of being able to generate the electricity needed for charging the vehicle. In addition, MidAmerican Energy offers time-of-use rates for residential and commercial owners which may provide savings to customers who have the ability to shift significant usage, including electric vehicle charging, to nights and weekends[18].

Businesses and multi-family buildings that install charging stations often strengthen their brand and public image. Offering charging stations, or preferred parking for alternative fuel vehicles, shows

[12] Iowa Energy Plan
[13] https://www.iowadot.gov/pdf_files/IowaVisionDocument.pdf
[14] https://www.forbes.com/sites/energyinnovation/2017/09/18/the-future-of-electric-vehicles-in-the-u-s-part-2-ev-price-oil-cost-fuel-economy-drive-adoption/#f449850345ce
[15] Level 2 charging stations provide 10–20 miles of range per 1 hour of charging and are most appropriate for "hot spots" where demand for charging is high, such as employment and retail centers. Level 1 stations are less expensive but more appropriate for households.
[16] Iowa EV plan, Table 15
[17] Assumes a typical EV efficiency of 0.24 kwh/mile compared to 23 MPG for gasoline vehicles, and an average electricity rate of $0.0835/kWh (2015).
[18] https://www.midamericanenergy.com/electric-vehicles.aspx

commitment to environmental issues and results in employee/tenant attraction and retention.

Additional Information

The International Council On Clean Transportation, in its report Assessment Of Leading Electric Vehicle Promotion Activities In United States Cities (2015), shares best practices and initiatives that various cities across the U.S. are undertaking to encourage adoption of electric vehicles. Other national efforts include:

- National Drive Electric Week: a nationwide celebration intended to heighten awareness of EVs.
- EV Everywhere Grand Challenge: created by U.S. Department of Energy in which partners set a goal of providing charging for a portion of EV-driving employees.

In 2017, 30 U.S. cities came together to negotiate a major purchase of electric cars for their municipal fleets with manufacturers. The cities jointly asked automakers for cost and feasibility estimated to provide over 110,000 cars to be split among them.[19]

The American Association of Motor Vehicle Administrators has an Autonomous Vehicles Best Practices Working Group to identify advances and best practices of self-driving vehicles.

Cities like Paris, Madrid, and Mexico City have announced plans to ban all diesel vehicles in their city by 2025[20]. Other cities such as Indianapolis[21] and San Bernardino[22] have begun incorporating electric busses into their fleets, and have seen significant savings in maintenance and fuel.

[19] https://www.greencarreports.com/news/1109410_30-cities-join-to-explore-10-billion-electric-car-purchase
[20] https://www.theguardian.com/environment/2016/dec/02/four-of-worlds-biggest-cities-to-ban-diesel-cars-from-their-centres
[21] https://www.indygo.net/electric/
[22] http://www.fleetowner.com/powertrain/san-bernardino-receives-electric-buses-powered-motiv

Improve and Enhance Mass Transit

Action Description

Getting to 2025

To encourage further use of public transportation options, the City of Iowa City will:

- Complete a transit route study to understand options for creating or revising bus service routes and hours of operation to increase access to underserved areas, and to gather intelligence on customer needs.
- Identify opportunities for coordination with bicycle and pedestrian efforts so that riders are offered alternative options of transportation for the "last mile" of their trips.
- Establish intelligent transportation systems that provide real-time arrival information to riders through cellphones or informational monitors, increase route frequency and scheduled hours, and reduce travel times. [1]
- Offering more bus service routes that help increase access for underserved communities.
- Concentrate development of infrastructure around transit corridors in density/mixed-use neighborhoods.[2]
- Evaluate option for replacing cash-fares with convenient transit passes that can be pre-paid and work with multi-modal public transportation such as bicycle rentals that are part of the bike share program. This approach would include working with the University to allow students to wrap cost of transit into their student fees.
- Embrace other customer-centric strategies through the development of mobile ticketing and route planning applications that integrate multiple modes of transportation (CAMBUS route, city buses and rental bicycles), as well as through modernizing of infrastructure such as bus stop shelters for safe and comfortable waiting periods.

Getting to 2050

In order to meet the aggressive emissions reduction goal for 2050, the city will need to implement additional actions to transform the cars we drive and the fuel we use away from petroleum. For public transit, the city should aim to double transit ridership, while improving access for lower income and other transit-dependent populations. Actions will include:

- Replace all public transit buses, with electric vehicles that are powered through clean electricity, or other non-carbon emitting technologies such as hydrogen fuel-cells.
- Support the build out of new transit routes and upgrade of existing routes as specified in the Future Forward 2045 Long Range Transportation Plan.
- Improve the efficiency of the current public transportation network by coordinating with land use patterns to reduce miles travelled and energy consumption, making investments in intelligent transportation systems, and reviewing route efficiency.
- Incorporate the objective of reducing greenhouse gas emissions into any form of transportation planning.

GHG Reduction Potential

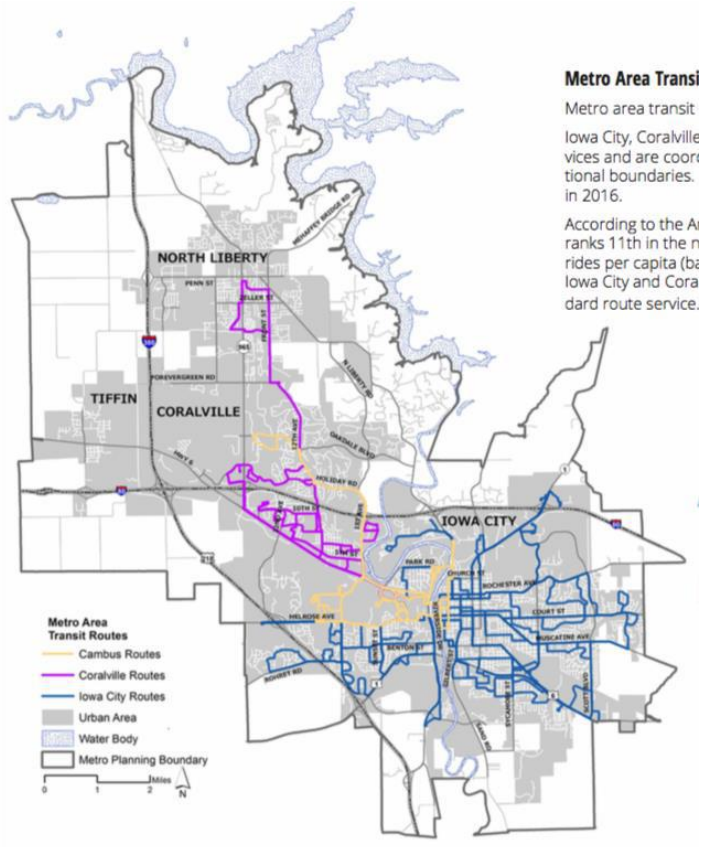
10,447 MT CO2e

[1] http://www.livablecommunity.org/Handler.ashx?Item_ID=B3B3F06A-CEF8-4BFD-8467-1F7D443498AB

[2] http://www.livablecommunity.org/Handler.ashx?Item_ID=B3B3F06A-CEF8-4BFD-8467-1F7D443498AB

Background

With 7.1 million rides completed in 2015, the Iowa City Metro Area ranks 11th in the nation for the highest number of bus rides per capita, at 66 rides.[3] The Iowa City Transit operates 27 bus routes across the City and University Heights using modern buses that include bike racks on standard route service[4]. All routes originate and terminate in the central downtown transit interchange on Washington Street, with service being offered Monday through Saturday, and some special night schedules offered on certain routes. Free transfers are issued to allow passengers to make a complete one-way trip from one part of town to another.[5]



Source: Future Forward 2045 Long Range Transportation Plan

The public transit system is funded through a combination of federal and state tax support, and approximately 20% of the funds are provided by the fares charged to the public.[6] Riding the bus requires having exact fares which range from $0.75 for youth to $1.00 for adults, children under five years old ride free[7]. Special rates are also available for the disabled and elderly with a special pass required, and on Saturdays there are special family fares ($1 per family). Regular riders are encouraged to purchase daily, 10-ride, or monthly bus pass for $32 which provides unlimited ridership for the calendar month.[8] University of Iowa Students can also purchase a yearly pass for $240, and Kirkwood students can

[3] http://www.livablecommunity.org/Handler.ashx?Item_ID=B3B3F06A-CEF8-4BFD-8467-1F7D443498AB
[4] http://www.bongo.org/routes/iowa-city/
[5] http://www.iowacity.com/icarrive.htm
[6] http://www.livablecommunity.org/Handler.ashx?Item_ID=B3B3F06A-CEF8-4BFD-8467-1F7D443498AB
[7] http://www.iowacity.com/icarrive.htm
[8] https://www.icgov.org/city-government/departments-and-divisions/transportation/transit/fares-and-passes

purchase a semester pass for $100. Iowa city transit also provides complementary paratransit services to senior citizens and persons with disabilities who are unable to use the regular bus service.[9]

In addition to the city's transit routes, the University of Iowa CAMBUS provides a free, fixed-route public transit service that provides frequent intercampus transportation for students, faculty, staff, and the general public.

A recent report by the American Public Transportation Association found that a drastic decline in ridership has been taking place on major public transit systems in cities nationwide, with almost a 4.1% decline in ridership due in part to lower gas prices. Iowa City has not escaped this trend and ridership has decreased in recent years due to a combination of detours and reroutes due to construction, mild winters, and lower gas prices.

Timing
Mid-term implementation (2-3 years).

Implementation Partners
MPOJC, as the transit planning organization for Iowa City Transit should lead the planning and implementation effort. Other stakeholders that should be involved include business leaders, the public, and transit organizations.

Next Steps for Action
The City will work with stakeholders to prioritize actions as part of its strategic planning process over the next year, with an emphasis on equity in transit system service.

Costs
The costs of implementing public transit projects are typically substantial and need to be budgeted out in advance. According to the Future Forward Plan produced by the Metropolitan Planning Organization, anticipated funding needs for bicycle, pedestrian, road, and bridge needs add up to a total of $548 million for the period 2017-2045.[10] As a point of comparison, adding a single new fixed route bus costs about $460,000.[11] The plan assumes that there will be a revenue shortfall of approximately -$168 million for that same time period associated with the transportation improvements that are required.

Benefits
Despite high implementation costs, public transportation provides significant economic benefits to riders, including an option for completing travel for those that cannot afford other alternatives.
For instance, by replacing only 10% of its total trips with public transportation a household can save $218 per year in avoided gasoline costs. This does not include additional savings that can be realized when a household replaces a vehicle and therefore eliminates parking, insurance and maintenance costs.

Additional Information
A document that remains relevant to best practice in public transportation is the ***Best Practices for Public Transportation: Guidance for Local Governments and Transit Operators to Achieve the***

[9] https://www.icgov.org/city-government/departments-and-divisions/transportation-and-resource-management/transit/seats
[10] Future Forward Plan page 57.
[11] Future Forward Plan, page 108

Blueprint Vision of Significantly Increased Transit Use put together by the Sacramento Transportation & Air Quality Collaborative.

Cities like Hong Kong and Toronto have created **overlapping networks of transportation modes** (subways, buses, streetcars, bike-shares, car-shares, etc.) linked by easily accessible real-time information systems. Connectivity is the key to the success of New York's transit system. In July 1997, the introduction of the free transfer "gold" MetroCards united the city's subway and bus systems and dramatically increased ridership by 17%.[12]

[12] http://www1.nyc.gov/assets/planning/download/pdf/plans/transportation/world_cities_pt1.pdf

Enhance Bicycle and Pedestrian Transportation Options

Action Description

Getting to 2025

Iowa City has adopted a complete streets ordinance that establishes the city's commitment to designing, building, operating, and maintaining public streets that accommodate people of all ages and abilities, regardless of their mode of travel.[1] To further support this commitment, Iowa City will advance and support infrastructure that promotes active modes of transportation such as walking and biking. In particular, these actions will also help to provide "last mile solutions" for individuals to have alternative options for making the final sector of their travels with bicycle and pedestrian options.

