

Prioritizing Municipal Actions to Mitigate and Adapt to Climate Change

An Overview

Michael Orange, 12/3/22

Introduction, purpose, and audience: This is a *high-altitude* prioritization of the actions a Minnesota city should take to mitigate and adapt to climate change. Many cities have been taking these steps for years, even decades. Others have yet to begin.

Even though, for nearly a half century, the world has known about the existential crisis posed by climate change and the importance of the three “E’s” of sustainability (Environment, Energy, and Equity), few national actions have had substantive effects. After describing the most current list of climate change threats, Roy Stanton, the director of the Environmental Humanities Initiative at Notre Dame University, stated, “[W]e need to face the fact that the world we live in is changing into something else, and that coping with the consequences of global warming demands immediate, widespread, radical action.”^{1, 2}

"This is all wrong. I shouldn't be up here. I should be back in school on the other side of the ocean. Yet you all come to us young people for hope. How dare you! You have stolen my dreams and my childhood with your empty words. And yet I'm one of the lucky ones. People are suffering. People are dying. Entire ecosystems are collapsing. We are in the beginning of a mass extinction, and all you can talk about is money and fairy tales of eternal economic growth. How dare you!"

Statement by climate activist Greta Thunberg, 16, at the United Nations Climate Action Summit in New York City, 9/23/19.³

A recent article by Michael Noble and Aimee Witteman argues that Minnesota should adopt more ambitious policies to address climate change:

“Gov. Tim Walz’s plan targeting 100 percent clean electricity by 2040 would help tackle climate change’s growing threat and accelerate our COVID-19 economic recovery. ... But new research and the state’s latest greenhouse gas inventory shows that ... we must be even bolder on climate action. A carbon-free electric grid is a critical but insufficient step... As long-time advocates for climate justice, we see Minnesota’s incredible opportunity to be America’s climate policy North Star by demonstrating smart climate policy that delivers lasting payoffs — a strong economy, good-paying jobs, and healthier communities. And new polling shows a majority of Minnesotans support ambitious climate action, specifically a national 100 percent clean electricity standard by 2035.”

¹ *I've Said Goodbye to Normal. You Should, Too*, Roy Scranton, *New York Times*, 1/25/21

² See also the United Nations *NDC Synthesis Report*, 2/26/21

³ Source: <https://www.npr.org/2019/09/23/763452863/transcript-greta-thunbergs-speech-at-the-u-n-climate-action-summit>

Prioritizing Municipal Actions to Mitigate and Adapt to Climate Change: An Overview

Since most people live in cities, and cities have the greatest potential to make an impact, the municipal level has the greatest potential for progress. We know what needs to be done, we know that it needs to be done yesterday, and we know how to do it and how to pay for it. The only real barrier is commitment. Every city needs a green champion; an individual or a group that inspires the city's decision-makers (city council, planning commission, city manager, planning director, public works director, etc.) to move away from a status-quo mindset of "this is how we've done it in the past, so it's good enough for the present" towards an openness to start down the path paved by other cities that are already well down on the following list of accomplishments.

Hopefully, this summary can offer encouragement and direction for a city's green champion. Virtually every action a city takes to save energy and become more resilient and adaptable to climate change will also save money for the city and its residents. It just makes sense/cents!

Here are the most crucial efforts:

B3 Program: It is essential that the city's focus begins with getting its own house in order first to serve as an example for others. The state's [Buildings, Benchmarks and Beyond](#) (B3) Program is a free and essential first step. The B3 tools and programs are designed to make public buildings more energy efficient and sustainable. The B3 Guidelines and the [SB 2030 Energy Standard](#) can be applied to new and renovated buildings during the design phase. B3 Benchmarking, B3 Energy Efficient Operations, and the B3 Post Occupancy Evaluation programs can be used to evaluate and improve existing buildings.

While annual data entry can be accomplished by a person with little training, it is essential that facility managers *use* the program results to identify energy consumption anomalies and compare individual facility efficiencies with the benchmark data from the program's inventories of similar facilities. Evaluation of the data and benchmark comparisons may indicate the need for a recommissioning of a facility, for example. [Attachment 1](#) includes a screen shot that offers a glimpse of the graphical and analytical power of this free program.

