8. Energy and Environment

Chapter Highlights

- The people in the City of Edina strongly value building and maintaining a sustainable environment, although that has not always been matched by actions.
- The City of Edina will take actions to address climate change, including greenhouse gas reduction and solid waste reduction.
- Climate change will have an increasing impact on Edina, as evidenced by a recent United Nations report.
- The City intends to learn from the experience of implementation since the last comprehensive plan, to build a stronger foundation to implement its values.
- The City will make sustainability a foundational element of its decision-making process.
- The decision-making process should also take into account the goal of an equitable distribution of benefits.

Definitions

Environment includes factors that act upon a community and ultimately determine its form and survival, including the impact humans have on natural resources.

Sustainability means protecting regional vitality for future generations by preserving our capacity to maintain and support our region's well-being and productivity.

Resilience is the ability to recover from a disaster or disruption while maintaining integrity and purpose.

Introduction

The people in the City of Edina strongly value building and maintaining a sustainable environment. Each development decision must consider the 'triple bottom line' – people, planet and profit – so that the economic factors are not favored over the health and welfare of the city's natural environment and/or its residents in present and future decisions.

The City of Edina supports an environmental policy approach that positively impacts the community. In a recent citywide visioning process, environmental stewardship was identified as one of seven key strategic focus areas for the City. Vision Edina states: "Community residents and stakeholders believe that Edina can take an active and ambitious internal and regional leadership role in embedding environmental stewardship principles through actions such as promoting more comprehensive recycling, smart building and energy efficiency practices."

- This includes clean energy, reduction of greenhouse gas (GHG) emissions, clean water, responsible management of solid waste, clean air, transportation, ecological health, and wise management of natural resources.
- This means actions throughout the city which includes all parts of the city: city operations, commercial, industrial, and residential.
- This addresses tradeoffs that occur when working to meet multiple goals, including environmental, fiscal/economic, and quality of life.
- This proactively pursues resiliency and adaptation in the face of a changing climate.

This chapter outlines existing conditions and progress to date as well as a framework for recommendations for the future to ensure the economic and environmental health of the community.

Background: Edina's Commitment to Sustainability

History

From the early 1970's, with the establishment of its first Environmental Quality Commission, Edina has sought to be on the forefront of environmental and natural resource issues. The past decade has included significant action in that area, particularly around energy and climate change topics.

The City of Edina established a citizen Energy and Environment Commission (EEC) in 2007 to promote sustainability initiatives and to advise the City Council. The commission is comprised of Edina residents focused on specific sustainability topics. The commission creates a work plan annually, and recent focus has been on carbon emission reduction.

Since its founding, the EEC has overseen several sustainability initiatives, as summarized in the sidebar to the right. An early focus has been on municipal facilities, looking for opportunities for the City to lead by example.

In 2007, the City Council set specific goals related to greenhouse gas (GHG) reduction: 15% reduction by 2015, 25% reduction by 2025, and 80% reduction by 2050 (based on the state 2007 Next Generation Energy Act). These goals were incorporated in the city's 2008 comprehensive plan. When the 2015 goal was not met, this was a wakeup call to do more. The Conservation and Sustainability Fund was created to fund a dedicated resource to manage and measure carbon reduction actions.

An important tool in meeting future goals was the development of an energy action plan, to jump-start a citywide effort towards energy efficiency. In 2016, the City worked with the Partners in Energy program to complete its Electricity Action Plan, the first element of this plan, to begin its strategy for energy use reduction. Additional action plans are anticipated to be completed in the following years, as outlined in this plan.

Key Edina Sustainability Milestones

2007: Became a participant in the Regional Indicators Initiative (RII)
Established EEC
Signed U.S. Mayor's Climate Protection Agreement
Became an ICLEI City for Climate Protection

2008: Energy and Environment chapter in the Comprehensive Plan

2009: Completed Greenhouse Gas Inventory

2010: Began benchmarking City Buildings; Installed a closed loop geothermal system at the Public Works building

2011: Entered into a Guaranteed Energy Savings Contract; Joined GreenStep Cities; Installed solar panels on the roof of City Hall

2012-2016: LED lighting retrofits in multiple public buildings

2015: Established Conservation and Sustainability Fund

2016: Hired sustainability coordinator; completed Electricity Station Plan

2017: Participation in Community Resilience-Building Workshop Series

2018: MN GreenCorps member provided recommendations to green City Fleet and meet GHG goals
664kW Community Solar Garden installed on top of the Public Works building.

