

# City of Aurora, Illinois

## Sustainability Plan 2019

September 2019

### ABSTRACT

This is a rough draft of the updated City of Aurora Sustainability Plan based on inputs from the Sustainable Aurora Board best practice research.

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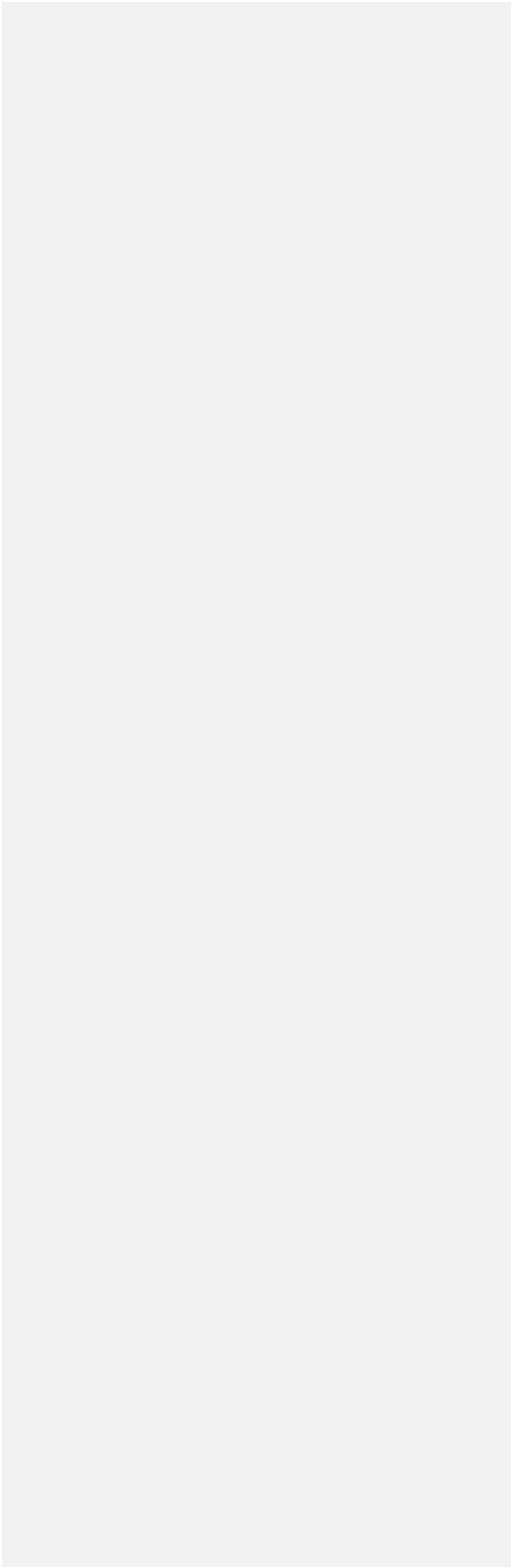
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# VISION

Aurora, founded in 1857, is a tolerant, inclusive, culturally diverse city that continually renews itself to meet the needs of changing times. Focused on resilient communities and peaceful growth, Aurora promotes the use of renewable, local resources to adapt to changing environmental, social and economic conditions. Aurora offers nurturing community support for all stages of life – family, education, career, employment, business, arts and entertainment through retirement. People of all ages and backgrounds flourish in a city that is second to none in its commitment to promoting a sustainable, prosperous quality of life for all its citizens.

## Introduction-background/Process

A

In 2009, the City of Aurora published its first Sustainability Plan, which was designed to be a long-range plan for enhancing the quality of life for present and future generations of Aurorans through sustainable practices. Many of the recommendations of that original plan were implemented, particularly those that the City government could implement and use to lead by example.

Aurora has been recognized as an environmental leader for quite some time, and the goal with this updated plan is to offer strategies that lead to tactics that can be monitored on a regular basis, inspiring even further action than has already begun. The updated plan is a citizen-initiated, forward-thinking document which has been designed to build an even more enduring plan, which sets innovate goals, metrics, and action plans to help Aurora achieve its sustainable community vision. One of the first actions of the Sustainable Aurora advisory board was to identify areas of the plan that needed to be updated. The board then determined that a public input was needed. Interviews were conducted announcing the intent to update the existing Sustainability Plan and inviting citizens to participate in the creation of the plan.

A draft of the plan was then presented to the public for input at public meeting(s) by social media and newspaper and took place at the Aurora Planning Commission Meeting. Feedbacks were further considered by the advisory board and City staff for additional comments and recommendations before being approved by the City Council.

## Definition

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CITY OF AURORA SUSTAINABILITY PLAN

A Long-Range Plan for Enhancing the Quality of Life for Present and Future Generations of Aurorans through Sustainable Practices

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\*Most definitions taken from the Environmental Protection Agency (www.epa.gov) or are a hybrid of multiple definitions modified to be more applicable to our local environment.

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## INTRODUCTION

### City of Aurora Sustainability Plan

What is sustainability? Sustainability is the ability to meet our needs without compromising the ability of future generations to meet theirs. The intent of the City of Aurora Sustainability Plan is to improve the quality of life for present and future Aurorans by considering the long-term significance of our everyday decisions.

