ROLL CALL ORDER FOR MEETING OF
July 13, 2020

Buol, Cavanagh, Jones, Resnick, Roussell, Sprank

<u>This meeting will be conducted as a virtual meeting.</u>

Due to social distancing guidelines related to the COVID-19 pandemic, City Council members and City staff will participate by webinar and will not meet in person. The virtual meeting will be aired live on CityChannel Dubuque (Mediacom cable channels 8 and 117.2), streamed live and archived on the city's website at www.cityofdubuque.org/media, and streamed live on the City's Facebook page at www.facebook.com/cityofdubuque.

The City of Dubuque highly encourages people to view and participate in City Council meetings through the virtual options.

CITY OF DUBUQUE, IOWA
CITY COUNCIL MEETING
This meeting will be conducted virtually.
Please see the information above for viewing and listening options.
July 13, 2020

Council meetings are video streamed live and archived at www.cityofdubuque.org/media and on Dubuque's CityChannel on the Mediacom cable system at cable channel 8 and digital 117.2

SPECIAL SESSION

6:30 PM

WORK SESSION

1. Sustainable Dubuque

City Manager transmitting information for the July 13, 2020 Sustainable Dubuque Work Session. Sustainable Communities Coordinator Gina Bell and consultant Ted Redmond with Pale Blue Dot will inform City Council on the updated 50% by 2030 Community Climate Action and Resiliency Plan.

Suggested Disposition:

ADJOURNMENT

The agenda with supporting documents may be accessed at www.cityofdubuque.org or at the City Clerk's Office, 50 W. 13th Street, during regular business hours.

This notice is given pursuant to Chapter 21, Code of Iowa, and applicable local regulations of the City of Dubuque, Iowa and/or governmental body holding the meeting.

Written comments regarding the above items may be submitted to the City Clerk's Office, 50 W. 13th St., Dubuque, IA 52001, before or at said time of meeting.

Individuals with limited English proficiency, vision, hearing or speech impairments or requiring special

assistance should contact the City Clerk's Office at (563) 589-4100, TDD/TTY (563) 690-6678, ctyclerk@cityofdubuque.org as soon as feasible. Deaf or hard-of-hearing individuals can use Relay Iowa by dialing 711 or (800) 735-2942.

Copyrighted
July 13, 2020

City of Dubuque Special Meeting

Work Session - Bottom # 1.

ITEM TITLE: Sustainable Dubuque Work Session

SUMMARY: City Manager transmitting information for the July 13, 2020 Sustainable Dubuque Work Session. Sustainable Communities Coordinator Gina Bell and consultant Ted Redmond with Pale Blue Dot will inform City Council on the updated 50% by 2030 Community Climate Action and Resiliency Plan.

SUGGESTED DISPOSITION: Suggested Disposition:

ATTACHMENTS:

Description	Type
Sustainable Dubuque Work Session-MVM Memo	City Manager Memo
Staff Memo	Staff Memo
PowerPoint Presentation_CAP Update 2020	Supporting Documentation
Climate Action Plan Appendix	Supporting Documentation
Climate Action Plan 2020	Supporting Documentation

THE CITY OF DUBUQUE
Masterpiece on the Mississippi

Dubuque All-America City NATIONAL CIVIC LEAGUE 2007•2012•2013 2017★2019

TO: The Honorable Mayor and City Council Members

FROM: Michael C. Van Milligen, City Manager

SUBJECT: Sustainable Dubuque Work Session

DATE: July 8, 2020

Sustainable Communities Coordinator Gina Bell is transmitting information for the July 13, 2020 Sustainable Dubuque Work Session. Gina Bell and consultant Ted Redmond with Pale Blue Dot will inform City Council on the updated 50% by 2030 Community Climate Action and Resiliency Plan.

Michael C. Van Milligen

MCVM:jh
Attachment
cc: Crenna Brumwell, City Attorney
Teri Goodmann, Assistant City Manager
Cori Burbach, Assistant City Manager
Gina Bell, Sustainable Communities Coordinator

THE CITY OF DUBUQUE

Masterpiece on the Mississippi

Dubuque All-America City NATIONAL CIVIC LEAGUE 2007•2012•2013 2017★2019

TO: Michael C. Van Milligen, City Manager

FROM: Gina Bell, Sustainable Communities Coordinator

SUBJECT: Sustainable Dubuque Work Session Agenda

DATE: June 2, 2020

The purpose of this memorandum is to set the agenda for the Sustainable Dubuque work session on Monday, July 13, 2020. Sustainability Coordinator Gina Bell, and consultant, Ted Redmond with Pale Blue Dot will inform Council on the updated 50% by 2030 Community Climate Action and Resiliency Plan.

Thank you.

50% by 2030 Climate Action Plan Update

SUSTAINABLE DUBUQUE

viable • livable • equitable

SUSTAINABILITY

“The ability to meet the needs of the present without compromising the ability of future generations to meet their own needs."

RESILIENCY

“The ability of individuals and systems to prevent, prepare, and recover from adverse vulnerabilities while adapting to long-term changes.”

What is a Climate Action Plan?

- Strategies that mitigate climate change and reduce greenhouse gas emissions.
- A roadmap of actions that the community will take to reduce emissions and adapt to project people and places to reduce vulnerability to climate impacts

Why a Climate Action Plan?

- The climate crisis is not waiting
- Economic opportunity to address high unemployment
- Racial justice must include environmental justice

Climate Action Plan History

- Community Climate Action Plan adopted in 2013
- Why the update?
- Initial inventory
- Differences from 2013 plan
- Current inventory

Process

- Hired Pale blue Dot
- Community Team Creation + Meetings
- Community engagement + Survey
- Next steps – implementation plan and engagement

Community Engagement

Three Phases of Engagement

- Phase 1: Developing the Engagement Approach and Strategy
- Phase 2: Deployment of Engagement Approach and Strategy
- Phase 3: Implementation of Engagement approach

Community Engagement – Youth Design Thinking Workshop

Community Engagement – In-Person Workshops

Four in-person workshops co-hosted with community partners

- January Workshop
- March Workshop
- April Workshop
- May Workshop

Community Engagement – In-Person Workshops

Four in-person workshops co-hosted with community partners

- January Workshop (co-hosted with Fountain of Youth Program)
- March Workshop
- April Workshop
- May Workshop

Community Engagement & COVID

Four in-person workshops co-hosted with community partners

- January Workshop (co-hosted with Fountain of Youth Program)

COVID

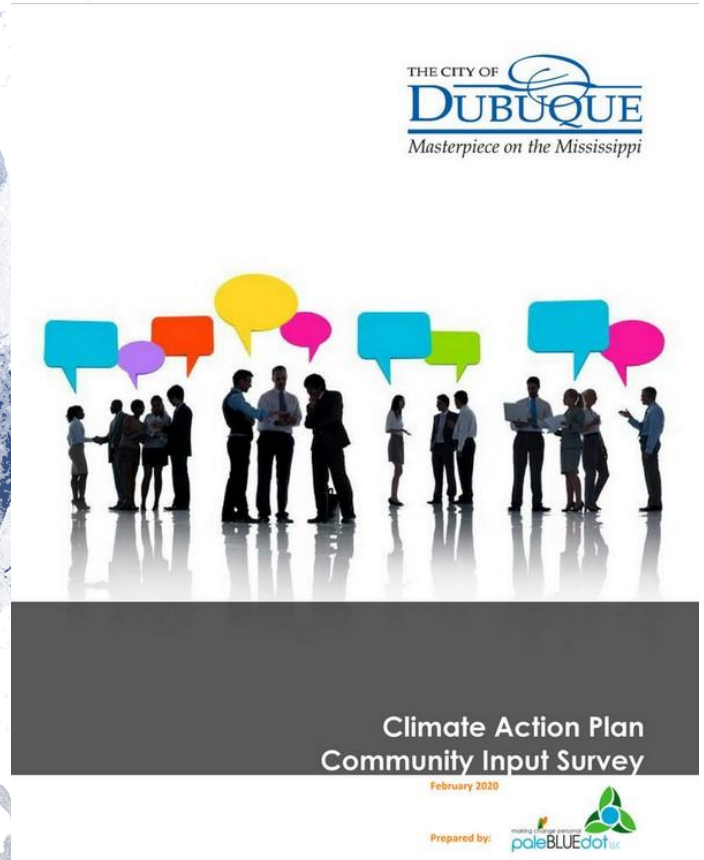
- March Workshop (rescheduled; canceled)
- April Workshop (rescheduled; canceled)
- May Workshop (rescheduled; canceled)

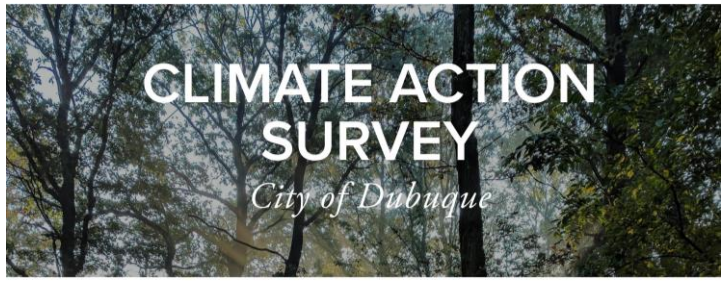
Community Engagement – Next Steps

Virtual listening sessions + one on one interviews with community leaders

- Building relationships to support and prioritize the identified climate actions
- Facilitating collaboration among a diverse cross-section of people
- Identifying community assets that can be mobilized for action

Community Engagement – Community Survey





CLIMATE ACTION PLAN UPDATE

In 2013 the City of Dubuque adopted the Dubuque Community Climate Action and Resiliency Plan. The City of Dubuque will be developing an update to this plan to reduce greenhouse gas (GHG) emissions throughout the City.

With this survey, Dubuque residents and business owners have an opportunity to share their ideas and concerns to help inform how the City of Dubuque might address climate change. Please help establish Dubuque's Climate Action priorities by completing this survey. It should take no longer than 10 minutes.

Your input through this survey is important to the City!

Dubuque Climate Action Survey

* Required

Email address *

Your email

1: Are you a resident of the City of Dubuque? *

- Yes
- No

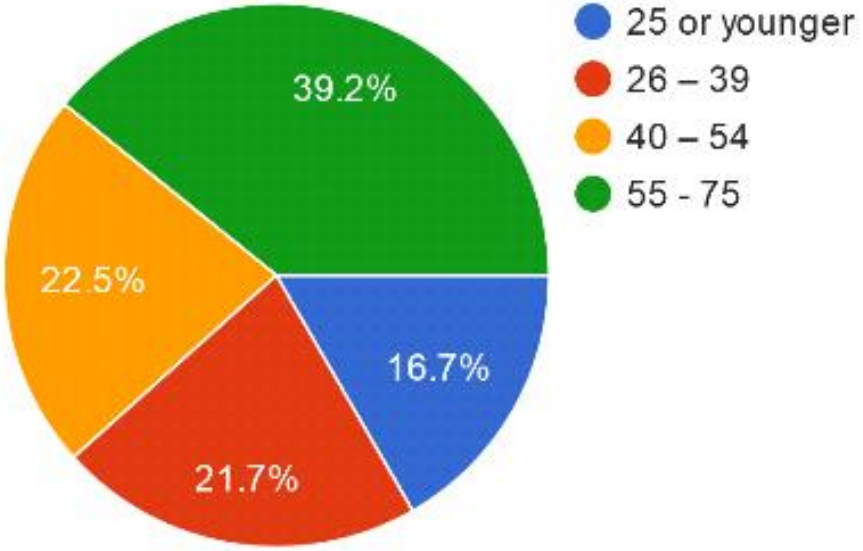
2: Do you rent or own your home? *

- Rent
- Own

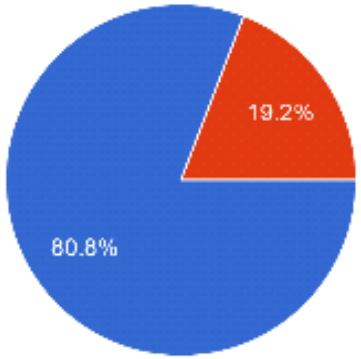
Community Survey Highlights

4: What age category describes you?

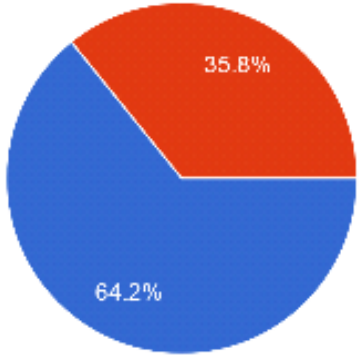
240 responses



1: Are you a resident



3: Do you work, or own a business,

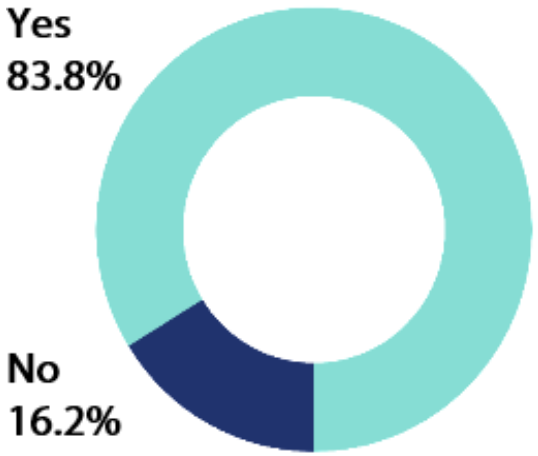


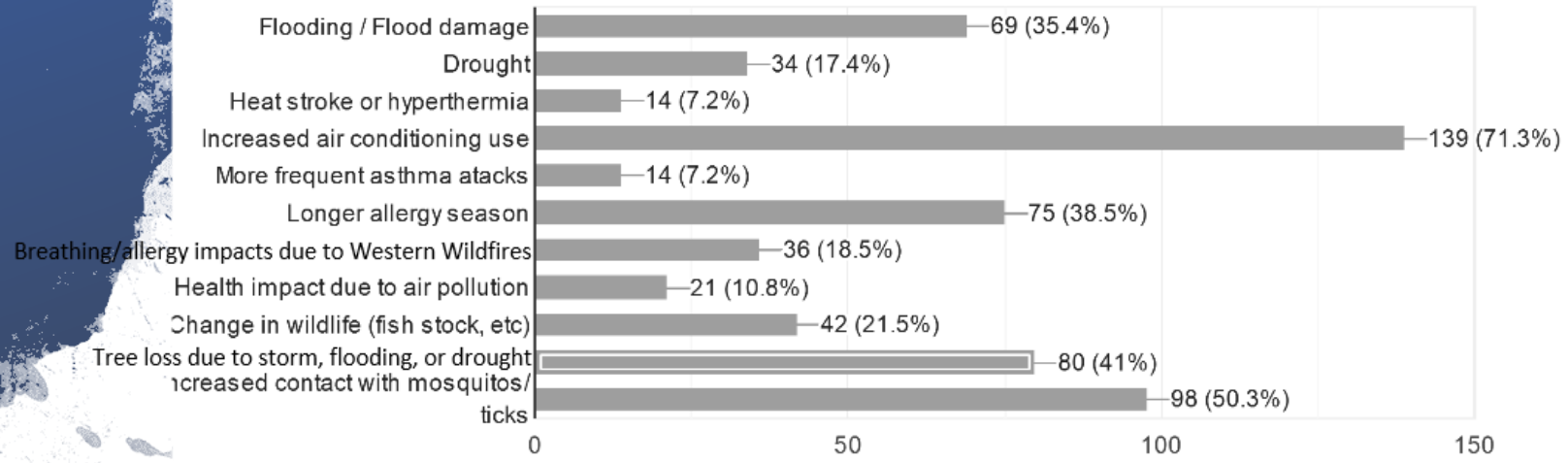
Yes

No

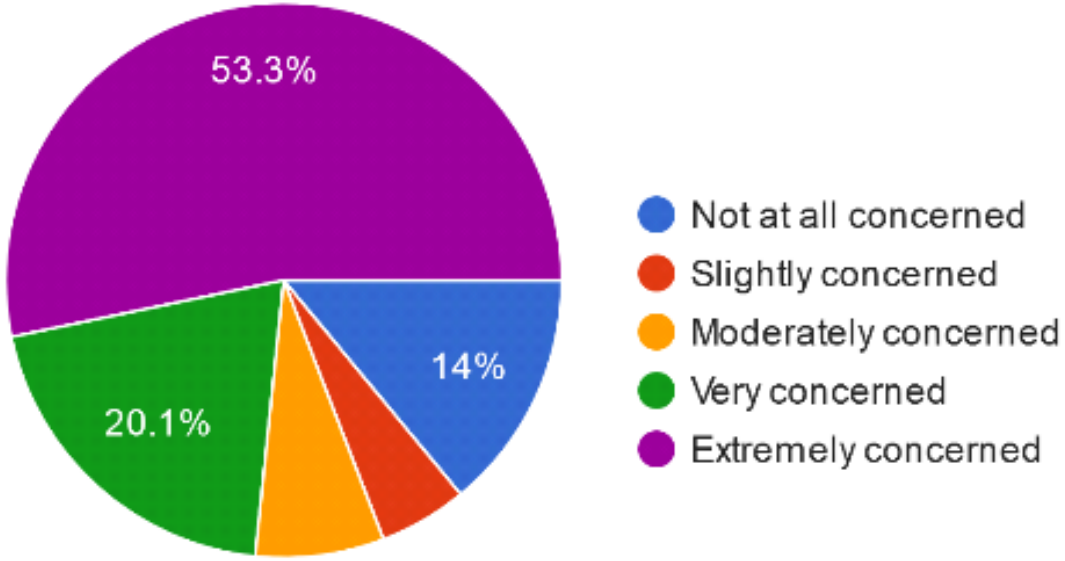
Community Survey Highlights

9: Have any of the following effects of climate change personally impacted you?

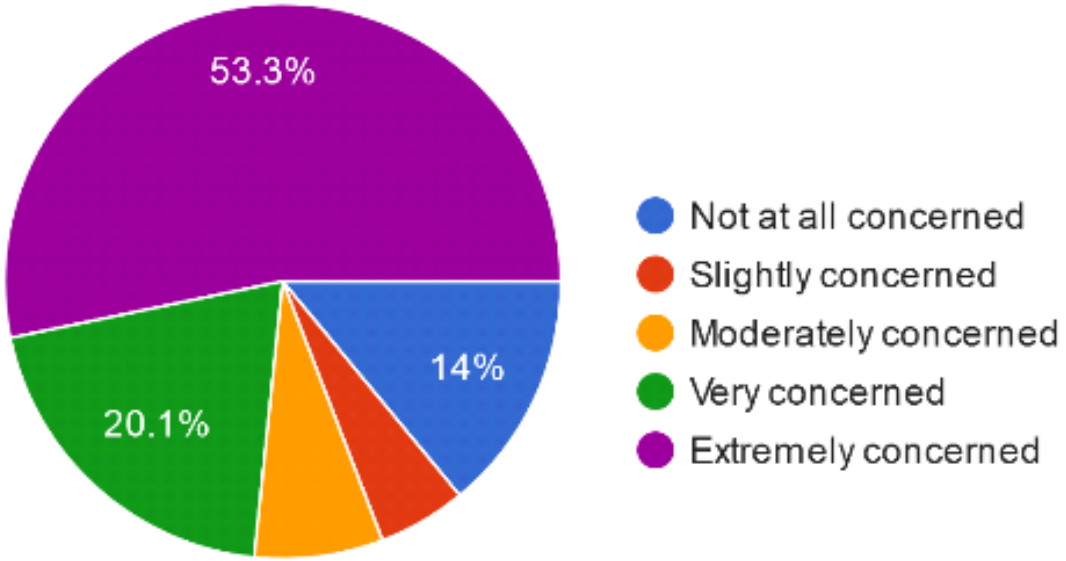


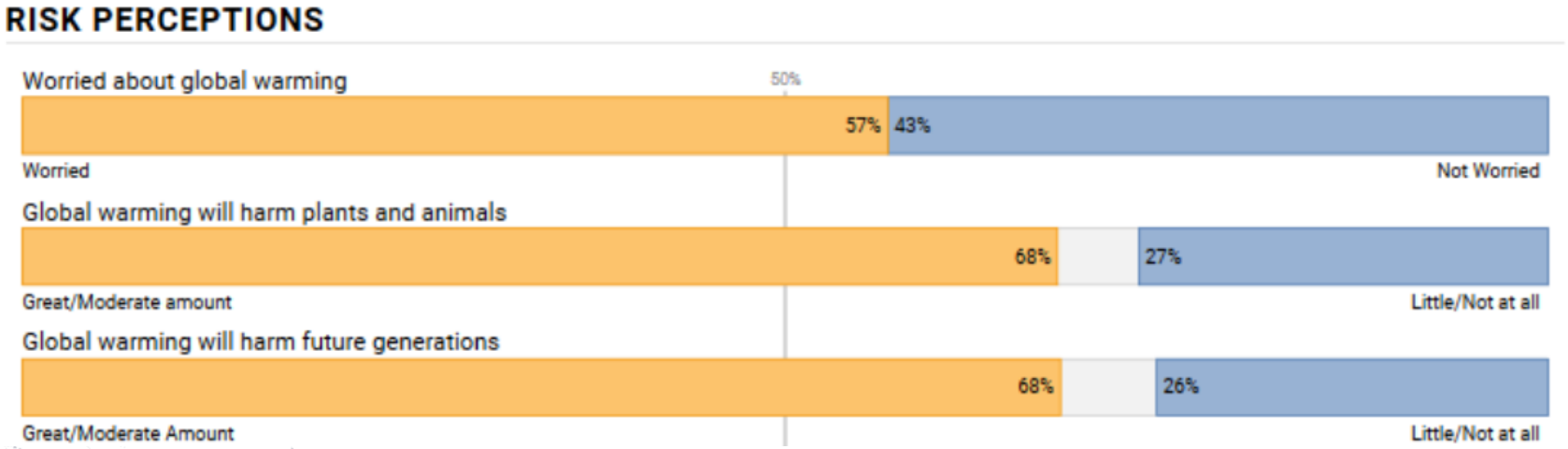


Community Survey Highlights



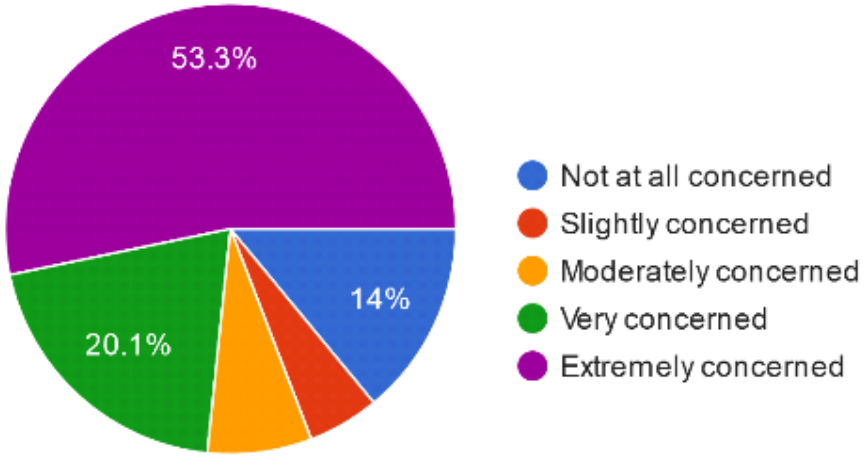
Community Survey Highlights



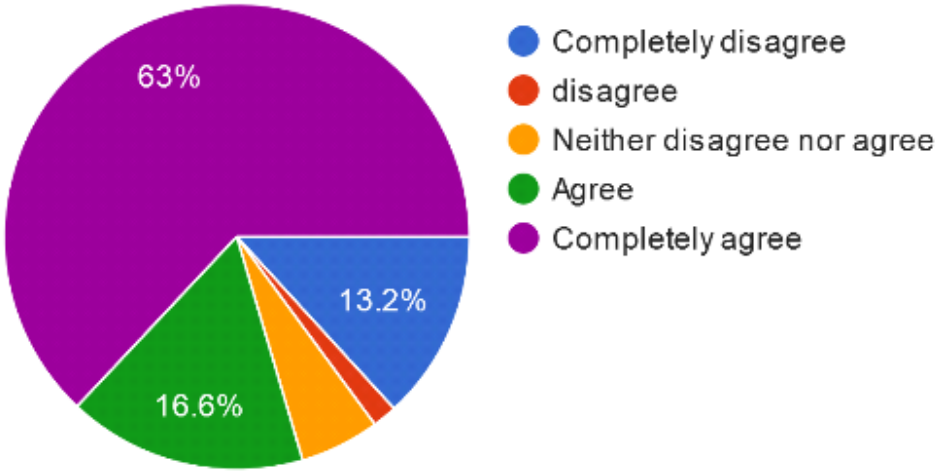


Community Survey Highlights

Over 79% agree that it is important for the City to take action to prepare for Climate Change impacts, with 61% of respondents "Completely Agreeing"

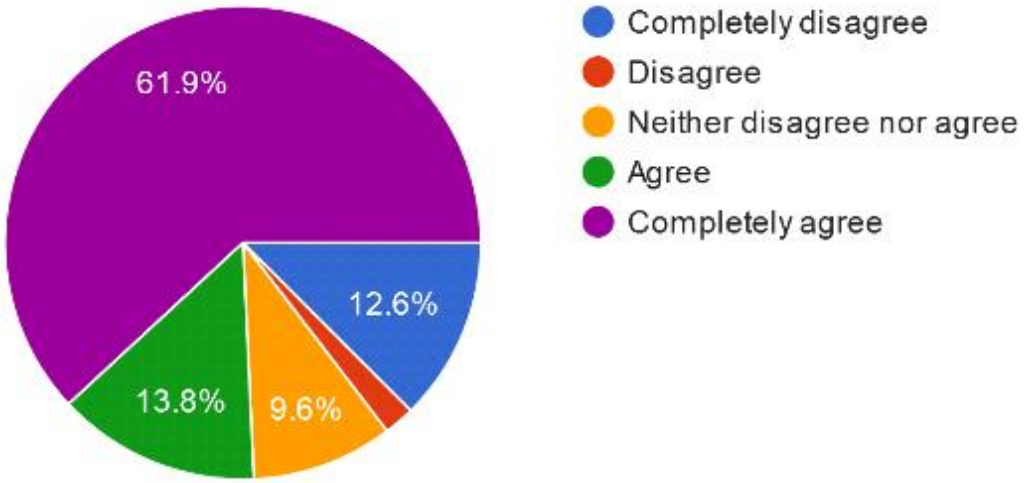


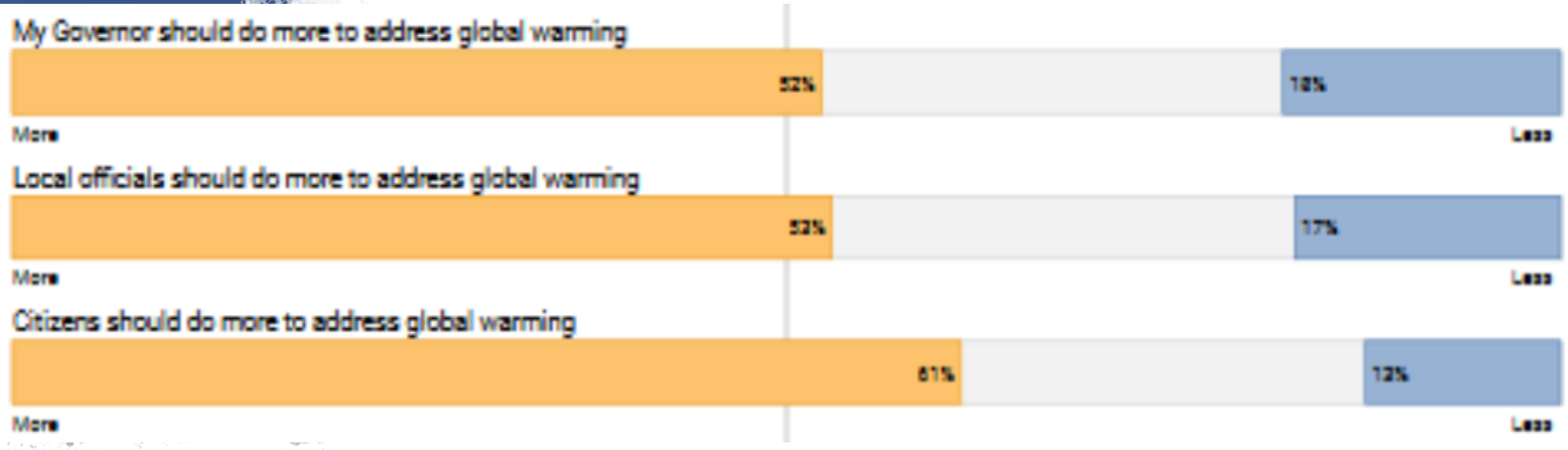
Over 79% agree that it is important for the City to take action to reduce city-wide greenhouse gas emissions, with 63% of respondents "Completely Agreeing"



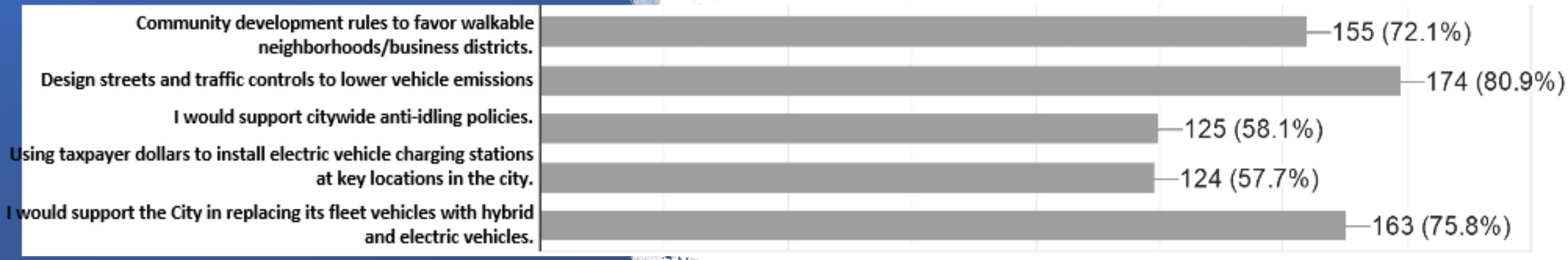
Community Survey Highlights

Over 75% agree that it is important for the City to be a proactive leader in addressing climate change, with 61.9% of respondents "Completely Agreeing"





17: Please select the following Transportation solutions you would support or engage in



19: Please select the following Building solutions you would support or engage in

21: Please select the following Energy solutions you would support or engage in

Climate Action Plan Definitions

- Climate Change
- Climate Vulnerability
- Climate Risk
- Adaptation
- Greenhouse Gas (GHG)
- Mitigation
- Social Cost of Carbon

Climate Change - is the long-term shift in worldwide weather driven by a global increase in average temperatures.

What is the Difference Between Weather and Climate?

Weather refers to short-term changes in the atmosphere.

Weather is what we experience today.

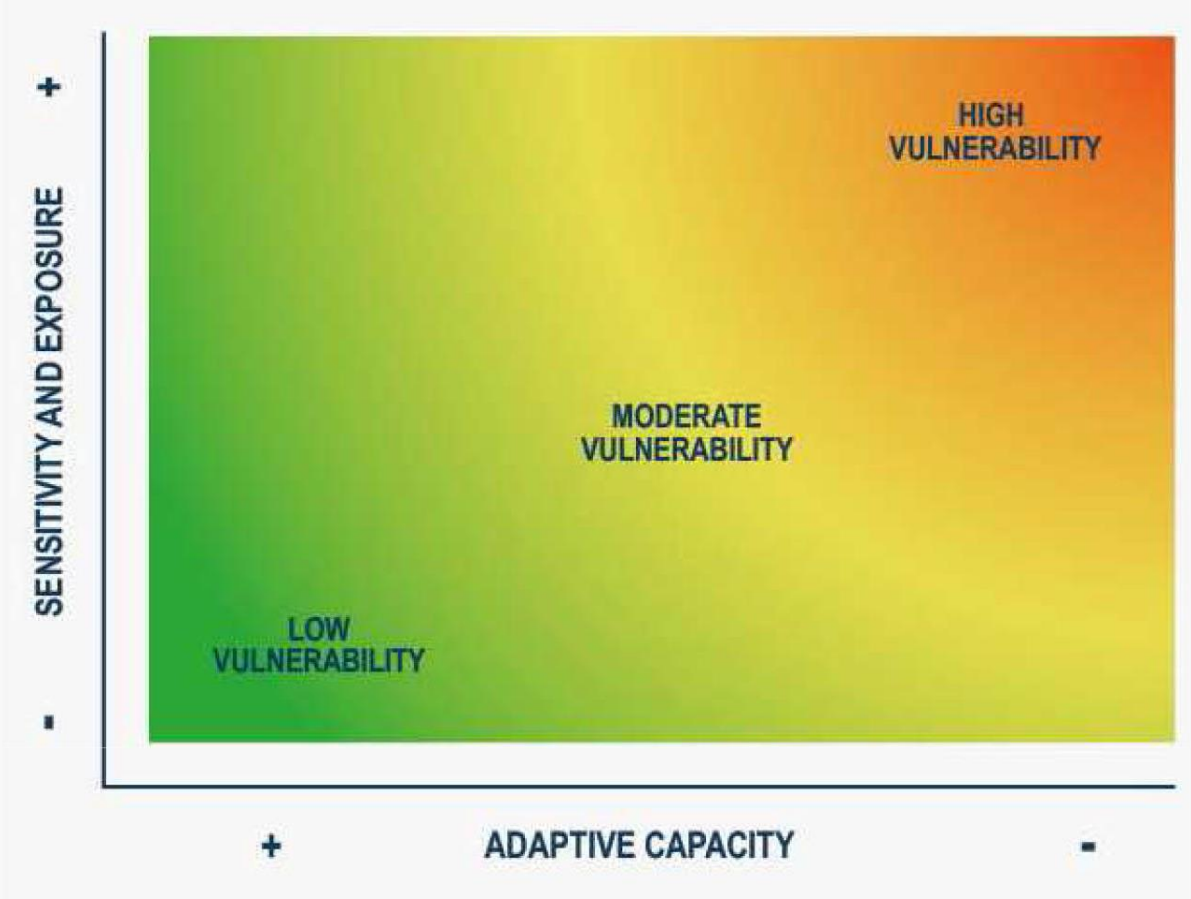
Climate describes what the weather is like over a long period of time in a specific area.

Climate is the likelihood of the weather we'll have.

Climate Vulnerability

Climate Vulnerability
(no universally accepted definition)

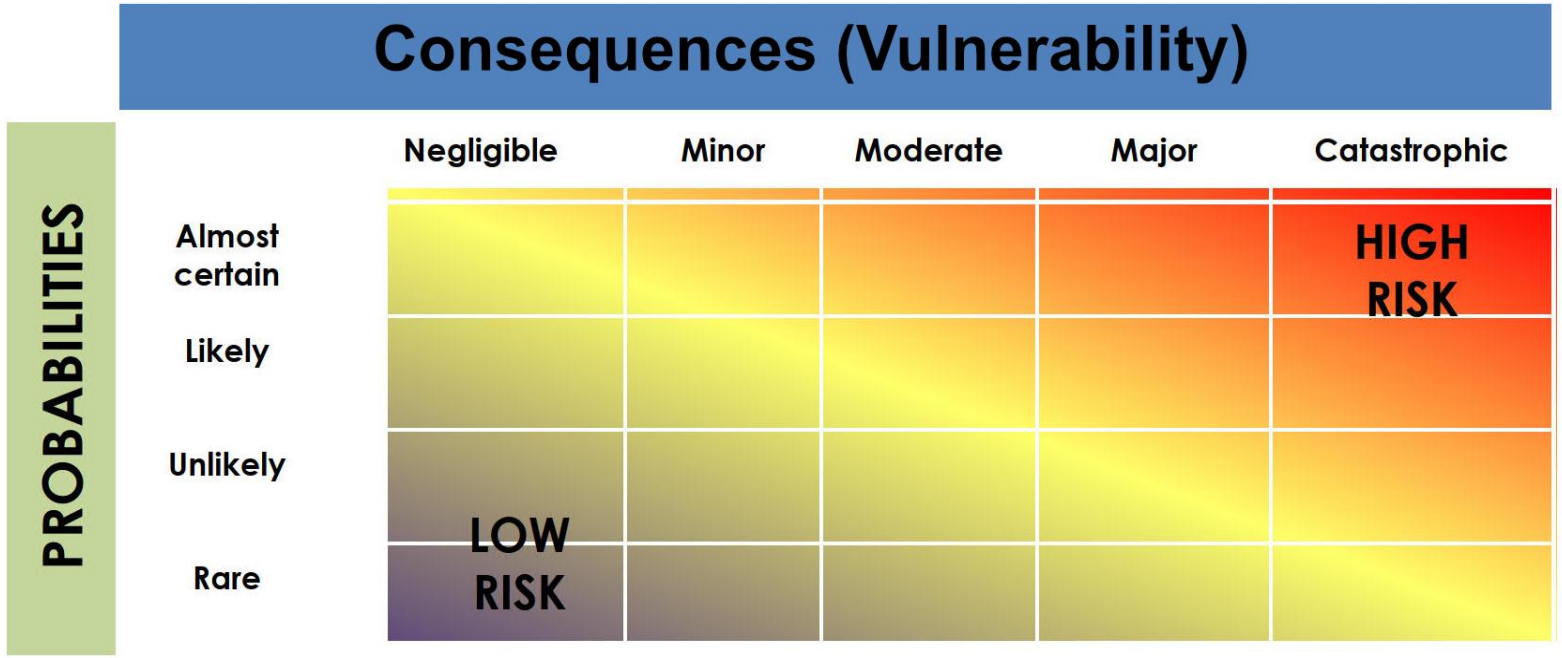
Is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change.



Climate Risk

Climate Risk
(no universally accepted definition)

Risk is probability of occurrence of hazardous events or trends multiplied by their impacts should they occur.



Climate Change Adaptation

Climate Change Adaptation

Developing ways to protect people and places by reducing their vulnerability to climate impacts – **increasing ability to cope**

Greenhouse Gases (GHG)

Greenhouse Gases (GHG)

Greenhouse Gases allow visible light from the sun to pass through to the earth but then react with the resulting infrared energy from the earth, trapping heat in the Earth's atmosphere.

Carbon dioxide CO_2

Methane CH_4

Nitrous oxide N_2O

Without them, Earth would have the same average temperature as the Moon: **0° F**

GHG Emissions Sources and Reduction Strategies

GHG Emissions and Sources

Fossil Fuel Use

Energy

Transportation

Biological Sources

Solid Waste

Wastewater

Reduction Strategies

Fossil Fuel Use

Eliminating fossil fuel use for electricity generation, on-site (natural gas), and liquid fossil fuels for transportation and equipment

Biological Sources

Eliminating or reducing the build-up of methane from biological processes, capture and beneficial use of methane when unavoidable

Climate Mitigation

Climate Mitigation

Reducing climate change impacts– involves reducing the emission of Greenhouse gases (GHG) into the atmosphere.

Social Cost of Carbon

Social Cost of Carbon

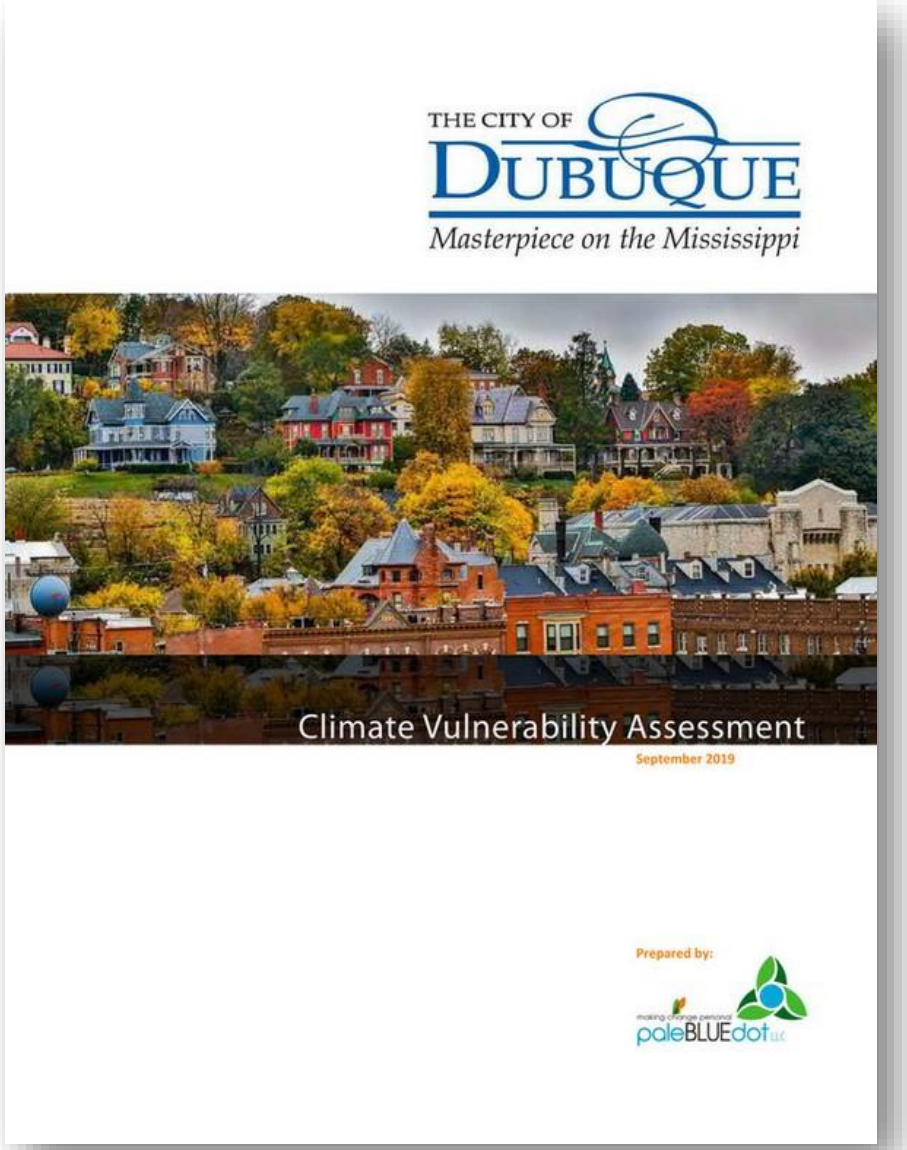
The social cost of carbon is a measure of the economic harm from climate change impacts, expressed as the dollar value of the total damages from emitting one ton of carbon dioxide into the atmosphere.

Climate Change Impacts

- Increased severe weather events
- Increased precipitation
- Increased heat
- Insurance premiums
- City’s credit rating
- Climate refugees

Climate Change Impacts

Vulnerability Assessment



Projected Climate Change Impacts

Looking Back

From 1983 through 2018, Dubuque has experienced:

Increase in annual average temperature:	1.7°
Increase in annual precipitation:	17%
Increase in heavy precipitation (Days with over 1.25" and heaviest rainfall event)	59%
Increase in Days above 95:	2 days
Decrease in Days below 32:	-9 days
Increase in growing season:	10 days

Projected Climate Change Impacts

Looking Back

From 1983 through 2018, Dubuque has experienced:

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Increase in heavy precipitation (Days with over 1.25" and heaviest rainfall event)	59%
Increase in Days above 95:	2 days
Decrease in Days below 32:	-9 days
Increase in growing season:	10 days

Looking Forward

By 2100, Dubuque Can Expect:

Increase in annual average temperature:	6-11°F
Increase in annual precipitation:	-9 to 15% With Significant Seasonal Variation
Increase in heavy precipitation events:	30%
Increase in Days above 95:	+48 days
Decrease in Days below 32:	-35 days
Increase in growing season:	48 days
Increase in Air Conditioning Demand:	266%

Projected Climate Change Impacts

Looking Back

From 1983 through 2018, Dubuque has experienced:

Increase in annual av temperature:

Increase in annual pr

Increase in heavy pre (Days with over 1.25' rainfall event)

Increase in Days abo

Decrease in Days below 32: -9 days

Increase in growing season: 10 days

Storm Weather Events

Number of Events Reported In Dubuque County:

From March 1999 to March 2009: 169 events

From March 2009 to March 2019: 182 events - an increase of 7%

Average Annual Storm Weather Economic Damage 1998-2018: $3,230,000
(source: NOAA National Centers for Environmental Information)

Looking Forward

By 2100, Dubuque Can Expect:

Increase in annual average 6-11°F

-9 to 15%
With Significant Seasonal Variation

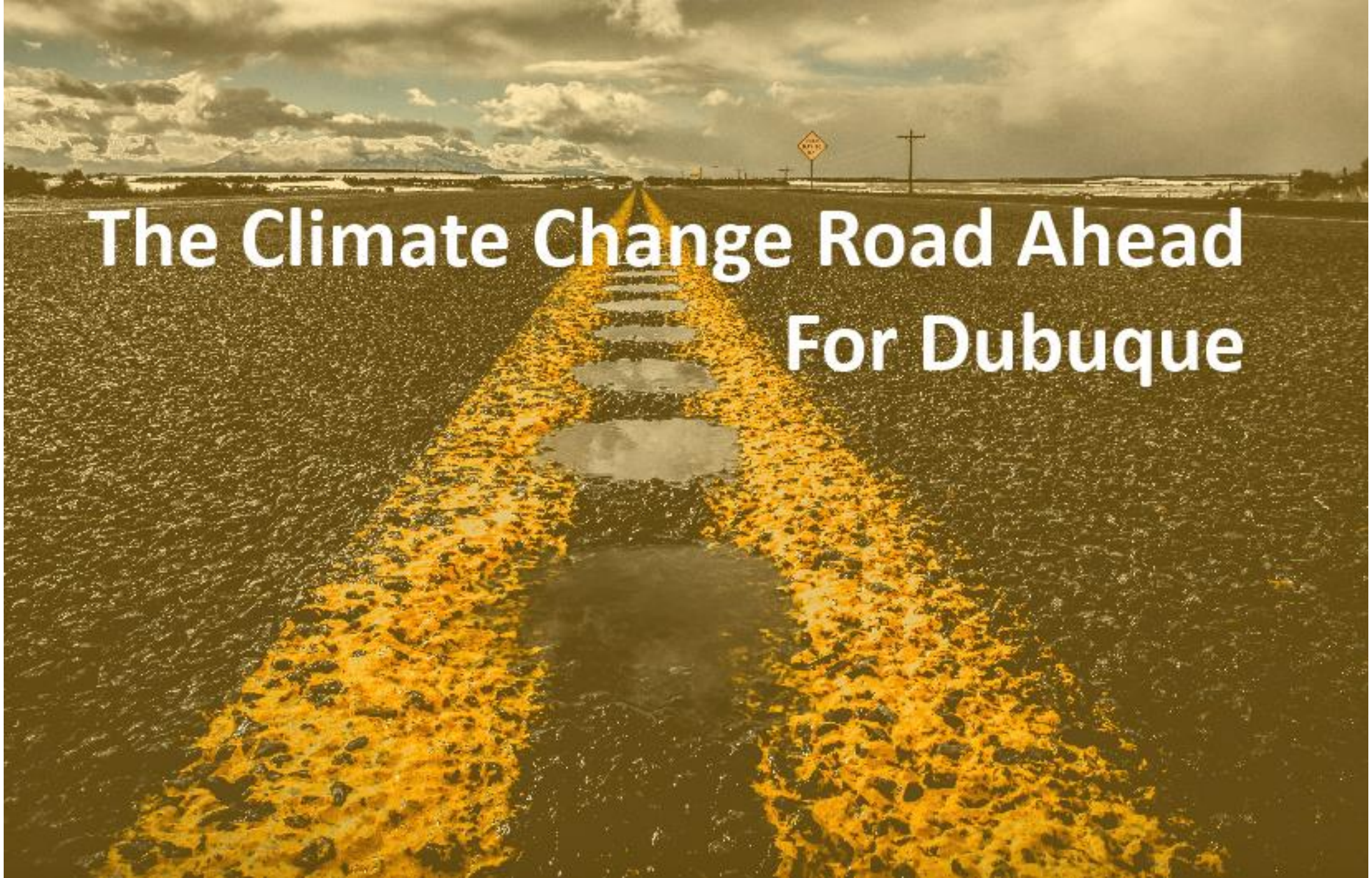
30%

+48 days

-35 days

Increase in growing season: 48 days

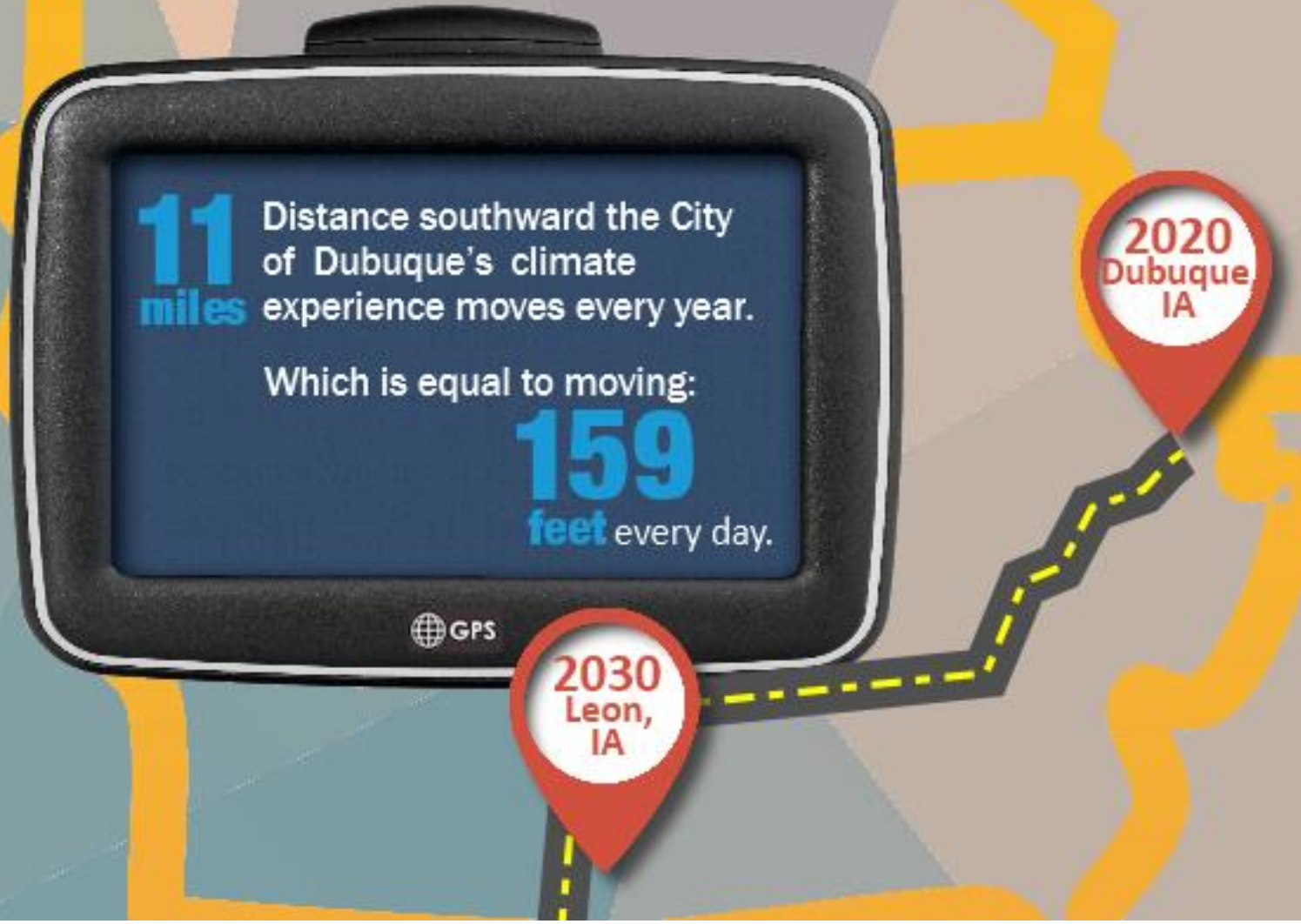
Increase in Air Conditioning Demand: 266%

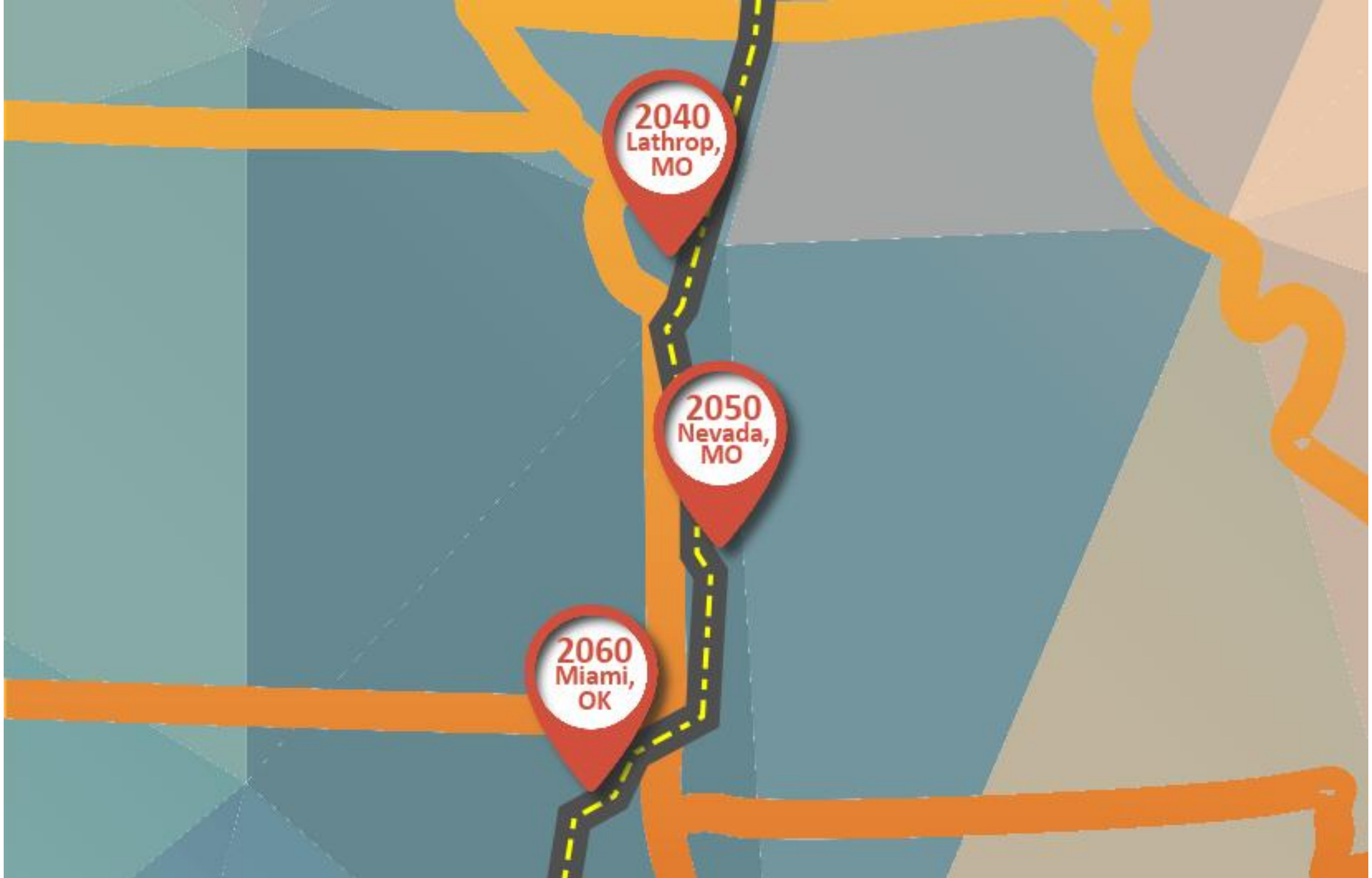


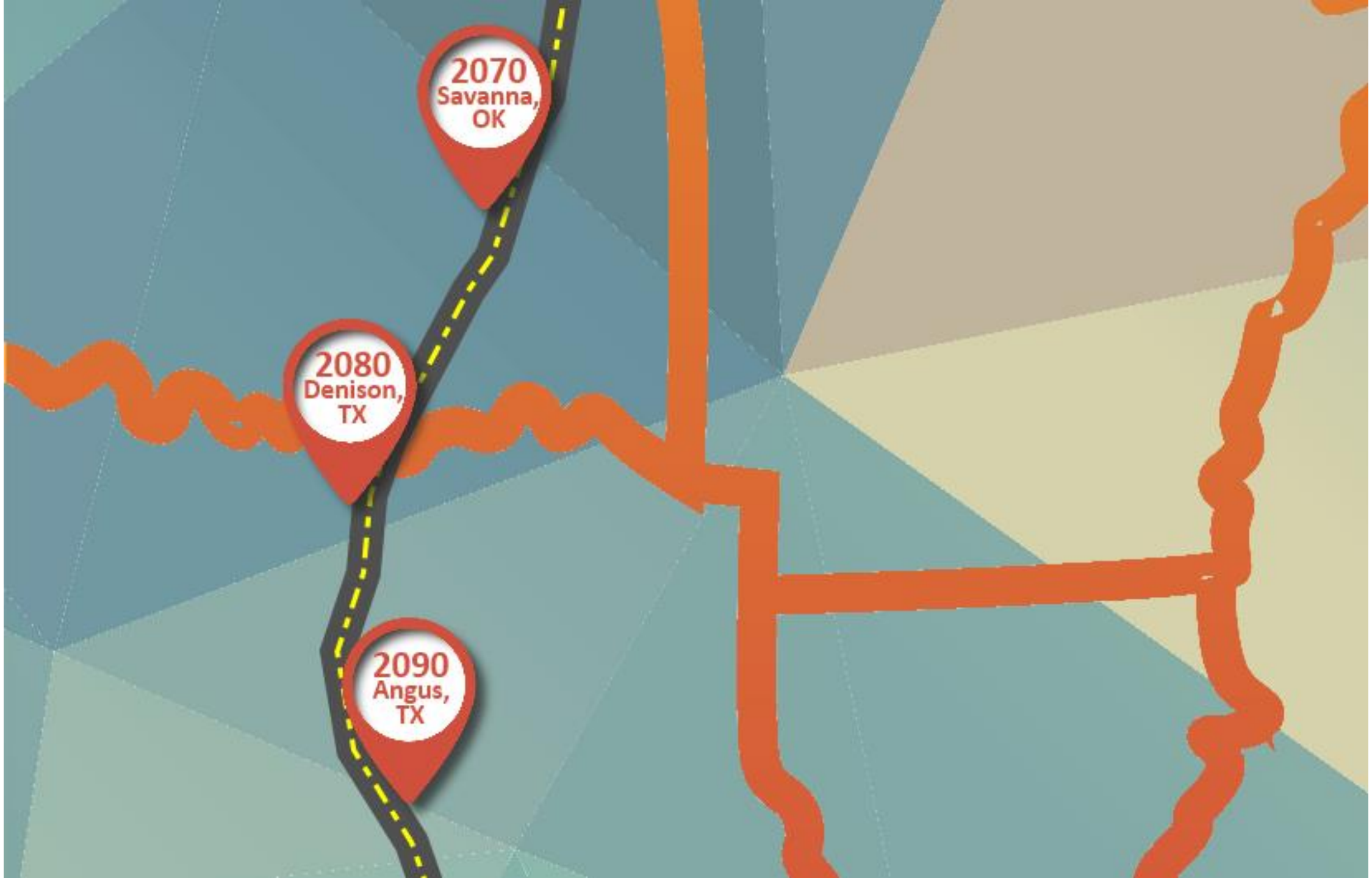
The Climate Change Road Ahead For Dubuque

Where Is Summer Going?

As Dubuque's climate continues to warm, summer weather will be similar to what communities to the south already experience.




2040
Lathrop,
MO
2050
Nevada,
MO
2060
Miami,
OK


2070
Savanna,
OK
2080
Denison,
TX
2090
Angus,
TX

Who is Most Vulnerable?