GreenStep Cities: The next step for any city is to join the [GreenStep Cities](#) Program. Officially launched in 2010, the Program, which is managed by the Minnesota Pollution Control Agency through a public-private partnership, has helped nearly 150 cities address these challenges by providing a convenient clearinghouse of information that is targeted to all Minnesota cities. This free, continuous improvement program offers an encyclopedic collection of best practices, links to state-of-the-art articles and free expert consultants, and constantly updated progress reports from participating cities. It is a voluntary, action-oriented program that supports and salutes the implementation of best practices that help cities identify and achieve sustainability and quality-of-life goals, and adapt to our rapidly changing climate. See also, their [Gold Leaf](#) climate action program which provides a pathway for taking 44 high-priority, high-impact climate actions. [Attachment 2](#) has a screen shot that summarizes the benefits of the program.

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Greenhouse gas assessments: As described by Osborne and Gaebler in their book, *Reinventing Government* (1992), “If you don’t measure results, you can’t tell success from failure. If you cannot see success, you cannot reward it. If you can’t see failure, you can’t correct it.”

Greenhouse gas (GHG) emissions serve as a common denominator for the comparison of kilowatts, natural gas therms, and gallons of vehicular fuels consumed; vehicle and air miles traveled; tons of municipal solid waste processed; gallons of sanitary sewage treated; and gallons of potable water produced. GHG emissions offer a unique way to compare the effectiveness of various energy and sustainability choices and their related costs.

Greenhouse gas assessments have two major components: A *citywide* assessment accounts for the GHG emissions associated with activities within the entire border of the city (energy consumption by all residences and commercial/industrial buildings, transportation, solid waste management, wastewater treatment, etc.). [Attachment 3](#) includes a graphic that illustrates total GHG emissions for the City of Edina. The *city operations* assessment focuses on the emissions associated with city-owned and leased buildings and facilities, city fleets and official travel, and waste management. It’s a subset of the citywide assessment.

- **City operations GHG assessment:** Every city prepares annual operating and capital improvement budgets. A city operations GHG assessment is akin to the environmental budget for the city. Of the two kinds of assessments, a city will have the most ability to improve the city operations assessment. [Attachment 4](#) includes a page from the *City of Burnsville City Operations Greenhouse Gas Assessment, 2005 to 2021*. This assessment will:
 - ◇ Enable the city to serve as a good example. A city can’t legitimately ask its community to increase energy efficiency and climate adaptability if it is unwilling to lead the way and track progress towards specific goals.
 - ◇ Highlight opportunities to reduce emissions, and save resources and money. A city has limited ability to move the needle on communitywide emissions and adaptability but strong operational control over its own facilities.
 - ◇ Provide baselines for estimating the effectiveness of many sustainability measures.
 - ◇ Enable comparison with future inventories and peer cities.
 - ◇ Inform subsequent analyses, plans, and policy decisions.
 - ◇ Improve the city’s competitiveness for federal and state funding opportunities that are targeted to cities that have taken steps to measure and improve their energy efficiency and reduce their carbon footprints.
 - ◇ Assist in promoting public understanding of the city’s effects on climate change.
 - ◇ Serve as a model for other cities.

Experience with prior city operations assessments indicates that important benefits often result from the preparation process as well. It can spark common interest among the involved city staff in understanding why energy consumption fluctuates from year to year, it can encourage the sharing of ideas among different departments, and it can foster a common desire to reduce emissions.

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The assessments for the City of Burnsville offer a lesson on the importance of the city operations assessment and potable water. In the 2005 base year for the assessment, the production and distribution of water constituted more than half of Burnsville's overall city operations footprint of GHG emissions. Over the next 16 years, the city invested about \$19 million in improvements. The city operations assessment for 2021 showed that the same amount of energy produced 67% more water in 2021 than in 2005 due primarily to these investments. This was the dominant factor that enabled the city to reach and exceed its citywide, GHG reduction goal for 2025 4 years earlier with its 34% GHG reduction from the 2005 base year. From the assessment: "Over the 17-year Study Period, the City's annual GHG reductions below the 2005 Base Year's emissions totaled about 51,000 tonnes, about 3,000 tonnes per year on average. This would offset the equivalent annual emissions from nearly 1,600 households over the Study Period, or about 89 households on average each year." These kinds of summary metrics are very valuable for promoting a city's efforts and successes towards improved sustainability.