What We Have Learned

The past decade has shown that the strong values and intentions of Edina to pursue environmental sustainability have not always been demonstrated in decisions and results. Therefore, the EEC seeks to learn from past experiences to support a renewed approach moving forward.

This chapter takes from a 2008 experience and builds on it. In 2008, Edina was the first city in the metropolitan area to include environmental action in its comprehensive plan. In 2018, Chapter 10 seeks to summarize the framework created since 2008 for taking environmental action:

- Sustainability actions will focus on key subject areas. To date, those areas include energy, water, solid waste, air quality, natural habitat, trees, and environmental contamination.
- Environmental decisions and actions vary across different sectors of the community: City municipal operations, residents, other governmental bodies, and commercial and industrial businesses.
- The City of Edina will take actions affecting all of these actors and, most importantly, lead by example.

It is our intent that future Energy and Environment Commissions use this chapter to frame their annual work plans. Building on the past experience of the EEC, we direct future EECs to advise the City to:

- Meet existing goals of Greenhouse Gas (GHG) and waste reduction.
- Set new goals with community input to address climate change.
- Continually learn about environmental best practices and integrate those into action plans.
- Educate the community about the environment and sustainability.
- Leverage areas where the environment intersects with other commissions.

Edina: A Community of Learning. Edina has a prized education system of high-quality public schools. The Energy and Environment chapter of the Comprehensive Plan recognizes the importance of extending the benefits of education to the entire community.

The work of City staff and the Energy and Environment Commission includes educating the public about best practices related to environment and sustainability. This covers what the public can do to support community goals regarding environmental quality and energy use. For instance, education about climate change can strengthen support for city goals and actions to address its impacts on the community.

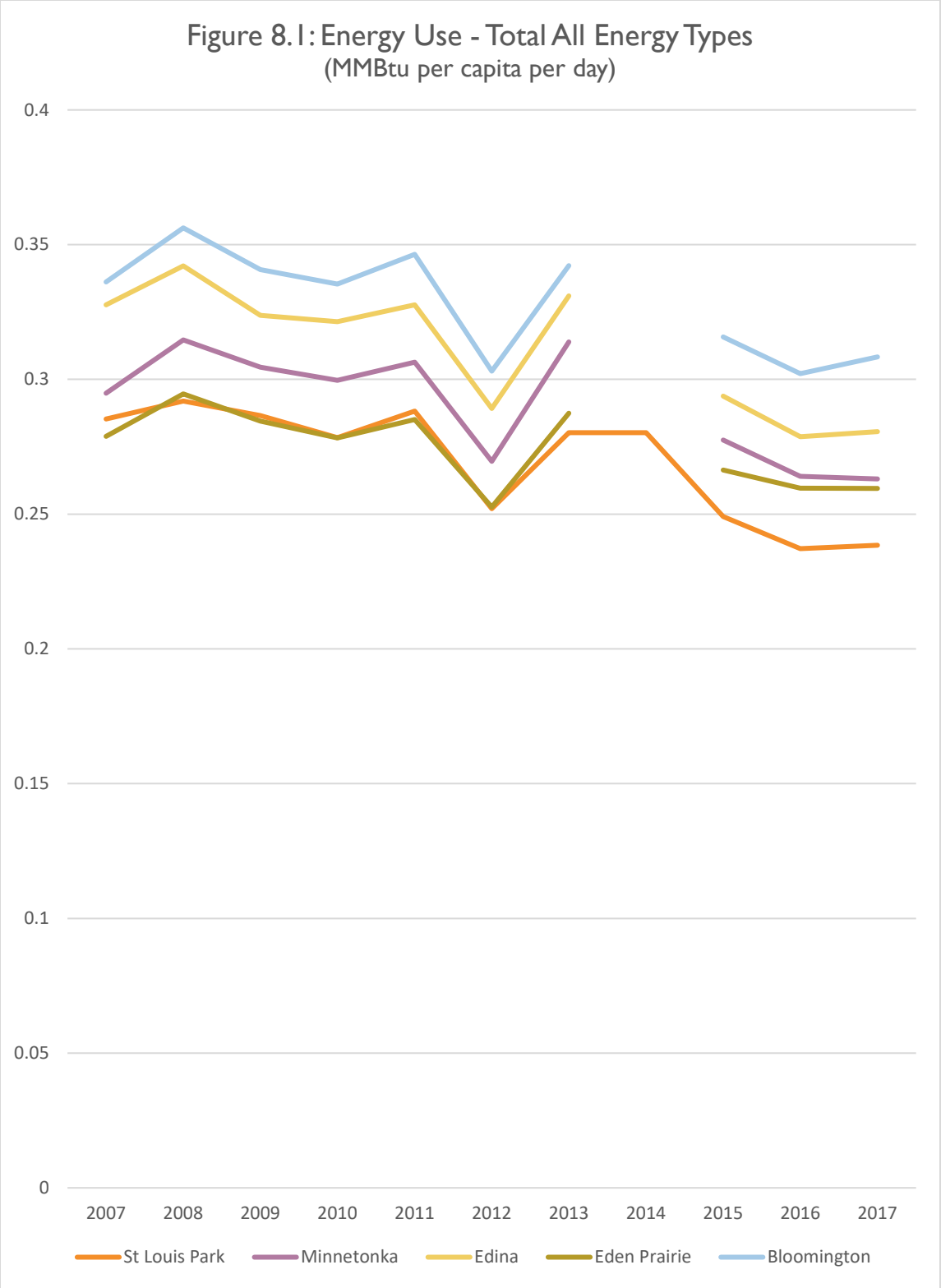
Existing Conditions, Trends, and Challenges