With a population of

At this point in time (2009) Aurora has grown to 46 square miles and over 200,000 residents, Aurora is the second largest city in Illinois. The health, safety and general welfare of Aurora's inhabitants and habitats are essential to maintaining our high quality of life. To take a comprehensive approach to sustainability, this plan identifies goals in the following areas: Community Development and Land Use, Transportation and Infrastructure, Energy Efficiency and Green Buildings, Waste and Food Residuals, Water Quality and Conservation, Education and Engagement.

The purpose of this plan is to identify Focus Areas and Goals that the City can use as a framework for making educated decisions based on resource conservation and life cycle costs. A true plan for sustainability cannot be short term; it should be a leap forward towards a long-term and multigenerational plan of responsible action.

### COMMITTED TO GREEN

Aurora is a recognized environmental leader in our region. Honors such as the Illinois Environmental Protection Agency's Green Fleet designation and the Clean Air Counts Platinum Award demonstrate the City's progress and initiative in environmental sustainability. The approvals of the Countryside Vision Plan in 2000, the Riverfront Vision Plan and the Seize the Future Master Plan in 2006, and the revised FoxWalk Overlay District Design Guidelines and the RiverEdge Park Master Plan in 2008, were all steps towards green development which have led to this comprehensive Sustainability Plan.

In June 2005, Aurora endorsed and signed the U.S. Mayors Climate Protection Agreement making a commitment that as a City, we would strive to meet or beat the United Nations Kyoto Protocol greenhouse gas emission reduction targets (7% below 1990 levels by 2012), and urge state and federal government to do so as well. This agreement identifies actions ranging from anti-sprawl and land-use policies to public information campaigns to reduce greenhouse gas emissions. The City of Aurora is also a case study municipality in the 'Go To 2040' Regional Energy Profile and Regional Greenhouse Gas Inventory commissioned by the Chicago Metropolitan Agency for Planning (CMAP). Working together with the Center of Neighborhood Technology (CNT), CMAP reported on Aurora's energy consumption and greenhouse gas emission from 2000 to 2005. Ultimately, this report can assist in understanding our current greenhouse gas emissions and guide Aurora's future sustainable goals.

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The City of Aurora also holds membership in many environmentally minded organizations including U.S. Conference of Mayors, Chicago Area Clean Cities, Clean Air Counts, Cool Cities, U.S. Green Buildings Council, Illi-

nois Recycling Organization, and Tree City USA. It is in the City's best interest to use all available resources, networks and experts to achieve the goals of this plan.

In October 2008, Aurora hosted GreenTown: The Future of Community conference which brought together people from throughout the US engaged in greening communities. This conference put the 'greening' of Aurora in a national framework and built momentum locally through its workshops and events. In anticipation of the conference, the City's 'Green Team' was created by Executive Order to document existing sustainable city practices, advance future green initiatives and advise the City on this Sustainability Plan. The group began this process by surveying current municipal operations through in-house workshops which were documented as achieved and ongoing sustainability projects. The team identified a number of existing accomplishments, plans, policies and practices that are in keeping with this plan and helped lay the foundation for the next steps. Building upon the GreenTown Conference, the Green Team joined with other local Fox Valley municipalities, environmentalists and businesses minded community members to discuss environmental issues on a local level. The so-called 'State of Green' workshop highlighted some of the successes, resources and challenges to going green.

### WHY?

**Why Reduce Greenhouse Gas (GHG) Emissions?** Within five years (2000-2005), greenhouse gas emissions in Aurora increased by 22.8%, and an overwhelming body of scientific evidence indicates that climate change is happening due to rises in such emissions worldwide; it is having a profound effect on our quality of life. Extreme weather events such as heat waves and heavy downpours have increased in recent decades. Here in the Midwest, there have been an increasing number of days with heavy precipitation and the annual amount of precipitation has increased by 10-20%. Average temperatures worldwide have risen by over one degree Fahrenheit the last century, and the impacts of climate change are increasingly apparent.

AS AN EXAMPLE OF ITS EFFECTS, INCREASES IN PRECIPITATION ARE EXPECTED TO LEAD TO MORE FREQUENT FLOODING, WHICH TENDS TO COMPROMISE WATER QUALITY ESPECIALLY IN THE FOX RIVER, A MAJOR SOURCE OF THE CITY'S DRINKING WATER. WHILE THE CITY HAS MADE SUBSTANTIAL PROGRESS ON A DE-COMBINATION PROGRAM TO SEPARATE SEWER AND STORMWATER SYSTEMS AND REDUCE THE NUMBER OF CONTAMINATED OVERFLOWS, THERE WILL ALWAYS BE SOME LEVEL OF OVERFLOW DURING THESE MAJOR RAIN EVENTS. INTENSE RAINFALL CAN ALSO OVERWHELM OUR STORMWATER SYSTEMS CAUSING DISRUPTION IN COMMERCE AND TRAFFIC, PUBLIC AND PRIVATE PROPERTY DAMAGE, AND ADD ADDITIONAL BURDEN ON OUR EMERGENCY SERVICES. THESE CONSEQUENCES NOT ONLY STRAIN OUR ENVIRONMENT, BUT OUR FINANCES AND LOCAL ECONOMY.