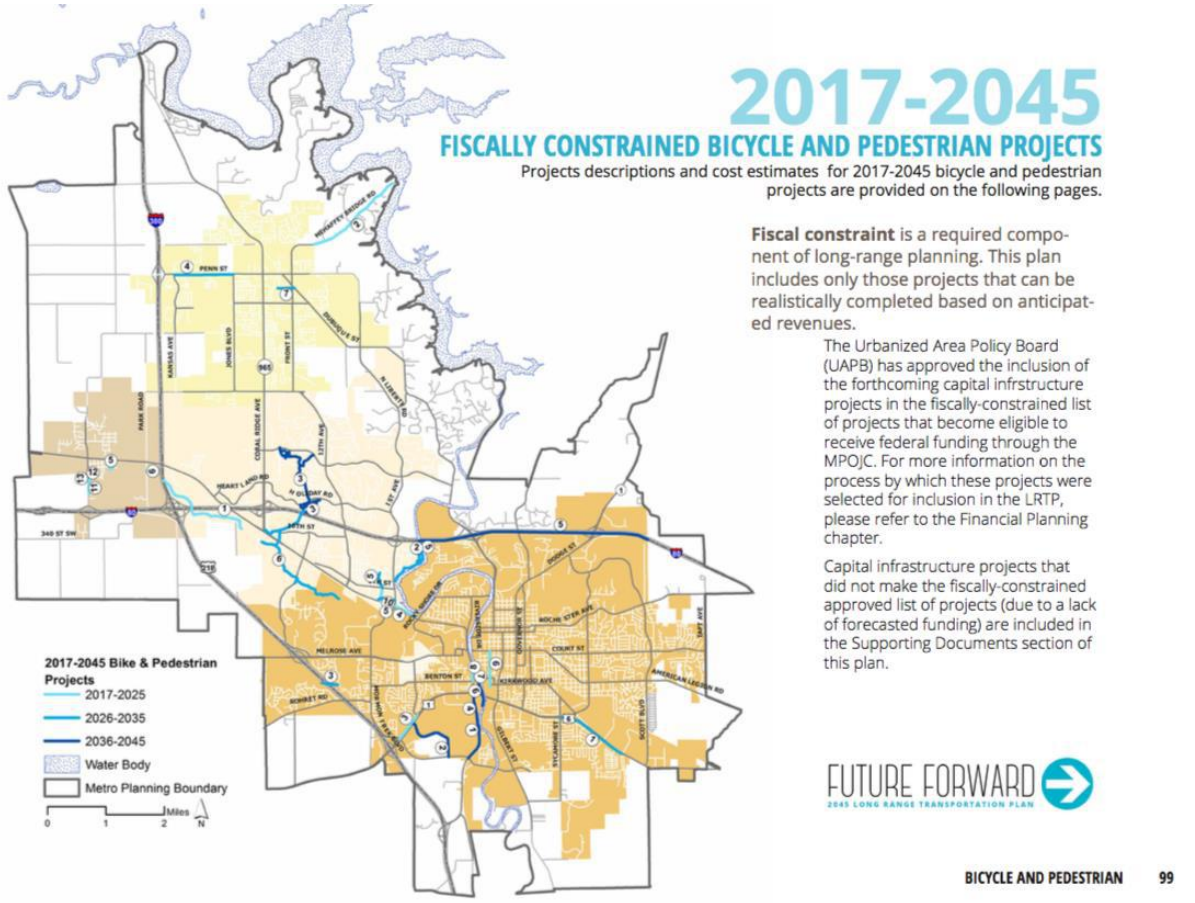
To continue to support bicycles the city will implement initiatives to enhance infrastructure, including actions identified in the Bicycle Master Plan such as:

- Continue to work towards the development of a bike sharing program that is open to the public and that is coordinated with the public transportation system to ensure bicycles are available to complement other modes of transportation.
- Support biking through the development policies and ordinances that address secure bike storage and bicycle parking requirements.
- Undertake immediate-term projects identified in the Bicycle Master Plan to increase the number and connectivity of bike routes including routes to underserved populations.[2] The Plan itself identifies over 100 miles of recommended bikeways prioritized by timeframe of implementation.
- Enhance the safety of bicycle lanes through the development of designated bike-lanes lanes, protected intersections, wayfinding, and other traffic signs.
- Continue to implement educational and awareness programs in partnership with local advocacy organizations and community groups to increase bicycle skills and traffic safety.

In addition, in order to support pedestrian traffic and promote walking trips for short distances, the city will continue to improve walking infrastructure and sidewalk amenities in critical pedestrian corridors of the City, as identified in the City and Pedestrian Mall Streetscape Plan that was completed in February of 2014. This includes:

- Continue to implement priority projects as identified in the City and Pedestrian Mall Streetscape Plan.[3]
- Explore sustainability and green infrastructure strategies such as conversion of street lighting to LEDs, and equipping bicycle parking canopies with solar panels.
- Promote walkable neighborhoods by addressing aging infrastructure, creating a lighting framework and establishing wayfinding, as well as identified opportunities for developing and enhancing safe routes to school to encourage children to adopt healthy habits of walking and biking.
- Increasing walkability by implementing policies that encourage the mixing of residential and commercial space within the same area.

[1] Bicycle Master Plan, page 44
[2] Bicycle Master Plan, Table 9, page 112
[3] Iowa City Downton and Pedestrian Mall Streetscape Plan, Page 150, Prioritization chart.



Source: Future Forward; 2045 Long Range Transportation Plan, page 99. https://www8.iowa-city.org/weblink/0/edoc/1583377/Future%20Forward%202045%20Long%20Range%20Transportation%20Plan.pdf

Getting to 2050

To achieve the 2050 emission reduction goals, the City should look to replace at least 50% of conventional trips originating in the city with sustainable transportation options such as bicycle, pedestrian, public transportation, or clean vehicles. To achieve this number, the city should work on providing suitable public transportation options to residents, offering streets and public spaces that are safe and easy for pedestrians and cyclists, and begin working towards compact development that permits shorter-length trips to be performed through non-conventional vehicle options.

GHG Reduction Potential

2,182 MT CO2e

Background

Iowa City has demonstrated its commitment to making bicycling a safer, easier, and more convenient form of transportation and has earned the League of American Bicyclist's (LAB) Silver Bicycle-Friendly Community (BFC) designation. As part of its efforts to obtain Gold designation, and make the city more bicycle-friendly, the City adopted its Bicycle Master Plan in August of 2017. The Bicycle Master Plan envisions Iowa City as a community where people of all ages and abilities have access to a comfortable, safe, and connected network of bicycle facilities, and where bicycling is an integral part of daily life and culture.

As of the summer of 2017, Iowa City had over 37 miles of shared-use paths primarily along the Iowa River Trail, which is the backbone of the Iowa City bike network.[4] In addition, nearly 52 miles of sidepaths expand the off-street trail system into neighborhoods, schools and other community destinations[5], and there are approximately 6 miles of bicycle lanes in Iowa City designated as an exclusive space for bicyclists with pavement markings and signage.[6]

The City has also made concerted efforts to incorporate bicycle parking into streetscape projects in the downtown area, and support policies that codify bicycle parking minimums.[7] As a valuable partner in this effort, the University maintains a strong online presence for bicycling and organizes a wide array of bicycle-related education and encouragement programs. In addition, there are multiple non-profit organizations and community groups that advocate for improved bicycling in Iowa City and Johnson County. Finally, efforts are currently underway to develop a first phase of a city bike share program in partnership with the University.

In terms of pedestrian infrastructure, the City has also made significant strides to promote walkability in downtown areas. In 2014, the City Council adopted the Iowa City and Pedestrian Mall Streetscape Plan to guide future utility and streetscape investments by the City of Iowa City over the next 10 to 15 years. Construction for the project identified under the plan began in 2017 and the bulk of the improvements are anticipated to begin in April 2018.[8] The first phase will be Dubuque Street improvements, from the Washington Street entry to fronting at the Sheraton/soon-to-be Graduate Hotel. The second phase, beginning spring 2019, will take place on the north and south ends of College Street, between Linn (by the Library) and Clinton Street (Capital Mall).[9] As part of the project, the City will focus on enhanced accessibility to make curb ramps compliant with the Americans with Disabilities Act (ADA), implement street/sidewalk replacements, adding people and dog water fountains, adding bicycle parking options, upgrade benches, install LED street lighting, install decorative planters, increase consistent parallel parking, and incorporate public art installations.[10]

Timing

Mid-term implementation (2-3 years). Infrastructure projects require a mid-to-long term timeframe to accommodate planning to implementation activities.

Implementation Partners

Implementation of these initiatives will require coordination amongst various city departments including Sustainability, Traffic, Parks and Recreation, and Police. In addition, for bicycle-related efforts coordination can occur through a Bicycle Coordinator position and with assistance from the Bicycle Advisory Committee through its ongoing meetings. Other important implementation partners include Iowa State University, nonprofits and community-based organizations that support bicycle and walking activities.

Next Steps for Action

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[4] Iowa City Bicycle Master Plan, page 16. **https://www.icgov.org/project/iowa-city-bicycle-master-plan**
[5] Iowa City Bicycle Master Plan, Page 18
[6] Iowa City Bicycle Master Plan, page 18
[7] Iowa City Bicycle Master Plan, Page 33
[8] Source: City staff
[9] Source: City staff and https://www8.iowa-city.org/weblink/0/doc/1482535/Electronic.aspx
[10] **https://downtowniowacity.com/wp-content/uploads/2016/08/2014.02-IC-DT-Streetscape-Master-Plan-Report.pdf**

Continue meetings of the Bicycle Advisory Committee and fill out the position for the Bicycle Coordinator. Continue to seek funding opportunities for implementation of infrastructure projects.

Costs

The costs of implementing infrastructure projects, such as the bicycle path additions identified in the Bicycle Master Plan, or pedestrian improvements identified in the Iowa City and Pedestrian Mall Streetscape Plan are substantial and need to be budgeted out in advance. Priority projects with estimated costs are identified in both of these plans[11,12] with costs ranging from $64,000 per mile of buffered bike lane, to $1.1 million per mile of shared use paths, and $1-$5 million for pedestrian improvement projects.

The costs of implementing a bicycle-sharing program are more moderate in comparison. As a benchmark, costs for the city of Des Moines bike share program are estimated at $35,000 for the installation of a 13-dock bike.[13] There are of course, additional maintenance costs that are incurred, but these could be partially covered through the revenue generated from rentals.

Benefits

Though the city bears most of the costs associated with the bike sharing program, riders will find significant economic benefits associated with replacing short vehicle trips with bicycles. Using comparable numbers from the Des Moines bike share program, and assuming residents take over 5,000 trips per year in rental bicycles Iowa City residents choosing to ride could save up to $1,100/year collectively in avoided fuel costs[14].

Other non-economic benefits include the prevention of greenhouse gas emissions that are associated with residents choosing to walk and ride bicycles more, therefore driving less. In addition, walking and biking are transportation choices that promote health, increase independence of the riders/walkers, reduce the impact of noise, address congestion, improve the quality of public spaces, and boost the economy by creating a community that is an attractive destination for new residents, tourists and businesses.

Additional Information

The **City of Davis**, California has been working on bicycle planning efforts since the 1970s and has long been known for its progressive view of transportation. Davis has more bikes than cars, operates two bicycle advisory committees and employs two full-time bike coordinators, and has bike lanes on 95-percent of its major streets.[15] The city has implemented a series of bike friendly innovations such as bike-only roundabouts, bike signal heads to improve traffic flow and detection technology that increases efficiency and safety.

In Iowa, the **city of Des Moines** has a bicycle sharing program called Des Moines BCyle. Through this program, members can pick up a bike at any station and return it to that same station or any other station after they complete use. Computers available on the bicycles allow members to track the miles

[11] Page 111 of Bicycle Master Plan and
[12] Page 150 of Streetscape Master Plan.
[13] https://www.desmoinesregister.com/story/news/local/des-moines/2016/12/05/collective-expand-des-moines-bike-share-program/95002246/
[14] Conservative estimate assumes 10,000 miles per year traveled in bicycles and replacing gasoline vehicle rides.
[15] https://www.wired.com/2009/05/what-makes-a-city-bike-friendly-ask-davis-california/

they ride, the calories they burn, the carbon emissions they avoid, and the dollars they saved by using a bicycle instead of a vehicle.

The City of Ann Arbor, Michigan, a University town has a bike share program that is owned and operated by Clean Energy Coalition, a non-profit located in downtown Ann Arbor. The program, called ArborBike was developed in partnership with the University of Michigan, the City of Ann Arbor, TheRide, and Clean Energy Coalition.