Climate Change – The urgency of action on climate change has been emphasized by an October 2018 report by the United Nations Intergovernmental Panel on Climate Change. This report asserts that unprecedented changes are needed within the next 12 years to keep rising temperatures in check and thereby lessen severe climate and weather impacts. While climate change is a global challenge, there are local implications regarding impacts and policy. Addressing this will require coordinated change on many fronts including reduction of emissions, promotion of alternative energy sources, and alterations in consumption patterns and waste production and management. This action will extend over multiple City departments and commissions.

Climate Resilience – Resilience is defined as the ability to absorb and respond to stresses, and to adapt and evolve accordingly. The key changes in weather patterns that the Minnesota Department of Natural Resources (MN DNR) Climatologist is predicting include warmer winters with more freezes and thaws, more extreme precipitation, strong storms and winds, and high summer humidity. This will affect the health and safety of people and property in Edina, including increased risk from ice, flooding, and pests such as mosquitoes. The City will need to mitigate climate impacts on the community to maintain a safe and desirable community. Developing a resilience strategy will include identifying and responding to climate vulnerabilities in the community, in terms of both people and resources.

Leading by Example – The City of Edina can set an example for sustainability best practices through its own operations and facilities. It will be important to look at the complete lifecycle of purchases and processes to determine the opportunities to meet sustainability goals and improve the community's health and resiliency. This will need to be done through a triple-bottom line lens, which identifies the true financial, environmental, and societal costs to allow productive discussion and decision making about the level of commitment needed. While there have been some significant steps in this direction, including the hiring of a sustainability coordinator and the completion of an electricity action plan, the data show that there is a still a long way to go to live up to the City's goals and aspirations.