Climate change is inevitable over the next few decades, but the degree to which the future climate will take a comprehensive approach to sustainability, this plan identifies goals in the following nine areas: change will be determined by the choices and decisions we make today. Continued heavy reliance on carbon-intensive energy sources, on the other hand, will lead to greater warming and consequences for human health, ecosystems, and the economy.

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**Why Increase Energy Efficiency?** Over 90% of our region's total greenhouse gas emissions are due to energy consumption (Chicago Regional Greenhouse Gas Emissions Inventory), and efficient energy use can improve our environment and reduce money spent on electricity, natural gas and the infrastructures built to deliver



them. Most energy comes from the burning of fossil fuels that include coal, petroleum and natural gas. When burned, fossil fuels create carbon dioxide, a greenhouse gas.

The demand for energy is growing; as our population increases energy dependent appliances continue to be ever more integrated into homes and businesses. Aurora has experienced an estimated increase of over 12,000 households since 2000 with an average consumption of 9,856 kWh of electricity and 808 therms of natural gas per household. The proliferation of consumer electronics, telecommunications and increasing demand for heating and cooling primarily drives the rise of energy consumption in the commercial and residential sectors. In 2005, Aurora consumed 1.4 billion kWh of electricity with 62% occurring in the commercial and industrial sector and the remaining 38% occurring in residential. The amount of natural gas consumed was 80 million therms with 45% occurring in the commercial and industrial sector and the remaining 55% occurring in residential.

Conserving energy and shifting to more sustainable sources is both important economically and environmentally. It is evident that our local energy consumption has a direct impact on our environment and greenhouse gas emissions. Shifting to more sustainable energy sources such as wind, solar and geothermal can greatly benefit our local economy and overall security. Energy efficiency can also translate into financial savings, especially for those under the poverty line or on a fixed income; 'going green' can mean 'saving green'.

## FOCUS AREAS

### City of Aurora Sustainability Plan

- Climate Change
- Community Development and Land Use
- Education and Engagement
- Energy Efficiency and Green Buildings
- Environmental Justice
- Transportation and Infrastructure
- Resilient Community
- Waste Minimization, Reuse and Recycling
- Water Quality and Conservation

## GUIDING PRINCIPLES

After looking extensively at best practices from sustainable cities around the region, the country and the world, the Sustainable Aurora Advisory Board and the City of Aurora agreed that “The Framework” created by the Metropolitan Mayors Caucus provided a sound basis for expanding the City of Aurora long-term plan to link with regional efforts. The Greenest Region Compact 2 (GRC2) Framework offered concise strategies, as well as expanded the concepts of what could be done in Aurora.

The strategies and associated actions outlined in this plan are not meant to be prescriptive, but rather an attempt to lay out a series of priorities, goals, actions, directions, and practices from which Aurora can benefit. This document is meant to be specific enough - to drive innovation in Aurora, and broad enough to allow for technological breakthroughs and new practices as they become available.

Based on all of our research, the City has created 2030 goals in the areas of:

- 50% Renewable Energy
- Implementing Zero Waste Pilot Initiatives
- Exploring Potential to Expand Solar and other forms of Renewable Energy so that Aurora is true to our motto – City of Lights

The Aurora Sustainability Plan is meant to engage the community in a way that inspires local actions that can strengthen the community against the shocks of rapidly shifting global systems.

The sustainability plan update presents a vision for the sustainability future of the social, economic, and environmental assets of the City of Aurora. The plan serves as a guide for elected officials, municipal staff, community residents, business owners, recreational users, and environmental advocates, providing them with a long-term framework for making informed decisions and achieve measurable goals that will affect present and future generations to come.

## METRICS AND EVALUATION

One of the challenges that every city faces is how to track progress on city initiatives, especially with an area as complex and comprehensive as sustainability can be. Much progress has been made in Aurora, and much remains to be accomplished.

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To ensure that this plan is more than a piece of paper that sits on a shelf unused, the City of Aurora will:

1. Track, analyze and manage data to advance sustainability goals
2. Establish performance metrics
3. Collect and organize data
4. Report and share data
5. Continue to track and monitor data over time
6. Publish a live dashboard on the City's website tracking sustainability achievements

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The City of Aurora will work with strategic partners to produce metrics, measure what has been accomplished and publish a score card.

## FOCUS AREAS

The City of Aurora Sustainability Plan is organized into ~~ninesix~~ focus areas, with a vision statement and goalset goals within each area. These focus areas and goals will guide our future efforts, yet allowallows for flexibility. As a supplement to this plan, there is an ongoing and updated list of "City of Aurora Sustainable Projects" which includes achieved, ongoing and proposed projects by the city, categorized by the same identified focus areas and goals. The timeline for implementation of Aurora's initiatives and proposed projects will vary. Ideas willshould be prioritized based on ease of implementation, availability of existing resources, funding commitments, and impact or urgency. It is our intention to undertake analyses of lifecycle costs so as to demonstrate the benefit of implementing projects and programs that, at the outset, may appear to be more costly, but over time, in fact, are signifi- cantly more cost-effective due to reduced operations, maintenance and replacement schedules, among other factors.