Mixing of residential and commercial space within the same area is an urban planning strategy that contributes to walkability. For example, **New York's** rating as the number one walkable city in the country is due primarily to density, but also to the comingling of commercial and residential space throughout all neighborhoods of the city. Today, fully 56% of New Yorkers do not own a car.[16]

The National Association of City Transportation Officials offers multiple resources around Bike Sharing programs: http://nacto.org/bikeshare/

Other references:
http://www.thegazette.com/subject/news/iowa-city-progresses-with-bicycle-master-plan-20170708
https://www.icgov.org/project/downtown-and-pedestrian-mall-streetscape-plan
http://downtowniowacity.com/get-around/
https://www.thrillist.com/travel/nation/most-walkable-cities-in-us-pedestrian-friendly
http://cityofdavis.org/city-hall/public-works/bike-pedestrian-program/bike-plans
https://www.wired.com/2009/05/what-makes-a-city-bike-friendly-ask-davis-california/

[16] https://www.thrillist.com/travel/nation/most-walkable-cities-in-us-pedestrian-friendly

Increase Composting

Action Description
In Iowa City's waste stream, decomposition of organic waste is the most significant source of emissions. Reducing the volume of organic waste is important in meeting reduction goals. Iowa City already has a successful composting program that has been in existence since the spring of 2017. To increase the overall diversion of organics, the City will continue to support the expansion of the current composting program by:

- **Focusing efforts on source reduction** to prevent food from being wasted in the first place. This will be done by continuing the promote the source reduction toolkit, Food: Too Good To Waste and other resources.
- **Providing additional outreach and educating** single family homes and other properties receiving City collection service on how to properly set aside food waste for curbside collection to increase the efficiency of the current program and the volume of organic material being composted.
- **Engaging commercial kitchens, food facilities and other major organic waste producers** such as food service organizations, schools and hospitals to send their organic waste to the City's compost facility.
- Considering **establishing a city ordinance** requiring large food waste producers to divert organics.
- Reviewing options for **increasing capacity of the city's compost facility**. This will be needed to be able to accept increased volumes of food waste.

In addition, the City can work to **encourage individuals and organizations** that are not serviced through the program to **implement composting practices at their own homes** and properties by providing education on how this can be done. As more residents practice in-home composting, presumably more food waste can be diverted and City collection trips can potentially be reduced. Composting efforts can also be **expanded through community initiatives** that take place in gardens, schools, universities, and other community centers. These initiatives have the benefit of keeping the process and product as local as possible while engaging the community through participation and education.

GHG Reduction Potential
9,198 MT CO2e (shared with increasing recycling/waste reduction)

Background
According to a 2017 waste characterization study, food waste makes up almost 24.8% of the waste that goes into the Iowa City Landfill each year, or around 27,877 tons per year.[1] This is a significant increase from a previous 2011 study that had estimated food waste at 18,000 tons per year.[2]

Food that is thrown away, not only results in dollars being thrown away for residents, but food that decomposes in landfills contributes to greenhouse gas emissions with the production of methane, a greenhouse gas that is twenty-one times more potent than carbon dioxide. According to the US. Environmental Protection Agency, food waste accounts for an estimated 13% of US greenhouse gas

[1] Waste Characterization Study, 2017 page 98. Total waste estimated at 112,411 in 2016 (from page 16)
[2] Waste Characterization Study, 2011

emissions which are associated with every level of food "production, processing, transport, and disposal."[3]

The City of Iowa City has been working towards reducing landfilled food waste for several years, and in 2016 the City set waste minimization targets as part of its STAR sustainability ratings[4]. In the spring of 2017, after a successful pilot, the City began offering curbside food waste collection services to over 15,000 households in an effort to divert some of the approximate 7,500 tons of organics that reach the Iowa City Landfill each year. This composting program allows residents to compost many different types of foods as well as paper products. Residents with Iowa City curbside garbage collection can set out food waste at the curb (either with yard waste[5] or in its own container) to be picked up and turned into compost, along with yard waste and other organics, at the Iowa City Landfill and Recycling Center's commercial compost facility.[6]

In its first year of operation, the program composted 995.1 tons of food waste, and, combined with yard waste that was composted, the City was able to sell around 2,100 tons of finished compost.

Timing
Short term implementation.

Implementation Partners
These initiatives would be led by the department of Public Works under their Solid Waste program with support from the Sustainability Department. Other implementation partners vary depending on the initiative but will likely include private solid waste haulers, community organizations and centers that can organize community composting centers and large food waste producers.

Next Steps for Action
The City should begin discussing initiatives with implementation partners and developing materials for increased outreach.

Costs
Expanding educational and outreach programs to encourage reduction at the source would have minimal costs to the city, as the infrastructure is already in place to deliver information and materials. Actions requiring the expansion of the Iowa City Landfill and Recycling Center compositing program would be costlier. As a point of reference, the annual cost of running the composting program at the Iowa City Landfill and Recycling center was xx in 2017 and doubling the capacity of the facility would have a cost of xxx-xxx.[7] The city also incurs monthly operation costs of about $2.00 per single-family dwelling or apartment up to four units that participates in the organics (yard waste and compost) recycling program.[8] The fee is passed down to the household.

[3] https://nrcrecycles.org/mobius/nrcwp-content/uploads/2015/01/IRA-White-Paper.pdf
[4] *https://www.icgov.org/news/city-rolls-out-new-curbside-composting-service*
[5] Note: yard waste, which is organic material that generates methane gas as it decomposes, has been banned from all Iowa landfills since 1991 https://ilsr.org/rule/on-farm-composting/iowa/
[6] https://www8.iowa-city.org/weblink/0/edoc/1575202/Iowa%20City%20food%20waste%20brochure.pdf
[7] Numbers not available at time of firs draft; will be available before 2/15/18 meeting
[8] https://www.icgov.org/city-government/departments-and-divisions/finance/revenue/utilities/rate-schedules

Benefits

Composting efforts result in a byproduct that can be sold to subsidize part of the facility's operation. Approximately 2,100 tons of finished compost is produced and sold each year[9] at a cost of $20 per ton of compost[10], therefore clearing approximately $42,000 per year in sales revenue. Large producers of organic waste can also see an economic benefit to composting efforts. The city's tip fee for commercial organics is $24/ton[11] which is lower than most tipping fees associated with waste disposal.

By implementing source reduction practices families can also realize significant savings. Recent estimates value the amount of food thrown away by the average American household at $2,200 each year, and presumably this number can be reduced by being more conscious about food purchase and disposal.[12]

Other benefits:

In addition to saving money, there are several environmental benefits of organic waste diversion:

- In a landfill, organic materials break down and produce landfill gas, which consists of approximately 49 percent methane. Methane is a greenhouse gas that is about 21 times more harmful to the environment than carbon dioxide.
- For the past several years, the Iowa City Landfill and Recycling Center has regularly sold out of compost. Diverting more organics for processing into compost would help meet the community's growing demand for more compost.[13]
- When we throw away food, we also waste all the water and energy used to produce, package and transport food from farm to plate.

Best Practices

The U.S. EPA Region 5 has a published a guide titled: ***Best Management Practices in Food Scraps Programs*** that summarizes best practices from more than 180 commercial and residential food scraps collection programs across the U.S.
http://www.foodscrapsrecovery.com/EPA_FoodWasteReport_EI_Region5_v11_Final.pdf

The Institute for Local Self Reliance provides a guide for community composting titled ***Growing local Fertility: A Guide to Community Composting***.
https://ilsr.org/growing-local-fertility/

In 2009, **San Francisco** passed a city ordinance that made composting food waste mandatory, making it the first U.S. city to tackle the issue on such a large scale. Today, the city diverts about 80 percent of all its waste to recycling and composting[14] and has been able to create revenue for the city through the sales of the compost[15]. Details on the Zero Waste program are available at: https://sfenvironment.org/zero-waste-in-SF-is-recycling-composting-and-reuse

[9] https://www.icgov.org/commercialorganics
[10] https://www.icgov.org/commercialorganics
[11] https://www.icgov.org/commercialorganics
[12] http://www.theswagusa.com/2017/04/20/10-shocking-food-waste-statistics/
[13] https://www.icgov.org/commercialorganics
[14] San Francisco: http://news.nationalgeographic.com/news/2013/06/130618-food-waste-composting-nyc-san-francisco/
[15] https://www.azcentral.com/story/entertainment/dining/food-waste/2017/08/03/san-francisco-mandatory-composting-law-turns-food-waste-money/440879001/

Other References:

http://www.thegazette.com/subject/news/government/local/food-waste-joins-curbside-composting-in-iowa-city-20170313
https://nextdoor.com/agency-post/ia/iowa-city/city-of-iowa-city/yard-waste-and-compost-collection-changes-coming-in-2018-72532896/
https://www.icgov.org/foodwaste
https://www.icgov.org/commercialorganics

Increase Recycling (through education and outreach campaign)

Action Description
Educational and outreach efforts are essential parts of any city waste reduction program. However, many educational initiatives are unsuccessful because they fail to engage residents in a way that they feel ownership of their own waste. Leveraging neighborhood pride and creating innovative and creative campaigns that incorporate a sense of community can be a very successful strategy.

The City will design and develop a highly-visible and creative campaign to promote reduction of overall consumption of disposable goods and products, offer alternatives for product reuse, and improve recycling rates amongst the city residents and businesses. The campaign should be results-focused, with a stated goal, for example 30% waste reduction by 2030, and offer opportunities for engagement. The campaign should also plan on communicating metrics of achieved progress at different time intervals so residents can see the impact of their individual actions (amount of recycling per month, year to date, etc.) and explain how these metrics tie to the benefits that residents and businesses realize.

Campaign initiatives can also include:

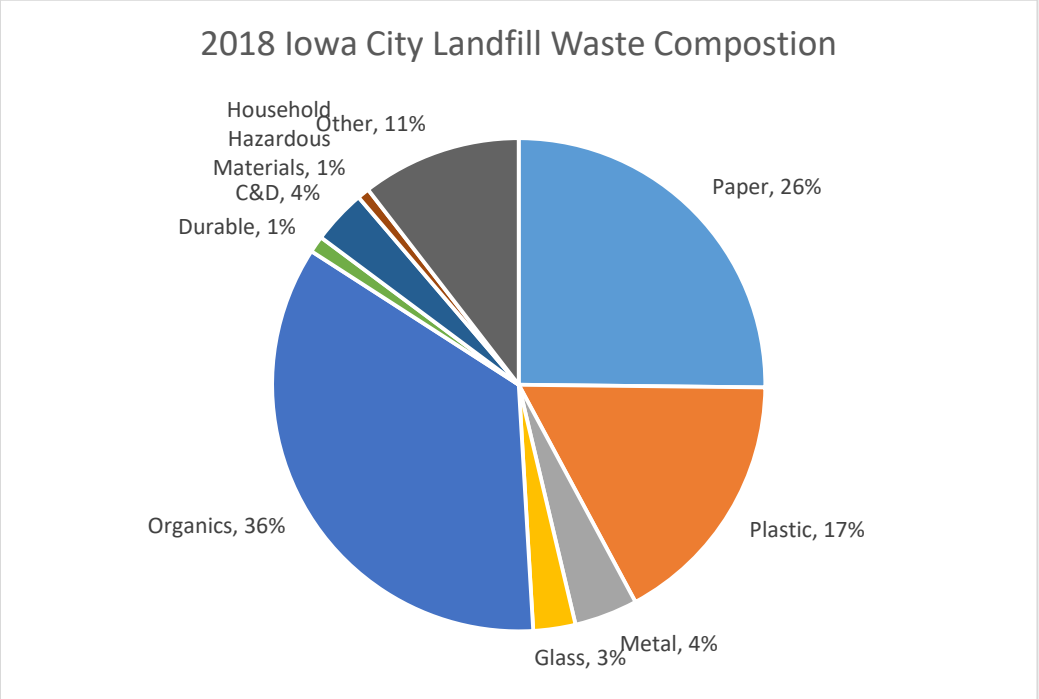
- Social media posts to engage an audience and create visibility for work already being done.
- Information for residents delivered through newsletters, on practical tips for reducing their waste stream, for example opt-out options for marketing collateral such as junk mail.
- Hands-on recycling workshops being offered in partnership with nonprofits and/or university students.
- Support for the commercial sector in development of employee-programs.
- Assistance to k-12 educational facilities in incorporating reduction and recycling information into the school's curriculum and practices.
- Educating and collaborating with large venues that host events, such as sporting and music events, to make sure waste is reduced and recycled.
- Create a Community Action Toolkit with tips for residents and businesses.

To better target campaign efforts, the city can learn from bin collectors which neighborhoods consistently have empty bins, and then focus additional education in that area by using public space to advertise or leveraging the voices of community leaders.

GHG Reduction Potential
9,198 MT CO2e (shared with increasing recycling/waste reduction)

Background
In 2017, the City diverted 825.94 tons of plastic, paper, cardboard, metal, glass, plastic bags through drop-off recycling sites, and an additional 1,583.37 tons of material were collected through the curbside recycling program.[1] Although recycling efforts have grown in recent years, these numbers only represent 1.7% of the total 137,000 tons of trash that entered the Iowa City Landfill in 2017 and ample opportunities still exist to divert recyclable paper, plastic, and other materials from entering the landfill.[2] In fact, data from the 2017 Iowa Statewide Characterization Study shows that a high percentage of the municipal solid waste entering the Iowa City landfill has a high potential for recyclability – see image below.