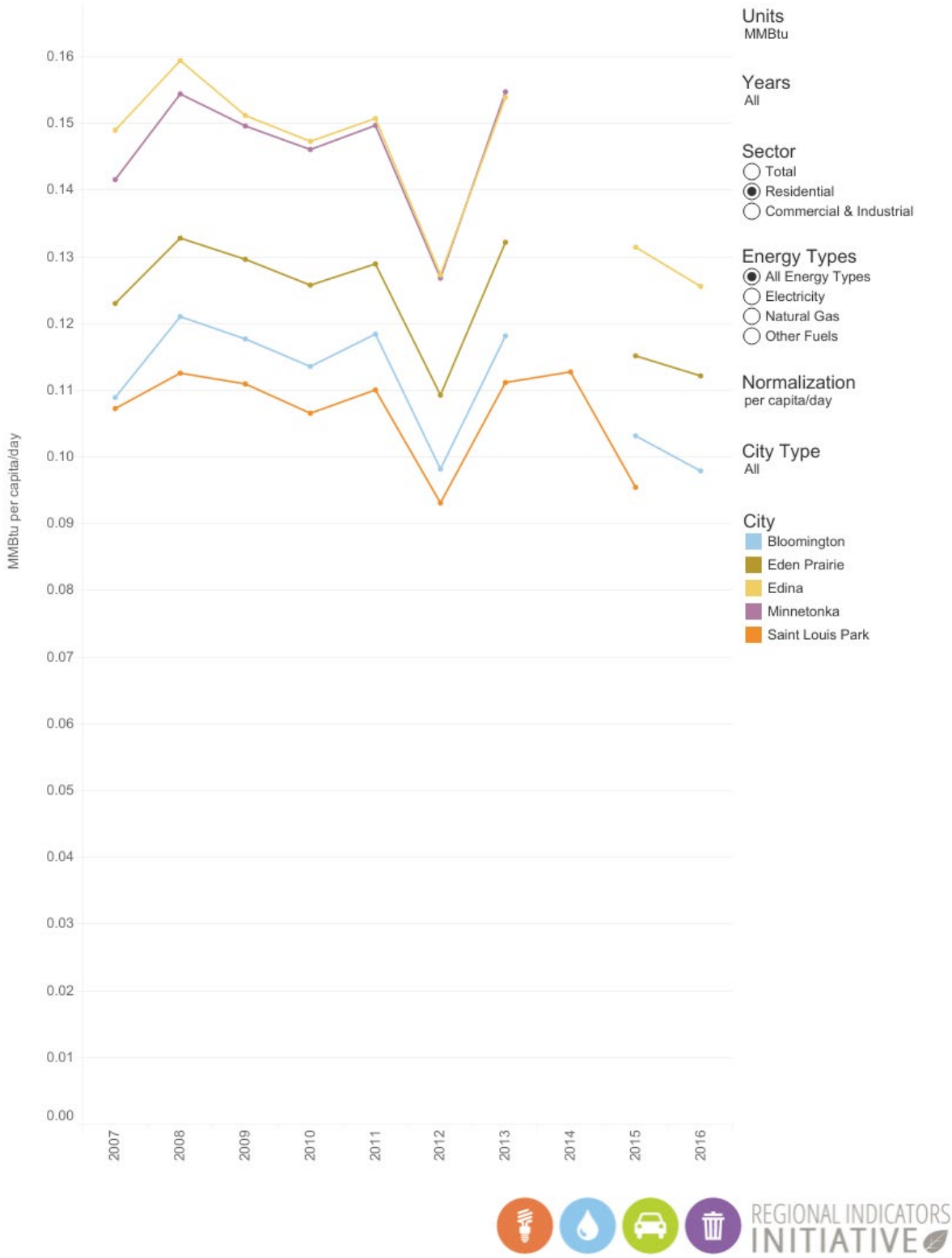
Energy – Sustainability best practices support continued energy efficiency and expanded use of alternative energy sources which replace large GHG emissions sources. Costs for renewable energy have reduced significantly at a commercial level. The cost of wind is on parity with coal generation. However, there are still issues regarding the availability and affordability of renewable energy generation on small residential scale (solar photovoltaic systems on a home). Conversion to renewables cannot be done overnight as there is significant infrastructure investment around current energy generation that will take time and resources to replace. Additionally, continued focus on efficiency use of energy generated will be critical to reducing emissions and keeping costs down. Data on Edina's energy consumption patterns, included in the following charts, shows that the city consumes energy at a fairly high rate with significant room for efficiency and reduction. The missing years reflect a gap in the available data.



Source: Regional Indicators Initiative

Figure 8.2: Energy Use – Residential

(MMBtu per capita per day)



Solid Waste – Sustainability also leads to an increased focus on a reduce/reuse/recycle approach to resources – with the goal of reducing overall waste generated. Undifferentiated waste in landfills, particularly organic waste, creates methane gas which is a primary contributor to climate change. Additionally, siting new landfills is increasingly costly and undesirable for communities. For these reasons, it is critical to address different waste streams, seek best practices and new technologies to reduce solid waste. This includes segregating the waste streams for the most sustainable outcome. The market for materials continues to change which makes recycling complex. These macro level systems will be challenging for a small community, like Edina, to change. However, education and behavior changes for city operations, residents, and businesses to alter their purchasing and disposal practices will be critical for successful recycling and waste reduction. In particular, education is needed on reducing waste contamination of the recycling stream, to ensure a higher percentage of recyclables collected can be processed cost-effectively.

Natural Habitat – Much of the land in Edina has been removed from its original ecological and natural function to make way for human development. While development impacts will remain, there are opportunities to retain, restore, and connect natural habitat areas within the city. A fuller picture emerges when looking at how this developed area fits into the larger ecological context of the region. Impacts on the city's tree canopy due to single-family home development, and pests such as the emerald ash borer, need to be addressed.

Water – Water quantity and quality must be wisely managed to deliver core services of drinking water distribution and source protection, sanitary sewer service, flood protection, runoff management, and clean surface water (lakes, creeks, ponds, and wetlands). Climate change and land use decisions have the biggest impacts on the resilience of our water resources systems. See Chapter 8 for more information and direction on water resources. The energy-water nexus is an important issue for sustainability as well: water treatment and transportation takes a considerable amount of energy, so reduction in water usage can reduce energy usage as well.