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There are many ways in which the achievement of sustainable goals can have a positive impact on local and regional economies. These goals will not only conserve resources and reduce Aurora's carbon footprintgreenhouse gas emis- sions, but also enhance economic vitality and lead to a more resilientustainable city.

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The City of Aurora SustainabilitySustainabil- ity Plan is intended to be a dynamic document; experience, testing, emerging and evolving technologies will be incorporated as we achieve goals and set new initiatives. All of the following six focus areas have a signifi- cant long-term impact on the sustainability of our community. The goals within each focus are intended to guide our actions.

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## Focus Area 01:

### COMMUNITY DEVELOPMENT AND LAND USE

~~Align Development Policies to Encourage Sustainable Growth. Our planning and zoning policies and ordinances provide the framework for how the community may develop. Projects to support this goal will be the revision of existing policies and removal of regulatory barriers so as to promote sustainability. Implementing Transit-Oriented Development around Aurora's transit centers and corridors will encourage smart growth and reinforce the City's Comprehensive Plan. The "RiverEdge Park Environmental Sustainability Handbook" and "Aurora Energy and Emissions Profile" will be critical guiding documents to achieving this goal.~~

~~**Promote** Planting of Native Vegetation. To minimize the impact of heavy rain events, flooding, pollution, and runoff, these projects will remove the regulatory barriers and put requirements in place for the installation and proper maintenance of Midwest Native Vegetation.~~

~~**Support** All of the following nine focus area have a significant long-term impact on the sustainability of our community. The goals within each focus area are intended to guide future actions.~~

~~**a Sustainable Local Economy and Develop a Green Collar Workforce. As global and local economies undergo radical transformations, these projects will support training of our local workforce for emerging technology jobs. Incentives to attract businesses providing "green jobs" will be put in place.**~~

## FOCUS AREA 1: CLIMATE CHANGE02: TRANSPORTATION AND INFRASTRUCTURE

~~**Encourage** Alternative Transportation, Reduce Vehicle Miles Traveled and Support Sustainable Energy Use. Heightened concern about the need to develop alternative modes of transportation and the rising cost of traditional fuels dictates the development of programs and policies to encourage alternative modes of transportation and the use of alternative, sustainable fuels. Projects to support this goal will promote the use of existing transportation infrastructure and services to their capacity, increase alternative and multi-modal accessibility, and increase access to renewable energy sources.~~

~~Expand the City's Green Fleets Program. The City will continue to be a leader in using fuel efficient vehicles and alternative energy sources. Projects to support this goal will expand purchasing policies and maintenance programs for the City's Green Fleets program.~~

~~**Implement** Sustainable Roadways. Because of the scale of our public roadway system, sustainable practices~~

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## Focus Area 01:

and improvements provide significant opportunities to use lifecycle analyses to reduce costs and extend efficiencies. In addition, their visibility to residents and visitors creates a dramatic opportunity to lead by example. The projects to support this goal include modifications to standard specifications for traffic signals, street lights and pavement types, while taking necessary measures to ensure public safety.

## Focus Area 03:

### ENERGY EFFICIENCY, CONSERVATION AND MANAGEMENT

Enhance Vision: The Services and Programs for Residential and Commercial Properties. The public may be resistant to incorporating energy efficiency or “experimenting” with green buildings or adaptive re-uses of existing structures because of their fear of costs and their lack of experience with emerging technologies. The projects to support this goal will offer technical assistance and incentives to encourage early adopters among both residential and commercial property owners.

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INCREASE ENERGY SUSTAINABILITY IN CITY-OWNED BUILDINGS. CITY OF AURORA CONTINUES TO EXPAND AWARENESS ABOUT THE IMPLICATIONS OF CLIMATE CHANGE TO OUR PROSPERITY, ENVIRONMENT AND SOCIAL SYSTEMS.

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Climate change is inevitable over the next few decades, but the degree to which the future climate will change will be determined by the choices and decisions we make today. Continued heavy reliance on carbon-intensive energy sources, will lead to greater warming and consequences for human health, ecosystems, and the economy. In this focus area, our goal is to increase public awareness on what we can do as individuals and collectively to ensure that we respond to climate change challenges.

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#### Goals:

1. Improve maintain air quality by implementing an air quality management plan (baseline assessment, facilitate EPA recommendations) and a climate action plan
2. Reduce greenhouse gas emissions and carbon footprint: measure and monitor greenhouse gas emissions by supporting and encouraging alternative transportation modes to private vehicles / green buildings
3. Develop resiliency to climate change.
4. Engage community in climate change mitigation and adaptation by implementing mitigation strategies such as events where the public can trade in appliances, and participate to a light bulb replacement program.