See additional examples of operations greenhouse gas reduction goals and inventories on the [MN Sustainability Index](#).

- **Citywide GHG assessment and reduction goals:** The primary document that guides a city's future is its comprehensive plan. Many cities' comprehensive plans now include a chapter on sustainability or have sustainability measures integrated throughout it. However, this is not sufficient to address the existential threat of climate change. The tool cities need to be fully prepared is called a climate action plan (described below).

A key element of a climate action plan is the development and formal adoption by the city of challenging but reasonable GHG reduction goals. The accomplishment of these goals can guide the subsequent implementation of components in the climate action plan. Of course, goal setting begins with measurement. It's the citywide GHG assessment that provides the historic citywide GHG emissions data needed to generate the goals.

See additional examples of community-wide greenhouse gas reduction goals and inventories on the [MN Sustainability Index](#).

- **Study years and updates:** The citywide and city operations assessments should include 3 or more study years to get to the current calendar year. If the city has already made significant progress with projects that reduce greenhouse gas emissions (e.g., widespread LED bulb replacements, building recommissionings, etc.), the base study year should be set prior to those improvements so the reduction goal can be more reasonable. For example, assuming the major improvement projects began in 2012, the assessments could set 2011 as the Base Study Year, then include 2013, 2016, 2019, and 2022 as additional Study Years. Using a separate RFP process, the city should commit to updating the citywide assessment every 4-5 years and the city operations assessment every other year, minimally.

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Climate action plan: Climate action plans can vary significantly depending on the amount of community engagement, the desired project schedule (e.g., shorter can be more expensive), and on the plan's components. Possible components include the following:

- Citywide and city operations greenhouse gas reduction projections (e.g., business as usual, best case, and most reasonable case projections out 10 or more years), and mid and long-range goals and implementation actions based on the respective GHG assessments and projections
- Sustainability indicators and communication tools (e.g., a sustainability progress dashboard for the city's website)
- Climate vulnerability and adaptation goals and implementation actions
- Renewable energy goals and actions
- Community wide tree and ground cover goals and actions
- Carbon sequestration planning
- Climate emergency and disaster planning

[Attachment 5](#) includes excerpts from the [Edina Climate Action Plan](#). Also see examples of climate action plans on the [MN Sustainability Index](#).

Costs: Costs will vary markedly based on the scope of a study and the size and complexity of a city. It's very important to include extensive community engagement in the planning process, which can also affect costs. Studies for cities that rely on regional systems for electricity, solid waste management, potable water, and wastewater treatment will be much easier to produce than for cities that actually provide these same essential services.⁴ As such, the following cost ranges are wide to account for these significant variables while still providing a general sense of scale for a city's decisionmakers. A city will need to go through a request for proposal process to establish actual costs:

- B3 program and GreenStep Cities programs: Free
- Custom Citywide GHG assessment: \$8,000-\$12,000
 - Updates to a citywide assessment (every 3-5 years): \$2,000-\$4,000
 - Basic: Available for cities included in the [Regional Indicators Initiative and/or Twin Cities Greenhouse Gas Inventory](#): Free (or ~\$3,000 to be added)
- Custom City operations GHG assessment: \$6,000-\$10,000
 - Updates to a city operations assessment (every other year): \$3,000-\$7,000
 - Basic: Available through the Step 4 & 5 [metric reporting](#) tool: Free
- Climate action plan: \$30,000-\$70,000. See the [City of Red Wing's Climate Action Work Plan](#) for an example of a CAP-light. Total cost: \$14,967 (2021)

⁴ For example, cities in the metropolitan area can access from the Metropolitan Council community data including GHG emissions data regarding transportation-related emissions, and a city's share of regional emissions from wastewater treatment. Xcel Energy provides energy consumption (electricity and natural gas) and GHG emissions data for cities within its service area.