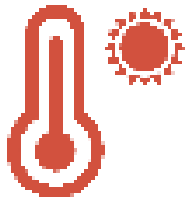
Across the United States, people and communities differ in their exposures, their inherent sensitivity, and their capacity to respond to and cope with climate change related threats. Community members who are most vulnerable include:

Children | Older Adults | Individuals with Disabilities | Those in Economic Stress | People of Color | At Risk Workers | Food Insecure Individuals | Individuals w/out Vehicle Access

Dubuque Climate Change Vulnerabilities

Medium | Medium-High | High

Heat Stress
(High)



Air Quality
(Medium-High)

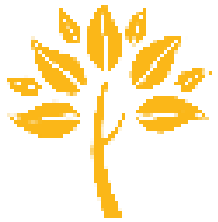
Vector-Borne Disease
(Medium)

Mental Health
(Medium-High)

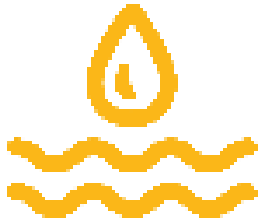
Housing
(High)

Stormwater Management
(High)

Trees, Greenspace, and Agriculture
(Medium)



Surface Water Quality
(Medium)



Climate Risks to Population

Health Impacts	Expected Impact(s)	Likelihood of Occurrence	Impact Level (Population Vulnerability)	Timeframe	Risk (Likelihood x Impact)	Impact-related indicators
Extreme Heat	Increased demand for cooling; heat stress and emergency visits, heat related health impacts	Possible	High	Medium-term	High	Cooling Degree Days, days above 95
Flooding	damage to property; flood related health impacts; infrastructure impacts	Likely	High	Short-term	Very High	Flood events, flash flood occurances, wettest 5-day periods, number of heavy rain events, disaster declarations, change in NOAA storm
Drought	Damage to crop/tree/ecosystem, reduced drinking water source, increased flash flood potential due to decreased soil permeability	Possible	Moderate	Medium-term	Moderate	Consecutive days without rain, acquafer level, surface water condition, river flow
Air Quality Impacts	Increased particulate matter, increased ozone impacts, increased instances of asthma	Possible	High	Medium-term	High	Air quality index
Vector-Borne Diseases	Increased instances of lyme disease, encephalitis, heart worm, malaria, zika virus,	Likely	Moderate	Long-term	Moderate	Disease records
Nutrition Insecurity	Food price volitility/change, fluctuation in availability	Possible	Moderate	Medium-term	Moderate	Food price index, Foodshelf demand, % of school children qualifying for free and reduced lunch
Water Quanity/Quality Impacts	Water shortage, surface water quality impacts due to heat and stormwater runoff	Possible	Moderate	Long-term	Moderate	Acquafer health; Water quality test results
Water Borne Disease	Bacteria exposussure at infected surface water locations, contamination of drinking water due to flood	Unlikely	High	Medium-term	Low	flood events; algea blooms

Climate Risks to Infrastructure and Institutions

Impacted Policy Sector	Expected Impact(s)	Likelihood of Occurrence	Potential Impact Level	Timeframe	Risk (Likelihood x Impact	Impact-related indicators
Buildings	Increased demand for cooling, need for weatherization	Likely	Moderate	Short-term	High	Low income housing units, % of residents with housing burden, housing stock age, % of units without weatherization improvements
Transport / Roads	Increased freeze/thaw damage, increased salt/sand use and maintenance budgets	Likely	High	Short-term	Very High	% of flooded or flood damaged roads and bridges, City road maintenance budget
Energy	Increased power outages, increased demand and cost expediture	Likely	High	Medium-term	High	Energy outage occurances, number of customers without power, cooling degree day increases
Water	Increased scarcity, water quality impacts	Possible	High	Long-term	Moderate	Water infrastructure damage, acquafer health, flood contamination
Waste	Damage to waste infrastructure and processing, particularly wastewater	Unlikely	Moderate	Long-term	Low	Flood impacts at wastewater facilities, sewage release, flooding at landfill/RDF sites
Land Use Planning	Stormwater management impacts, heat island impacts, flood management,	Likely	High	Short-term	Very High	Heat Island co-efficient; stormwater runoff projections, citywide tree canopy coverage, citywide impervious surface coverage, % of complete streets
Agriculture & Forestry	Reduction in crop yield, forest + tree species loss due to changes in hardiness zone and pests	Likely	Moderate	Medium-term	Moderate	% change in crop yeild, impacts to crop planting and harvesting; tree canopy loss to pests, tree canopy loss to hardiness zone changes
Environment & Biodiversity	Insect infestation, increased disease vectors, ecosystem degradation	Likely	Moderate	Medium-term	Moderate	% of habitat loss, invasive species
Law Enforcement and Emergency Response	Increased property and violent crime, increased emergency response demand and mortality rate	Likely	Moderate	Long-term	Low	Property and violent crime statistics (particularly durring extreme heat), instances of mental health need, calls for emergency response (particularly during extreme heat and weather)
Tourism	Decline in tourism demand	Not known	Not Known	Not known	Not Known	Tourism statistics, hotel occupancy levels
Economic Impact	Impacts on regional Ag business, energy expenditures, labor impacts	Likely	Moderate	Medium-term	Moderate	Disaster declarations, economic indicators, employment rates

Estimated Economic Risk of Climate Change to Dubuque by 2100

(in today's dollars):

Annual % Change by Category:

Agriculture:	Mortality:	Energy:	Labor Productivity:	Property Crime:	Violent Crime:
-22%	+4%	+8%	-1.2%	+2%	+4%

= **$42,160,000**

Annual Cost Impact

Source: "Estimating economic damage from climate change in the United States"

Estimated Localized "Social Cost of Carbon"
(in today's dollars):

Estimated Economic Risk of Climate Change:

$42,160,000
Annual Cost Impact

÷

Current Annual Emissions:

819,406
Metric Tons

=

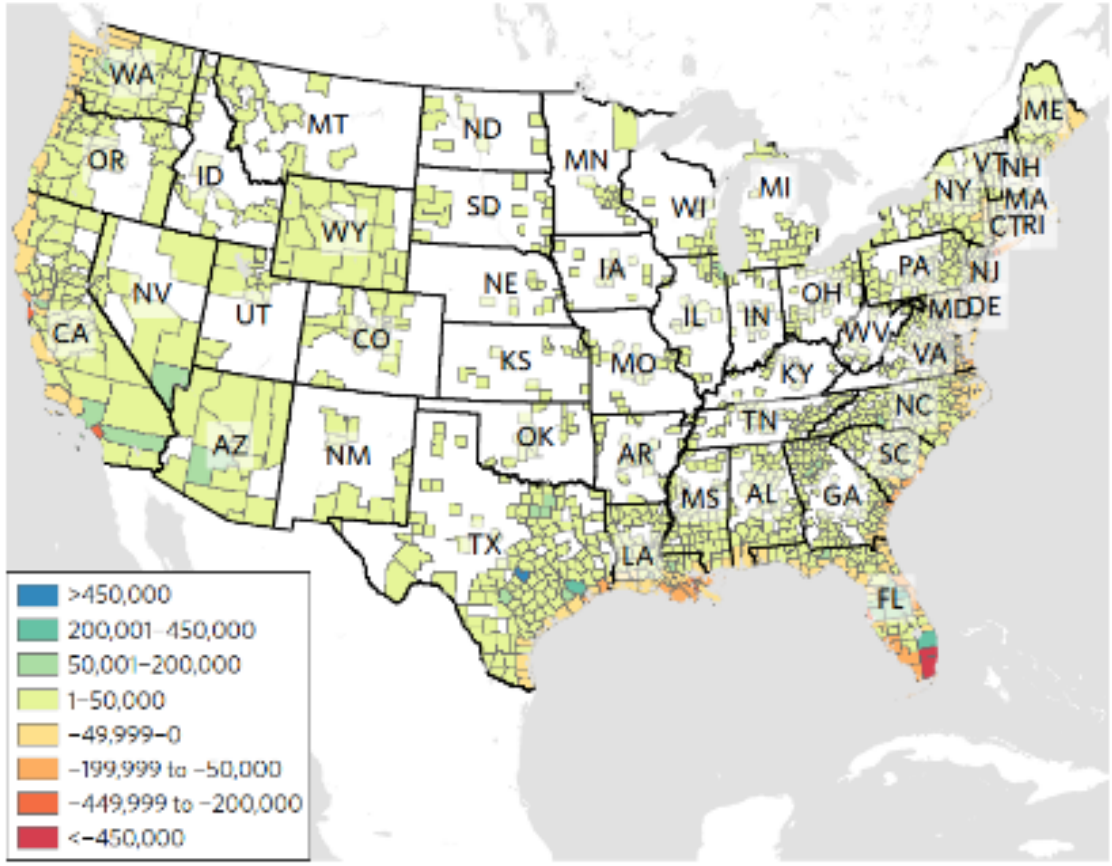
Current Estimated Localized Social Cost of Carbon:

$51
Per Ton

(compared to current global estimate of $50 per ton by the Environmental Defense Fund)

Anticipated Climate Migration

Hauer Projection
Migration induced by sea-level rise in US



Robinson Projection
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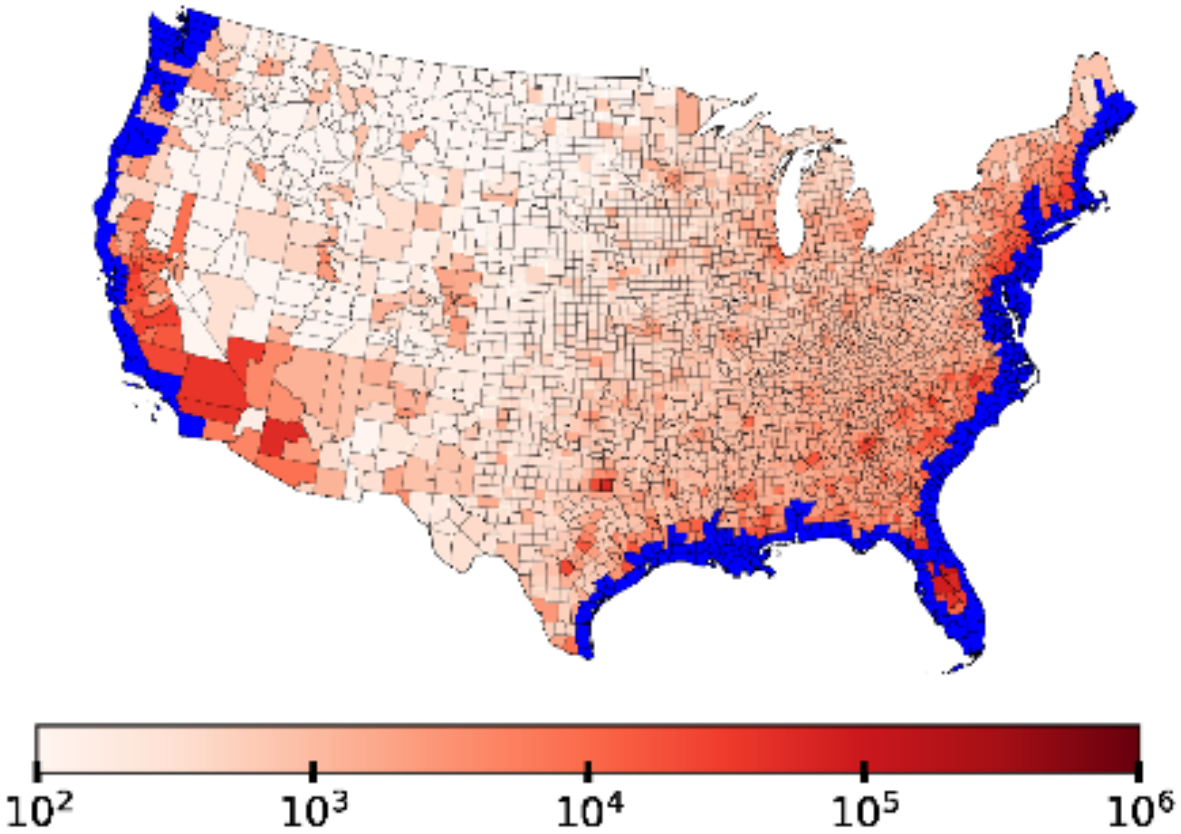

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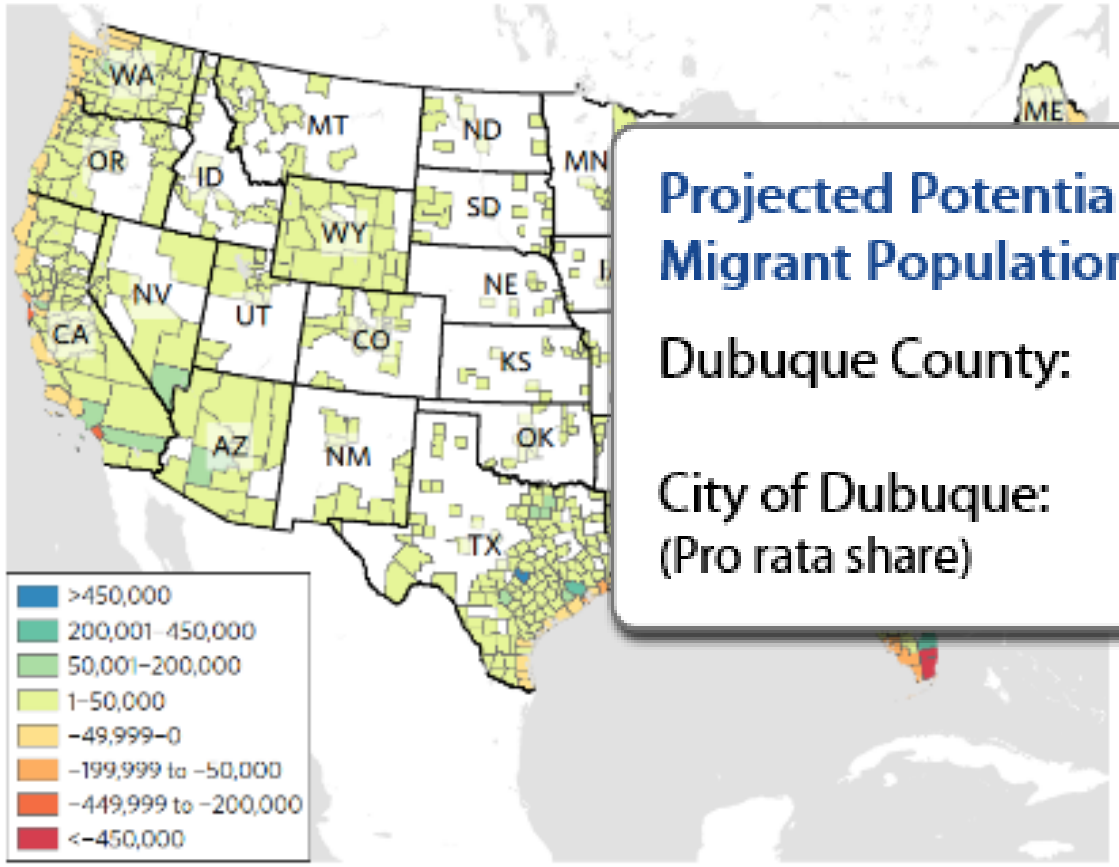
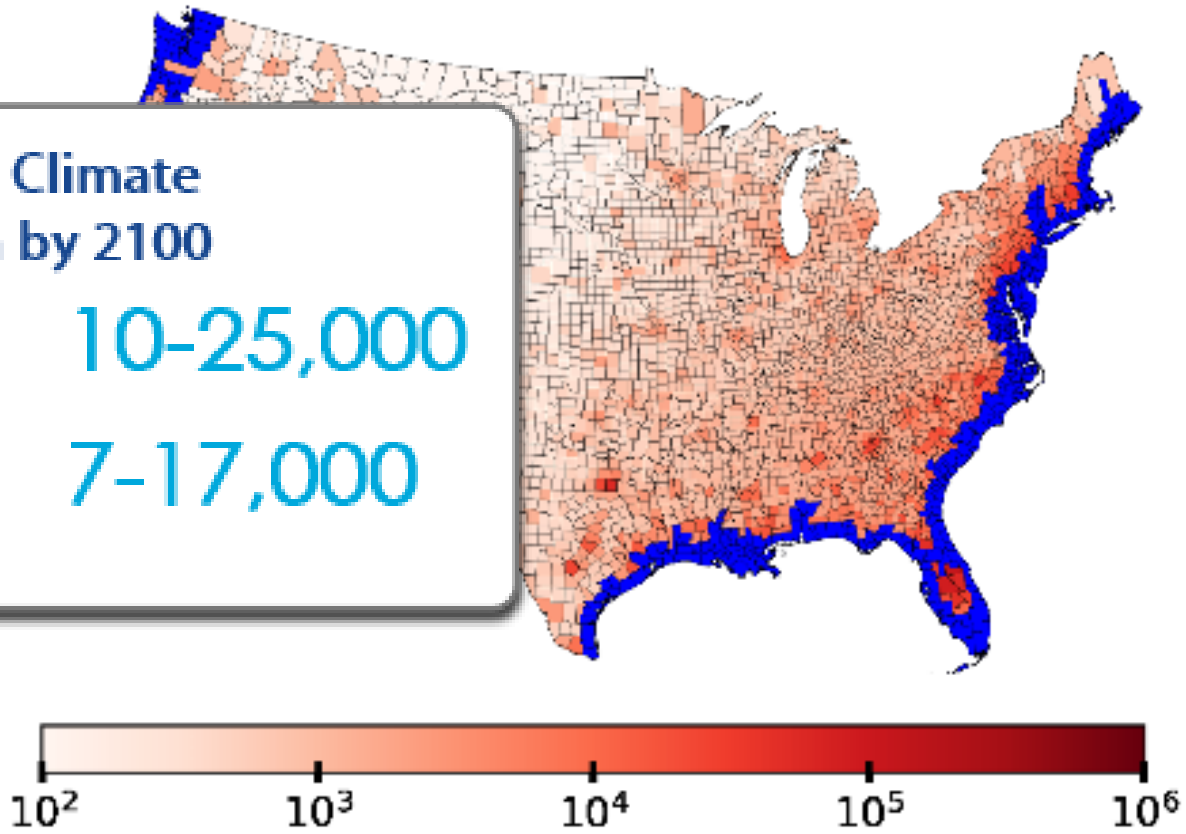


Projected Potential Climate Migrant Population by 2100

Dubuque County: **10-25,000**

City of Dubuque: **7-17,000**
(Pro rata share)

Robinson Projection
Migration induced by sea-level rise in US



Benefits of Climate Action Planning

- Job creation and economic development
- Improved air quality and public health
- Cost savings for residents and businesses
- Improved energy resilience
- Improved water quality and ecosystems
- Improved community resilience

Benefits of Climate Action Planning – Cost Savings

Cumulative Economic Savings Potential of Successfully Implementing Climate Action Plan Through 2030

Household Savings Potential:
$167,773,000
$6,984
per household

+

Commercial Business Savings Potential: **$143,651,000**
$3,351
per job

+

Industrial Business Savings Potential: **$81,345,000**
$10,228
per job

+

Estimated Localized Social Cost of Carbon: **$59,170,000**
(1,160,203 metric tons GHG avoided x $51 per ton)

=

Community-Wide Cumulative Savings Potential:
$451,939,000
$7,654
per-capita

Benefits of Climate Action Planning - Jobs

+

New job and business development opportunities

Cumulative Economic Savings Potential of Successfully Implementing Climate Action Plan Through 2030

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Climate Action Plan Vision

Climate Action Plan Vision

To be the first Climate Resilient community in Iowa, leading in the social and economic transitions necessary to prevent, prepare for, recover from, and adapt to the long-term impacts of climate change.

Climate Action Plan Goal

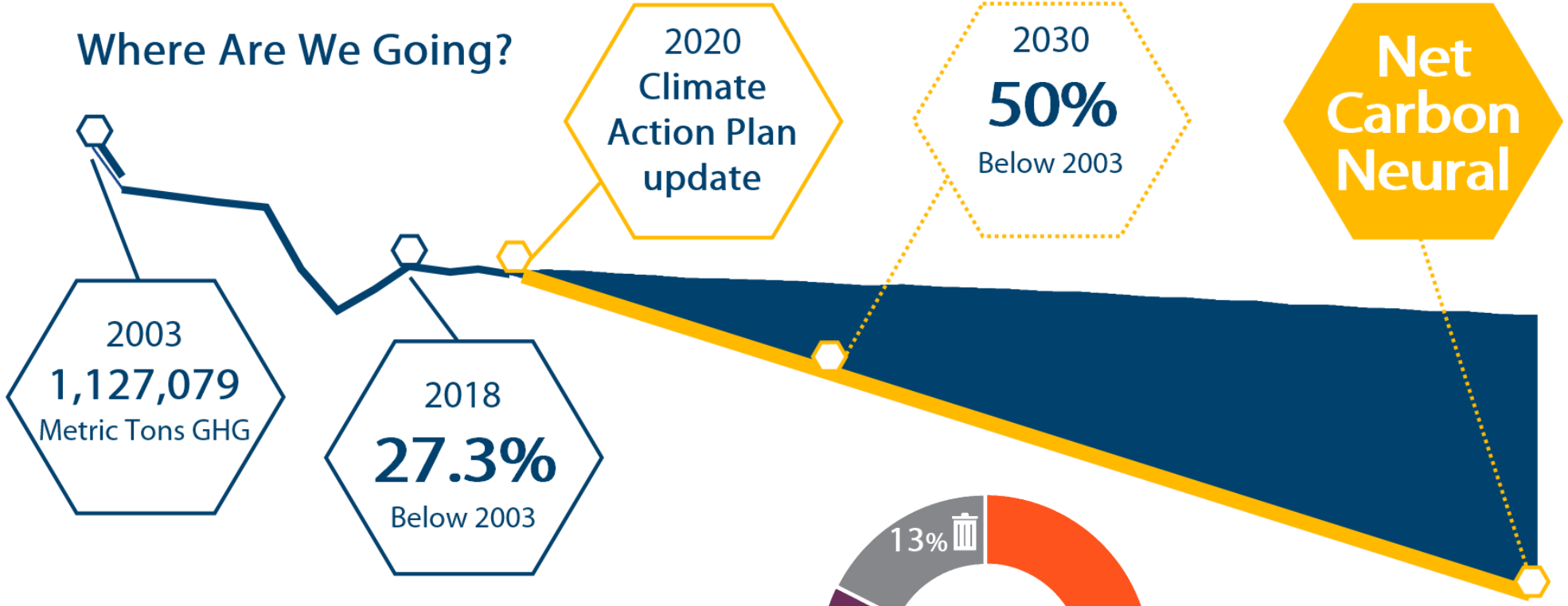
Climate Action Plan Vision

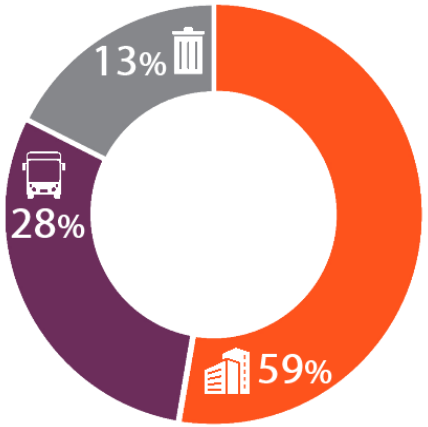
To be the first Climate Resilient community in Iowa, leading in the social and economic transitions necessary to prevent, prepare for, recover from, and adapt to the long-term impacts of climate change.

Climate Action Plan GHG Reduction Goal

To be the first **Net Carbon Neutral** community in Iowa and to reduce community-wide GHG emissions **50% below 2003 levels by 2030**.

Where Are We Going?





Reduction Share By Sector

Share of Total 2030 Reductions of Climate Action Plan by Sector:

Climate Mitigation: addresses the root causes of climate change through the reduction or prevention of greenhouse gas (GHG) emissions. Sectors with this as a significant focus are shown to the right with this symbol:

Climate Adaptation: seeks to lower the risks posed by the impacts of climate change which are now inevitable or likely. Sectors with this as a significant focus are shown to the right with this symbol:

Strategies: are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions.

Actions: are detailed items that should be completed in order to carry out the vision and strategies identified in the plan.

CAP As Living Document

The Climate Action Plan is intended to be a 'living document'. It should be a tool in used conjunction with its implementation, monitoring and periodic updates.

As a living document, CAP actions should be modified, added, or removed as new implementation results can be measured, and as new emission reduction strategies and technologies emerge that effectively reduce emissions.

Inside the Climate Action Plan

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Appendix 3	Glossary of Term
Appendix 4	Dubuque Climate Action Infographics
Appendix 5	Dubuque Climate Vulnerability Assessment
Appendix 6	Dubuque Renewable Energy Potential Study

GHG Reductions Included In The CAP

How do we know our goal is right?
IPCC Guidance:

Global Emission Reduction To Limit Global Warming to 2°C:

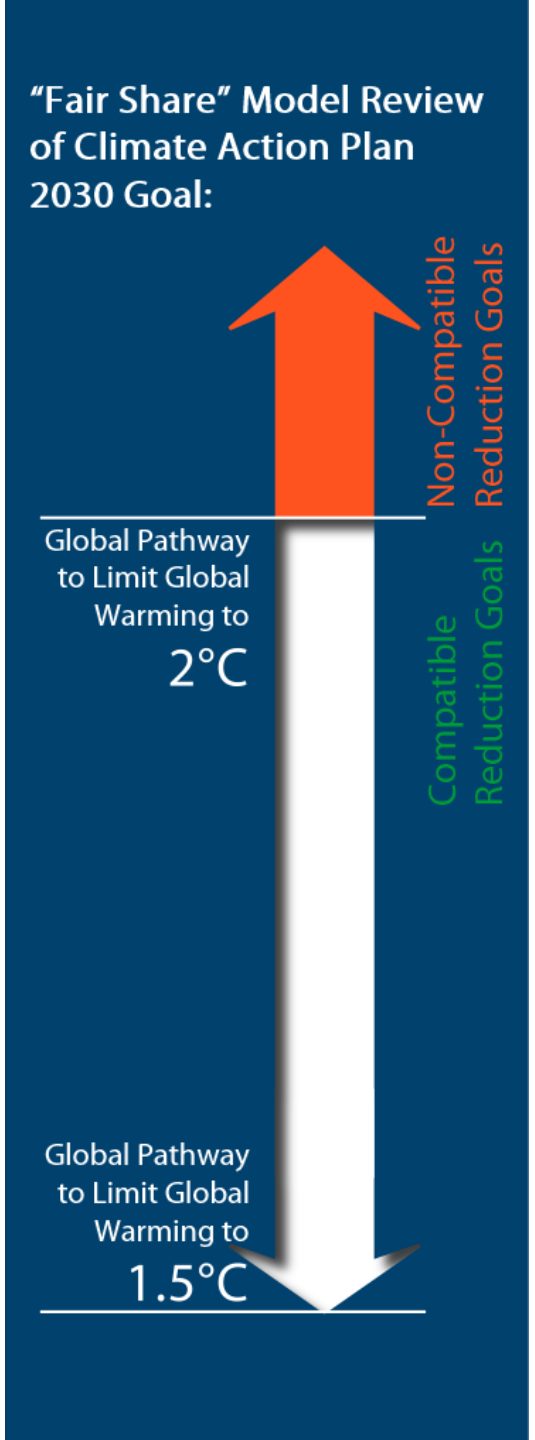
25%

Below 2018 Emissions

Global Emission Reduction To Limit Global Warming to 1.5°C:

55%

Below 2018 Emissions



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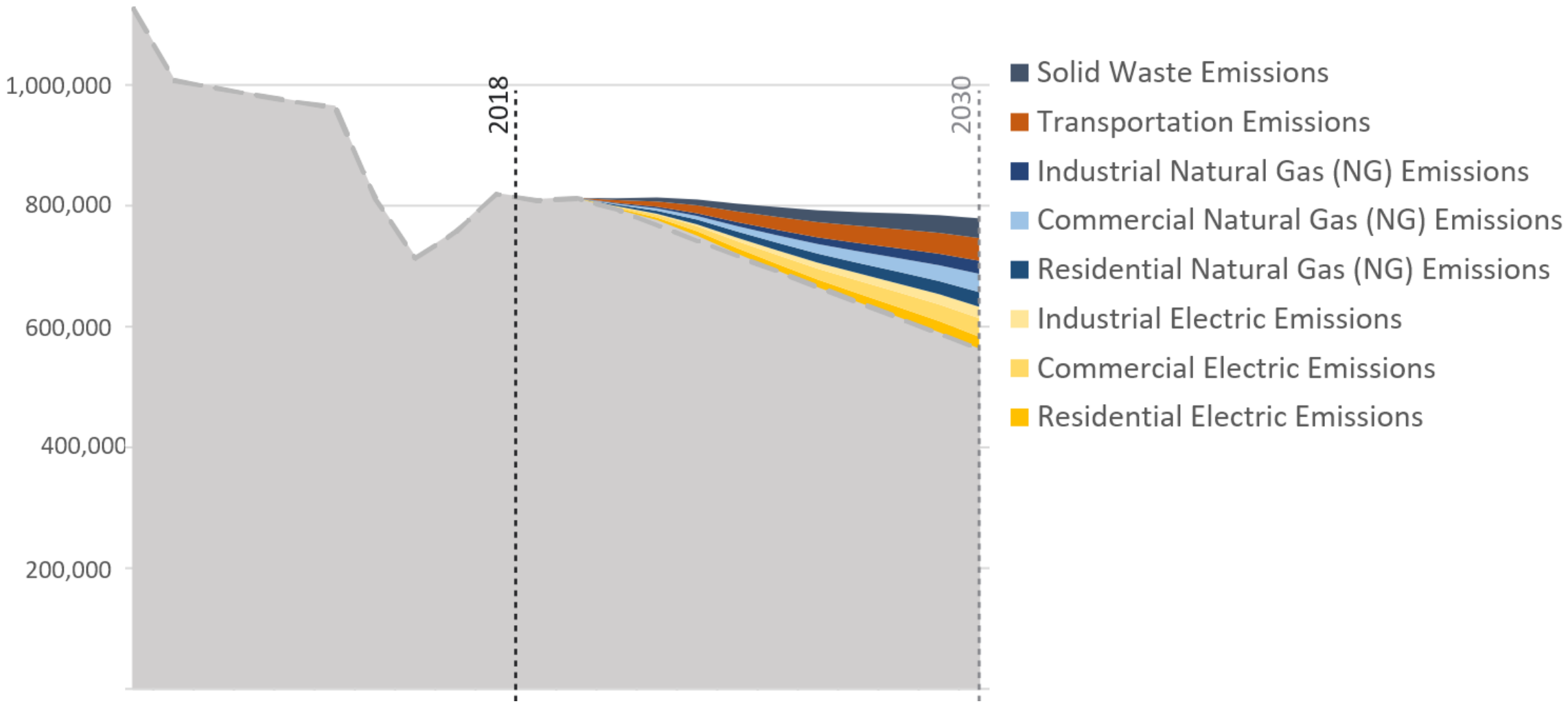
GHG Reductions Included In The CAP



GHG Reductions Included In The CAP

Breakdown of Sector Emission Reductions

Below is a breakdown of estimated sector emission reductions by sector strategy.

50.0%

Buildings and Energy

Total Emission Reduction:
151,429 Metric Tons Annually

BE1 Increase Distributed Renewable Energy by 21 MW:
11,190 Metric Tons Annually

BE2 Reduce Citywide Energy Consumption:
65,932 Metric Tons Annually

BE3 Promote "Fuel Switching" achieving 10% adoption:
43,417 Metric Tons Annually

BE4 Increase renewable energy share of electric grid by 15%:
30,890 Metric Tons Annually

45.1%

Transportation and Land Use

Total Emission Reduction:
37,478 Metric Tons Annually

TL1 Decrease Vehicle Miles Traveled by 10%:
13,546 Metric Tons Annually

TL2 Support and encourage alternative fuel vehicles, Achieve 15% of VMT:
23,932 Metric Tons Annually

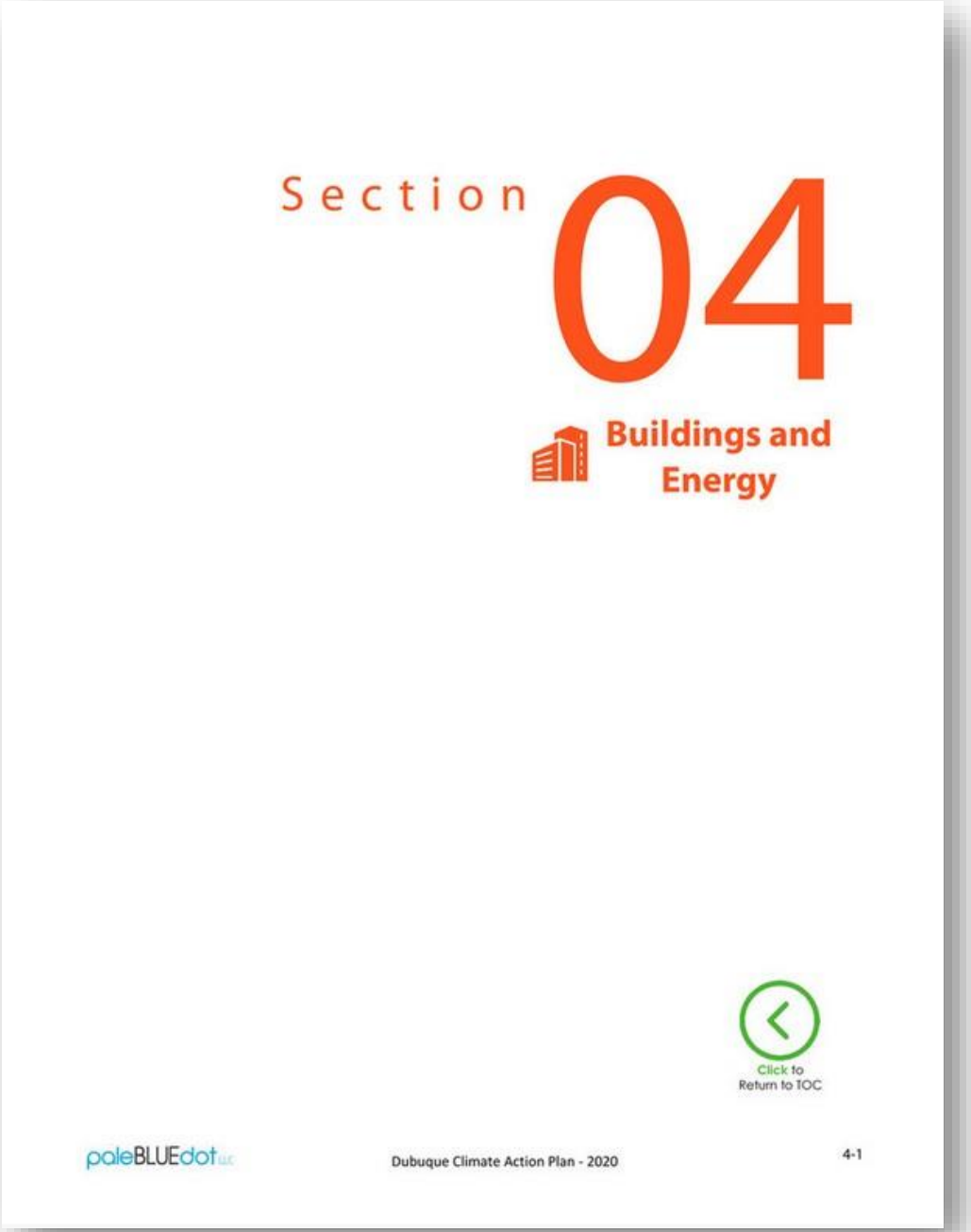
60.4%

Solid Waste

Total Emission Reduction:
32,544 Metric Tons Annually

SW1 50% Diversion by 2030 measure on a per capita basis:
32,544 Metric Tons Annually

Anatomy of a Section



Building energy use is a major contributor to greenhouse gas (GHG) emissions. The Building Energy sector includes all residential, commercial, and industrial buildings. Greenhouse gas emissions from this sector come from **direct emissions** – from fossil fuels burned *on-site* for heating or cooking needs – as well as **indirect emissions** – from fossil fuels burned *off-site* in order to supply that building with electricity. Building design plays a large role in determining the future efficiency and comfort of facilities. Increasing energy efficiency can help reduce GHG emissions and result in significant cost savings for both homes and businesses. The Dubuque community can also achieve environmental, social, and economic benefits through enhancements to the built environment.

Equity Considerations:

- Often, families that live in properties that are not energy efficient are also those that can least afford high-cost utility bills. These households may lack the ability to pay for energy efficiency improvements or access renewable energy options.
- Renters of both single family homes as well as multi-family housing usually do not have the ability to implement energy efficiency measures to the buildings they live in to gain the benefits of energy efficiency. Energy efficiency retrofits are typically in the hands of the landlord while the costs associated with the resulting energy use are usually paid by the occupant.
- Families with fewer resources must dedicate a disproportionately larger share of their income towards energy costs. This energy access inequity exacerbates other vulnerabilities including exposure to heatwaves and other climate vulnerabilities. Families sometimes are forced to forego basic access to service altogether - an estimated 123 households in Dubuque go without heating fuel of any type.
- Air pollution, mainly from fossil energy use, disproportionately impacts low income and communities of color due to community locations and physical characteristics.

Buildings and Energy Goals

BE1: Increase distributed renewable energy by 21 MW of installed capacity by 2030.
BE2: Reduce citywide energy consumption by 10% by 2030.
BE3: Promote "fuel switching" to reduce on-site fossil fuel use 10% by 2030.
BE4: Increase renewable energy share of electric grid to 15% by 2030
(beyond current Alliant Energy commitments).

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching strategies established to meet 2030 goals and detailed actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. On the following page are the strategies guiding the Buildings and Energy section.

Did You Know?

Electric grid transitions towards renewable energy sources, improvements in energy efficiency, and installations of solar power in Dubuque have already reduced the building sector greenhouse gas emissions by **32.6%** since 2003!

36,631,642,162
Cubic Feet of greenhouse gasses have been saved by building energy city-wide since 2010.

Buildings and Energy

BE1 Increase distributed renewable energy by 21 MW of installed capacity by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy BE1-A: Increase solar on City facilities	City facility annual on-site solar PV electricity generation reported
Strategy BE1-B: Support and accelerate installation of on-site solar PV and solar thermal.	City-wide annual on-site solar PV installations and electricity generation reported
Strategy BE1-C: Encourage equity for renewable energy	On-site solar pv installations within low-to-moderate income communities reported
Strategy BE1-D: Increase solar on residential buildings	City-wide Residential on-site solar PV installations and electricity generation reported
Strategy BE1-E: Increase solar on commercial/industrial facilities	City-wide Commercial/Industrial on-site solar PV installations and electricity generation reported
Strategy BE1-F: Advocate for stronger state policy	Status of establishing community solar, virtual net metering, and aggregated net metering policies and laws

BE2 Reduce citywide energy consumption by 10% by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy BE2-A: Increase energy efficiency in City facilities	City facility annual energy consumption reported
Strategy BE2-B: Improve energy efficiency in all sectors	City-wide annual energy consumption reported; City-wide annual total residential consumption and residential consumption per household reported; City-wide annual commercial and industrial energy consumption reported
Strategy BE2-C: Promote audits, energy efficiency rebates and financial incentives	City-wide utilization of available rebate and incentive programs reported
Strategy BE2-D: Improve energy efficiency and equity in residential buildings	City-wide Commercial/Industrial sector annual energy consumption reported per job or per building area
Strategy BE2-E: Increase net zero energy residential building stock	City-Wide Net Zero Energy certified residential buildings as reported by New Buildings Institute, Living Building Institute and/or HERs Rating Index

BE3 Promote "fuel switching" to reduce on-site fossil fuel use 10% by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy BE3-A: Promote "fuel switching" to low/no carbon alternatives	Reported city-wide natural gas use; reported city-wide Renewable Natural Gas use

Buildings and Energy

How we'll accomplish this goal	How we'll measure our progress
Strategy BE4-A: Community solar for residential and commercial	City-wide community solar subscriptions reported (with REC retained by residents/businesses within community or by utility serving community without resale)
Strategy BE4-B: Increase utility scale renewable energy installations	Alliant Energy GHG annual emissions factor reported

Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as increased energy efficiency and on-site renewable energy, can save money for the community. The estimated community savings of the goals for this section include:

Residential Energy Cost Savings: **$33,677,000** (Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

+

Commercial Energy Cost Savings: **$81,492,000** (Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

+

Industrial Energy Cost Savings: **$19,187,000** (Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

=

Estimated Cumulative Savings Potential: **$134,356,000**

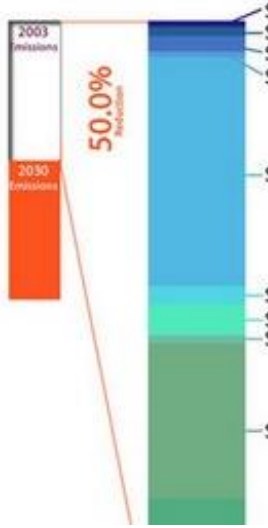
$2,275 per-capita

Planned Buildings and Energy GHG Emission Reductions

Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 151,429 metric tons (MT) by 2030 - a 50% reduction over 2003 levels.

This is equivalent to eliminating **2.9 billion** cubic feet of man-made greenhouse gas atmosphere annually by 2030.



Individual Strategy Annual Emission Reductions by 2030

- Strategy BE1-A: Increase solar on City facilities - 1,172 MT
- Strategy BE1-D: Increase solar on residential - 3,811 MT
- Strategy BE1-E: Increase solar on comm/in - 6,207 MT
- Strategy BE2-A: Increase EE in City facilities - 817 MT
- Strategy BE2-B: Improve energy efficiency in all sectors 55,369 MT
- Strategy BE2-C: Promote audit EE rebates - 3,539 MT
- Strategy BE2-D: Improve EE, equity in res - 5,103 MT
- Strategy BE2-E: Increase NZE res building - 1,104 MT
- Strategy BE3-A: Promote "fuel switching" - 43,417 MT

Anatomy of a Section

Buildings and Energy

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Create a policy that all City buildings shall reduce energy usage by 20% over the next 10 years, and require all municipal buildings to be benchmarked using ENERGY STAR Portfolio Manager. (Strategy BE2-A-1, Strategy BE2-A-2)
2) Implement energy benchmarking (performance tracking and annual reporting) program for commercial buildings, required for all buildings equal to or greater than 50,000 square feet. (Strategy BE2-C-4)
3) Develop and adopt a rental housing energy efficiency policy requiring single family and multi-family rental housing properties to meet minimum energy efficiency level to qualify for rental licensing. (Strategy BE2-D-2)
4) Adopt a voluntary green building stretch code (IgCC) including stretch energy efficiency requirements in-line with Architecture 2030 goals. Make (IgCC) code required for all City facility projects and all projects receiving $50,000 or more in City tax abatement, financing or funding. (Strategy BE2-B-4)

City Staff

1) Establish a centralized facility management / construction project management structure or department for all City owned facilities. Structure to focus on increased capacity for execution of high performance city construction projects capable of achieving energy efficiency and renewable energy goals consistent with the City's CAP plan. (Strategy BE-2-A-4)
2) Explore the development of a Revolving Loan program for City facilities to fund capital costs for high performance energy efficiency and renewable energy options with appropriate return on investment. (Strategy BE-2-A-5)
3) Conduct a detailed solar assessment and "Renewable Energy Master Plan" for all primary city facilities. City's largest energy consuming properties should be prioritized for assessment. Goal: 50% of city facility electric demand supplied through solar. (Strategy BE-1-A-1)
4) Deploy an incentive program for electrification. Work with Alliant Energy or other regional partnerships to create financial incentives to electrify new and existing buildings. (Strategy BE-3-A-1)
5) Develop and issue an RFI / RFP for community solar developers to advance community solar options and subscriptions within City. (Strategy BE-4-A-1)

Business Community

1) Use ENERGY STAR Portfolio Manger to benchmark your energy consumption and identify energy savings potential - then make an energy savings plan targeting a 10% reduction.
2) Contact a solar pv installer and ask for a no-risk, free solar site assessment for your business. Ask the installer to educate you on all applicable rebates and tax incentives.
3) Explore replacing your roof with a greenroof system or a "cool roof": https://palebluedot.llc/dubuque-net-zero-energy-guide

Households/Individuals

1) Switch your lightbulbs to more energy efficient LED lights.
2) Set a goal to save 10% in annual energy use and costs this year and schedule a Home Energy Assessment from the Dubuque Green Iowa AmeriCorps team.
3) Contact a solar pv installer and ask for a no-risk, free solar site assessment for your home/apt. Ask the installer to educate you on all applicable rebates and tax incentives. Alternatively, you can take advantage of Alliant Energy's Second Nature™ option to switch to renewable energy through your utility.

Buildings and Energy

Taking Action

How can you help Dubuque reach our emissions reductions goals?

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Section 13

Climate Actions and Implementation

Click to Return to TOC

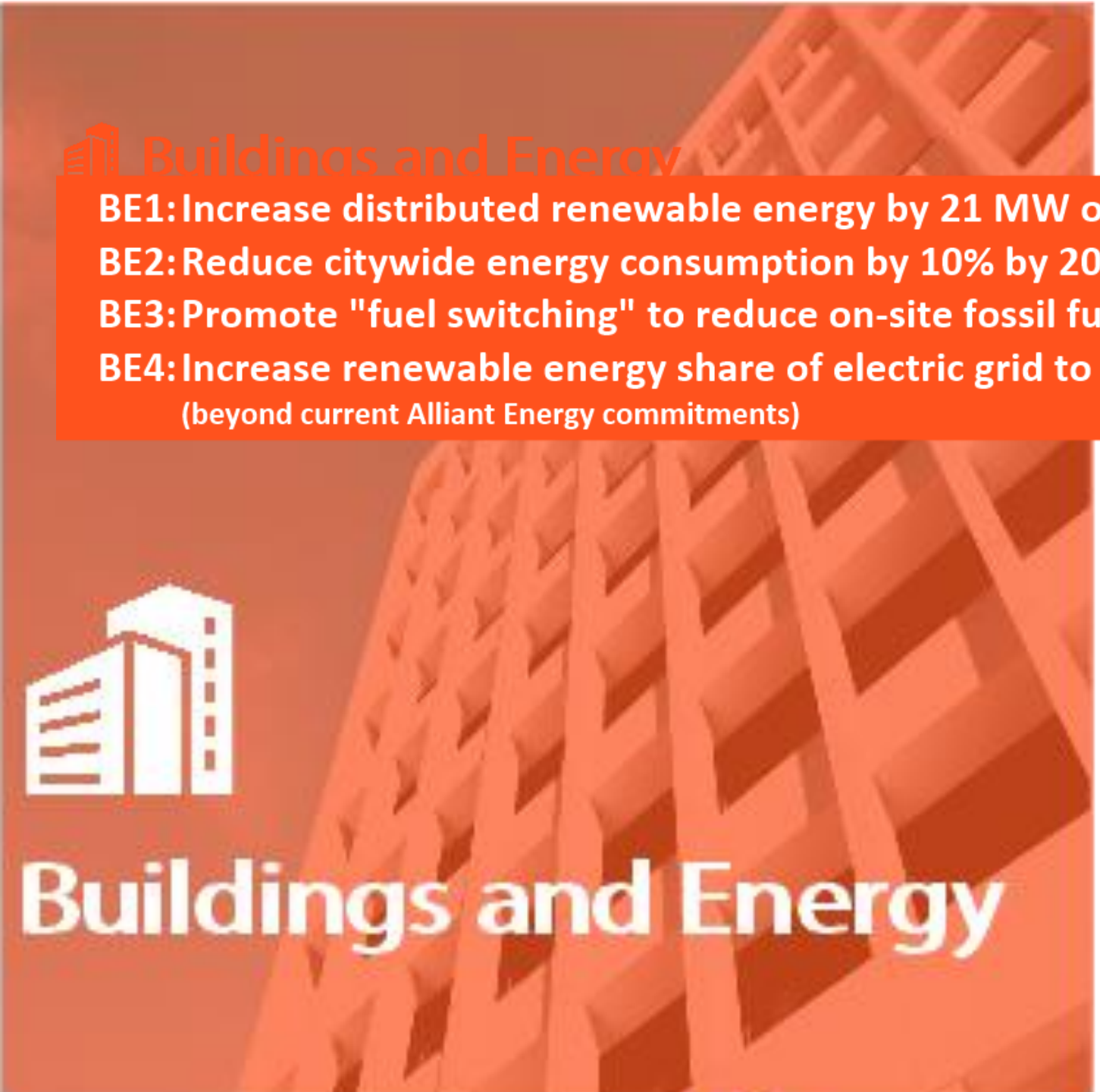
Detailed Actions - Buildings and Energy	Priority Level (Criteria Review Score: 4.5 - 5.0 = 5; 4.0 - 4.4 = 2; 3.5 - 3.9 = 3; 3.0 - 3.4 = 4; 2.0 - 2.9 = 5; 0.0 -	Implementation: Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
BE1 Increase distributed renewable energy by 21 MW of installed capacity by 2030						
Strategy BE1-A: Increase solar on City facilities						
BE1-A- 1 Conduct a detailed solar assessment and "Renewable Energy Master Plan" for all primary city facilities. Include new and existing buildings, incorporate strategies to address electricity storage, and focus on highlighting any hurdles or solutions that would be applicable to the broader community. Install solar panels on all City buildings and sites, where feasible, based on implementation established in Renewable Energy Master Plan. City's largest energy consuming properties should be prioritized for assessment. Goal: 50% of city facility electric demand supplied through solar	2.0					
Strategy BE1-B: Support and accelerate installation of on-site solar PV and solar thermal.						
BE1-B- 1 Develop solar ready policy or incentive offering with the goal of achieving 100% solar ready new home construction by 2025.	1.0					
BE1-B- 2 Collaborate with local Solar PV contractors and Alliant Energy to identify infrastructural challenges to solar PV implementation throughout the community in support of the goals of the CAP - particularly circuit capacities, utility upgrade requirements and costs. Support Alliant Energy and collaborators in establishing a strategies and a plan for overcoming infrastructural challenges identified, with a prioritization of resolving challenges at the city's most optimal sites.	1.0					
BE1-B- 3 Incentivize local renewable energy projects. Explore leveraging existing incentives to increase renewable energy utilization and generation throughout the entire city. These incentives would include support for low-income solar installations and the creation of green jobs.	2.0					
BE1-B- 4 Conduct Solar Ready training using the City's Solar Ready Guidelines and listening sessions with the home builders association, contractors, building designers, developers, and building owners. Include information on benefits of on-site renewable energy generation. Distribute the Solar Ready Guidelines and checklist through city channels. (http://palebluedot.llc/dubuque-solar-ready-guide)	3.0					
BE1-B- 5 Encourage and educate residents on the benefits of on-site solar. Post the state solar resource map on city's CAP Resource Hub; include City's Solar Ready Guidelines (http://palebluedot.llc/dubuque-solar-ready-guide). Resource HUB should include links to helpful resources and tools supporting site owners in exploration and procurement of on-site solar.	3.0					
Strategy BE1-C: Encourage equity for renewable energy						
BE1-C- 1 Collaborate with Alliant Energy to establish an on-bill financing option for renewable energy and energy efficiency upgrades. (https://www.lowincomesolar.org/toolbox/on-bill-recovery/)	1.0					
BE1-C- 2 Create a local Low Income Solar Renewable Energy Credit (SREC) Market and/or 3rd party financing loan guarantee program.	2.0					
Strategy BE1-D: Increase solar on residential buildings						
BE1-D- 1 Coordinate and promote a residential Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 120 households annually). Program design to explore strategies to support local small business solar installers such as being set up to enable small installers to collaborate or having a competitive "marketplace" approach with more than one installer to choose from.	3.0					
Strategy BE1-E: Increase solar on commercial/industrial facilities						
BE1-E- 1 Identify the "Solar Top 50" commercial/industrial properties within the city and produce detailed solar feasibility assessments for each site. Assessments to include potential solar generation and economic performance and return on investment estimates, information on financing and ownership models, and next step resources. Provide solar assessment reports to properties and conduct an informational workshop to assist building owners and businesses in understanding the assessments and next step potential. "Solar Top 50" assessment effort could be repeated annually, particularly through 2025	2.0					
BE1-E- 2 Coordinate and promote a commercial Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 1100KW installed annually). Group purchase campaign could include/focus on properties identified in the "Solar Top 50" assessment effort. Program design to explore strategies to support local small business solar installers and strategies to support local workforce development.	3.0					
BE1-E- 3 Motivate and assist businesses throughout the community to install solar. Provide information on solar incentives, tools, and financing to businesses throughout the City.	3.0					
Strategy BE1-F: Advocate for stronger state policy						
BE1-F 1 Collaborate with other communities, industry, and state agencies to support the State establishing community solar, virtual net metering, and aggregated net metering policies and laws.	1.0					
BE2 Reduce citywide energy consumption by 10% by 2030						
Strategy BE2-A: Increase energy efficiency in City facilities						
BE2-A- 1 Create a policy that all City buildings shall reduce energy usage by 20% over the next 10 years	1.0					

Section 04

Buildings and Energy

Click to Return to TOC

Goals



BE1: Increase distributed renewable energy by 21 MW of installed capacity by 2030.

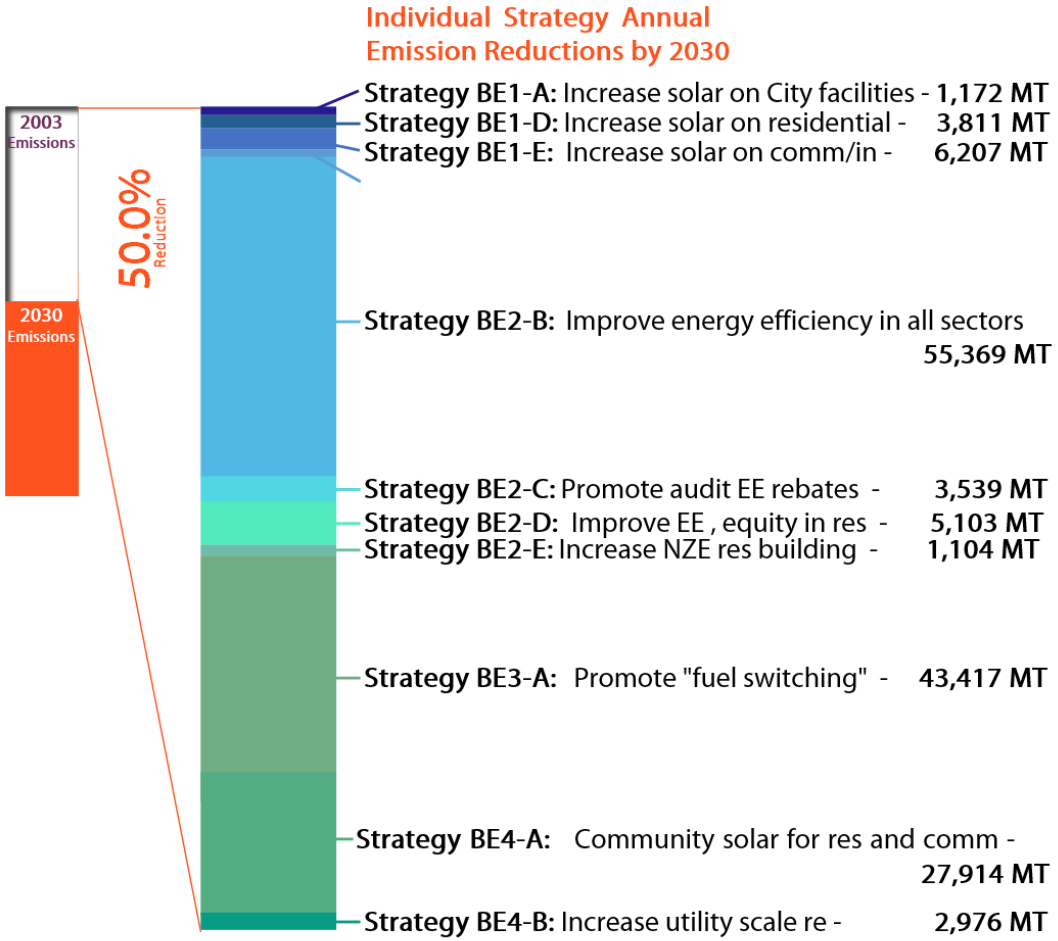
BE2: Reduce citywide energy consumption by 10% by 2030.

BE3: Promote "fuel switching" to reduce on-site fossil fuel use 10% by 2030.

BE4: Increase renewable energy share of electric grid to 15% by 2030
(beyond current Alliant Energy commitments)

How We'll Get There

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 151,429 metric tons (MT) by 2030 - a 50% reduction over 2003 levels.



Kick-Start Actions

City Council

- Create a policy that all City buildings shall reduce energy usage by 20% over the next 10 years.

- Implement energy benchmarking (performance tracking and annual reporting) program for commercial buildings, required for all buildings equal to or greater than 50,000 square feet.

Transportation and Land Use

Section 05

Transportation and Land Use

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Goals

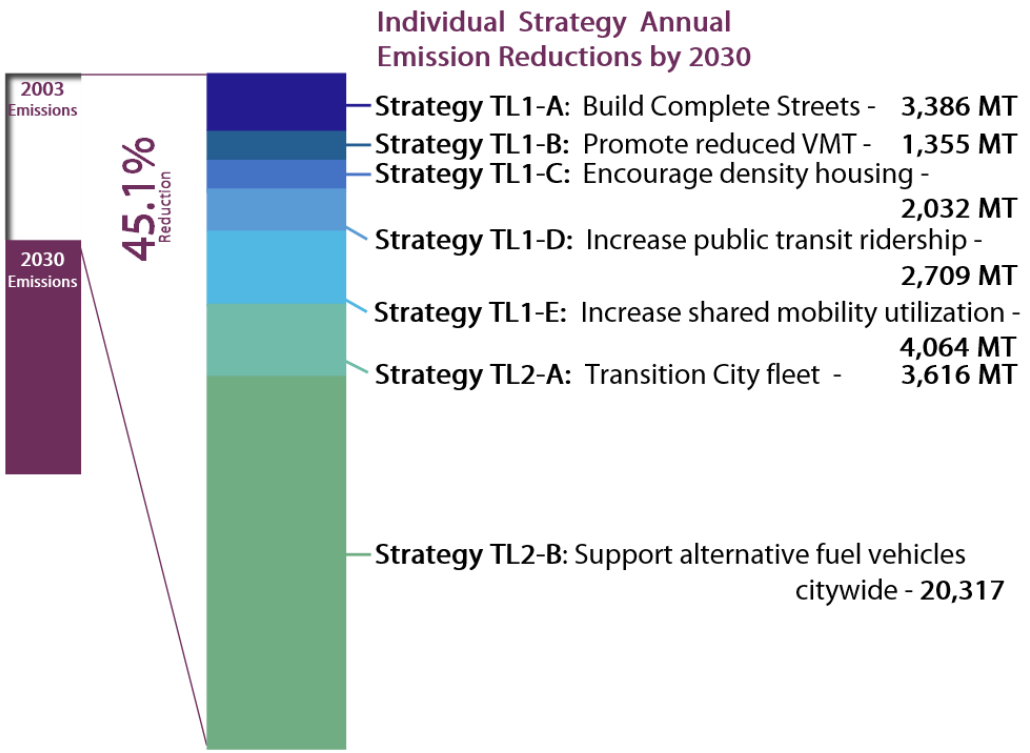
Transportation and Land Use

TL1: Decrease Vehicle Miles Traveled (VMT) by 10% by 2030.

TL2: Support and encourage alternative fuel vehicles, Achieve 20% of vehicles sold and 15% of VMT by 2030.

How We'll Get There

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 37,478 metric tons (MT) by 2030 - a 45.1% reduction over 2003 levels.



Kick-Start Actions

City Council

- Update, adopt and fund a more comprehensive Complete Streets Policy including a Systems Approach, increased Transparency / Accountability, and an Inclusive Public Process.

- Update City vehicle (including The Jule transit) purchasing policy/budget process to default to alternative fuel with traditional internal combustion engine (ICE) as optional requiring proof of need.

Section 06

Solid Waste and Recycling

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Goals

Solid Waste

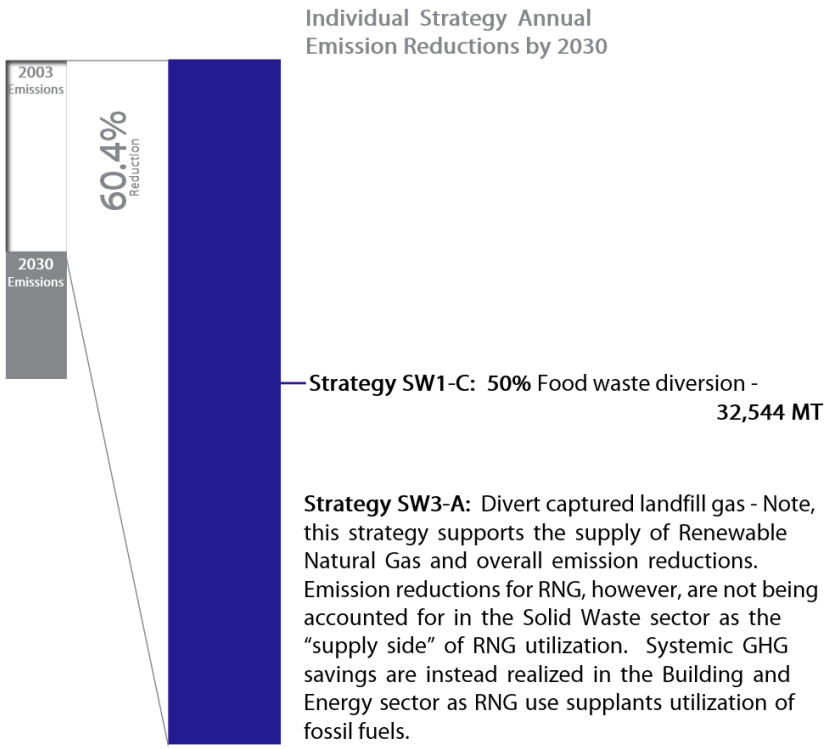
SW1: 50% diversion by 2030 measured on a per capita basis.

SW2: Waste education.

SW3: Achieve 100% beneficial use of landfill gas.

How We'll Get There

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 32,544 metric tons (MT) by 2030 - a 60.4% reduction over 2003 levels.



Kick-Start Actions

City Council

- Adopt an ordinance and construction permit changes supporting C&D recycling requirements to be implemented as sufficient C&D recycling capacity is developed.

- Request DMASWA review food waste handling capacities and permitting limits and expand/update as needed to support food waste diversion and organics collection increases in line with CAP goals.

Section 07

Water, Wastewater, and Flooding

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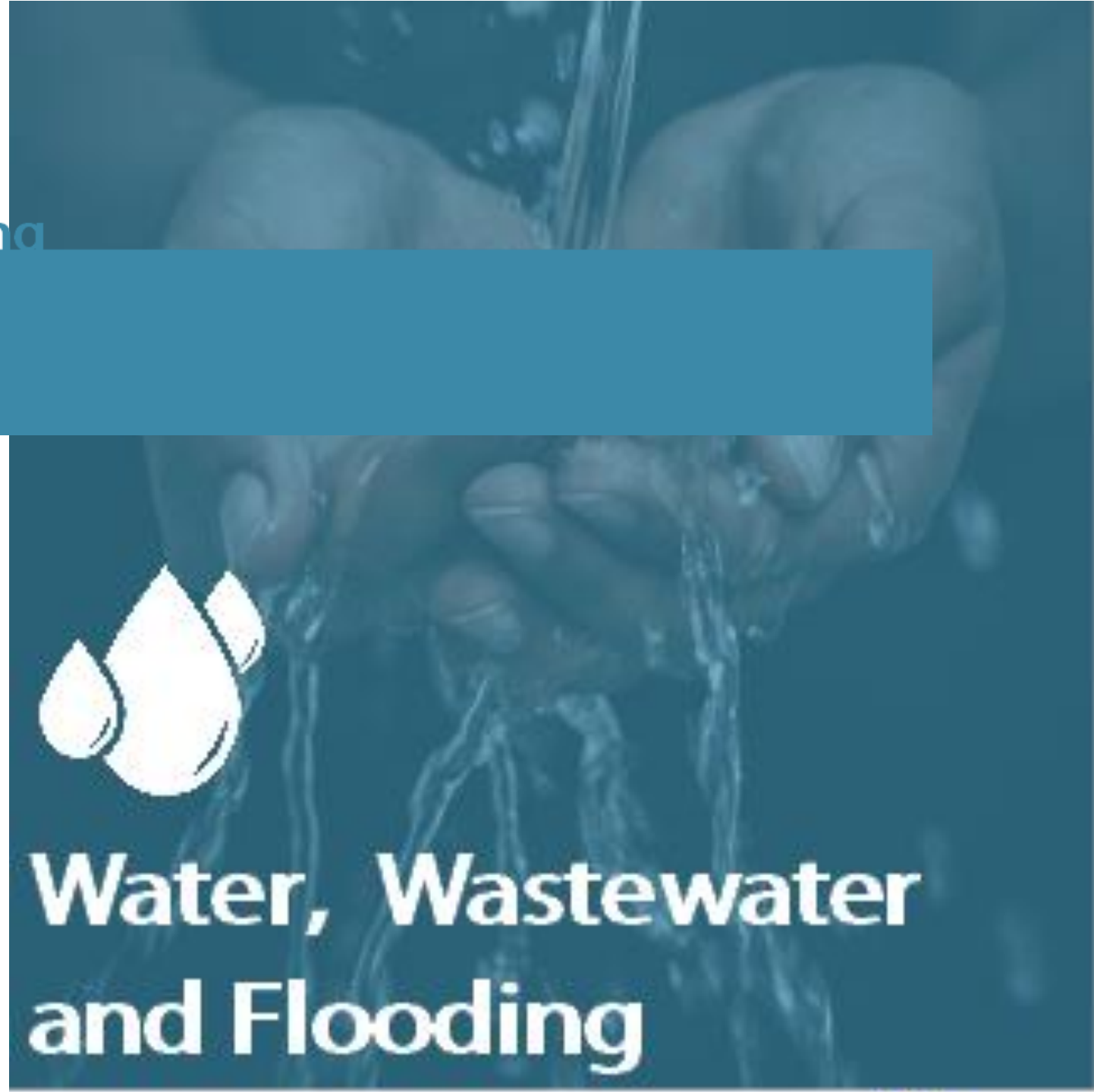
Goals

Water, Wastewater, and Flooding

W1: Increase water conservation citywide.
W2: Reduce wastewater impacts.
W3: Mitigate flood hazards and impacts.



Kick-Start Actions

City Council

- Implement a policy to require installation of rainwater collection systems and Water Sense water efficient fixtures and appliances at all City facility projects and all projects receiving $50,000 or more in City tax abatement, financing or funding.

Section 08

Climate Health And Safety

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Goals

Climate Health and Safety

HS1: Create a climate adaptive community.
HS2: Educate, engage, and empower the public for climate health and safety.
HS3: Address air quality impacts of climate change.

Kick-Start Actions

City Council

- Adopt policies to incentivize residential building owners (particularly rental and multi-family properties), to increase the resilience of existing and new buildings with resilience strategies.

Section 09

Food

Click to
Return to TOC

Goals

Food

F1 Reduce food's contribution to climate change.

F2 Improve local food resilience and availability.

Kick-Start Actions

City Council

- Pass city policy to procure climate-friendly foods for events and other city-managed facilities. Foods should be locally sourced to the highest extent feasible.

- Revise zoning ordinances to allow urban agriculture and clarify acceptability to remove barriers to front yard and rooftop vegetable gardens, edible landscaping and foraging.

Section 10

Greenspace and Tree Canopy

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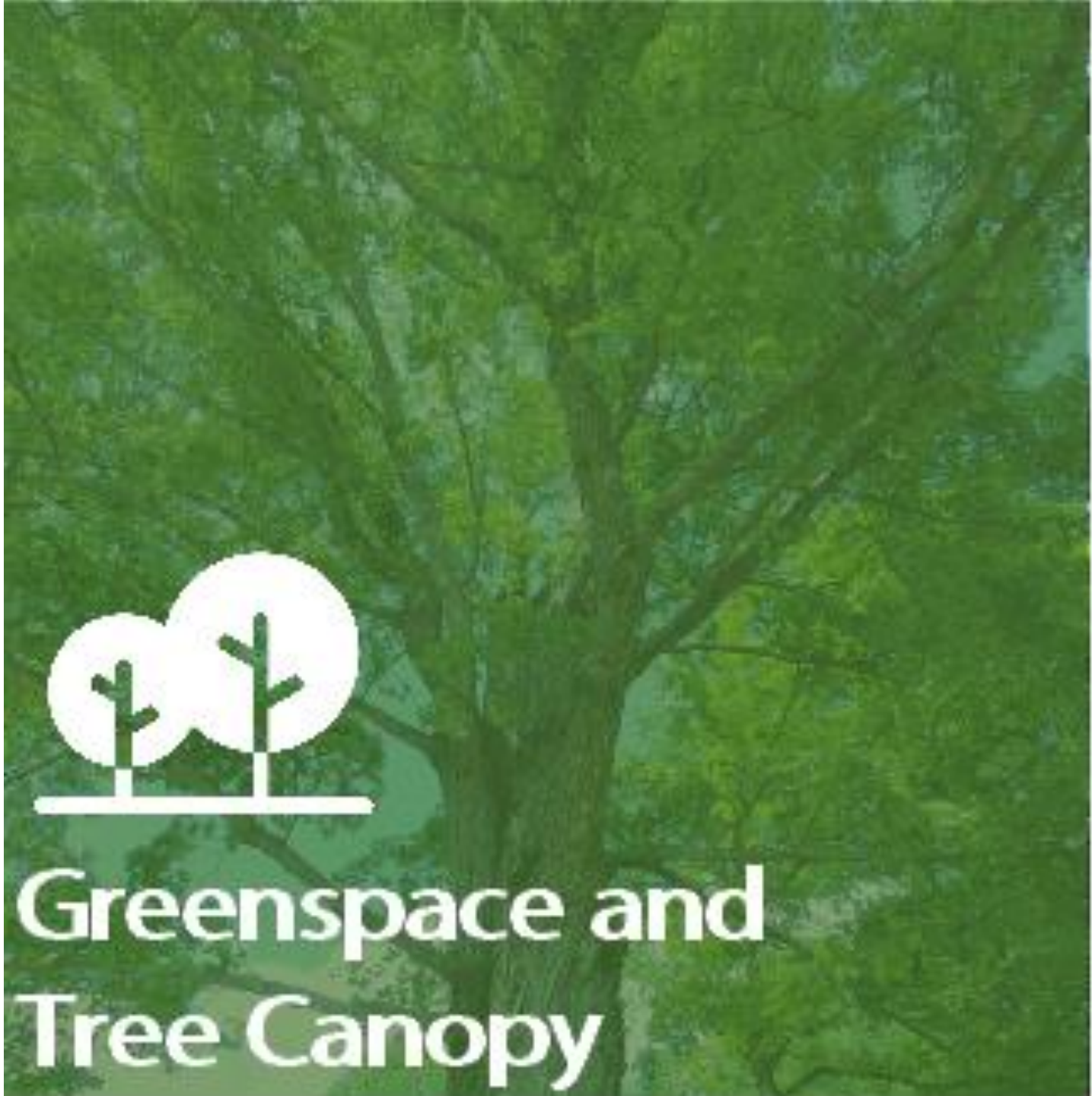


Goals

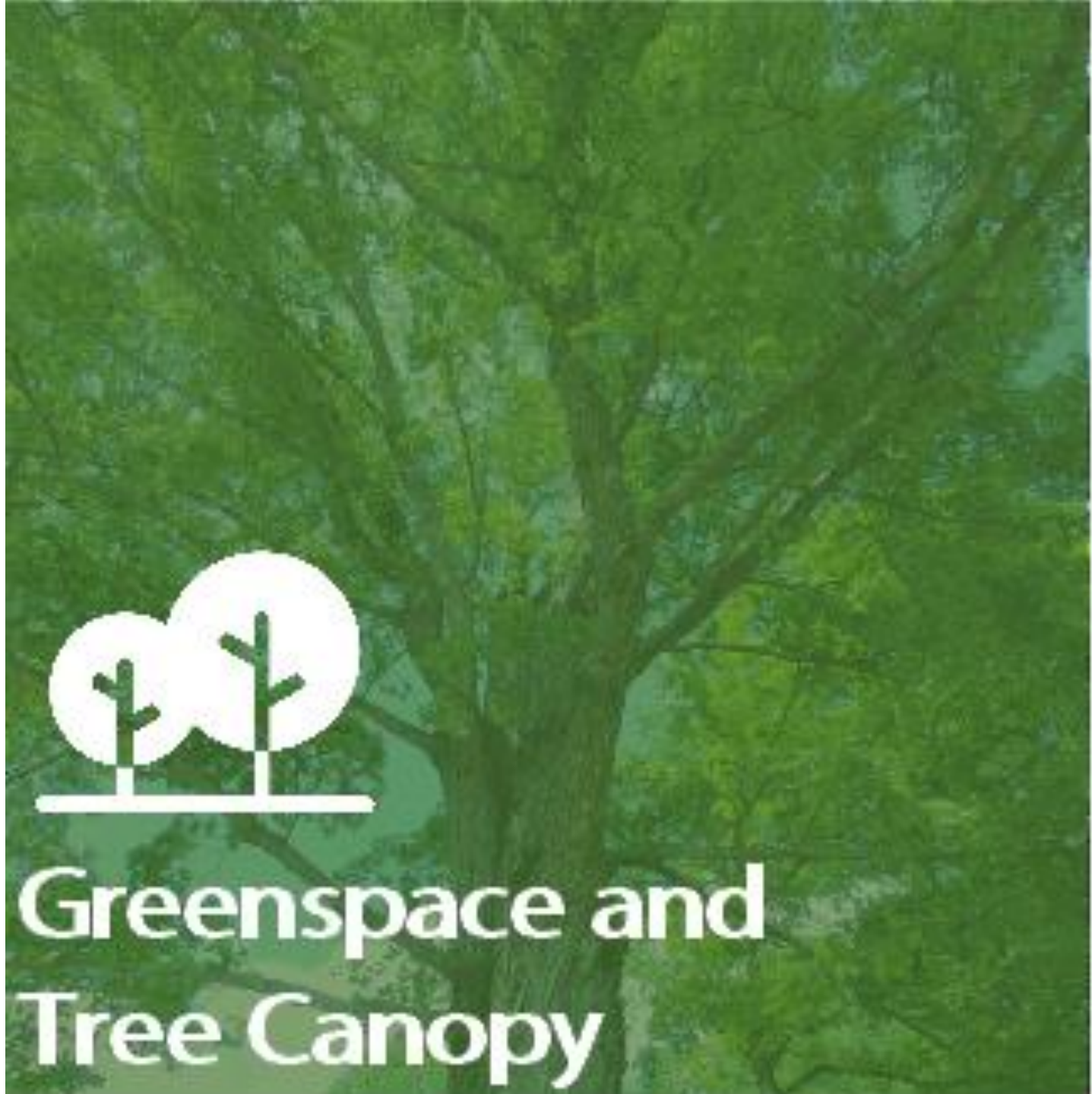
Greenspace and Tree Canopy

GS1: Strengthen Dubuque's tree canopy.
GS2: Strengthen Dubuque's green space.
GS3: Mitigate current and future urban heat island impacts.

Kick-Start Actions

City Council

- Develop a performance based ordinance requiring tree planting within parking lots. Ordinance should establish a specific goal of percentage of pavement to be shaded by trees.
- Develop a policy that requires all housing and commercial development projects receiving City funding, PUD approval, and/or Conditional Use Permitting to implement commercial scale heat island mitigation strategies.