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## FOCUS AREA 2: COMMUNITY DEVELOPMENT AND LAND USE

VISION: THE CITY OF AURORA CONTINUES TO DEVELOP OUR COMMUNITY'S ENVIRONMENTAL, SOCIAL AND ECONOMIC RESOURCES USING BEST PRACTICES FOR OUR REGION

Planning for prosperity, peace and security are ongoing goals of the City of Aurora, so that Community Development and Land Use remains a high priority. The City of Aurora contributions to regional plans for becoming the greenest region include the following extensive list of goals for community development and land use:

#### Goals:

1. Promote smart growth by promoting local and sustainable development that will reuse existing infrastructures and buildings, aggregate jobs and businesses, local food and organic farms
2. Reduce the overall carbon footprint
3. Enhance economies of scale.
4. Promote local goods and services by recognizing and supporting businesses who practice and promote sustainability

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### Focus Area 03:

8. Create an award or recognition program to encourage and report sustainable actions by local businesses
9. Educate the community on zero waste practices: waste reduction, recycling, reuse and repurposing
10. Educate the community on benefit and practices of green infrastructure
11. Collaborate to raise watershed awareness, teach water conservation and foster stewardship in schools
12. Engage the community in programs and special events to celebrate nature, such as Arbor day, Cinco de Mayo, and Earth day
13. Seek citizen input to ongoing sustainability initiatives
14. Implement zero waste practices among City divisions
15. Partner with schools for public engagement initiatives and ensure data collection.
16. Engage the public in more frequent entertainment and educational opportunities along the Fox River promoting best environmental practices
17. Encourage/Promote the use of permeable paving in residential driveways
18. Encourage/Promote the use of photocatalytic paving in commercial parking and pedestrian areas

## FOCUS AREA 4: ENERGY EFFICIENCY, CONSERVATION AND MANAGEMENT

VISION: THE CITY OF AURORA CONTINUES TO EXPAND OUR GREEN ENERGY OPTIONS AND PROMOTE ENERGY EFFICIENCY, WITH A GOAL TO BECOME A 50% RENEWABLE ENERGY CITY BY 2025.

The City plays an important role in encouraging the adoption of emerging technologies by setting an example in its own operations and construction projects. Projects, e.g., the LEED (Leadership in Energy and Environmental Design) certified Aurora Police Headquarters and Municipal Court Building on Indian Trail Road. The projects to support this goal include setting and implementing new standards to improve energy efficiency for new buildings, and retrofitting existing buildings to maximize energy efficiency.

Increase Energy Sustainability in the Delivery of Public Services. Delivery of City services represents another arena in which the City can improve its own operations and model behavior for the private sector. Projects to support this goal will be initiated by City staff after ongoing review of existing practices. New opportunities to maintain and seeking opportunities where service delivery can be maintained at its current level or be improved while improving using sustainable practices will continue to be pursued.

#### Goals:

1. Implement energy efficiency measures that have a longer term payback such as upgrading power plants, and improve power plants efficiency
2. Collaborate with utilities and other agencies to upgrade streetlight equipment and integrate smart technologies
3. Utilize performance contracts to finance large energy efficiency projects
4. Budget and plan for long-term energy efficiency equipment upgrades
5. Procure, install and operate renewable energy systems at municipal and public facilities
6. Support the adoption of renewable energy technologies in the community
7. Promote and Support procurement of renewable energy through community choice aggregation
8. Reduce energy consumption: participate in energy management challenges and programs

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## Focus Area 03:

9. Enact policies that support clean energy
10. Adopt 'stretch codes' setting higher standards for energy efficiency thru the International Energy Conservation Code (IECC)
11. Facilitate the adoption of renewable energy technologies by adapting building and zoning codes
12. Engage the community in clean energy practices: partner with electric and gas utilities and renewable energy installers to promote energy efficiency programs to the community
13. Create and enforce renewable energy requirements for new building development
14. Publicly recognize institutional and private buildings that achieve specific energy efficiency

### Targets

15. Collaborate with utilities, local energy agencies and school districts to provide free energy audits
16. Introduce water-conserving plumbing fixtures, electronic thermostats, and motion-sensor lighting in all City buildings
17. Conduct an energy audit recruiting students and/or public utilities/energy organizations to establish a baseline of energy use

## FOCUS AREA 5: ENVIRONMENTAL JUSTICE

**VISION: THE CITY OF AURORA WILL ENSURE THAT ALL NEIGHBORHOODS AND REGIONS IN THE CITY WILL HAVE ACCESS TO SUSTAINABLE DEVELOPMENT OPPORTUNITIES.**

The City has a long-standing reputation for respecting the rights of all its citizens. Environmental justice is 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 policies. The following goals specifically relate to this important aspect of sustainable development:

### Goals:

1. Integrate historical and cultural assets through community programming
2. Foster understanding of diverse cultural traditions by promoting culture diversity through public events
3. Protect all residents from the effects of pollution by enhancing the 3Rs of solid waste management: reduce, reuse and recycle policy; and by encouraging the use of sustainable, reclaimed, or recycled building materials
4. Promote community-based education to connect community members to existing services that support health and wellness
5. Support and encourage better connections between all residents, particularly those in need, and profit or not for profit organizations to ensure high quality essential human services are available and utilized
6. Collaborate to offer active and healthy lifestyle programs to residents by implementing dedicated fitness paths and infrastructures
7. Integrate planning, policies and programs to accommodate residents of all ages and abilities
8. Support social justice and equity throughout the community by involving schools, profit and not for profit organizations

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### Focus Area 03:

## PROMOTE THIRD PARTY CERTIFICATION FOR SUSTAINABLE PRIVATE FACILITIES FOCUS AREA 6: RESILIENT COMMUNITY

VISION: THE CITY OF AURORA IS A PROSPEROUS, HEALTHY AND SAFE CITY FOR ALL OF ITS CITIZENS NOW, AND 100 YEARS FROM NOW BY WISELY PLANNING FOR THE WELL-BEING OF OUR CITIZENS.