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Attachments:

1. Screen Shot from the State's [Buildings, Benchmarks and Beyond](#) program
2. Screen Shot from the State's [GreenStep Cities](#) program
3. Graphic from the Citywide Greenhouse Gas Assessment: Excerpt from the [Edina Climate Action Plan](#)
4. Graphic from a City Operations Greenhouse Gas Assessment: Excerpt from the [City of Burnsville City Operations Greenhouse Gas Assessment, 2005 to 2021](#)
5. Excerpts from the [Edina Climate Action Plan](#)

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Attachment 1

Screen Shot from the State's [Buildings, Benchmarks and Beyond](#) Program

Building Energy Data in your Hands

B3, which stands for Buildings, Benchmarks and Beyond, is an online tool that puts energy data in your hands. Using basic building and meter information, the online tool summarizes energy consumption, costs, and carbon emissions in easily digestible monthly and annual reports for Minnesota public buildings.

3 BENCHMARKING

Demo Organization

Dashboard Data Metrics Visualizations Improvements Reports

Energy: 84.18 kWh/SF (Jan 2019-Dec 2019)

Cost: \$439,704/year (Jan 2019-Dec 2019)

Energy Baseline: Actual 75.00 kWh/SF, Baseline 85.02 kWh/SF, Variance -4.80%

Space: 376,000 gross bldg sf

Potential Savings: \$56,000/year

Data Quality: Site Completeness 100% complete

Lower your costs

By reducing energy consumption, you lower your operating costs – freeing up money for your organization’s core services.

B3 Benchmarking helps you ensure your building is operating and performing as expected, and the tool screens buildings that would provide the greatest return on investment from any building improvements.

The Power of Perspective

Have you ever been asked, “How do your buildings compare?” B3 uses complex analyses that allow you to compare a building from four major perspectives. This multiple-angle approach helps you identify weak buildings and gives you the confidence that an identified poor performer is truly in need of improvement and will yield significant returns on investment.

Benchmark	Peer Comparison	ENERGY STAR®	Baseline
An engineering modeling comparison using DOE-2 simulations and B3 energy standards predicts expected energy use.	An evaluation of a building to others with similar space usage, geographic location, and energy code provides true peer comparison.	A simple 0-100 score produced by ENERGY STAR® Portfolio Manager analyzes a building against similar buildings across the US.	A weather-normalized comparison of a building to itself over time provides monthly and annual analysis.

Over Two Decades of Benchmarking Expertise

Attachment 2

Screen Shot from the State's [GreenStep Cities](#) Program

Minnesota GreenStep Cities

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Benefits

What are the benefits of joining the GreenStep program and implementing its best practices?

The answers to this question will be different for different cities, but here are the key points we have heard from GreenStep cities and around which we have designed the program. The GreenStep program:

- **Is a continuous improvement pathway** for cities to "go green," becoming more sustainable and resilient.
- **Will save city staff time** in researching proven, cost-effective actions for cutting energy use, decreasing the city's carbon footprint, and accomplishing other sustainability goals that exceed regulatory requirements. Information on and an Advisor for how to complete 170 actions – in the best practice groups of buildings, land use, transportation, environment, and economic/community development – is continuously updated with Minnesota-specific information.
- **Will save cities money** and deliver a stream of multiple environmental, social and financial benefits; will help cities explore how to spend the same amount of money smarter.
- **Is a home-grown, independent program tailored to Minnesota cities** and provides maximum flexibility and total control and choice by city councils in how to implement a proven best practice.
- **Provides over 4,000 reports** on how Minnesota cities are taking action, making it easy to learn from and contact peer cities so as to jump-start actions in your own city.
- **Opens up special opportunities** for funding and technical assistance, available mostly to GreenStep cities because the GreenStep program focuses on existing GreenStep cities.
- **Positions a city** to more easily apply for competitive grant and assistance programs.
- **Maps out how to follow-through** on the various commitments cities may have made, such as the U.S. Mayors Climate Protection Agreement, signed by over 40 Minnesota cities, and on the Minnesota Legislature's aggressive Next Generation Energy Act.
- **Provides leadership and action roles for community** members, businesses and institutions so as to stretch limited city funds and strengthen a civic culture of engagement and innovation. We encourage cities to use student interns to help enter best practice action reports on the GreenStep web site, and have an intern manual to make this easier.
- **Continuously prompts** program participants – like an exercise coach would! – to maximize opportunities to accelerate sustainability actions.
- **Provides public recognition** of the good work being done by Minnesota cities.