Section 11

Climate Economy

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Goals

Climate Economy

CE1: Capture local economic potential of climate action.
CE2: Build marketplace climate resilience.

Kick-Start Actions

City Council

- Establish a policy that designates City Franchise Fee Income as funding source for Climate Initiatives
- Fund and organize the establishment of a ReStore Facility for reusable furnishings and salvage including construction/demolition.

Section 12

Climate Action Capacity

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Goals

Climate Action Capacity

C1: Enhance and expand community capacity for climate action and resilience.

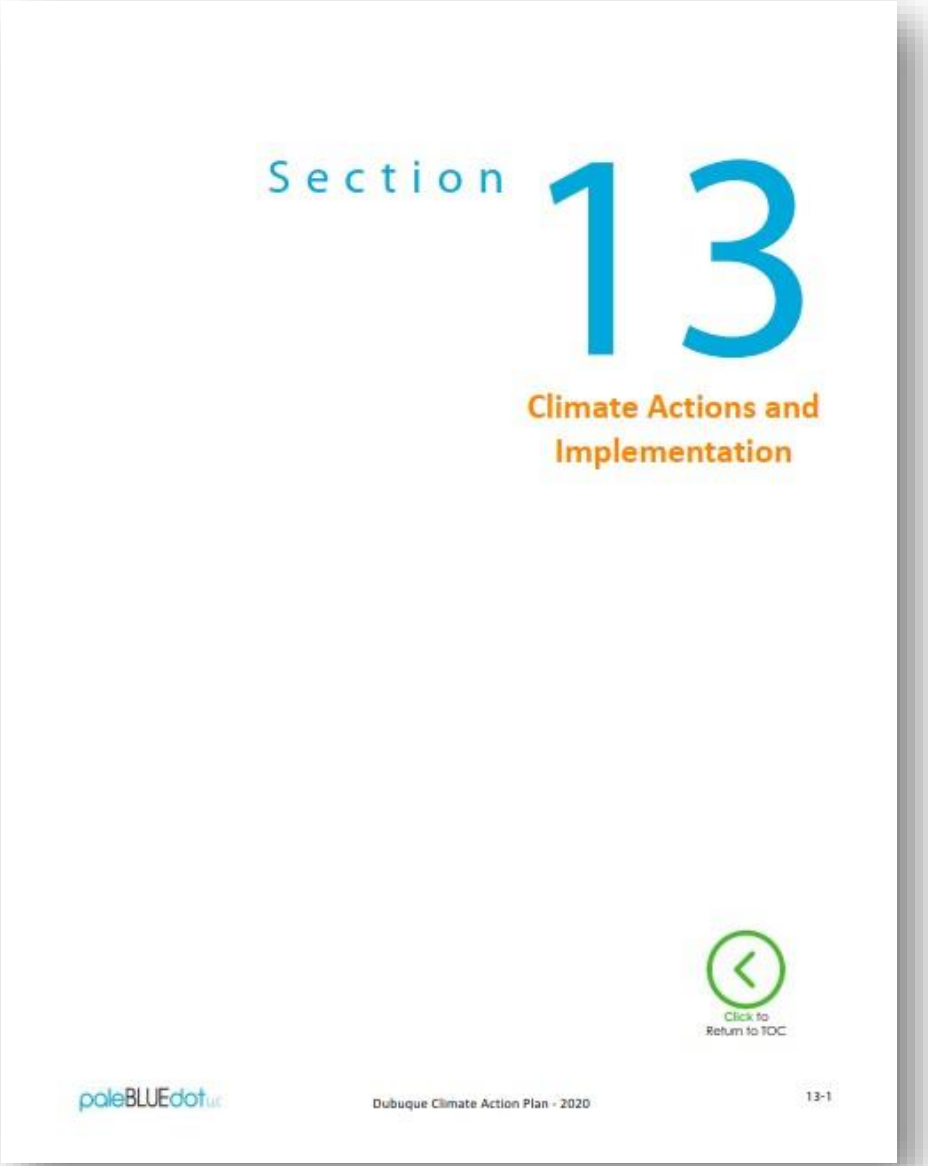
C2: Develop new mechanisms for financing climate action work that account for equity and co-benefits (building upon existing budget scoring criteria)**.**

Kick-Start Actions

City Council

- Establish a policy that requires city infrastructure projects and capital budgets incorporate climate risk and vulnerability analysis and adaptation plans to ensure that future spending contributes to resilience and achieving the City's CAP plan goals
- Explore the development of a "Carbon Impact Fee" Additional funds raised to be used for Climate Mitigation and Adaptation implementation.

Implementation



Section 13

Climate Actions and Implementation

Click to Return to TOC

paleBLUEdot

Dubuque Climate Action Plan - 2020

13-1

Implementation Recommendations

Implementation is for everyone – Council, Staff, businesses, households, and individuals.

Implementation Recommendations- Capacity

Building Internal Capacity

- Establish clear guidance and direction for the participation in and support of the CAP implementation actions by all City of Dubuque departments.
- Fund and support Sustainability staffing to support Implementation.
- Review Climate Action Plan implementation progress and impacts on a regular basis (1-2 year cycle); adjust, add, and remove detailed CAP actions as appropriate based on implementation progress review.

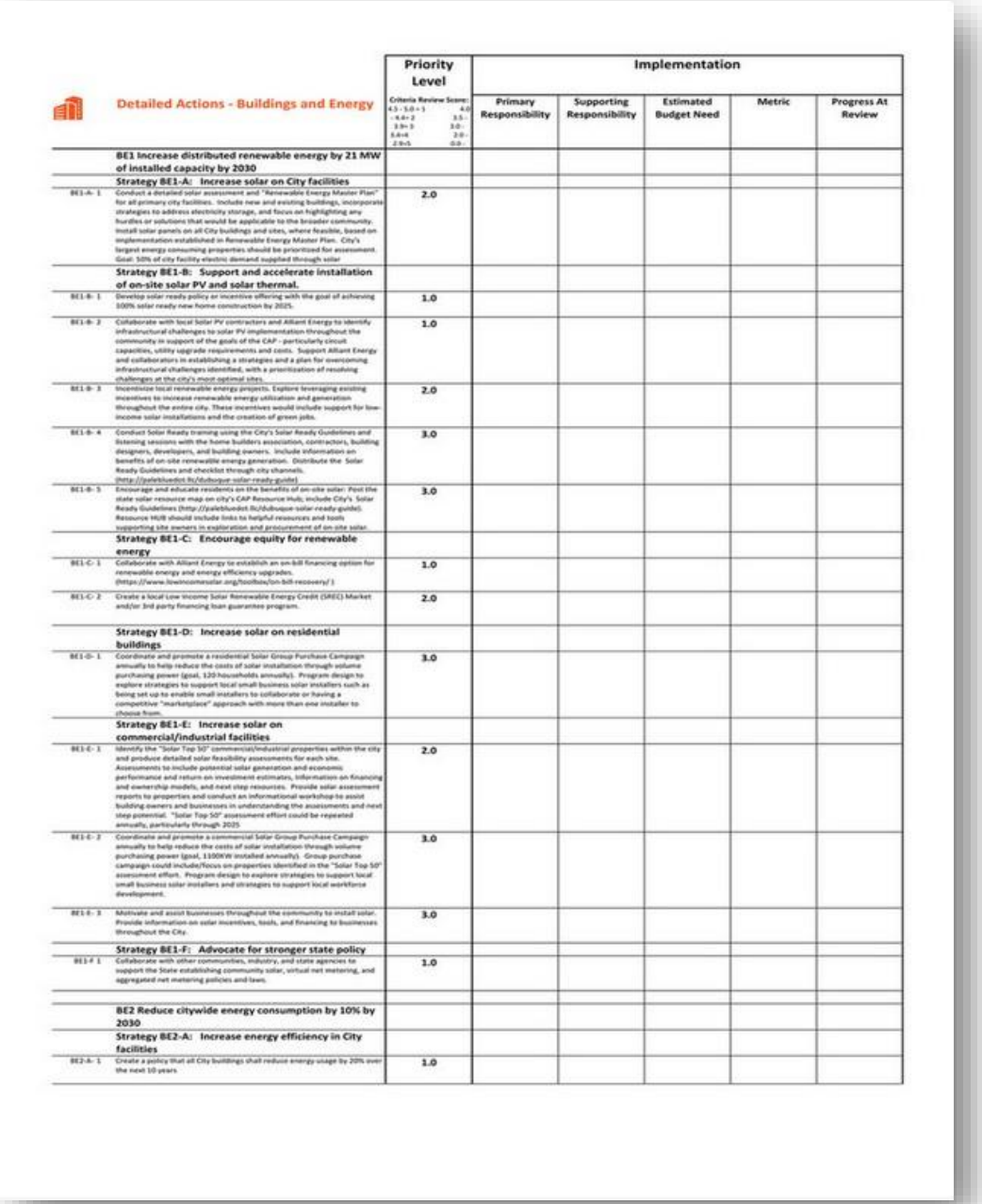
External Capacity

- Establish the Resilient Community Advisory Commission as the main citizen-body to support the implementation of the CAP
- Establish jurisdictional partnerships that advance CAP strategies to advance and accelerate action.

Implementation Recommendations-Funding

Funding

- Maintain a budget and identify funding sources for staff dedicated to the implementation of the CAP.
- Identify a budget necessary to support projects on an annual basis.
- Utilize no-cost technical assistance offerings as available.



Detailed Actions - Buildings and Energy		Priority Level	Implementation				
		Criteria Review Score: 4.5 - 5.0 = 5; 4.0 - 4.4= 2; 3.5 - 3.9= 3; 3.0 - 3.4=4; 2.0 - 2.9=5; 0.0 -	Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
	BE1 Increase distributed renewable energy by 21 MW of installed capacity by 2030						
	Strategy BE1-A: Increase solar on City facilities						
BE1-A- 1	Conduct a detailed solar assessment and "Renewable Energy Master Plan" for all primary city facilities. Include new and existing buildings, incorporate strategies to address electricity storage, and focus on highlighting any hurdles or solutions that would be applicable to the broader community. Install solar panels on all City buildings and sites, where feasible, based on implementation established in Renewable Energy Master Plan. City's largest energy consuming properties should be prioritized for assessment Goal: 50% of city facility electric demand supplied through solar	2.0					
	Strategy BE1-B: Support and accelerate installation of on-site solar PV and solar thermal.						
BE1-B- 1	Develop solar ready policy or incentive offering with the goal of achieving 100% solar ready new home construction by 2025.	1.0					
BE1-B- 2	Collaborate with local Solar PV contractors and Alliant Energy to identify infrastructural challenges to solar PV implementation throughout the community in support of the goals of the CAP - particularly circuit capacities, utility upgrade requirements and costs. Support Alliant Energy and collaborators in establishing a strategies and a plan for overcoming infrastructural challenges identified, with a prioritization of resolving challenges at the city's most optimal sites.	1.0					
BE1-B- 3	Incentivize local renewable energy projects. Explore leveraging existing incentives to increase renewable energy utilization and generation throughout the entire city. These incentives would include support for low-income solar installations and the creation of green jobs.	2.0					
BE1-B- 4	Conduct Solar Ready training using the City's Solar Ready Guidelines and listening sessions with the home builders association, contractors, building designers, developers, and building owners. Include information on benefits of on-site renewable energy generation. Distribute the Solar Ready Guidelines and checklist through city channels. (http://palebluedot.llc/dubuque-solar-ready-guide)	3.0					
BE1-B- 5	Encourage and educate residents on the benefits of on-site solar: Post the state solar resource map on city's CAP Resource Hub; include City's Solar Ready Guidelines (http://palebluedot.llc/dubuque-solar-ready-guide). Resource HUB should include links to helpful resources and tools supporting site owners in exploration and procurement of on-site solar.	3.0					
	Strategy BE1-C: Encourage equity for renewable energy						
BE1-C- 1	Collaborate with Alliant Energy to establish an on-bill financing option for renewable energy and energy efficiency upgrades. (https://www.lowincomesolar.org/toolbox/on-bill-recovery/)	1.0					
BE1-C- 2	Create a local Low Income Solar Renewable Energy Credit (SREC) Market and/or 3rd party financing loan guarantee program.	2.0					
	Strategy BE1-D: Increase solar on residential buildings						
BE1-D- 1	Coordinate and promote a residential Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 120 households annually). Program design to explore strategies to support local small business solar installers such as being set up to enable small installers to collaborate or having a competitive "marketplace" approach with more than one installer to choose from.	3.0					
	Strategy BE1-E: Increase solar on commercial/industrial facilities						
BE1-E- 1	Identify the "Solar Top 50" commercial/industrial properties within the city and produce detailed solar feasibility assessments for each site. Assessments to include potential solar generation and economic performance and return on investment estimates, information on financing and ownership models, and next step resources. Provide solar assessment reports to properties and conduct an informational workshop to assist building owners and businesses in understanding the assessments and next step potential. "Solar Top 50" assessment effort could be repeated annually, particularly through 2025	2.0					
BE1-E- 2	Coordinate and promote a commercial Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 1100KW installed annually). Group purchase campaign could include/focus on properties identified in the "Solar Top 50" assessment effort. Program design to explore strategies to support local small business solar installers and strategies to support local workforce development.	3.0					
BE1-E- 3	Motivate and assist businesses throughout the community to install solar. Provide information on solar incentives, tools, and financing to businesses throughout the City.	3.0					
	Strategy BE1-F: Advocate for stronger state policy						
BE1-F 1	Collaborate with other communities, industry, and state agencies to support the State establishing community solar, virtual net metering, and aggregated net metering policies and laws.	1.0					
	BE2 Reduce citywide energy consumption by 10% by 2030						
	Strategy BE2-A: Increase energy efficiency in City facilities						
BE2-A- 1	Create a policy that all City buildings shall reduce energy usage by 20% over the next 10 years	1.0					

Implementation Recommendations

Detailed Actions and Implementation Tool

Tool under development

Next-step community engagement

- Support transition into implementation
- Partnership building
- Community empowerment

Initial Implementation Phase

- Things we can do this with no budget
- FY22 will need funding

Questions?

SUSTAINABLE
DUBUQUE
viable • livable • equitable

THE CITY OF DUBUQUE

Masterpiece on the Mississippi

City of Dubuque
Climate Action Plan 2020 - Appendix Report

July 2020

Prepared By:

making change personal paleBLUEdot LLC

Section

A1

Additional Climate Action Sector Information

This appendix provides additional information for each of the climate action sectors included in this Climate Action Plan. The information includes background data, baseline metrics, or additional supporting information for each section. Some of this information was foundational in the planning process while others provide additional background content for understanding the intent of the actions of the sector. The additional information is provided for each of the following Climate Action Sectors:

Section 04	Buildings and Energy
Section 05	Transportation and Land Use
Section 06	Solid Waste
Section 07	Water, Wastewater, and Flooding
Section 08	Climate Health and Safety
Section 09	Food
Section 10	Greenspace and Tree Canopy
Section 11	Climate Economy
Section 12	Climate Action Capacity

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Buildings and Energy

Dubuque Building Stock

The measure of a community's existing building stock, certified high performance buildings, and housing characteristics provides a basis for determining the current and potential energy efficiency gains for the community. Energy and water efficiency upgrades are one of the simplest and most effective ways to conserve resources, save money, and reduce greenhouse gas emissions. New building technology has increased energy efficiency significantly in recent decades. Although newer U.S. homes are 30 percent larger, they consume a similar amount of total energy as older homes - meaning they are more energy efficient per square foot of space. Consequently, this means that retrofitting older homes with some of these technologies provides ample opportunity to improve energy efficiency throughout the community.

National benchmarking and certification tools can help measure as well as promote energy efficiency of buildings in a community. The US EPA ENERGY STAR program, for instance, certifies high performing buildings. On average, ENERGY STAR certified buildings use 35% less energy than typical buildings nationwide. LEED certification is another measure of energy efficiency. Energy Benchmarking data from Washington, D.C. are the first to show that LEED-certified office buildings demonstrate decreased energy use (site or source) of 15 percent, on average, compared with other D.C. office buildings. Finally, the New Buildings Institute certifies Net Zero buildings, buildings which generate as much on-site renewable energy as they consume in a year, and all Net Zero buildings eliminated all greenhouse gas emissions associated with their energy consumption.

Existing High Performance Buildings in Dubuque

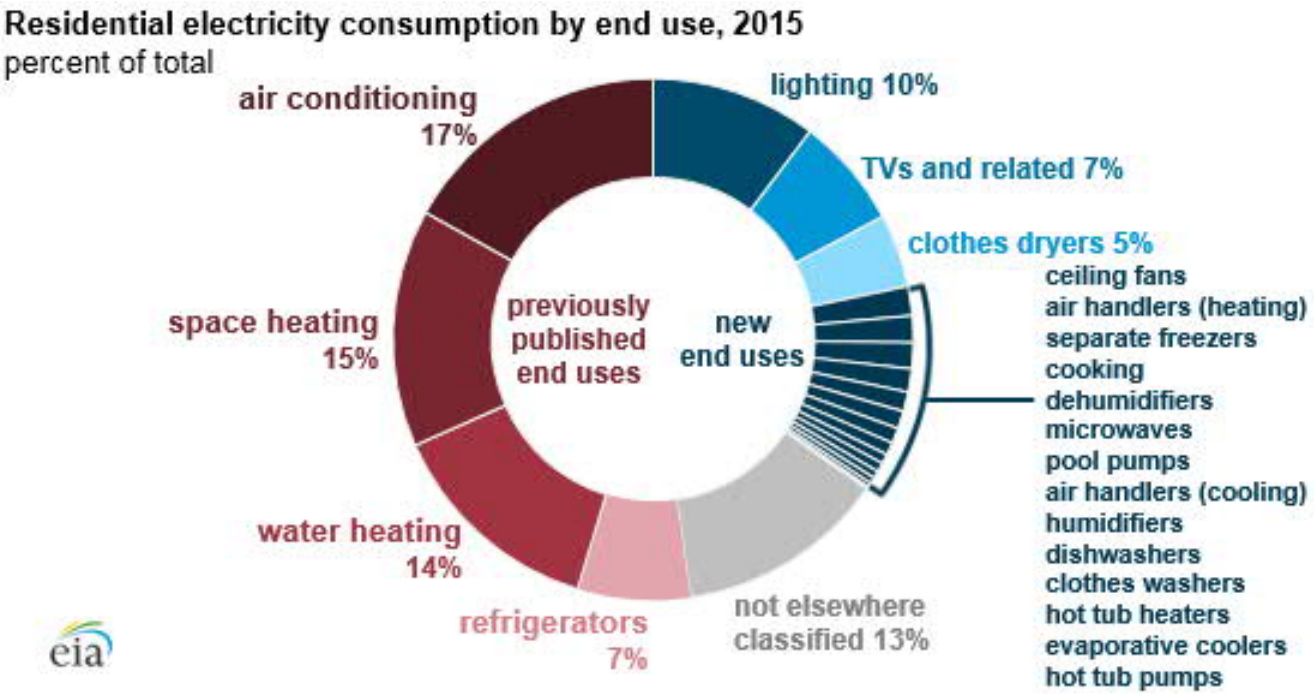
ENERGY STAR Certified Buildings:	10
LEED Certified Buildings:	9
Certified Net Zero Buildings:	0

Sources: US EPNew Buildings Institute
A ENERGY STAR, US Green Building Council,

Green Roofs in Dubuque

Existing Green Roofs, Known:	1

Sources: Greenroofs.com, Rooftop Sedums LLC



Buildings and Energy

Energy Efficiency Potential of City of Dubuque Housing Stock

According to the 2017 U.S. Census, 89% of single family homes in the City of Dubuque were built prior to 2000, and over 80% were built prior to 1980. According to the National Association of Home Builders, homes built prior to 1980 consume an average of 20%-35% more than homes built after 2000.

In 2018, the average Dubuque household used 8,229 kWh of electricity and 909 therms annually. If all single family homes in Dubuque were renovated to achieve the energy efficiency level of those built after 2000, an estimated 33.2 million kWh and 3.6 million therms might be saved annually totaling nearly 17% of all residential electric and natural gas use in the City.

Energy Efficiency Programs For Residents

Commercial electricity use in Dubuque increased from 5,008 kWh/job in 2010 to 4,820 kWh/job in 2018, a decrease of 4%. During the same timeframe, residential electric use increased 4.6% from 7,867 kWh/household 8,229 kWh/household in 2018.

Commercial natural gas use in Dubuque increased 10% between 2010 and 2018 from 456 therms/job to 502 therms/job. Meanwhile, residential natural gas use in the city increased even more rapidly at 17% from 777 therms/household to 909 therms/household.

Though energy efficiency is certainly a significant opportunity in all building sectors in the community, these residential energy consumption increases over the last decade indicate a great potential for energy savings within the residential building sector.

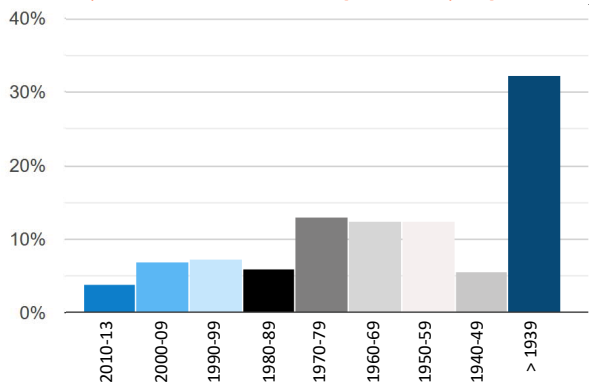
There are already energy efficiency programs and resources available in the City of Dubuque. As an example, the Home Energy Assessment from the Dubuque Green Iowa Americorps team, the New View Community Action Agency LIHEAP Weatherization program, and energy efficiency rebates by Alliant Energy and Black Hills Energy. Data shows that effective home energy assessment and upgrade programs can readily reduce participants annual energy consumption by up to 10% annually.

For the City of Dubuque, converting all residential light bulbs to LED lights could save 32.4 million KWH annually or more. A Greenhouse Gas savings of:

289,586,211

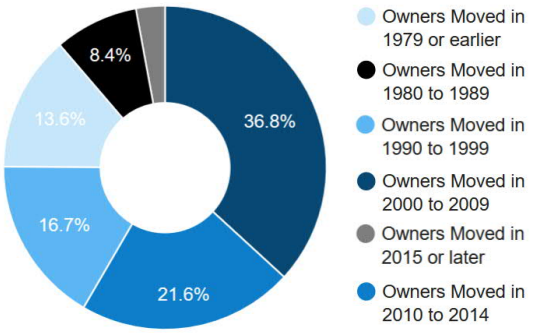
Cubic Feet Annually

City of Dubuque Housing Stock by Age



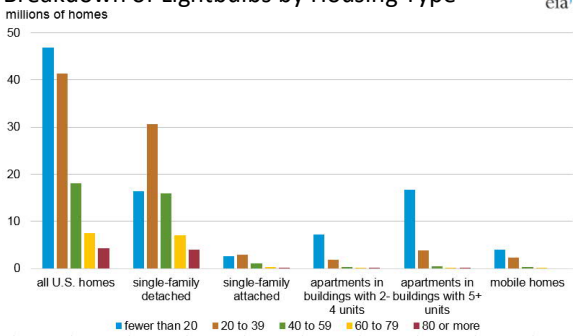
Source: US Census

Years Occupying Home (home owners)



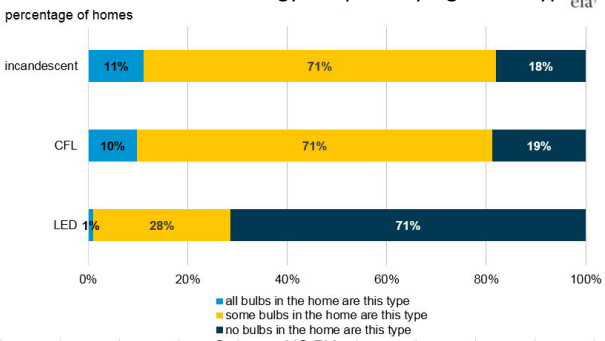
Source: US Census

Breakdown of Lightbulbs by Housing Type

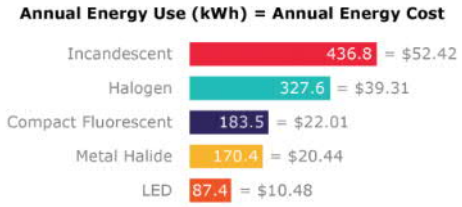


Source: US EIA

Residential Rate of Technology Adoption by Lightbulb Type



Source: US EIA



(Source: USAI Lighting)

Buildings and Energy

Generation Capacity In Dubuque - Rooftop Solar PV

Generation capacity represents the total amount of energy generation potential of the total Technical Capacity of the city. The generation capacity is calculated using City-specific annual energy production factor (annual KWH production/KW nameplate capacity) which is based on the region's weather patterns and annual insolation levels (exposure to sun's energy). This energy production factor is then modified by estimated system losses by azimuth and estimated system losses by roof tilt. The chart below illustrates the total generation potential by roof azimuth and by roof tilt classifications - this includes all figures in black and red text. The Grand Total solar PV energy generation potential for the City is 313,865,880 KWH annually, approximately 46.4% of the City's total electric consumption.

Optimized Generation Capacity In Dubuque - Rooftop Solar PV

Though the total energy generation outlined previously is reasonably feasible, for purposes of establishing Citywide potentials expectations it is appropriate to modify the total generation to reflect the likely most cost efficient installation potentials given current technologies and cost parameters. Solar PV installations which have less than ideal orientations capture less light per panel and therefore generate less energy per dollar spent. Establishing an Optimized Capacity establishes the cost effective solar pv installation potential based on current technology.

On the chart below, all solar suitable roof planes with roof tilt and azimuth orientation combinations likely to be consistently cost effective are highlighted in red and are considered to be the City's Optimized Generation Capacity. It should be noted that installations outside of these selections may still be cost effective but require individual feasibility assessment. The total Optimized Generation Capacity of rooftop solar pv in Dubuque is estimated to be 232,691,457 KWH annually (the total of all entries in red text). For more information, please see the September 2019 Dubuque Citywide Solar Potentials Study.

Optimized Generation Capacity In Dubuque

			Flat		Low Tilt		Mid-Low Tilt		Mid-High Tilt		High Tilt	
Subtotal Flat												
Suitable Buildings	8,815	25.33%	**8,815**		0		0		0		0	
Suitable Roof Planes	16,218	25.33%	**16218**		0		0		0		0	
Square Footage	2,786,851	25.38%	**2,786,851**		0		0		0		0	
Capacity (KW dc)	49,528	25.38%	**49,528**		0		0		0		0	
Generation (KWH)	83,207,619	26.51%	**83,207,619**		0		0		0		0	
Subtotal South Facing												
Suitable Buildings	8,656	24.87%	0		**1,959**		**5,504**		**1,187**		**6**	
Suitable Roof Planes	15,925	24.87%	0		**3604**		**10126**		**2184**		**11**	
Square Footage	2,736,525	24.92%	0		**619,236**		**1,740,075**		**375,240**		**1,974**	
Capacity (KW dc)	48,634	24.92%	0		**11,005**		**30,925**		**6,669**		**35**	
Generation (KWH)	76,921,438	24.51%	0		**16,824,684**		**48,836,555**		**11,203,613**		**56,586**	
West + Southwest												
Suitable Buildings	8,598	24.70%	0		**1,672**		**5,503**		1,415		8	
Suitable Roof Planes	15,819	24.70%	0		**3076**		**10124**		2603		15	
Square Footage	2,718,557	24.76%	0		**528,503**		**1,739,920**		447,432		2,702	
Capacity (KW dc)	48,315	24.76%	0		**9,393**		**30,922**		7,952		48	
Generation (KWH)	76,628,210	24.41%	0		**14,359,470**		**48,832,217**		13,359,076		77,448	
East + Southeast												
Suitable Buildings	8,735	25.10%	0		**1,674**		5,639		1,415		7	
Suitable Roof Planes	16,071	25.10%	0		**3080**		10375		2603		13	
Square Footage	2,737,252	24.93%	0		**528,917**		1,782,819		422,969		2,547	
Capacity (KW dc)	48,647	24.93%	0		**9,400**		31,685		7,517		45	
Generation (KWH)	77,108,612	24.57%	0		**14,370,713**		50,036,201		12,628,681		73,018	
Grand Total			**Subtotal: Flat Roof**		**Subtotal: Low Tilt**		**Subtotal: Mid-Low Tilt**		**Subtotal: Mid-High Tilt**		**Subtotal: High Tilt**	
Suitable Buildings	34,804		8,815	25.33%	5,305	15.24%	16,646	47.83%	4,017	11.54%	21	0.06%
Suitable Roof Planes	64,033		16,218	25.33%	9,760	15.24%	30,625	47.83%	7,390	11.54%	39	0.06%
Square Footage	10,979,186		2,786,851	25.38%	1,676,656	15.27%	5,262,813	47.93%	1,245,641	11.35%	7,224	0.07%
Capacity (KW dc)	195,124		49,528	25.38%	29,798	15.27%	93,532	47.93%	22,138	11.35%	128	0.07%
Generation (KWH)	313,865,880		83,207,619	26.51%	45,554,866	14.51%	147,704,973	47.06%	37,191,370	11.85%	207,051	0.07%

Ground Mounted Solar PV In Dubuque

The assessments provided in the the September 2019 Dubuque Citywide Solar Potentials Study focused explicitly on rooftop solar PV potentials. It should be noted that significant additional solar PV potential exists in the community for ground mounted arrays and "car port" arrays (arrays located over parking areas. If desired, the City may wish to study the potential of these solar formats in addition to the rooftop potential reviewed here.

Buildings and Energy

Market Capacity

Adequately anticipating the potential for new solar PV installations must consider not only the potential technical and generation capacities, but also the likely market capacity. As an emerging energy sector, there is little data upon which to base projections for likely installation of rooftop solar PV in the private sector. Additionally, the solar PV market is rapidly changing in both sophistication as well as in pricing and cost effectiveness. As noted in the Solar in Iowa section of this report, the installed cost of solar PV in Iowa has dropped 35% since 2014 and is expected to continue to decline in the coming years. Projections of solar PV installations should anticipate a continued increase in the number of solar pv installations year over year.

Market History

According to the Department of Energy, since 2005 the residential solar PV market has grown at an annual rate of 51%. A growth rate that has resulted in a residential solar PV capacity 95 times larger in just 12 years. In the State of Iowa, the new installed capacity that went on line in 2016 was 22 MW; equal to 1/3rd of the cumulative total of all solar PV installations in the state for all previous years.

State Market Projections

The Solar Energy Industries Association (SEIA) projects solar PV installation capacity in the State to increase 269 MW by 2024. This is equal to a sustained increase of installed capacity of 59% annually. The timeframe of this projection overlaps with the currently established Federal Income Tax incentive program. For years 2022 and beyond, the tax incentive is expected to be phased out for residential solar pv installations, but a smaller incentive (10%) will remain for commercial property owners while cost projections anticipate a continued decrease in installation costs.

Dubuque Market Absorption Projections

Simply anticipating the solar adoption rate within the City of Dubuque to match the rate of adoption throughout the State based on population share would mean an increase of 12.5 MW of installed capacity within the City by 2025 (including the existing utility scale arrays reported by Alliant Energy), equivalent to approximately 6.43% of the total rooftop technical capacity potential or 8.5% of the optimized capacity potential within the City.

Following the projected elimination of the residential portion and a scaling back of the commercial portion of the Federal residential tax incentive, a reasonable assumption may be a partial reduction in the annual growth rate for year 2023 and a few years following. As the market continues to mature through the 2020's it may, again, be reasonable to assume another reduction in the growth rate of new installed capacity beginning in year 2031. For purposes of this study, we recommend a 2/3rd reduction of the annual rate of growth for 2023 and then again at 2030. This would result in a growth rate of 59% through 2024 (as projected by SIEA), an 11% growth rate for years 2023 through 2030, and a mature market growth rate of 3.5% beginning in 2031. For more information, please see the September 2019 Dubuque Citywide Solar Potentials Study,

Dubuque Solar PV Projection Based on Potential Market Absorption

Year	Cumulative Installed (KW)	Annual Generation (KWH)	% of City Electric Consumption
2025	12,497	20,101,998	2.97%
2030	21,058	33,873,036	5.00%
2040	29,705	47,781,263	7.06%

Solar Potential and Climate Action Plan Goals

As outlined above, a reasonable good-faith projection anticipates a market absorption potential of over 20MW of installed capacity in the City of Dubuque by 2030. These projections support the total increased distributed energy goals targeted in the Buildings and Energy section of this CAP plan.

Transportation and Land Use

The map below showing Housing + Transportation costs as a percentage of income shows that people living in Dubuque's outlying neighborhoods spend more on their housing and transportation than those living closest to the downtown area. This is true when housing costs are removed and only transportation costs are included because these outlying areas require increased car ownership due to lack of bike, pedestrian and transit connectivity. If you don't drive or you want to rent, some neighborhoods aren't available to you. If you live in an outlying neighborhood, you'll have to shoulder the financial burden of owning and maintaining more cars.

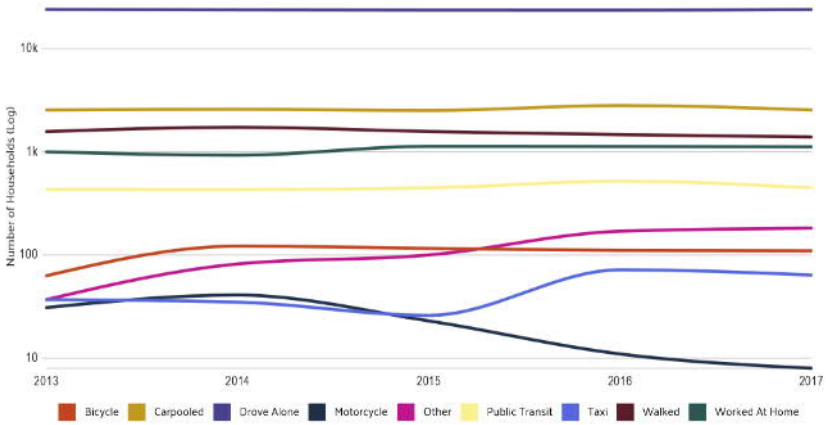
Housing + Transportation Costs % Income

< 24% | 24-36% | 36-45% | 45-54% | 54-66% | 66-78% | 78-87% | 87%+

Source and Graphic: The Housing and Transportation (H+T®) Affordability Index

Dubuque Commuter Transportation

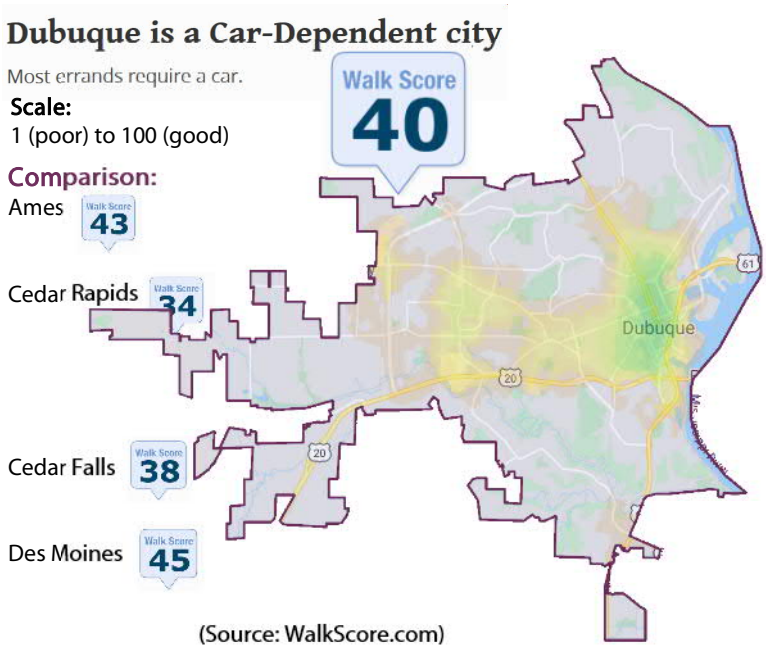
In 2017, the most common method of travel for workers in Dubuque, IA was Drove Alone (80.3%), followed by those who Carpooled (8.55%) and those who Walked (4.68%).



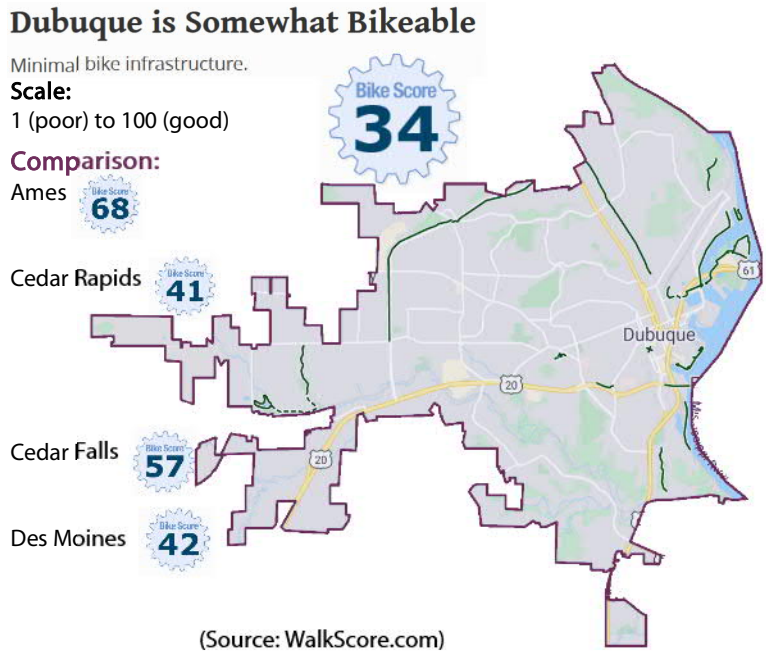
Transportation and Land Use

The measure of a community's walkability and bikeability are an important metric of the community's ability to advance sustainable transportation. Below are Dubuque's walk and bike heat maps:

Dubuque Walkability Heat Map



Dubuque Bikeability and Route Map

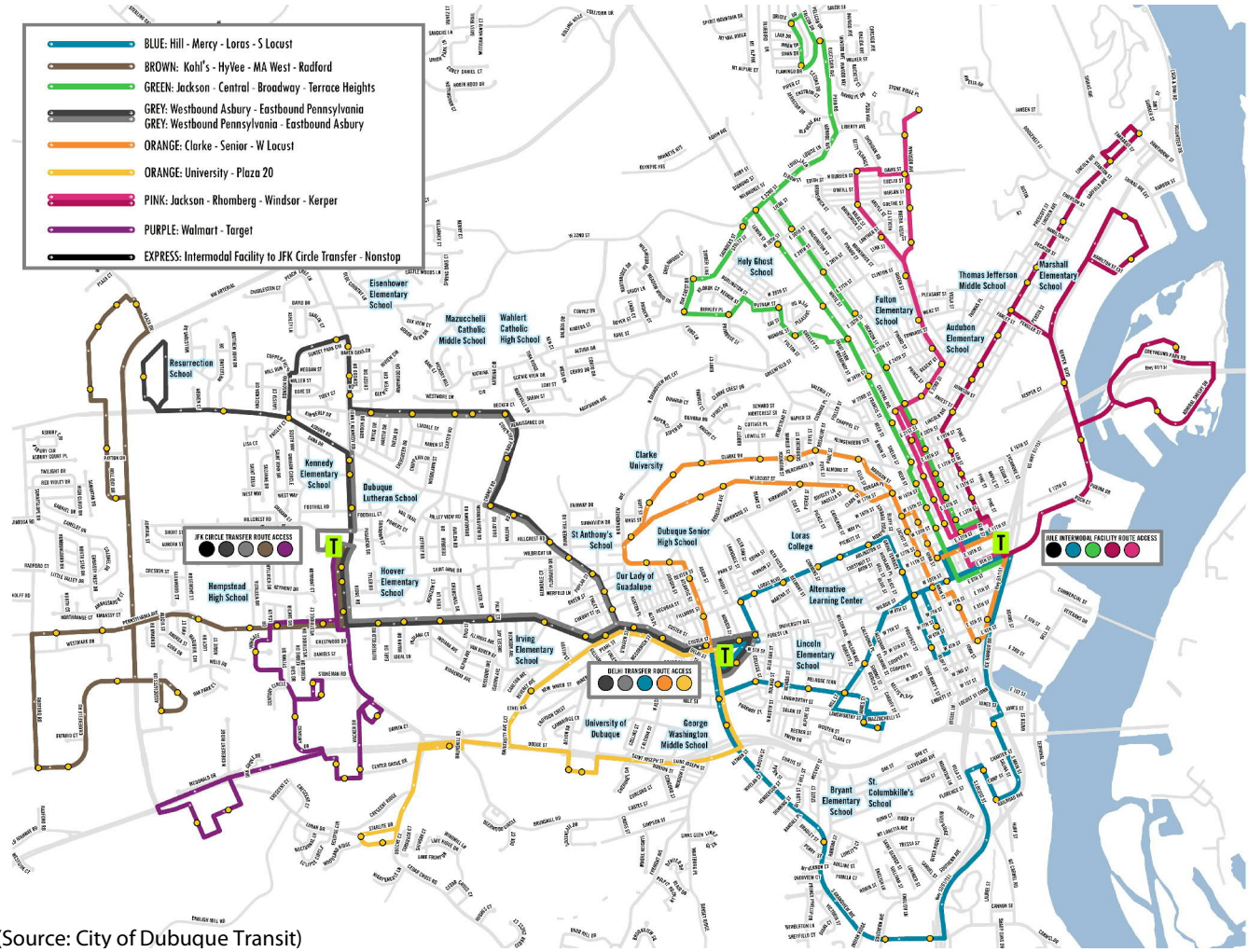


To increase alternative transportation use (walk, bike, etc), achieve the goal of a Silver Certification for a Bicycle Friendly Community, and to support other transportation goals of the CAP, considerations should be made in the engineering of bike lanes and pedestrian friendly sidewalks throughout the city. Assuring proper "Complete Streets" infrastructure is in place is foundational to advancing the communities CAP goals.

Transportation and Land Use

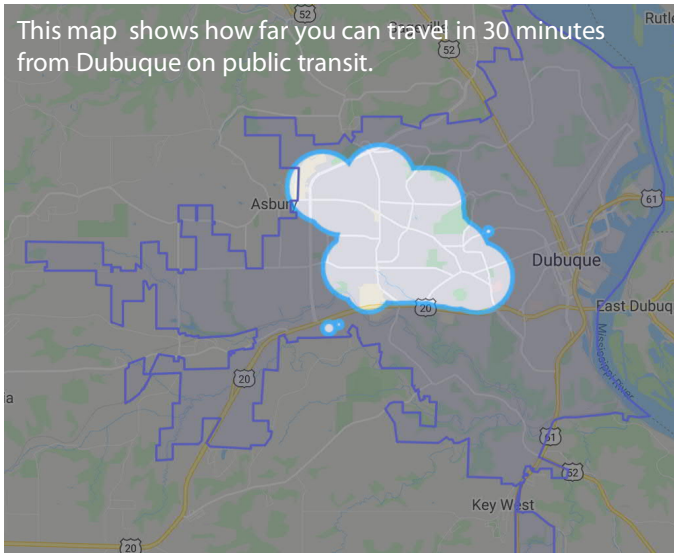
A review of a community's transit options, commute times, and overall transit performance can identify opportunities for improvement to the sustainability of the community's transportation system.

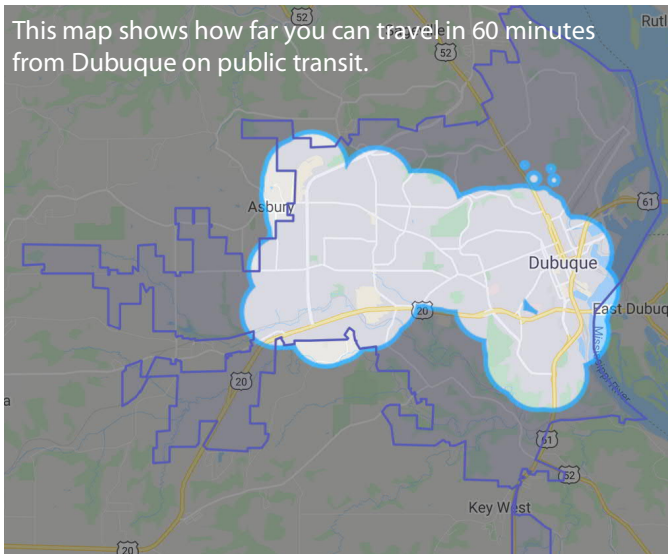
Dubuque Transit Route Map



(Source: City of Dubuque Transit)

Dubuque Transit Time Heat Map





(Source: WalkScore.com)

Transportation and Land Use

The measure of a community's walkability and bikeability are an important metric of the community's ability to advance sustainable transportation. Below are Dubuque's walk and bike heat maps:

Dubuque Route Heat Map

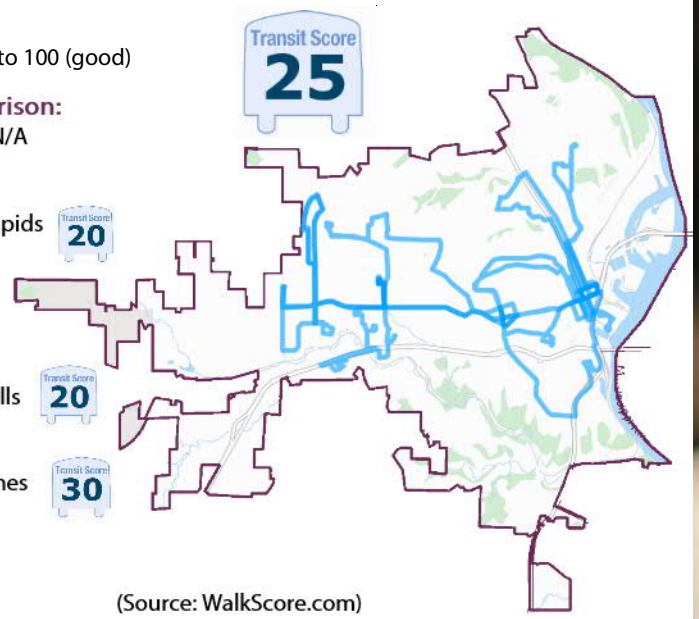
Scale:
1 (poor) to 100 (good)

Comparison:
Ames N/A

Cedar Rapids 20

Cedar Falls 20

Des Moines 30

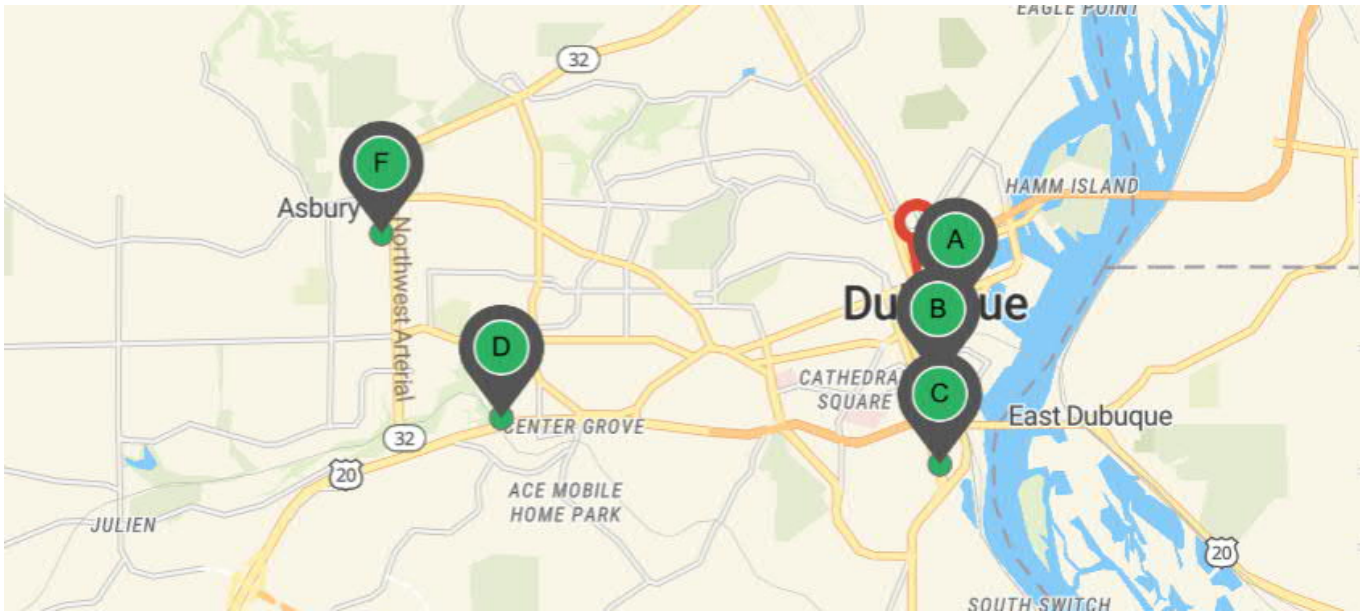


(Source: WalkScore.com)

While Jule Routes do reach a large portion of the city and residents, increasing bus frequency and continuing to increase route efficiency to meet rider's daily needs can increase ridership and decrease community VMT. Improvement considerations should focus on ensuring greater frequency of buses and times, ultimately, to create parity of use of public transit compared to the efficiency and timeliness of taking a personal vehicle. Special consideration may be appropriate in the areas of *North End* and *Rockdale* as residents in these areas would need to take multiple buses to reach a full service grocery store, and facing potentially 1+ hour transportation rides in one direction.

While Dubuque car use per person increased **3.5%** since 2010, the city's per-capita car mileage is **36.4%** *lower than the State average.*

Transportation and Land Use



Existing EV Infrastructure in Dubuque

The map above shows the existing public EV charging infrastructure available in Dubuque. There are 6 charging locations with a total of 14 Level 2 ports and 8 DC Fast Charge port.

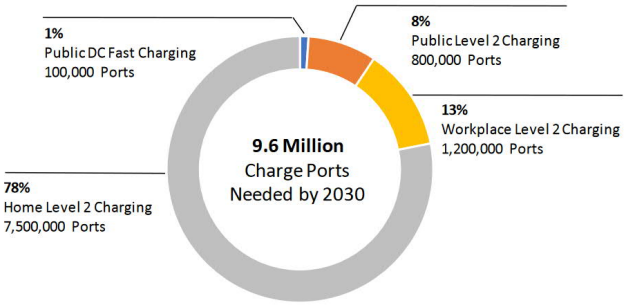
Projected EV Infrastructure Needed in Dubuque - 2030

According to the Edison Foundation, Electric Vehicle stock in the United States is projected to reach 18.7 million in 2030, up from slightly more than 1 million at the end of 2018. This means EV's will make up at least 7% of the vehicles on the road by that time.

For Dubuque, that means an anticipated 4100 EV's owned and operated by Dubuque residents by 2030. These EV's will require a minimum of 175 public level 2 charging ports, 264 workplace level 2 charging ports, and 21 public CD Fast Charging ports.

EV Charging Infrastructure Required in the US by 2030

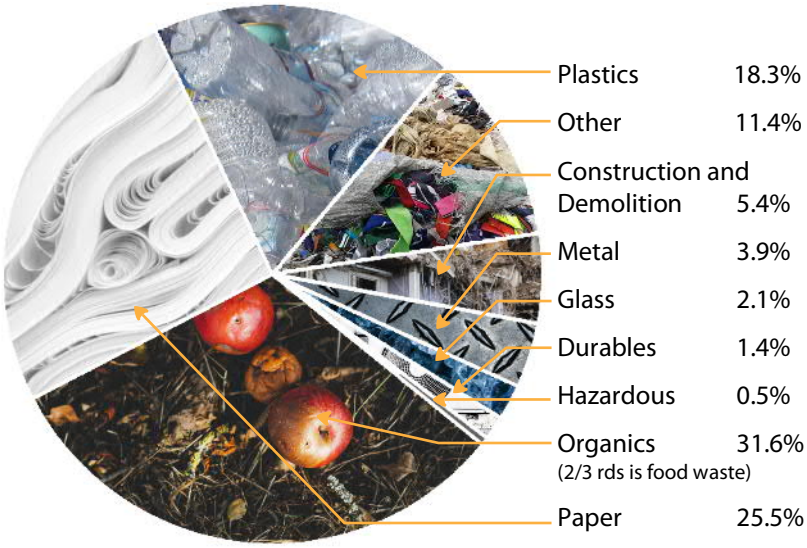
(serving 18.7 million EV's in use)

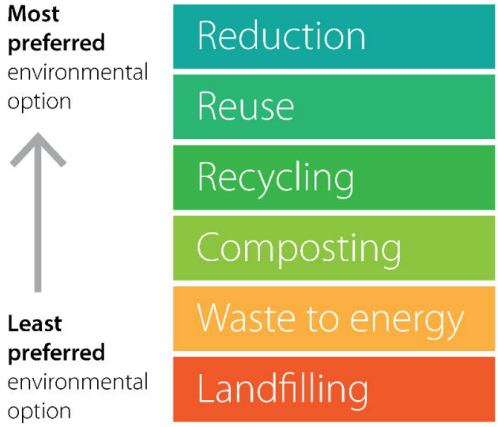


(Sources: US Department of Energy, Alternative Fuels Data Center, US Census, Edison Foundation "Electric Vehicle Sales Forecast and the Charging Infrastructure Required Through 2030" report).

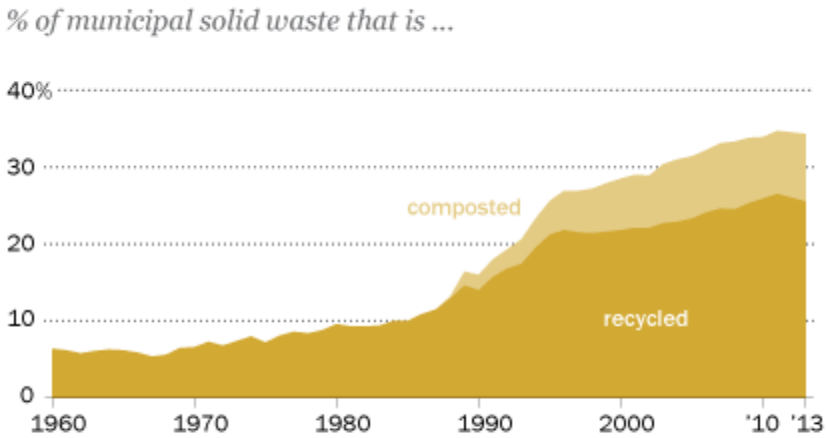
Iowa's Waste Stream

The Iowa Department of Natural Resources commissioned the 2017 Iowa Statewide Waste Characterization Study to determine the characteristics of statewide waste streams. The project studied garbage from 10 facilities throughout the state and separated it into nine primary categories. The study found that Iowa waste is dominated by organics, paper, and plastics. This indicates great potential for increased waste stream capture for beneficial use through recycling, composting and other opportunities.





Recycling Rates Have Declined Recently



According to the EPA, only 34.3% of the 254.1 million tons of municipal solid waste generated in 2013 was recovered through recycling or composting; the overall recovery rate has actually slipped a bit since peaking at 34.7% in 2011. These numbers indicate a potential for increased recycling and organics participation.

(Source: Pew Research Center)

EPA's Waste Hierarchy

EPA developed a four-tiered waste management hierarchy to guide waste management decision-making. The hierarchy recognizes that no single waste management approach is suitable for managing all materials and waste streams in all circumstances. The hierarchy ranks the various management strategies from most to least environmentally preferred. The hierarchy places emphasis on reducing, reusing, and recycling as key to sustainable materials management

For the average family of four in Dubuque, eliminating food waste could save:

5,978 lbs of GHG

and up to

$1,500* Annually

* According to the National Resources Defense Council.

Water, Wastewater, and Flooding

Water Resources and Conservation

The city of Dubuque's drinking water source are a series of aquifers. Currently there are no perceived threats for these aquifers ability to meet the city's water needs into the future. The Jordan Aquifer, as an example, has had no recorded changes in levels at the Dubuque water wells since 1977. Even with these fortunate, and uncommon, water resource projections, there are still compelling reasons to focus on and improve water conservation strategies.

Water and Energy Nexus

Water and energy are fundamental components of our 21st century life. Production, distribution, consumption, and treatment of water consumes energy. Production of energy - particularly those generated through fossil fuel use - consumes water. The water-energy nexus is the relationship between how much water is used to generate and transmit energy, and how much energy it takes to collect, clean, move, store, and dispose of water. Both fresh water production and waste water treatment are typically the highest energy and carbon emission sources within a City's operations. Reduction of water demand saves energy not only in the production and distribution of fresh water but also in the collection and treatment of wastewater.

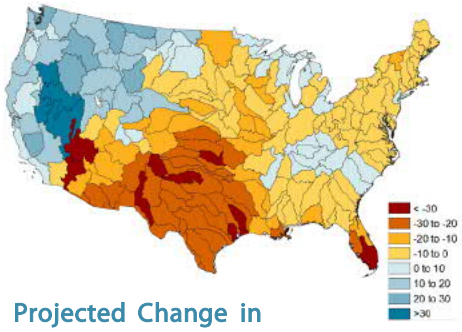
The Savings Of Conservation

In Iowa, the aquifers serving water use are projected to meet even the State's future needs. As cities grow larger and industries expand, water use will increase. Though the aquifer water sources are anticipated to meet that need, the demand on the infrastructure to access and deliver those water resources will increase as well. This may require creating additional sources of water, either by drilling more water wells or making a lake. Taxes and increased water bills usually pay for construction of public water supplies. By conserving water use, existing water supplies can be used longer, allowing towns, cities, and industries to grow without the need to find additional sources of water.

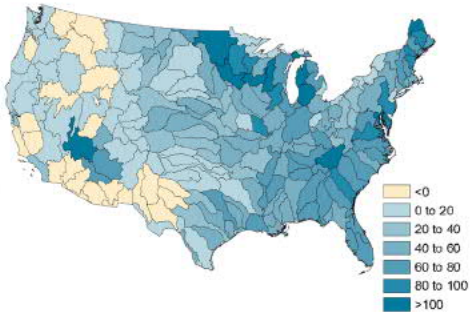
Regional Water Stress

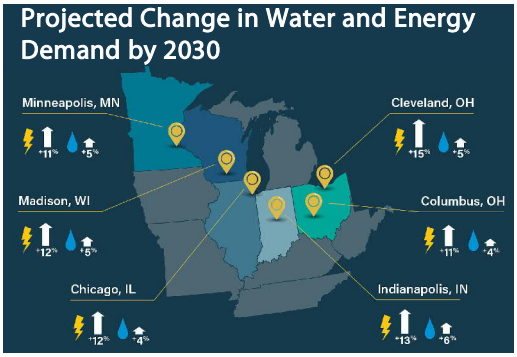
By 2025, an estimated 1.8 billion people will live in areas plagued by water scarcity, with two-thirds of the world's population living in water-stressed regions. Since 1985, water yield in parts of Iowa, Illinois, Wisconsin, and Minnesota has declined as much as 20%. More importantly, many sections in the United States have seen a decrease in water yield of over 30% - including portions of the greater Mississippi watershed area. Projected climate changes will not only continue the water yield decreases but also increase water demand - by 2030 cities throughout the Midwest are projected to have an increase in annual water demand of 4-6% due to climate change and population increases. By 2071, nearly half of the 204 fresh water basins in the United States may not be able to meet the monthly water demand. As Dubuque shares the same watershed area with portions of these water-stressed areas, the interconnectedness means choices made in Dubuque can have impacts within the region. (Sources: "Adaptation to Future Water Shortages in the United States Caused by Population Growth and Climate Change", "Managing the water–electricity demand nexus in a warming climate").

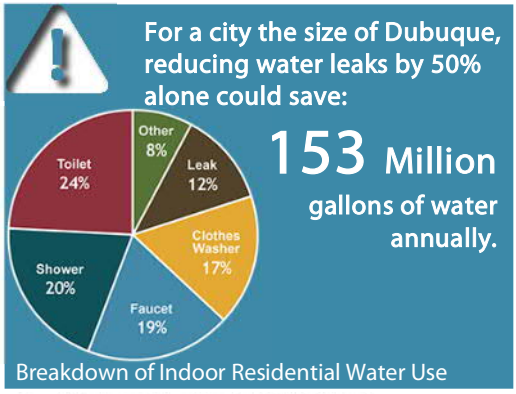
Change in Water Yield Since 1985



Projected Change in Water Demand by 2050







Source: Water Research Foundation, Residential End Uses of Water, Version 2. 2016

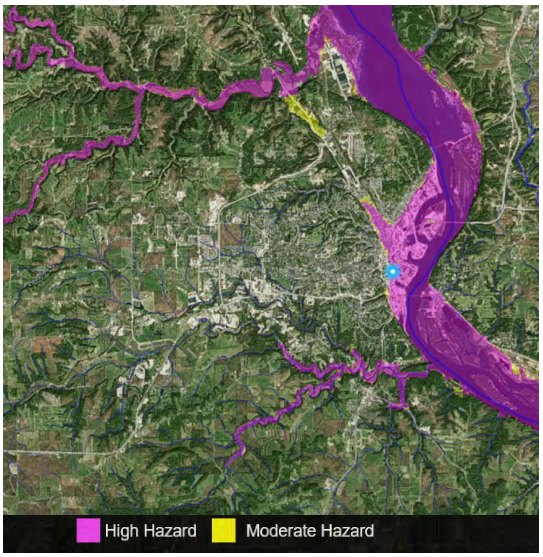
Water, Wastewater, and Flooding

Minimizing Wastewater Impacts

Nearly 60% of consumer water use is for indoor purposes, and all of that water eventually ends up at the Wastewater Treatment plant for processing. Wastewater treatment is an energy and carbon emission intensive community need. Waste collection and processing consumes significant electricity, while the organic materials in the wastewater create large quantities of methane as they break down. The City of Dubuque has employed anaerobic digesters at the Wastewater treatment plant (a process where organic matter is broken down to produce biogas for electricity and biofertilizer) which significantly reduce methane emissions. However, a minimum of 25% of wastewater treatment emissions remain related to process energy emissions. This means that every gallon of wastewater avoided saves approximately 4 cubic feet of GHG emissions for the city.

Mitigating Flood Impacts

According to the US National Climate Assessment, the ten rainiest days can contribute up to 40% of the annual precipitation in the Iowa region. By 2070, the Dubuque area can anticipate an increase of 10-20% in the total annual precipitation, while the amount of precipitation in summer months may actually decline. In addition, the timeframe between rains is expected to continue to increase, (source US National Climate Assessment). Under this scenario, it is likely that certain periods of the year, like spring, may be significantly wetter with storms producing heavier rains. In anticipation of that, it is appropriate to review the areas of the City with flood risk and to review current storm water management capacity against future extreme rainfall event projections.



The map below shows the flood risk areas throughout the City as defined by FEMA . Flood risks illustrated relate to water surface elevations for 1% chance annual floods ("100 year flood event"). Areas shown relate to existing bodies of water. Beyond these risks, many other areas may be susceptible to potential "flash" flooding.
(Source: FEMA, FM Global, National Flood Services)

Expertise

Climate Health and Safety

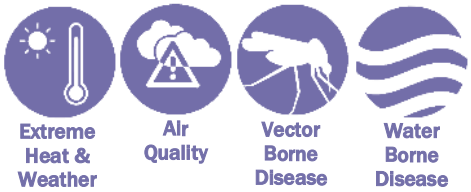
Climate Vulnerable Populations

Climate change is already causing, and is expected to continue to cause, a range of health impacts that vary across different population groups in the United States. The vulnerability of any given group is a function of its sensitivity to climate change related health risks, its exposure to those risks, and its capacity for responding to or coping with climate variability and change. Below is an overview of populations of concern within Dubuque for climate change impacts.

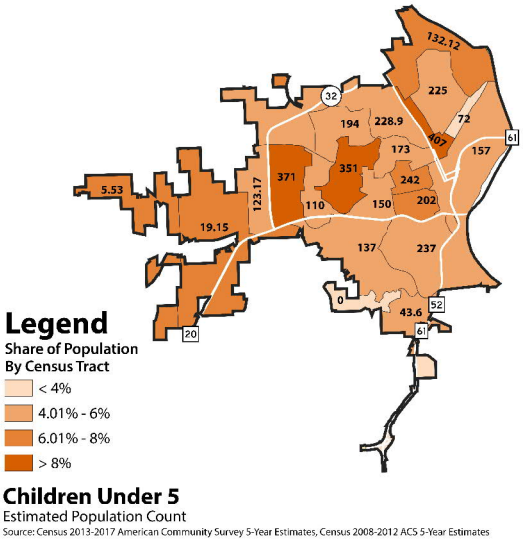
Children

According to the US Global Change Research Program, "Children are vulnerable to adverse health effects associated with environmental exposures due to factors related to their immature physiology and metabolism, their unique exposure pathways, their biological sensitivities, and limits to their adaptive capacity. Children have a proportionately higher intake of air, food, and water relative to their body weight compared to adults. They also share unique behaviors and interactions with their environment that may increase their exposure to environmental contaminants such as dust and other contaminants, such as pesticides, mold spores, and allergens."

Children are particularly sensitive to the following Climate Risks (see the City's 2019 Climate Vulnerability Assessment for more information):



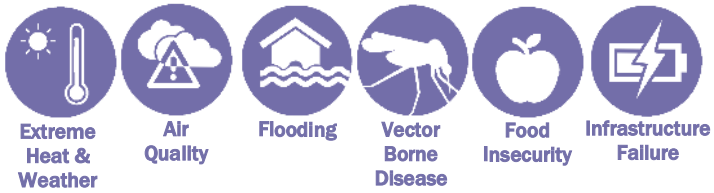
Map of Vulnerable Population Distribution Within Community



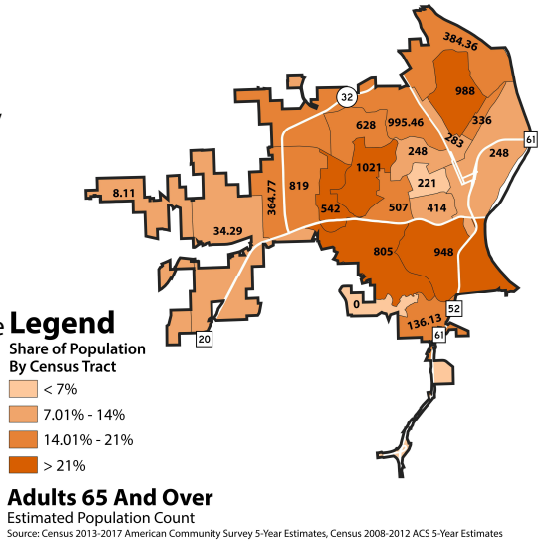
Older Adults

Older adults are also vulnerable to the health impacts associated with climate change and weather extremes. Vulnerabilities within older adults are not uniform due to the fact that this demographic is a diverse group with distinct sub-populations that can be identified not only by age but also by race, educational attainment, socioeconomic status, social support networks, overall physical and mental health, and disability status. According to the US Global Change Research Program, "The potential climate change related health impacts for older adults include rising temperatures and heat waves; increased risk of more intense floods, droughts, and wildfires; degraded air quality; exposure to infectious diseases; and other climate-related hazards."