Density and Development – On the regional scale, it is generally more sustainable for development to be located in developed communities that are well-served by infrastructure, rather than on the outskirts where undeveloped land is being consumed and infrastructure is being created and extended, creating a larger carbon footprint. However, at the local level, as the City considers development and density options it must consider local impacts to the environment. Meeting the carbon reduction goal will necessitate discussions on tradeoffs in development, density, and their carbon impacts. For example, density can provide a lower carbon footprint per resident and new development can be more energy efficient. But increasing the population through density may increase the community's overall carbon footprint (though possibly not at a per capita level). Stopping density within the city will not solve sustainability problems and meet sustainability goals, but accommodating growth does require investigation of ways to grow more sustainably, and to seek to decouple carbon increases from economic growth.

Youth Activism – Climate change will impact youth and young adults much more than older generations. As a result, there is growing concern and activism among young people in Edina around the issue of climate change. Youth will need to be involved in the discussion and decision-making process to ensure their views are taken into consideration. The role of student members on the EEC is an example of this.

Attracting New Residents – Many young adults and families are taking green and sustainable values into account when deciding where they will live. To continue to attract young people and families to the community, it is important for the City to demonstrate a commitment to these values.

Financial Stewardship – A comprehensive approach to sustainability also includes a financial element. Strategic and timely investments in the short term may preclude much larger expenses later. One key element of this is identifying the lifecycle cost of investments – for example a larger up-front capital cost may at times be justified by lower operations and maintenance cost over the life of an investment. This should be taken into account in decision making.

Ongoing Data Needs – Particularly with regards to its commitment to GHG and waste reduction goals, the City will need to continually monitor data regarding environmental and climate conditions, energy usage, water usage, waste production, recycling participation, travel behavior, and other factors. The City of Edina's participation in the Regional Indicators Initiative https://www.regionalindicatorsmn.com/ provides access to a regularly updated data source that can help inform the City's decisions. Additional information sources may be linked on the City's website as well, as they are identified.

Recommendations and Strategies

Recommendations

The City will lead in sustainability both by example and by taking the lead role where possible.

The City will plan for resilience regarding climate change.

Future EECs will build on past experience.

The City will meet or exceed its GHG reduction goals and solid waste reduction goals.

Future EECs will continue to research and educate the community on environmental best practices.

Strategies

The following section summarizes the strategies used to implement the above goals. More details and examples of best practices can be found in a section at the end of this chapter.

Utilize a myriad of tools available. There are different tools for the City to use and support the community's goals. The right tool depends on the need and targeted outcome:

- **Policy** – The City will focus through staff and commission to amend and approve policies and its regulatory framework in order to support sustainable actions, meet sustainability goals, and meet the needs of the community.
- **Education** – The EEC encourages the City to connect on policies and learn best practices. We will use opportunities with city staff, EEC, organized neighborhoods, neighbor-to-neighbor, and business organizations to promote sustainable actions.
- **Alliances** – Edina is a part of a larger community. It is important to build alliances across City Commissions, with Edina School District, Chamber of Commerce, Hennepin County, and other government entities within the region to connect on policies, learn best practices, and share resources.

- **Measurements** – Develop and utilize existing tools for benchmarking and metrics to monitor and reach stated goals.

Understand there are different actors and their roles and impact on sustainability varies:

- City operations and budget decisions – City facilities, capital budget, operating budget, and operating decisions will lead by example and commit resources to achieving our sustainability goals through its own facilities and operations.
- Commercial and industrial facilities – In addition to private businesses, this includes non-city owned government and nonprofit entities, as well as multifamily and mixed-use development. Work with these entities to address sustainability through design, construction, and operations.
- Single family residential – Work with single family residential communities, residents, and developers to address sustainability.

Incorporate sustainability into land use decisions:

Decisions on land use and development are one of the main ways the City can influence sustainability in the community. From the beginning of the process, land use and development review should incorporate sustainability as a primary consideration when making decisions.