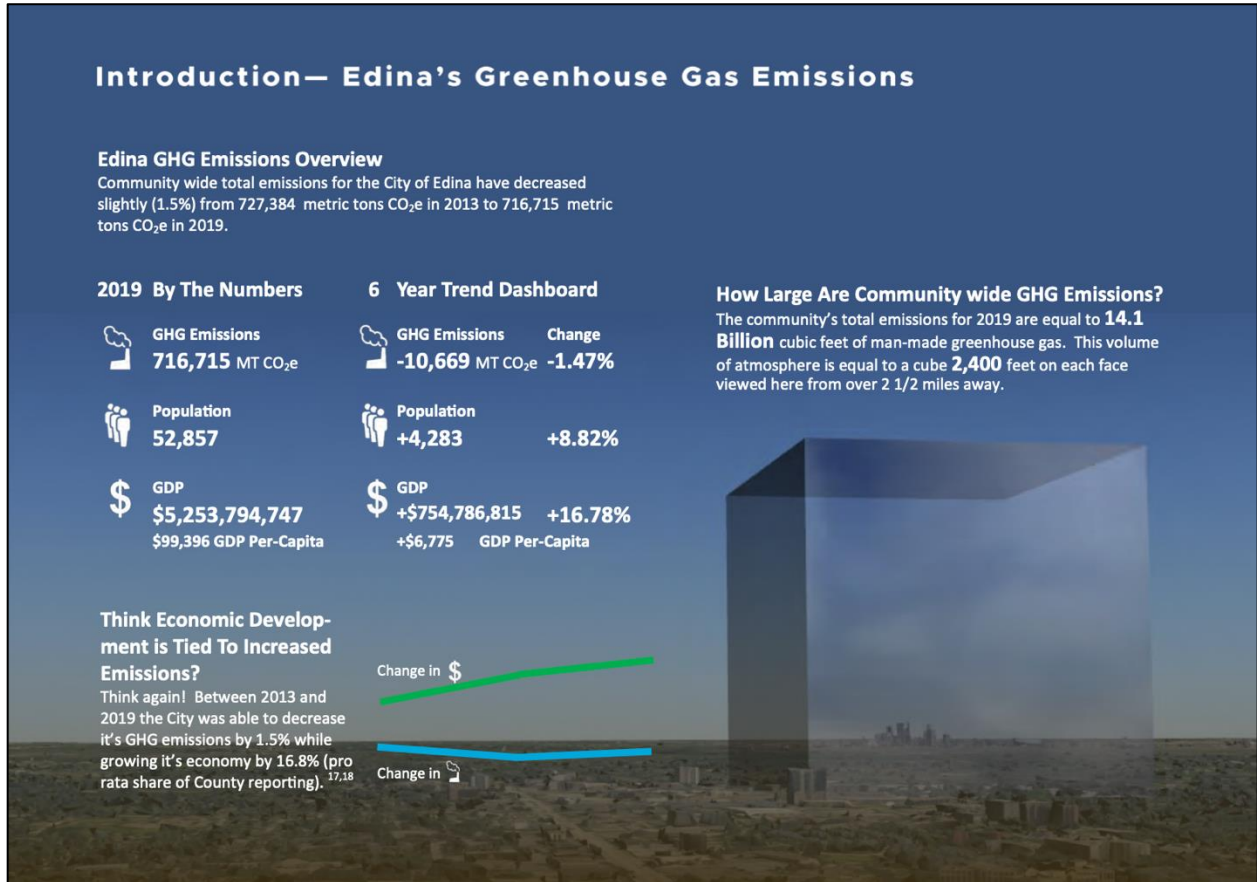
What recognition is there for a GreenStep City?