Older Adults are particularly sensitive to the following Climate Risks (see the City's 2019 Climate Vulnerability Assessment for more information):



Map of Vulnerable Population Distribution Within Community



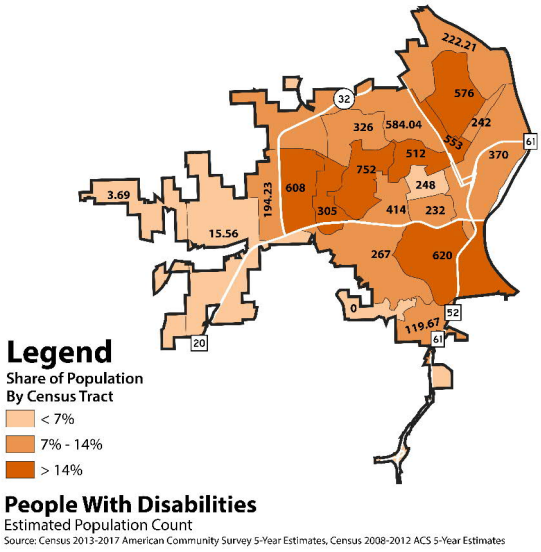
Climate Health and Safety

Individuals with Disabilities

People with disabilities experience disproportionately higher rates of social risk factors, such as poverty and lower educational attainment, that contribute to poorer health outcomes during extreme events or climate-related emergencies. These factors compound the risks posed by functional impairments and disrupt planning and emergency response. Of the climate-related health risks experienced by people with disabilities, perhaps the most fundamental is their "invisibility" to decision-makers and planners. Disability refers to any condition or impairment of the body or mind that limits a person's ability to do certain activities or restricts a person's participation in normal life activities, such as school, work, or recreation.

Individuals with disabilities are particularly sensitive to the following Climate Risks (see the City's 2019 Climate Vulnerability Assessment for more information):

Map of Vulnerable Population Distribution Within Community



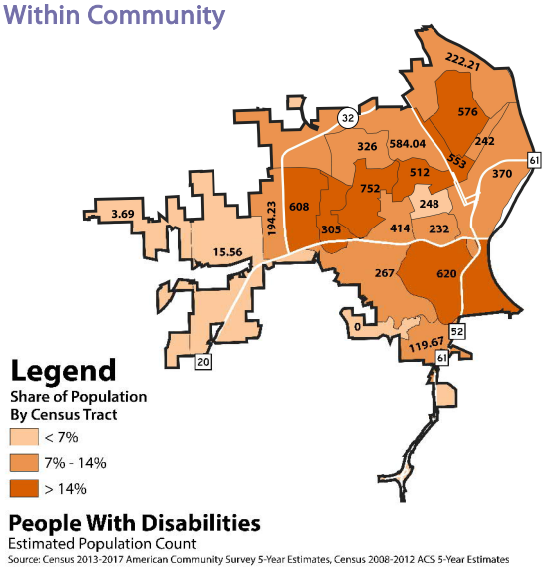
Individuals Under Economic Stress

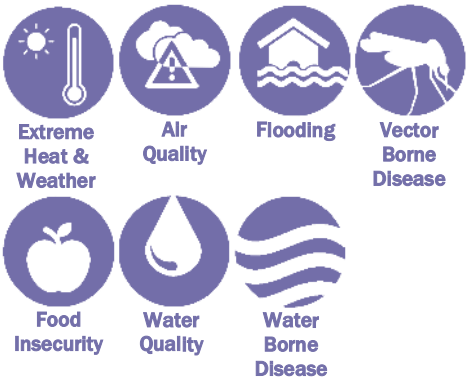
Individuals and families living under economic stress, defined here as "low income" individuals (200% poverty level), are frequently the most adaptive demographic group in our communities. Those living under economic stress exhibit on-going adaptation capabilities simply navigating day-to-day challenges with less than needed resources. This adaptive capacity, however, is overwhelmed in times of emergency as lack of sufficient economic resources greatly reduce the range of options available in response to crisis. For those in poverty, weather-related disasters or family members falling ill can facilitate crippling economic shocks.

With limited economic adaptive capacity, this portion of our population is especially vulnerable to every projected climate impact. Frequently, the most effective measures in avoiding extreme heat such as efficiently functioning air conditioning or high performing building enclosures are simply not available to those in poverty while many work in outdoor or industrial jobs which are particularly vulnerable to climate conditions. Diseases which may result from exposure to vector-borne, water-borne, and air-borne pathways may go untreated due to lack of medical access or ability to pay and may increase the level of economic stress due to missed work days or even loss of employment. Those living under economic stress usually carry a heavy housing cost burden, including higher utility costs. This burden can be exacerbated from damaged sustained by their home in extreme weather or flooding events.

Individuals experiencing economic stress are particularly sensitive to the following Climate Risks (see the City's 2019 Climate Vulnerability Assessment for more information):

Map of Vulnerable Population Distribution Within Community





Climate Health and Safety

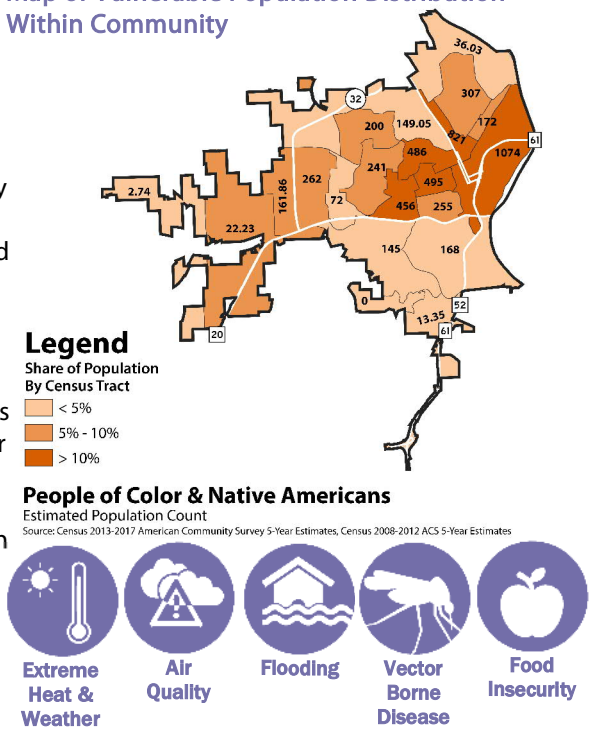
People of Color

These populations are at increased risk of exposure given their higher likelihood of living in risk-prone areas, areas with older or poorly maintained infrastructure, or areas with an increased burden of air pollution. In addition, according to the Center for Disease Control and the National Health Interview Survey these portions of our population also experience higher incidence of chronic medical conditions which can be exacerbated by climate change impacts. These populations may also be impeded from preparing, responding, and coping with climate related health risks due to socioeconomic and education factors, limited transportation, limited access to health education, and social isolation related to language barriers.

Though not specifically a "person of color" category, individuals with limited English frequently overlap with populations of color. Individuals with limited English language skills may be more socially isolated. Their limited English also likely limits their access to public information and notifications, potentially resulting in a knowledge gap related to community resources, programs, or education which may be relevant in preparing for and recovering from climate impacts. In addition, communication barriers may create challenges for limited English speakers in understanding critical information or instructions given in public address during an extreme weather event.

People of Color may be particularly sensitive to the following Climate Risks (see the City's 2019 Climate Vulnerability Assessment for more information):

Map of Vulnerable Population Distribution Within Community



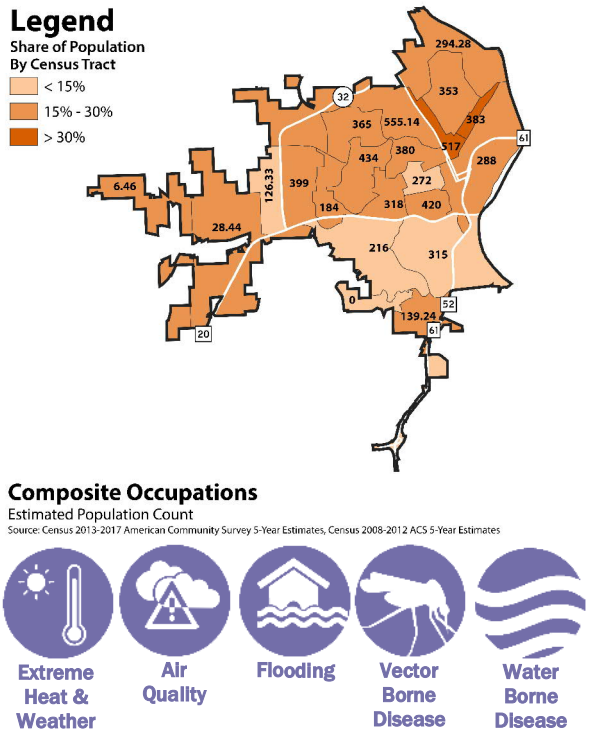
At Risk Workers

Climate change will increase the prevalence and severity of occupational hazards related to environmental exposure. As our climate changes, we may also experience the emergence of new work related risks. Climate change can be expected to affect the health of outdoor workers through increases in ambient temperature, more prevalent and longer-lasting heat waves, degraded air quality, extreme weather, vector-borne diseases, and industrial exposures. Workers affected by climate change include farmers, ranchers, and other agricultural workers; laborers exposed to hot indoor work environments; construction workers; paramedics, firefighters and other first responders; and transportation workers.

For individuals employed in climate vulnerable jobs who also fall within other vulnerable population categories, the health effects of climate change can be cumulative. For these individuals, the risks experienced in their work can be exacerbated by exposures associated with poorly insulated housing and lack of air conditioning. Workers may also be exposed to adverse occupational and climate-related conditions that the general public may be more able to avoid, such as direct exposure to extreme heat, extreme weather events, low air quality, or wildfires.

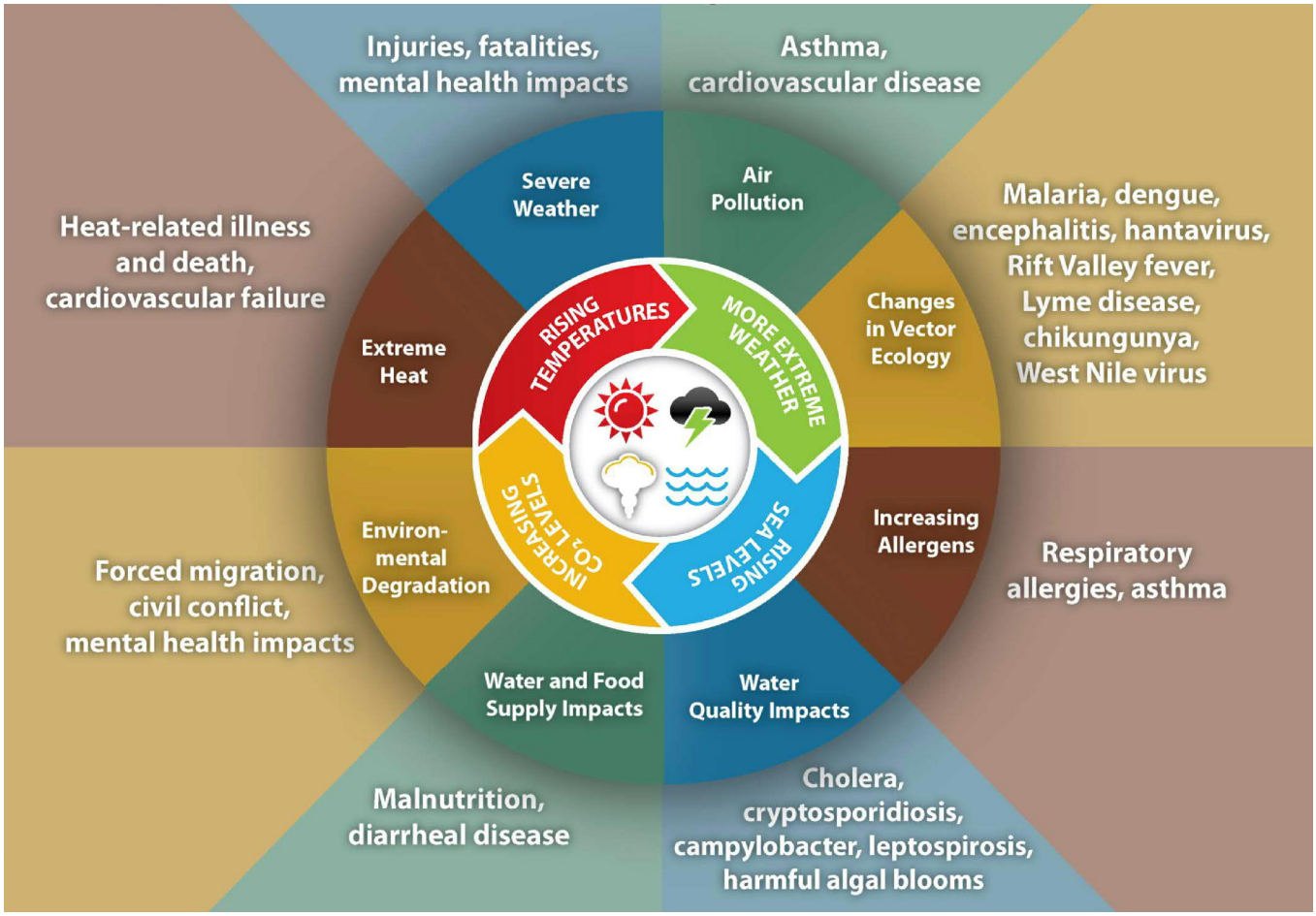
Individuals employed in at-risk occupations may be particularly sensitive to the following Climate Risks (see the City's 2019 Climate Vulnerability Assessment for more information):

Map of Vulnerable Population Distribution Within Community



Climate Health and Safety

Impacts of Climate Change on Human Health



Source: Centers for Disease Control and Prevention

Vulnerable Population Risk Sensitivity Chart

	Primary Climate Risks to Population								Economic Climate Risks to Population			
	Extreme Heat	Flooding	Air Quality	Vectorborne Disease	Food Insecurity	Water Quality Impacts	Waterborne Disease	Power Failure	Crop Yield Impacts	Energy Costs	Property Crime	Violent Crime
Children Under 5	3,770		3,770	3,770			3,770	3,770	3,770	3,770		
Seniors	8,078	8,078	8,078	8,078	8,078			8,078	8,078	8,078	8,078	
Disabled Individuals	5,253	5,253	5,253		5,253			5,253		5,253	5,253	
Low Income Individuals	4,017	4,017	4,017	4,017	4,017	4,017	4,017	4,017	4,017	4,017	4,017	4,017
Low Income Families	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462	4,462
People of Color	15,175	15,175	15,175	15,175	15,175		15,175	15,175		15,175	15,175	15,175
Limited English	3,820	3,820	3,820	3,820	3,820		3,820	3,820	3,820	3,820	3,820	3,820
At-Risk Workers	5,579	5,579	5,579	5,579			5,579					5,579
Total by category	58,321	46,384	50,154	44,901	40,805	8,479	36,823	44,575	24,147	44,575	40,805	33,053
percentage of Vuln pop	100%	80%	86%	77%	70%	15%	63%	76%	41%	76%	70%	57%

Climate Health and Safety

Review of Climate Risks for the City of Dubuque

A "Climate Risk" is the potential for negative consequences and outcomes for human health, systems, or communities. The most common way of evaluating the level of risk associated is "likelihood of Occurrence" x "Impact Level" or vulnerability.

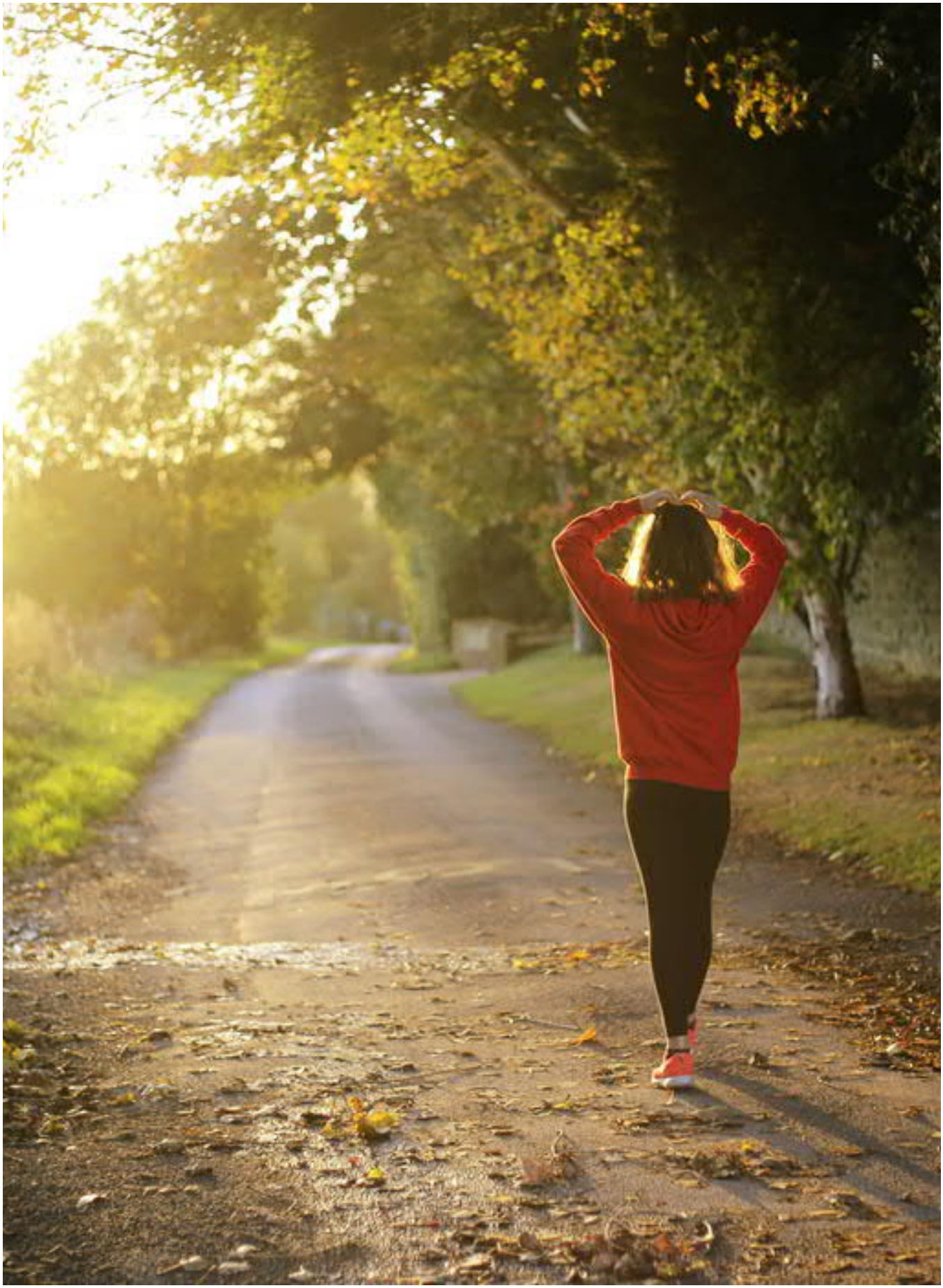
Two charts are provided below. The first reviews the expected impacts, likelihood of occurrence, impact level based on Population vulnerability reviewed in the City's 2019 Climate Vulnerability Assessment, potential timeframe, and resulting overall risk level for Climate Risks to Population (Health Impacts). The second reviews the infrastructural and institutional Climate Risks to the Community. Each chart includes a brief review of the expected impacts and indicators.

Climate Risks to Population

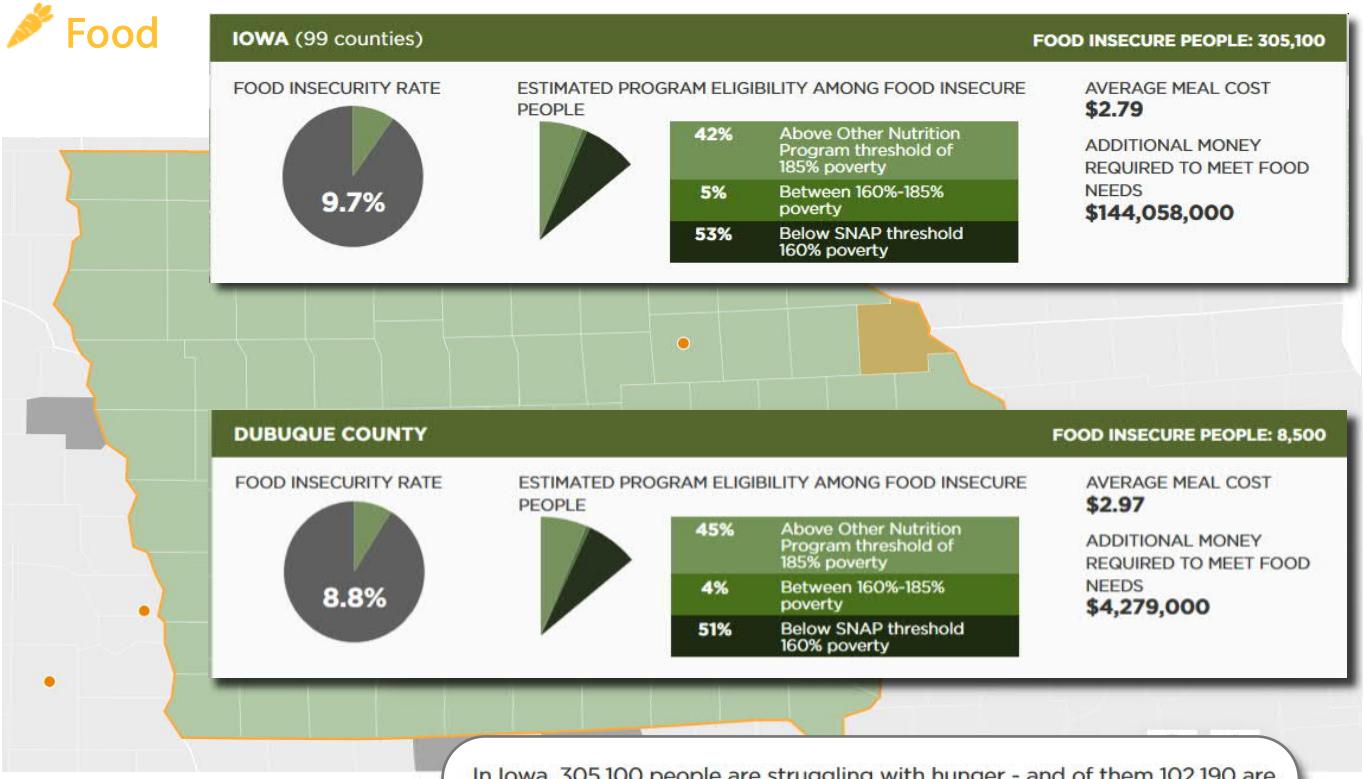
Health Impacts	Expected Impact(s)	Likelihood of Occurrence	Impact Level (Population Vulnerability)	Timeframe	Risk (Likelihood x Impact)	Impact-related indicators
Extreme Heat	Increased demand for cooling; heat stress and emergency visits, heat related health impacts	Possible	High	Medium-term	High	Cooling Degree Days, days above 95
Flooding	damage to property; flood related health impacts; infrastructure impacts	Likely	High	Short-term	Very High	Flood events, flash flood occurances, wettest 5-day periods, number of heavy rain events, disaster declarations, change in NOAA storm
Drought	Damage to crop/tree/ecosystem, reduced drinking water source, increased flash flood potential due to decreased soil permeability	Possible	Moderate	Medium-term	Moderate	Consecutive days without rain, acquafer level, surface water condition, river flow
Air Quality Impacts	Increased particulate matter, increased ozone impacts, increased instances of asthma	Possible	High	Medium-term	High	Air quality index
Vector-Borne Diseases	Increased instances of lyme disease, encephalitis, heart worm, malaria, zika virus,	Likely	Moderate	Long-term	Moderate	Disease records
Nutrition Insecurity	Food price volitility/change, fluctuation in availability	Possible	Moderate	Medium-term	Moderate	Food price index, Foodshelf demand, % of school children qualifying for free and reduced lunch
Water Quanity/Quality Impacts	Water shortage, surface water quality impacts due to heat and stormwater runoff	Possible	Moderate	Long-term	Moderate	Acquafer health; Water quality test results
Water Borne Disease	Bacteria exposusure at infected surface water locations, contamination of drinking water due to flood	Unlikely	High	Medium-term	Low	flood events; algea blooms

Climate Risks to Infrastructure and Institutions

Impacted Policy Sector	Expected Impact(s)	Likelihood of Occurrence	Potential Impact Level	Timeframe	Risk (Likelihood x Impact)	Impact-related indicators
Buildings	Increased demand for cooling, need for weatherization	Likely	Moderate	Short-term	High	Low income housing units, % of residents with housing burden, housing stock age, % of units without weatherization improvements
Transport / Roads	Increased freeze/thaw damage, increased salt/sand use and maintenance budgets	Likely	High	Short-term	Very High	% of flooded or flood damaged roads and bridges, City road maintenance budget
Energy	Increased power outages, increased demand and cost expediture	Likely	High	Medium-term	High	Energy outage occurances, number of customers without power, cooling degree day increases
Water	Increased scarcity, water quality impacts	Possible	High	Long-term	Moderate	Water infrastructure damage, acquafer health, flood contamination
Waste	Damage to waste infrastructure and processing, particularly wastewater	Unlikely	Moderate	Long-term	Low	Flood impacts at wastewater facilities, sewage release, flooding at landfill/RDF sites
Land Use Planning	Stormwater management impacts, heat island impacts, flood management,	Likely	High	Short-term	Very High	Heat Island co-efficient; stormwater runoff projections, citywide tree canopy coverage, citywide impervious surface coverage, % of complete streets
Agriculture & Forestry	Reduction in crop yield, forest + tree species loss due to changes in hardiness zone and pests	Likely	Moderate	Medium-term	Moderate	% change in crop yeild, impacts to crop planting and harvesting; tree canopy loss to pests, tree canopy loss to hardiness zone changes
Environment & Biodiversity	Insect infestation, increased disease vectors, ecosystem degradation	Likely	Moderate	Medium-term	Moderate	% of habitat loss, invasive species
Law Enforcement and Emergency Response	Increased property and violent crime, increased emergency response demand and mortality rate	Likely	Moderate	Long-term	Low	Property and violent crime statistics (particularly durring extreme heat), instances of mental health need, calls for emergency response (particularly during extreme heat and weather)
Tourism	Decline in tourism demand	Not known	Not Known	Not known	Not Known	Tourism statistics, hotel occupancy levels
Economic Impact	Impacts on regional Ag business, energy expenditures, labor impacts	Likely	Moderate	Medium-term	Moderate	Disaster declarations, economic indicators, employment rates



Food



In Iowa, 305,100 people are struggling with hunger - and of them 102,190 are children.

1 in 10 people

struggles with hunger.

1 in 7 children

struggles with hunger.

People facing hunger in Iowa are estimated to report needing

$144,058,000

more per year to meet their food needs.

(Source: Feeding America)

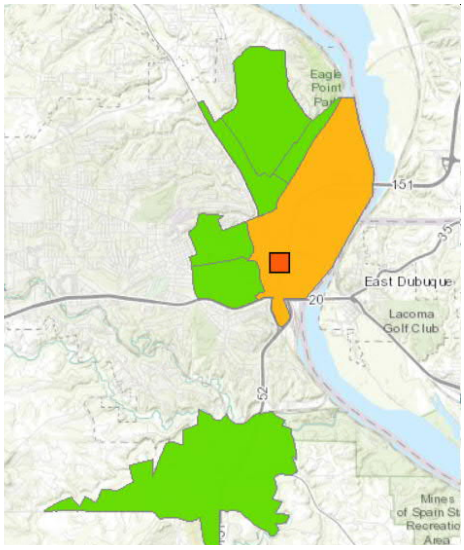
Fruit and Vegetable Consumption in Iowa

Only 10.7% of adults meet the daily fruit intake recommendation [2]

Only 7.0% of adults meet the daily vegetable intake recommendation [2]

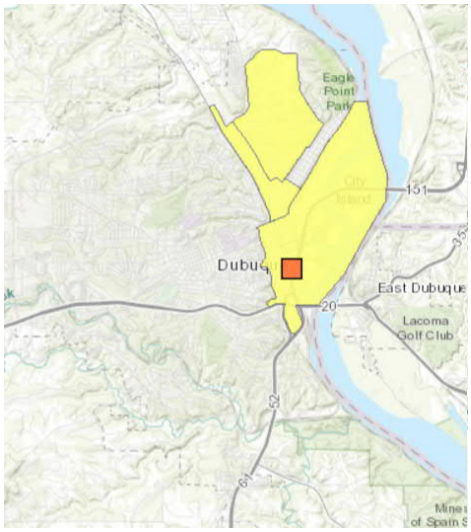
(Source: CDC State Indicator Reports on Fruits and Vegetables, 2018)

Food



Food Access

On the map to the left, highlighted sections represent low-income census tracts (tracts where 20% or more of the population is at or below poverty, or where family median incomes are 80% or less of State median) where a significant number (at least 500 people) or share (at least 33 percent) of residents are distant from the nearest supermarket. In sections which are green, residents are more than 1 mile (urban) or 10 miles (rural), while in orange sections residents are more than ½ mile (urban) or 10 miles (rural) from nearest supermarket.



Vehicle Access

On the map to the left, highlighted sections represent low-income census tract where more than 100 housing units do not have a vehicle and are more than ½ mile from the nearest supermarket in urban/suburban areas, or a significant number (at least 500 people) or share (at least 33 percent) of residents are more than 20 miles from the nearest supermarket in rural areas.

Access to Local Food

The map on the left shows community garden and farmers market locations. The City of Dubuque currently has two community garden locations and two farmers market locations. According to the USDA Local Food Directory, the summer Dubuque Farmers Market accepts Federal Nutrition Benefits such as WIC, WIC to cash, SNAP, or Senior Farmers Market Nutrition Program while the winter location does not.

Community Gardens Per 100,000 Residents

United States: 18,000 Total (est)	5.0
City of Des Moines: 2 Total	0.9
City of Cedar Rapids: 6 Total	4.5
City of Dubuque: 2 Total	3.5

(Sources: American Community Gardening Association, Star Tribune)

Greenspace and Tree Canopy

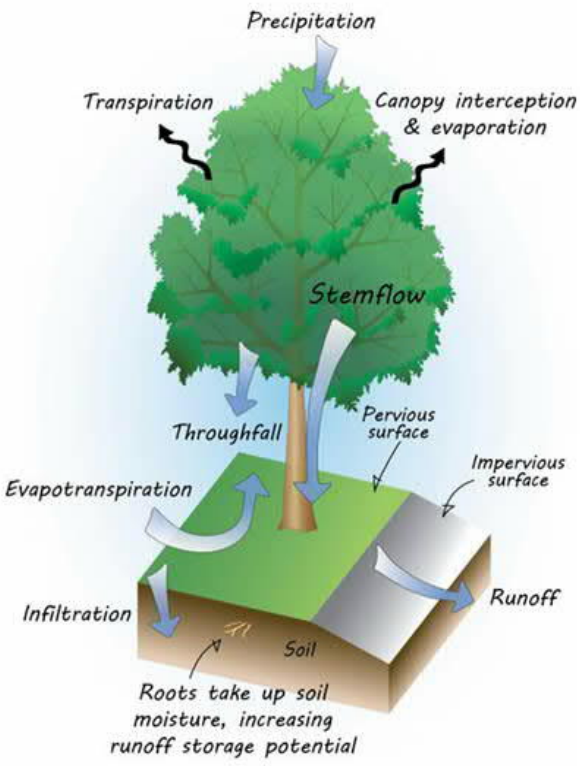
Climate Benefits of Greenspace and Tree Canopy Coverage

Stormwater Management

Greenspace and tree coverage provide significant stormwater management service to a community. Every tree catches the rain as it comes down, as well as increasing the soil's capacity to retain water longer. A mature White Oak can intercept up to 12,010 Gallons of water in a single year. This water stays in the leaves until it's absorbed by the tree or evaporates to cool our air. Within an urban environment, this prevents that water from otherwise needing to be piped or treated by other stormwater infrastructure.

Trees leaves and branches act to capture and direct water to the tree's roots, providing one of the greatest stormwater benefits: infiltration and storage. Through filtering the water with their roots and soil, pollutants get trapped and diluted which reduces the impact of water pollution.

Additionally, storing all this water makes it available for the tree and other plants around it. This stored water can then be used to grow the tree and evaporate this water back into the air, once more preventing it from impacting our stormwater system.



Source and Graphic:
United States Environmental Protection Agency

Pollution Absorption

Greenspace and urban trees remove gaseous air pollution primarily by uptake via leaf stomata, though some gases are removed by the plant surface. Once inside the leaf, gases diffuse into intercellular spaces and may be absorbed by water films to form acids or react with inner-leaf surfaces. Trees also remove pollution by intercepting airborne particles. (Source: USDA Forest Service)

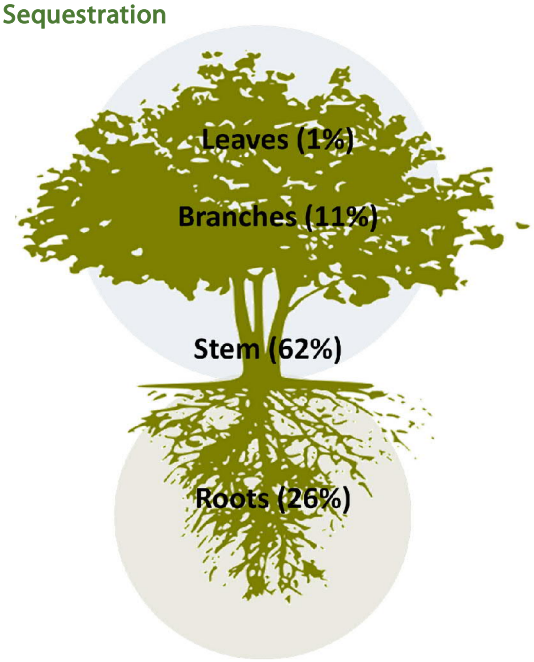
Carbon Sequestration

Through photosynthesis, plant ground cover, and trees take in carbon dioxide (CO_2) and release oxygen (O_2). Trees then transfer the remaining carbon to their trunks, limbs, roots, and leaves as they grow. When leaves or branches fall and decompose, or trees die, the carbon that has been stored will be released by respiration and/or combustion back to the atmosphere or transferred to the soil.

Heat Island Mitigation

Plant and tree transpiration and tree canopies affect air temperature, radiation absorption and heat storage, wind speed, relative humidity, turbulence, surface albedo, surface roughness and consequently the evolution of the mixing-layer height. These changes in local meteorology can alter pollution concentrations in urban areas. Maximum mid-day air temperature reductions due to trees are in the range of 0.07 to 0.36 degrees F for every percent canopy cover increase. (Source: USDA Forest Service)

Breakdown of Tree Mass Carbon Sequestration

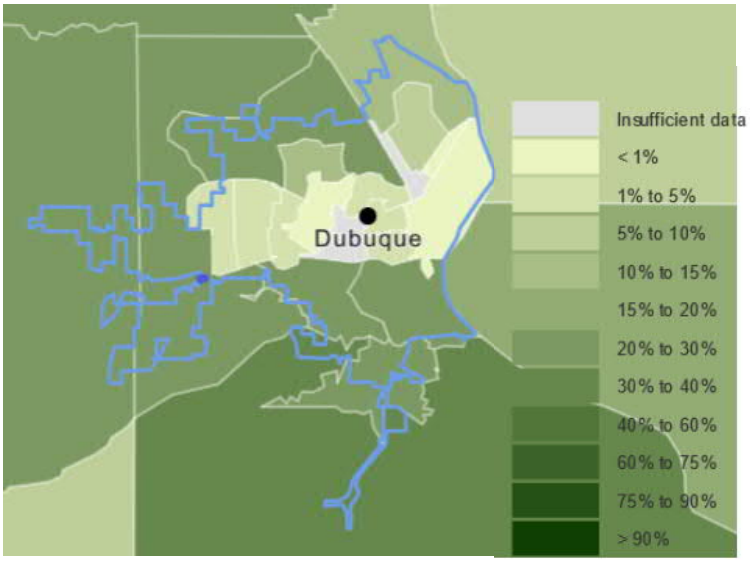


Source and Graphic: Ecometrica

Greenspace and Tree Canopy

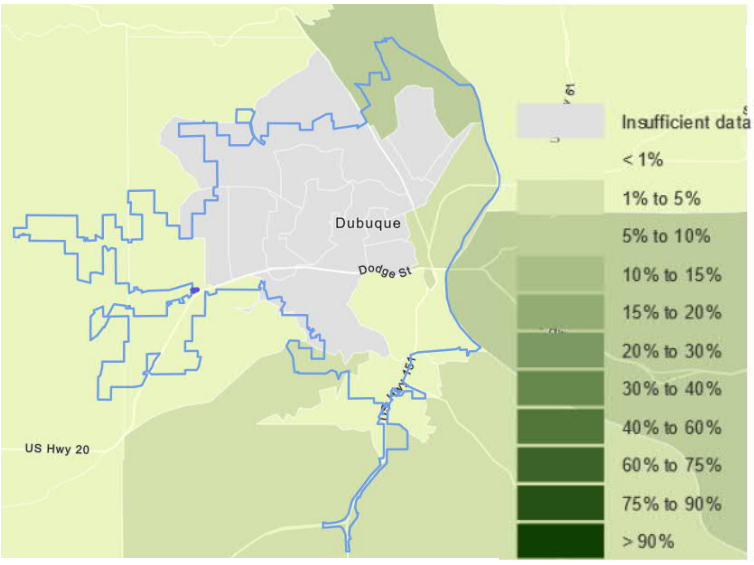
Estimated Citywide Ground Coverage - Tree Canopy Deciduous Forest

Deciduous forest areas are dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change. The map to the right illustrates the estimated Mixed Forest coverage in the City of Dubuque by census tract.



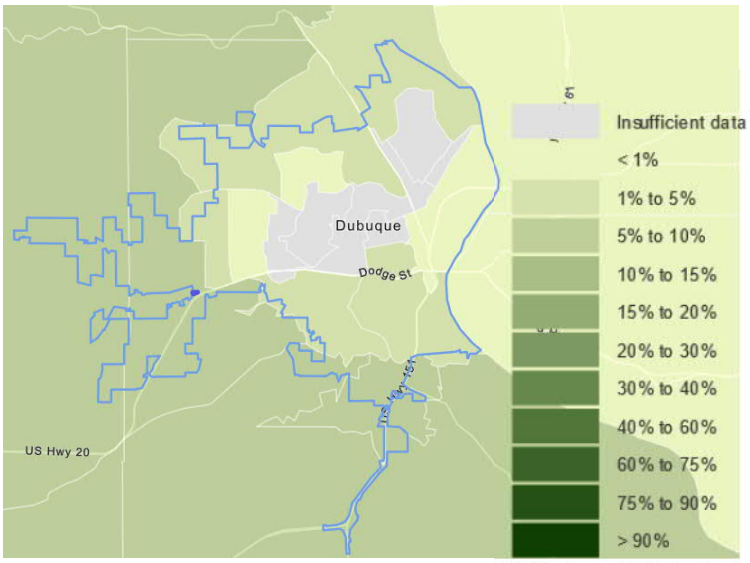
Estimated Citywide Ground Coverage - Woody Wetlands

Woody Wetlands are areas where forest or shrubland vegetation account for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.



Estimated Citywide Ground Coverage - Grassland

Grassland areas are dominated by grasses or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.



Source: 2011 Environmental Summaries, PUMS National Historical Geographic Information System: Version 12.0

Estimated City-Wide Ground Coverage Totals

Open Water:	2.9%
Wetland / Woody Wetland:	1.1%
Forest and Shrub:	26.2%
Grass:	31.2%
Pavement and Buildings:	38.6%

Greenspace and Tree Canopy

City of Dubuque Park Space Characteristics

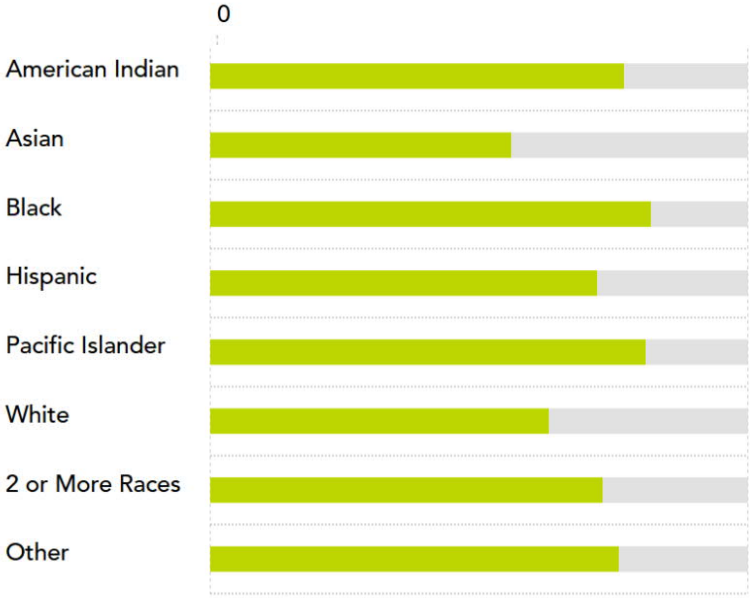
65% of residents live within a 10 minute walk of a park.

20,588

People outside a 10-minute walk

PERCENT OF RESIDENTS WITHIN A 10-MINUTE WALK OF A PARK BY AGE

PERCENT OF RESIDENTS WITHIN A 10-MINUTE WALK OF A PARK BY RACE/ETHNICITY



5% of Dubuque's city land is used for parks and recreation.

National median **15%**

Source and Graphic Source: The Trust For Public Land ParkScore® index

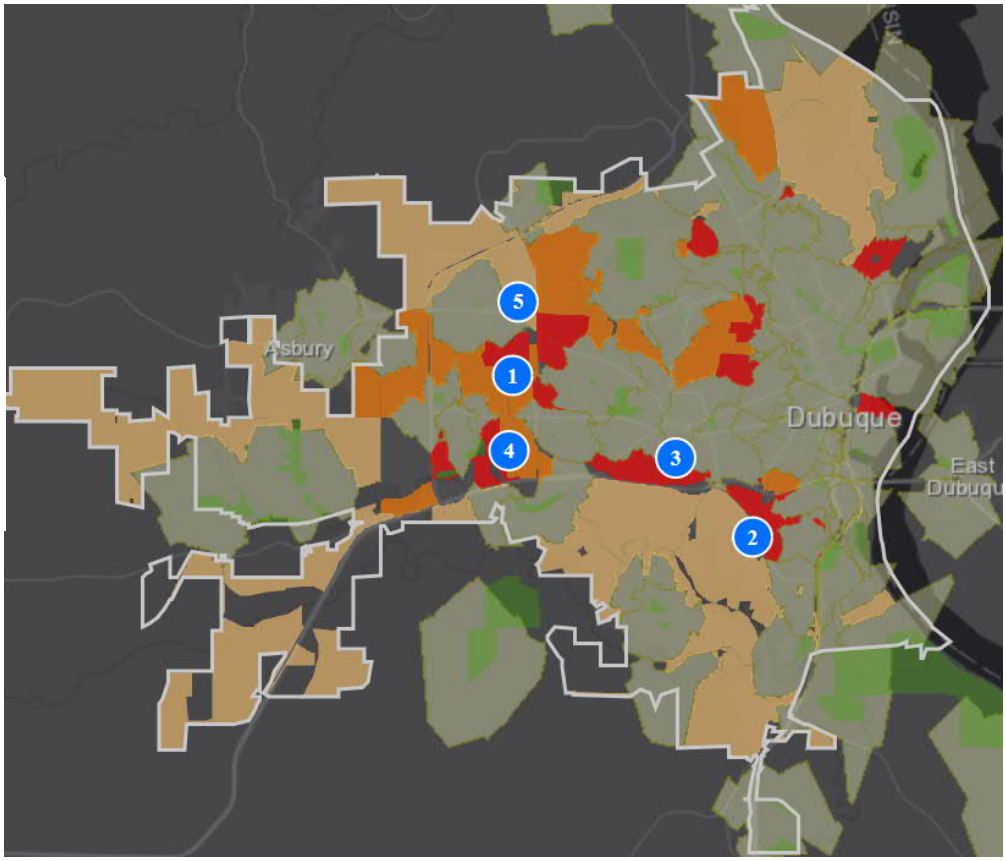
Greenspace and Tree Canopy

Recommended Focus Areas for Additional Dubuque Park Space

Park Need

- Very High
- High
- Moderate

5 **Optimized points** are suggested locations for a new park, ranked based on the estimated increase of residents served within a 10-minute walk of a park.

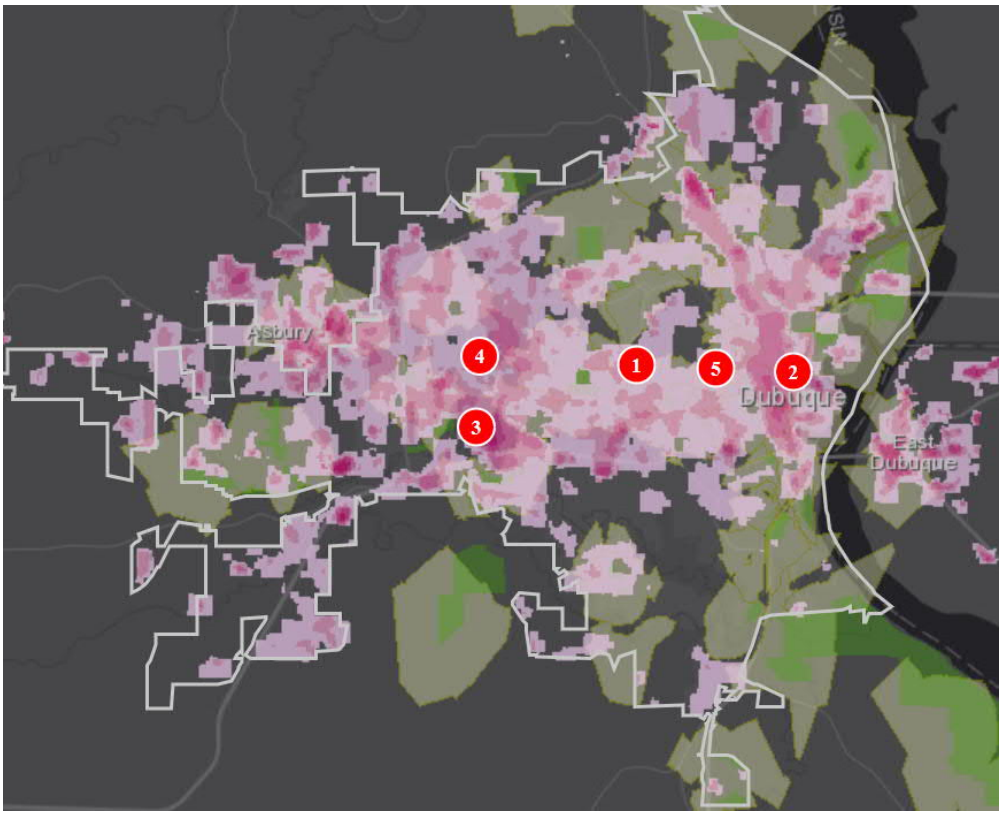


Recommended Focus Areas for Additional Dubuque Park Space, Weighted for Heat Island Impacts

Urban Heat Islands

- Mild
- Mild to Moderate
- Moderate
- Moderate to High
- Severe

5 **Heat Island influenced optimized points** are locations for a new park, ranked based the 10-minute walk of a park criteria and proximity to urban heat islands. Circle encompasses a 1/4 mile radius.

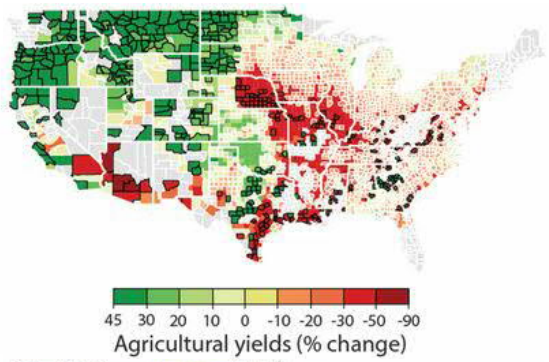


Source and Graphic Source: The Trust For Public Land ParkScore® index

Climate Economy

Projected Economic Impacts of Climate Change

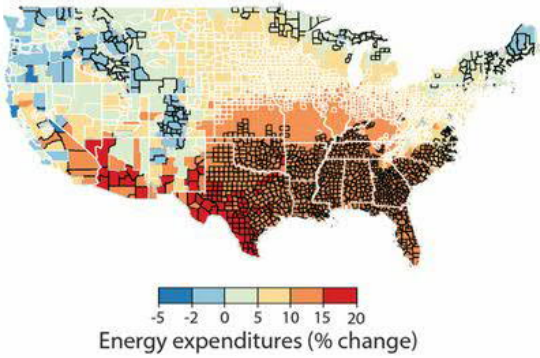
"Estimating economic damage from climate change in the United States", a 2017 study completed by Solomon Hsiang and others from the University of California at Berkeley assessed the economic impact of current climate projections throughout the United States. The sectors assessed, and the findings for Story County Iowa and the City of Ames, are below:



Agricultural Yields Through 2100

Agricultural yields are projected to decline with the increase of Global Mean Surface Temperature in addition to impacts related to precipitation changes. Although increased CO2 levels are anticipated to offset a portion of these yield loses, the impact for much of the United States will be a net negative. Local projections:

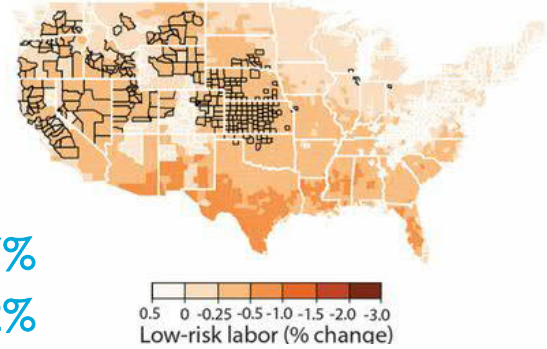
County and City of Dubuque: **-21.8%**



Energy Expenditures Through 2100

As average annual temperatures increase, demand for energy will increase, resulting in increased energy expenditures. Local projections:

County and City of Dubuque: **+8.4%**

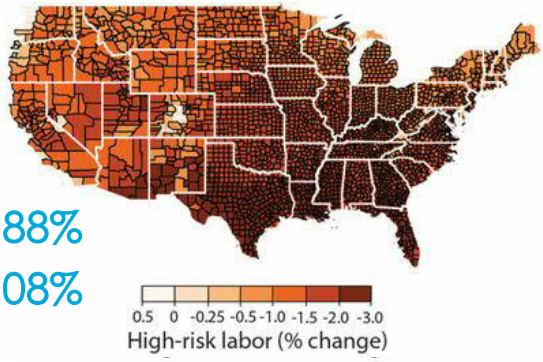


Reduced Labor Productivity Through 2100

Labor productivity declines with the instance of increased temperature. Rates vary for "low-risk" workers who are predominantly not exposed to exterior conditions and for "high-risk" workers (those identified as "At Risk Workers" in Section 9). Local projections:

Low-Risk Labor Loss for County and City of Dubuque: **-0.17%**

High-Risk Labor Loss for County and City of Dubuque: **-1.12%**

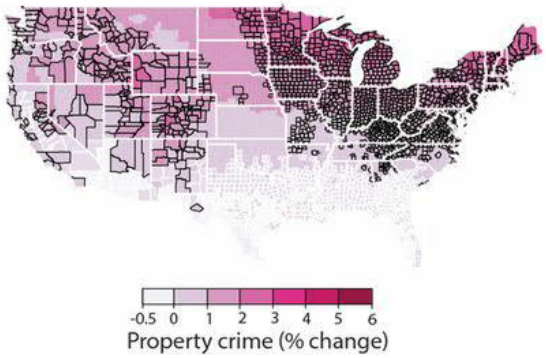


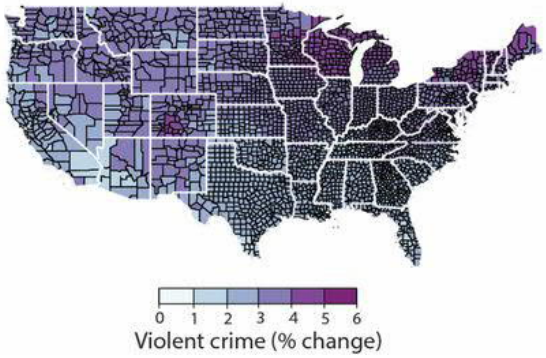
Increases in Crime Rates Through 2100

Studies indicate property crime increases as the number of cold days decrease due to the property crime suppression effect cold days have. Violent crime rates have been shown to increase linearly at a relatively precise 0.88% per 1°C. Local projections:

Property Crime Increase for County and City of Dubuque: **+1.88%**

Violent Crime Increase for County and City of Dubuque: **+4.08%**

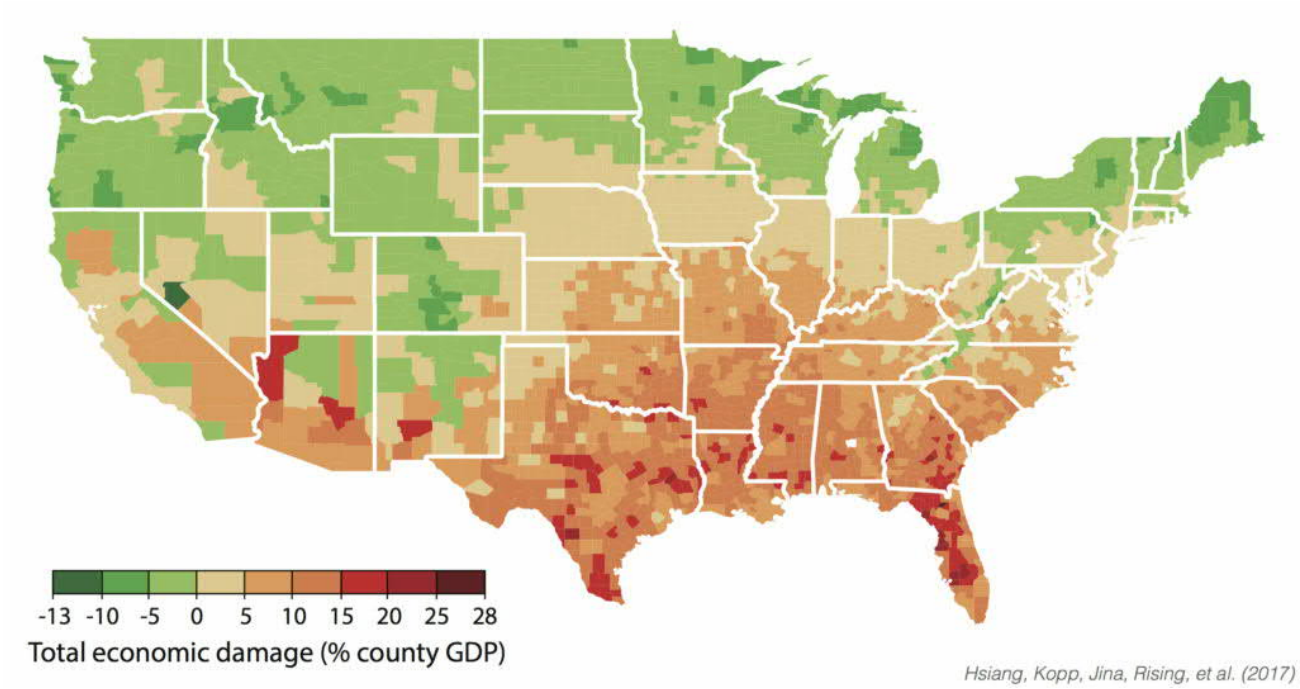


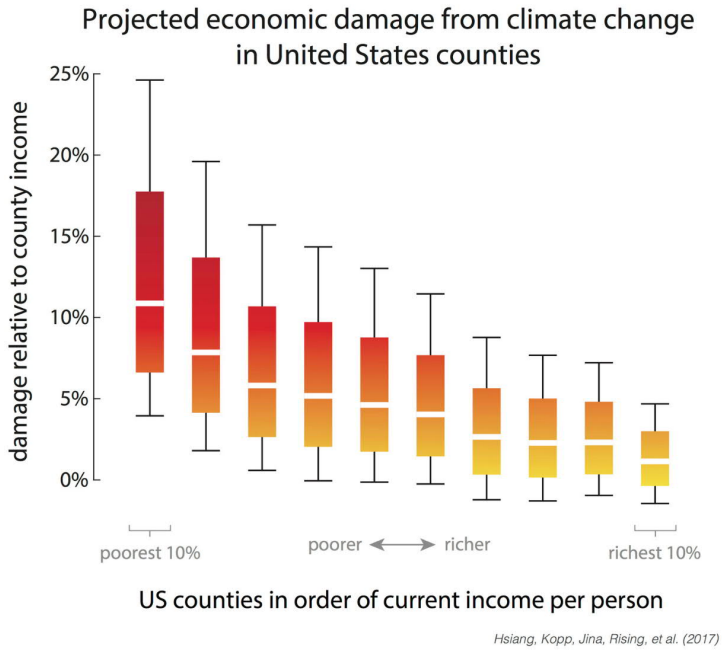


Climate Economy

Total Projected Economic Impacts Through 2100

According to research completed for "Estimating economic damage from climate change in the United States", a 2017 study completed by Solomon Hsiang and others from the University of California at Berkeley the total annual economic impact for Dubuque Iowa by 2100 will be: **$42,160,000** annually (2018 dollars)





Inequity of Economic Impacts Through 2100

According to the study "Estimating economic damage from climate change in the United States", climate change economic impacts will increase the unpredictability and inequity of future economic outcomes. The projected economic effects are unequally borne. As the graphic to the left illustrates, the poorest 10% are likely to receive 5 to 10 times the negative economic impacts of the wealthiest 10% in the community.

Source: "Estimating economic damage from climate change in the United States" Muir-Wood, Paul Wilson, Michael Oppenheimer, Kate Larsen and Trevor Houser Solomon Hsiang, Robert Kopp, Amir Jina, James Rising, Michael Delgado, Shashank Mohan, D. J. Rasmussen, Robert
DOI: 10.1126/science.aal4369
Science 356 (6345), 1362-1369.

Climate Economy

Climate Migrant Populations

In the United States alone, within just a few decades, hundreds of thousands of homes on US coasts will be chronically flooded. According to a study by the Union of Concerned Scientists, over 170 communities in the United States will be chronically inundated from sea level rise by the end of this decade. More than half of these 170 communities are currently home to socioeconomically vulnerable neighborhoods.

By 2060 the number may more than double to 360 communities and by 2100 double yet again to over 670 communities chronically inundated. By that time more than 50 heavily populated areas—including Oakland, California; Miami and St. Petersburg, Florida; and four of the five boroughs of New York City—will face chronic inundation. These effects of sea level rise could displace 13,000,000 people within the United States by the end of this century. In addition to these internal-US climate migrants, the UN forecasts estimate that there could be anywhere between 25 million and 1 billion environmental migrants by 2050.

Human migration is a natural response to these climate change pressures and is one of many adaptation measures that people will take in response to climate change. Understating how human migration will be affected by climate change is therefore a critical input in the decision making process of many governments and organizations. In particular, it is important to understand how climate change driven migration will differ from "business as usual" forms and motivations humans have to migrate, increasing the volume rate of migration bringing with it indirect impacts on the communities likely to receive migrants.

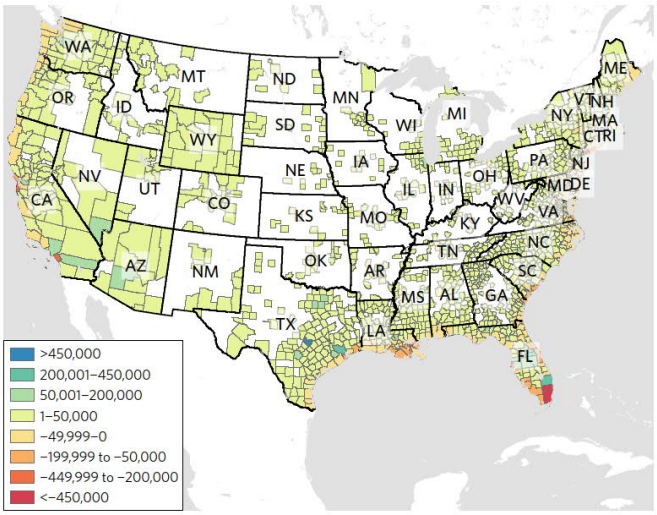
The impacts of climate migration will cause accelerated changes for inland areas, particularly urban areas, that will observe much higher levels of incoming migrants than they would have without climate impacts. It is projected that 86% of all communities with populations of over 10,000 will be impacted with climate migration this century. These changes can in turn take the form of tighter labor markets and increased housing prices, and impacts on income inequality. This climate migration can also have positive impacts such as improved productivity, broadened skill sets within the labor force, and expanded human capital.

Projected Potential Climate Migrant Population by 2100

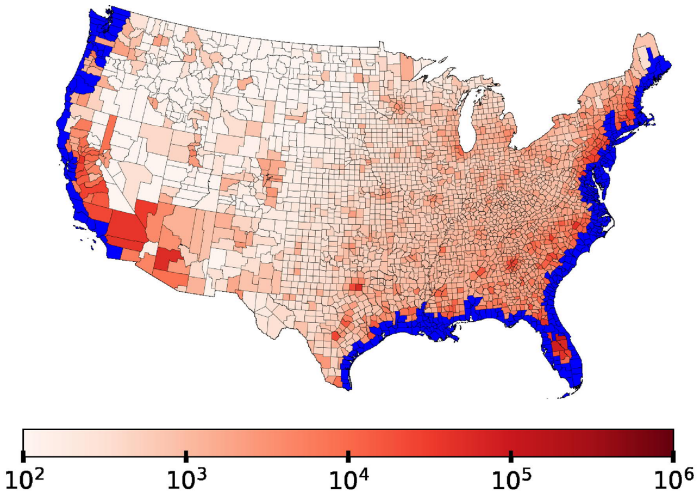
Dubuque County:	10-25,000
City of Dubuque: (Pro rata share)	7-17,000

Below are two modeled projections for US climate migration induced by sea level rise through 2100:

Hauer Projection
Migration induced by sea-level rise in US



Robinson Projection
Migration induced by sea-level rise in US



(Sources: United Nations International Organization on Migration, Hauer, M. Migration induced by sea-level rise could reshape the US population landscape. Nature Clim Change 7, 321–325 (2017). Robinson C, Dilkina B, Moreno-Cruz J (2020) Modeling migration patterns in the USA under sea level rise.)

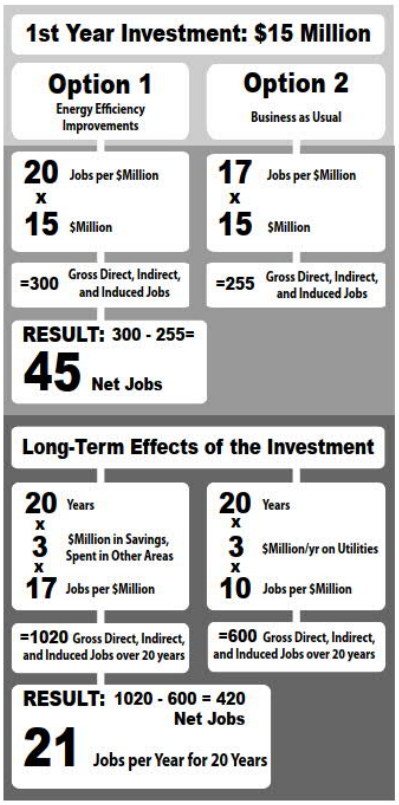
Climate Economy

Climate Action and Economic Development

Rather than weakening the economy, climate action can support economic development. Transitioning away from fossil fuel use, improvements to public transit systems, and growth of local food industries are all, in part, a transition to local energy and labor sources. These transitions represent opportunities for communities to reduce the community wealth that is being exported and increase the percentage of community wealth that remains in the community in the form of local jobs. Additionally, many of the jobs potentials in Climate Action redirect funds away from less labor intensive (but more material resource intensive) sectors of the economy to support greater overall employment combined with less resource utilization. In general, economic opportunities include:

Energy Efficiency Jobs

Increases in city-wide energy efficiency requires energy retrofits and renovations within existing building stock. This construction effort provides new opportunities for construction laborers, efficiency experts, and testing agents. The specialty niche also provides opportunities for new businesses to be created to address the demand. A study by the American Council for an Energy-Efficient Economy illustrated that a $15 million investment in energy efficient city facilities, when compared against "business-as-usual", would increase local employment by 45 jobs in year one and have on-going impacts creating up to 20 additional jobs annually for 20 years.

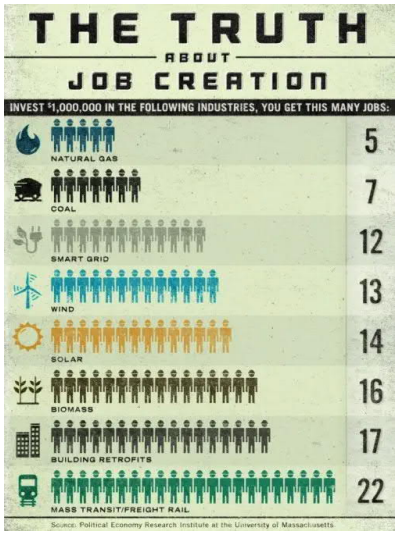


Public Transit Jobs

Transit is key to both creating jobs and increasing access to existing jobs. A study by Smart Growth America found that investments in public transit created almost twice the number of jobs than the same level of spending in auto-centric transportation systems. Cities with better public transportation systems also have lower levels of unemployment, and greater reductions in unemployment, among young people - likely because public transit links areas with entry-level jobs to neighborhoods where people live. According to the APTA, for every $1 invested in public transportation, $4 in economic returns are generated. Investing in more buses and drivers both creates jobs directly and makes local labor markets function better.

Renewable Energy Jobs

Fossil fuel oriented jobs have been decreasing since 1980, due largely to mechanization and are projected to continue to decrease. In contrast, renewable energy jobs have increased dramatically. Solar alone has increased employment by over 160% in the last ten years. Investments in renewable energy have significant local return - not only is the energy generated less expensive, for every dollar spent on renewable energy twice the number of people are employed over fossil fuels. What is more, expenditures on renewable energy promote the local economy - 40% of every dollar spent on solar can be kept in the local community rather than nearly 100% being spent out of state to import fossil fuel energy.



Economic Savings

Investments in energy efficiency, public transportation, renewable energy, and many other climate action strategies ultimately result in cost savings for community businesses and residents. These savings contribute to an increase in the quality of life for residents and will largely be spent within the community on goods and services, providing indirect and induced economic development potential for the city.

Section

A2

GHG Emissions Forecast Assumptions

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City of Dubuque
GHG Forecast Assumptions:

Demographics:

- **Population:** Total Population projections through 2050 are projected based on the average growth rate over the last decade (2009-2018) of 0.11% annual. Note, according to the DMATS Long-Range Transportation Plan, the Dubuque Metropolitan Area is projected to grow 0.81% annually through 2045, however, the majority of that growth projection is indicated to be outside of the City of Dubuque city limits.
- **Households:** Total household counts through 2050 are projected based on maintaining the existing household to city population ratio.
- **Jobs:** Total commercial and industrial jobs through 2050 are projected based on average growth rate over the last decade of 0.7% annually.

Climate Data

- **Cooling Degree Days (CCD):** Projected climate changes for the region will include increased summer temperatures. The increase in temperatures will result in an increase, or variability, in air conditioning demand. The forecast calculates annual changes in air conditioning demand based on projections provided by the "Climate Explorer" tool developed by US NOAA in support of the National Climate Assessment work. https://crt-climate-explorer.nemac.org/
- **Heating Degree Days (HDD):** Projected climate changes for the region will include increased winter temperatures. The increase in temperatures will result in a decrease, or variability, in building heating demand. The forecast calculates annual changes in heating demand based on projections provided by the "Climate Explorer" tool developed by US NOAA in support of the National Climate Assessment work. https://crt-climate-explorer.nemac.org/

Electricity:

- **Residential:** Demand is based on a per household basis and modified based on the projected Cooling Degree Days for each year, assuming 15% of electricity is used for cooling (RCP 4.5 model). 50% of projected increased electrical vehicle usage is attributed to residential EV charging.
- **Commercial and Industrial**: Demand is based on a per job basis and modified based on projected cooling degree days for each year, assuming that 15% of commercial and 7.5% of industrial electricity is used for cooling. (RCP 4.5 model). 50% of projected increased electrical vehicle usage is attributed to commercial EV charging
- **All electricity emission factors** are calculated using estimated emissions factors for 2030, 2040, and 2050 based on current, known, supplier commitments (Alliant Energy 30% renewables and 40% carbon reduction by 2030, 80 carbon reduction by 2050). For electrical suppliers with unknown or unestablished emission commitments, and for electricity purchased from the MISO grid, electricity emission factors are calculated based on EPA forecasts (https://fas.org/sgp/crs/misc/R45453.pdf). Estimated emissions factors are reduced 5% by 2030, 10% by 2040, and 15% by 2050.