There are key areas to focus sustainable action:

- Energy – The City will consider energy resources and reduction and their impact on our city's goals. Continue to look for opportunities for renewable energy sources, including solar.
- Water – Water is governed by the water chapter (see Chapter 7 for more information).
- Solid Waste – Encourage all to think of their waste footprint, use the waste reduction pyramid (i.e. rethink, reduce, reuse, recycle), and anti-littering to reduce waste and its impact on the environment. As we manage waste (i.e. trash, recyclables, and organic recyclables), continue to find ways for reduction via pick up options, hazardous waste, green demolition, sharing economy, and the circular economy.
- Air Quality – Promote clean energy and other actions to improve air quality such as reducing transportation emissions.
- Trees – Tree canopy has many stacked benefits (carbon sequestering, reduction in heat island effect, storm water mitigation, supporting wildlife, etc.). Review policy and actions that support tree canopy and benefits.
- Natural Habitat – Consider other natural resources such as soil, biodiversity, and sunlight.
- Environmental Contamination – Monitor sources of contamination of nonpoint source contaminants like runoff, pet waste, pesticide, and fertilizer use.

Goals and Benchmarks

Goals are our way to prioritize actions, get resources, and measure our actions. Meeting these goals will require trade-offs between various city priorities, though this chapter asserts that sustainability should be a major consideration in all decisions. The need for the city to address environmental and sustainability issues is urgent and important.

- GHG reduction: 30% or more reduction in GHG emissions by 2025, 80% emissions reduction by 2050.
- 75% of solid waste annually diverted from landfills by 2030
- Create an integrated environmental action plan.
- Continually seek best practices, reference following resource list for ideas.
- Apply metrics, benchmarks, and reporting to environmental actions.
- Lead decision-making policies with sustainable principles.
- Coordinate and communicate technical aspects of addressing resilience.
- Ensure equitable distribution of environmental benefits.
- Seek continuous improvement in water planning for drinking water, surface water, and storm water

Collection of Sustainability Ideas and Specifics from the Energy and Environment Commission

The following is a list of tools and ideas compiled through the Energy and Environment Commission (EEC) to inform ongoing work by the City and the EEC. The intent is to provide a flexible framework and list of options that can apply to a wide range of circumstances and decisions. While these are written as general guidance, they may be used to direct the development of more formal programs, goals, benchmarks, and initiatives.

City Budget and Leading by Example

- Integrate strategy, planning, and budgetary decisions.
- Encourage city staff to embed sustainability into decision-making, budget process, capital improvements and build alliances across city departments.
- Operations – consider development of green building policy, and approach on net new city buildings
    - Operational aspects (like irrigation, tree canopy and green space).
    - Share resources example (South Metro training center).
- Reporting – set baselines and report out on (e.g. energy utilization, purchasing, new buildings).

Commercial and Industrial Facilities

- Constructions and Design – encourage green buildings, energy guidelines, give to get options, and deconstruction.
- Operations – encourage energy consumption and efficiency, minimize waste and optimize processing of waste stream with zero waste being target goal, water quality, and water drainage.
- Capture opportunities to educate.
- Address drainage, impervious surfaces, and runoff plans.
- Consider energy efficiencies and renewable energy options.
- Support lawn and plant diversity – permeable lawn, grass (weed ordinance), tree policy.
- Explore rebate and financial options.

Single Family Residential

- Utilize policies available to support green buildings (design, materials, etc.), energy efficiency and residential energy options, responsible demolition, pervious surface use, smart water use (e.g. irrigation), reduction of waste, and increase in plant biodiversity (including tree canopy and green space).
- Give to get options was mentioned as a policy form.
- Continue to reassess policies that impact drainage and impervious surfaces (i.e. construction permits needing runoff plans) and look for ways to stack benefits (i.e. utilizing native plants that can absorb runoff, support pollinators, and clean water versus use of a buried cistern).
- Support pollinators, tree canopy, biodiversity, and native plants.
- Beyond policy, look for opportunities to educate (see big ideas section).

Solid Waste

- Incorporate consideration of waste into every aspect of plan – think of the waste hierarchy: reduce, reuse, recycle.
- Any new commercial development should incorporate three-stream waste collection.
- Consideration for organics both in production and collection – i.e. new food establishments take packaging and waste collection into consideration.
- Keep all new technologies and innovations regarding waste on the table.
- Educate citizens on waste at every opportunity.
- Public spaces need to have three-stream waste receptacles conveniently located for citizens.
- Events should consider waste in their planning. Both packaging and waste collection should be part of permit/expectation.
- Consider opportunities for citizens to dispose of waste materials at centralized location – i.e. a day where there is an electronics collection at a central drop-off.
- Construction and demolition requirements or options for greener practices. This could include reusing materials and/or more environmental considerations when building.
- Parks using a percentage of compost in turf management and in planting beds.