[1] Jennifer Jordan, Resource Management Superintendent
[2] Jennifer Jordan, Resource Management Superintendent



[3]

But in order to accomplish greater recycling rates, Iowa City residents need to be given the information and tools they need to increase recycling efforts in each home and business.

Currently, as part of its recycling program, the City maintains a dedicated website with recycling information and resources available to the public at https://www.icgov.org/recycling. Additionally, the City makes available to the public educational opportunities and materials with tips and information. For example, the East Side Recycling Center, is a site for the public to learn about waste reduction by touring the center or having a speaker talk about waste reduction or recycling. Special events are frequently organized during Earth Day celebrations, Rummage in the Ramp, Farmers Market, and at the Iowa City Public Library.

The Iowa City Landfill also provides assistance with education/outreach through templates for email, posters, and printed materials for distribution. This is partly funded through the ECO Iowa City program, which is a grant-funded initiative to improve environmental sustainability in Johnson County, Kalona and Riverside.[4] ECO Iowa City offers a series of events, programs, hands-on workshops, films, book recommendations and discussions, incentives and free resources.

Timing
Short term implementation, aiming for a campaign launch within a year.

[3] 2017 Iowa Statewide Characterization Study, page 98
[4] **http://www.ecicog.org/eco-iowa-city.html**

Implementation Partners
These initiatives would be led by the department of Public Works under their Solid Waste program with support from the Sustainability Department. Other implementation partners will include the University of Iowa and local nonprofit groups.

Next Steps for Action
The first step to developing this educational campaign will be for the city to assign resources to it, whether that be by creating a new position or adding responsibilities to an existing position. Volunteer time and effort will be integral to achieving a successful campaign, and volunteer recruitment and support should be of the main responsibilities of the staff person.

Costs
Educational campaigns have the benefit of having a relative-low cost, depending on the outreach channels used and the reach of the efforts. With the advent of social media, and by leveraging local newspapers, the City will be able to reach multiple people at a low-cost. For example, an educational campaign in New York reports costs of $14.81 to reach a 1,000 people.[5]

Benefits
The benefits of educational campaigns are multiple and can often translate to real economic savings. Residents that get informed about recycling programs can increase their recycling rates, therefore reducing landfill operating costs for the city. At the same time, residents that begin reducing their consumption can save money by avoiding the purchase of unnecessary materials and products. Businesses that implement recycling practices can benefit from a positive public imagine that oftentimes attracts more customers.

Additional Information
San Francisco has the highest recycling rate of all cities in the country, with an estimated 80 percent success rate at keeping discards out of landfills as of 2013. This is partly due to the environmental consciousness that exists amongst its residents, but also because of several bans and rules that the city has implemented about how residents and businesses can dispose of their waste. For example, recycling and composting are mandatory and residents face fines if they place recyclables in regular trash bins.

The **City of Houston** has implemented a collaborative program between its Solid Waste Management Department and the Houston Arts Alliance, to engage local artists and designers in decorating the recycling truck fleet. The art is indented to inspire public enthusiasm and ignite an interest in the action of repurposing materials.[6]

The City of **New York** has instituted an innovative social media campaign to increase interest and participation in recycling programs. The campaign, called "Where are the Binnies?" involved placing small green and blue recycling bin beanie toys, representing the bins from the curbside recycling program, in various locations around NYC, taking photos of them, and posting the pictures on our social media channels with a clue about the location. Residents who guessed the location correctly were entered into a raffle to win a set of Binnies, along with informational literature on recycling.
https://swana.org/Portals/0/awards/2016/winners/NYCDepartmentofSanitation_AwarenessCampaign.pdf

[5] **https://swana.org/Portals/0/awards/2016/winners/NYCDepartmentofSanitation_AwarenessCampaign.pdf**
[6] https://nextcity.org/daily/entry/how-to-get-people-to-recycle-creative-ways

In **San Jose**, California, as part of their Clean Recyclables Cart campaign, waste haulers will note residences with consistently missorted recyclables and compostables. City staff will assess the situation, contact residents and provide educational material available in several languages. The City has also undergone major efforts to cut trash generated at public events.[7]

Other references:
https://www.icgov.org/city-government/departments-and-divisions/solid-waste
http://www.ecicog.org/eco-iowa-city.html

[7] http://www.takepart.com/article/2014/09/17/5-cities-are-recycling-superstars

Increase Multifamily Recycling

Action Description
While the multifamily recycling program is enforced, and therefore participation from every multifamily building is expected by end of 2018, there are opportunities to educate landlords and property managers in an effort to expedite participation. In addition, education of tenants is important to ensure that they are properly sorting out their waste and maximizing recycling rates. The city can make available educational materials, such as new tenant/owner packet, and undertake campaigns to increase recycling rate.

Educational efforts could be developed in conjunction with tenant associations and could involve identifying "champions" within each building that sign a pledge to help educate their neighbors and other tenants, as well as developing friendly competitions between different buildings. It is important to note that constant education will be critical to address high turnover in residents, property owners and property managers.

GHG Reduction Potential
9,198 MT CO2e (shared with increasing recycling/waste reduction)

Background
An estimated 45 percent of Iowa City's households, or 12,000 of the city's 27,000 residences, are in buildings larger than four-plexes that are not provided recycling services through the city curbside pickup program.[1] Seeing an opportunity to engage multifamily residences, in 2012, the Iowa City Landfill and Recycling Center implemented a pilot recycling program for multifamily apartments and condominiums in Iowa City. The pilot was funded in part by participating apartment landlords/managers and condominium associations, the Iowa City Landfill and Recycling Center and the Iowa Department of Natural Resources' Solid Waste Alternative Program.[2]

As a result of the pilot, on November 1, 2016, City Council passed a resolution requiring all multifamily apartments and condominiums with four units or more to provide recycling for their tenants. The mandate is now in full effect and extended recycling to more than 10,000 households in Iowa City that had not previously been offered the option.[3] Compliance enforcement is done through rental permits, which is something that must be done every two years. By November 2018, all multifamily housing should have recycling services on-site for tenants.

The City offers assistance to tenants and owners/managers by organizing meetings to discuss how to start recycling program, and making education materials available to tenants and condo owners. In addition, the City has created a Best Management Practices Manual to offer recommendations for apartment and condominium recycling.

Another recent development is a ban on cardboard landfill disposal that came into effect in 2018. The ban aims to reduce the amount of cardboard received by the landfill, estimated at approximately 4,000[4]

[1] http://www.press-citizen.com/story/news/local/2015/12/28/city-considering-mandate-apartment-recycling/77982258/
[2] https://www.icgov.org/recyclepilot
[3] https://www.icgov.org/recyclepilot
[4] http://littlevillagemag.com/iowa-city-apartments-recycling-mandate/

tons per year, and to prevent methane emissions that result from decomposing cardboard buried in landfills.

Timing
Short term implementation.

Implementation Partners
Partnerships with owners and managers of multifamily complexes will be critical to success. Tenants should be actively involved in creating and rolling out recycling plans in their buildings.

Next Steps for Action
Meet with property owners and managers to get feedback on the program. Work with tenant leaders to identify educational needs of tenants and strategies for engagement around recycling and related building initiatives.

Costs
Since this is a mandatory program, there is a cost that is borne by property managers and owners to provide the service. In some instances, it is likely that property managers are passing through the cost to the homeowners' association and condominium owners. It is estimated that the current average cost to landlords is $2.57 per unit per month.[5] With an estimated 12,000 units in Iowa City classified that are part of buildings with five units or more, the current estimated total annual cost of implementation is approximately: $370,080.

In addition to the economic costs of compliance, some small and older properties may have difficulty with compliance due to having a limited space for extra recycling bins and trash facilities.

Benefits
While it is not possible to quantify the benefits of expanding recycling rates, there are several non-economic benefits that should be considered. For example, residents of multifamily properties are afforded the option of recycling materials within their waste stream. Recycling programs bring positive attention, thus increasing the desirability of a building. Recycling programs can also instill a sense of community among residents and a sense of pride for helping out the City and the environment.

From an environmental standpoint, diverting materials that would otherwise end up in the City's landfill can extend the longevity of the landfill itself and maintain disposal costs and rates. In addition, the energy spent to recycle materials like aluminum, plastic, paper and glass is far lower than the amount of energy that it takes to produce new materials[6].

Additional Information
Seattle has implemented a successful "Friends of Recycling" program, which consists of identifying a volunteer champion for a property's recycling efforts, that is trained to monitor collection containers, hang up posters, and educate other residents. In exchange for participation, the buildings receive a one-time $100 credit for waste collection.
http://www.seattle.gov/util/MyServices/FoodYard/BldgOwnersManagers_FoodYard/RecyclingSteward/index.htm

[5] https://sustainability.uiowa.edu/news/iowa-city-considering-mandate-for-apartment-recycling/
[6] https://www.saveonenergy.com/energy-saving-tips/recycling-save-energy/

Other references:

https://www.icgov.org/recyclepilot
https://sustainability.uiowa.edu/news/iowa-city-considering-mandate-for-apartment-recycling/
http://cbs2iowa.com/news/corridor-business-journal/iowa-city-approves-recycling-mandate-for-multifamily-properties
http://www.press-citizen.com/story/news/local/2015/12/28/city-considering-mandate-apartment-recycling/77982258/
http://littlevillagemag.com/iowa-city-apartments-recycling-mandate/

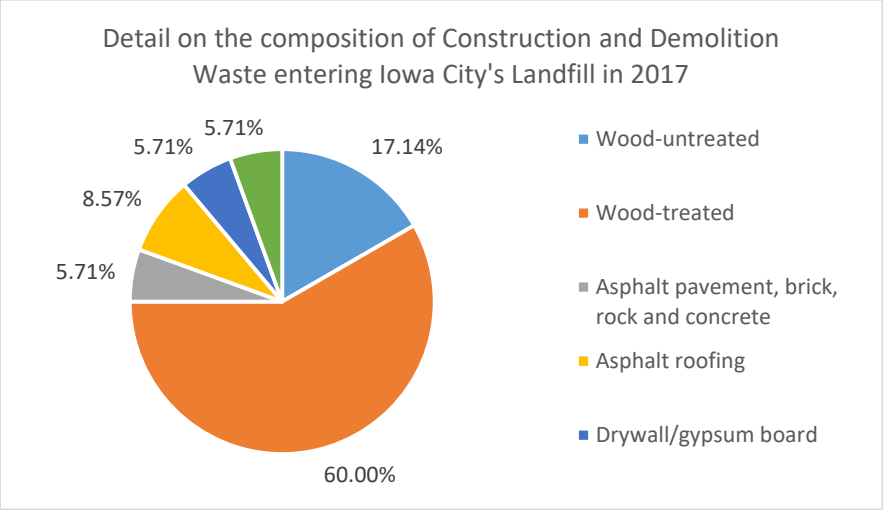
Implement Building Deconstruction Policy

Action Description
Iowa City will aim to increase the diversion of wood waste from land and incineration by creating a Construction and Demolition recycling program. In addition, the City will look to adopt ordinance to include demolition waste recycling requirements for construction projects. Builders can be required to implement jobsite recycling programs and will direct mixed construction and demolition (C&D) debris to certified facilities who extract reusable and recyclable products.

GHG Reduction Potential
9,198 MT CO2e (shared with increasing recycling/waste reduction)

Background
Management of materials during construction and deconstruction has an impact on greenhouse gas emissions. For instance, by reusing materials that would otherwise be disposed in a landfill, it is possible to avoid the emissions that would come from additional resource extraction, material processing, and transportation of finished goods and products.

According to a statewide waste characterization study completed in 2017, approximately 3.5% of the municipal solid waste that enters the Iowa City Landfill consists of demolition, renovation and construction materials[1]. Much of this material – including both treated and untreated wood, concrete, bricks, rock, drywall, and carpet – have been found to be recyclable and/or used as a fuel feedstock with appropriate end markets and recycling infrastructure.



A city-wide comprehensive effort to enhance building deconstruction and demolition practices for reuse of C&D materials does not exist. However, there are a couple of local non-profits that provide resale options for residents for building materials and that are both located at Iowa's East Side Recycling Center:

[1] page 98. 2017 IOWA STATEWIDE WASTE CHARACTERIZATION STUDY, http://www.iowadnr.gov/Environmental-Protection/Land-Quality/Waste-Planning-Recycling.

- The Iowa Valley Habitat for Humanity's ReStore is a reuse and resale venue for building materials.
- The Salvage Barn, part of the Iowa City Friends of Historic Preservation, is a resale venue for historically significant building materials.

Timing
Mid-term implementation (1-2 years)

Implementation Partners
Local nonprofits, Homebuilders Association, commercial builders, trade association and organizations that currently provide resale of building materials.