Natural Gas:

- Residential: Demand is based on a per household basis and modified based on the projected Heating Degree Days for each year, assuming 75% of natural gas is used for heating (RCP 4.5 model).

- Commercial and Industrial: Demand is based on a per job basis and modified based on projected heating degree days for each year, assuming that 40% of commercial and 20% of industrial natural gas is used for heating (RCP 4.5 model).
- Natural Gas emissions factors are projected to be unchanged.

Transportation:

- Vehicle Miles Traveled is calculated maintaining existing VMT per household factors.
- https://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt_forecast_sum.cfm
  Vehicle fuel use is calculated based on US Energy Information Agency projected rolling stock average fuel efficiency projections, modified to 75% projected MPG to account for heavy duty vehicle MPG share (based on US Department of Transportation data on current light duty to average all vehicle MPG ratios)
  https://www.eia.gov/todayinenergy/detail.php?id=31332
- Total vehicle stock is based on maintaining current Census data for per household ownership ratios for 0-5 vehicles owned.
- Electric Vehicle Adoption: Transportation emissions assume a reduction in fossil fuel based VMT emissions based on estimated adoption rates. Adoption rates are based on State of Iowa Economic Development "Advancing Iowa's Electric Vehicle Market" report, medium scenario. Existing vehicle stock is assumed to be replaced based on an average replacement lifespan of 15 years.
  (https://www.iowaeconomicdevelopment.com/our-agency-detail-resources/6620
  https://berla.co/average-us-vehicle-lifespan/).

Solid Waste:

- Total Solid Waste handled is based on total number of households and maintaining existing volume per household and emissions factors per ton handled.

Wastewater:

- Total Wastewater handled is based on total number of households and maintaining existing volume per household and emissions factors per household.

https://www.eia.gov/tools/faqs/faq.php?id=1174&t=1

Note:

GHG emissions forecasts are not predictions of what will happen, but rather modeled projections of what may happen given certain assumptions and methodologies. GHG forecasts in this report should be interpreted with a clear understanding of the assumptions that inform them and the limitations inherent in any modeling effort.

Section A3

Glossary of Terms

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A

Activity Data
Data on the magnitude of a human activity resulting in emissions or removals taking place during a given period of time. Data on energy use, metal production, land areas, management systems, lime and fertilizer use and waste arisings are examples of activity data. (IPCC)

Aerosols
A collection of airborne solid or liquid particles, with a typical size between 0.01 and 10 micrometer that reside in the atmosphere for at least several hours. Aerosols may be of either natural or anthropogenic origin. Aerosols may influence climate in several ways: directly through scattering and absorbing radiation, and indirectly by acting as cloud condensation nuclei or modifying the optical properties and lifetime of clouds. (IPCC2)

Afforestation
Planting of new forests on lands that historically have not contained forests. (IPCC2)

Air Pollutant
Any man-made and/or natural substance occurring in the atmosphere that may result in adverse effects to humans, animals, vegetation, and/or materials. (CARB)

Anthropogenic
The term "anthropogenic", in the context of greenhouse gas inventories, refers to greenhouse gas emissions and removals that are a direct result of human activities or are the result of natural processes that have been affected by human activities. (USEPA2)

Atmosphere
The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1% volume mixing ratio) and oxygen (20.9% volume mixing ratio), together with a number of trace gases, such as argon (0.93% volume mixing ratio), helium and radiatively active greenhouse gases such as carbon dioxide (0.035% volume mixing ratio) and ozone. In addition, the atmosphere contains the greenhouse gas water vapor, whose amounts are highly variable but typically around 1% volume mixing ratio. The atmosphere also contains clouds and aerosols. (IPCC2)

B

Baseline Emissions
A baseline is a measurement, calculation, or time used as a basis for comparison. Baseline emissions are the level of emissions that would occur without policy intervention or without implementation of a project. Baseline estimates are needed to determine the effectiveness of emission reduction programs (also called mitigation strategies).

Base Year
The starting year for the inventory. Targets for reducing GHG emissions are often defined in relation to the base year.

Biogenic
Produced by the biological processes of living organisms. Note that we use the term "biogenic" to refer only to recently produced (that is non-fossil) material of biological origin. IPCC guidelines recommend that peat be treated as a fossil carbon because it takes a long time to replace harvested peat.

Biogeochemical Cycle
Movements through the Earth system of key chemical constituents essential to life, such as carbon, nitrogen, oxygen, and phosphorus. (NASA)

Biomass
Either (1) the total mass of living organisms in a given area or of a given species usually expressed as dry weight; or (2) Organic matter consisting of or recently derived from living organisms (especially regarded as fuel) excluding peat. Includes products, by-products and waste derived from such material. (IPCC1)

Biomass Waste
Organic non-fossil material of biological origin that is a byproduct or a discarded product. "Biomass waste" includes municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural crop byproducts, straw, and other biomass solids, liquids, and gases; but excludes wood and wood-derived fuels (including black liquor), biofuels feedstock, biodiesel, and fuel ethanol. Note: EIA "biomass waste" data also include energy crops grown specifically for energy production, which would not normally constitute waste. (EIA)

Black Carbon
Operationally defined aerosol species based on measurement of light absorption and chemical reactivity and/or thermal stability; consists of soot, charcoal and/or possible light absorbing refractory organic matter (Charlson and Heintzenberg, 1995, p. 401). (IPCC2)

C

Carbon Cycle
All parts (reservoirs) and fluxes of carbon. The cycle is usually thought of as four main reservoirs of carbon interconnected by pathways of exchange. The reservoirs are the atmosphere, terrestrial biosphere (usually includes freshwater systems), oceans, and sediments (includes fossil fuels). The annual movements of carbon, the carbon exchanges between reservoirs, occur because of various chemical, physical, geological, and biological processes. The ocean contains the largest pool of carbon near the surface of the Earth, but most of that pool is not involved with rapid exchange with the atmosphere. (NASA)

Carbon Dioxide (CO_2)
A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal anthropogenic greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1. (IPCC2)\

Carbon Dioxide Equivalent (CO_2e)
A metric used to compare emissions of various greenhouse gases. It is the mass of carbon dioxide that would produce the same estimated radiative forcing as a given mass of another greenhouse gas. Carbon dioxide equivalents are computed by multiplying the mass of the gas emitted by its global warming potential.

Carbon Disclosure Project (CDP)
An international organization that administers a platform for organizations and cities to publicly disclose their environmental impacts, such as climate risk. CDP is one of the approved disclosure platforms utilized by GCoM.

Carbon Emissions
The release of carbon dioxide into the atmosphere. Primary human sources of the release of carbon dioxide occur from burning oil, coal, and gas for energy use.

Carbon Equivalent (CE)
A metric measure used to compare the emissions of the different greenhouse gases based upon their global warming potential. Carbon equivalents can be calculated from to carbon dioxide equivalents by multiplying the carbon dioxide equivalents by 12/44 (the ratio of the molecular weight of carbon to that of carbon dioxide). The use of carbon equivalent is declining in GHG inventories.

Carbon Intensity
The amount of carbon by weight emitted per unit of energy consumed. A common measure of carbon intensity is weight of carbon per British thermal unit (Btu) of energy. When there is only one fossil fuel under consideration, the carbon intensity and the emissions coefficient are identical. When there are several fuels, carbon intensity is based on their combined emissions coefficients weighted by their energy consumption levels. (EIA)

Carbon Neutrality
For the purposes of the Plan, Carbon Neutrality refers to the point at which the organization / organization's net greenhouse gas emissions reach 0. This will likely be achieved through a combination of reducing emission sources and offsetting and sequestering any remaining emissions.

Carbon Sinks
A forest, ocean, or other natural environment viewed in terms of its ability to absorb carbon dioxide from the atmosphere.

Carbon Sequestration
This refers to the capture of CO_2 from the atmosphere and its long term storage in oceans (oceanic carbon sequestration), in biomass and soils (terrestrial carbon sequestration) or in underground reservoirs (geologic carbon sequestration).

Chlorofluorocarbons (CFCs)
Greenhouse gases covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Because they are not destroyed in the lower atmosphere, CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are being replaced by other compounds, including hydrochlorofluorocarbons and hydrofluorocarbons, which are greenhouse gases covered under the Kyoto Protocol. (IPCC3)

Circular Economy
An alternative to a traditional linear economy (make, use, dispose) in which an economy is a regenerative system where resource input and waste are minimized. This is achieved through long-lasting product design, repair, reuse, remanufacturing, and recycling. Circular economy strategies are often cited as systems level approaches to reducing waste generation through product and system design.

Climate
Climate in a narrow sense is usually defined as the "average weather" or more rigorously as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. (IPCC2)

Climate Adaptation or Resilience
The capacity of a natural environment to prevent, withstand, respond to, and recover from a disruption. The process of adjusting to new climate conditions in order to reduce risks to valued assets.

Climate Change
Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. (IPCC2)

Climate Hazard
An extreme climate event or condition that can harm human health, livelihoods, or natural resources. It can include abrupt changes to the climate system such as extreme precipitation, storms, droughts, and heat waves.

Climate Risk
The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability and hazard. (IPCC):

Climate Vulnerability
Is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity, and its capacity to adapt. Vulnerability = potential impact (sensitivity x exposure) – adaptive capacity (IPCC):

Climate Vulnerability Assessment
A report used to identify and define the risks posed by climate change and inform adaptation measures needed to combat climate change. Reports can be about a wide range of fields including food security, poverty analysis, and extreme weather events.

Cogeneration
Cogeneration is an industrial structure, installation, plant, building, or self-generating facility that has sequential or simultaneous generation of multiple forms of useful energy (usually mechanical and thermal) in a single, integrated system. (CARB)

Combined Heat and Power (CHP)
Combined heat and power is the simultaneous production of both electricity and useful heat for application by the producer or to be sold to other users with the aim of better utilisation of the energy used. Public utilities may utilise part of the heat produced in power plants and sell it for public heating purposes. Industries as auto-producers may sell part of the excess electricity produced to other industries or to electric utilities. (IPCC)

Community Solar
Solar facilities shared by multiple community subscribers who receive credit on their electricity bills for their share of the power produced. Community solar allows members of a community to share the benefits of solar power on their property without installing it on their own property. Electricity generated by the community solar farm typically costs less than the price from utility companies.

Consistency
Consistency means that an inventory should be internally consistent in all its elements over a period of years. An inventory is consistent if the same methodologies are used for the base and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks. (IPCC)

Continuous Emission Monitor (CEM)
A type of air emission monitoring system installed to operate continuously inside of a smokestack or other emission source. (CARB)

Criteria Air Pollutant
An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM10 and

PM2.5. The term "criteria air pollutants" derives from the requirement that the U.S. EPA must describe the characteristics and potential health and welfare effects of these pollutants. The U.S. EPA and CARB periodically review new scientific data and may propose revisions to the standards as a result. (CARB)

D

Deforestation
Those practices or processes that result in the change of forested lands to non-forest uses. This is often cited as one of the major causes of the enhanced greenhouse effect for two reasons: 1) the burning or decomposition of the wood releases carbon dioxide; and 2) trees that once removed carbon dioxide from the atmosphere in the process of photosynthesis are no longer present and contributing to carbon storage. (UNFCC)

Distillate Fuel Oil
A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation. (EIA)

E

Emissions
The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere. (USEPA1)

Emission Factor
A coefficient that quantifies the emissions or removals of a gas per unit activity. Emission factors are often based on a sample of measurement data, averaged to develop a representative rate of emission for a given activity level under a given set of operating conditions. (IPCC)

Emission Inventory
An estimate of the amount of pollutants emitted into the atmosphere from major mobile, stationary, area-wide, and natural source categories over a specific period of time such as a day or a year. (CARB)

Emission Rate
The weight of a pollutant emitted per unit of time (e.g., tons / year). (CARB)

Environmental Justice
The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies

Estimation
Estimation is the assessment of the value of an unmeasurable quantity using available data and knowledge within stated computational formulas or mathematical models.

F

Fluorocarbons
Carbon-fluorine compounds that often contain other elements such as hydrogen, chlorine, or bromine. Common fluorocarbons include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). (UNFCC)

Flux
Either (1) Raw materials, such as limestone, dolomite, lime, and silica sand, which are used to reduce the heat or other energy requirements of thermal processing of minerals (such as the smelting of metals). Fluxes also may serve a dual function as a slagging agent. (2) The rate of flow of any liquid or gas, across a given area; the amount of this crossing a given area in a given time. (e.g., "Flux of CO2 absorbed by forests"). (IPCC)

Fossil Fuel
Geologic deposits of hydrocarbons from ancient biological origin, such as coal, petroleum and natural gas.

Fuel Combustion
Fuel combustion is the intentional oxidation of materials within an apparatus that is designed to provide heat or mechanical work to a process, or for use away from the apparatus. (IPCC)

Fugitive Emissions
Emissions that are not emitted through an intentional release through stack or vent. This can include leaks from industrial plant and pipelines. (IPCC)

G
Geologic Carbon Sequestration
It is the process of injecting CO_2 from a source, such as coal-fired electric generating power plant, through a well into the deep subsurface. With proper site selection and management, geologic sequestration could play a major role in reducing emissions of CO_2. Research efforts to evaluate the technical aspects of CO_2 geologic sequestration are underway. (USEPA4)

Global Warming
Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities. Also see Climate Change (USEPA1)

Global Warming Potential (GWP)
An index, based upon radiative properties of well-mixed greenhouse gases, measuring the radiative forcing of a unit mass of a given well-mixed greenhouse gas in the present-day atmosphere integrated over a chosen time horizon, relative to that of carbon dioxide. The GWP represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing thermal infrared radiation. The Kyoto Protocol is based on GWPs from pulse emissions over a 100-year time frame. (IPCC2)

GCOM Global Covenant of Mayors:
GCoM is the largest global alliance for city climate leadership, built upon the commitment of over 10,000 cities and local governments. The alliance’s mission is to mobilize and support climate and energy action in communities across the world.

Greenhouse Effect
Trapping and build-up of heat in the atmosphere (troposphere) near the earth's surface. Some of the heat flowing back toward space from the earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the earth's surface. If the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will gradually increase. (UNFCC)

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories:
A robust, transparent and globally-accepted framework that cities and local governments can use to consistently identify, calculate and report on city greenhouse gas emissions.

Greenhouse Gas
Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrochlorofluorocarbons (HCFCs), ozone (O_3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). (UNFCC)

Green Infrastructure
An approach to managing precipitation by reducing and treating stormwater at its source while delivering environmental, social, and economic benefits. Stormwater runoff can carry trash, bacteria, and other pollutants and is a major cause of water pollution in urban areas.

Gross Domestic Product (GDP)
The sum of gross value added, at purchasers' prices, by all resident and non-resident producers in the economy, plus any taxes and minus any subsidies not included in the value of the products in a country or a geographic region for a given period, normally one year. It is calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources. (IPCC3)

H

Halocarbons
A collective term for the group of partially halogenated organic species, including the chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), halons, methyl chloride, methyl bromide, etc. Many of the halocarbons have large Global Warming Potentials. The chlorine and bromine-containing halocarbons are also involved in the depletion of the ozone layer. (IPCC2)

Hydrocarbons
Strictly defined as molecules containing only hydrogen and carbon. The term is often used more broadly to include any molecules in petroleum which also contains molecules with S, N, or O An unsaturated hydrocarbon is any hydrocarbon containing olefinic or aromatic structures. (IPCC)

Hydrofluorocarbons (HFCs)
Compounds containing only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are powerful greenhouse gases with global warming potentials ranging from 140 (HFC-152a) to 11,700 (HFC-23). (USEPA1)

I

ICLEI Local Governments for Sustainability:
A membership organization for local governments to pursue reductions in carbon pollution and improvements in advancing sustainable urban development. ICLEI's members and team of experts work together through peer exchange, partnerships and capacity building to create systemic change for urban sustainability.

Intergovernmental Panel on Climate Change
The IPCC was established jointly by the United Nations Environment Programme and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers. Leading experts on climate change and environmental, social, and economic sciences from some 60 nations have helped the IPCC to prepare periodic assessments of the scientific underpinnings for understanding global climate change and its consequences. With its

capacity for reporting on climate change, its consequences, and the viability of adaptation and mitigation measures, the IPCC is also looked to as the official advisory body to the world's governments on the state of the science of the climate change issue. For example, the IPCC organized the development of internationally accepted methods for conducting national greenhouse gas emission inventories. (USEPA1)

K

Kilowatt Hour (kWh):
A measure of electrical energy equivalent to a power consumption of 1,000 watts for one hour.

Kyoto Protocol
The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1997 in Kyoto, Japan, at the Third Session of the Conference of the Parties (COP) to the UNFCCC. It contains legally binding commitments, in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (most Organisation for Economic Cooperation and Development countries and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5% below 1990 levels in the commitment period 2008 to 2012. The Kyoto Protocol entered into force on 16 February 2005. (IPCC2)

L

Land Use and Land Use Change
Land use refers to the total of arrangements, activities and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction and conservation). Land use change refers to a change in the use or management of land by humans, which may lead to a change in land cover. Land cover and land use change may have an impact on the surface albedo, evapotranspiration, sources and sinks of greenhouse gases, or other properties of the climate system and may thus have a radiative forcing and/or other impacts on climate, locally or globally. (IPCC2)

LULUCF
Acronym for "Land Use, Land Use Change and Forestry", a category of activities in GHG inventories.

M

Megawatt Hour (MWH):
A measure of electrical energy equivalent to a power consumption of 1,000,000 watts for one hour.

Methane (CH_4)
A hydrocarbon that is a greenhouse gas with a global warming potential most recently estimated at 25 times that of carbon dioxide (CO_2). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, flooded rice fields, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion. The GWP is from the IPCC's Fourth Assessment Report (AR4).

Metric Ton
The tonne (t) or metric ton, sometimes referred to as a metric tonne, is an international unit of mass. A metric ton is equal to a Megagram (Mg), 1000 kilograms, 2204.6 pounds, or 1.1023 short tons.

Million Metric Tons (MMT)
Common measurement used in GHG inventories. It is equal to a Teragram (Tg).

Mitigation:
Actions taken to limit the magnitude or rate of long-term global warming and its related effects. Climate change mitigation generally involves reductions in human emissions of greenhouse gases.

Mobile Sources
Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes. (CARB)

Mode Share
The percentage of travelers using a particular type of transportation. Modal share is an important component in developing sustainable transport within a city or region because it reveals the level of utilization of various transportation methods. The percentage reflects how well infrastructure, policies, investments, and land-use patterns support different types of travel.

Model
A model is a quantitatively-based abstraction of a real-world situation which may simplify or neglect certain features to better focus on its more important elements. (IPCC)

Municipal Solid Waste (MSW)
Residential solid waste and some non-hazardous commercial, institutional, and industrial wastes. This material is generally sent to municipal landfills for disposal. (USEPA1)

N
Natural Sources
Non-manmade emission sources, including biological and geological sources, wildfires, and windblown dust. (CARB)

Net-zero Emissions (NZE)
Building A building or property that generates or offsets all energy consumed. If the City develops a NZE building code, this definition will have to be refined to provide additional guidance on calculating emissions and offsets to achieve net-zero emissions.

Nitrogen Fixation
Conversion of atmospheric nitrogen gas into forms useful to plants and other organisms by lightning, bacteria, and blue-green algae; it is part of the nitrogen cycle. (UNFCC)

Nitrogen Oxides (NO_x)
Gases consisting of one molecule of nitrogen and varying numbers of oxygen molecules. Nitrogen oxides are produced in the emissions of vehicle exhausts and from power stations. In the atmosphere, nitrogen oxides can contribute to formation of photochemical ozone (smog), can impair visibility, and have health consequences; they are thus considered pollutants. (NASA)

Nitrous Oxide (N_2O)
A powerful greenhouse gas with a global warming potential of 298 times that of carbon dioxide (CO_2). Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, manure management, fossil fuel combustion, nitric acid production, and biomass burning. The GWP is from the IPCC's Fourth Assessment Report (AR4).

O
Ozone (O_3)
Ozone, the triatomic form of oxygen (O_3), is a gaseous atmospheric constituent. In the troposphere, it is created both naturally and by photochemical reactions involving gases resulting from human activities (smog).

Tropospheric ozone acts as a greenhouse gas. In the stratosphere, it is created by the interaction between solar ultraviolet radiation and molecular oxygen (O_2). Stratospheric ozone plays a dominant role in the stratospheric radiative balance. Its concentration is highest in the ozone layer. (IPCC2)

Ozone Depleting Substances (ODS)
A compound that contributes to stratospheric ozone depletion. Ozone-depleting substances (ODS) include CFCs, HCFCs, halons, methyl bromide, carbon tetrachloride, and methyl chloroform. ODS are generally very stable in the troposphere and only degrade under intense ultraviolet light in the stratosphere. When they break down, they release chlorine or bromine atoms, which then deplete ozone. (IPCC)

P

Perfluorocarbons (PFCs)
A group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly CF_4 and C_2F_6) were introduced as alternatives, along with hydrofluorocarbons, to the ozone depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they are powerful greenhouse gases: CF_4 has a global warming potential (GWP) of 7,390 and C_2F_6 has a GWP of 12,200. The GWP is from the IPCC's Fourth Assessment Report (AR4).

Photosynthesis
The process by which plants take carbon dioxide from the air (or bicarbonate in water) to build carbohydrates, releasing oxygen in the process. There are several pathways of photosynthesis with different responses to atmospheric carbon dioxide concentrations. (IPCC2)

Point Sources
Specific points of origin where pollutants are emitted into the atmosphere such as factory smokestacks. (CARB)

Power Purchase Agreement (PPA)
A power purchase agreement (PPA), or electricity power agreement, is a contract between two parties; one party generates electricity (the seller) and the other party looks to purchase electricity (the buyer). Individual customers and organizations may enter into PPAs with individual developers or may join together to seek better prices as a group. PPAs can allow longer term commitments to renewable energy as well as a form of “direct” investing in new renewable energy generation.

Property-Assessed Clean Energy (PACE)
A program created for financing energy efficiency and renewable improvements on private property. Private property can include residential, commercial or industrial properties. Improvements can include energy efficiency, renewable energy and water conservation upgrades to a building.

Process Emissions
Emissions from industrial processes involving chemical transformations other than combustion. (IPCC)

R

Radiative Forcing
A change in the balance between incoming solar radiation and outgoing infrared (i.e., thermal) radiation. Without any radiative forcing, solar radiation coming to the Earth would continue to be approximately equal to the infrared radiation emitted from the Earth. The addition of greenhouse gases to the atmosphere traps an increased fraction of the infrared radiation, reradiating it back toward the surface of the Earth and thereby creates a warming influence. (UNFCC)

Reforestation
Planting of forests on lands that have previously contained forests but that have been converted to some other use. (IPCC2)

Regeneration
The act of renewing tree cover by establishing young trees, naturally or artificially - note regeneration usually maintains the same forest type and is done promptly after the previous stand or forest was removed. (CSU)

Renewable Energy
Energy resources that are naturally replenishing such as solar, wind, hydro and geothermal energy.

Renewable Energy Credits (RECs)
A market-based instrument that represents the property rights to the environmental, social and other non-power attributes of renewable electricity generation. RECs are issued when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource. The single largest category of reductions in Evanston's emissions has been through the purchase of RECs.

Residence Time
Average time spent in a reservoir by an individual atom or molecule. Also, this term is used to define the age of a molecule when it leaves the reservoir. With respect to greenhouse gases, residence time usually refers to how long a particular molecule remains in the atmosphere. (UNFCC)

Reservoir
Either (1) a component or components of the climate system where a greenhouse gas or a precursor of a greenhouse gas is stored; or (2) Water bodies regulated for human activities (energy production, irrigation, navigation, recreation etc.) where substantial changes in water area due to water level regulation may occur. (IPCC)

Respiration
The process whereby living organisms convert organic matter to carbon dioxide, releasing energy and consuming molecular oxygen. (IPCC2)

Retro-commissioning
The systematic process to improve an existing building's performance ensuring the building controls are running efficiently and balancing the designed use and the actual use of the building.

Ride-share
The practice of sharing transportation in the form of carpooling or vanpooling. It is typically an arrangement made through a ride-matching service that connects drivers with riders.

S

Scope 1:
Scope 1 includes emissions being released within the city limits resulting from combustion of fossil fuels and from waste decomposition in the landfill and wastewater treatment plant.

Scope 2:
Scope 2 includes emissions produced outside the city that are induced by consumption of electrical energy within the city limits.

Scope 3:
Scope 3 includes emissions of potential policy relevance to local government operations that can be measured and

reported but do not qualify as Scope 1 or 2. This includes, but is not limited to, outsourced operations and employee commute.

Short Ton
Common measurement for a ton in the United States. A short ton is equal to 2,000 lbs or 0.907 metric tons. (USEPA1)

Sink
Any process, activity or mechanism that removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol from the atmosphere. (IPCC2)

Social Cost of Carbon
The social cost of carbon is a measure of the economic harm from climate change impacts, expressed as the dollar value of the total damages from emitting one ton of carbon dioxide into the atmosphere.

Solar Radiation
Electromagnetic radiation emitted by the Sun. It is also referred to as shortwave radiation. Solar radiation has a distinctive range of wavelengths (spectrum) determined by the temperature of the Sun, peaking in visible wavelengths. (IPCC2)

Source
Any process, activity or mechanism that releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol into the atmosphere. (IPCC2)

Stationary Sources
Non-mobile sources such as power plants, refineries, and manufacturing facilities which emit air pollutants. (CARB)

Sulfur Dioxide (SO_2)
A compound composed of one sulfur and two oxygen molecules. Sulfur dioxide emitted into the atmosphere through natural and anthropogenic processes is changed in a complex series of chemical reactions in the atmosphere to sulfate aerosols. These aerosols are believed to result in negative radiative forcing (i.e., tending to cool the Earth's surface) and do result in acid deposition (e.g., acid rain). (UNFCC)

Sulfur Hexafluoride (SF_6)
A colorless gas soluble in alcohol and ether, slightly soluble in water. A very powerful greenhouse gas with a global warming potential most recently estimated at 22,800 times that of carbon dioxide (CO_2). SF_6 is used primarily in electrical transmission and distribution systems and as a dielectric in electronics. This GWP is from the IPCC's Fourth Assessment Report (AR4).

T

Terrestrial Carbon Sequestration
It is the process through which carbon dioxide (CO_2) from the atmosphere is absorbed by trees, plants and crops through photosynthesis, and stored as carbon in biomass (tree trunks, branches, foliage and roots) and soils. The term "sinks" is also used to refer to forests, croplands, and grazing lands, and their ability to sequester carbon. Agriculture and forestry activities can also release CO_2 to the atmosphere. Therefore, a carbon sink occurs when carbon sequestration is greater than carbon releases over some time period. (USEPA3)

Therm:
A unit of measure for energy that is equivalent to 100,000 British Thermal units, or roughly the energy in 100 cubic feet of natural gas. Often used for measuring natural gas usage for billing purposes.

Total Organic Gases (TOG)
Gaseous organic compounds, including reactive organic gases and the relatively unreactive organic gases such as methane. (CARB)

Transparency
Transparency means that the assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information. The transparency of inventories is fundamental to the success of the process for the communication and consideration of information. (IPCC)

Trend
The trend of a quantity measures its change over a time period, with a positive trend value indicating growth in the quantity, and a negative value indicating a decrease. It is defined as the ratio of the change in the quantity over the time period, divided by the initial value of the quantity, and is usually expressed either as a percentage or a fraction. (IPCC)

U
Urban Tree Canopy
Describes the makeup and characteristics of trees within the urban environment.

V
VMT Vehicle Miles Traveled:
A unit used to measure vehicle travel made by private vehicles, including passenger vehicles, truck, vans and motorcycles. Each mile traveled is counted as one vehicle mile regardless of the number of persons in the vehicle.

W
Water Vapor
The most abundant greenhouse gas; it is the water present in the atmosphere in gaseous form. Water vapor is an important part of the natural greenhouse effect. While humans are not significantly increasing its concentration, it contributes to the enhanced greenhouse effect because the warming influence of greenhouse gases leads to a positive water vapor feedback. In addition to its role as a natural greenhouse gas, water vapor plays an important role in regulating the temperature of the planet because clouds form when excess water vapor in the atmosphere condenses to form ice and water droplets and precipitation. (UNFCC)

Weather
Atmospheric condition at any given time or place. It is measured in terms of such things as wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. In most places, weather can change from hour-to-hour, day-to-day, and season-to-season. Climate in a narrow sense is usually defined as the "average weather", or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. A simple way of remembering the difference is that climate is what you expect (e.g. cold winters) and 'weather' is what you get (e.g. a blizzard). (USEPA1)

Z
Zero Emission Vehicles (ZEV)
A vehicle that does not emit harmful emissions during operation. Harmful emissions can have a negative impact on human health and the environment. Electric (battery-powered) cars, electric trains, hydrogen-fueled vehicles, bicycles, and carriages are considered to produce zero emissions.

Zero Waste
A cyclical system in which products are designed for reuse, which creates no waste. A zero waste system eliminates the volume and toxicity of waste and materials and conserves current resources through reuse.

Section

A4

Dubuque Climate Action Infographics

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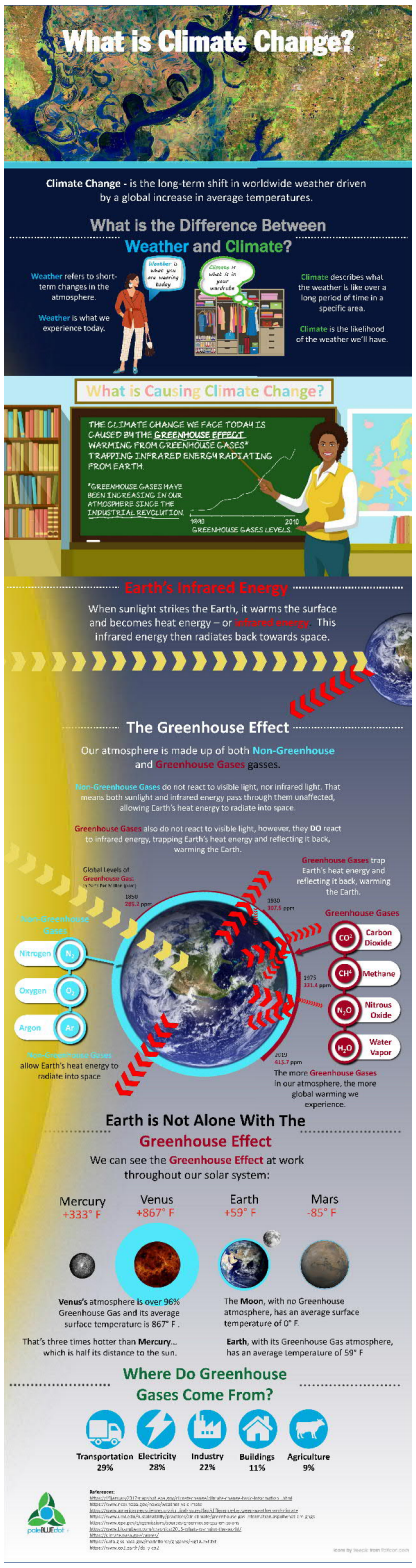
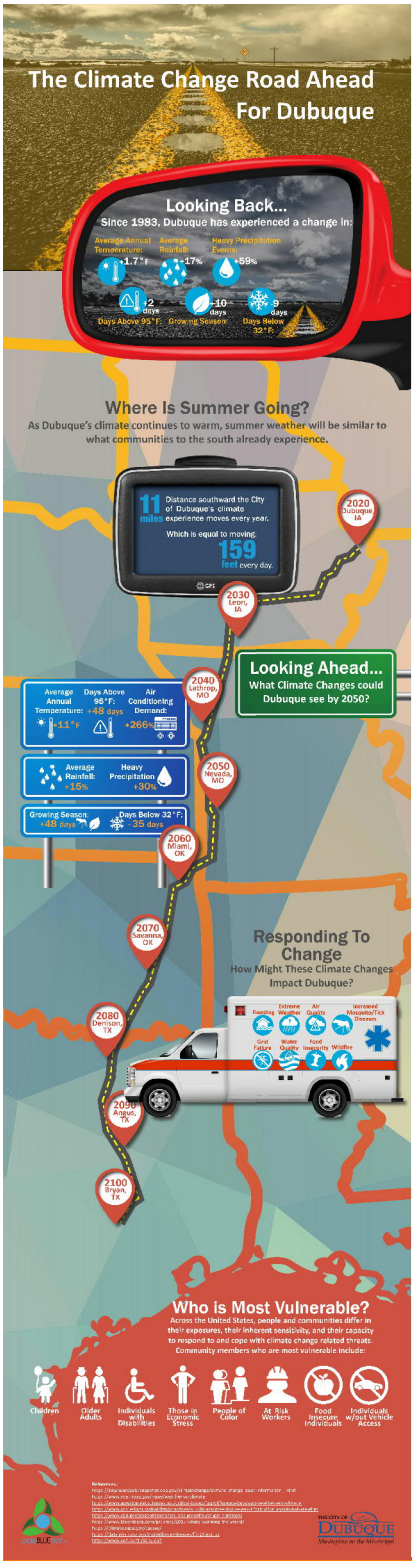
Dubuque Climate Action Infographics

Below are infographics developed during the Climate Action Plan planning effort in support of the City's communications. Click on or scan the QR code to access the infographics.

https://palebluedot.llc/dubuque-cap-infographics





Section

A5

Dubuque Climate Vulnerability Assessment

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Dubuque Climate Vulnerability Assessment

At the beginning of the Climate Action Planning effort, The paleBLUEdot team developed a Climate Vulnerability Assessment for the City of Dubuque. The assessment included the identification of vulnerable populations within the community and possible impacts and risks associated with projected climate change for the region. paleBLUEdot mapped the vulnerable populations within the City as well as existing City infrastructure and resources which may be capable of supporting climate adaptation strategies. These assessments provided a basis for understanding vulnerabilities and resources which supported the decision making process needed for identifying and prioritizing climate adaptation measures to be included in the final Climate Action Plan. The Assessment focused on City-Wide vulnerabilities with a particular focus on climate vulnerable populations to ensure all populations benefit from proposed implementation measures.

Broad Climate Change Impacts and Risk Factors

The paleBLUEdot identified and summarized the broad climate change metrics already experienced, projected climate change impacts, and risk factors at a regional level. Data on Midwest was collected from the US National Climate Assessment as well as the University of Michigan Climate Center. State of Iowa specific data was collected and summarized from State and National agencies, and regional university data sources. In addition, detailed climate projections, based on National Center for Atmospheric Research, was developed for the City of Dubuque.

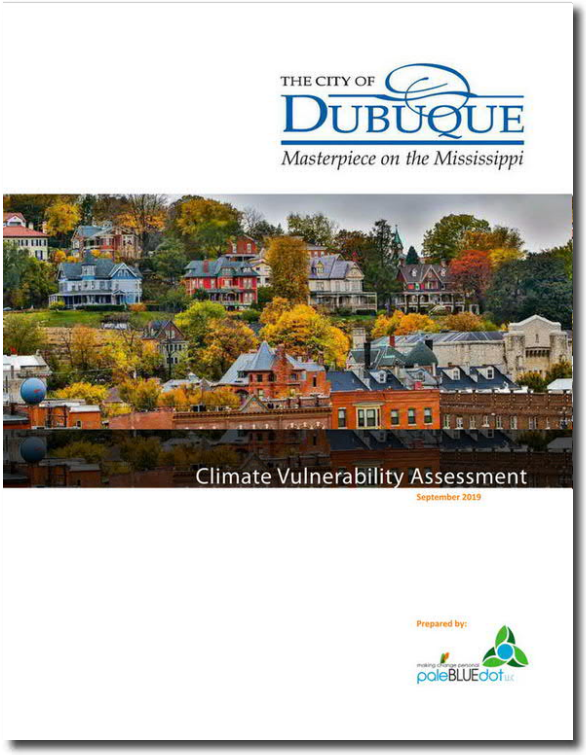
Climate Risk Factors

The paleBLUEdot team identified and quantified the primary climate risk factors facing the City of Dubuque The risk factors quantified included:

- Flood data, risk, and histories
- Air Quality considerations
- Land Cover and tree canopy characteristics and extent
- Heat Island Characteristics and Temperature Impact
- Food Environment and Food Access considerations
- Population health data and characteristics from the Minnesota Department of Health
- Heart attack rates
- Asthma hospitalization rates
- heat related illnesses
- Vector Borne disease data.

Click on the link below or scan the QR code to access the vulnerability assessment:

https://view.publitas.com/palebluedot/dubuque-climate-vulnerability-assessment/



Section

A6

Dubuque Renewable Energy Potentials Study

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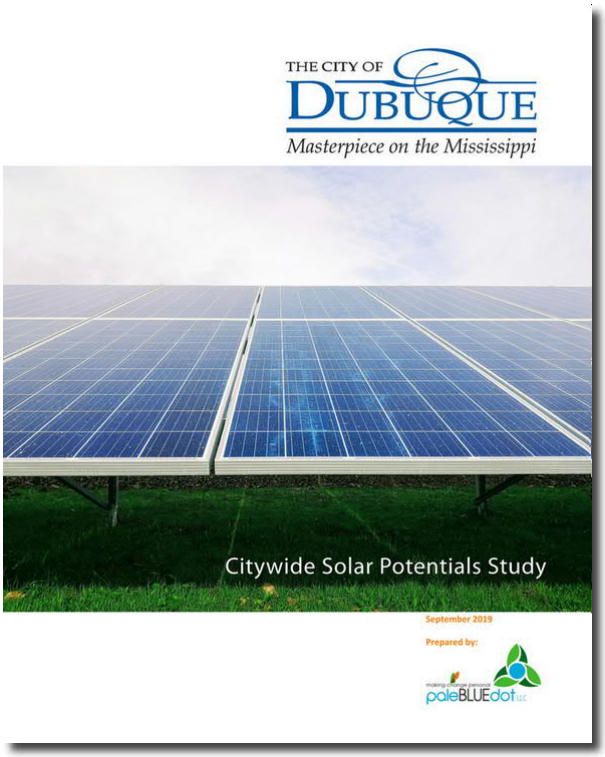
Dubuque Renewable Energy Potentials Study

At the beginning of the Climate Action Planning effort, In support of development of effective renewable energy goalsetting and to establish strategies addressing renewable energy development, paleBLUEdot conducted a Community-Wide solar pv potentials study including economic and environmental benefits. Through study of community-wide potential, the City of Dubuque was provided data enabling the creation of near and long-term renewable energy targets and implementation strategies based on community specific opportunity. This effort included:

1) Collect city-wide satellite data (NREL, NOAA, and NASA data).
2) Determine building roof stock characteristics and solar suitable buildings, calculate total suitable areas by roof configuration/orientation.
3) Calculate total rooftop solar capacity and annual energy generation by roof configuration/orientation
4) Identify cost efficient annual energy generation potential.
5) Research solar market at national, State and regional levels. Identify low, medium, and high solar market absorption rates and city-wide solar pv goals.
6) Identify environmental and economic benefit of solar including economic development and job creation potential (NREL JEDI model)
7) Develop City-Wide Renewable Solar Energy Potentials report.
8) Development of a "Menu of Strategies" addressing potential climate adaptation and mitigation, and sustainability goals related to ground cover, tree canopy health, heat island mitigation, and carbon sequestration.

Click on the link below or scan the QR code to access the Renewable Energy Potentials Study:

https://view.publitas.com/palebluedot/dubuque-solar-potential-study/



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THE CITY OF DUBUQUE

Masterpiece on the Mississippi

City of Dubuque
Climate Action Plan 2020

July 2020

Prepared By:

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Acknowledgements

Thank you to the following organizations and individuals for their contributions:

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Mayor's Statement

Dear Neighbors,

Every community owes its existence and vitality to generations from around the world who contributed their hopes, dreams, and energy to creating the history that led to this moment. Some were brought here against their will, some were drawn to leave their distant homes in hope of a better life, and some have lived on this land for more generations than can be counted. Truth and acknowledgment are critical to building mutual respect and connection across all barriers of heritage and difference.

I acknowledge that while we now call Dubuque home, it was built on the ancestral lands of the Meskwaki, Ho-Chunk, Potawatomi, and other Indigenous Peoples who have stewarded this land throughout the generations. Black, Indigenous, and people of color have demonstrated resilience and resistance in the face of violent efforts to separate them from their land, culture, and one another. They remain at the forefront of movements to protect Mother Earth and the life earth sustains.

As we work to address the climate crisis, we must put people first. This means working in partnership with frontline communities to determine how best we can support efforts already in motion and build coalitions to lessen the impacts of climate change for all residents. By centering equity in our climate work, we can achieve fair outcomes for every Dubuque resident.

Beginning in the 1980s, when Dubuque led the country in unemployment and had lost its connection to the Mississippi River, residents and business owners found a way to change Dubuque, making it a new kind of national leader for the 21st century. When I ran for the office of mayor in 2005, my platform was based upon "engaging citizens as partners," and what I heard from thousands of citizens was a consistent theme surrounding water quality, recycling, greenspace, public transit, cultural vitality, accessibility and downtown revitalization. A year later, with support from my council colleagues, we named sustainability a top priority, stating, "cities that get out in front on sustainability will have competitive economic advantages in the future."

Fifteen years later, amid a global health pandemic, a climate crisis and uncertainty regarding the health, safety, and economic prosperity of our community's future, this continues to ring true. Bolstered by the work of Sustainable Dubuque, a City Council-adopted, community-created, and citizen-led initiative, Dubuque will continue to expand awareness, create partnerships and work hard to cut the emissions that cause climate change and prepare our neighborhoods for its inevitable impacts to make sure Dubuque is a sustainable, resilient, equitable, and compassionate community of choice. I am proud of the progress we have made, and we will continue to evolve and advance our citizen-inspired vision and goals for Dubuque.

Now, we take our next big step. It requires innovation, imagination, resourcefulness, originality, and risk. In order to reach our goal, the 2020 update to our 50% by 2030 Community Climate Action and Resiliency Plan details the specific actions we will take over the next decade to significantly cut emissions across all sectors of city life. Our work is informed by the most up-to-date science and projections from climate experts. The United Nations Intergovernmental Panel on Climate Change (IPCC) Report, as well as the United States' Fourth National Climate Assessment, show that the global community must act with urgency to confront this crisis before it is too late. In Dubuque, we are heeding this warning and setting a strong, replicable example.

Mayor's Statement

In 2013, the City Council adopted the 50% by 2030 Community Climate Action & Resiliency Plan. Our first-ever greenhouse gas inventory identified that over 70% of our emissions come from heating, cooling, and powering buildings. In this update, we have committed to protect and prepare our most vulnerable residents and the larger community for the impacts of climate change. While we invest in infrastructure improvements to improve our resiliency, we also invest in the resiliency of our residents through a variety of programs and public/private partnerships to address affordable housing, generational poverty, underemployment, grade-level reading, brain health, racism, and other challenges faced by our community.

The City of Dubuque and our partners are committed to be an anti-racist, pro-climate action, human-centered organization. This update is only the beginning of the urgent body of work and, although we have a plan, we will continue to learn about creating more sustainable, resilient communities, and ways to create opportunities to collaborate and work together to create innovative solutions to our most daunting challenges.

I am proud to say that I am one of thousands of community leaders who have committed to fighting climate change, creating more equitable communities, and creating innovative economic development opportunities that benefit all of our residents and businesses. I look forward to making Dubuque climate ready with you!

Sincerely,

Mayor Roy D. Buol

Section 01

Executive Summary

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Executive Summary

This plan lays out the foundation for the City of Dubuque's efforts to reduce its greenhouse gas (GHG) emissions and improve its resilience to future impacts of climate change on its environment, infrastructure, and people. This plan should be viewed as a living document, with progress on actions and impacts occurring regularly and adjustments to the plan being made based on actionable data.

Our Challenge

The combustion of fossil fuels is warming earth's atmosphere and changing our climate. Climate change is already affecting Dubuque and its impacts are projected to become much more severe in the coming decades. To minimize harmful impacts and play its part in curbing global carbon pollution, Dubuque needs to take bold steps to reduce greenhouse gas emissions and build resiliency.

Our Opportunity

Transformation of our energy system is essential in order to stop burning fossil fuels. This transition presents an opportunity for Dubuque. Directing our energy investments into renewable sources will make them more decentralized and resilient and provide for local job creation. Innovation, technology, and collective social change inherent in Climate Action can also support greater community abundance and shared equity.

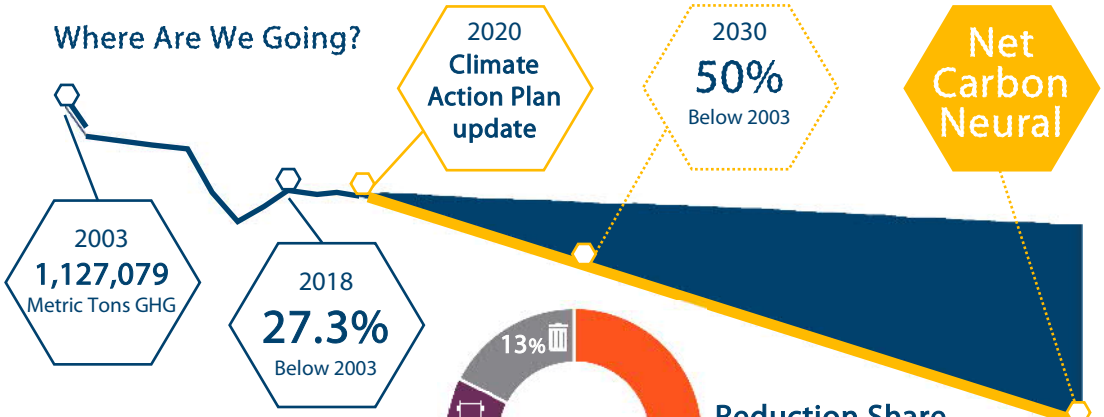
Our Vision

To be the first Climate Resilient community in Iowa, leading in the social and economic transitions necessary to prevent, prepare for, recover from, and adapt to the long-term impacts of climate change.

Our Carbon Reduction Goal

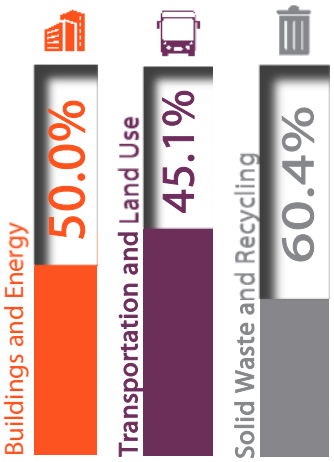
To be the first **Net Carbon Neutral** community in Iowa and to reduce community-wide GHG emissions **50% below 2003 levels by 2030**.

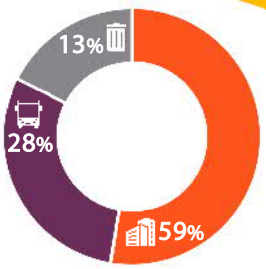
Where Are We Going?



How Do We Get There?

Reductions by 2030 of Climate Action Plan by Sector:





Reduction Share By Sector

Share of Total 2030 Reductions of Climate Action Plan by Sector:

Cumulative Potential Cost Savings of Plan Measures Through 2030: $451,939,000

Implementing many of the measures in this plan, such as reduction of energy consumption or single-occupancy auto use, and avoided cost of carbon, can save money for the community.

Share of Potential Cost Savings by Sector:

By the 2050's Dubuque Will Likely See…

Increase in Average Annual Temperature:

+6°F

Days Above 95°F:

+18 days

Air Conditioning Demand:

+150%

Average Rainfall:

+7%

Heavy Precipitation Events

+10%

Growing Season:

+21 days

(Time for 3 more generations of mosquitos)

Net Carbon Neutral

car· bon neu· tral

Adjective

Having or resulting in no net addition of carbon dioxide to the atmosphere.

Executive Summary

Our Climate Action Goals

Buildings and Energy

BE1: Increase distributed renewable energy by 21 MW of installed capacity by 2030.
BE2: Reduce citywide energy consumption by 10% by 2030.
BE3: Promote "fuel switching" to reduce on-site fossil fuel use 10% by 2030.
BE4: Increase renewable energy share of electric grid to 15% by 2030 (beyond current Alliant Energy commitments)

Transportation and Land Use

TL1: Decrease Vehicle Miles Traveled (VMT) by 10% by 2030.
TL2: Support and encourage alternative fuel vehicles, Achieve 20% of vehicles sold and 15% of VMT by 2030.

Solid Waste

SW1: 50% diversion by 2030 measured on a per capita basis.
SW2: Waste education.
SW3: Achieve 100% beneficial use of landfill gas.

Water, Wastewater, and Flooding

W1: Increase water conservation citywide.
W2: Reduce wastewater impacts.
W3: Mitigate flood hazards and impacts.

Climate Health and Safety

HS1: Create a climate adaptive community.
HS2: Educate, engage, and empower the public for climate health and safety.
HS3: Address air quality impacts of climate change.

Food

F1 Reduce food's contribution to climate change.
F2 Improve local food resilience and availability.

Greenspace and Tree Canopy

GS1: Strengthen Dubuque's tree canopy.
GS2: Strengthen Dubuque's green space.
GS3: Mitigate current and future urban heat island impacts.

Climate Economy

CE1: Capture local economic potential of climate action.
CE2: Build marketplace climate resilience.

Climate Action Capacity

C1: Enhance and expand community capacity for climate action and resilience.
C2: Develop new mechanisms for financing climate action work that account for equity and co-benefits (building upon existing budget scoring criteria).

Section 02

Introduction

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Introduction

Dubuque's Vulnerability to Climate Risks:

Climate change is a global phenomenon that creates local impacts. It presents one of the most profound challenges of our time. A broad international consensus exists among atmospheric scientists that the Earth's climate system is being destabilized in response to elevated levels of greenhouse gas emissions in the atmosphere. Two changes to Iowa's climate are occurring already: shorter winters with fewer cold extremes, and more heavy and extreme precipitation. Increases in the global surface temperature and changes in precipitation levels and patterns are expected to continue and intensify for decades. In turn, these changes in climate have impacts on the economy and health of local communities.

The following highlight the vulnerabilities to climate risks facing Dubuque, excerpted from the 2019 Dubuque Climate Vulnerability Assessment:

Medium | Medium-High | High

Heat Stress (High)

Warmer temperatures and more extreme heat may lead to higher risk of heat-related illness

Air Quality (Medium-High)

Increased heat may result in more days of poor air quality and exposure to allergens, impacting respiratory illnesses.

Vector-Borne Disease (Medium)

Longer growing seasons and higher temperatures may increase vector-borne diseases like West Nile Virus and Lyme disease.

Mental Health (Medium-High)

Exposure to increased climate impacts and disasters may lead to increased anxiety and other mental health ramifications.

Housing (High)

Warmer temperatures will increase demand for air conditioning and weatherization needs. Energy costs may be difficult for vulnerable populations to meet. Heavier rains coupled with higher risk of surface drought conditions may cause more local flooding, particularly "flash flooding" which could cause damage to housing and reduce mobility for portions of the community.

Stormwater Management (High)

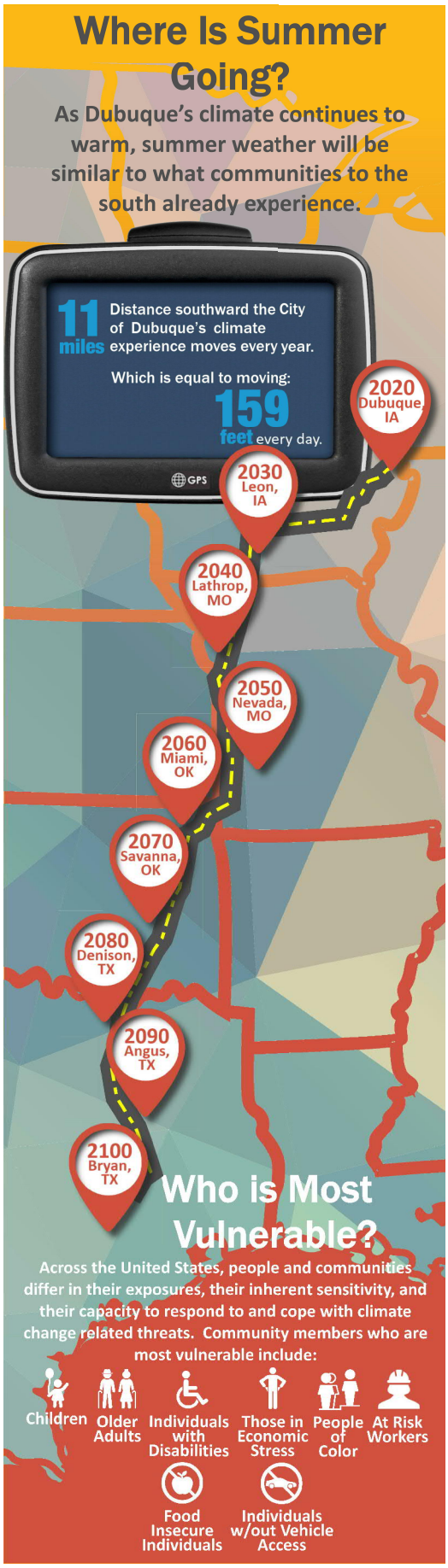
Heavier rains coupled with higher risk of surface drought conditions may significantly increase demand on stormwater management. The city's stormwater infrastructure may not be capable of handling the amount of runoff during more frequent heavy down pours, requiring resources to make needed upgrades.

Trees, Greenspace, and Agriculture (Medium)

Increased temperatures and changes to precipitation will stress trees, greenspace, and agriculture. Conditions may be more favorable for disease, pests, and invasive species. Trees and crop species which formerly thrived in the area's climate may be less suited for future climate conditions

Surface Water Quality (Medium)

Increases to heavy rain events and flooding/flash flooding risk may negatively impact water quality in the city's lakes, streams, and rivers. Increased pollutants and contamination potential, combined with increased annual water temperatures could increase risk to algal and bacterial growth, harming habitats and limiting recreation.



Introduction

Why Create a Climate Action Plan

The creation, and dedicated implementation of a Climate Action Plan (CAP) is an organized way for a city to contribute to solving the global climate crisis while helping its resident and business communities create improved resilience to the current and future impacts and risks of climate change.

What is a Climate Action Plan (CAP)

Climate action plans are comprehensive road maps that outline the specific Strategies and Actions that a City will implement to reduce greenhouse gas emissions and build resilience to related climatic impacts. The Dubuque CAP addresses both climate mitigation and climate adaptation actions.

What is Climate Change Mitigation?

Climate Change Mitigation addresses the root causes of climate change through the reduction or prevention of greenhouse gas (GHG) emissions. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior.

What is Climate Change Adaptation?

Some impacts of climate change are now inevitable. Climate Change Adaptation seeks to lower the risks posed by these impacts. Both mitigation and adaptation are necessary, because even if emissions are dramatically decreased, adaptation will still be needed to deal with the global changes that have already been set in motion.

The Role of Cities in Climate Action

With a large majority of Americans living in urban areas, cities play a key role in addressing climate change. While each individual city's impact on global GHG emissions is relatively small, the leadership cities provide in motivating change can be extremely significant. According to a survey by the US Conference of Mayors, more than half (53%) had committed to reducing greenhouse gas emissions.

Types of Climate Plan Actions:

Leading by Example:

Actions the City can apply to city operations or facilities to illustrate actions others can take:

- Install solar on rooftops of public buildings
- Adopt net-zero energy standards for public facilities
- Convert city fleets to EVs

Advocating:

Encourage change in support of meeting CAP goals - these can include lobbying at State/Federal and educating public on actions they can take:

- Lobby for PACE financing legislation
- Promote utility rebate programs
- Provide Net Zero and Solar Ready Guides to Residents and Businesses

Require:

Actions the City can take to require actions within the private sector:

- Require energy efficiency and renewable energy within PUD ordinance
- Adopt an energy benchmarking ordinance
- Require solar pv feasibility assessment with all new building permits

Incentivize:

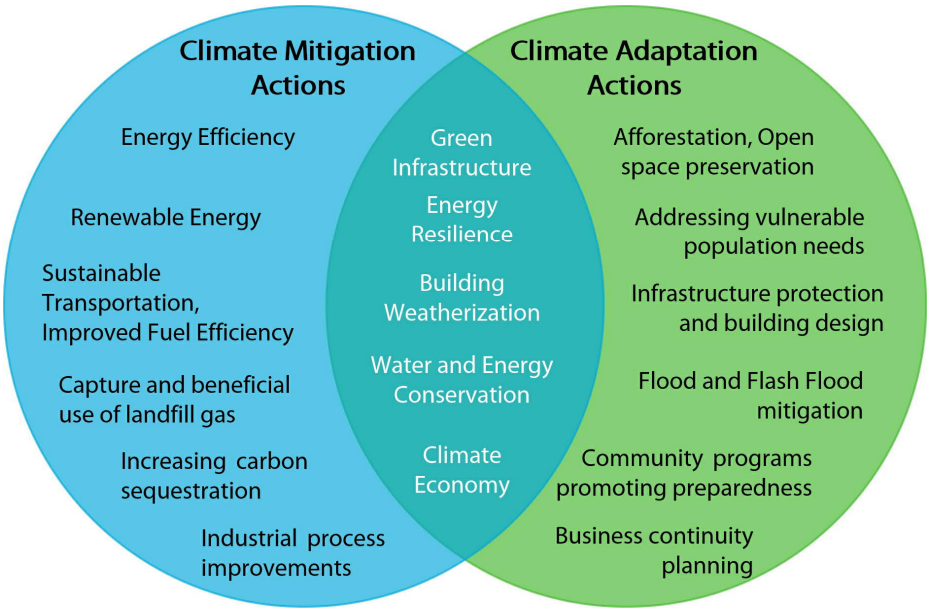
These can include direct economic incentives as well as actions which remove barriers:

- Expedite permitting for clean energy projects
- Offer Net Zero technical assistance
- Establish a Renewable Energy grant program for income qualified residents.

Climate Action As A Journey

The Climate Action Plan represents a robust vision of the future with a comprehensive scope of action befitting the magnitude of our collective climate challenge ahead. This plan should be seen as a living document. Action progress and effectiveness should be reviewed at regular intervals through the plan's implementation and adjustments should be made to expand or modify the scope of individual actions and to augment the plan with new actions as appropriate to respond to ever-changing market and community conditions.

Synergy of Mitigation and Adaptation Actions



Climate Action Plan Framework

This Climate Action Plan includes an implementation framework designed to achieve community-wide goals for greenhouse gas reduction and climate adaptation and resilience. This CAP is organized around a unifying framework organized by sector as illustrated to the right. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation. Sector actions have primary focus on Climate Mitigation, Climate Adaptation, or both.

Strategies: are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions.

Actions: are detailed items that should be completed in order to carry out the vision and strategies identified in the plan.

Climate Mitigation: addresses the root causes of climate change through the reduction or prevention of greenhouse gas (GHG) emissions. Sectors with this as a significant focus are shown to the right with this symbol:

Climate Adaptation: seeks to lower the risks posed by the impacts of climate change which are now inevitable or likely. Sectors with this as a significant focus are shown to the right with this symbol:

This sector area includes all electricity and natural gas consumption within the city and also considers the mix of energy generation supplying the city of Dubuque. Strategies in this sector area include improved energy efficiency as well as shifts in Dubuque's energy supply to cleaner, low and no carbon sources.

This sector area includes emissions from on-road vehicle traffic occurring in the community. Strategies in this sector area include reductions in vehicle miles traveled as well as shifts to cleaner, low and no carbon fuel vehicles in Dubuque.

This sector area includes commercial and non-commercial food cultivation and distribution, food and nutrition insecurity, and food waste. Strategies in this sector area include reduction of food waste, food system and distribution resilience, strengthening of local food production capacity, and equitable access to healthy food.

This sector area includes the climate resilience and benefits of urban tree canopy, ground cover, community greenspace and parks, and ecosystems that rely on these natural elements. Strategies in this sector include resilience/expansion of urban tree canopy coverage, improvement of beneficial use of lawn areas, and mitigation of heat island impacts

Solid Waste and Recycling

This sector area includes all solid waste generated by residents and businesses within the community. Strategies in this sector focus on diversion of food, consumer, and construction waste as well as reduction of landfill gas generation and beneficial use of unavoidable landfill gas emissions.

Water, Wastewater and Flooding

This sector area includes potable water distributed to Dubuque residents and businesses, wastewater collection and treatment, stormwater collection, flood mitigation, and surface water health. Strategies in this sector focus on water conservation, wastewater reduction and beneficial use of wastewater emissions, flood mitigation, and stormwater infiltration.

Climate Health and Safety

This sector area includes community health impacts and resilience in the face of current climate impacts and projected risks. Strategies in this sector focus on community resilience to extreme heat and weather, vector-borne and water-borne disease, and air quality impacts of climate change.

Climate Economy

This sector includes the economic development, jobs, and business creation potential represented by the actions and goals of all sectors in this Climate Action Plan. Strategies in this sector include workforce development, economic development and new business financing, and resilience of businesses in the community.

Climate Action Capacity

This sector area includes financial mechanisms, and systemic and organizational capacity to implement the actions and goals of all sectors in this Climate Action Plan. Strategies in this sector focus on mechanisms for financing Climate Action work, resilience of social networks - particularly those serving vulnerable populations, and education, engagement, and empowerment of the public.

> You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make.
>
> Jane Goodall, Anthropologist

Introduction

Benefits of Climate Action

The strategies and actions contained in this plan seek to reduce Dubuque's dependence on non-renewable fossil fuels, prioritize sustainable uses of land and water, reduce waste, and support improved equity and livability. The actions outlined in this plan will reduce Dubuque's GHG emissions. In addition to reducing the community's contribution to climate change this plan strives to identify how climate change will increasingly impact the community. The CAP addresses next steps for Dubuque to adequately respond to climate change. If implemented successfully the CAP will enhance Dubuque's economic vitality, resilience, and viability as a healthy, livable city.

Types of Climate Action Benefits

6 Ways Climate Action Can Be Good For Dubuque's Economy

1: **Dubuque can lower emissions while growing the economy.**
Since 2003, Dubuque's GDP has increased 41% while community wide GHG emissions have fallen over 27%.

2. Electricity from renewable sources is typically less expensive than fossil fuels.
The costs of renewable energy fallen significantly over the last decade and their portion of our energy mix has grown. According *The Coal Cost Crossover,* a study by Energy Innovation, it would be cheaper to replace 3/4ths of existing U.S. coal plants with wind and solar power than to keep them operating with coal.

3. Clean energy jobs already employ about 3.5 million Americans and growing.
The transition to renewable energy is a transition to local energy sources and infrastructure – and retention of more energy expenditures in the local economy. According to a study by the non-profit group MassSolar, every dollar invested in solar creates $1.20 in local economic benefits.

4. CAP focus areas can save Dubuque residents and businesses money .
Energy efficiency improvements, renewable energy adoption, and reduced single occupancy vehicle dependence strategies included in this plan can result in annual savings for Dubuque businesses and households.

5. Better planned, low-carbon cities are more productive.
According to a study by The Coalition for Urban Transitions, for every 1% increase in population density in US cities, medium and high-skilled wages increase 0.5% and carbon emissions decrease 0.2% per capita.

6. Without climate action, Dubuque will face increasing economic damage.
According to NOAA Records, extreme weather and climate disasters in Dubuque County have increased 7% in the last twenty years, causing an average of $3,230,000 in damages annually. According to a study by the University of California at Berkeley, climate impacts can be expected to increase agricultural damage, death rates, energy costs, and violent and property crime rates in the City of Dubuque. In addition, as annual average temperatures and the number of extreme heat days increase, economic productivity will decrease due to labor efficiency losses. These impacts can be used to establish an estimated minimum "Social Cost of Carbon" - a measure of the economic harm of those impacts from emitting one ton of carbon dioxide into the atmosphere.

See calculations on the following page for an estimated cumulative economic savings potential of successfully implementing the Climate Action Plan through 2030.

Introduction

Estimated Economic Risk of Climate Change to Dubuque by 2100
(in today's dollars):

Annual % Change by Category:

Agriculture:	Mortality:	Energy:	Labor Productivity:	Property Crime:	Violent Crime:
-22%	+4%	+8%	-1.2%	+2%	+4%

Source: "Estimating economic damage from climate change in the United States"

= $42,160,000
Annual Cost Impact

Estimated Localized "Social Cost of Carbon"
(in today's dollars):

Estimated Economic Risk of Climate Change:
$42,160,000
Annual Cost Impact

÷

Current Annual Emissions:
819,406
Metric Tons

=

Current Estimated Localized Social Cost of Carbon:
$51
Per Ton

Cumulative Economic Savings Potential of Successfully Implementing Climate Action Plan Through 2030

Household Savings Potential:
$167,773,000
$6,984
per household

+

Commercial Business Savings Potential: $143,651,000
$3,351
per job

+

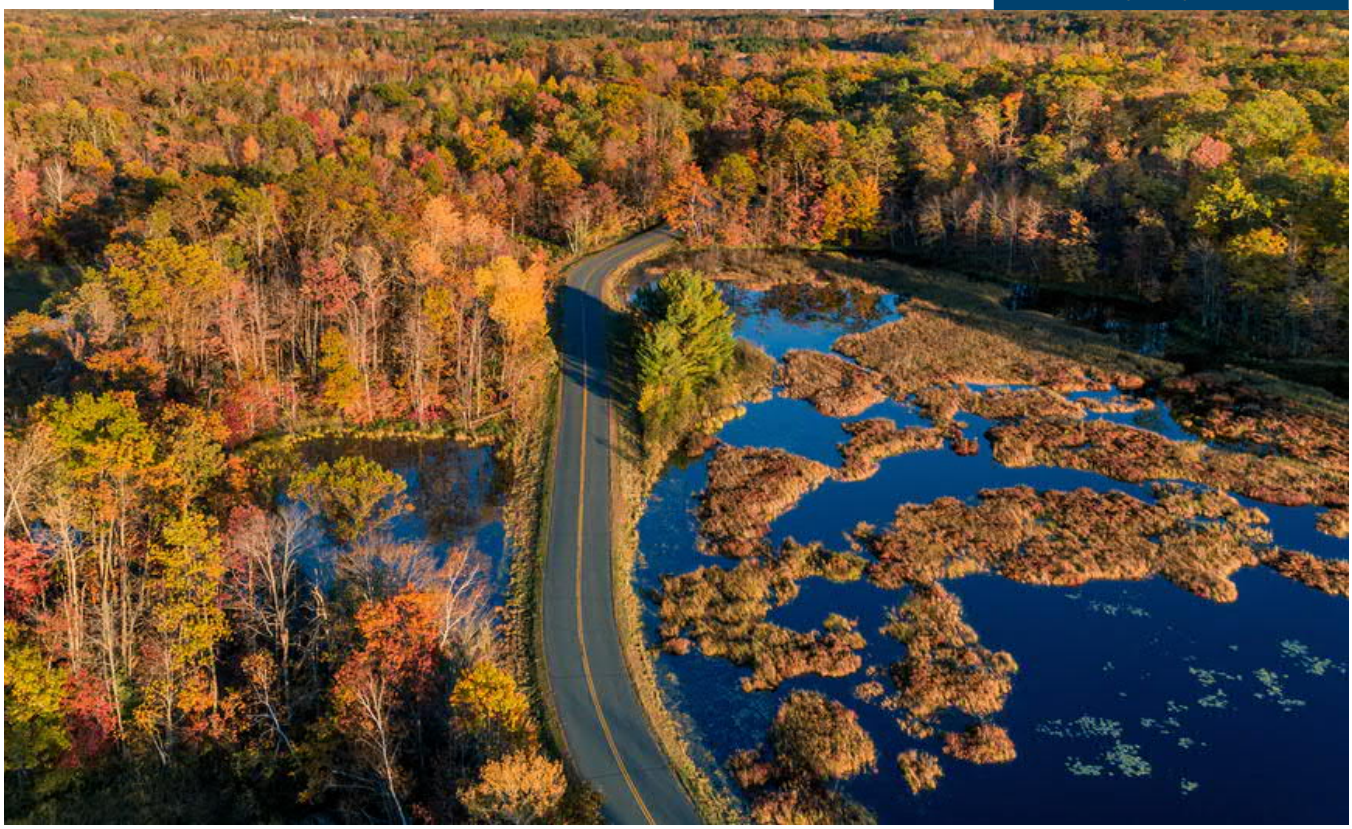
Industrial Business Savings Potential: $81,345,000
$10,228
per job

+

Estimated Localized Social Cost of Carbon: $59,170,000
(1,160,203 metric tons GHG avoided x $51 per ton)

=

Community-Wide Cumulative Savings Potential:
$451,939,000
$7,654
per-capita



Did You Know?