Energy

- Consideration of self-generation or self-sourced generation:
    - Look into costs for on-site generation or programs to source directly from remote sources.
    - Consider long term environmental impact relative to city goals.
    - Consider carbon free sources or programs giving Renewable Energy Credits to end users.
- Explore benefits of all electric sites and partnerships with utilities to offset potentially higher bills.
- For larger developments consider on-site generation, district energy systems, or district thermal options. (Natural gas use on site will always have carbon emissions.)
- Consider the impact of community solar gardens.
- If the new home construction boom continues, consider local rebates/incentives to make homes more efficient, resilient, and sustainable. Consider incentives for reused materials or products sourced through in-state companies. (Discount on permit fees? Free LEDs throughout the house is builder/owner meets a designated energy efficiency level or a percentage of recycled materials.)

Wetland

- Achieve no net loss of wetlands.
- Discourage wetland alteration.
- Administer the Wetland Conservation Act.
- Update the wetland inventory data.
- Restore previously existing wetlands.
- Buffer zones of native vegetation.
- Minimization of water level fluctuations.
- Involve the appropriate regulatory agencies (MPCA, U.S. Army Corps of Engineers, and the MnDNR) in the planning of any proposed water quality or flood control facilities.

Natural Habitat

- Address invasive species, including ongoing coordination with Hennepin County and the Minnesota Department of Agriculture regarding the City's plan for emerald ash borer treatment and mitigation.
- Encourage native plants, especially pollinator-friendly plants.
- Encourage large tree preservation.
- Encourage increasing tree canopy.
- Capture education opportunities for teaching ecosystems.
- Reduce pesticide and fertilizer use.

Water

- Road salt best practices for overall reduction of chlorides to surface water receptors.
- Irrigation system best practices including upgrades and incentives for overall water use reduction.
- Incentives for potable water use reduction (business, residential).
- Long term drinking water sustainability, well redundancy, and water quality (including emerging chemicals of concern).
- Leveraging available new technologies that optimize electricity usage and well maintenance.
- Resilient storm water management.
- Incentives to reduce the proliferation of single use plastic water bottles.
- Building / new structure enhancements that optimize water usage including options for gray water systems.
- Continued long term water use coordination with watershed agencies, County, and adjacent communities.
- Innovative use of rainwater run-off for activities such as watering plants (refer to U of M operations example).

Solar Access Protection

One important contribution the City can make in the transition to renewable energy sources is to protect the access that individual residents, businesses and industry have to renewable sources of energy. Active solar rooftop collectors and passive solar technologies require maximum exposure to sunlight, which may be challenging in a developed environment. To help ensure that sufficient exposure is available for all homeowners and businesses, the City already has ordinances for building setbacks, building height restrictions, and maximum lot coverage. At present, there are still very few houses with solar energy systems, likely due to high costs and logistical considerations associated with installation.

The University of Minnesota has developed a high-resolution statewide solar resource map that allows cities to calculate how much electricity they could potentially receive from locally installed solar energy systems. These data (see **Figure 8.3**) were used to calculate Edina's solar resource, in terms of potential for energy generation. The solar map shows the location of the best sites solar installations and helps identify where there may be potential land use conflicts with solar development. **Table 8.1** shows the amount of solar energy reasonably available for development in Edina. The gross potential includes the total available resource, regardless of location; rooftop capacity and generation include only the resource available on the rooftops of commercial buildings located in the city.

Table 8.1 – Edina Gross and Rooftop Solar Generation Potential	
Total Generation Potential (MWh/year)	16,700,686
Rooftop Potential (MWh/year)	2,739,861
Gross Generation Potential (MWh/year)	1,670,068
Roof Generation Potential (MWh/year)	273,986

These calculations assume a 10% conversion efficiency and current (2016/17) solar technologies. The average home in Minnesota consumes between 9 and 10 Mwh/year (Solar Energy Industries Association; US Energy Information Administration). Using only Edina's rooftop generation potential, 27,000-30,000 homes could be powered by solar energy annually – more than the number of existing units in Edina.

Actions by the City of Edina that promote solar access and energy usage – such as facilitating financing mechanisms like PACE financing and maintaining updated development regulations and incentives – can result in wider adoption of solar energy in Edina. Another alternative is participation in community solar gardens, which provide people an opportunity to support renewable energy through membership in a large solar array located in a sunny open area. The Edina Community Solar Garden, located on the roof of the Public Works and Park Maintenance Facility, is fully subscribed at the time of this writing with 68 households participating.