Next Steps for Action
Investigate option to adopt ordinance to include demolition waste recycling requirements for construction projects. Initiate talks with partners to discuss action, potential concerns and barriers, and proposed methods for implementation.

Costs
When looking only at the costs directly associated with a deconstruction project, it is commonly understood that a full-property deconstruction is more expensive and time-consuming than a comparably-sized demolition project. The major source of the cost gap is the relative labor intensiveness associated with deconstruction, and of course, the costs will depend on the type of building being deconstructed.[2] For example, a 1997 study for the U.S. Environmental Protection Agency estimated the total cost of deconstruction for a 2,000-square foot residence at between $4.50 and $5.40 per square foot, compared to a cost of $3.50 to $5 for standard demolition.[3]

However, much of a demolition's cost is not captured by its price tag, and is instead borne by parties uninvolved in a given construction project, for example maintenance of landfills and the environmental costs of extracting raw materials and converting to a finished product.[4] In addition while deconstruction is associated with higher labor costs, the process reduces expenses related to waste disposal, which typically make up a large share (up to 40%) of a demolition bid.[5]

Benefits
Builders and developers are able to offset some of the deconstruction project costs through disposal savings associated with avoided tipping fees, avoided purchases of new materials, revenue earned from sales and potential tax incentives and deductions associated from donated building materials, can result in a reduction in overall costs. The process can also have significant economic benefits for Iowa City. For example, recycling a ton of material creates many more jobs than sending the same material to a landfill because of the labor required to collect, sort, and process the materials. In addition, there will be economic benefits to buyers who may purchase reused materials at a lower cost than new materials, and the added benefit of maintaining the dollars local and thus stimulating the local economy.

[2] https://www.pdx.edu/nerc/sites/www.pdx.edu.nerc/files/BPS%20NERC%20Deconstruction%20Study%20Final%20Report%205-7_0.pdf
[3] https://www.cga.ct.gov/2004/rpt/2004-R-0911.htm
[4] https://www.pdx.edu/nerc/sites/www.pdx.edu.nerc/files/BPS%20NERC%20Deconstruction%20Study%20Final%20Report%205-7_0.pdf
[5] http//www.cce.ufl.edu/past/deconstruction/final_report.html

Reusing and recycling building materials will result in avoided greenhouse gas emissions associated with material extraction, transportation and transformation, at the same time as it prevents land from being used for the disposal of construction and demolition debris.

Additional information

In 2007, the **City of Chicago** worked with the Chicago Manufacturing Center, the United States Business Council for Sustainable Development, and US EPA to launch a Waste to Product Network, which has diverted 14,000 tons of solid waste from landfills and resulted in new innovative products, such as recycled glass countertops. The program was relaunched in 2016, and the US Business Council for Sustainable Development (US BCSD) has facilitated additional networks in the Gulf Coast, Kansas City, and the Pacific Northwest.
http://www.ct-si.org/publications/proceedings/pdf/2008/70229.pdf

The EPA provides guidance to construction managers and builders through its guide: **Best Practices for Reducing, Reusing, and Recycling Construction and Demolition Materials**
https://www.epa.gov/smm/best-practices-reducing-reusing-and-recycling-construction-and-demolition-materials

The California Green Building Code and requires that 65% of construction and demolition waste be diverted from landfills. To implement this regulation, the City of Sacramento requires that projects with a job value of $250,000 or more file a waste management plan identifying a waste hauler and recycling facility prior to beginning construction. The City also has an active *Construction & Demolition (C&D) Waste Recycling Program* that certifies and designates facilities as C&D Debris Sorting Facilities.
https://www.cityofsacramento.org/Public-Works/RSW/Collection-Services/Recycling/Construction-and-Demolition

Other References:
https://www.youtube.com/watch?v=8i4Ztc3jFlA
http//www.cce.ufl.edu/past/deconstruction/final_report.html
https://www.cga.ct.gov/2004/rpt/2004-R-0911.htm
http://delta-institute.org/delta/wp-content/uploads/DeconstructionAndReuseGoGuide2ndEd_Web.pdf
http://www.icosc.com/wp-content/uploads/2014/08/Charitable-Contributions-Salvaged-Materials-Tax-Deduction.pdf

Harness Landfill Methane Energy

Action Description
Iowa City will conduct a feasibility study that examines capturing methane energy at the landfill in order to heat and power buildings. In the past the City had discussions with University of Iowa for a joint project that would heat and power university buildings, and it is anticipated that this proposed partnership will move forward.

GHG Reduction Potential
10,922 MT CO2e

Background
Methane is a by-product of decomposing waste in landfills and is a potent greenhouse gas. In Iowa City, the methane is currently being flared to transform it into the less potent GHG carbon dioxide. While this is the conventional approach, landfill gas can also be harnessed and burned in a combustion engine to generate heat and electricity to power buildings. This results in reducing emissions and energy costs by using a free and existing source of power.

Iowa City and the University of Iowa have long been considering a partnership to power UI's research park in part through landfill methane gases, which would help that campus meet its 100 percent renewable power goal. The City has budgeted for this study in FY2019.

Timing
Mid term.

Implementation Partners
Iowa City should continue its conversations with University of Iowa and any other potential partners as identified in the pending 2019 study.

Next Steps for Action
The City should establish parameters for the 2019 study.

Costs
Development of a feasibility study has a moderate cost to the City, associated with labor costs required to perform the analysis and develop the plan. This action might require the hiring of external firms to assist with the process. Full implementation of the project would have a more significant cost depending on the sizing requirements, however, feasibility studies often demonstrate the financial benefits for the community.

Benefits
Flaring methane gas has environmental benefits that result in fewer harmful emissions, but using landfill methane for energy builds upon that initial benefit of reduced emissions. Harnessing methane gas results in the creation of a renewable energy source for the foreseeable future, and to those that are on the receiving end of the generated heat and power, there is the added benefit of reduced building operations costs.

Additional Information

DOE landfill methane outreach program: https://www.epa.gov/lmop/about-partners-landfill-methane-outreach-program

Current Iowa City/U of I research park project https://www.facilities.uiowa.edu/uem/renewable-energy/landfill-gas-project.html

Scottsdale, Arizona landfill methane to electricity project: https://www.glendaleaz.com/Green/glendalelandfill.cfm

Anne Arundel County, Md. Methane to electricity project: http://www.nmwda.org/anne-arundel-county/

Toronto Gas to Electricity Program:http://www.c40.org/case_studies/trash-to-cash-methane-capture-generates-3-4-million-annually

Establish Community Solar Energy

Action Description
The City will seek to pilot two to three community solar projects that expand access to the benefits of solar renewable energy to communities in Iowa City. The City will investigate the appropriate model(s), seek out funding models and partners and seek out ideal host/anchor institutions while educating the public on the benefits of participating as subscribing members. In addition to the inherent equitable nature of community solar projects, the City commits to locating its first project in and for the benefit of a low income neighborhood.

GHG Reduction Potential
No direct calculation.

Background
Community solar helps to expand access to solar renewable energy by drastically reducing high start-up costs often attributed to renewable energy. Community renewable projects generally eliminate that barrier by developing an off-site renewable energy source with one or several "anchor" members that then offer subscriptions that allow others to tap into the renewable energy source for a low fee. Types of projects vary from solar array "gardens" or fields to a collection of rooftop panels across a particular area. The uptake of community solar projects is growing nationwide, so the City should seek out the latest information on project models, supporting policies and incentives, best practices and other tools.

Timing
Long term.

Implementation Partners
Iowa City should reach out to agencies already strategizing on renewable energy in the community including MidAmerican Energy, Johnson County and Midwest Renewable Energy Alliance (Solarize Johnson County), Iowa Economic Development Authority, I-RENEW (Iowa Renewable Energy Association), Iowa Solar Energy Trade Association, Sierra Club-Iowa Chapter and any other like-minded nonprofit organizations. Additionally, as the action moves into fruition, the City should partner with the myriad of organizations whose audiences include low income households that would benefit from community solar subscription.

Next Steps for Action
As part of a Task Force to take action on renewable energy, the City should begin investigating opportunities for funding and partnerships to establish community solar projects in Iowa City. The ability for this project to move forward will hinge greatly on the potential for funding, so initial research should focus on identifying funding models that would be a good fit for Iowa City and potential partners in place before moving forward on any other component of this action.

Costs
Community solar projects can have moderate costs. For example, an average community solar project of 50 kW can have costs ranging from $80,000-$150,000[1] and though installation costs are clearly the most

[1] http://communityrenewableenergy.com/index.php/resources/faq-community-owned-solar/

significant part of a project, there are ongoing annual maintenance costs that can be recouped through membership fees.

Benefits

Community solar projects have ample economic and social benefits, providing options for renewable energy to renters and other individuals that are unable to afford, or otherwise unable to install solar panels within their individual properties. An average project can yield significant savings in electricity costs to its participants and can save thousands of dollars to members over the years. As an example, a 50 kW community solar garden can yield savings of $12,500 per year.

Additional Information

"A Guide to Community Shared Solar" by U.S. Department of Energy
https://www.nrel.gov/docs/fy12osti/54570.pdf

Presentation from Iowa Economic Development "community efficient and renewable energy workshop" by Iowa Economic Development Authority
https://www.iowaeconomicdevelopment.com/userdocs/documents/ieda/CommunitySolar-WarrenMcKenna.pdf

Integrate Parking Management

Action Description

Getting to 2025

The City will align parking policies with its climates goals to provide an advantage for green vehicles and alternative modes of transportation and discourage excessive use of personal vehicles. This will primarily be done by amending zoning code to:

- Eliminate minimum parking requirements for new developments;
- Limit the total number of parking spaces available in certain areas; and
- Establish minimum requirements for designated parking for alternative fuel vehicles (including carpooling) in existing city-owned facilities and as well as employment centers, retail centers, and multi-family properties.

Other initiatives to investigate include:

- Incenting or requiring parking unbundling, for developers to sell parking space separate from commercial and residential space in lease and sale agreements.
- Investigate parking pricing strategies for metered areas with a goal of achieving efficient use of the available space and at least one empty spot per block at all times.
- Requiring developers to allocate bicycle parking and car sharing facilities in new employment center and multi-family developments.
- Investigating special population provisions where parking requirements are reduced for developments designed for low-income or elderly housing to make the property more affordable for developers and tenants.[1]
- Collaborate with large employers to develop parking programs that include rideshare coordination, transit subsidies, flexible work schedules and bicycle accommodations to achieve substantial reductions in parking and personal vehicle trips.

Getting to 2050

To meet the 2050 emission reduction goal, the City will be required to take additional action to reduce personal vehicle use through parking policies. Other than eliminating parking minimum requirements for developments, the city will have to reduce the amount of parking space available in public areas. This is

- The implementation of “cap and trade” programs, where for every off-street spot built, and on-street parking spot is converted into a park.[2]
- Simple elimination of parking spots through the temporary use of city-installed physical blocks.
- The development of emission-based parking permits, where drivers are charged for their residential parking permits based on how much greenhouse gases their vehicle emits.

As autonomous vehicle technologies develop, the common expectation is that there will be a significant reduction in parking needs within metropolitan areas and therefore an opportunity for cities to reclaim parking space. With the uptake of autonomous vehicles, the need to park near one’s destination will become irrelevant and likely result in parking lots being relocated to cheaper plots on the outskirts of a community, increase capacity of parking lots as cars will be able to park very close to each other, or even

[1] According to the U.S. Consumer Expenditure Survey Tables the lowest income quintile households own on average 0.9 vehicles, compared with 2.7 for the highest income households. https://www.bls.gov/cex/tables.htm

[2] https://www.scientificamerican.com/article/reducing-parking-cut-auto-emission/

the possibility of eliminating parking spaces as vehicles may not need to park at all.[3] While progress on this topic continues, the City should maintain abreast of developments and investigate options for leveraging these technologies to reduce parking space in dense areas.

In the long term, the combination of other recommended actions such as compact and contiguous development should help reduce the need for parking spaces, and the uptake of electric vehicles powered with clean energy will, at the same time, reduce the greenhouse gases resulting from transportation.

GHG Reduction Potential
66 MT CO2e

Background
Research has shown that the availability and pricing of parking are key factors affecting people's decisions to drive.[3] Excess parking can actually hurt a city's progress towards reducing greenhouse gas emissions and encouraging the use of travel alternatives. For these reasons, recent years have seen a paradigm shift that recognizes that too much parking is as harmful as too little and that it should be managed for efficiency.

Title 9 of the Iowa City Code covers parking regulations in both public and private areas. Although the city has minimum bicycle parking requirements for existing commercial and multi-family residential uses, to date, the City has not adopted any ordinances to discourage the availability of parking in commercial properties and encourage preferential parking for greener modes of transportation.

Timing
Short term implementation.