A rapidly changing world is inevitable in years to come, and the resilience of the Aurora community is something that will drive our health and well-being in times of challenging change. The City will most likely have to adapt to climate change effects such as more frequent storms and extreme weather and adapt to shifting agricultural seasons. It is possible that there will be demand for our clean water from other drought stricken regions, as well as migration to our city from climate change refugees. Promoting resilient community encourages citizens to take action now to protect the ongoing safety and prosperity of the City.

#### Goals:

1. Promote beauty and livability in community design, stewardship, and through partnerships
2. Improve and maintain diversity of plant and wildlife populations-
3. Create a community that is well prepared for disaster
4. Collaborate with state and federal partners to prepare for and respond to pest and disease threats to public health
5. Support balanced, active play for families
6. Prioritize safe practices and collaborate to reduce accidental injuries and death
7. Support innovative technologies for local food production and distribution
8. Assess sustainability achievements relative to comparable cities
9. Encourage residents and businesses to contribute their time and resources to sustain the community
10. Integrate resiliency strategies into development policies and plans
11. Work in partnership with local food providers and agencies to identify and develop strategies for eliminating food insecure areas and "food deserts" in Aurora.

## FOCUS AREA 7: TRANSPORTATION AND INFRASTRUCTURE

VISION: THE CITY OF AURORA CONTINUES TO DEVELOP AND EXPAND UPON ITS GREEN INFRASTRUCTURE.

The City will continue to invest in fuel-efficient vehicles and alternative energy sources. Projects that implement sustainable roadways, bike path, and pedestrian walkways while ensuring public safety remain an ongoing priority. Whenever possible, the City will encourage alternative transportation, reduced vehicle miles traveled and support sustainable energy use.

#### Goals:

1. Identify gaps in pedestrian and the bicycle networks and barriers to active modes of transportation
2. Improve a bicycle and pedestrian plan to enhance connectivity in the community and beyond
3. Collaborate with regional partners to connect on and off-road bicycle facilities with existing and planned regional trail networks
4. Provide more bicycle parking at municipal facilities, business districts, and transit stations and in neighborhoods
5. Maintain streets and sidewalks for efficiency and safety without harming natural resources
6. Collaborate to provide alternative fuel infrastructure at public sites



## Focus Area 05:

### WATER QUALITY AND CONSERVATION

Clean, Conserve and Replenish Natural City of Aurora has a unique ability to influence residents and business behavior regarding waste disposal due to its historic role as a provider of these services. The city will continue to expand its waste minimization through reduce, reuse, repurpose and recycling efforts.

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The City will raise awareness of the benefits of becoming a Zero Waste, Circular Economy City. Becoming a zero waste City can eliminate the destruction of land, water and air that by wastes, toxic and otherwise, which are a threat to planetary, human, animal or plant health. Creating Zero Waste pilot programs will demonstrate lifestyle choices that systematically avoid and eliminate the volume and toxicity of waste and materials, and conserve and recover all resources.

#### Goals:

1. Promote and practice the 4 R's of reduce, reuse, recycle and repurpose
2. Make public events "zero waste"
3. Continue to promote home composting
4. Create zero waste zones/pilot programs
5. Create services for commercial organic waste disposal/collection
6. Establish and strive for specific recycling goals
7. Support regional efforts for developing a food scrap composting services and provide curbside recycling for residents
8. Provide recycling and compost bins city wide alongside of regular trash cans beginning with pilot projects/zones in the downtown business district, parks, and entertainment venues
9. Promote a circular economy where we reinvest discarded resources into the local economy with incentives and support for green, sustainable, and zero waste businesses.
10. Provide incentives for entrepreneurs will create new green collar jobs from discarded resources
11. Support bio-solid re-use in the community (e.g. landscaping)
12. Engage with Solid Waste agencies to manage waste sustainably
13. Ban or discourage the use of polystyrene to-go containers, single-serve food service and plastic bags city wide.
14. Continue to promote community wide clean-up days
15. Promote year round light bulb replacement program
16. Promote year round trade in appliances replacement program
17. Partner with regional municipalities in creating a green energy production network that focus on a greener waste minimization program.
18. Adopt a policy by which elements of any structure to be demolished, be entirely or partially reused, or recycled to reduce waste.

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### FOCUS AREA 9: WATER QUALITY AND CONSERVATION

VISION: THE CITY OF AURORA WILL CONTINUE TO PROTECT AND MAINTAIN ITS PRECIOUS WATER RESOURCES FOR ENVIRONMENTAL, SOCIAL AND ECONOMIC BENEFIT TO ITS RESIDENTS AND CONNECTED COMMUNITIES ALONG THE FOX RIVER.