The City plans to meet or exceed state standards regarding solar access protection:

1. Continue to enforce setback, building height, and lot coverage ordinances that can serve as protection to solar access
2. Become SolSmart certified to ensure policies, permitting, and inspections processes do not inhibit solar access.
3. Consider access to solar protection when reviewing variance requests.
4. Promote the use of active and passive solar energy for heating, lighting, and other aspects in design, construction, remodeling, and operation of City buildings.
5. Leverage the Solar and Wind Access Law to establish polices that restrict development for the purpose of protecting solar access.

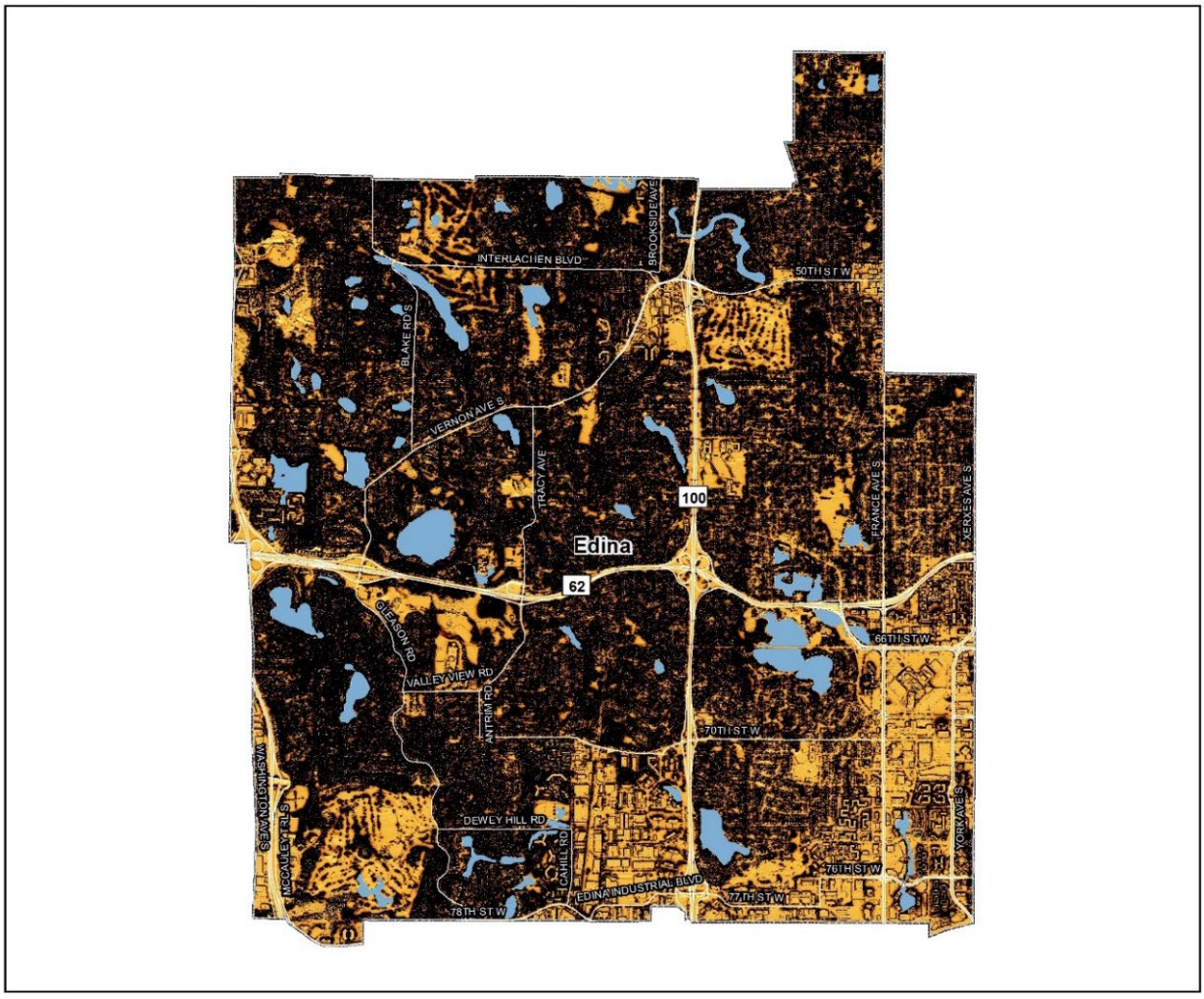


Figure 8.3: Gross Solar Potential in Edina