Implementation Partners
The Parking Division of the Iowa City Transportation Services Department oversees the operation of parking garages, parking lots, and on-street (metered) parking. Parking Services enforces parking regulation in the central business district.[4]

Next Steps for Action
Analyze potential changes to city zoning code and ordinances to align with parking changes. Consider the interplay between new development and existing/planned transit service.

Costs
While it is not possible to quantify the costs associated with the establishment of policies that cap parking in certain areas and set requirements for parking assignment for alternative modes of transportation, compared to other initiatives the costs of implementation would be low. The policies would result in some costs for developers deriving from the need to comply with the policies, but again, these would be minimal compared to overall costs of project development.

[3] https://home.kpmg.com/xx/en/home/insights/2017/04/reclaiming-space-in-the-autonomous-vehicle-era.html
[4] https://www.icgov.org/city-government/departments-and-divisions/parking

Benefits

Vehicle parking is costly. Some estimates suggest that considering land, construction and operations a parking space typically costs $400 to $3,000 and even higher when parking is done in underground garages or other complex structures.5 Therefore, implementing strategies that efficiently reduce the number of parking spaces while still offering convenient alternatives to riders, can save significant money to cities and property managers. Initiatives such as the ones proposed in this action can also provide other non-economic benefits, such as reducing traffic congestion and emissions from vehicle use.

Additional Information

Several jurisdictions across the U.S. are reducing or eliminating minimum parking requirements, and instead encouraging more efficient parking management strategies that make productive use of spaces.[6]

Buffalo, NY recently became the first major city in the U.S. to completely remove minimum parking requirements at a city-wide level,[7] requiring instead that new developments to factor in alternative transportation options.

The NYC Department of City Planning has published a compilation of best practices through their Parking Best Practices: A Review Of Zoning Regulations And Policies In Select U.S. And International Cities.

The Majors Innovation Project recently published a paper exploring options for urban parking:
Urban Parking: Rational Policy Approaches for Cities and Towns

Hamburg, Germany and Zurich, Switzerland have implemented "cap and trade" of parking spots, where for every off-street spot built, an on-street parking spot was converted into park or community space.[8] Paris France has invested in physical blocks to prevent cars from parking. London was the only city in the study to charge parked vehicles based on their level of carbon emissions. As a result of these strategies, these European cities have seen traffic and emission decrease despite an increase in car ownership over the same time period.[9]

Other references:
https://www.planetizen.com/node/92360/reduced-and-more-accurate-parking-requirements

[5] https://www.planetizen.com/node/92360/reduced-and-more-accurate-parking-requirements
[6] https://www.planetizen.com/node/81972/how-parking-management-can-help-cities-grow-smarter
[7] https://www.citylab.com/equity/2017/01/buffalo-is-first-to-remove-minimum-parking-requirements-citywide/512177/
[8] https://www.slideshare.net/transportsdufutur/european-parking-uturn
[9] http://grist.org/cities/cities-could-be-big-players-when-it-comes-to-cutting-carbon-emissions/

Promote Compact and Contiguous Development

Action Description
Vehicle miles traveled are directly tied to how communities are planned and developed, and therefore a reduction in greenhouse gas emissions requires changes to land use and transportation policies. To accomplish this, the City will adopt and enforce policies that reduce transportation needs with compact, mixed-use, transit-oriented and walkable neighborhoods.

For many neighborhoods, a central idea that promotes multi-modal transportation is the design and development around public transportation hubs. Homes, businesses, and retail space that are clustered near transit stops encourage walking and use of public transportation, thus helping reduce greenhouse emissions. To continue encouraging compact and contiguous Iowa City will also perform a review of city policies to explore new ways to increase average density and mix use of land for new developments including options such as:

- Providing incentives for increased density and mixed land use such as removing zoning barriers or eliminating fees.
- Promoting transit-oriented development in priority areas by adjusting zoning to increase residential densities near existing and planned bus stop stations to ensure adequate ridership, and requiring a minimum percentage of residences to be located within a certain distance of a transit stop.
- Focus growth along key corridors and areas identified in the Comprehensive Plan while preserving the diversity of house choices for all income types.
- Follow adopted MPO "Complete streets" policy.[1]

GHG Reduction Potential
2,015 MT CO2e

Background
The City of Iowa City adopted an updated Comprehensive Plan in May 2013. The new plan, Iowa City 2030, sets a foundation for moving our community forward on a path to sustainability and provides guidance for decisions on planning and development issues as they arise.[2] The Comprehensive Plan encourages mixed use development in the Downtown and Riverfront crossings but also in the Neighborhood Commercial and Mixed-Use zones dispersed throughout the community. [3]

The City also encourages commercial nodes located at key intersections throughout the community to provide opportunities for basic retail uses and services close to where people live.

Timing
Short term implementation.

Implementation Partners
Collaborate with MPOJC, as the transit planning organization for Iowa City Transit, to promote transit-oriented development. Work with existing non-profits such as the American Institute of Architects to

[1] "Complete Streets" are rights of way designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. Source: page 40 Future Forward Transportation Plan.
[2] https://www.icgov.org/districtplans
[3] From BICYCLe plan page 45

facilitate workshops to identify additional barriers and incentives for the development of mixed-used neighborhoods.

Next Steps for Action
Review current zoning ordinances with the intent of identifying potential revisions to promote more compact and efficient use of land.

Costs
Overall, compact and contiguous development patterns are significantly more cost-effective than those of a scattered and linear nature. Establishing policies that encourage contiguous and compact development has minimal cost to the City. Even if the policies created provide financial incentives to builders, such as removal of fees for development projects, the City and taxpayers would still save money. This is because compact development results in reduced costs associated with the decreased need to building and maintain additional infrastructure to support urban sprawl.

Benefits
Compact, mixed-used neighborhoods result in reduced distances traveled between uses such as homes, jobs, stores, schools, and play areas. Residents not only benefit from savings resulting from the reduced fuel associated with less distance traveled, but also potentially from enhanced alternatives for public transportation, and less stress and inconvenience associated with traveling long distances. Compact neighborhoods also alleviate the need for the City to build and maintain additional public infrastructure, and expand the area covered by critical services to residents, therefore saving tax-payer dollars. Overall, urban areas that have higher density tend to offer additional services that are typically not as readily available as in low-density environment, for example restaurant areas, libraries and services such as fire protection.

Additional Information
The Center for Transit Oriented Development offers a compilation of best practices around these strategies http://ctod.org/portal/taxonomy/term/13.

The World Resources Institute also offers a Transit-oriented Development (TOD) Guide for Urban Communities.

Encourage the Purchase of Local Goods

Action Description
Iowa City will encourage residents to buy local food and other products through the following initiatives:

- Convene local business owners and follow their creative lead to develop "buy local" campaigns.
- Provide online education on the benefits of buying local products and incorporating messaging into City communications.
- Facilitate the temporary location of farmer's markets, and small business fairs in public spaces, and educate the public on the ability to use Supplemental Nutrition Assistance Program Electronic Benefit Transfer cards at the farmers market.[1]
- Collaborate with local business owners that deliver product to other businesses or residents to explore clean options for last-mile delivery, for example, using bicycles as the delivery modes of transportation, or alternatively green vehicles.

GHG Reduction Potential
39 MT CO2e

Background
Transportation of raw materials, intermediate products, and final goods and products from one location to another, results in greenhouse gas emission associated with the fuel spent to travel that distance. These emissions are particularly critical with the consumption of food items that are part of our daily lives, and that often travel long distances to reach our plates, therefore creating a large carbon footprint.

To reduce emissions associated with these activities, communities around the world are educating their residents and encouraging the purchase of local food, goods and products.

Timing
Short term implementation.

Implementation Partners
The City should engage Iowa City Area Chamber of Commerce, Iowa City Downtown District and local nonprofit groups.

Next Steps for Action
Meet with the Iowa City Area Chamber of Commerce and the Iowa City Downtown District to discuss and identify strategies to help promote local purchasing.

Costs
While it is not possible to quantify the costs associated with the encouragement of local goods and products, programs designed to encourage local purchase can vary in cost depending on the initiatives undertaken and the extent of the effort. Compared to other initiatives, however, the costs of implementation would be low.

[1] As an added benefit, those using EBT/SNAP cards to purchase tokens can have their dollars matched through Double Up Food Bucks, Iowa's statewide healthy food incentive program. **Source:** http://downtowniowacity.com/event/iowa-city-farmers-market-2/

Benefits

When buying local, buyers are reducing the greenhouse gas emissions and pollution caused indirectly through consumption. Buying food or products that were produced locally also celebrates the local community, strengthens community cohesion, and helps the economy by supporting farmers and small businesses directly and therefore creating and maintaining jobs. In addition, the tax dollars spent by buyers stay within the community and therefore benefit local businesses and residents. When small businesses thrive, business owners are less likely to leave the community and become more invested in the community's feature, therefore creating a positive loop of additional vital contributions that are made to community and neighborhoods.

Additional Information

The city of San Francisco has developed an online portal for promoting San Francisco-made products and services with the intent of empowering manufacturers and creating jobs. The American Independent Business Alliance offers guidance on the development of Buy Local campaigns and programs at: https://www.amiba.net/buy-local-campaigns/mistakes-fail/.

Several organizations have begun instituting programs for delivery of goods and services using bicycles and cleaner modes of transportation. For example, DHL Express has instituted a new pilot program involving bicycles, hauling a customized "city hub" trailer to ease last mile urban deliveries.[2] A report by McKinsey published in 2016 on Parcel delivery: The future of last mile, describes pilots into delivery of parcels through bike couriers, drones and automated vehicles.

[2] https://www.supplychaindive.com/news/dhl-cycle-mobility-last-mile-urban-delivery-cubicycle/437271/

Create a Comprehensive Waste Management Plan

Action Description
The City will develop of a waste management plan using an Integrated Solid Waste Management methodology that looks at waste reduction at the source, recycling, composting, and disposal in a holistic manner and for all sectors of the city. At the core of the plan, should be an effort to encourage a fundamental change in mindsets and attitudes towards waste; to see it as a resource and not as something to be inconvenient and disposed of.

The plan should have a long-term planning horizon (15-20 years), establish clear goals and progress indicators, and look at:

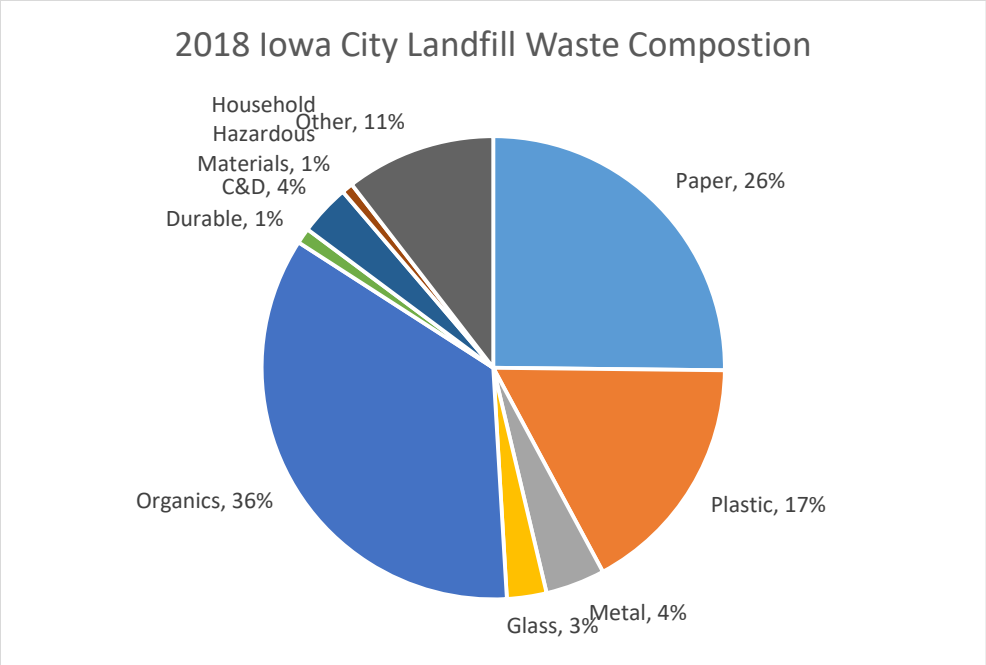
- Policies that address special waste streams such as electronic waste, end-of-life vehicles, organic waste, and construction and demolition waste.
- Landfill management strategies and outlook of other solid waste management facilities, including waste-bins and recycling bins throughout the City.
- Educational programs and awareness campaigns that lead to more sustainable consumption patterns for waste minimization.
- Opportunities to encourage private-sector innovation derived from "waste" products.
- Opportunities for improvement in services to residents as well as industrial, commercial and institutional sectors.
- Synergies with state efforts and opportunities to advocate for state-wide policies such as deposits for recycled cans and bottles.