Forest acres needed to sequester Dubuque's Citywide GHG Emissions:

1,064,163 Acres

Total land within City: 19,981 Acres

Forest area required to sequester Dubuque's citywide emissions:

53.3 x City of Dubuque's land area.

Section 03

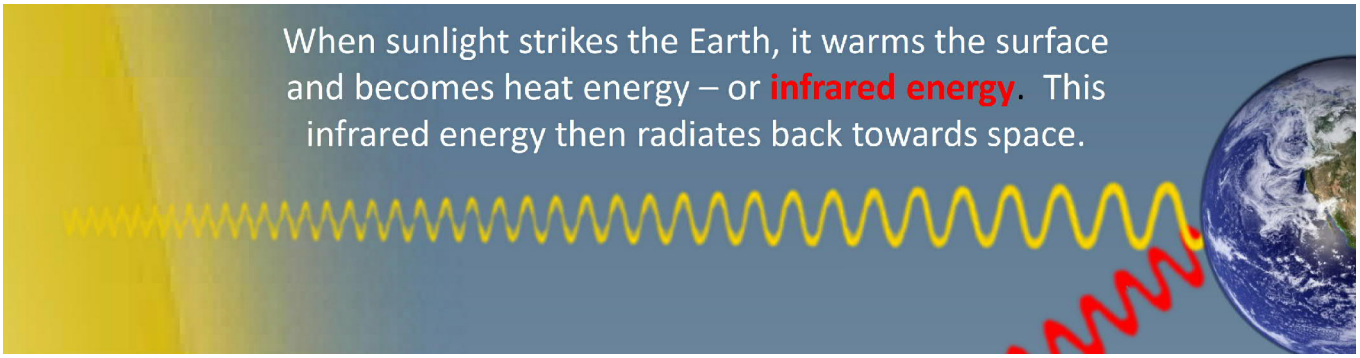
Dubuque's GHG Emissions

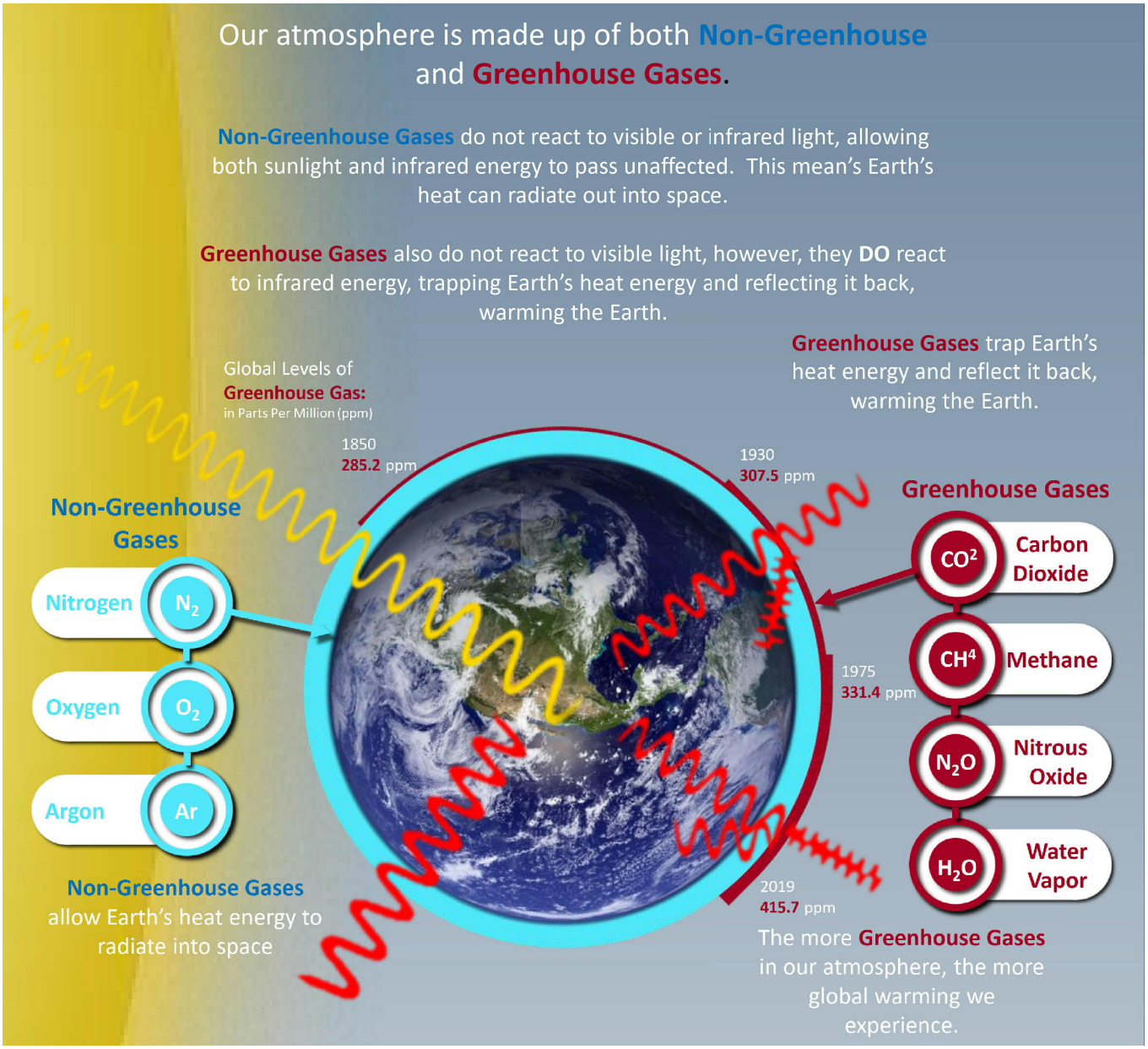
Click to Return to TOC

Dubuque's GHG Emissions

Greenhouse Gas Emissions (GHG) and Climate Change

The climate change we face today is caused by warming from greenhouse gases trapping infrared energy radiating from the earth. This is called the greenhouse effect. Greenhouse gases have been increasing in our atmosphere since the Industrial Revolution. Scientists attribute the global warming trend observed since the mid-20th century to human greenhouse gas (GHG) emissions which expand the "greenhouse effect" — warming that results when the atmosphere traps heat radiating from Earth toward space





Dubuque's GHG Emissions

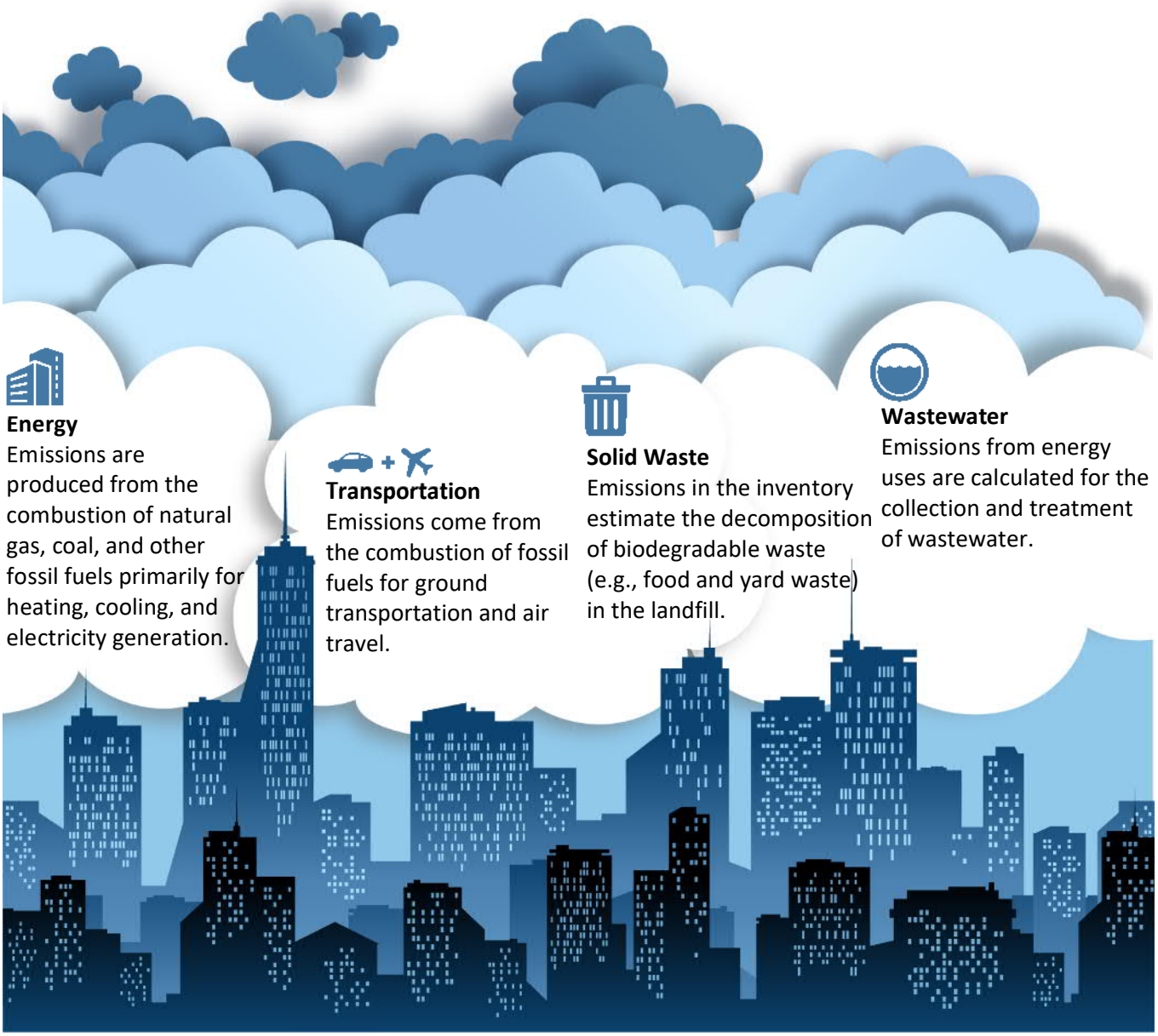
What Are GHG's?

Greenhouse Gases (GHG) absorb radiation and trap heat in the Earth's atmosphere. They are the basis of the Greenhouse Effect. The more GHGs there are, the more heat that is trapped in our atmosphere, leading to Global Warming and Climate Change. The most common greenhouse gases include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).

Carbon dioxide CO_2 Methane CH_4 Nitrous oxide N_2O

Greenhouse Gas Sectors

Where do GHGs come from?



Dubuque's GHG Emissions

Dubuque's GHG Emission Trends

2003 By The Numbers

GHG Emissions
1,122,597
19.52 MT Per-Capita
28.51 MT / Job
0.2466 MT / $1,000 GDP

Population
57,500

GDP
3,273,713,000
$56,934 GDP Per-Capita

Employment
39,376

2018 By The Numbers

GHG Emissions
819,406
14.06 MT Per-Capita
18.56 MT / Job
0.1404 MT / $1,000 GDP

Population
58,276

GDP
5,838,896,000
$100,194 GDP Per-Capita

Employment
44,150

Fifteen-Year Trend Dashboard

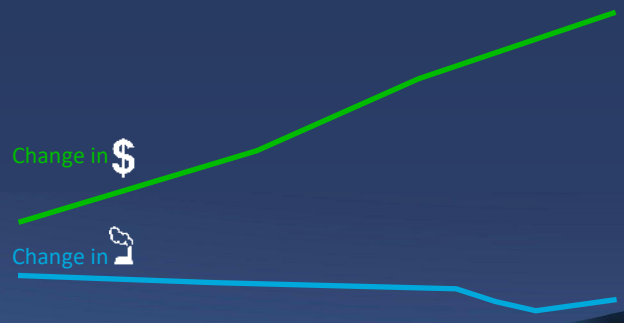
GHG Emissions
-303,191 -27.01%
-5.46 MT Per-Capita
-9.95 MT / Job
-0.11 MT / $1,000 GDP

Population
+776 +1.35%

GDP
+$2,565,183,000 +78.36%
+$43,260 GDP Per-Capita

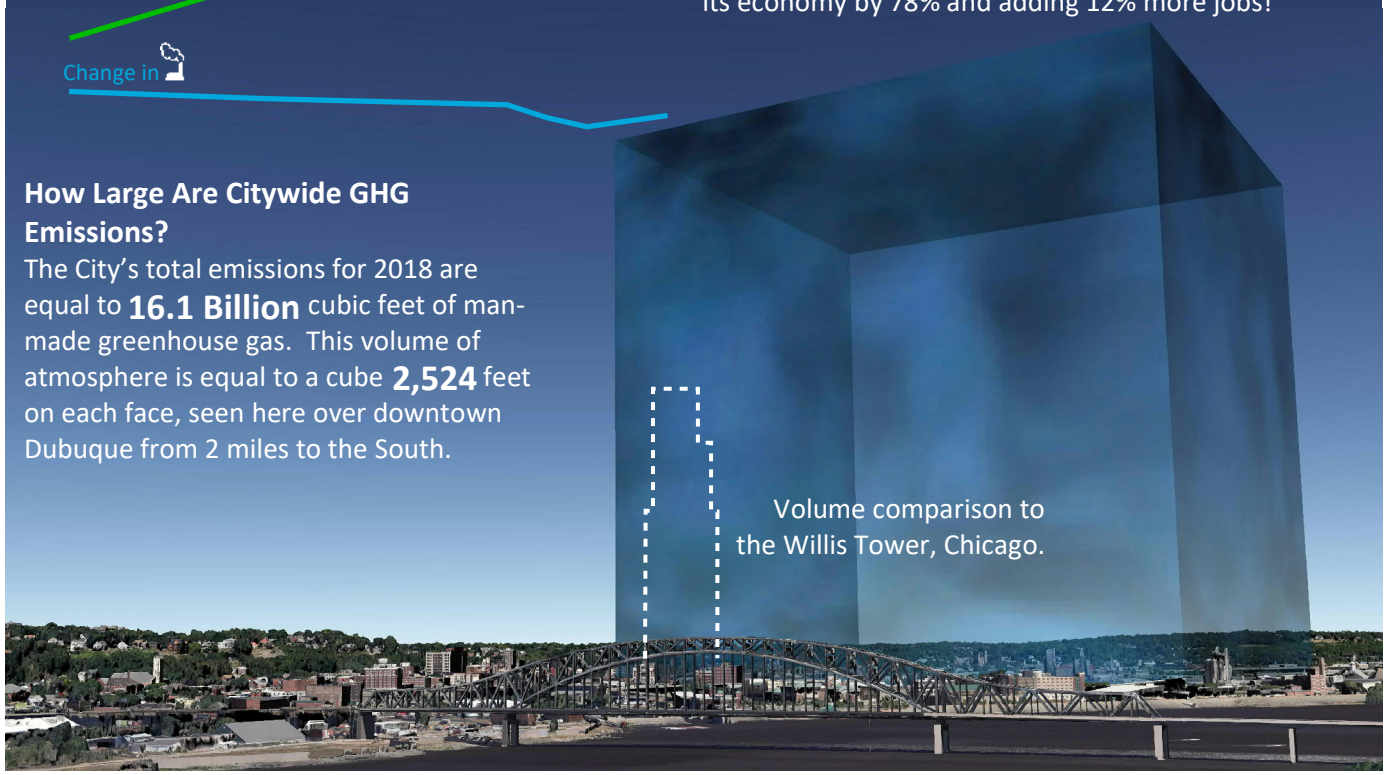
Employment
+4,774 +12.12%

Dubuque Citywide GHG Emissions Overview
Total emissions for the City of Dubuque dropped 27% from 1,122,597 metric tonnes in 2003 to 819,406 in 2018.



Think Economic Development is Tied To Increased Emissions?
Think again! Between 2003 and 2018 the City was able to decrease its GHG emissions by 27% while growing its economy by 78% and adding 12% more jobs!

How Large Are Citywide GHG Emissions?
The City's total emissions for 2018 are equal to **16.1 Billion** cubic feet of man-made greenhouse gas. This volume of atmosphere is equal to a cube **2,524** feet on each face, seen here over downtown Dubuque from 2 miles to the South.

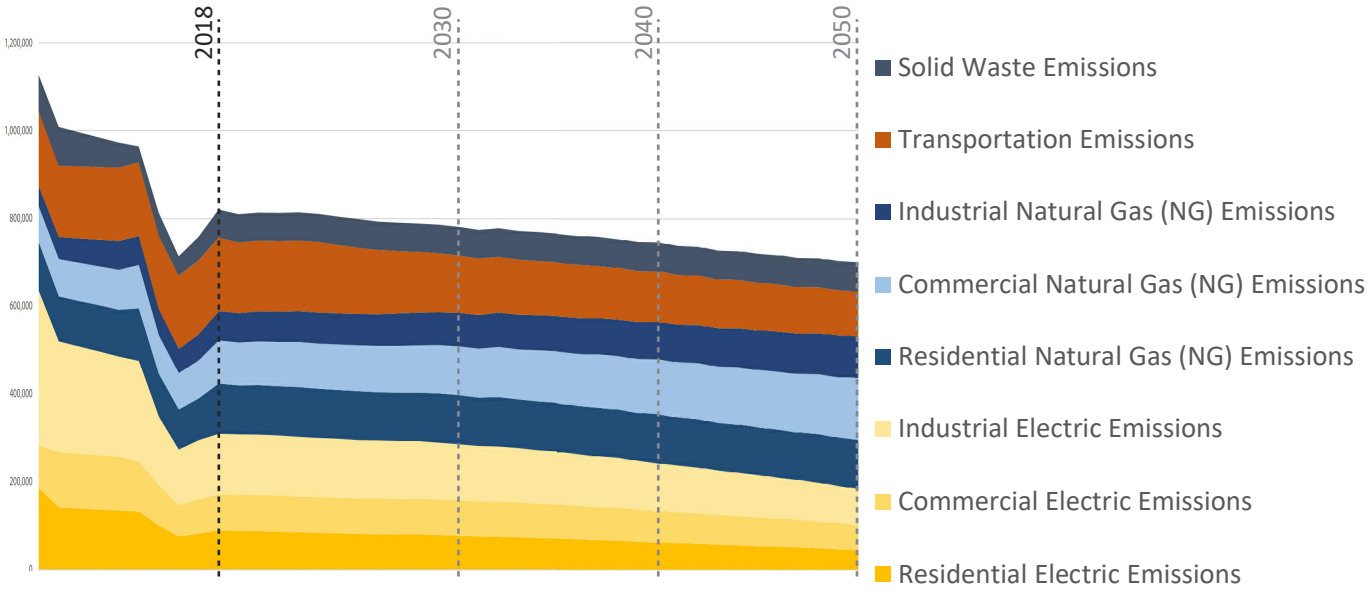


Dubuque's GHG Emissions

Citywide GHG Emission Forecast

A GHG emission forecast supports GHG reduction planning efforts by anticipating what emissions may be like if actions are not taken. Emissions are typically forecast under a business-as-usual (BAU) scenario. The Intergovernmental Panel on Climate Change (IPCC) defines a "business-as-usual" baseline case as the level of emissions that would result if future development trends follow those of the past and no changes in policies take place.

The City of Dubuque GHG forecasts included here were based on population and employment growth estimates determined by 10 and 20 year historic growth rates. In addition to these data, information from the State of Iowa Department of Economic Development, the US Environmental Protection Agency, US Department of Transportation, and US Energy Information Agency. The full assumptions used for the Business-as-usual GHG Emissions Forecast model are outlined in detail in the appendix of this report.



	Change from 2003		Change from 2003		Change from 2003
2030 GHG Emissions	**-30.8%**	**2040 GHG Emissions**	**-33.8%**	**2050 GHG Emissions**	**-37.8%**
Total Annual GHG	780,130	Total Annual GHG	745,668	Total Annual GHG	700,575
Goal Annual GHG	563,540	Goal Annual GHG	281,770	Goal Annual GHG	0
Difference	216,590	Difference	463,898	Difference	700,575

Buildings and Energy

Electricity Use Emissions:	**-55.2%**	**Electricity Use Emissions:**	**-61.8%**	**Electricity Use Emissions:**	**-71.1%**
Residential	76,517	Residential	61,913	Residential	44,805
Commercial	79,959	Commercial	71,626	Commercial	56,959
Industrial	127,772	Industrial	108,674	Industrial	81,738
Natural Gas Use Emissions:	**26.0%**	**Natural Gas Use Emissions:**	**35.4%**	**Natural Gas Use Emissions:**	**46.4%**
Residential	111,834	Residential	111,720	Residential	112,260
Commercial	111,961	Commercial	125,134	Commercial	140,284
Industrial	76,350	Industrial	85,599	Industrial	96,114

Transportation and Land Use

Transportation Emissions:	**-24.0%**	**Transportation Emissions:**	**-33.0%**	**Transportation Emissions:**	**-40.8%**
VMT (Thousands)	378,088	VMT (Thousands)	382,268	VMT (Thousands)	386,494

Solid Waste

Solid Waste Emissions:	**-20.8%**	**Solid Waste Emissions:**	**-20.0%**	**Solid Waste Emissions:**	**-19.1%**
LFG Emissions	65,159	LFG Emissions	65,879	LFG Emissions	66,608

Dubuque's GHG Emissions

Climate Action Plan GHG Reduction Goal

The GHG emission reduction goals guiding this Climate Action Plan are to be the first Net Carbon Neutral community in Iowa and to reduce community-wide GHG emissions 50% over 2003 baseline by 2030.

GHG Emission Reduction Goal in Global Context

Reviewing the City's Climate Action Plan emission reduction goal within a global context and GHG emission reduction recommendations formulated by the International Panel on Climate Change (IPCC) can help validate the appropriateness of the goal. The IPCC is the United Nation Environment Porgramme (UNEP) body for assessing the science related to climate change and providing support in climate action policy making. The scientific consensus of the international IPCC working groups is to reduce global GHG emissions as needed in order to limit global warming to 1.5°C. In addition, the Paris Agreement aims to limit global warming to 1.5 to 2 degrees C above pre-industrial levels, considered to be the threshold for dangerous climate change.

The UNEP Emissions Gap Report published in November 2019 calculates that by 2030, global emissions will need to be 25% lower than 2018 to put the world on the least-cost pathway to limiting global warming to below 2°C. To limit global warming to 1.5°C, the same report finds emissions would need to be 55% lower than in 2018 - an upward adjustment of earlier recommendations which suggested a 45% reduction.

Fair Share Citywide Emission Reductions To Meet Global Need

The concept of "Fair Share" has been introduced into international climate action discussions. Though there is no consensus on how "fair share" should be defined, the most common way of looking at the concept is a straight-line reduction economy-wide. This means that the share of emissions reductions for each jurisdiction (the City of Dubuque, the State of Iowa, the United States, etc) should match their share of global emissions - meaning if the US emits 25% of global emissions, the "fair share" of emissions reductions for the US would be 25% of the global emission reduction goals.

Based on a "Fair Share" model of GHG emission reduction, the City's goal of 50% over 2003 baseline by 2030 is compatible with the Paris Agreement and exceeds the threshold of required reductions to keep global warming below 2°C. The goal, however, may not be fully compatible with a 1.5°C global warming pathway, as illustrated by the graphic to the right.

Climate Action Plan Approach to Emissions Reduction

This Climate Action Plan is intended as a "living plan" rather than a static document. This means that the implementation phase of this plan should be characterized by intermittent measurement of progress and plan adjustments. Plan adjustments should look towards increasing implementation goals for actions which illustrate success, modify goals for actions which may fall short of desired outcomes, and identifying additional action opportunities.

As a "living plan", the 2030 emission reduction goal should be seen as a guiding constant and recognition should be given that initial implementation actions may not yet fully achieve plan goals. Intermittent plan progress measurements and adjustments should identify additional actions, or increases in action implementation targets as needed to meet the ultimate 2030 GHG reduction goal.

2030 Citywide GHG Emissions Goal:

563,540
Metric Tons

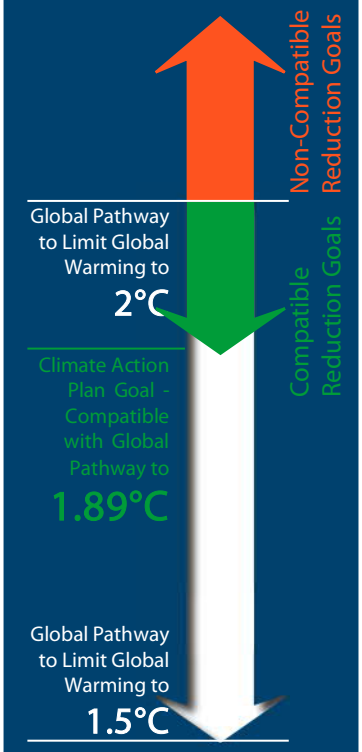
Global Emission Reduction To Limit Global Warming to 2°C:

25%
Below 2018 Emissions

Global Emission Reduction To Limit Global Warming to 1.5°C:

55%
Below 2018 Emissions

"Fair Share" Model Review of Climate Action Plan 2030 Goal:



Dubuque's GHG Emissions

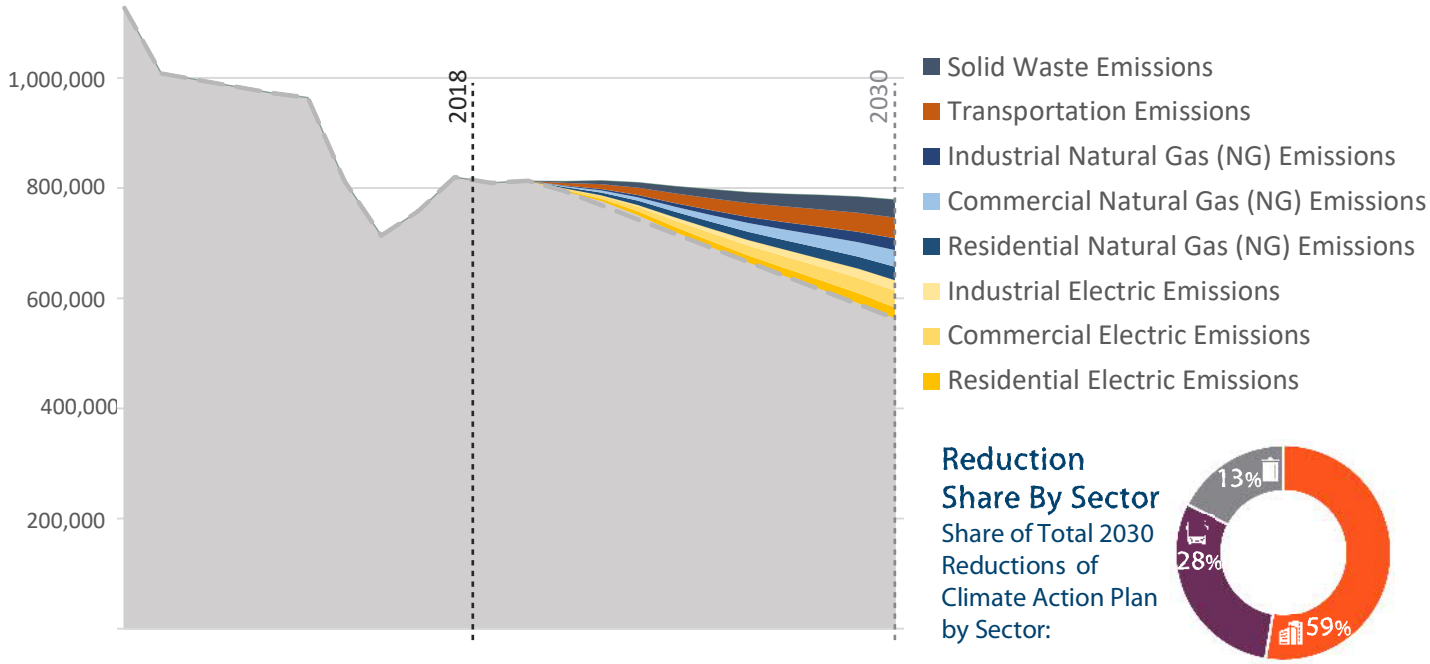
Estimated GHG Reductions Included in This Plan

Compared to the 2018 citywide GHG inventory, the total estimated emissions reductions included in the initial implementation actions of this plan are projected to total 221,451 metric tons annually. These estimated reductions are projected to result in total citywide GHG emissions of 563,605 metric tons. The potential cumulative GHG emissions reductions over the 10 year implementation period are estimated at over 1,160,000 metric tons - an elimination of over **22.7 billion** cubic feet of man made greenhouse gas atmosphere annually.

The total projected GHG emissions reductions estimated for the initial implementation actions of this plan are projected to be sufficient to achieve a total reduction in annual emissions of 50.0% below 2003 baseline emissions by 2030. As outlined on the previous page, the implementation phase of the plan should be characterized by intermittent measurement of progress and plan adjustments based on results in order to achieve the ultimate 2030 reduction goals.

GHG Emission Reductions Wedge Diagram

The diagram below shows the estimated emission reductions from the Business-as-Usual projections, by emission sector, of the initial implementation actions and targets.



Breakdown of Sector Emission Reductions

Below is a breakdown of estimated sector emission reductions by sector strategy.

Buildings and Energy

Total Emission Reduction:
151,429 Metric Tons Annually

50.0%

BE1 Increase Distributed Renewable Energy by 21 MW:
11,190 Metric Tons Annually

BE2 Reduce Citywide Energy Consumption:
65,932 Metric Tons Annually

BE3 Promote "Fuel Switching" achieving 10% adoption:
43,417 Metric Tons Annually

BE4 Increase renewable energy share of electric grid by 15%:
30,890 Metric Tons Annually

Transportation and Land Use

Total Emission Reduction:
37,478 Metric Tons Annually

45.1%

TL1 Decrease Vehicle Miles Traveled by 10%:
13,546 Metric Tons Annually

TL2 Support and encourage alternative fuel vehicles, Achieve 15% of VMT:
23,932 Metric Tons Annually

Solid Waste

Total Emission Reduction:
32,544 Metric Tons Annually

60.4%

SW1 50% Diversion by 2030 measure on a per capita basis:
32,544 Metric Tons Annually

Section 04

Buildings and Energy

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Buildings and Energy

Building construction and their operations can have extensive direct and indirect impacts on the environment, society, and economy. Buildings use significant resources (energy, water, raw materials, etc.), generate waste (occupant, construction, and demolition), emit potentially harmful atmospheric emissions, and fundamentally change the function of land, and the ability of that land to absorb and manage water.

Building energy use is a major contributor to greenhouse gas (GHG) emissions. The Building Energy sector includes all residential, commercial, and industrial buildings. Greenhouse gas emissions from this sector come from **direct emissions** – from fossil fuels burned *on-site* for heating or cooking needs – as well as **indirect emissions** – from fossil fuels burned *off-site* in order to supply that building with electricity. Building design plays a large role in determining the future efficiency and comfort of facilities. Increasing energy efficiency can help reduce GHG emissions and result in significant cost savings for both homes and businesses. The Dubuque community can also achieve environmental, social, and economic benefits through enhancements to the built environment.

Equity Considerations:

- Often, families that live in properties that are not energy efficient are also those that can least afford high-cost utility bills. These households may lack the ability to pay for energy efficiency improvements or access renewable energy options.
- Renters of both single family homes as well as multi-family housing usually do not have the ability to implement energy efficiency measures to the buildings they live in to gain the benefits of energy efficiency. Energy efficiency retrofits are typically in the hands of the landlord while the costs associated with the resulting energy use are usually paid by the occupant.
- Families with fewer resources must dedicate a disproportionately larger share of their income towards energy costs. This energy access inequity exacerbates other vulnerabilities including exposure to heatwaves and other climate vulnerabilities. Families sometimes are forced to forego basic access to service altogether - an estimated 123 households in Dubuque go without heating fuel of any type.
- Air pollution, mainly from fossil energy use, disproportionately impacts low income and communities of color due to community locations and physical characteristics.

Buildings and Energy Goals

BE1: Increase distributed renewable energy by 21 MW of installed capacity by 2030.
BE2: Reduce citywide energy consumption by 10% by 2030.
BE3: Promote "fuel switching" to reduce on-site fossil fuel use 10% by 2030.
BE4: Increase renewable energy share of electric grid to 15% by 2030
(beyond current Alliant Energy commitments).

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching strategies established to meet 2030 goals and detailed actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. On the following page are the strategies guiding the Buildings and Energy section.

Did You Know?

Electric grid transitions towards renewable energy sources, improvements in energy efficiency, and installations of solar power in Dubuque have already reduced the building sector greenhouse gas emissions by 32.6% since 2003!

36,631,642,162
Cubic Feet of greenhouse gasses have been saved by building energy city-wide since 2010.

Buildings and Energy

BE1 Increase distributed renewable energy by 21 MW of installed capacity by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy BE1-A: Increase solar on City facilities	City facility annual on-site solar PV electricity generation reported
Strategy BE1-B: Support and accelerate installation of on-site solar PV and solar thermal.	City-wide annual on-site solar PV installations and electricity generation reported
Strategy BE1-C: Encourage equity for renewable energy	On-site solar pv installations within low-to-moderate income communities reported
Strategy BE1-D: Increase solar on residential buildings	City-wide Residential on-site solar PV installations and electricity generation reported
Strategy BE1-E: Increase solar on commercial/industrial facilities	City-wide Commercial/Industrial on-site solar PV installations and electricity generation reported
Strategy BE1-F: Advocate for stronger state policy	Status of establishing community solar, virtual net metering, and aggregated net metering policies and laws

BE2 Reduce citywide energy consumption by 10% by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy BE2-A: Increase energy efficiency in City facilities	City facility annual energy consumption reported
Strategy BE2-B: Improve energy efficiency in all sectors	City-wide annual energy consumption reported; City-wide annual total residential consumption and residential consumption per household reported; City-wide annual commercial and industrial energy consumption reported
Strategy BE2-C: Promote audits, energy efficiency rebates and financial incentives	City-wide utilization of available rebate and incentive programs reported
Strategy BE2-D: Improve energy efficiency and equity in residential buildings	City-wide Commercial/Industrial sector annual energy consumption reported per job or per building area
Strategy BE2-E: Increase net zero energy residential building stock	City-Wide Net Zero Energy certified residential buildings as reported by New Buildings Institute, Living Building Institute and/or HERs Rating Index

BE3 Promote "fuel switching" to reduce on-site fossil fuel use 10% by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy BE3-A: Promote "fuel switching" to low/no carbon alternatives	Reported city-wide natural gas use; reported city-wide Renewable Natural Gas use

Buildings and Energy

How we'll accomplish this goal	How we'll measure our progress
Strategy BE4-A: Community solar for residential and commercial	City-wide community solar subscriptions reported (with REC retained by residents/businesses within community or by utility serving community without resale)
Strategy BE4-B: Increase utility scale renewable energy installations	Alliant Energy GHG annual emissions factor reported

Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as increased energy efficiency and on-site renewable energy, can save money for the community. The estimated community savings of the goals for this section include:

Residential Energy Cost Savings: **$33,677,000**

(Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

+

Commercial Energy Cost Savings: **$81,492,000**

(Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

+

Industrial Energy Cost Savings: **$19,187,000**

(Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

=

Estimated Cumulative Savings Potential: **$134,356,000**

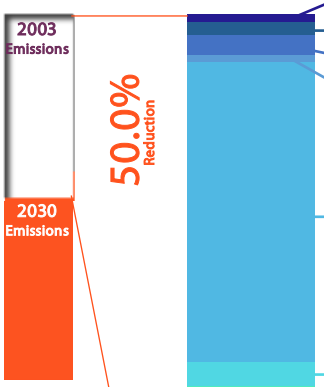
$2,275 per-capita

Planned Buildings and Energy GHG Emission Reductions

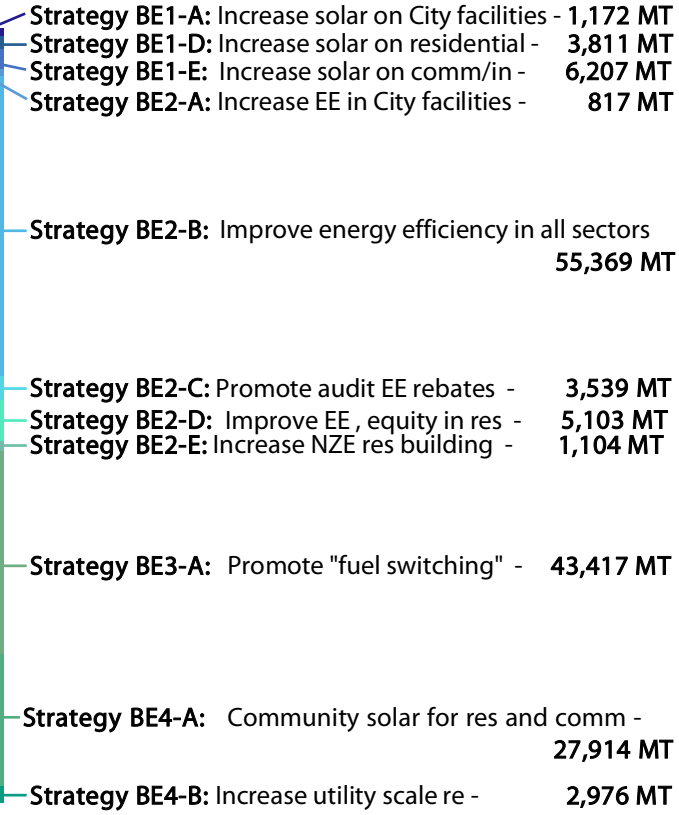
Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 151,429 metric tons (MT) by 2030 - a 50% reduction over 2003 levels.

This is equivalent to eliminating **2.9 billion** cubic feet of man-made greenhouse gas atmosphere annually by 2030.



Individual Strategy Annual Emission Reductions by 2030



Buildings and Energy

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Create a policy that all City buildings shall reduce energy usage by 20% over the next 10 years, and require all municipal buildings to be benchmarked using ENERGY STAR Portfolio Manager. (Strategy BE2-A-1, Strategy BE2-A-2)
2) Implement energy benchmarking (performance tracking and annual reporting) program for commercial buildings, required for all buildings equal to or greater than 50,000 square feet. (Strategy BE2-C-4)
3) Develop and adopt a rental housing energy efficiency policy requiring single family and multi-family rental housing properties to meet minimum energy efficiency level to qualify for rental licensing. (Strategy BE2-D-2)
4) Adopt a voluntary green building stretch code (IgCC) including stretch energy efficiency requirements in-line with Architecture 2030 goals. Make (IgCC) code required for all City facility projects and all projects receiving $50,000 or more in City tax abatement, financing or funding. (Strategy BE2-B-4)

City Staff

1) Establish a centralized facility management / construction project management structure or department for all City owned facilities. Structure to focus on increased capacity for execution of high performance city construction projects capable of achieving energy efficiency and renewable energy goals consistent with the City's CAP plan. (Strategy BE-2-A-4)
2) Explore the development of a Revolving Loan program for City facilities to fund capital costs for high performance energy efficiency and renewable energy options with appropriate return on investment. (Strategy BE-2-A-5)
3) Conduct a detailed solar assessment and "Renewable Energy Master Plan" for all primary city facilities. City's largest energy consuming properties should be prioritized for assessment. Goal: 50% of city facility electric demand supplied through solar. (Strategy BE-1-A-1)
4) Deploy an incentive program for electrification. Work with Alliant Energy or other regional partnerships to create financial incentives to electrify new and existing buildings. (Strategy BE-3-A-1)
5) Develop and issue an RFI / RFP for community solar developers to advance community solar options and subscriptions within City. (Strategy BE-4-A-1)

Business Community

1) Use ENERGY STAR Portfolio Manger to benchmark your energy consumption and identify energy savings potential - then make an energy savings plan targeting a 10% reduction.
2) Contact a solar pv installer and ask for a no-risk, free solar site assessment for your business. Ask the installer to educate you on all applicable rebates and tax incentives.
3) Explore replacing your roof with a greenroof system or a "cool roof": https://palebluedot.llc/dubuque-net-zero-energy-guide

Households/Individuals

1) Switch your lightbulbs to more energy efficient LED lights.
2) Set a goal to save 10% in annual energy use and costs this year and schedule a Home Energy Assessment from the Dubuque Green Iowa AmeriCorps team.
3) Contact a solar pv installer and ask for a no-risk, free solar site assessment for your home/apt. Ask the installer to educate you on all applicable rebates and tax incentives. Alternatively, you can take advantage of Alliant Energy's Second Nature™ option to switch to renewable energy through your utility.

Section 05

Transportation and Land Use

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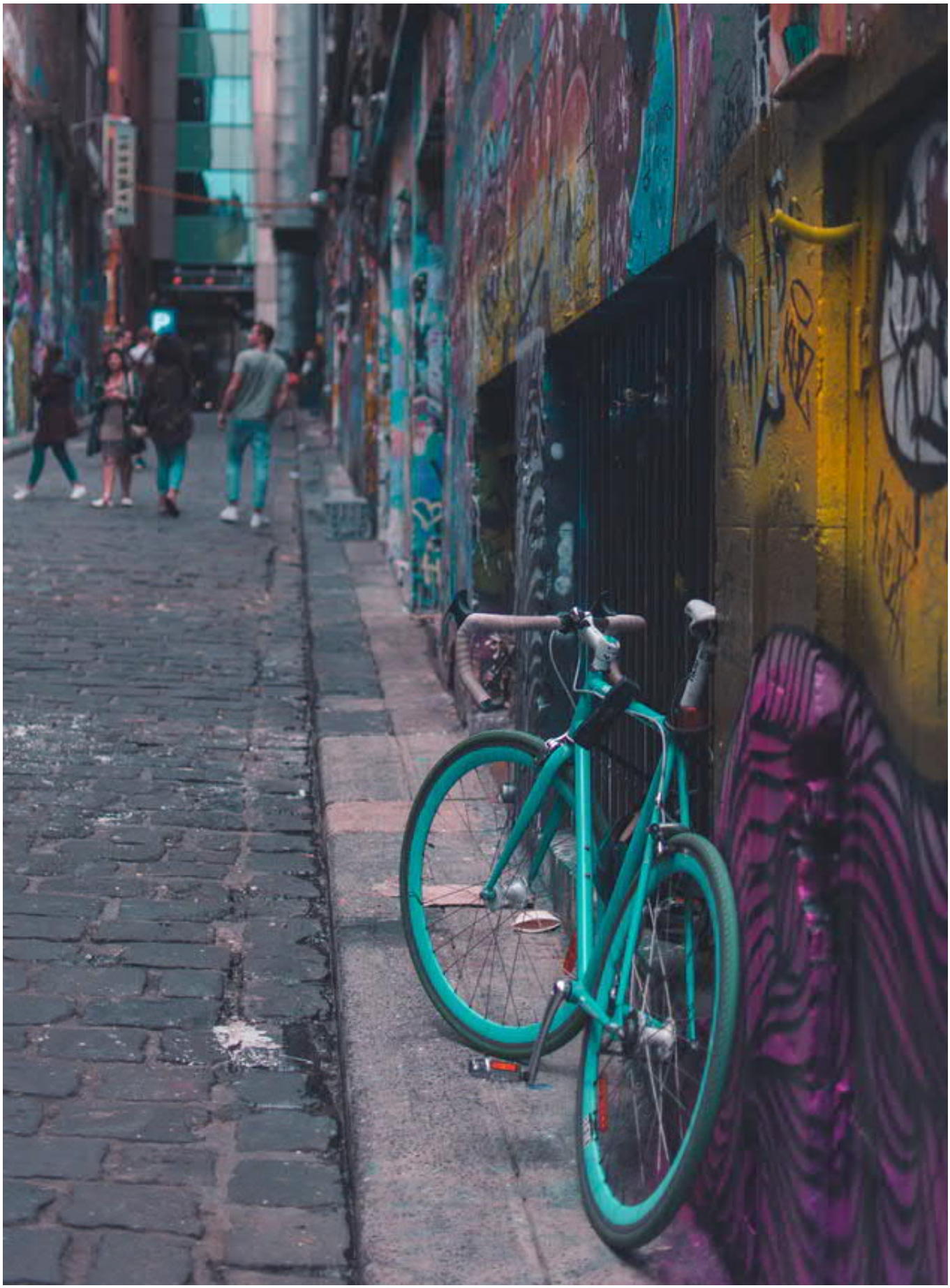


Transportation and Land Use

The design of a city can limit or expand the choices and opportunities available to its residents in where they live, how they travel and the impact of those decisions on the global environment. Transport systems have significant impacts on the environment, accounting globally for 20% to 25% of world energy consumption and carbon dioxide emissions - in Dubuque transportation accounts for 20.4% of citywide GHG emissions.

Improving the equity and sustainability of our land use and transportation systems requires a focus on developing systems and networks that allow for greater choice in where residents live and work as well as how they commute. Implementation of Complete Streets and a connected system of transit, bike and pedestrian infrastructure along with consolidation of residential zoning categories and emphasis on neighborhood design that supports density and walkability will help Dubuque reach its goal of a 34% reduction by 2030.

Equity Considerations:

- Increased opportunities for public transit and active transportation can help address health disparities for many at-risk populations.
- Affordable and reliable options for mobility for people with special transportation needs can significantly improve transportation equity. Populations with special transportation needs include older adults, youth, persons with disabilities, and persons with reduced incomes.
- Some neighborhoods in Dubuque have fewer housing and transportation options than others. This can limit people's choices in where they live and how they get to work or other activities. If you don't drive or you want to rent, some neighborhoods aren't available to you. Households that rely on public transit service or who rent their home will be limited in where they can find housing that meets both needs. See Appendix A1 for more information.

Transportation and Land Use Goals

TL1: Decrease vehicle miles traveled (VMT) by 10% by 2030.

TL2: Support and encourage alternative fuel vehicles; achieve 20% of vehicles sold and 15% of VMT by 2030.

Did You Know?

For the City of Dubuque, if just one commuter from each household walked, biked, or took public transit to work just once a week, city-wide emissions would be reduced by:

27,204,594
pounds of GHG annually

On average, switching your daily commute to public transit will save:

$9,797
annually

42,720
cubic feet of greenhouse gas atmosphere

Transportation and Land Use

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. Below are the Strategies guiding the Transportation and Land Use section:

Goal TL1 Decrease vehicle miles traveled (VMT) by 10% by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy TL1-A: Build Complete Streets; target: 25% Complete Street community coverage by 2030	Street miles meeting Complete Streets policy
Strategy TL1-B: Promote reduced vehicle travel citywide	Annual Dubuque VMT reported; Percentage of telecommuters; Percentage of workforce receiving mode-neutral incentives; ACS reported telecommuting levels; Bike and commuter friendly designations
Strategy TL1-C: Encourage density and increase housing options and affordability; target: increase gross density by 3.75% by 2030	Calculated residential and commercial density (Households per residential zoned acre; Commercial building area/jobs per commercial zoned acre)
Strategy TL1-D: Increase public transit ridership to 3% by 2030	US Census ACS Commute by mode; Fixed route ridership statistics
Strategy TL1-E: Increase shared mobility utilization; target: increase shared mobility (carpooling) from 8.55% to 11% of commuters by 2030	City-wide commuter transportation mode data from US Census ACS 5 year estimates
Strategy TL1-F: Increase pedestrian access and safety	Percentage of schools with implemented Safe Routes To School plans; Average auto speed limit on bike and pedestrian corridors

TL2 Support and encourage alternative fuel vehicles, achieve 20% of vehicles sold and 15% of VMT by 2030

How we'll accomplish this goal	How we'll measure our progress
Strategy TL2-A: Transition City fleet to alternative fuels	Percentage of alternative fuel vehicles to gas/diesel internal combustion (ICE) within City of Dubuque vehicle fleet
Strategy TL2-B: Support and encourage alternative fuel vehicles citywide	Percentage of registered alternative fuel vehicles to registered gas/diesel internal combustion (ICE) within city of Dubuque

Transportation and Land Use

Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as reduction of single-occupancy auto use, can save money for the community. The estimated community savings of the goals for this section include:

Goal TL1 Decrease VMT by 10%: **$139,458,000**

(Based on AAA calculated auto use cost per mile and 2020 Jule pass costs)

+

Goal TL2 Increase alternative fuel vehicles: **$45,960,000**

(Based on US Energy Department estimated fuel and vehicle savings)

=

Estimated Cumulative Savings Potential: **$185,418,000**

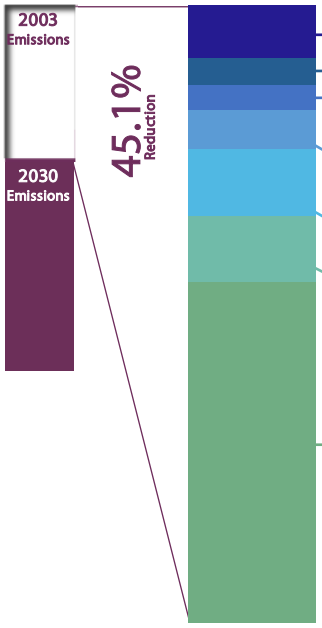
$7,719
per household

Planned Transportation and Land Use GHG Emission Reductions

Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 37,478 metric tons (MT) by 2030 - a 45.1% reduction over 2003 levels.

This is equivalent to eliminating **735 million** cubic feet of man-made greenhouse gas atmosphere annually by 2030.



Individual Strategy Annual Emission Reductions by 2030

Strategy TL1-A: Build Complete Streets - **3,386 MT**

Strategy TL1-B: Promote reduced VMT - **1,355 MT**

Strategy TL1-C: Encourage density housing - **2,032 MT**

Strategy TL1-D: Increase public transit ridership - **2,709 MT**

Strategy TL1-E: Increase shared mobility utilization - **4,064 MT**

Strategy TL2-A: Transition City fleet - **3,616 MT**

Strategy TL2-B: Support alternative fuel vehicles citywide - **20,317**

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Update, adopt and fund a more comprehensive Complete Streets Policy including a Systems Approach, increased Transparency/Accountability, and an Inclusive Public Process. A recommended policy is included here: https://palebluedot.llc/dubuque-cap-policies . (Strategy TL1-A-1)
2) Implement mode-neutral commuter incentives for City employees. Establish an incentive or subsidy and promote mode-neutral incentives with the goal of 25% of private workforce receiving mode-neutral incentives. (Strategy TL1-B-5)
3) Fund neighborhood-based plans for all neighborhoods to encourage neighborhood identity, engagement and development. Plan goals should be to increase housing density, options, affordability, and equity while furthering the goals of the Climate Action Plan. (Strategy TL1-C-2)
4) Update City vehicle (including The Jule transit) purchasing policy/budget process to default to alternative fuel with traditional internal combustion engine (ICE) as optional requiring proof of need. (Strategy TL2-A-1)
5) Establish an incentive or subsidy and promote commuter mode-neutral incentives with the goal of 25% of private workforce receiving mode-neutral incentives or telecommute benefits. (Strategy TL1-B-2)

City Staff

1) Implement feedback from existing Bike Friendly Community applications and re-apply to achieve a minimum of Silver Bicycle Friendly Community certification by 2025. (Strategy TL1-A-2)
2) Engage employers to secure a minimum of 10 Top Work places for commuters designations. (Strategy TL1-B-4)
3) Redesign parking fees to capture the full cost of parking in downtown and other commercial districts with equity and carbon reduction in mind. Explore using increased revenue to provide funding for alternative modes, for example, bike and pedestrian paths, public transit investments. (Strategy TL1-B-3)
4) Issue competitive redevelopment Request for Proposals encouraging high quality mixed use redevelopment on infill properties and existing surface parking lots within downtown district. (Strategy TL1-C-1)
5) Collaborate with Alliant Energy to develop and implement outreach and education campaigns designed to help residents understand the benefits of transitioning to an EV and to learn how to leverage applicable Alliant Energy programs or other incentives to facilitate EV charger installation or EV purchase. (Strategy TL2-B-1)

Business Community

1) Work to be designated as a Bike Friendly Business and encourage your peers to participate. Dubuque has a goal of 10 businesses meeting the designation. (https://bikeleague.org/business)
2) Explore how you can offer your employees mode-neutral commute incentives (https://www.vtpi.org/tdm/tdm8.htm).
3) Make - and implement - a Fleet Transition Plan to convert your vehicle fleet to electric vehicles (https://cutt.ly/DuI3ZSK)

Households/Individuals

1) Participate in Bike to Work Week Work and commit to changing your regular commute to walking, biking or carpooling at least one day/week.
2) Make your next personal vehicle a hybrid or EV. Explore incentives: https://cutt.ly/NuI4VGO
3) Consider becoming a one-car household - and save thousands of dollars annually. Explore options: https://cutt.ly/auI5IUS .

Section 06

Solid Waste and Recycling

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Solid Waste and Recycling

In Dubuque, solid waste contribute about 7.8% of citywide greenhouse gas emissions. However, studies indicate that municipal solid waste sector has great potential paths towards zero waste to avoid emissions throughout the economy thanks to prevention and waste recovery. Landfills are the third largest anthropogenic (man-made) source of methane, accounting for approximately 11% of the estimated total global methane emissions.

Habitat destruction, global warming, and resource depletion are some of the effects of our materials consumption. Recycling - converting discarded materials into new materials or putting them to beneficial use - is an important approach in mitigating these impacts and reducing the pollution caused by wasting. Recycling reduces the need for raw materials so that natural resources, and the environments in which they exist, can be preserved. Recycling creates manufacturing jobs, extends the value of materials, and conserves natural resources while reducing the need for landfill space.

Food discards and residuals that decompose in landfills release methane, a greenhouse gas that is at least 28 times more potent than carbon dioxide. This fact makes food wasting a significant contributor to solid waste greenhouse gas emissions. On the other end of the food supply chain, food production accounts for 26% of global emissions. In the United States, approximately 30% of the food produced is wasted - meaning nearly 8% of US emissions come from the production and distribution of wasted food.

Equity Considerations:

- Accessibility to recycling and composting programs may not be equally and readily available to all community residents and may also be impacted by other participation-related barriers, including awareness of programs, user fees, accessibility based on housing type, and language barriers.
- Populations that are situated very close to the landfill or composting facility may experience nuisance issues like bad odors and potential health issues unless mitigation actions are implemented.

Solid Waste Goals

SW1: 50% diversion by 2030 measured on a per capita basis.
SW2: Waste education.
SW3: Achieve 100% beneficial use of landfill gas.

Did You Know?

For the average family of four in Dubuque, eliminating food waste could save:

$1,500 annually*

5,978 cubic feet of greenhouse gas atmosphere

* According to the National Resources Defense Council.

Nationally **75%** of food waste that could be composted ends up in landfills

Solid Waste and Recycling

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. Below are the Strategies guiding the Solid Waste section:

Goal SW1 50% Diversion by 2030 measured on a per capita basis

How we'll accomplish this goal	How we'll measure our progress
Strategy SW1-A: Divert construction and demolition (C&D) waste	Annual reported C&D waste handled and landfilled
Strategy SW1-B: Divert consumer waste	Annual reported total waste handled; Annual reported consumer waste handled
Strategy SW1-C: 50% Food waste reduction and diversion	Annual reported total waste handled; Annual reported food waste and organics handled
Strategy SW1-D: Expanded recycling options for multi-family – equity	Multi-family facilities participating in recycling collection; Annual reported recycling handled

Goal SW2 Waste education

How we'll accomplish this goal	How we'll measure our progress
SW2 Waste education	Annual educational events and communications completed, Annual reported total waste handled; Annual reported recycling participation; Annual reported organics and food waste handled

Goal SW3 Achieve 100% beneficial use of landfill gas

How we'll accomplish this goal	How we'll measure our progress
Strategy SW3-A: Divert captured landfill gas	Reported annual landfill gas diverted to beneficial energy use; Reported annual landfill gas “flared” on site

Solid Waste and Recycling

Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as the reduction of food waste and diversion of commercial waste streams, can save money for the community. The estimated community savings of the goals for this section include:

SW1-C: 50% Food Waste Diversion: **$72,290,000** (Based on NRDC per-person calculations)

+

SW1-B: Divert Consumer Waste: **$706,000** (Business waste savings based on MN WasteWise reported average business savings)

=

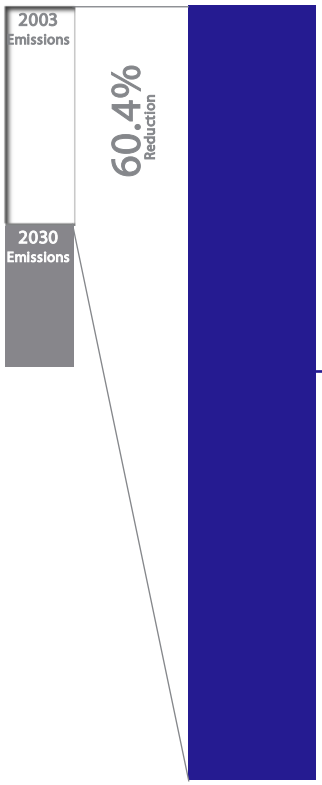
Estimated Cumulative Savings Potential: **$72,996,000**

Planned Waste GHG Emission Reductions

Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 32,544 metric tons (MT) by 2030 - a 60.4% reduction over 2003 levels.

This is equivalent to eliminating **639 million** cubic feet of man-made greenhouse gas atmosphere annually by 2030.



Individual Strategy Annual Emission Reductions by 2030

Strategy SW1-C: 50% Food waste diversion - **32,544 MT**

Strategy SW3-A: Divert captured landfill gas - Note, this strategy supports the supply of Renewable Natural Gas and overall emission reductions. Emission reductions for RNG, however, are not being accounted for in the Solid Waste sector as the "supply side" of RNG utilization. Systemic GHG savings are instead realized in the Building and Energy sector as RNG use supplants utilization of fossil fuels.

Solid Waste and Recycling

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Adopt an ordinance and construction permit changes supporting C&D recycling requirements to be implemented as sufficient C&D recycling capacity is developed. (Strategy SW1-A-8)
2) Establish a policy requiring compost be used as a soil amendment for public and private construction projects that disturb the soil cover over a baseline level. (Strategy SW1-C-4)
3) Request DMASWA review food waste handling capacities and permitting limits and expand/update as needed to support food waste diversion and organics collection increases in line with CAP goals. (Strategy SW1-C-10)
4) Revise Land Use Code to require commercial indoor and outdoor space for recycling and diversion equal to or greater than the space provided for disposal. (Strategy SW1-D-2)
5) Adopt a deconstruction/diversion ordinance to require the reuse or recycling of salvageable construction and demolition materials. (Strategy SW1-A-3)

City Staff

1) Seek grant funds to launch a food waste reduction campaign for residents, such as the U.S. Environmental Protection Agency's Food: Too Good to Waste program. (Strategy SW1-C-7)
2) Examine options for expanding commercial and residential composting, including offering compost/food waste collection at restaurants; assess the feasibility of establishing a permitted facility to compost or anaerobically digest organic materials and food waste. (Strategy SW1-C-8)
3) Conduct a phased-in commercial organics waste collection project. Explore possible incentives for food retailers, restaurants, and institutions to participate in food waste reuse and recycling programs. (Strategy SW1-C-1)
4) Identify jobs benefits and economic potential of implementation of construction and demolition waste diversion policies, ordinances, and permitting requirements: create cost-benefit analysis. (Strategy SW1-A-1)
5) Require all commercial construction and demolition projects to submit waste management plans illustrating project's capacity to achieve specific C&D Waste diversion levels in-line with City's CAP goals. (Strategy SW1-A-5)

Business Community

1) Conduct a Waste Assessment and reduction action plan: https://cutt.ly/ruOwZ9S
2) Partner with the Iowa Waste Exchange to divert waste through identification of viable markets for waste materials or find another facility that can use disposed materials. https://cutt.ly/xuOyKjh

Households/Individuals

1) Minimize your food waste by first eating what you already have in your fridge. Plan meals and make grocery lists to further reduce your weekly food waste.
2) Start a back-yard compost to collect yard waste and the food waste you cannot avoid. Alternatively, sign up for the City's curbside yard waste and food scrap collection service.
3) Bring your own reusable produce and tote bags when grocery shopping to avoid using plastic bags.

Section 07

Water, Wastewater, and Flooding

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Water, Wastewater, and Flooding

Water is at the core of sustainable development. Quality water is vitally important for socio-economic development, maintaining healthy ecosystems, and for human survival. Water is central to the production and preservation of a wide range of services benefiting people. Water related energy use totals 13% of US electricity consumption and has a carbon footprint of at least 290 million metric tons. Meanwhile, wastewater treatment is responsible for 3% of global GHG emissions.

Water is also at the heart of adaptation to climate change - climate change, particularly in the Midwest will be closely linked to changes in precipitation including increased likelihood of drought combined with increased instance of heavy rain events, flooding, and flash flooding. Many impacts of climate change also increase stress on our water systems, increase water pollution potential, and place more risk on maintaining safe water resources. Water is an irreplaceable, critically important resource fundamental to the well-being of our communities. Water can only be considered renewable with high quality best water management practices in place.

Equity Considerations:

- Low-income neighborhoods frequently suffer more damage from flooding, according to studies by the National Academies of Sciences, Engineering and Medicine. The frequency and magnitude of heavy rain events is expected to increase as a result of a changing climate, making the future flooding impacts for at-risk neighborhoods potentially more accute.
- Disadvantaged communities within cities often have denser populations, more impervious surfaces, and less open/green spaces. These areas can also be prone to flooding and sewer overflows. Stormwater management through the creation of open, green spaces serve to revitalize and promote health within these disadvantaged communities

Water and Wastewater Goals

W1: Increase water conservation citywide.
W2: Reduce wastewater impacts.
W3: Mitigate flood hazards and impacts.

Did You Know?

A 2015 study by Illinois flood authorities found that between 2007 and 2014, **90%** of the flood damage in urban areas occurred outside the traditional flood plain.

For a city the size of Dubuque, reducing water leaks by 50% alone could save:

153 Million gallons of water annually.

Breakdown of Indoor Residential Water Use

Source: Water Research Foundation, Residential End Uses of Water, Version 2. 2016

Water, Wastewater, and Flooding

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. Below are the Strategies guiding the Water, Wastewater, and Flooding section:

Goal W1 Increase water conservation citywide

How we'll accomplish this goal	How we'll measure our progress
Strategy W1-A: Promote increased water conservation citywide	Annual reported citywide water use total and per capita
Strategy W1-B: Maintain and update city plans and standards in support water conservation goals	Annual reported citywide water use total and per capita; Annual reported citywide irrigation/outdoor water use

Goal W2 Reduce wastewater impacts

How we'll accomplish this goal	How we'll measure our progress
Strategy W2-A: Capture and use of wastewater energy potential	Identified and studied opportunities for biogas beneficial use; Reported percentage of wastewater biogas energy captured for beneficial use
Strategy W2-B: Reduce waste water generation	Reported annual waste water flows per capita
Strategy W2-C: Improve waste water pollution prevention	Reported wastewater pollution contaminants; Wastewater overflow events

Goal W3 Mitigate flood hazards and impacts

How we'll accomplish this goal	How we'll measure our progress
Strategy W3-A: Educate, engage, and empower the public for flood mitigation	Reported annual educational events and publications; Audience reached
Strstegy W3-B: Update design standards and plans for flood mitigation	Reported City plans and standards updated
Strategy W3-C: Create a storm water infiltration plan	Reported status on Storm Water Infiltration Plan; Reported status on fee structuring/restructuring; storm water infiltration performance
Strategy W3-D: Increase flood resilience of infrastructure	Reported status on green infrastructure improvements

Water, Wastewater, and Flooding

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Implement pricing preference for households installing water efficient fixtures (such as WaterSense certified fixtures) and water/energy efficient water heaters. Establish incentives/cost reduction programs for qualifying low-income residents to purchase WaterSense certified fixtures. (Strategy W1-A-2)
2) Implement a policy to require installation of rainwater colleciton systems and WaterSense water efficient fixtures and appliances at all City facility projects and all projects receiving $50,000 or more in City tax abatement, financing or funding. (Strategy W2-B-3)
3) Establish incentives to prioritize the development of "green infrastructure" such as parks, wetlands, riparian and wildlife corridors, natural drainage-ways, and low-impact development. (Strategy W3-D-1)
4) Establish and implement a policy requiring a biochar or biosolids soil amendment for all building and earth working construction sites. (Strategy W3-D-8)

City Staff

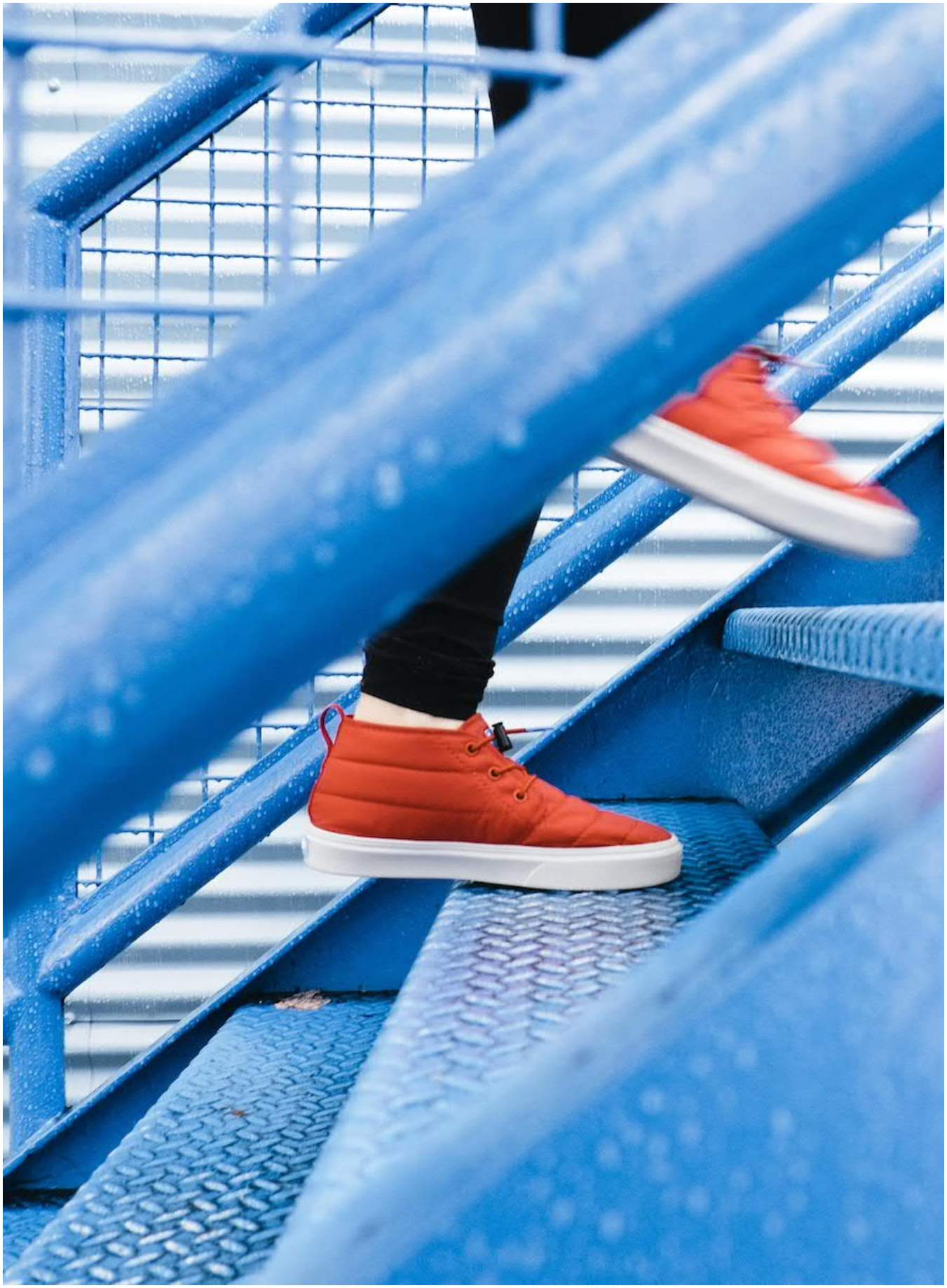
1) Explore modifying residential water rates that better incentivize water conservation and dis-incentivize water use. (Strategy W1-A-3)
2) Prepare a Blue Spot flash flood risk map to identify areas within city that are particularly vulnerable to flash flood impacts. (Strategy W3-B-2)
3) Prepare a comprehensive plan for stormwater management that goes beyond baseline regulatory requirements and includes green infrastructure with the goal of eliminating Stormwater Sewer Overflows. (Strategy W3-B-5)
4) Review and update Public Infrastructure Design Standards to meet Climate Change projections for Dubuque. (Strategy W3-B-1)
5) Continue research into additional biogas opportunities at the City's wastewater treatment plant: Enhance existing RNG development capacity. (Strategy SW2-A-2)

Business Community

1) Improve your building site's stormwater capacity by eliminating all unnecessary pavement areas, planting trees, and installing rain gardens.
2) Convert lawn areas to native, drought resistant landscaping that does not require watering.
3) Replace your water fixtures with WaterSense certified water efficient fixtures. Develop a Water Management Plan with specific conservation goals: https://www.energy.gov/eere/femp/developing-water-management-plan

Households/Individuals

1) Assess your home's rain and flood readiness by using the online My Rainready Assessment Tool and implementing recommended improvements: https://www.cnt.org/tools/my-rainready-home-assessment-tool
2) Collect rainwater in rain barrels to water your lawn and/or plants.
3) Download and use WaterSmart - the City of Dubuque's app to help you conserve water and save money.