- **Annual peer recognition** at the June conference of the League of Minnesota Cities.
- **Annual \$1,000 LMC/GSC Sustainable City Award.**
- **Your city's accomplishments will be visible** on the GreenStep web site, the most comprehensive web site in Minnesota devoted to city sustainability.
- **Artwork and recognition materials** (logos, sample press releases).
- **Five steps of recognition:**
 - **Step One:** for cities that have passed a city council resolution to work on implementing best practices of their own choice and at their own pace.
 - **Step Two:** for cities that have implemented any 4, 6 or 8 best practices (depending on city Category/city capacity).
 - **Step Three:** for cities that have implemented an additional 4, 6 or 8 best practices (depending on city Category) and completed a handful of specific high-impact actions – this can take between one and a few years.
 - **Step Four:** for cities that report (by May 1st), for the previous calendar year, between 7 and 10 core city performance metrics and 5, 3, or no (depending on city Category) additional metrics of their choice.
 - **Step Five:** for cities that report improvement in a minimum number of metrics.

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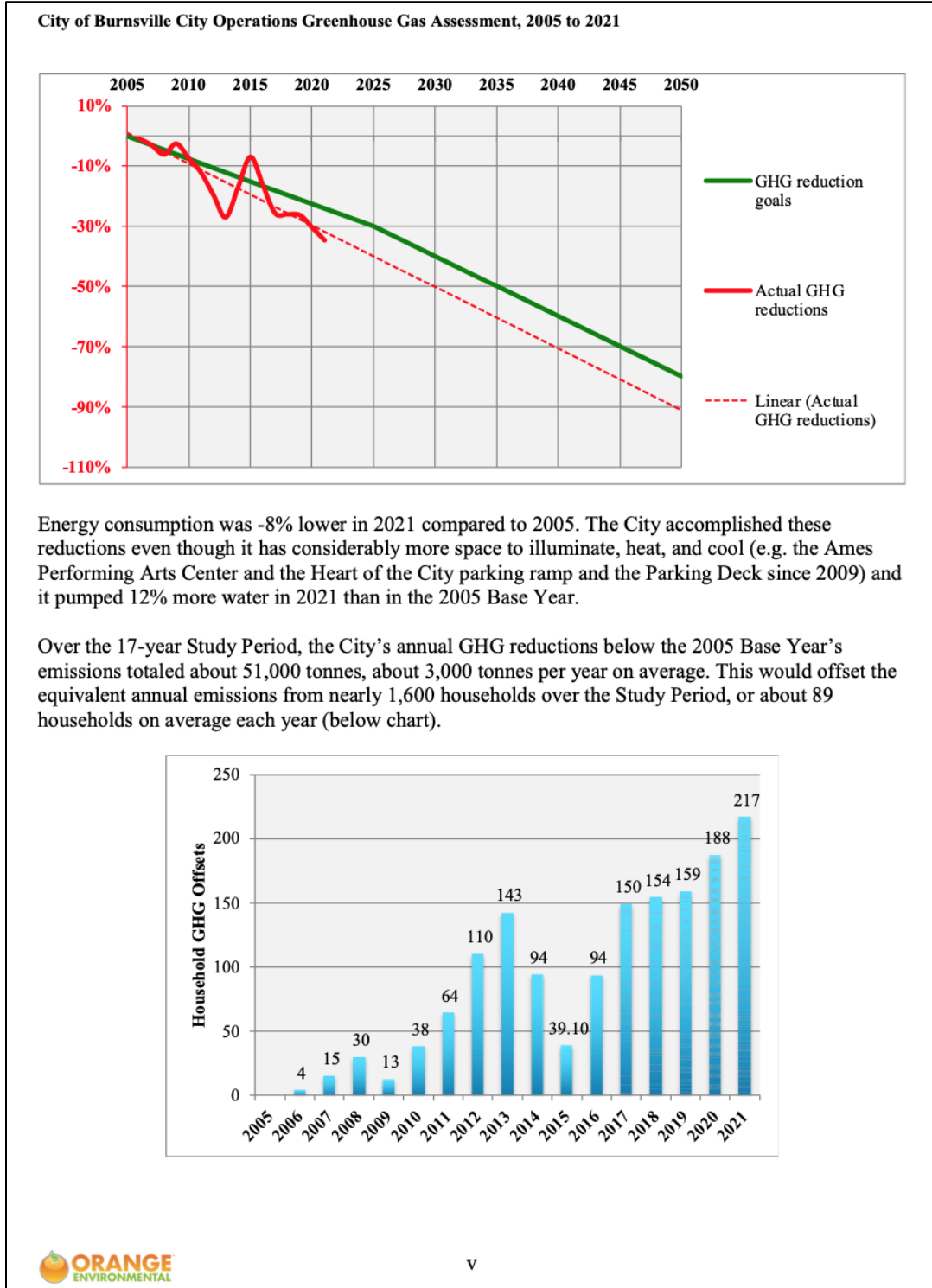
Attachment 3