GHG Reduction Potential
No direct calculation.

Background
In recent years, cities across the U.S. have begun adopting Integrated Solid Waste Management principles and developing comprehensive plans to effectively manage waste streams and operations. While the City of Iowa City does not have a comprehensive plan, it has long-focused on waste reduction strategies and offered services such as general waste pickup, recycling, and composting to residents and businesses.

A first step in developing a waste management plan is understanding the composition of the waste stream and how it is changing. In 2017, the Iowa Department of Natural Resources completed a statistically representative analysis of Iowa's disposed waste stream. As part of this study, Iowa City's waste stream was individually analyzed and results were shared with the city. Analysis of this waste stream is what allows the City to implement policies such as the Cardboard Ban at the Iowa City Landfill and Recycling Center that was instituted starting on January 2018.[1] The figure below shows the breakdown of major material groups for the Iowa City Landfill municipal solid waste composition, with results shown in estimated percent composition disposed.[2]

[1] https://www.icgov.org/city-government/departments-and-divisions/iowa-city-landfill-and-recycling-center
[2] 2011 IOWA STATEWIDE WASTE CHARACTERIZATION STUDY



Timing
Short term implementation (1 year).

Implementation Partners
These initiatives would be led by the department of Public Works under their Solid Waste program with support from the Sustainability Department. The planning exercise should ensure multi-stakeholder participation by involving non-profits, community-based organizations, waste collectors, private sector, and the general public.

Next Steps for Action
After obtaining City Council approval, convene an advisory committee to begin planning efforts.

Costs
Development of a comprehensive waste management plan has a moderate cost to the City, associated with labor costs required to perform the analysis and develop the plan. This action might require the hiring of external firms to assist with the process.

Benefits
There are a number of reasons why cities should aim to improve resource efficiency. From an environmental perspective, waste diversion can reduce greenhouse gas emissions associated with energy needs of materials extraction, processing and transportation. It can also lessen other environmental burdens such as solid waste clogging drainage canals, land degradation and pollution levels and nuisance issues for communities, such as bad odor. One aspect that is often overlooked is the economic competitiveness that results from resource efficiency and that helps hedge against the long-term rise of commodity prices. Overall, proper waste planning and management can help create cleaner and more desirable communities to live in.

Additional Information

The **United Nations** has published reports on municipal solid waste management that include international case studies and best practices such as the one available here: http://www.un.org/esa/dsd/susdevtopics/sdt_pdfs/shanghaimanual/Chapter%205%20-%20Waste_management.pdf

New York's Comprehensive Solid Waste Management Plan offers a framework for dramatically reducing the number of truck trips and miles associated with disposal of New York City's waste. Simultaneously, it establishes a cost-effective, reliable, and environmentally sound system for managing the City's waste over the next 20 years.

The most recent iteration of the **City of Forth Worth** **Comprehensive Solid Waste Management Plan** includes the results of a city-wide planning effort that establishes clear intended actions, a timeframe for enacting them, and evaluation criteria.

Other references:

http://www.un.org/esa/dsd/susdevtopics/sdt_pdfs/shanghaimanual/Chapter%205%20-%20Waste_management.pdf
http://www.uncrd.or.jp/env/ipla/index.htm
https://nrcrecycles.org/mobius/nrcwp-content/uploads/2015/01/IRA-White-Paper.pdf
https://www.icgov.org/city-government/departments-and-divisions/solid-waste
https://www.icgov.org/garbage

Capture Wastewater Operations Methane

Action Description
To reduce greenhouse gas emissions associated with municipal wastewater treatment, the City will explore options for the feasibility of methane capture at their Waste Water Treatment Facility to either create renewable gas fuel or to burn in a co-generation facility that can provide electricity to the plant itself.

GHG Reduction Potential
To be determined.

Background
Waste water treatment facilities contribute to greenhouse gas emissions through the decomposition of waste in the water, which creates methane, a potent greenhouse gas. The process also produces nitrous oxide (N2O), a much stronger heat-trapping gas than carbon dioxide or even methane. In addition, the process of wastewater treatment directly impacts the quantity of GHG emissions from other sectors such as energy emissions from the operation of wastewater treatment facilities and pumps.

In 2015, wastewater treatment processes were responsible for generating 15% of the greenhouse gas resulting from municipal operations, or approximately 6,621 metric tonnes of CO2.[1]

Iowa City through its Wastewater Division maintains and operates a wastewater treatment plant that processes the city's wastewater. The plant has a design treatment capacity for 24.2 million gallons per day, and in 2014, the plan processed an average of 9.66 million gallons of wastewater per day.[2] The Waste Water Treatment Plan, located at 4366 Napoleon Street SE, was expanded in 2014 as a result of the decommissioning of another wastewater treatment plan that was considered vulnerable to flooding.[3]

Timing
Mid term implementation.

Implementation Partners
Department of Public Works, Wastewater Division, plant operators, community.

Next Steps for Action
Procure services of a firm to develop a feasibility study for the project.

Costs
Development of a feasibility study has a moderate cost to the City, associated with labor costs required to perform the analysis and develop the plan. This action might require the hiring of external firms to assist with the process. Fill implementation of the project would have a more significant cost depending on the sizing requirements, however, feasibility studies often demonstrate the financial benefits for the community. Federal agencies may have grant funding available to help partially cover the cost of implementation of anaerobic digesters or combined heat and power systems.

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[1] https://www8.iowa-city.org/weblink/0/edoc/1753565/ICMunicipalGreenhouseGasUpdate-2017.pdf
[2] https://www.icgov.org/city-government/departments-and-divisions/wastewater
[3] https://www.epa.gov/arc-x/iowa-city-iowa-closes-vulnerable-wastewater-facility

Benefits

On-site generation of electricity, if this route is pursued after the feasibility study is completed, has economic incentives. Where energy can be captured from the wastewater less energy must be purchased from the grid. This also promotes energy independence to insulate the plant from future price fluctuations. It is estimated that the cost of wastewater and water utilities are generally 30-60 percent of a city's energy bill,[4] making it economically advantageous for municipalities to adopt these technologies to minimize the impact of these utilities on their limited budgets.

Additional Information

Wastewater treatment plants operated by the Metropolitan Water Reclamation District (MWRD) in Chicago utilize digester gas to supply one-third of their total energy utilization. Digester gas is produced by the fermentation of sewage sludge, a process that turns a waste product into power.[5]

At the Sacramento Regional Wastewater Treatment Plant, methane is captured and sent to a cogeneration facility to produce electricity.[6]

[4] "Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities." Office of Watewater Management of the U. S. Environmental Protection Agency with the Global Environment and Technology Foundation. January 2008.

[5] http://www.chicagoclimateaction.org/pages/waste/15.php

[6] http://www.per.saccounty.net/PlansandProjectsIn-Progress/Documents/Climate%20Action%20Plan/Stakeholder%20Meeting%20Presentation_08242016.pdf

Encourage a Plant-Rich Diet

Action Description
The City and its partners will develop an education and outreach campaign that features the climate benefits of a plant-rich diet, and other ancillary benefits such as health/disease prevention. Implementation will include work to connect other potential partners such as the network of community gardens across the city and farmers markets.

GHG Reduction Potential
The impact on local emissions reduction could not be calculated against Iowa City's GHG Inventory Baseline. However, the City should consider conducting a survey to determine the success of efforts to encourage eating local, plant based foods in motivating residents to change their diets.

Background
Worldwide, approximately 20% of greenhouse emissions are attributed to livestock and our meat centric diets. Researchers at Project Drawdown cite that switching to a plant-rich diet ranks highly (4th) among worldwide solutions to reduce emissions. The report states that "if 50 percent of the world's population restricts their diet to a healthy 2,500 calories per day and reduces meat consumption overall, we estimate at least 26.7 gigatons of emissions could be avoided from dietary change alone." It is also important to note that there are emissions associated with how far our food travels to get to our plates. A report on locally produced food in Iowa cites that only 10% of Iowa-grown produce is eaten within the state.[1]

Timing
Short term.

Implementation Partners
Iowa City should engage a multitude of partners that may include University of Iowa, 100 Grannies, The Iowa Policy Project, Grow Johnson County, local farmers' collective Field to Family and Local Foods Connection[2].

Next Steps for Action
The City should establish a volunteer led working group to design and implement a campaign to promote consumption of local, plant based foods.

Costs
Developing an educational and outreach campaign would have minimal cost to the city, as existing information and educational channels can be leveraged.

Benefits
Shifting to a predominantly plant-based diet can have a considerable impact in reduction of greenhouse gas emissions, by choosing sources of nourishment that are less carbon intensive than other alternatives. Livestock for example, only converts about 11% of the energy it is fed into human food[3] and in the process generates a significant amount of greenhouse gases associated with the clearing of

[1] "Iowa's Local Food Systems: A Place to Grow." The Iowa Policy Project. 2007.
[2] Local Foods Connection is moving from Iowa City, but may be good to have a conversation http://www.localfoodsconnection.com/
[3] https://www.wri.org/sites/default/files/wri13_report_4c_wrr_online.pdf

land for agriculture, the growing of single-crops for feed, and methane that is released from the animals system through digestion. The Environmental Defense Fund reports that if each American replaced chicken with plant-based foods at just one meal per week, the carbon dioxide savings would be the same as taking more than half a million cars off American roads.[4]

In addition to help reduce carbon emissions, shifting to a plant-rich diet can have numerous economic and health benefits for Iowa City residents. Plant-based diets can help reduce intake calories, often helping individuals manage their weight. In addition, minerals and vitamins included in plants can help prevent a variety of diseases such as hypertension and heart disease.[5] Cutting meat consumption and moving instead to fruits and vegetables could also help families reduce their yearly food expenditures and save money for other uses. Furthermore, adopting plant-based diets can reduce the burden on our healthcare system. In fact, according to a 2016 study, adopting a vegan and vegetarian diets could save up to $1 trillion in annual health-care costs.[6]

Additional Information

Drawdown: Plant-Rich Diet http://www.drawdown.org/solutions/food/plant-rich-diet

"How Your Diet Can Save the Planet." Fortune. July 19, 2017. http://fortune.com/2017/07/19/climate-change-vegan-vegetarian-diet-humane-society/

Pittsburgh Climate Action Plan http://apps.pittsburghpa.gov/redtail/images/606_PCAP_3_0_Draft-_9-26-17.pdf

[4] http://web.archive.org/web/20080923070051/http:/www.edf.org/article.cfm?contentid=6604
[5] http://web.archive.org/web/20080923070051/http:/www.edf.org/article.cfm?contentid=6604
[6] According to a 2016 study, adopting a vegan and vegetarian diets could save up to $1 trillion in annual health-care costs.

Expand Community Gardens

Action Description

The City will work to make additional land available (existing public lands or new acquisitions) for community groups to turn into food gardens. For the deepest penetration, focus will be on neighborhoods disproportionately impacted by poverty and food insecurity.[1] Community-based organizations and institutions such as churches, neighborhood groups, and block clubs should take responsibility for suggesting locations, creating plans, recruiting leaders and community members, setting up and maintaining these gardens. The City should consider transfer of ownership of land after a period of successful implementation and the demonstrated ability for long term success.

Support from the City should be provided in the form of:

- Free, long term land leases; potential of transfer of ownership to qualified organizations
- Basic liability insurance
- Water access
- "Big tools" garden lending program, housed at Parks Department
- Limited start-up funds for low income neighborhoods

Community groups should provide support in the form of:

- Education on sustainable gardening methods
- Establishing/maintaining community support
- Support in securing grants or other funding for tools, sheds, etc.

GHG Reduction Potential

Calculating GHG reduction potential for this strategy is challenging. Benefits related to reduced emissions are largely the result of creating and using compost that would otherwise be methane generating food scraps in the landfill.[2] Additional benefits include reductions in greywater sent to the wastewater treatment plant (when rain barrels or other greywater irrigation systems are used) and the consumption of local foods rather than reliance on food trucked into grocery stores. The largest benefit is likely in increasing access to healthy foods, building a stronger sense of community, and fostering heightened awareness of the importance of related initiatives (composting, rain gardens, local plant rich foods, etc).

Background

Iowa City currently has four parks hosting garden plots for interested residents and an Edible Forest located at Wetherby Park. A local community Group, Backyard Abundance, helps interested residents set up gardens in their front or back yard. Local resident Blair Frank owns a one acre food and herb producing garden that he shares with the public. By expanding partnerships between the City, which owns and can secure additional land, and local groups with the capacity and desire to establish food gardens, both parties benefit.