Section

08

Climate Health And Safety

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Climate Health and Safety

There is a strong relationship between human health and environmental health. From the air we breathe to the water we drink and use, life here on Earth depends on the natural resources and the environment around us. This link between the environment and human health is a critical consideration of the impacts of climate change. As outlined in the City's 2019 Climate Vulnerability Assessment, changes in climate, such as higher average temperatures and increased storm frequency and intensity, can intensify public health stressors. These climate change impacts endanger public health and safety by affecting the air we breathe, the weather we experience, our food and water sources, and our interactions with the built and natural environments. As the climate continues to change, the risks to human health continue to grow.

In the same way local governments and the health care industry promotes healthy behaviors such as eating right and exercising; agencies should recognize the relationship between climate action, environmental stewardship and community health since the health of our environment affects public health.

Equity Considerations:

- Some populations, including aging adults, children, persons with disabilities, economically stressed, non-English speakers, homeless persons, and workers employed in climate exposed jobs are particularly vulnerable to extreme weather, natural disasters, and the health, supply chain, and economic impacts of climate change. Many of these individuals also have limited access to the information, services, and resources needed to ensure resilience in the face of these impacts.
- Areas within the city with increased flood risk, air quality impacts, compromised tree canopy coverage, and older housing stock with insufficient air conditioning are vulnerable environments within our cities with heightened exposure to climate change risks and compromised capacity to adapt.
- Vulnerable populations are disproportionately represented within the vulnerable environments of our cities and frequently lack resources to improve the adaptive capacity of their surroundings.

Climate Health And Safety Goals

HS1: Create a climate adaptive community.

HS2: Educate, engage, and empower the public for climate health and safety.

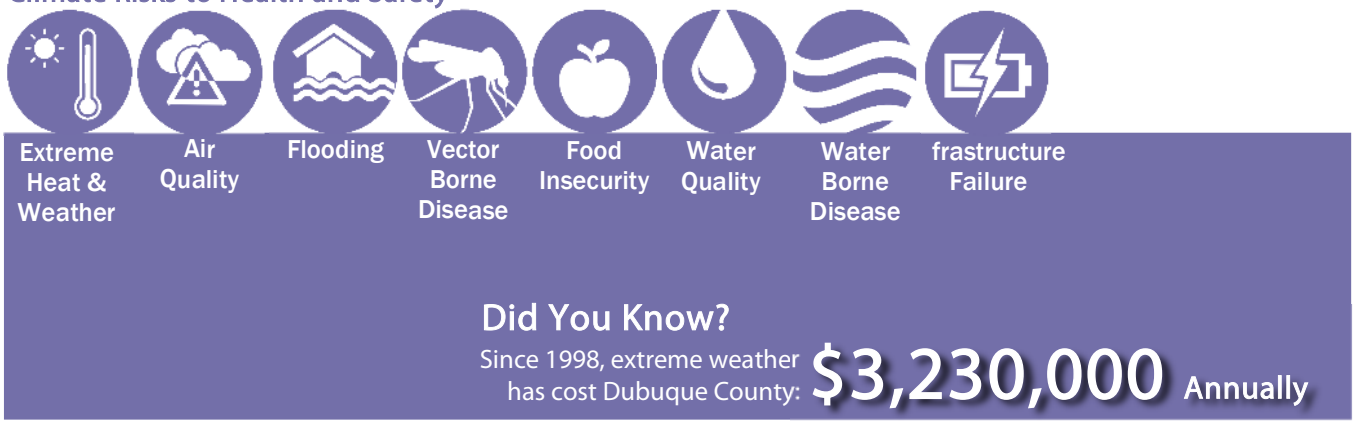
HS3: Address air quality impacts of climate change.

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. On the following page are the Strategies guiding the Climate Health and Safety section.

Climate Risks to Health and Safety



Climate Health and Safety

Goal HS1 Create a climate adaptive community

How we'll accomplish this goal	How we'll measure our progress
Strategy HS1-A: Review facilities and plans	Reported City facilities updated
Strategy HS1-B: Update design standards and plans	Reported City plans and standards updated
Strategy HS1-C: Expand cooling and warming facilities	Reported cooling and warming facility quantity, distribution, and proximity and accessibility to vulnerable population; Status of process for vulnerable population check-in
Strategy HS1-D: Enhance resilience of community to extreme weather	Status of adoption of policies and incentives for climate resilient upgrades; Reported building renovation permits for climate adaptive improvements
Strategy HS1-E: Reduce risks to health and safety created by ongoing climate impacts	Status of Emergency Management incorporation of projected climate impacts and risks into Emergency Management plan and procedures; Status of Vector Borne Disease Response Plan

Goal HS2 Educate, engage, and empower the public for climate health and safety

How we'll accomplish this goal	How we'll measure our progress
Strategy HS2-A: Expand public education campaign for impacts of climate change	Reported annual educational events and publications; Audience reached
Strategy HS2-B: Educate and engage the public on extreme heat and weather risks	Reported annual educational events and publications; Audience reached
Strategy HS2-C: Educate and engage the public on air quality and linkage with health	Reported annual educational events and publications; Audience reached

Goal HS3 Address air quality impacts of climate change

How we'll accomplish this goal	How we'll measure our progress
Strategy HS3-A: Promote reduction of particulate matter and air quality impacts of fossil fuel use	Reported public transit ridership levels; Status of electric lawn equipment incentive; Status of enhanced City policies, ordinances, and incentives for “clean diesel” and diesel to electric fuel switch
Strategy HS3-B: Implement air quality monitoring	Status of collaboration with other agencies; Status of assessment and remediation of environmental justice concerns in Dubuque
Strategy HS3-C: Explore and address ozone impacts on local agriculture	Measured and reported ozone levels in Dubuque

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Adopt policies to incentivize residential building owners (particularly rental and multi-family properties), to increase the resilience of existing and new buildings with resilience strategies. (Strategy HS1-D-1)

City Staff

1) Include a Health and Climate Change Impact Assessment component in all City plans. Develop metrics for reporting on climate related risks and health events. (Strategy HS1-A-3)
2) Update the City's emergency response plan and ensure that preparation and updates recognize and address likely climate change impacts. (Strategy HS1-A-6)
3) Develop/Update a comprehensive heat response plan that incorporates most current climate change impact projections and combines individual strategies into an integrated approach. (Strategy HS1-B-6)
4) Create and maintain a Response Plan for emerging vector-borne diseases, including increased capacity for health services that are triggered by certain case thresholds. (Strategy HS1-E-2)
5) Explore use of the EPA Midwest Clean Diesel Program resources to create enhanced City policies and ordinances and incentives for businesses. (Strategy HS3-A-2)

Business Community

1) Prepare your business for the extremes. Understand the risk of extreme weather, temperatures, flooding or wildfire to your facilities and employees, and take action to safeguard your business.
2) Collaborate with other businesses and create information, positions, and voluntary standards to define what climate and health mean within your sector.

Households/Individuals

1) Prepare your home for the extremes. Understand the risk of extreme weather, extreme temperatures, flooding or wildfire to your home, and take action to safeguard your home.
2) Put together an emergency preparedness kit for your household by visiting Ready.Gov
3) Check in on the people in your life, especially the elderly and those experiencing mental health problems - particularly when extreme weather temperatures strike.

Section 09

Food

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Food

Food and climate change are directly linked. For food or nutritionally insecure people, climate change is a threat multiplier. The extreme weather events, extreme temperature variations, changes in precipitation, changing soil temperatures and other climate impacts can impact crop yields as well as introduce interruptions in the current food processing and distribution system - disruptions that are likely to cause food availability or pricing fluctuations.

Our choices about what we eat and where our food comes from also directly impact our personal and community greenhouse gas emissions. Transporting food across long distances burns fossil fuels and emits greenhouse gases. In addition, the extended period of time of long-distance transport increases the need for refrigeration. The less transportation and refrigeration needed to supply us our food, the more sustainable it becomes.

Strengthening local food sources can address both climate change relationships with food and also supports your small business local economy. Studies have indicated that nearly 32 jobs are created for every $1 million in revenue generated by produce farms involved in a local food market, compared to only 10.5 jobs for those involved in wholesale channels exclusively. Increased local food systems also increase community resilience. A robust local food system establishes additional supply chains and resilience to distribution disruptions. Healthy local food systems can also play a critical role in addressing food access vulnerability and food insecurity within neighborhoods of higher vulnerability. Increased local food systems also tend to increase diversity and long-term food system resilience in food crops cultivated.

Equity Considerations:

- People in low-income neighborhoods may have limited access to full-service supermarkets or grocery stores - an area known as a "food desert". Over 8.8% of Dubuque County households are food insecure – over 40% of those with incomes above assistance program thresholds.
- Studies have also shown that communities with fewer resources often have more outlets that promote unhealthy dietary behaviors such as fast food restaurants, and little access to affordable nutritious food. This condition is known as a "nutrition desert".

Food Goals

F1: Reduce food's contribution to climate change.

F2: Improve local food resilience and availability.

Did You Know?

Shifting just **20%** of food purchases in the City of Dubuque to local food sources would add **260** local jobs.

$15,900,000

Could be added to the local economy by shifting just 20% of food purchases to local sources.

Food

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. Below are the Strategies guiding the Food section:

Goal F1 Reduce food's contribution to climate change

How we'll accomplish this goal	How we'll measure our progress
Strategy F1-A: Reduce perishable food wasting	Reported food waste volumes at DMASWA
Strategy F1-B: Increase food residuals recovery to beneficial use	Reported City organics and food scrap collection volumes; reported DMASWA compost sales/utilization volumes

F2 Improve local food resilience and availability

How we'll accomplish this goal	How we'll measure our progress
Strategy F2-A: Improve healthy food system resilience and supply safety net	Number of reported grower locations, vendor participants, and sales volumes; Number of reported community garden locations and plots; Community garden participation by vulnerable populations; Oobserved number of residential and commercial urban agriculture plots
Strategy F2-B: Strengthen farm to institution procurement	Reported government and community institutions with implemented Farm-To-Institution programs

Food

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Pass city policy to procure climate-friendly foods for events and other city-managed facilities. Foods should be locally sourced to the highest extent feasible. (Strategy F2-B-3)
2) Revise zoning ordinances to allow urban agriculture and clarify acceptability to remove barriers to front yard and rooftop vegetable gardens, edible landscaping and foraging. (Strategy F2-A-4)
3) Identify funding for, develop and promote a Shared Food Processing facility with commercial grade, code compliant equipment and space. (Strategy F2-A-3)

City Staff

1) Identify opportunities to build upon the City's public health procedures, information and messaging to encourage local gardening, composting, leaving leaves, and reducing chemical fertilizers and pesticides. (Strategy F2-A-1)
2) Develop a comprehensive farmland conservation plan that prioritizes food production while taking into consideration other Imagine Dubuque priorities. (Strategy F2-A-7)
3) Coordinate with City GIS Mapping servcies to identify potential sites for community garden sites or community farm sites with a focus on expanding community equity. Develop master plan and schedule for development of best sites. (Strategy F2-A-8)
4) Coordinate with School District, local universities, and local hospitals to establish a climate-friendly, locally sourced foods procurement policies. (Strategy F2-B-1)

Business Community

1) For catering needs, use local restaurants and suppliers selling organic and locally-grown food.
2) Convert lawn areas to Edible Landscape where food-producing trees, shrubs, and plants grow within the landscape. Collaborate with local community kitchens and food shelves enabling them to harvest food produced.

Households/Individuals

1) Plant fruit or nut bearing trees or shrubs that are well suited for our hardiness zone on your property.
2) Support restaurants, grocery stores, and farmer's markets that use and sell locally-grown food.
3) Grow your own food through front or back yard gardens or join a community garden.

Section 10

Greenspace and Tree Canopy

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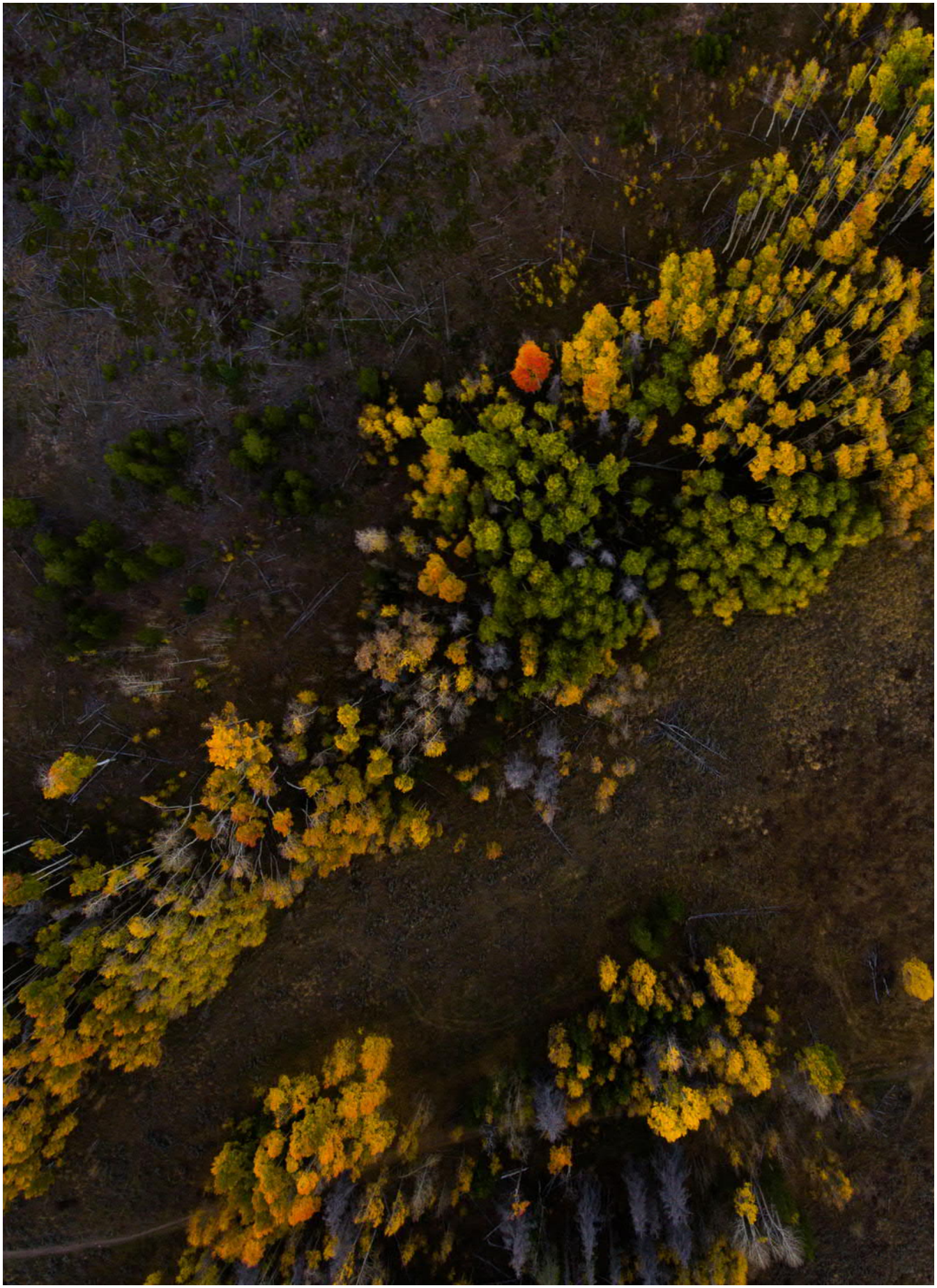

Greenspace and Tree Canopy

Trees and natural ground covering play a central role in supporting community health, improving air and water quality, helping to reduce building energy use, and supporting climate mitigation. Recent studies have shown that sometimes, going to a park, or even looking a single tree can significantly improve a person's health and stress levels. Some doctors have started prescribing parks as a remedy to patients' health issues. Our understanding of the value of trees has been expanded to include mental and physical health benefits. Trees are critical in filtering air, removing harmful pollutants, such as carbon monoxide, particulate matter, and ground-level ozone - pollutants that can be toxic at high levels and which can cause asthma and other respiratory impacts.

Conversely, higher levels of impervious surfaces (pavement and buildings) within a community will increase the heat island of the community. Heat island refers to the phenomenon of higher atmospheric and surface temperatures occurring in developed areas than those experienced in the surrounding rural areas due to human activities and infrastructure. Increased heat indicies during summer months due to heat island effects effectively raise human discomfort and health risk levels in developed areas, especially during heat waves. Based on a 2006 study done by Minnesota State University and the University of Minnesota, the relationship between impervious surface percentage of a City and the corresponding degree of heat island temperature increase can be understood as a ratio - meaning there is a measurable reduction in future heat island impacts for every healthy tree in the city's tree canopy.

Equity Considerations:

- Lower income neighborhoods and neighborhoods with higher proportions of people of color regularly have lower tree canopy coverage; and the environmental, economic, and quality of life benefits trees support; than more affluent neighborhoods.
- "Heat islands" are built up areas that are hotter than other nearby areas. This is caused by lack of adequate greenspace and healthy tree canopy coverage combined with too many hard surfaces like roads, parking lots, and hard building surfaces. Frequently neighborhoods with higher vulnerable populations have the highest heat island impacts.

Greenspace and Tree Canopy Goals

GS1: Strengthen Dubuque's tree canopy.
GS2: Strengthen Dubuque's green space.
GS3: Mitigate current and future urban heat island impacts.

Did You Know?

Dubuque's tree canopy covers an estimated **26.2%** of the city's total land area. The city's trees and grasslands sequester a over **47,000,000** pounds of CO_2 annually.

$8,786,896 in environmental and energy savings are provided by the trees within the city annually.

Greenspace and Tree Canopy

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. Below are the Strategies guiding the Greenspace and Tree Canopy section:

Goal GS1 Strengthen Dubuque's tree canopy

How we'll accomplish this goal	How we'll measure our progress
Strategy GS1-A: Educate, engage, and empower the public	Reported annual educational events and publications; Audience reached
Strategy GS1-B: Update and implement recommendations in 2011 Dubuque urban forest evaluation	Completion of Updated Urban Forest Evaluation; Completion of implementation Master Plan; Reported city-wide greenspace, ground cover, and tree canopy percentages (5 year interval)

GS2 Strengthen Dubuque's green space

How we'll accomplish this goal	How we'll measure our progress
Strategy GS2-A: Reduce, repurpose, and reimagine lawn space	Reported city-wide grass coverage and lawn coverage percentages (5 year interval)
Strategy GS2-B: Utilize parks and marginal city property for greater community use	Acres of equitably distributed publicly accessed greenspace: Percentage of residents within 10 minute walk of park space: Reported park space utilization

Goal GS3 Mitigate current and future urban heat island impacts

How we'll accomplish this goal	How we'll measure our progress
Strstegy GS3-A: Update design standards, plans, and policies for heat island mitigation	Reported City plans and standards updated
Strstegy GS3-B: Promote and implement heat island mitigation improvements	Percentage of tree canopy coverage by census tract; Heat Island Coefficient by census tract

Greenspace and Tree Canopy

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Create a tree preservation ordinance with reasonable exceptions that support the CAP tree canopy coverage and heat island mitigation goals. Ordinance should reflect projected climate changes and impacts on tree species. (Strategy GS-1B-6)
2) Develop a performance based ordinance requiring tree planting within parking lots. Ordinance should establish a specific goal of percentage of pavement to be shaded by trees. (Strategy GS3-A-2)
3) Establish a policy and incentive to assist homeowners by covering some of the cost of converting traditional lawns by planting pollinator friendly food gardens, permaculture, wildflowers, clover or native grasses. (Strategy GS2-A-4)
4) Develop a policy that requires all housing and commercial development projects recieving City funding, PUD approval, and/or Conditional Use Permitting to implement commercial scale heat island mitigation strategies. (GS3-A-3)

City Staff

1) Establish an implementation master plan with schedule, budget, and prioritized actions following the completion and recommendations of the City's updated Dubuque Urban Forest Evaluation. (Strategy GS1-B-2)
2) Replanting tree loss, and Ash tree replacement for EAB management, at 110% or more of replacement with improved diversity. (Strategy GS1-B-5)
3) Based on city's citywide heat island impact study (see Buildings and Energy actions) identify vulnerable urban tree canopy and street tree sections and develop policies to incentivize, encourage, or require strategic tree planting for heat island mitigation. (Strategy GS3-A-1)
4) Transition maintenance of all city owned properties to Carbon Gardening practices including elimination of synthetic fertilizer and pesticide use, high mow deck settings, use of biochar amendments, and polyculture lawn mixture. (Strategy GS2-A-1)

Business Community

1) Remove pavement and increase permeable surfaces, plant trees in parking lot islands to shade pavement and reduce heat island effect.
2) Convert traditional lawns by planting pollinator friendly food gardens, permaculture, wildflowers, clover or native grasses.
3) Use biochar soil amendments on any site construction projects that disturb the soil. Implement soil profile rebuilding around any new trees planted around buildings, parking lots, or other areas with heavily compacted soils.

Households/Individuals

1) Make your backyard a Certified Wildlife Habitat with the National Wildlife Federation.
2) Plant trees in your yard to provide shade and cooling in summer heat. Select climate adapted trees that don't interfere with power lines and preserve the trees you already have.
3) Plant a rain garden with native plantings to absorb storm water and replenish our aquifers.

Section 11

Climate Economy

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Climate Economy

Climate change and the economy are inexorably linked. Left unabated, the impacts of man-made climate change through the end of this century will cost the United States billions of dollars. According to a 2019 study by two EPA scientists, the difference in economic impact between the mid-range climate model and the high range climate model may account for as much as $224 billion in economic impact annually by 2090. According to a 2019 World Bank report on trends in carbon pricing, a carbon price range of $40-$80 per ton is necessary by 2020 to reach the goals set by the 2015 Paris Agreement, while other studies have placed the full cost of carbon at $200-$400 per ton. The calculations outlined in Section 2 of this plan estimate a conservative localized cost for carbon at over $50 per ton.

The economy is also directly linked to climate action as well. One common reason given by those who wish not to see action taken on climate change is that the economy will be damaged. Setting aside the avoidance of the future costs should we not act to mitigate climate change, evidence is building a clear case that acting on climate change, and reducing fossil fuel emissions can be done without weakening the economy. Since 2003, Dubuque has seen city-wide GHG emissions drop over 27% while during that same period the city's GDP has ***increased*** 78%.

Many of the climate actions included in this plan can reduce Dubuque's contributions to global greenhouse gas levels, deal with the risks posed by climate change, and achieve economic growth and opportunity. Transformative change is needed now in how we build our cities, produce and use energy, transport people and goods, and manage our landscapes. This change also represents opportunities to improve our quality of life, improve health outcomes, and provide opportunities for new jobs and economic development.

Equity Considerations:

- Economic impacts of climate change are inequitably felt. Low income individuals in our communities are especially prone to the impacts of climate change and bear a greatly disproportionate share of the costs.
- Income inequality is rising in the US, with September 2019 levels being the highest in 50 years. High inequality leads to lower life spans, increased instances of mental health issues, and increased obesity rates among other social impacts.

Climate Economy Goals

CE1: Capture local economic potential of climate action.

CE2: Build marketplace climate resilience.

Did You Know?

Between 2003 and 2018 Dubuque was able to decrease its GHG emissions by 27% while growing its economy by 78% and employment by 12%

Climate Economy

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. Below are the Strategies guiding the Climate Economy section:

Goal CE1 Capture local economic potential of climate action

How we'll accomplish this goal	How we'll measure our progress
Strategy CE1-A: Create a climate action market supporting and advancing climate action strategies.	Status of market establishment; Annual revenue available for climate action implementation
Strategy CE1-B: Increase workforce development for the climate economy	Reported local workforce and employment in climate/green economy jobs
Strategy CE1-C: Explore climate action economic development and financing, particularly within underserved populations	Equitable funding sources established and/or utilized by underserved populations

Goal CE2 Build marketplace climate resilience

How we'll accomplish this goal	How we'll measure our progress
Strategy CE2-A: Inform businesses of climate vulnerability and opportunities for increasing resilience	Reported annual educational events and publications; Audience reached; Utilization of on-line assessment resource
Strategy CE2-B: Prepare for climate change immigration/migration	Status of assessment and plan completion; Status of strategy identification; Status of collaboration with school district

Climate Economy

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Establish a policy that designates City Franchise Fee Income as funding source for Climate Initiatives. (Strategy CE1-A-1)
2) Fund and organize the establishment of a ReStore Facility for reusable furnishings and salvage including construction/demolition. (Strategy CE1-A-3)
3) Establish a policy to utilize TIF (Tax increment Financing) to incentivize Mitigation and Adaptation actions in line with the goals of the CAP. (Strategy CE1-A-4)
4) Create an ordinance to expand residual food scrap collection. (Strategy CE1-A-2)

City Staff

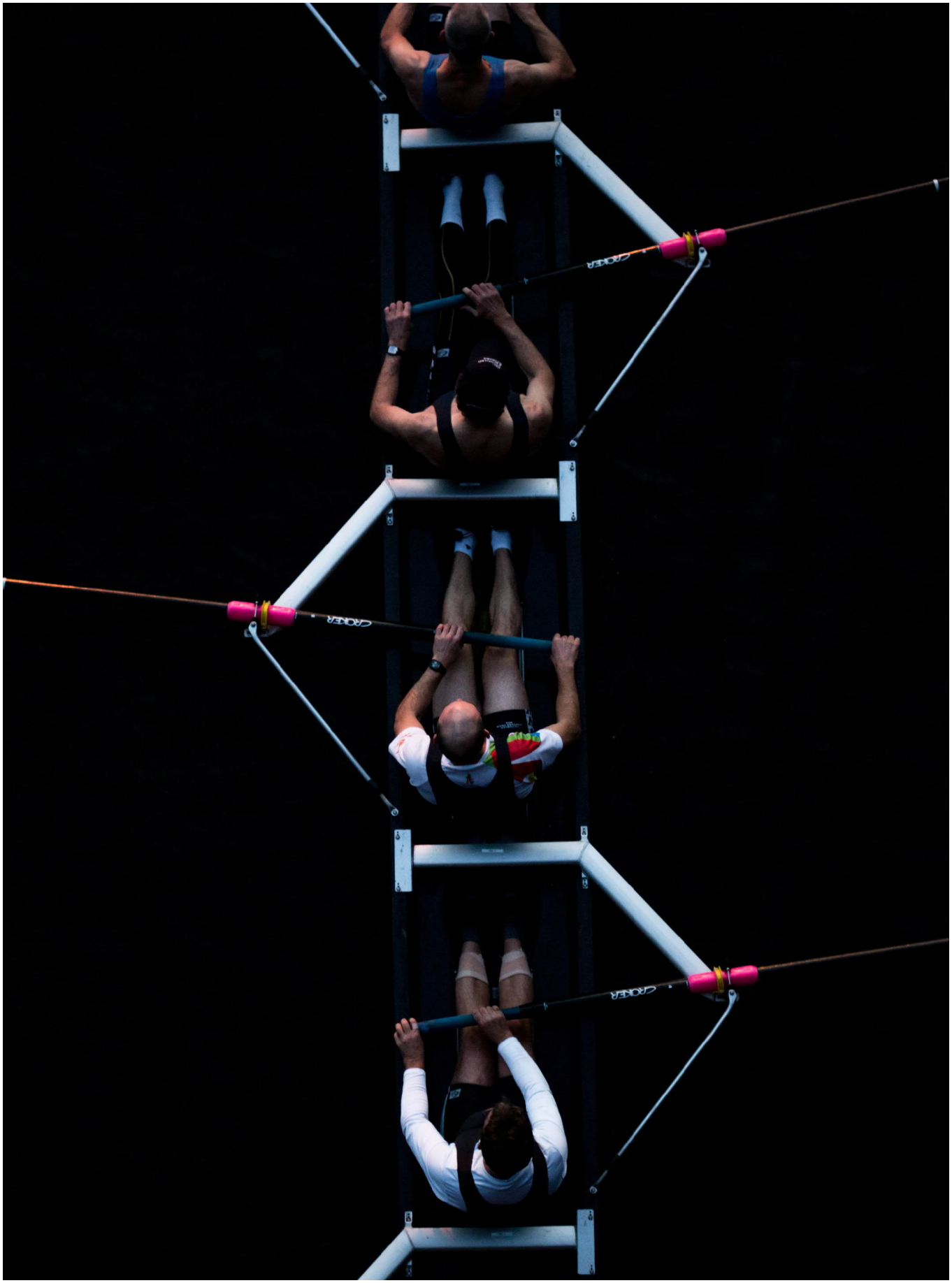
1) Explore the creation of Community Development Finance program or institution to provide credit and financial services to underserved markets and populations, with a particular focus on advancing the goals, strategies, and acitons of the City's CAP plan. (Strategy CE1-C-1)
2) Create an intern program similar to the IDNR Pollution Prevention (P2) model. Task interns with finding resiliency solutions and cost savings. Intern development should focus on increasing community equity. (Strategy CE1-B-3)
3) Explore the development of a job training and entrepreneurial development program similar to Operation Fresh Start. Program to focus on devvelopping green jobs skills within vulnerable and underserved populations in local sustainable agriculture, energy efficiency audits and upgrades, renewable energy, and other skills that support the goals of the CAP. (Strategy CE-1-B-2)
4) Work with local union hall to ensure that apprenticeship program includes solar training. (Strategy CE1-B-1)

Business Community

1) Consider hiring an intern to focus on identifying resiliency solutions, energy efficiency opportunities, waste reduction potentials, and cost savings.

Households/Individuals

1) Explore opportunities for job training, skills development, and employment in the "green economy" and industries which advance renewable energy, energy efficiency, and local sustainable food development.



Section 12

Climate Action Capacity

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Climate Action Capacity

Implementing a Climate Action Plan requires capacity both internal to City government as well as external within the public. External capacity includes the social and technical skills of individuals, organizations and groups within the community to respond to and engage the environmental and socioeconomic changes at the core of a Climate Action Plan. External capacity is often established through education and engagement as well as support in establishing social networks supporting resilience. Internal capacity includes the staff support necessary for tracking and reporting progress, creating and executing an annual work plan, and establishing and growing collaborative relationships to support this important work.

Implementation of a Climate Action Plan should be supported by a variety of funding mechanisms and sources to be successful. Funds should be directed internally to support the city operations goals as well as toward the community in the form of communications, educational outreach, partnership development, and incentivization to spur action and change. Outside funds may also be identified to complement efforts of the city.

Equity Considerations:

- Climate action capacity is determined by a number of determinants including an individual or organization's assets, flexibility, and agency – or ability to impact change. Climate vulnerable populations are frequently vulnerable specifically due to one or more of these key determinants being missing.
- Individuals, organizations, and communities with a higher degree of adaptive capacity will suffer less harm from exposure to climate impacts and will recover more quickly than those with a lower degree of adaptive capacity.

Climate Action Capacity Goals

C1: Enhance and expand community capacity for climate action and resilience.

C2: Develop new mechanisms for financing climate action work that account for equity and co-benefits (building upon existing budget scoring criteria)**.**

Climate Action Capacity

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. Below are the Strategies guiding the Climate Action Capacity section:

Goal C1 Enhance and expand community capacity for climate action and resilience

How we'll accomplish this goal	How we'll measure our progress
Strategy C1-A: Educate, engage, and empower the public	Status of Outreach Plan; Status of CAAP outreach communication materials; Reported annual educational events and publications; Audience reached
Strategy C1-B: Support development of social networks to build social resilience	Reported annual social networks engaged; Reported participation levels within partner organizations and networks

C2 Develop new mechanisms for financing climate action work that account for equity and co-benefits (building upon existing budget scoring criteria)

How we'll accomplish this goal	How we'll measure our progress
Strategy C2-A: Leverage existing financing pathways	Status of funding pathways; Status and stability of annual climate action funding and staff allocation
Strategy C2-B: Develop new financing pathways	Mechanisms identified; Status of funding pathways; Status and stability of annual climate action funding and staff allocation

Climate Action Capacity

Taking Action

How can you help Dubuque reach our emissions reductions goals?

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. All of the actions in the plan are divided by who has the ability, access and decision-making power to get them accomplished. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. It is important to remain engaged and active, advancing and advocating for actions you feel are important.

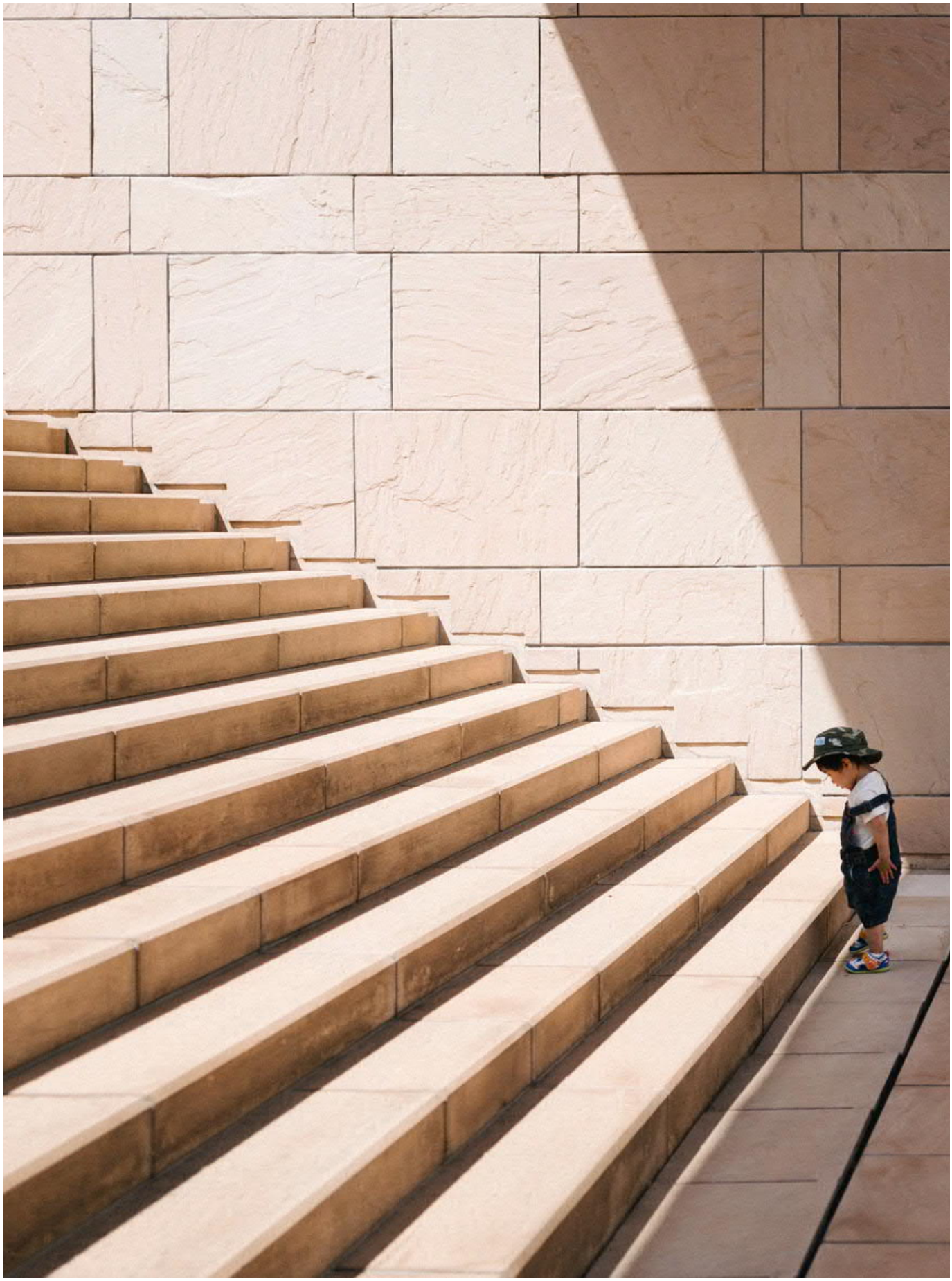
The following kick-start actions are foundational, high impact, and will help provide momentum for launching the City's Climate Action Plan (See Section 13 Implementation Action Plan for the complete list of detailed actions):

City Council

1) Establish a policy that requires city infrastructure projects and capital budgets incorporate climate risk and vulnerability analysis and adaptation plans to ensure that future spending contributes to resilience and achieving the City's CAP plan goals. (Strategy C2-A-4)
2) Explore the development of a "Carbon Impact Fee" Additional funds raised to be used for Climate Mitigation and Adaptation implementation. (Strategy C2-B-2)
3) Establish Rate Payer Advisory Commissions for review of rates, revenue, and uses for Resource Management and DMASWA. Explore revenue uses for opportunities to support actions in support of the City's Climate Action goals. (Strategy C2-A-2)
4) Create an ordinance to expand residual food scrap collection. (Strategy CE1-A-2)

City Staff

1) Explore modifications to City's zoning ordinance, such as allowance of accessory dwelling units, to encourage development of affordable intergenerational single-family homes and multi-family housing with a focus on improved social connectedness across demographic cohort. (Strategy C1-B-1)
2) Explore the potential of developing a "Carbon Impact Fee" similar to the City of Watsonville CA. Fee could be a percentage of the building permit fee applied to all construction projects. (Strategy C2-B-2)
3) Explore use of City share of DMASWA landfill methane capture and beneficial reuse as Renewable Natural Gas to fund Climate Mitigation and Adaptation implementation. (Strategy C2-A-1)
4) Explore the potential of collaborations with donors, philathropists, and non-profit foundations to develop a Climate Action and Equity Fund for the City of Dubuque. (Strategy C2-B-5)



Section 13

Climate Actions and Implementation

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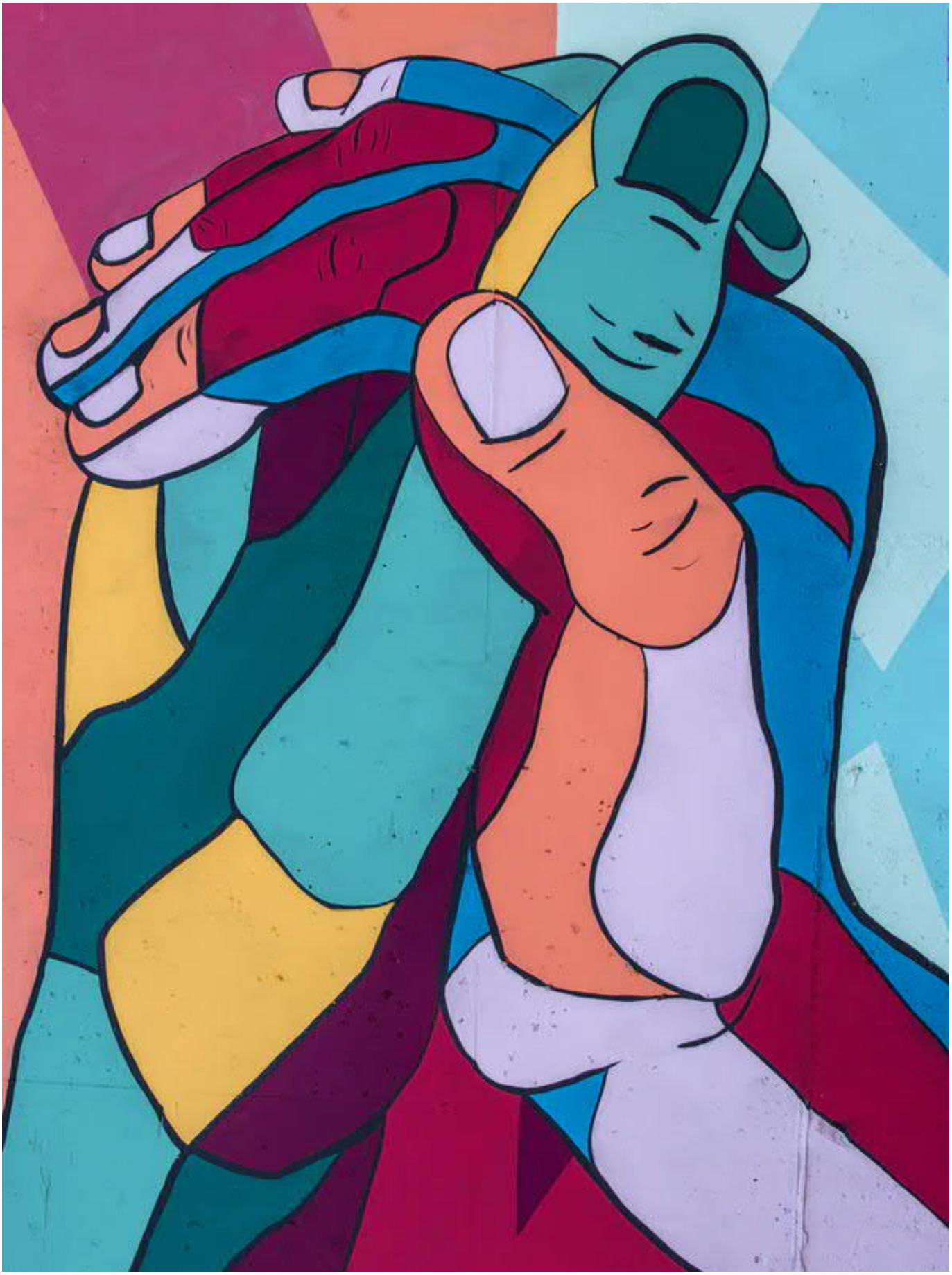

Climate Actions and Implementation

The first few years after plan adoption are critical to its success. Establishing roles, both internal and external, and identifying funding will help establish the implementation phase of the plan and ensure the community is on track to achieve its goals. This plan includes robust goals for significant GHG emission reductions and addressing climate resilience. This vision require commitment and integration of the CAP into City operations, functions, and services.

Implementation is For Everyone

As noted throughout this plan, the following Climate Actions include actions that require leadership and engagement from City Council, City departments and staff, the business community, as well as households and individuals. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. Ultimately, achieving the visionary energy efficiency, renewable energy, alternative transportation, and climate resilience goals outlined in this plan will require engagement and a sense of responsibility not only by the City of Dubuque leadership and government, but by the community itself as well. It is critical for all to remain engaged and active, advancing and advocating for actions you feel are important.

General Implementation Recommendations

The following are foundational recommendations to support the long-range implementation of the CAP:

Building Internal Capacity

Continuing to build internal capacity will be important to help establish the CAP as a priority integral to internal operations as well as fostering connections to community partners, businesses, and individuals through outreach, education, special projects, and service delivery.

1. Establish clear guidance and direction for the participation in and support of the CAP implementation actions by all City of Dubuque departments.

2. Fund and support Sustainability staffing required to:
   - Facilitate discussion among large users to reduce emissions through business and industrial strategies.
   - Participate in technical resource programs as they are available through County, State, Federal, and non-profit provider partners.
   - Support City of Dubuque department managers and staff as they implement CAP actions within their service area or area of expertise.
   - Convene an internal City climate working group that meets regularly and provides updates on progress and success, identifies additional support or resources needed to advance actions of the CAP, and collaboratively discusses strategies for more complex challenges.
   - Ensure the establishment and maintenance of a City of Dubuque Climate Action webpage supporting CAP resources for the community.
   - Coordinate and organizing volunteer groups and events.
   - Engage city boards and commissions (e.g., the Resilient Community Advisory Commission, Planning Commission, etc.) to ensure the CAP is integrated into their work plans.

3. Review Climate Action Plan implementation progress and impacts on a regular basis (1-2 year cycle); adjust, add, and remove detailed CAP actions as appropriate based on implementation progress review.

Climate Actions and Implementation

External Support

City staff and elected officials will not be able to implement this plan without robust support from community members and coordination with jurisdictional, institutional, and organizational partners.

1. Establish the Resilient Community Advisory Commission as the main citizen-body to support the implementation of the CAP:
   - Form subcommittees that focus on particular areas of the CAP
   - Coordinate with City staff in all relevant departments to receive updates on City projects and progress

2. Establish jurisdictional partnerships that advance CAP strategies to advance and accelerate action. This can include government entities like Dubuque County, the State of Iowa, the Catfish Creek Watershed Management Authority, and Dubuque Soil & Water Conservation District; utilities like Alliant Energy and Black Hills Energy; institutions like University of Dubuque, Clarke University and Loras College; community groups like Dubuque Multicultural Family Center, Fountain of Youth, and Green Dubuque; and neighboring communities.

Funding

Funding the implementation of the CAP will require reallocation/reconsideration of existing City funds, raising new City funds, and identifying outside resources and funding opportunities. Some funds will need to be dedicated toward long-term support like staffing, while other funding will be on a project-by-project basis.

1. Maintain a budget and identify funding sources for staff dedicated to the implementation of the CAP.

2. Identify a budget necessary to support projects on an annual basis as per the detailed actions outlined in the Climate Economy and Climate Action Capacity sections of the plan and climate actions.

3. Utilize no-cost technical assistance offerings as available.

Climate Action and Implementation Plan

The following is the full detailed list of detailed Climate Actions and implementation details supporting the goals and strategies of each Climate Action section.

Section 04	Buildings and Energy
Section 05	Transportation and Land Use
Section 06	Solid Waste and Recycling
Section 07	Water, Wastewater and Flooding
Section 08	Climate Health and Safety
Section 09	Food
Section 10	Greenspace and Tree Canopy
Section 11	Climate Economy
Section 12	Climate Action Capacity

	Detailed Actions - Buildings and Energy	Priority Level Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 -	Implementation				
			Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
	BE1 Increase distributed renewable energy by 21 MW of installed capacity by 2030						
	Strategy BE1-A: Increase solar on City facilities						
BE1-A- 1	Conduct a detailed solar assessment and "Renewable Energy Master Plan" for all primary city facilities. Include new and existing buildings, incorporate strategies to address electricity storage, and focus on highlighting any hurdles or solutions that would be applicable to the broader community. Install solar panels on all City buildings and sites, where feasible, based on implementation established in Renewable Energy Master Plan. City's largest energy consuming properties should be prioritized for assessment. Goal: 50% of city facility electric demand supplied through solar	**2.0**					
	Strategy BE1-B: Support and accelerate installation of on-site solar PV and solar thermal.						
BE1-B- 1	Develop solar ready policy or incentive offering with the goal of achieving 100% solar ready new home construction by 2025.	**1.0**					
BE1-B- 2	Collaborate with local Solar PV contractors and Alliant Energy to identify infrastructural challenges to solar PV implementation throughout the community in support of the goals of the CAP - particularly circuit capacities, utility upgrade requirements and costs. Support Alliant Energy and collaborators in establishing a strategies and a plan for overcoming infrastructural challenges identified, with a prioritization of resolving challenges at the city's most optimal sites.	**1.0**					
BE1-B- 3	Incentivize local renewable energy projects. Explore leveraging existing incentives to increase renewable energy utilization and generation throughout the entire city. These incentives would include support for low-income solar installations and the creation of green jobs.	**2.0**					
BE1-B- 4	Conduct Solar Ready training using the City's Solar Ready Guidelines and listening sessions with the home builders association, contractors, building designers, developers, and building owners. Include information on benefits of on-site renewable energy generation. Distribute the Solar Ready Guidelines and checklist through city channels. (http://palebluedot.llc/dubuque-solar-ready-guide)	**3.0**					
BE1-B- 5	Encourage and educate residents on the benefits of on-site solar: Post the state solar resource map on city's CAP Resource Hub; include City's Solar Ready Guidelines (http://palebluedot.llc/dubuque-solar-ready-guide). Resource HUB should include links to helpful resources and tools supporting site owners in exploration and procurement of on-site solar.	**3.0**					
	Strategy BE1-C: Encourage equity for renewable energy						
BE1-C- 1	Collaborate with Alliant Energy to establish an on-bill financing option for renewable energy and energy efficiency upgrades. (https://www.lowincomesolar.org/toolbox/on-bill-recovery/)	**1.0**					
BE1-C- 2	Create a local Low Income Solar Renewable Energy Credit (SREC) Market and/or 3rd party financing loan guarantee program.	**2.0**					
	Strategy BE1-D: Increase solar on residential buildings						
BE1-D- 1	Coordinate and promote a residential Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 120 households annually). Program design to explore strategies to support local small business solar installers such as being set up to enable small installers to collaborate or having a competitive "marketplace" approach with more than one installer to choose from.	**3.0**					
	Strategy BE1-E: Increase solar on commercial/industrial facilities						
BE1-E- 1	Identify the "Solar Top 50" commercial/industrial properties within the city and produce detailed solar feasibility assessments for each site. Assessments to include potential solar generation and economic performance and return on investment estimates, information on financing and ownership models, and next step resources. Provide solar assessment reports to properties and conduct an informational workshop to assist building owners and businesses in understanding the assessments and next step potential. "Solar Top 50" assessment effort could be repeated annually, particularly through 2025	**2.0**					
BE1-E- 2	Coordinate and promote a commercial Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 1100KW installed annually). Group purchase campaign could include/focus on properties identified in the "Solar Top 50" assessment effort. Program design to explore strategies to support local small business solar installers and strategies to support local workforce development.	**3.0**					
BE1-E- 3	Motivate and assist businesses throughout the community to install solar. Provide information on solar incentives, tools, and financing to businesses throughout the City.	**3.0**					
	Strategy BE1-F: Advocate for stronger state policy						
BE1-F 1	Collaborate with other communities, industry, and state agencies to support the State establishing community solar, virtual net metering, and aggregated net metering policies and laws.	**1.0**					
	BE2 Reduce citywide energy consumption by 10% by 2030						
	Strategy BE2-A: Increase energy efficiency in City facilities						
BE2-A- 1	Create a policy that all City buildings shall reduce energy usage by 20% over the next 10 years	**1.0**					

BE2-A- 2	Introduce a policy that requires all municipal buildings to be benchmarked using ENERGY STAR Portfolio Manager. Each primary building's Energy Score rating, and energy use intensity (kBTU/sqft) shall also be posted on the City's website. Invite County, School District, and other public agencies located within the City to participate in the City's public facilities energy benchmarking and disclosure effort.	**1.0**					
BE2-A- 3	Introduce a policy that requires all new and existing municipal buildings to meet and maintain energy and resource efficiency standards meeting an ENERGY STAR rating of 75 or better, and built to meet or exceed IGCC code. Require new and existing municipal buildings without solar PV installations in place or planned to install cool roof or green roofing. Require all new construction or major renovation projects to use the City's Net Zero Energy Building Guide and Checklist to explore opportunities to advance towards Net Zero Energy (palebluedot.llc/dubuque-net-zero-energy-guide). Invite County, School District, and other public agencies located within the City to participate in City's energy efficiency policy effort.	**1.0**					
BE2-A- 4	Establish a centralized facility management / construction project management structure or department for all City owned facilities. Structure to focus on increased capacity for execution of high performance city construction projects capable of achieving energy efficiency and renewable energy goals consistent with the City's CAP plan.	**1.0**					
BE2-A- 5	Explore the development of a Revolving Loan program for City facilities to fund capital costs for high performance energy efficiency and renewable energy options with appropriate return on investment. Fund to be used to implement all cost-effective (simple payback of ten years or less) resource-efficiency projects in City-owned buildings and facilities. Rather than reverting back to the City's general fund, operational savings from energy efficiency measures of completed projects are to be re-invested into revolving loan and a portion of savings provided to the participating depratment(s) to support funding of additional energy efficiency improvements.	**1.0**					
BE2-A- 6	Conduct a occupancy and plug load energy efficiency study of primary city owned facilities and establish a "Plug Load and Occupancy Energy Eficiency Guide" outlining operational practices to advance the City's energy efficency goals for City facilities. Provide training to all existing city employees and provide on-going training to all new city hires.	**1.0**					
BE2-A- 7	Conduct a Building Energy Audit on all primary City owned facilities. Fully implement audit recommendations. Prioritization should be given to the City's largest energy consuming sites. Study for Water Resource and Recovery Center (WRRC) to incorporate self-generated energy use including Renewable Natural Gas (RNG) into WRRC future planning.	**2.0**					
	Strategy BE2-B: Improve energy efficiency in all sectors						
BE2-B- 1	Conduct a citywide heat island impact study to identify areas of high heat island contribution and impact, overlapped with vulnerable population mapping from the City's Climate Vulnerability Assessment. Study to establish specific goals, by census tract, for reduction of imperviious surfaces (particularly dark), improvement of tree canopy and greenspace coverage, and target "Heat Island Coefficient". Study to establish heat island mitigation strategy recommendations and identify priority areas for heat island mitigation based on need, potential, and impact on equity and vulnerable populations. Study should provide prioritized direction on "cool pavement" strategies for integration with the City's Pavement Preservation Program CIP and city facility maintenance ance and construction plans. Study should also evaluate opportunities to plant additional trees near city facilities to reduce heat island. Coordinate and integrate study with the City's Storm Water Infiltration Plan (see Water section). http://palebluedot.llc/tree-canopy-assessments	**1.0**					
BE2-B- 2	Support state adoption of the new International Green Construction Code (IGCC) statewide and/or enabling local jurisdicitons to adopt and enforce IGCC locally.	**1.0**					
BE2-B- 3	Establish an "energy efficiency and renewable energy introduction" course for all city employees with any degree of facility responsibilities. Course shall then be provided on a regular basis for all new city employees as they are hired. Create a policy, to be part of assigned duties and presented during new employee orientation, that City employees shall turn off lights and equipment when they are done using them	**2.0**					
BE2-B- 4	Prior to adoption at the State level (see action BE2-B-2), adopt a voluntary green building stretch code (IgCC) including stretch energy efficiency requriements in-line with Architecture 2030 goals. Make (IgCC) code required for all City facility projects and all projects receiving $50,000 or more in City tax abatement, financing or funding. providing information, technical assistance	**2.0**					
BE2-B- 5	Develop educational and informational resources explaining the drivers and impacts of heat island and solutions which may offer multiple benefits for property owners and users to share with residents and businesses.	**2.0**					
BE2-B- 6	Explore the development of a "Cool Roof", "Cool Building" and "Cool Pavement" pilot project to exhibit heat island mitigation strategies and measure potential for effectiveness. Identify city building with low solar PV prioritization/feasibility for inclusion as cool roof pilot locaiton. Alternatively, pilot program could be advertized for submission by City of Dubuque residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential	**2.0**					
BE2-B- 7	Explore development of "Cool Roof", "Green Roof", "Green Wall" / "Live Wall" and "vertical garden" incentives (demonstration projects, voluntary programs, incentivized program, ordinance / policy) to meet long-range dark impervious surface reduction goals. Coordinate with existing compatible city policies such as the Stormwater Management Utility fee structure. Examples of incentive programs have been developed by the Climate Protection Partnership Division in the U.S. Environmental Protection Agency's Office of Atmospheric Programs. These can be found at: https://www.epa.gov/sites/production/files/2014-08/documents/greenroofscompendium_ch3.pdf and https://www.epa.gov/sites/production/files/2014-08/documents/coolroofscompendium_ch4.pdf	**2.0**					
	Strategy BE2-C: Promote audits, energy efficiency rebates and financial incentives						

BE2-C- 1	Partner with local community organizations serving under-resourced households to promote energy efficieny audit and upgrade program for low-income residents. (see BE2-C-2). Target 150 households per year	**1.0**					
BE2-C- 2	Work with Alliant Energy, Black Hills Energy, and University of Northern Iowa's Center for Energy and Environmental Education Green Iowa AmeriCorps program to establish residential and multi-family energy efficiency audit and upgrade program similar to Xcel Energy's "Home Energy Squad Visits". Target 300 households per year (https://www.homeenergysquad.net/)	**1.0**					
BE2-C- 3	Work with Alliant Energy, Black Hills Energy, and University of Northern Iowa's Center for Energy and Environmental Education Green Iowa AmeriCorps program to establish commercial energy efficiency audit and upgrade program similar Minnesota Chamber of Commerce's EnergySmart commercial energy savings program. Program could be integrated with the commercial waste audit service identified in Solid Waste action SW1-B- 1. 70 commercial businesses and 70 industrial businesses per year with 10% electricity savings and 12% natural gas savings each. ((https://www.mnchamber.com/your-opportunity/energy-smart)	**1.0**					
BE2-C- 4	Regularly host utility bill clinics similar to those offered by Minnesota Citizens Utility Board (http://cubminnesota.org/) to help residents understand their bills, discuss energy savings options, and hear about rebate availability and clean energy options	**1.0**					
BE2-C- 5	Implement energy benchmarking (performance tracking and annual reporting) program for commercial buildings, required for all buildings equal to or greater than 50,000 square feet.	**1.0**					
BE2-C- 6	Develop a city-hosted website with resources about home energy options for residents, including available energy programs and where to purchase ENERGY STAR appliances	**1.0**					
BE2-C- 7	Collaborate with other communities, industry, and state agencies to support the State establishing the enabling legislation for Commercial Property Assisted Clean Energy (C-PACE) and Residential Property Assisted Clean Energy (R-PACE) financing	**2.0**					
BE2-C- 8	Work with County to establish a Commercial Property Assessed Clean Energy (C-PACE) program and a Residential Property Clean Energy (R-PACE) program to provide financing for energy efficiency and renewable energy measures.	**2.0**					
BE2-C- 9	Create a building weatherization and high energy efficiency renovation program that includes a job training component. Potential partners may include the HEART program (https://www.fourmounds.org/programs-events/youth-programs/heart-program/). Program example: https://risingsunenergy.org/	**2.0**					
	Strategy BE2-D: Improve energy efficiency and equity in residential buildings						
BE2-D- 1	Develop and adopt a rental housing energy efficiency policy requiring single family and multi-family rental housing properties to meet minimum energy efficiency level to qualify for rental licensing. Program to include an energy efficiency rating system (ENERGY STAR or HERS). Example program: https://bouldercolorado.gov/plan-develop/smartregs.	**1.0**					
BE2-D- 2	Implement a residential energy benchmarking (performance tracking and reporting) and labeling program for homes listed for sale. Examples include HERS (https://www.hersindex.com/), and ENERGY STAR Portfolio Manager (https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager)	**2.0**					
BE2-D- 3	Develop a pilot project with the City's True North Community Development Corporation home rehabilitation program to model residential scale heat island mitigation strategies including cool surfaces, solar-friendly landscape shading strategies, impervious surface reduction, and breeze capture. Alternatively, pilot program could be advertized for submission by City of Dubuque residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential. Reference City's Rehab Guidelinnes and Net Zero Energy Building Guide for relevant strategies.	**2.0**					
	Strategy BE2-E: Increase net zero energy residential building stock						
BE2-E- 1	Utilize incentives, vacant City land, and current programs for pilots of net-zero buildings across different sectors. Explore option of issuing a competitive RFP for effective and innovative Net Zero pilot projects. Focus on "Net zero building in every neighborhood" to establish visibility of strategies within the community	**1.0**					
BE2-E- 2	Provide City's Net Zero Energy Building Guide and Solar Ready Guidelines document to local home shows or remodeler showcase events. Include the City's Net Zero Energy Building Guide and Solar Ready Guideline documents on the City's Design Guidelines webpage (https://www.cityofdubuque.org/1295/Design-Guidelines)	**2.0**					
BE2-E- 3	Provide training on solar ready and net-zero strategies as found in the City's Net Zero Energy Building Guide and Solar Ready Guidelines to area builders with local builders association. Target 1% market coverage (140 homes) (palebluedot.llc/dubuque-net-zero-energy-guide) (http://palebluedot.llc/dubuque-solar-ready-guide)	**2.0**					
BE2-E- 4	Encourage new construction and remodeling projects to meet Electric Vehicle (EV) ready standards using the EV Readiness section of the City's Net Zero Energy Building Guide	**2.0**					
	BE3 Promote "fuel switching" to reduce on-site fossil fuel use 10% by 2030						
	Strategy BE3-A: Promote "fuel switching" to low/no carbon alternatives						

BE3-A- 1	Deploy an incentive program for electrification. Work with Alliant Energy or other regional partnerships to create financial incentives to electrify new and existing buildings. For example, rebates for panel upgrades, electric appliances, Air Source Heat Pumps, and Ground Source Heat Pumps can encourage the transition to electric energy use in homes and businesses. Goal: Target 10% residential market conversion (250 households annually) and 5% commercial/industrial market conversion (an estimated 25 commercial businesses, 10 industrial businesses annually) by 2030	**1.0**					
BE3-A- 2	Work with regional energy partnerships to invest in electrification financing programs such as on-bill financing and metered energy efficiency. Working with third-party entities allows the City to leverage incentive systems for electrification, such as options for financing retrofit projects and paying back loans through power bills	**1.0**					
BE3-A- 3	Work with Black Hills Energy Corporation to establish an option for Renewable Natural Gas for customers and achieve 2.5% commercial/industrial use by 2030 (128 businesses per year)	**1.0**					
BE3-A- 4	Work with Black Hills Energy Corporation to establish an option for Renewable Natural Gas for customers and achieve 7% residential use by 2030 (170 households per year)	**2.0**					
	BE4 Increase renewable energy share of electric grid to 15% by 2030 (beyond current Alliant Energy commitments)						
	Strategy BE4-A: Community solar for residential and commercial						
BE4-A- 1	Develop and issue an RFI / RFP for community solar developers to advance community solar options and subscriptions within City. RFP shall focus on projects that benefit all residents, particularly communities of color and low income populations. Include community solar option benefiting small businesses. (Goal: 400 households subscribed per year, 100 businesses subscribed per year)	**1.0**					
BE4-A- 2	Collaborate with Alliant Energy in establishing policies to allow Community Wind and Solar Gardens/Shared Solar, Aggregated Net Metering, and Virtual Net Metering within the City of Dubuque service area prior to statewide legislation as a demonstration project for the State.	**1.0**					
	Strategy BE4-B: Increase utility scale renewable energy installations						
BE4-B- 1	Partner with Alliant to expand 1.2MW Solar Array to 3-5MW utilizing lower Bee Branch reservoir (floating solar) by year 2023.	**1.0**					
BE4-B- 2	Partner with Alliant for the development of an additional utility owned solar arrays and/or wind turbine installations totaling 12MW by 2028	**1.0**					
BE4-B- 3	New Hydro Electric Development at Lock and Dam – Identify strategically located energy offtakers (John Deere, Alliant Energy, etc). Research available technology options and develop proforma to use for bidding project to EPCs or submit an RFI to identify options. Construction and activation of new hydro development antciipated after 2030.	**2.0**					

	Detailed Actions - Transportation and Land Use	Priority Level	Implementation				
		Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
	Goal TL1 Decrease vehicle miles traveled (VMT) by 10% by 2030						
	Strategy TL1-A: Build Complete Streets; target: 25% Complete Street community coverage by 2030						
TL1-A- 1	Update, fund, and adopt a more comprehensive Complete Streets Policy including but not limited to: i.Inclusive Public Process- The City of Dubuque should utilize a Charrette or other citizen input process to determine Dubuque's long-term objectives with complete streets. See also "Transparency/Accountability". ii.Systematic Approach - Upon regularly scheduled maintenance ALL roadways should be considered for compliance with complete streets concepts and how that roadway fits into the overall transportation system. iii.Transparency/Accountability - There should be public documentation of planned upgrades and exemptions to roadways as they come up for maintenance with enough time for public comment. iv.Heat Island Mitigation Integration - integrate the heat island mitigation strategies recommended in the City's citywide heat island impact study (see Buildings and Energy actions) .	**1.0**					
TL1-A- 2	Utilize and implement feedback from existing Bike Friendly Community applications and achieve a minimum of Silver Bicycle Friendly Community certification by 2025 (https://bikeleague.org/community)	**1.0**					
TL1-A- 3	Engage employers to secure a minimum of 10 Bike Friendly Business designations (goal of 25% of workforce impacted) (https://bikeleague.org/business)	**1.0**					
TL1-A- 4	Implement a comprehensive sidewalk network plan and policy - with public funding plan. Implementation should prioritize locations which improve equity of mobility.	**2.0**					
	Strategy TL1-B: Promote reduced vehicle travel citywide						
TL1-B- 1	Engage colleges and universities to secure a minimum of 3 Bike Friendly University designations (https://bikeleague.org/university)	**1.0**					
TL1-B- 2	Establish an incentive or subsidy and promote commuter mode-neutral incentives with the goal of 25% of private workforce receiving mode-neutral incentives or telecommute benefits. Note, commuter "mode-neutral" incentives equalize overall commuter incentivization and benefits of all commute choices, creating equity for non-auto commute choices. Resources: https://www.vtpi.org/tdm/tdm8.htm https://www.smartgrowthamerica.org/app/legacy/documents/smartgrowthclimatepolicies.pdf http://shoup.bol.ucla.edu/Parking%20Cash%20Out%20Report.pdf	**1.0**					
TL1-B- 3	In coordination with right-pricing of on-street parking which redesigns parking fees to capture the full cost of parking in downtown and other commercial districts with equity and carbon reduction in mind, establish parking betterment districts where revenue generated at meters supports neighborhood infrastructure and other transport mode investments such as bike and pedestrian paths, public transit improvements.	**1.0**					
TL1-B- 4	Engage employers to secure a minimum of 10 Top Work places for commuters designations (goal of 25% of workforce impacted) (https://www.bestworkplaces.org/)	**2.0**					
TL1-B- 5	Implement mode-neutral commuter incentives or telecommuting benefits for City employees Resource: https://www.smartgrowthamerica.org/app/legacy/documents/smartgrowthclimatepolicies.pdf	**2.0**					
TL1-B- 6	Provide information on parking availability, transit routes, bike paths using one application: Integrate smart traffic project with smart parking and bus/shuttle routes	**2.0**					
TL1-B- 7	Participate, promote, engage and support Bike to Work/School Week efforts	**2.0**					
TL1-B- 8	Leverage Iowa Games as an opportunity to host a Walking and Biking, Challenge focused on increasing awareness of existing and planned complete street routes.	**3.0**					
	Strategy TL1-C: Encourage density and increase housing options and affordability; target: increase gross density by 3.75% by 2030						
TL1-C- 1	Issue competitive redevelopment Request for Proposals encouraging high quality mixed use redevelopment on infill properties and existing surface parking lots within downtown district. RFP's should focus on equity, affordability, livability, and compliance/support of Climate Action Plan goals.	**1.0**					
TL1-C- 2	Fund neighborhood-based plans for all neighborhoods to encourage neighborhood identity, engagement and development. Plan goals should be to increse housing density, options, affordability, and equity while furthering the goals of the Climate Action Plan.	**1.0**					
TL1-C- 3	Incentivize infill and mixed-use development, particularly in census tracts with highest existing and planned public transit service and highest existing and planned bike trails and routes (e.g., through alternative code compliance, fee waivers, density bonuses, investment prioritization, development impact fees, tax benefits, historic tax credit utilization). Create an Infill Redevelopment Plan identifying priority infill redevelopment sites and establishing an implementation plan for redevelopment. Initial Focus areas include: Kerper Blvd, Loras Blvd, University Ave, Hill St.	**1.0**					
TL1-C- 4	Consolidate residential zoning categories to allow density based on market demand and historical development patterns. Example: multi-family moderate density in midtown area, mixed-use along transportation corridors. If infeasible, increase allowable density along transportation corridors (example - walkable, mixed-use low rise buildings along arterials).	**1.0**					
TL1-C- 5	Implement form-based code to along transportation corridors with goal of improved pedestrian experience (frequent access points, greenspace)	**1.0**					