Graphic from a Citywide Greenhouse Gas Assessment: Excerpt from the [Edina Climate Action Plan](#)



Attachment 4

Graphic from a City Operations Greenhouse Gas Assessment: Excerpt from the [City of Burnsville City Operations Greenhouse Gas Assessment, 2005 to 2021](#)



Attachment 5

Excerpts from the [Edina Climate Action Plan](#)

Introduction—Benefits of Climate Action Planning

Co— Benefits of Climate Action Planning
 According to the World Health Organization, studies are increasingly showing that the implementation of climate policies leads to both cost savings and improvement in health. The actions communities take to reduce greenhouse gas emissions in various sectors, including housing, transportation and energy, have many co-benefits that go beyond climate change mitigation. These co-benefits to climate planning include reduced air pollution, substantial human health gains and reduced health risks, increased resource efficiency, improved local economic security, and improved resilience of ecosystems and our built environment.^{1,2,3,4} These benefits result in positive financial impacts, improved quality of life, and natural resources.















GHG Mitigation can avoid 57,000 premature deaths in the United States annually by 2100
 - United States Environmental Protection Agency¹¹

Positive Financial Impacts
 Many climate actions have a direct positive financial impact (e.g. savings from reduced fuel consumption). Many actions also have significant indirect financial impacts. Studies show that air pollution benefits of climate actions can cover a significant part of the cost of those initiatives.⁵ Still others help avoid costs through increase resilience such as the reducing dependence on fossil fuels – estimated at \$5 per metric ton of GHG reduction.⁶ Health benefits may offer the most significant financial opportunity. One study estimated global average health co-benefits of \$58-380 per metric ton of GHG.

Improved Quality of Life
 The actions included in this and other climate action plans support a continued improvement to the community’s quality of life. Studies indicate that successful implementation of many climate actions will result in increased mobility options, job creation, and reductions in poverty and inequality.⁸

Improved Natural Resources
 Addressing global warming could help lessen the harmful impacts of climate change on the ecosystems that now provide us with multiple benefits.⁹ Increasing the Edina’s community wide tree canopy to meet the goals of this climate action plan, for instance, could increase the economic benefit provided by the city’s trees by as much as \$60 million while other actions can result in improved access to green-space for residents.¹⁰

Common Co-Benefits of Climate Planning

Reduced Costs 	Improved Air Quality 
Improved Energy Resilience 	Reduced Pollution 
Improved Public Health 	Jobs / Economic Development 
Safer Streets 	Reduced Traffic Congestion 
Protected / Enhanced Ecosystems 	Improved Community Resilience 
Improved Mobility 	Improved Social Connectivity 
Improved Community Equity 	Improved Quality of Life 