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[1] An article on food security cites that "about 14% of Johnson County residents are food insecure — one of the highest rates in the state of Iowa — and 40 percent of them don't receive government food assistance." http://littlevillagemag.com/fighting-hunger-in-iowa-despite-food-to-spare-disparity-remains/

[2] A home garden can help reduce greenhouse gas emissions. Agriculture and Natural Resources Blog, University of California. http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=22155

Timing
Short to mid Term.

Implementation Partners
Iowa City should engage a multitude of partners that may include Backyard Abundance, Iowa City Parks and Recreation, Johnson County Food Bank, Iowa City Landfill and Recycling Center (provision of compost), and other interested community organizations.

Next Steps for Action
The City should establish a volunteer working group to develop specific plans and protocols for expansion of the community garden. The working group should be tasked with seeing their newly proposed plan through at one pilot site to trouble shoot and make adjustments.

Costs
Because land would be donated by the city to the project, there would be an opportunity cost to the City in terms of using the plot for other revenue-generating activities. Other costs associated with community gardens include land preparation costs, equipment and supply purchasing costs, and ongoing costs such as water and compost. In spite of this, community gardens are usually a small-to-modest investment and the benefits experienced by the neighborhood it is located in greatly outweigh the costs.

Benefits
While it is not possible to assign a monetary value on them, the benefits of community garden are varied and particularly contribute to a sense of equity within communities. Growing food locally reduces the VMT to deliver food from other regions while improving resident health, air quality, and creating a sense of stewardship and ownership in the community. For residents, being able to grow their own food provides them with access to fresh and nutritious food, and for those who do not have land of their own, the gardens provide a space to make this possible. Other societal benefits include the aesthetic value that gardens provide as a safe and relaxing space for residents to retreat to, and the opportunity to develop skills that can be marketed for jobs. Community gardens also help filter rainwater, restore oxygen to the air, and recycle organic waste.

Additional Information
Community Garden Program, Chicago: http://neighbor-space.org/about/

Explore Climate-related Funding Mechanisms & Financial Tools

Action Description
Few, if any cities across the nation have the ability to completely fund every implementation element of their climate plans. Iowa City should document funding gaps, investigate best practices in other cities that will aid in the uptake of actions, and identify a variety of potential partners. Proven mechanisms and tools that work are described below, and the City should endeavor to seek out others as well.

Revolving Loan Fund (RLF) is a tool for "recycling" funding. Seed capital provides initial loans, and when those loans have capitalized, new loans are initiated. Offering no interest loans to small businesses, non-profits, University initiatives, and home owners provides capital to residents and institutions not currently being served by other financial tools.

Public/Private Partnerships are structured agreements between private agencies/businesses and a public institution (e.g. City of Iowa City) in which the skills and assets of both parties combine in delivering a service or desired end result.

Property Assessed Clean Energy (PACE) is a financing tool that allows building owners to access capital for large scale building energy improvements. Financing is repaid as an assessment on the property tax bill. Enabling legislation at the state level is required.

Pay as You Save (PAYS) is another financing tool that allows utility customers to access capital for approved energy improvements. Repayment occurs directly on the utility bill out of the energy savings gained. PAYS programs are an equitable way to engage renters and low income households, because home/building ownership and traditional credit requirements are not typical requirements for participation—many programs only require that the participant is a utility customer in good standing.

Climate Information/Incentive Clearinghouses are informational tools, often implemented in the form of an online searchable database, which outline local, state and federal opportunities to fund climate-related improvements, big or small. Typical users include the general public, building owners and operators, and program implementers. Products often cited include loans from local financial partners, grants, utility incentives and rebates, federal and state programs or tax incentives, and applicable municipal programs.

GHG Reduction Potential
No direct calculation.

Timing
Mid-term.

Implementation Partners
The City should engage a variety of partners including the Iowa Economic Development Authority, MidAmerican Energy, Urban Sustainability Directors Network (information/best practices), local banks and other financial institutions, and private institutions.

Next Steps for Action
All of the funding mechanisms and tools are existing and in use today by cities across the world. The City should prioritize its next steps based on which products have both the potential implementation partners in place and also, the ability to broadly impact implementation of the plan's actions.

Costs
Program costs vary for each funding mechanism or tool and will be investigated during a deeper examination.

Benefits
The success of many of the proposed actions is contingent upon broad uptake and participation across Iowa City. Carefully designed funding mechanisms and tools provide access to flexible capital that can be used in combination with other traditional sources by the consumer. When funds are set aside for clean energy projects they can help many projects cross the hurdle of putting together the initial capital required and move projects from ideas to implementation.

Additional Information

Iowa State Live Green! Revolving Loan Fund: https://www.icgov.org/city-government/departments-and-divisions/neighborhood-and-development-services/neighborhood-9

San Antonio internal RLF (for energy efficiency at municipal buildings): https://eepartnership.org/wp-content/uploads/2015/10/revolving-funds-sanantonio.pdf

Technical Toolkit - Revolving Loan Funds. American Council for an Energy Efficient Economy. Accessed on January 11, 2018. https://aceee.org/sector/state-policy/toolkit/revolving-loan-funds

"Five Public/Private Partnerships Pushing the Sustainability Envelope." GreenBiz. March 4, 2015. https://www.greenbiz.com/article/5-public-private-partnerships-pushing-sustainability-envelope

PACENation, a membership-based organization that provides assistance in developing successful PACE legislation across the country; website includes good resources http://pacenation.us/

Commercial PACE (Property Assessed Clean Energy) Assessment Fact Sheet for Local Governments, by U.S. Department of Energy https://energy.gov/sites/prod/files/2017/10/f39/FL1710_WIP_CPACEv2.PDF

Property Assessed Clean Energy (PACE) Program, (Milwaukee, WI) by Better Buildings Challenge/U.S.

Department of Energy https://betterbuildingssolutioncenter.energy.gov/implementation-models/property-assessed-clean-energy-pace-program

Implement a Communications Plan

Action Description
The City will develop and implement a long-term outreach plan that directly coincides with the Iowa City Climate Action and Adaptation Plan and engages the people of Iowa City from all ages and walks of life. Demographic, psychographic and geographic considerations will be key to reach and effectiveness of the communications plan. Key elements of the communications plan will likely engage people on why "climate change now" is important, and how they can contribute to the actions that will allow Iowa City to reach its goal to reduce emissions by 80% by 2050.

GHG Reduction Potential
No direction calculation.

Background
Undertaking a climate action plan is no small feat and will require the attention, commitment and continued involvement of the Iowa City community. Communications should speak to each audience as active participants working as a collective body to realize a more sustainable Iowa City. Buy-in, community action, resource sharing and two-way communications are critical to the success of the CAAP. The establishment of new norms can result from conscious efforts to share the ways in which individuals and groups are harnessing their abilities to reduce GHG. The communications plan will coincide with the Climate Action Toolkit.

Timing
Long-term, with integrated short and midterm milestones.

Implementation Partners
The City should consider working with other partners across the city, including University of Iowa, green/sustainability-oriented PR/Communications firms, local news outlets from a variety of media types, and other sustainability-minded organizations. Grassroots and neighborhood level initiatives should be prioritized and supported to ensure that all are involved in the plans implementation.

Next Steps for Action
The Communications Department will likely take the lead on initial communications before the plan is fully adopted by the City Council, and should begin to outline a full-scale communications plan and timeline that aligns with the prescribed actions and goals of the plan.

Costs
Development of a communications plan has a low cost to the City. This action can be connected to the implementation of the Community Action Toolkit.

Benefits
Having a city-wide communications and outreach plan, with a medium-term planning horizon, can help coordinate the multiple messages and information initiatives that will result from the Iowa City Climate Action Plan effort. With a coordinated approach it is likely that the efforts will be more efficient in leveraging resources to reduce redundancies, more successful at identifying and reaching target populations, and more effective at eliciting the desired action from targeted populations.

Additional Information

Greenovate Boston is a Mayor's initiative to involve the community in the implementation of the City's Climate Action Plan. Three main objectives guide the work of Greenovate: to achieve policy and program goals by liaising between the city and those who live, work, and play in it; to act as a central location for climate and environment resources in Boston; and to be a convener of communities to amplify successes. www.greenovateboston.org/

Sustainable Cleveland has produced a Neighborhood Climate Action Toolkit and a short video about the plan and the need for climate action. They organize climate workshops and connect community members with fundraising opportunities for projects that reduce GHG. Sustainable Cleveland also organizers six working groups in areas such as waste and clean water, most of which are open for all to join. www.sustainablecleveland.org/climate_action

Implement a Green Certification Program

Action Description
The City will develop a green business certification program that will highlight and celebrate businesses, events and meetings that meet certain established thresholds related to energy consumption, efficient transportation/alternative transportation accessibility, waste reduction, local food and products and other climate-related values.

Green Businesses Certification applies to businesses that reach certain thresholds like the following suggestions:

- Energy efficiency improvements or a demonstrated energy use intensity lower than the average for that building type (as referenced by US DOE's Energy Star Portfolio Manager
- Fewer than XX% of employees that travel to work along and one of the following: within ½ mile walking distance from mass transit; company encourages carpooling; company has on-site electric vehicle charging stations; company has documented work-from-home policy
- Company implements a recycling program
- Company encourages green meeting practices (reduced reliance on paper; conference calling; etc)
- Other ideas

Green Business Certification will include annual recognition by the city and presentation-worthy documentation for display.

Green Events/Conferences apply to large-scale meetings either external or internal that reach certain thresholds like the following suggestions:

- Reduced energy consumption whenever possible e.g. using ambient lighting instead of overhead lighting whenever possible
- Advertised transportation alternatives such as mass transit or carpooling/rideshare; access to electric vehicle charging stations;
- Clear plan for waste and recycling
- Use of recycled products or no paper products for meeting purposes
- When food is served, use of dishes and silverware if possible
- If not possible, use of recyclable, compostable food waste items
- Other ideas

Green Events/Conference Certification will apply for recognition before their event and achieve said recognition to publicize prior to their event.

Green Meetings Internal City Policy applies to internal meetings in which the City can develop a "green meetings" policy to reduce impacts. The City may consider the following suggestions:

- Using ambient light instead of overhead lights when possible
- Permit tele-conference attendance at meetings when possible
- Sending meeting materials electronically to avoid or reduce the amount of paper used at meeting
- Use of recycled products or no paper products for meeting purposes

- When food and/or drink is served, use of dishes and silverware if possible
- If not possible, use of recyclable, compostable food waste items
- Other ideas

GHG Reduction Potential
No direction calculation.

Background
Currently Iowa City has no green certification or recognition of businesses, events or other meetings. The City believes that this recognition is an important achievement to many businesses and their consumers, and a marketable one as well. The development of these certifications will applaud the important work of local businesses and events and will also serve as a catalyst to encourage others to do the same. Certification programs are not new to the municipal arena and can be found across the country. These certification programs will coincide with some of the business tools highlighted in the Climate Action Toolkit.

Timing
Short to mid term.

Implementation Partners
The City should consider working the Iowa City Area Chamber of Commerce, Iowa City Downtown District, University of Iowa and any green/sustainability-oriented PR/communications firms.

Next Steps for Action
Identify internal City team to establish internal green meeting policies for consideration. Simultaneously, the City should work with the Chamber of Commerce and the Downtown District to gauge interest in a green certification program and determine how best a program like this could serve them. Next, the City should develop external city rules and regulations for external Green Business, Green Event certifications. For Green Business Certification, Iowa City may want to consider targeting a business subsector for initial pilot or rollout, such as restaurants.

Costs
Certification programs of this nature have minimal costs for businesses that pursue the certification. With an a la carte approach, where businesses can pick and choose the activities they want to pursue, businesses are also afforded flexibility in determining how they want to spend their dollars and potentially select strategies that are cost-effective to the business. For the City, administration of a certification program will have minimal annual costs primarily associated with labor required to monitor participation and compliance. However, the City can subsidize some of these costs through a small fee that can be levied on those businesses seeking certification.

Benefits
In addition to potential economic benefits associated with reduced or more efficient use of resources, businesses that receive certification through the programs will benefit from positive brand image through the recognition that the City will provide. Employees may also feel a sense of community and motivation provided by the opportunity to be a part of the efforts.

Additional Information

Sustainable Jersey Green Business Certification Program http://www.sustainablejersey.com/actions-certification/actions/?type=1336777436&tx_sjcert_action%5BactionObject%5D=46&tx_sjcert_action%5Baction%5D=getPDF&tx_sjcert_action%5Bcontroller%5D=Action&cHash=1b94560c448d3879e884bea71acf08ee

Thousand Oaks (CA) Green Business Certification Program http://www.toaks.org/departments/public-works/sustainability/go-green-in-business/green-business-certification

Monterrey Bay (CA) Green Business Program https://montereybaygreenbusiness.org/certification/

Chicago Green Office Challenge http://greenpsf.com/go/community/index/chicago