TL1-C- 6	Eliminate minimum parking requirements from Unified Development Code and replace with a transportation reference guide for development that includes considerations for all modes. Allow developers to determine and defend their transportation needs - don't mandate parking. Resource: https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/f0016902-final-pricing-parking-management-to-reduce-vehicles-miles-travelled-pi.pdf	**2.0**					
TL1-C- 7	Conduct public engagement and development planning around public transit transfer areas to increase Transit Oriented Development. Specfically address mixed use and childcare access near transit hubs. Provide incentives based on results of planning process.	**2.0**					
	Strategy TL1-D: Increase public transit ridership to 3% by 2030						
TL1-D- 1	Research, develop and promote a universal access program for employers to support (public-private partnership) commuter specific routes and services. Resource: https://www.cdta.org/news/connecting-capital-region	**1.0**					
TL1-D- 2	Increase frequency of public transit routes to a minimum of 30 minutes (goal of 15 min frequency)	**2.0**					
TL1-D- 3	Establish a single credential for either all city services a "City Pass" to include library, pool, recreation programs, and transit OR establish technology integration between City and regional transit providers to allow one pass for all transit services. As additonal public services roll out, ensure technology integration. Resource: Navigo Paris, France	**2.0**					
	Strategy TL1-E: Increase shared mobility utilization; target: increase shared mobility (carpooling) from 8.55% to 11% of commuters by 2030						
TL1-E- 1	Implement Existing Plans starting with infrastructure and policy changes first and education and encouragement, second: Implement a minimum of 3 East-West and 3 North-South Complete Street corridors based on the Tri-State Integrated Walking, Biking, Hiking Plan (Envision 2010 top 10 project) with a focus on commuter routes	**1.0**					
TL1-E- 2	Conduct a pilot bike-share service in a limited geographic area	**2.0**					
TL1-E- 3	Ensure ordinances allow flexibility for mode-forward services, for example: ride-hailing services such as Uber and Lyft; and the bike-share services Zagster and LimeBike, scooter -share	**2.0**					
TL1-E- 4	Outline clear policies for electric bikes, skateboards and scooters on city bike lanes, paths and trails	**3.0**					
	Strategy TL1-F: Increase pedestrian access and safety						
TL1-F- 5	Implement Existing Safe Routes To SchoolsPlans starting with infrastructure and policy changes first and education and encouragement, second: At each school, implement a minimum of recommended speed reductions, raised or high visibilty crosswalks and signage from Dubuque Community Schools and Holy Family Catholic Schools Safe Routes to School (SRTS) Plan	**1.0**					
TL1-F- 6	Collaborate with colleges and universities to develop and implement Safe Routes to School programs and infratsructure for each campus	**1.0**					
TL1-F- 7	Evaluate and reduce speeds on pedestrian and bicycle corridors and major crosswalk/intersections	**2.0**					
TL1-F- 8	Focus on transportation access for everyone using 5-95 access as the goal (5 years old to 95 years old), not just very fit and capable cyclists and pedestrians	**2.0**					
TL1-F- 9	Evaluate crosswalks and extend crosswalk times based on findings of evaluation including populations using the intersections.	**2.0**					
	TL2 Support and encourage alternative fuel vehicles, achieve 20% of vehicles sold and 15% of VMT by 2030						
	Strategy TL2-A: Transition City fleet to alternative fuels						
TL2-A- 1	Update City vehicle (including The Jule transit) purchasing policy/budget process to default to alternative fuel with traditional internal combustion engine (ICE) as optional requiring proof of need. For ICE Vehicle options, establish minimum fuel efficiency requirements. Focus on small vehicles as well as large vehicles for alternative fuels. EV replacement to be prioritized for high mileage vehicles. Goal: Achieve 50% EVs within City Fleet by 2030, maximize utilization of Renewable Natural Gas (RNG) and KwH produced from RNG from City biogas resources (explore using new funding options in American Recovery and Reinvestment Act (ARRA), Diesel Emissions Reduction Act (DERA), Iowa Energy Center (IEC) Board and the Iowa Economic Development Authority (IEDA) and Volkswagen Clean Air Act Settlements for State of Iowa)	**1.0**					
	Strategy TL2-B: Support and encourage alternative fuel vehicles citywide						
TL2-B- 1	Collaborate with Alliant Energy to develop and implement outreach and education campaigns designed to help residents understand the benefits of transitioning to an EV and to learn how to leverage applicable Alliant Energy programs or other incentives to facilitate EV charger installation or EV purchase. Explore with Alliant the development of additional incentives to advance the city's EV goals. Program should focus on increased community equity	**1.0**					
TL2-B- 2	Create an Electric Vehicle (EV) Transition Study and Masterplan to map existing infrastructure, determine the current and future demand for EV charging stations, Establish public EV parking regulation and policy, and to identify options for increasing number of electric charging stations in public parking areas (e.g., schools, parks, libraries, City-owned parking garages, near City Hall) and in commercial and high-density residential areas. Master plan should identify additonal strategies and actions for advancing EV adoption to meet or exceed the Climate Action Plan goals.	**1.0**					

TL2-B- 3	Work with local utility providers to promote and incentivize alt-fuel vehicle locations. Program implementation should focus on increasing community equity.	**1.0**					
TL2-B- 4	As a prerequisite to receipt of TIF funds and/or other local incentives via development agreements require EV ready construction and installationn of EV charging stations. Include for new AND amended agreements.	**1.0**					
TL2-B- 5	Set an emissions standard for mass transit vehicles (including cabs, ride-sharing services) to achieve our climate and air quality goals	**1.0**					
TL2-B- 6	Allow or require builders to include EV charging station parking spaces as part of the required off-street parking spaces for new commercial and multi-family building construction	**2.0**					
TL2-B- 7	Organize and promote an electric vehicle (EV) Group Purchase campaign annually to partner with local dealerships to offer limited-time discounted pricing on EVs to help reduce the costs of EV purchasing through volume purchasing power. Program should focus options to increase community equity	**2.0**					
TL2-B- 8	Encourage new construction and remodeling projects to meet Electric Vehicle (EV) ready standards using the EV Readiness section of the City's Net Zero Energy Building Guide	**2.0**					
TL2-B- 9	Work with large entities and employers to host EV charging station.	**2.0**					
TL2-B- 10	Make all EV charging (home and private) franchise fee exempt.	**2.0**					
TL2-B- 11	Develop public and private partnerships for the installation of fast-charging electric vehicle chargers in publicly accessible parking areas along tourism corridors, at workplaces, and in multi-family housing developments.	**2.0**					
TL2-B- 12	Establish education materials on EV permitting process: Develop a guide or process checklist for what is required for EV infrastructure installation (include contacts at Alliant Energy when working with electric utility is appropriate), establish an EV Charging Station checklist for use by building owners, designers and contarctors. Establish list of where to buy	**2.0**					
TL2-B- 13	Collaborate with local partners to host ride-and-drive events to increase EV ownership by providing residents an opportunity to compare EVs to ICE	**3.0**					

	Detailed Actions - Solid Waste and Recycling	Priority Level	Implementation				
		Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	**Primary Responsibility**	**Supporting Responsibility**	**Estimated Budget Need**	**Metric**	**Progress At Review**
	Goal SW1 50% Diversion by 2030 measured on a per capita basis						
	Strategy SW1-A: Divert construction and demolition (C&D) waste						
SW1-A- 1	Identify jobs benefits and economic potential of implementation of construction and demolition waste diversion policies, ordinances, and permitting requirements: create cost-benefit analysis	**1.0**					
SW1-A- 2	Collaborate with County and other partners in developing a regional construction and demolition recycling / ReUse facility	**1.0**					
SW1-A- 3	Adopt a deconstruction/diversion ordinance to require the reuse or recycling of salvageable construction and demolition materials.	**1.0**					
SW1-A- 4	Support capacity for construction and demolition transfer, sorting and possible processing. Establish a centralized C&D drop-off and construction / demolition processing facility to provide an affordable and environmentally preferable alternative to disposal. Drop off site can be co-located or coordinated with potential ReUse facility.	**1.0**					
SW1-A- 5	Require all commercial construction and demolition projects to submit waste management plans illustrating project's capacity to achieve specific C&D Waste diversion levels in-line with City's CAP goals	**1.0**					
SW1-A- 6	Engage business community in indentifying and developing opportunities for diversion of materials in support of the City's CAP goals	**2.0**					
SW1-A- 7	Partner with local organizations (e.g., Habitat for Humanity) for demolition waste pickup and reuse	**2.0**					
SW1-A- 8	Promote a C&D recycling industry in city by adopting an ordinance and construction permit changes supporting C&D recycling requirements to be implemented as sufficient C&D recycling capacity is developed within the community. Actively seek C&D recycling companies or promoting the creation of new business enterprises in support of establishing capacity following the proposed policy changes	**2.0**					
SW1-A- 9	Research management practices of construction and demolition waste diverted from the landfill. Provide best practices education, training, and resources to community.	**2.0**					
	Strategy SW1-B: Divert consumer waste						
SW1-B- 1	Develop and fund an assistance program for businesses to provide waste audit services, support businesses in establishing tracking and reporting waste streams, identify reduction, diversion, and benificial use opportunities. Program should include identification of potential grants including the DMASWA Waste Minimization Grant and other revenue sources for implementation costs. Assistance program should pro-actively identify and outreach to businesses likely to benefit from waste reduction assistance. Assistance should include connecting businesses with energy audit and other resources in support of full CAP goals. Goal: 25 business waste audits completed with recommendations implemented anually.	**1.0**					
SW1-B- 2	Create ordinance so trash haulers can incorporate more progressive Pay-As-You-Throw (PAYT) residential trash rates	**1.0**					
SW1-B- 3	Implement a plastic straw and stirrer-free policy or opt-in policy for businesses that provide food and/or beverage services, with appropriate options for people with disabilities	**2.0**					
SW1-B- 4	Develop a recognition program to promote leading businesses succeeding in waste diversion and reduction.	**2.0**					
SW1-B- 5	Reduce Citywide garbage pickup frequency to biweekly. Provide compost and recycling pickup weekly.	**2.0**					
SW1-B- 6	Generate and enact policy, ordinance, and permitting mechanisms to increase diversion, including policies that look 'upstream' waste reduction like Extended Producer Responsibility (EPR)	**3.0**					
SW1-B- 7	Expand consumer education (e.g. host community forums and provide direct outreach) on sustainable consumption and materials management, including recycling	**4.0**					
	Strategy SW1-C: 50% Food waste reduction and diversion						
SW1-C- 1	Conduct a phased-in commercial organics waste collection project. Explore possible incentives for food retailers, restaurants, and institutions to participate in food waste reuse and recycling programs	**1.0**					
SW1-C- 2	Based on the results of the phasedd-in commercial organics waste project, establish a business incubator to establish capacity for organics collection, five days a week (Monday through Friday) at businesses, particularly restaurants.	**1.0**					
SW1-C- 3	Establish an At-Home and Community Garden Composting program supporting the expansion of food waste diversion through at-home composting. Provide backyard composting workshops, tips, and resources. (https://www.bouldercounty.org/environment/composting/)	**2.0**					
SW1-C- 4	Close the loop on organics recycling; establish a policy requiring compost be used as a soil amendment for public and private construction projects that disturb the soil cover over a baseline level to improve water infiltration in line with City CAP goals	**1.0**					
SW1-C- 5	Combat food wasting by requiring retailers and restaurants to donate, reduce, reuse, or compost their unsold food, creating "zero-waste sections" where products are sold close to their expiration dates, and designating "zero-waste coaches" to raise awareness among staff and help manage products reaching the end of their marketable life. Edible unsold products shall be donated. When not edible, organic waste shall be composted through a City-approved vendor	**1.0**					
SW1-C- 6	Conduct a community wide food waste assessment to identify scope of potential food diversion. Encourage Dubuque area institutions and food businesses to conduct a food waste assessment (https://www.epa.gov/sustainable-management-food/resources-assessing-wasted-food)	**2.0**					

SW1-C- 7	Seek grant funds to launch a food waste reduction campaign for residents, such as the U.S. Environmental Protection Agency's Food: Too Good to Waste program	**2.0**					
SW1-C- 8	Examine options for expanding commercial and residential composting, including offering compost/food waste collection at restaurants; assess the feasibility of establishing a permitted facility to compost or anaerobically digest organic materials and food waste	**1.0**					
SW1-C- 9	Provide a kitchen best practices guide to help households and businesses reduce food waste and excessive portions	**3.0**					
SW1-C- 10	Request DMASWA review food waste handling capacities and permitting limits and expand/update as needed to support food waste diversion and organics collection increases in line with CAP goals and supporting generation of soil amendment feedstocks and /or energy.	**3.0**					
	Strategy SW1-D: Expanded recycling options for multi-family – equity						
SW1-D- 1	Promote subsidised low, or no charge, subscription recycling. Explore how the DMASWA Waste Minimization Grant program may support this action.	**1.0**					
SW1-D- 2	Land-Use Code Updates - improve commercial and multifamily recycling requirements by revising Land Use Code to require commercial indoor and outdoor space for recycling and diversion equal to or greater than the space provided for disposal. Explore how the DMASWA Waste Minimization Grant program may support this action.	**2.0**					
	SW2 Waste education						
	Strategy SW2-A: Waste education						
SW2-A- 1	Coordinate with the Dubuque Public Schools to establish paths towards Zero Waste program. Program to include zero waste curricula and family content as well as zero waste strategies for school facilities. (https://www.ecocycle.org/files/Zero%20Waste%20A%20Realistic%20Approach%20Sustainability%20Program%20for%20Schools.pdf) (http://www.zerowastechallenge.org/curriculum.html)	**1.0**					
SW2-A- 2	Coordinate with the Dubuque chamber of commerce, business, and manufacturing associations to provide seminars, resources, and content to area businesses on Circular Economy concepts. Work with cohort to explore economic potential of Circular Economy business opportunities within the Dubuque region. (https://www.ceguide.org/)	**1.0**					
SW2-A- 3	Coordinate with the Dubuque chamber of commerce, business, and manufacturing associations to provide seminars, resources, and content to area businesses on the use of Life Cycle Assessment (LCA) process to minimize waste material and energy. LCA educational content should include end-of-life planning	**2.0**					
SW2-A- 4	Establish a public education program for solid waste contamination reduction education	**2.0**					
SW2-A- 5	Continue, and explore opportunities to expand consumer education (e.g. host community forums and provide direct outreach) on sustainable consumption and materials management, including recycling	**4.0**					
	Goal SW3 Achieve 100% beneficial use of landfill gas						
	Strategy SW3-A: Divert captured landfill gas						
SW3-A- 1	Divert methane captured at landfill cells to natural gas supply network in lieu of flaring on site. Goal of achieving 100% diversion of methane captured to beneficial use	**1.0**					

Detailed Actions - Water, Wastewater and Flooding

		Priority Level	Implementation				
		Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	**Primary Responsibility**	**Supporting Responsibility**	**Estimated Budget Need**	**Metric**	**Progress At Review**
	Goal W1 Increase water conservation citywide						
	Strategy W1-A: Promote increased water conservation citywide						
W1-A- 1	Improve/refine water and energy utilization incentives: Users retain non-profit reduced rates IF water efficiency/climate resiliency best practices used; Users retain residential second meter option at a reduced rate for outdoor irrigation/watering/pool filling, and IF water efficiency and climate resiliency best practices are used.	**1.0**					
W1-A- 2	Implement pricing preference for households installing water efficient fixtures (such as WaterSense certified fixtures) and water/energy efficient water heaters. Establish incentives/cost reduction programs for qualifying low-income residents to purchase WaterSense certified fixtures.	**2.0**					
W1-A- 3	Explore modifying residential water rates that better incentivize water conservation and dis-incentivize water use.	**2.0**					
W1-A- 4	Consider requirements for businesses that sell single-use plastic water bottles to provide an accessible drinking fountain with bottle filler capacity.	**2.0**					
W1-A- 3	Explore incentives for businesses, institutions, and events that do not allow the sale or use of single use plastic water bottles.	**3.0**					
	Strategy W1-B: Maintain and update city plans and standards in support water conservation goals						
W1-B- 1	Continue to evaluate opportunities for real-time water and energy metering that may help customers better understand and reduce their water and energy consumption (example: https://www.fluidwatermeter.com/). Implementation should focus on improving community equity	**1.0**					
W1-B- 2	Develop, distribute, and promote a water efficiency and climate resiliency best practices guide for improved water efficienty in residential, commercial, and industrial properties. Explore the development of an award/recognition program for residents/businesses with greatest water conservation achievements through use of the guide	**2.0**					
W1-B- 3	Explore options for expanding the use of greywater systems and water conservation measures in public and private buildings	**2.0**					
W1-B- 4	Continue to Update City landscaping standards for reducing water consumption, pesticide, and chemical use.	**2.0**					
	Goal W2 Reduce wastewater impacts						
	Strategy W2-A: Capture and use of wastewater energy potential						
W2-A- 1	Conduct a study to determine facility specific GHG emissions generated by nitrification and denitrification processes used in the wastewater treatment. Study should explore additional mitigation actions and recommend next steps.	**1.0**					
W2-A- 2	Continue research into additional biogas opportunities at the City's wastewater treatment plant: Enhance existing RNG development capacity. - Research ability to recycle released CO2 into biogas production - Research ability to increase biogas production and reduce landfill waste feedstocks through new WRRC handling and processing capacity for commercial organics. - Research ability to convert WRRC biosolids/digestates from energy and funding consumption model (trucking and land application) to energy and funding production model (dry anerobic processing for biogas and compost Bi-products)	**2.0**					
W2-A- 3	Study options for retaining City waste water treatment plant produced Renewable Natural Gas (RNG) and KwH for City heating and electrical needs. Study to identify potential new funding sources.	**2.0**					
	Strategy W2-B: Reduce waste water generation						
W2-B- 1	Improve/refine waste water and storm water discharge incentives: Implement incentives/pricing preference for businesses and households installing waste/storm water avoidance strategies: - Rain gardens - permeable pavers - energy efficient dishwashers - Greywater reuse Implement new data enhanced outreach and incentives to identify and remedy sources of waste/storm water before management or processing is required. Incentive implementation should focus on improving community equity	**1.0**					
W2-B- 2	Evaluate the potential for installation of rainwater collection systems at City facilities for graywater uses, and investigate opportunities for graywater reuse at existing and new City facilities and properties. Implement grey-water systems identified capable of reducing energy/water demand in other areas (for example, watering urban tree canopy to reduce heat island effect and air conditioning needs)	**1.0**					
W2-B- 3	Implement a policyt to require installation of rainwater colleciton systems and WaterSense water efficient fixtures and appliances at all City facility projects and all projects receiving $50,000 or more in City tax abatement, financing or funding. providing information and technical assistance.	**2.0**					
	Strategy W2-C: Improve waste water pollution prevention						

W2-C- 1	Reduce pollutants, including PFAS, entering the sewage system that contaminate WRRC effluent and reduce beneficial use options for biosolids/digestate. Develop, distribute, and promote a Wastewater Pollution Prevention guide and establish an additional resources page (examples:https://dnr.mo.gov/pubs/pub1128.pdf ; https://www.townofchapelhill.org/home/showdocument?id=8535 ; https://www.cityofpacificgrove.org/living/green-pg/waste-water/preventing-waste-water-pollution)	**1.0**					
	Goal W3 Mitigate flood hazards and impacts						
	Strategy W3-A: Educate, engage, and empower the public for flood mitigation						
W3-A- 1	During and immediately after major rainfall events, deploy an education and communication plan in coordination with the appropriate partners such as Catfish Creek Watershed Management Authority to alert residents, businesses and institutions of any potential water quality issues such as increased E Coli counts. Communication systems also to include recommendations on delaying activities that could contribute to stormwater innundation.	**1.0**					
W3-A- 2	Provide flood insurance education to home owners, particularly new home buyers and at-risk home owners. Education should include when insurance is recommended, purposes for flood insurance, and what is typically covered and not covered by insurance.	**1.0**					
W3-A- 3	Strengthen education and outreach efforts in culturally appropriate and accessible ways, especially for those most vulnerable to potential impacts of flooding, to help the public understand, prevent and respond to vector-borne diseases	**2.0**					
W3-A- 4	Promote "landscaping for absorption" practices for water prone residential and commercial landscapes. Strategies include reduction/elimination of hardscape surfaces, use of native moisture tolerant perennial plantings and shrubs, use of compost, natural mulching, and soil aeration.	**2.0**					
W3-A- 5	Expand use of City's SCADA system to actively monitor and communicate flood events.	**2.0**					
W3-A- 6	Establish a preparedness education program and an emergency alert system that help protect the community from flooding and extreme heat events.	**3.0**					
W3-A- 7	Expand public education about the value of watersheds, rain gardens, and low-impact development to address stormwater run-off	**3.0**					
W3-A- 8	Continue promoting information regarding flood insurance on City's website (https://www.cityofdubuque.org/1242/Flood-Maps-Flood-Insurance) Expand content to include flash flood and event based flooding. Promote information, particularly among properties identified as at risk in City's Blue Spot Flash Flood risk mapping.	**3.0**					
W3-A- 9	Explore opportunities for use of public art to educate about water quality and stormwater impacts. Art installations could be both permanent, temporary, and interactive.	**2.0**					
	Strstegy W3-B: Update design standards and plans for flood mitigation						
W3-B- 1	Review and update Public Infrastructure Design Standards to meet Climate Change projections for Dubuque. Determine stormwater volume requirements meeting anticipated future storm levels and identify stormwater management systems and infrastructure not capable of meeting projected needs. Prioritize upgrades required and implement. Integrate upgrades into already scheduled maintenance programs and budgets.	**1.0**					
W3-B- 2	Prepare a Blue Spot flash flood risk map to identify areas within city that are particularly vulnerable to flash flood impacts. Create a composite flash flood risk map overlapping flash flood risk with the Citywide tree canopy, impervious surface, and heat island contributuion mapping created in the City's Heat Island Impact study (see Heat Island Strategies) as well as the vulnerable populations mapping (see City's Climate Vulnerability Assessmetn). Review flash flood risk identified near/around critical and sensitive community infrastructure (emergency response, power generation, fresh water supply, hospitals, etc) and identify sites requring flash flood protection enhancements. Based on risk mapping and assessments, create an implement a risk reduction and response plan. Share and promote the information developed by the flash flood risk map, particularly among vulernable populations and neighborhoods. (https://climate-adapt.eea.europa.eu/metadata/tools/the-blue-spot-model-a-key-tool-in-assessing-flood-risks-for-the-climate-adaptation-of-national-roads-and-highway-systems)	**1.0**					
W3-B- 3	Confirm Flood wall readiness for current and anticipated climate change impacts. Explore opportunities to improve system with earth levy combined with bike and walking trails.	**1.0**					
W3-B- 4	Prepare a comprehensive plan for stormwater management that goes beyond baseline regulatory requirements and includes green infrastructure with the goal of eliminating Stormwater Sewer Overflows (SSO).	**1.0**					
W3-B- 5	Estabish a Green Infrastructure Masterplan to target specific types of green infrastructure to implement including: parking lots, alleys, parks, vacant lots, parkways, and grading near sidewalks. In addition, identify property owned by other public entities that have a high potential for improved ecological management to improve stormwater management functions (school districts, county, etc)	**1.0**					
W3-B- 6	Test, train on, and update emergency response plans that address hazards likely to become more frequent or intense as the climate changes, including power loss, flash flooding, and unseasonal riverine flooding	**2.0**					
W3-B- 7	Establish and implement a policy requiring a biochar or biosolids soil amendment for all building and earth working construction sites – improves soil sequestration and builds carbon content of topsoil, and improves water retention and permeability characteristics.	**2.0**					
W3-B- 8	Set a limitation on the total citywide percentage of pavement and impervious surface areas.	**2.0**					
W3-B- 9	Change design and management methods to minimize water use and waste in publicly owned or managed properties while still maintaining thriving vegetation. Replace potable water lawn irrigation systems with grey/recycled water systems at city-owned facilities and replace lawn areas with drought tollerant landscape design where practicable.	**2.0**					
W3-B- 10	Review city codes, drainage rules, and surface waterways to evaluate their ability to protect and improve stream flows, seeps, springs, wetland function, water quality including temperature, vegetation and habitat, and stormwater management during periods of extreme heavy rain. Use the Natural Resource Inventory and other data to track gains and losses, and propose revisions as necessary	**4.0**					
	Strategy W3-C: Create a storm water infiltration plan						

W3-C- 1	Establish a Storm Water Infiltration Plan identifying priority areas and strategies for improved infiltration of storm water to minimize storm water volumes requiring handling while increasing water aquifer recharging. Strategies to focus on reduction of impervious surfaces, increase of permeable surfaces, trees, bio swales, rain barrels, rain gardens, compost, mulch, etc. Coordinate and integrate Plan with city's Citywide Heat Island Impact Study (see Buildings and Energy actions)	**1.0**					
W3-C- 2	Advance improved Storm Water infiltration in new development by creating and enforce codes aimed at zero run-off with a focus on on zero run-off parking strategies. Coordinate and integrate Plan with city's Citywide Heat Island Impact Study (see Buildings and Energy actions)	**1.0**					
W3-C- 3	Promote effective Storm Water infiltration in residential sectors by exploring rebates and incentive opportunities including tax incentives, rebates, or other incentives for deceasing driveway, roof, and yard run-off. Implementation of incentive structure to focus on increasing community equity	**1.0**					
W3-C- 4	Restructure storm water fee based on impermeable surfaces with tax or other incentives for permeable surfaces and other water retention improvements.	**2.0**					
	Strategy W3-D: Increase flood resilience of infrastructure						
W3-D- 1	Establish incentives to prioritize the development of "green infrastructure" such as parks, wetlands, riparian and wildlife corridors, natural drainage-ways, and low-impact development, particularly in residential districts. Research green infrastructure implementation and long-term viability in local environment	**2.0**					
W3-D- 3	Expand on the success of the Bee Branch Creek Restoration project using it as a model for the restoration of other creeks or "daylighting" of other primary storm sewer collectors for improved flash flood capacities and community amenities. (https://www.cityofdubuque.org/804/Bee-Branch-Creek-Restoration)	**2.0**					

Detailed Actions - Climate Health and Safety

		Priority Level	Implementation				
		Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
	HS1 Create a climate adaptive community						
	Strategy HS1-A: Review facilities and plans						
HS1-A- 1	Support and expand a social vulnerability assessment to more effectively respond to diverse neighborhoods and households that are most at risk during emergency situations. Enhance interagency data sharing to increase response capacity across the city	**1.0**					
HS1-A- 2	Coordinate with County to incorporate climate change and CAP goals into the County's Community Health Needs Assessment Health Improvement Plan	**1.0**					
HS1-A- 3	Include a Health and Climate Change Impact Assessment component in all City plans. Develop metrics for reporting on climate related risks and health events	**1.0**					
HS1-A- 4	Develop and implement a plan to monitor climate change related illnesses. Utilize results in resource and policy planning, with particular focus on neighborhoods. Communicate results to the public on a periodic basis	**2.0**					
HS1-A- 5	Form a team to develop action plans to address climate-related mental health resilience at the individual, neighborhood and community level. Explore potential to include this action with HUD Resiliency grant research, or future work in collaboration with the University of Iowa or other partners.	**2.0**					
HS1-A- 6	Update the City's emergency response plan and ensure that preparation and updates recognize and address likely climate change impacts	**2.0**					
	Strategy HS1-B: Update design standards and plans						
HS1-B- 1	Prepare for public buildings to be used in different ways insupport of CAP adaptation goals, both in lower-impact ways, such as seniors using the library to cool down during hot June days, and as safe-havens during acute emergencies.	**1.0**					
HS1-B- 2	Ensure public safety staff are properly trained to recognize and respond to physical and behavioral signs of heat-related illness	**1.0**					
HS1-B- 3	Establish guidelines and appropriate requriements for adequate community-safe space within the City's special event permitting process. Community-safe space guidelines and requirements to address climate change impacts such as extreme heat, cold, extreme weather, and poor air quality. Guidelines to ensure that these spaces are accessible and adequate for vulnerable populations.	**2.0**					
HS1-B- 4	Ensure that facilities that serve vulnerable populations are resilient to climate hazards. Develop model procedures for ensuring both City and non-City facilities employ best practices in the event of an emergency such as flooding, power outages, extreme heat, etc	**2.0**					
HS1-B- 5	Update or develop a community resilience plan to prioritize and prepare for responses in the event of a disaster and extreme weather events. Identify the location of critical facilities including hospitals, medical service providers, senior homes, childcare facilities, shelters, major and alternate transportation routes, public transit facilities and locations where hazardous chemicals are used or stored	**2.0**					
HS1-B- 6	Develop/Update a comprehensive heat response plan that incorporates most current climate change impact projections and combines individual strategies into an integrated approach. Components of plan may include forecasting and monitoring, education and awareness, and heat wave response strategies for City and individuals. Include Response Plan on City's Emergency Preparedness webpage (https://www.cityofdubuque.org/168/Emergency-Preparedness)	**2.0**					
	Strategy HS1-C: Expand cooling and warming facilities						
HS1-C- 1	Increase availability to cooling mechanisms in low-income housing and rental units (e.g., air conditioning units, fans, window screens)	**1.0**					
HS1-C- 2	Study how cooling/warming and refugue areas and amenities can be made culturally responseive and equitable. Develop an Equitable and Culturally Responsive Refugue master plan to guide implementation.	**1.0**					
HS1-C- 3	Educate the public about the health risks of higher temperatures, develop strategies to check on individuals at greatest risk, and make options for cooling widely accessible	**2.0**					
HS1-C- 4	Develop a plan to improve bus stop shelters' ability to provide relief from extreme heat (e.g., reflective materials, cooling fans)	**2.0**					
	Strategy HS1-D: Enhance resilience of community to extreme weather						
HS1-D- 1	Adopt policies to incentivize residential building owners (particularly rental and multi-family properties), to increase the resilience of existing and new buildings with resilience strategies such as minimal impact site design standards, resilient passive and active cooling systems, resilient electrical system design, elevated HVAC and electrical off basement floor, installation of backflow preventers, tree maintenance, permeable pavements, energy conservation and on-site renewable energy generation, and safe rooms. Incentives should focus on increasing community equity.	**1.0**					
HS1-D- 2	Explore the potential for installation of re-deployable solar microgrid systems for resilient power use in community emergency management and hazard/disaster response. Systems can be semi-permently installed at public facilities to provided day-to-day power and re-deployed in emergency resopnse (https://www.footprintproject.org/)	**1.0**					
HS1-D- 3	Seek to reduce exposure to extreme heat by targeting the distribution of energy-efficient, air conditioning in vulnerable populations	**1.0**					
	Strategy HS1-E: Reduce risks to health and safety created by ongoing climate impacts						

HS1-E- 1	Strengthen emergency management capacity to prepare for and respond to the impacts of climate change.The City should prioritize capacity improvements such as training and equipment to address risks exacerbated by climate change. Emergency management should be equipped to address the possibility of multiple emergencies at the same time, such as the combination of extreme heat and power outage.	**2.0**					
HS1-E- 2	Create and maintain a Response Plan for emerging vector-borne diseases, including increased capacity for health services that are triggered by certain case thresholds	**2.0**					
	HS2 Educate, engage, and empower the public for climate health and safety						
	Strategy HS2-A: Expand public education campaign for impacts of climate change						
HS2-A- 1	Increase outreach to diverse populations about climate change and health, natural hazards, and emergency preparedness via broadcast, print, bus ads, social media, and other forms of communication in multiple languages and accessible to individuals with disabilities to ensure that emergency preparedness planning reaches all City residents	**1.0**					
HS2-A- 2	Give city and county elected officials and staff tools (e.g. webinar trainings on emergency preparedness, facilitation guides, and other materials in multiple languages) to have dialogues about emergency preparedness within neighborhoods and to create local resilience strategies such as an Adopt-A-Neighbor campaign or hosting an OEM CERT-like training session in their community.	**1.0**					
HS2-A- 3	Support education to the public, medical, and veterinary communities about the potential importation of non-native insect vectors (e.g. ticks, mosquitoes, fleas) through human and pet travel to areas outside of State where these insect vectors are prevalent	**2.0**					
HS2-A- 4	Deploy point-in-time alert systems (e.g., RAVE, Nixle) to notify people of extreme weather events, periods of dangerous cold, and heat waves and refer them to resources on symptoms and prevention of climate-related illness	**2.0**					
HS2-A- 5	Identify current efforts and programs in place to engage the business and health care community in developing emergency response plans and business continuity plans. Review and expand efforts and programs to assure climate change impacts and risks are incorporated.	**2.0**					
	Strategy HS2-B: Educate and engage the public on extreme heat and weather risks						
HS2-B- 1	Enhance community networks and connections for those who require special attention during extreme heat and weather events, such as the elderly, homebound, disabled, isolated, or those likely to be in need of financial assistance during or after extreme weather events (heat, cold and heavy precipitation)	**1.0**					
HS2-B- 2	Develop extreme heat, weather, and poor air quality early warning and response plans and systems that alert City employees and community members when projected conditions pose a health risk. Public system enhancement should focus on reaching at-risk populations and improving communty equity	**2.0**					
	Strategy HS2-C: Educate and engage the public on air quality and linkage with health						
HS2-C- 1	In alignment with the American Public Health Association Policy Number: 201711, city will collaborate with educators at local k-12 and colleges to ensure that air quality learning objectives,particularly those related to current and projected climate change impacts, are included in their curricula (e.g., fundamentals of air pollution assessment and control, health risk assessment, environmental justice). Collaboration should include education and training programs for health professionals, including public health, medical, and nursing programs, and science education programs for postsecondary and K–12 science students. All health professionals and students should be informed about steps individuals and communities can take to reduce air pollution, and they should be made aware of services such as the Air Quality Index that can help individuals take appropriate actions to reduce exposures on days when air quality is poor. (Coordinate with action in Capacity section)	**1.0**					
HS2-C- 2	Explore funding to continue and expand community outreach and education of the CLE4R collaboration between University of Iowa, the City of Dubuque, and Dubuque-area partners. CLE4R outreach and education expansion to include the climate change risks, impacts, and actions outlined in this CAP.	**2.0**					
HS2-C- 3	Educate public, healthcare, and public health professionals about health risks posed by climate change, including potential changes in air quality and impacts on mental health.	**2.0**					
HS2-C- 4	Work with County Public Health Department, Emergency Management, and local media to establish a process (and expand the number of platforms e.g., social media) to notify schools, community organizations, residents, and businesses on changes in air quality and potential impacts on health. Notification process could intigrate the EPAs AirNow.gov information and platform. Final process established to be integrated within the Multi-Hazard Mitigation Plan.	**2.0**					
HS2-C- 5	Develop and distribute educational content (brochures, k-12 curricula content, infographics, media announcements, etc) which outlines and actively promotes the clean air and health benefits of strategies included in this CAP plan. Strategies to be actively promoted include use of renewable energy, conservation of energy, use of electric venichles, public transit, ride share, and walking and biking for transportation. Engagement may include collaborating with public schools on curricula content, visiting local schools to talk about environmental conservation, sponsoring science fairs and asthma awareness days, dissimination of information.	**2.0**					
HS2-C- 6	In alignment with the American Public Health Association Policy Number: 201711, City will expand outreach to urban populations to better educate the public about the hazards of air pollution, including indoor air quality, and the steps individuals can take and available resources to reduce their exposure. In planning and conducting outreach efforts, the city will explore collaboration with regional and national industry trade associations, nonprofit groups, and environmental organizations.	**2.0**					
HS2-C- 7	Disiminate information about the Air Quality Index and the UV index, supporting smart growth and green community programs, and working with community leaders to establish clean air policies and initiatives. Everyone can set an example for young people by thinking globally and acting locally.	**2.0**					
	Goal HS3 Address air quality impacts of climate change						
	Strategy HS3-A: Promote reduction of particulate matter and air quality impacts of fossil fuel use						
HS3-A- 1	Reduce generation of particulate matter, air pollution, and waste heat from mobile sources by promoting and incentivizing public transit, biking and walking.	**1.0**					

HS3-A- 2	Explore use of the EPA Midwest Clean Diesel Program resources to create enhanced City policies and ordinances and incentives for businesses. The Clean Diesel Program provides support for projects that protect human health and improve air quality by reducing harmful emissions from diesel engines. This program includes grants and rebates funded under the Diesel Emissions Reduction Act (DERA). https://www.epa.gov/cleandiesel/midwest-clean-diesel-initiative	**1.0**					
HS3-A- 3	Develop an incentive program to convert fuel-burning lawn equipment such as gas-powered lawn mowers and blowers to electric. Incentive should focus on increasing community equity. (For GHG impacts, see: http://palebluedot.llc/carbon-copy/2015/7/16/the-carbon-footprint-of-a-lawn)	**2.0**					
HS3-A- 4	Explore use of photocatalytic concrete for city road-side construction including road surfaces, curbs, sidewalks, barrier walls, sculptures, and bus shelters.	**2.0**					
HS3-A- 5	Install roadside vegetation that creates effective barriers to prevent drifting of air pollutants to adjacent schools and residences. Vegintation should be native plantings. Conduct a study to identify the most impactful placement locations for vegitation, locations for greatest equity impacts, and establish an implementation plan https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6060415/	**2.0**					
	Strategy HS3-B: Implement air quality monitoring						
HS3-B- 6	Explore developing a collaboration with other government agencies, universities, and institutions to fund and install an array of sensors for monitoring air quality similar to the City of Chicago's "Array of Things" which uses light post mounted monitors. Coordinate with the US EPA Air Quality System to share data. https://www.epa.gov/aqs	**1.0**					
HS3-B- 7	In alignment with the American Public Health Association Policy Number: 201711, city will collaborate with state and county environmental offices and health departments and with the EPA regional office in assessing and remediating environmental justice concerns in Dubuque. Concerns to be assessed to include exposures to smog and toxic air pollutants and the disproportionate number of asthma cases among people of color. Assessment to prioritize review of exposures near public housing and schools in the vicinity of freeways, industrial facilities, and power plants. Impacts of land-use planning and infrastructure decisions on air pollution exposure to be reexamined.	**1.0**					
HS3-B- 8	Explore potential of deploying a series of air quality monitoring stations at appropriately located public facilities.	**2.0**					
	Strategy HS3-C: Explore and address ozone impacts on local agriculture						
HS3-C- 1	Collaborate with regional agencies, universities, and agricultural interests to identify potential impacts of ozone on regional agriculture (both current and projected future impacts based on climate change). Identify strategies to address impacts.	**1.0**					
HS3-C- 2	Develop educational materials on the relationship between nitrogen fertilizers, nitrogen monoxide emissions, and ground level ozone formation. Include strategies for minimizing and eliminating ground level ozone creation such as modified fertilizer managment strategies and use of slow release fertilizers. Share and promote materials with regional farmers and agriculture associations. https://www.nature.com/articles/news050718-15 https://www.ucdavis.edu/news/smog-forming-soils/	**2.0**					

	Detailed Actions - Food	Priority Level Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	Implementation Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
	Goal F1 Reduce food's contribution to climate change						
	Strategy F1-A: Reduce perishable food wasting						
F1-A- 1	Create and support a business network of sourcing, distributing and marketing cosmetically imperfect produce	**1.0**					
F1-A- 2	Educate on food date labels so people won't throw out food they don't need to discard	**1.0**					
F1-A- 3	Improve logistics of sourcing and transporting surplus food from events, schools, restuarants, grocery stores and other sources.	**1.0**					
F1-A- 4	Support and facilitate food donation, food rescue and distribution programs to food-insecure people. This may include working with Health Dept. regulations/ advocating for restrictive regulations to change.	**1.0**					
F1-A- 5	Work with distribution and retail establishments to voluntarily phase out refrigerants with high ozone depletion and global warming potential. Explore conservation, efficiency and weatherization rebates for improving refrigeration efficiency	**2.0**					
F1-A- 6	Promote Restaurant, Food Service and Household Best Management Practices oReduce Food Wastage in the Kitchen (pre-consumer) oReduce over-purchasing of food oReduce prep waste and improperly cooked food oConsider secondary uses for excess food oEnsure proper storage techniques oReduce Plate Scraping Wastage (post-consumer) –Modify menu to increase consumer satisfaction and reduce food left uneaten –Modify serving sizes and garnishes –Encourage guests to order/request and take only the food they will consume - Go Trayless at buffets and school/institutional cafeterias	**2.0**					
F1-A- 7	Expand the refrigerated and freezer capacity at free meal sites and food pantries by 2022	**2.0**					
	Strategy F1-B: Increase food residuals recovery to beneficial use						
F1-B- 1	Expand residential food scraps/residuals collection as DMASWA processing capacity expands by 2022 oAIM: 50% of Households as Green Cart participants by 2025. Start selling certified compost	**1.0**					
F1-B- 2	Expand commercial food residuals collection as processing capacity expands by 2022 oEstablish 2x/week commercial food residuals collection option by 2022 oAIM: 50% of commercial food residual tonnage to beneficial use by 2025	**1.0**					
	F2 Improve local food resilience and availability						
	Strategy F2-A: Improve healthy food system resilience and supply safety net						
F2-A- 1	Identify opportunities to build upon the City's public health procedures, information and messaging to encourage local gardening, composting, leaving leaves, and reducing chemical fertilizers and pesticides (coordinate with Health and Safety)	**1.0**					
F2-A- 2	Expand Farmers Markets, local food hubs and marketing of locally produced and processed foods. Program to focus on increased community equity and food security among at-risk populations	**1.0**					
F2-A- 3	Identify funding for, develop and promote a Shared Food Processing facility with commercial grade, code compliant equipment and space. Space to be made available to individuals to produce food products for sale to public. Explore the feasibility of including an on-site locally produce food market. Facility access should focus on expanding community equity.	**1.0**					
F2-A- 4	Revise zoning ordinances to allow urban agriculture and clarify acceptability to remove barriers to front yard and rooftop vegetable gardens, edible landscaping and foraging. Proactively promote and educate the public on urban agriculture ordinances, options and approaches	**1.0**					
F2-A- 5	Collaborate with State economic, workforce, agriculture, and commerce departments to develop green jobs and skills to grow, harvest, market and prepare local, climate-friendly foods	**1.0**					
F2-A- 6	Expand to more garden plots, rooftop and community garden sites with water supply options	**1.0**					
F2-A- 7	Develop a comprehensive farmland conservation plan that prioritizes food production while taking into consideration other Imagine Dubuque priorities. The plan could also include specific maps or areas prioritized for farmland conservation or identify those areas most at risk from development. Program should focus on exploring increased local food-to-table, local food utilization, and local development of cultural food products in support of Dubuque area underserved communities.	**1.0**					
F2-A- 8	Coordinate with City GIS Mapping servcies to identify potential sites for community garden sites or community farm sites with a focus on expanding community equity (similar to Dubuque Rescue Mission Community Farm http://dbqrescue.org/). Develop master plan and schedule for development of best sites as community garden/farm locations with a focus on improving community access equity	**1.0**					

F2-A- 9	Promote information on locations and price ranges of uncommon cultural produce, dairy and meats. Explore opportunities to expand local development of these goods through the green job and skills program (see other strategy, this category) oVulnerable populations lack information needed to get what they want to feed their families oExplore options to include these goods at community events. Shared meal events with cultural foods can help unify and break down climate stressed social barriers	**1.0**					
F2-A- 10	Work collaboratively with the Dubuque County Food Policy Council to leverage county support and expand partnerships. This provides an important, credible decision-making body to guide food policy for years to come; aligning it with county government positions it for additional reach, resources, and impact	**1.0**					
F2-A- 11	Expand the *Dubuque County Food Policy* PARTNERS to include the City, Cooperative Extension, DCSD, Holy Family Schools, colleges, institutions, retailers and sustainable\regenerative farmers by 2022	**1.0**					
F2-A- 12	Collaborate with other agencies, such Iowa State Extension, in evaluating risks to local food sources under climate change. Prioritize additional action strategies with a focus on increasing community equity and food security. Identify additional implementation partnerships.	**2.0**					
F2-A- 13	Work with Dubuque Water and other water providers to determine the feasibility of offering rebates or other incentives to farmers for irrigation water management equipment, water storage, reclaimed water, and conservation tillage equipment that saves potable water	**2.0**					
F2-A- 14	Incentivize food related businesses with green recognition achievement awards for Best Practices	**2.0**					
F2-A- 15	Support efforts to encourage expanded plant-based diets, including Meatless Monday campaigns	**2.0**					
	Strategy F2-B: Strengthen farm to institution procurement						
F2-B- 1	Coordinate with School District, local universities, and local hospitals to establish a climate-friendly, locally sourced foods procurement policies. Explore development of group purchasing and logistics agreements to increase efficiency of local farm-to-agency process.	**1.0**					
F2-B- 2	Work with state economics, workforce, agriculture, and commerce departments to develop green jobs and skills to grow, harvest, market and prepare climate-friendly foods. Job development to focus on increasing commuinty equity	**1.0**					
F2-B- 3	Pass city policy to procure climate-friendly foods for events and other city-managed facilities. Foods should be locally sourced to the highest extent feasible.	**2.0**					
F2-B- 4	Expand Farmers Markets, local food hubs and marketing of climate-friendly food	**2.0**					

		Priority Level	Implementation				
	Detailed Actions - Greenspace and Tree Canopy	Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	**Primary Responsibility**	**Supporting Responsibility**	**Estimated Budget Need**	**Metric**	**Progress At Review**
	Goal GS1 Strengthen Dubuque's tree canopy						
	Strategy GS1-A: Educate, engage, and empower the public						
GS1-A- 1	Develop educational and informational resources providing information on beneficial and climate adaptive tree species, "carbon gardening" strategies for ornamental gardens, and produce gardens, tree profile rebuilding, elimination of synthetic fertilizer and pesticide use, high mow deck settings, use of biochar amendments, polyculture lawn mixture and other beneficial greenspace practices included in this CAP.	**2.0**					
GS1-A- 2	Create and distribute tree and wildlife guide for residents. Guide should focus on improving urban ecosstem health and resilience.	**2.0**					
	Strategy GS1-B: Update and implement recommendations in 2011 Dubuque urban forest evaluation						
GS1-B- 1	Update the 2011 Dubuque Urban Forest Evaluation. Update should include a citywide tree canopy, light impervious surface, dark impervious surface, grassland, and water coverage by census tract. Study should include heat island impact study to identify areas of high heat island contribution and impact. Findings of tree coverage, benefits, heat island impacts, and opportunities should be overlapped with vulnerable population mapping from the City's Climate Vulnerability Assessment. Study to establish specific goals of tree canopy coverage, by census tract, for reduction of dark imperviious surfaces, and target "Heat Island Coefficient". Study to identify specific citywide percentage coverage goals for forsted and native planting ground cover. Study to priority areas for heat island mitigation based on need, potential, and impact on equity and vulnerable populations. Study should also evaluate opportunities to plant additional trees near city facilities to reduce heat island.http://palebluedot.llc/tree-canopy-assessments	**1.0**					
GS1-B- 2	Establish an implementation master plan with schedule, budget, and prioritized actions following the completion and recommendations of the City's updated Dubuque Urban Forest Evaluation.	**1.0**					
GS1-B- 3	Continue, and expand promotion of community grant to assist in planting trees. Grant should focus within targeted ares for improved equity as identified in the City's updated urban forest study.	**1.0**					
GS1-B- 4	Promote the expansion of tree canopy in urban heat islands or areas that need air conditioning such as schools. Explore potential for pilot project. Identify target areas based on Citywide heat island impact study called for in Heat Island strategies, overlapped with vulnerable population mapping from the City's Climate Vulnerability Assessment.	**1.0**					
GS1-B- 5	Replanting tree loss, and Ash tree replacement for EAB management, at 110% or more of replacement with improved diversity	**1.0**					
GS1-B- 6	Create a tree preservation ordinance with reasonable exceptions that support the CAP tree canopy coverage and heat island mitigation goals. Ordinance should reflect projected climate changes and impacts on tree species.	**2.0**					
GS1-B- 3	Review City ordinances, policies, and standards to assure appropraitely flexible allowance of tree placement in line with City goals.	**2.0**					
GS1-B- 4	Emphasize diversity and native, climate appropriate plantings	**2.0**					
GS1-B- 5	Maintain an annual free street tree giveaway program in celebration of Earth Day (similar to 2020 Earth Day program).	**3.0**					
	GS2 Strengthen Dubuque's green space						
	Strategy GS2-A: Reduce, repurpose, and reimagine lawn space						
GS2-A- 1	Transition maintenance of all city owned properties to Carbon Gardening practices including elimination of synthetic fertilizer and pesticide use, high mow deck settings, use of biochar amendments, and polyculture lawn mixture	**1.0**					
GS2-A- 2	Encourage appreciation of functional, productive use of yard space such as food production and wildlife habitat. i.Encourage a 'garden club' aimed at education for productive yard space ii.Leverage colleges to survey and certify residential wildlife habitats through a city recognition program	**1.0**					
GS2-A- 3	Require soil profile rebuilding at all building project sites or compacted soil conditions to reduce erosion and runoff contaminated with fertilizers, increase soil carbon stores and support long-term soil building (https://www.urbanforestry.frec.vt.edu/SRES/)	**1.0**					
GS2-A- 4	Establish a policy and incentive to assist homeowners by covering some of the cost of converting traditional lawns by planting pollinator friendly food gardens, permaculture, wildflowers, clover or native grasses in an effort to slow the collapse of the state's bee population. (http://m.startribune.com/program-pays-minnesota-homeowners-to-let-their-lawn-go-to-the-bees/510593382/)	**2.0**					
GS2-A- 5	Educate citizens on use of chemicals and water and wildlife habitat impacts.	**2.0**					
GS2-A- 7	Review city ordinances on lawns, explore opportunities to encourage lawn alternatives, consider set-backs and signage areas for native installations.	**2.0**					
GS2-A- 8	Implement a biochar soil amendment for all building and earth working construction sites – improves soil sequestration and builds carbon content of topsoil, and improves water retention and permeability characteristics.	**2.0**					

	Strategy GS2-B: Utilize parks and marginal city property for greater community use						
GS2-B- 1	Review access to city parks and playgrounds and diversity of amenities offered across the city. i.Consider use of vacant lots for small playgrounds and/or community gardens in coordination with Food sector CAP Goals ii.Connect hiking and biking trails throughout the city. Expand into marginal wooded areas throughout the city. iii.Bike racks at all parks, safe bike routes to all parks. iv.Expansion and diversification of community gardens.	**1.0**					
GS2-B- 2	Map city owned properties and amenities offered or possible at each, including hiking, foraging, etc	**3.0**					
	Goal GS3 Mitigate current and future urban heat island impacts						
	Strstegy GS3-A: Update design standards, plans, and policies for heat island mitigation						
GS3-A- 1	Based on city's citywide heat island impact study (see Buildings and Energy actions) Identify vulnerable urban tree canopy and street tree sections and develop policies to incentivize, encourage, or require strategic tree planting for heat island mitigation.	**1.0**					
GS3-A- 2	Develop a performance based ordinance requiring tree planting within parking lots. Ordinance should establish a specific goal of percentage of pavement to be shaded by trees. Explore partnering with local business (Hyvee, Target, Mall, etc) to create a pilot project to illustrate new ordinance requirements and benefits.	**1.0**					
GS3-A- 3	Develop a policy that requires all housing and commercial development projects recieving City funding, PUD approval, and/or Conditional Use Permitting to implement commercial scale heat island mitigation strategies including cool surfaces, solar-friendly landscape shading strategies, impervious surface reduction, and breeze capture. Reference City's Net Zero Energy Building Guide for relevant strategies.	**1.0**					
	Strstegy GS3-B: Promote and implement heat island mitigation improvements						
GS3-B- 1	Explore creation of a Heat Island Reduction Incentive / Award program to advance the actions and strategies identified in the city's citywide heat island impact study (see Buildings and Energy actions). Incentives and awards from governments, utilities, and other organizations can be an effective way to spur individual heat island reduction actions. Incentives might include below-market loans, tax breaks, product rebates, grants, and giveaways. (Determine the optimum balance for achieving climate adaptation goals of incentives vs. potential loss of tax base needed to accomplish those goals.) Explore potential for sponsorship of program by key local and regional businesses. Awards can reward exemplary work, highlight innovation, and promote solutions across the public and private sectors.	**1.0**					
GS3-B- 2	Promote the expansion of tree canopy in urban heat islands or areas that need air conditioning such as schools. Prioritize efforts based on city's citywide heat island impact study (see Buildings and Energy actions). Collaborate with school district, regional agencies, or instititions to identify and implment a pilot project, including community eductional and interprative content.	**2.0**					
GS3-B- 3	Explore partnering with local business (Hyvee, Target, Mall, etc) to create a pilot project to illustrate heat island reduction strategies included in this CAP and their benefits.	**2.0**					
GS3-B- 4	Research, evaluate and pilot porous paving, de-paving, vegetation and/or more reflective surfaces in parking areas to reduce and cool impervious surfaces, particularly in urban heat island areas with populations most vulnerable to heat. Explore partnership opportunities with local multi-family property owners (particularly low income communities), local businesses or institutions for pilot projects as well as research and development	**3.0**					

Detailed Actions - Climate Economy

		Priority Level	Implementation				
		Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
	Goal CE1 Capture local economic potential of climate action						
	Strategy CE1-A: Create a climate action market supporting and advancing climate action strategies.						
CE1-A- 1	Establish a policy that designates City Franchise Fee Income as funding source for Climate Initiatives Partner with Alliant to proactively identify barriers in existing infrastructure to reach Distributed Generation goals (DTT Relays, Fiber Communications between substations, Other SubStation upgrades, etc…) Fund renewable and efficiency projects directly related to the utility through which the franchise fee is generated	**1.0**					
CE1-A- 2	Create a market for Certified Compost DMASWA: Upgrade permit and expand infrastructure to accept more food residuals. City: Create an ordinance to expand residual food scrap collection City: Specify compost utilization for all city projects	**1.0**					
CE1-A- 3	Fund and organize the establishment of a ReStore Facility for reusable furnishings and salvage including construction/demolition. Habitat for Humanity as partner with DMASWA	**1.0**					
CE1-A- 4	Establish a policy to utilize TIF (Tax increment Financing) to incentivize Mitigation and Adaptation actions in line with the goals of the CAP.	**2.0**					
CE1-A- 5	Biochar Business partnership with Forestry Division with Emerald Ash Borer Build local market for valuable product •Add to compost to boost value •Utilization as soil amendment •Utilize to bond contaminants in soil (positive cation exchange) •Establish city ordinance requiring Biochar soil amendment for all new construction projects	**3.0**					
	Strategy CE1-B: Increase workforce development for the climate economy						
CE1-B- 1	Work with local union hall to ensure that apprenticeship program includes solar training. Potential partners and vehicles include: Greater Dubuque Development Corporation Green Job Development Initiative Attract Green Businesses	**1.0**					
CE1-B- 2	Explore the development of a job training and entrepreneurial development program similar to Operation Fresh Start. Program to focus on devvelopping green jobs skills within vulnerable and underserved populations in local sustainable agriculture, energy efficiency audits and upgrades, renewable energy, and other skills that support the goals of the CAP. (http://www.operationfreshstart.org/)	**1.0**					
CE1-B- 3	Create an intern program similar to the IDNR Pollution Prevention (P2) model. Task interns with finding resiliency solutions and cost savings. Intern development should focus on increasing community equity (https://www.iowadnr.gov/Environmental-Protection/Land-Quality/Waste-Planning-Recycling/Pollution-Prevention-P2)	**1.0**					
CE1-B- 4	Promote alternatives to traditional building demolition such as relocation, deconstruction and salvage. Establish a jobs training program focused on building workforce with deconstruction skills and capacities. Job training program should focus on establishing job skills and placement for low income individuals. See Beter Futures Program (https://betterfuturesminnesota.com/services/building-deconstruction/)	**2.0**					
CE1-B- 5	Renew DBQ Low Income Solar Program through local SREC market and financing to ensure that everyone benefits from equity in solving the problem not just those that created it	**2.0**					
	Strategy CE1-C: Explore climate action economic development and financing, particularly within underserved populations						
CE1-C- 1	Explore the creation of Community Development Finance program or institution to provide credit and financial services to underserved markets and populations, with a particular focus on advancing the goals, strategies, and acitons of the City's CAP plan. (https://www.developstrongcities.org/#cities)	**1.0**					
	Goal CE2 Build marketplace climate resilience						
	Strategy CE2-A: Inform businesses of climate vulnerability and opportunities for increasing resilience						
CE2-A- 1	Create an online assessment of business' vulnerability/resiliency, including the following topics and content: Potential Climate Impacts and Risks Climate Resiliency Energy: efficiency and renewables Emergency Response Zero Waste improvements Potential Incentives or Tax breaks available	**3.0**					
	Strategy CE2-B: Prepare for climate change immigration/migration						
CE2-B- 1	Create an Affordable Housing Master Plan to identify current and potential future need for affordable housing including scenarios anticipating climate immigration and migration potentials. Master plan should identify priority affordable housing locations which meet the Buildings and Energy, Transportation and Land Use, Climate Adaptation, Health and Safety, and other goals of this CAP plan.	**1.0**					
CE2-B- 2	Collaborate with the school district to study potential service needs which may be required under a range of climate immigration/migration scenarios. Collaborate to create a "Climate immigration and migration response plan" identifying actions.	**1.0**					
CE2-B- 3	Conduct a climate immigration / migration community development assessment to identify potential sustainable economic development and community development opportunities for the City. Assessment should assess the potential value of establishing a proactive communication and marketing campaign to areas of potential climate immigrant/migrant audiences. (coordinate with Adaptive Capacity)	**1.0**					

CE2-B- 4	Study strategies to maintain and increase equity in the face of potential climate change immigration / migration. Study should identify policies and efforts the City can implement to avoid "climate gentrification"	**1.0**					

	Detailed Actions - Climate Action Capacity	Priority Level Criteria Review Score: 4.5 - 5.0 = 1 4.0 - 4.4= 2 3.5 - 3.9= 3 3.0 - 3.4=4 2.0 - 2.9=5 0.0 - 1.9=6	Implementation				
			Primary Responsibility	Supporting Responsibility	Estimated Budget Need	Metric	Progress At Review
	Goal C1 Enhance and expand community capacity for climate action and resilience						
	Strategy C1-A: Educate, engage, and empower the public						
C1-A- 1	Create a formal public outreach and education plan to inform the community about climate actions and progress (National Mississippi River Museum CAARE program may be a potential partner). Outreach and education should assure inclusion of chronic, non-accute, stressors	**1.0**					
C1-A- 2	Design and promote CAAP educational materials to ensure full engagement of community members by using methods that are accessible and relevant to all.	**1.0**					
C1-A- 3	Build City staff capacity, within multiple departments, to support community-led, neighborhood-focused resilience actions (e.g., identifying best practices, establishing resilience hubs and implementing neighbor-based emergency response)	**1.0**					
C1-A- 4	Provide information on creating Personal Response Kits. Expand on City efforts to support families who cannot afford to purchase supplies for household emergency preparedness kits to adequately prepare their homes (e.g. solicit emergency supply donations). Identify possible strategies for the structure of the program through a review of donation programs in other communities and engagement with community partners and businesses.	**1.0**					
C1-A- 5	Develop and expand partnerships for education, training, and outreach efforts for residents around climate action and sustainability. Potential partners include regional Universities and the National Mississippi River Museum & Aquarium's existing CAARE curriculum.	**2.0**					
C1-A- 6	Work with local public and private schools to promote environmental education curriculums and provide in-school lessons on climate change science and climate action in K-12 classrooms. Curridula should include communication of actions within the City's Climate Action Plan. Establish Climate Communicaiton and Education hubs to provide localized (neighborhood level) information and guidance on resources on climate impacts including flooding, flash flooding, extreme heat and weather, air quality, water quality, and vector borne diseases. HUB to include information from City's Blue Spot flash flood risk assessment and promote the City's flood and water quality information HUB. HUB should Emphasize steps individuals can take to improve emergency preparedness, support the City's CAP, and increase awareness of City and other alert systems. (https://www.ready.gov/heat ; https://www.ready.gov/severe-weather ; https://www.ready.gov/drought ; https://www.ready.gov/thunderstorms-lightning ; https://www.ready.gov/tornadoes ; https://www.ready.gov/winter-weather)	**2.0**					
C1-A- 7	Explore communication and education strategies to reach different audiences. Consider developing robust climate education app such as a "choose your own adventure" activity/app or other existing tools like the NIH Preparedness app (https://tools.niehs.nih.gov/wetp/index.cfm?id=2536)	**2.0**					
C1-A- 8	Work with the Iowa DNR and County Public Health Department to establish a process (and expand the number of platforms e.g., social media) to notify schools, community organizations, residents, and businesses durring periods of air quality, water quality, extreme heat, and extreme weather concerns. Cooridnate to provide educational resources on actions for personal and family safety.	**2.0**					
C1-A- 9	Develop and promote educational materials on the health impacts of air pollution, extreme heat, longer allergy seasons, and vector-borne disease	**2.0**					
C1-A- 10	Provide information on what residents can do to reduce their carbon footprint and how their households can be more resilient. Action examples should focus on strategies included in the City's CAP and should highlight opportunities for increasing the community's equity	**2.0**					
C1-A- 11	Create a climate change awareness "mascot" to promote education, awareness, and action at public events. Mascot development and design could be conducted as a design competition and education/engagement opportunity in itself.	**4.0**					
C1-A- 12	Increase household education about water quality and food storage risks resulting from power outages associated with increased extreme weather events	**4.0**					
	Strategy C1-B: Support development of social networks to build social resilience						
C1-B- 1	Explore modifications to City's zoning ordinance, such as allowance of accessory dwelling units, to encourage development of affordable intergenerational single-family homes and multi-family housing with a focus on improved social connectedness across demographic cohorts (age and ethnicity)	**1.0**					
C1-B- 2	Ensure safe and welcoming community spaces for all, including parks, community and youth centers, and city streets and rights of way, located in all areas of the city. Identify areas within city not served by park space within 10 minute walk and develop a master plan to establish effective park spaces to support social connectedness in areas with greatest need, with a priority on equity. Study should coordinate with bike and walkability and public transit plans and pathways. See Parkscore: https://parkserve.tpl.org/mapping/index.html?CityID=1922395	**1.0**					
C1-B- 3	Strengthen social connectedness through relationship-building among community members across age, ethnicity, income, and other demographic differences	**1.0**					
C1-B- 4	Expand activity and participatory arts programs for older adults, extracurricular activities for youth social engagement, youth peer mentoring and intergenerational mentoring. Programs should focus on expanding social connectedness within and between demographic cohorts (age and ethnicity)	**2.0**					
C1-B- 5	Expand the use of social media to share information and encourage collaboration and civic engagement. Identify responsible party within city to establish and maintain a social media campaign to include organized and regular climate action plan implementation and/or climate change preparedness communications	**2.0**					
C1-B- 6	Ensure integrated community centers that provide space for recreational and educational programming, counseling and support services, and socialization readily available to all vulnerable and at risk populations within walking distance or convenient public transit service.	**2.0**					

C1-B- 7	Support and encourage the expansion of public events that bring communities together in public and private spaces. Explore developing events in collaboration with other regional public agencies and private sponsors	**2.0**					
C1-B- 8	Build and support social networks: neighborhoods, churches, affinity groups	**3.0**					
	C2 Develop new mechanisms for financing climate action work that account for equity and co-benefits (building upon existing budget scoring criteria)						
	Strategy C2-A: Leverage existing financing pathways						
C2-A- 1	Explore use of City share of DMASWA landfill methane capture and beneficial reuse as Renewable Natural Gas to fund Climate Mitigation and Adaptation implementation.	**1.0**					
C2-A- 2	Establish Rate Payer Advisory Commissions for review of rates, revenue, and uses for Resource Management and DMASWA. Explore revenue uses for opportunities to support actions in support of the City's Climate Action goals.	**1.0**					
C2-A- 3	Research climate action financing tools and develop approach for Dubuque. Research should include resources included in the Dubuque Climate Vulnerability Assessment, September 2019, Chapter 12 "Possible Funding" as well as other sources	**1.0**					
C2-A- 4	Establish a policy that requires city infrastructure projects and capital budgets incorporate climate risk and vulnerability analysis and adaptation plans to ensure that future spending contributes to resilience and achieving the City's CAP plan goals.	**2.0**					
	Strategy C2-B: Develop new financing pathways						
C2-B- 1	Identify a sustainable funding source for increased utility assistance for low-income residents, including support for energy efficiency projects, such as weatherization	**1.0**					
C2-B- 2	Explore the potential of developing a "Carbon Impact Fee" similar to the City of Watsonville CA. Fee could be a percentage of the building permit fee applied to all construction projects. Additional funds raised to be used for Climate Mitigation and Adaptation implementation. Projects may apply for a a sliding scale refund if they install on-site renewable energy system and provide documentation that demonstrates the system will offset either 40%, 80%, or 100% of the project's average annual electricity demand. Alternative options include increasing the building permit fee base costs and providing a discount or rebate to properties meeting City energy and climate goals. Increased revenue to be used to fund Climate Mitigation and Adaptation implementation with a focus on the actions and strategies which increase the community's equity. https://www.cityofwatsonville.org/DocumentCenter/View/198/Frequently-Asked-Questions-About-the-Carbon-Fund-Ordinance-PDF https://www.cityofwatsonville.org/DocumentCenter/View/3944/Carbon-Fund-Voluntary-Compliance-Worksheet?bidId=	**1.0**					
C2-B- 3	Explore Issuing "resilience bonds" that generate risk-reduction rebates from a city's catastrophe insurance premiums to pay for resilience projects, prioritizing projects with high resilience, GHG mitigation, and climate adaptation potential.	**1.0**					
C2-B- 5	Explore the potential of collaborations with donors, philanthropists, and non-profit foundations to develop a Climate Action and Equity Fund for the City of Dubuque. (https://www.mcknight.org/news-ideas/new-charitable-fund-to-support-local-action-on-climate-change-2/)	**1.0**					
C2-B- 6	Establish a policy that accounts for all energy efficiency and renewable energy operational cost savings of City buildings and fleets. All savings to be invested into a Climate Action Fund as one source of financing for the City's climate action efforts.	**2.0**					
C2-B- 7	Explore the "green marketplace" utilization potential of the city's urban forest with all revenue being invested in Climate Action Plan strategies. Strategies may include sale of downed and select removed trees through marketplaces such as the Urban Wood Network (http://urbanwoodnetwork.org/members), as well as exploring lease of benefits of select city owned tree stock such as "sugaring" rights of maple trees. Utilization should be prioritized to maintain quality of the city's urban forest and qualtiy of life benefits.	**2.0**					

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