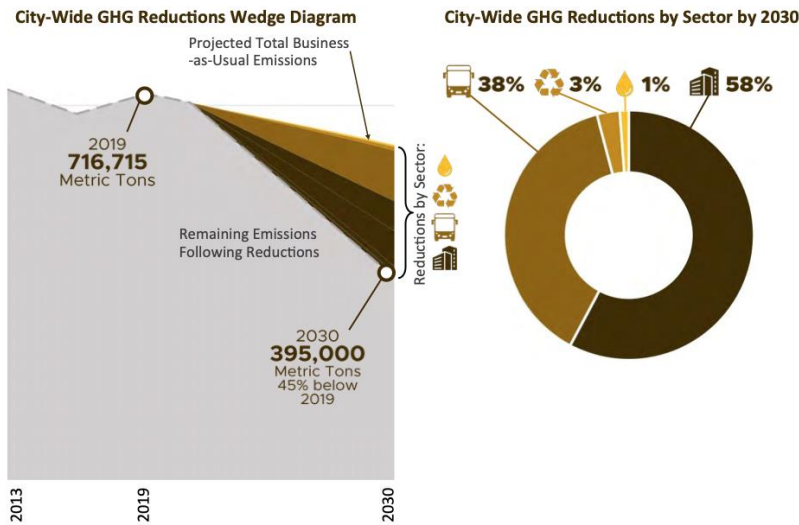
Edina Climate Action Plan

1-3

Introduction—Plan Impacts

Estimated City-Wide GHG Reductions Included in This Plan

Long-term emission reduction potentials of the strategies and actions included in this plan have been modeled based on projected energy and fuel reductions and adoption rates of renewable energy and low/no emission transportation modes outlined in the strategies and actions. From this modeling, we know that with the successful implementation of this climate action plan, city-wide annual GHG emissions are projected to drop 323,672 metric tons below 2019 levels by 2030. The potential cumulative GHG emissions reductions over the 9 year implementation period are estimated at over 935,000 metric tons - an elimination of over **18.4 billion cubic feet** of man made greenhouse gas atmosphere resulting from this climate action plan.



Edina Climate Action Plan

Cumulative Economic Savings Potential of Implementing the CAP Through 2030

Transportation Economic Potential*:

Sector Savings: \$380,651,966
Sector Cost Increases: -\$57,532,663
Potential Sector Net Cost Savings:

\$323,119,304

Buildings + Energy Economic Potential*:

Sector Savings: \$223,977,235
Sector Cost Increases: -\$183,805,885
Potential Sector Net Cost Savings:

+ \$40,171,350

Waste Reduction Economic Potential*:

Residential Savings: \$21,219,114
Commercial Savings: \$5,828,145
Potential Sector Net Cost Savings:

+ \$27,047,258

Social Cost of Avoided Carbon:

+ \$55,986,020

Cumulative Community-Wide Savings Potential:

= \$446,323,932*

* Value does not include economic potential of job creation and new business potential represented in the Climate Action Plan actions. (see Appendix for more)



Executive Summary

- 1 University of Reading, Show Your Stripes: <https://showyourstripes.info/>
- 2 City of Edina Climate Vulnerability Assessment: <https://view.publitas.com/palebluedot/edina-climate-vulnerability-assessment/>
- 3 U.S. Global Change Research Program, National Climate Assessment: <https://nca2018.globalchange.gov/chapter/14/>
- 4 REN21, Is Renewable Energy the Definition of Resilience: <https://www.ren21.net/renewable-energy-resilient/>
- 5 Generation180, Clean Energy is a Massive Job Creator: <https://generation180.org/clean-energy-is-a-massive-job-creator/>
- 6 United Nations Environmental Programme, Emissions Gap Report November 2019: <https://www.unep.org/resources/emissions-gap-report-2019>

Introduction

- 1 Estimating the Health-Related Costs of 10 Climate-Sensitive US Events During 2012: <https://www.nrdc.org/resources/bitter-pill-high-health-costs-climate-change>
- 2 Stop Climate Change, Save Lives: <https://www.nrdc.org/stop-climate-change-save-lives>
- 3 World Health Organization Building Capacity on Climate Change for Human Health Toolkit: <https://www.who.int/activities/building-capacity-on-climate-change-human-health/toolkit/cobenefits>

- 4 United Nations Economic Commission for Europe: https://unece.org/DAM/Sustainable_Development_No.2_Final_Draft_OK_2.pdf
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- 9 Union of Concerned Scientists, Top 10 Benefits of Climate Action: <https://www.ucsusa.org/resources/top-10-benefits-climate-action>
- 10 City of Edina Ground Cover Survey and Carbon Sequestration Study: <https://view.publitas.com/palebluedot/edina-ground-cover-survey-and-sequestration-study>
- 11 US EPA, Benefits of Global Action; <https://www.epa.gov/sites/default/files/2015-06/documents/cirareport.pdf>