Sources--The founders of the City of Aurora were attracted by opportunities they saw emanating from the Fox River. The Fox River was once the economic engine of the City and is central to its revival strategies. Projects to support this

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## Focus Area 05:

~~goalsgoal~~ will further implement best management practices and water conservation methods for new development and adaptive re-uses, which will reduce the loads on municipal water production and stormwater infrastructure.

**Goals:**  
~~Sustain supply of high-quality public water with a comprehensive, sustainably managed water infrastructure~~

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### ~~Focus Area 06: EDUCATION AND ENGAGEMENT~~

~~Initiate Public Relations Campaign. A public relations campaign involves education and engagement on sustainable policies and programs beyond Aurora's engagement in the US Mayor's Climate Protection Agreement. The City currently has many outlets to communicate with our constituents including websites, direct mail, public events, and customer service interaction. Projects supporting a public relations campaign will utilize these outlets to educate and engage the public and to connect people with resources including information on and programs and incentives to make our homes, businesses, not-for-profit organizations and schools more sustainable.~~

~~Increase Awareness among City Staff and Elected Officials. Policies and ordinances can make the City's services more sustainable but our largest opportunity to lead by example is through our staff and elected officials. Training, outreach, coordination and research will help increase awareness and arm City staff and elected officials with the tools to make educated decisions based on resource conservation and life cycle cost.~~

~~TAKING ACTION~~

- ~~1. City of,~~
- ~~2. Participate in watershed planning and stewardship efforts and implement municipal recommendations from watershed plan~~
- ~~3. Collaborate with regional initiatives to protect the Fox River Valley watershed~~
- ~~4. Promote the reduction of community water consumption per capita, and participate in regional efforts and programs to conserve water~~
- ~~5. Provide customer incentives to retrofit using high efficiency, Water Sense appliances and fixtures~~
- ~~6. Collaborate with energy utilities to integrate water conservation into energy audits for residential customers~~
- ~~7. Resolve to eliminate unnecessary landscape pesticides and fertilizer use on municipal property~~
- ~~8. Riparian communities: Collaborate with other agencies to assess dam performance and support removal when feasible~~
- ~~9. Build or retrofit paved surfaces with permeable materials~~
- ~~10. Install and maintain bioswales, filter strips, trees, rain gardens, and other functional landscapes~~
- ~~11. Collaborate to provide rain barrels, plants, and other resources to allow residents to capture and store rainwater~~
- ~~12. Collaborate to enhance wetlands for improved ecosystem services~~
- ~~13. Collaborate with regional and state agencies to sustainably manage stormwater~~
- ~~14. Incorporate conservation practices into new development guidelines and incentives, and review and adopt codes to eliminate barriers to green infrastructure BMPs including cisterns, green roofs, bioswales, permeable paving~~
- ~~15. Enact codes that protect surface and groundwater from runoff and contamination~~
- ~~16. Collaborate to enact a Pollinator Preservation Project by creating habitats in City parks and private gardens.~~

~~Taking Action for Aurora  
Sustainability Plan~~

~~THROUGHOUT THE SIX FOCUS AREAS, THERE MAY BE A MULTITUDE OF IDEAS AND INITIATIVES BUT IT IS ESSENTIAL FOR AURORA TO TAKE ACTION NOW. THE NUMBER OF CITIES THAT ARE BEING PROACTIVE ON ENVIRONMENTAL ISSUES IS GROWING WORLD-WIDE. AS OF JUNE 2009, 944 MAYORS FROM THE 50 STATES, PUERTO RICO AND WASHINGTON, D.C. HAVE SIGNED THE U.S. MAYORS CLIMATE PROTECTION AGREEMENT, REPRESENTING MORE THAN 83 MILLION CITIZENS. MUNICIPALITIES WITHIN OUR REGION, SUCH AS CHICAGO, EVANSTON, ELGIN AND OAK PARK, ARE INCREASINGLY ENGAGED IN GREEN INITIATIVES AND BEYOND HAVE APPROVED OR ARE IN THE PROCESS OF APPROVING SUSTAINABILITY PLANS.~~

~~LOCAL GOVERNMENTS TAKING THE LEAD~~

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Although local governments ~~account~~ accounts for just a portion of our community's ~~resources~~ resource use and carbon ~~emissions~~ emissions, policy decisions have far reaching implications. There are many ~~goals~~ goals within this plan that have ~~implications~~ implications for municipal policy and services, and concepts such as resource conservation, circular economy and life-cycle analysis analyses that can be used to make future decisions. Action by local governments has a symbolic value and ~~demonstrates~~ demonstrates leadership that extends beyond the magnitude of energy efficiency, waste reduction or other actions taken, and GHG emissions reductions. Through sustainable choices sustainability, officials may better progress the local quality of life, and partner with motivated stakeholders for maximum effectiveness. The intent for this plan is to serve

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### PARTNERING WITH MOTIVATED STAKEHOLDERS

There are many local entities such as environmental groups, schools, businesses and developers, not for profit organizations, individuals and other entities that are motivated to promote green initiatives. This Plan can be a vehicle to unite and engage these key stakeholders – locally, within our region, and perhaps even nationally. ~~No one entity in the community, not local government~~ government, not businesses, and not residents, ~~can improve Aurora's quality of life alone. The best way for an improved quality of life is to take action together~~ this to be achieved is through coordination. So, beyond our focus area goals, the City is also committed to:

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1. Seek recognition for community sustainability achievements
2. Advocate for federal and state policies and investment that support municipal advances in sustainability
3. Seek collaboration with the business sector to support municipal sustainability
4. Partner with other local governments to achieve efficiency and sustainability
5. Partner with non-governmental organization to advance sustainability in the community and regionally
6. Support or create an interdisciplinary team to coordinate internal sustainability efforts
7. Dedicate staff to direct sustainability initiatives
8. Leverage state/federal and private grants and resources to advance sustainability
9. Educate and train staff on sustainability practices
10. Achieve third party certification for sustainable public facilities
11. Use the GRC2 Framework to update a sustainability plan and formally adopt it
12. Adopt an environmental purchasing policy
13. Manage special events sustainably
14. Integrate sustainability into capital planning

### Conclusion

As such, the City's 'Green Team' will be expanded to include motivated stakeholders, from key community entities, and remain intact to advance this plan. The recommendation would be that the team becomes the Environmental Advisory Committee, which shall advise the City on all matters concerning sustainability and the environment.



### ESTABLISHING IMPLEMENTATION PRIORITIES

There are many goals in this plan that can achieve noteworthy improvements in our quality of life. An important step in the implementation process is to evaluate the cost and benefits of proposed actions. This will enable the City and other community stakeholders to identify short-, medium-, and long-term timeframes for accomplishing various initiatives.

For example, many sustainable initiatives proposed may be consistent with efforts that are already being implemented or can be implemented in the short term by the City or community members. Other initiatives will require greater resources or longer development periods and can be targeted for implementation in a more long-term timeframe. For each strategy in the plan, resources, responsibilities and timeframes for implementation should be identified.

### IDENTIFYING FINANCING OPPORTUNITIES

Implementing some of the goals in this plan may require a significant investment by the public and private sectors, however, having a plan can attract significant financing and grant opportunities from outside resources.

Throughout 2009, there has been considerable momentum at the local, regional and national level to assist communities with resource conservation measures. Having demonstrated a commitment to resource conservation and environmental sustainability, Aurora was chosen to participate in the ComEd Community Energy Challenge. This challenge offered the opportunity to leverage ComEd's resources with our own in order to develop and implement energy efficient projects that reduce electric use while advancing our sustainability objectives. This challenge highlights the many financial incentives that are available to the City of Aurora and local businesses and residents for energy efficiency measures. This program also offers a means for education and outreach as to the value of creating energy efficiencies – not only for the environment but also for the pocketbook. In addition, the recent federal economic stimulus packages have included funding opportunities to assist in creating and achieving goals to reduce fossil fuel emissions; reduce energy use and improve energy efficiency.

These two examples highlight a heightened awareness of green initiatives and sustainable development which has led to added assistance and opportunities for municipalities, residents and businesses. These opportunities can help move green initiatives forward, and with the adoption of a sustainability plan Aurora is effectively geared to do so.

## ENGAGING LOCAL RESIDENTS

The City of Aurora Sustainability Plan identifies ways the City can become more sustainable and improve the quality of life for all of our residents.

While the City has a key role to play in through the implementation of this plan, the impact of these actions on Aurora as a whole depends largely on the embrace and motivation of the community. More As a result of the current economic situation, and the ongoing outreach efforts by community based organizations, federal, state and local governments, more and more residents in Aurora are becoming aware of the necessity to live more sustainably. The City created the citizen-led Sustainable Aurora Advisory Board included "Pledge for Sustainability" is a non-binding means of securing individual commitments to provide a vital link between City staff and residents achieving our collective goal. Residents and businesses who take the pledge agree to take steps towards beginning a personal sustainability plan.

Smaller measures like switching home lights to energy efficient bulbs, washing clothes with cold water, or starting a home compost bin can have a cascading effect and should not be minimized. When making decisions, such as purchasing goods and services, life cycle analyses should be considered. By taking into account things such as the source of a given product, the cost of maintenance and upkeep, impact on the environment and its means of production, sustainable choices can be made that will benefit our wallet, our health and the environment.

The City and its community partners promote this pledge by enhancing the resources and information available to help these individuals achieve their pledged goals. The Internet is a powerful resource for engaging local citizens and for providing tools and information that makes it easier for residents to fulfill their commitment to play a role. Many sustainable resources exist from respectable sources; the included "Glossary of Terms and Resources" is intentionally packed with links to resourceful sites. For other tips and information on how residents can conserve resources and reduce greenhouse gas emissions visit the City's green website at [www.aurora-il.org/green](http://www.aurora-il.org/green).

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## CONCLUSION

### City of Aurora Sustainability Plan

The City of Aurora Sustainability Plan identifies ways the City can become more sustainable and provides a framework for making educated decisions based on resource conservation and life cycle costs. It identifies sustainable goals for the purpose of conserving energy and reducing greenhouse gas emissions within the areas of Community Development and Land Use, Transportation and Infrastructure, Energy Efficiency, Conservation and Management, Waste Minimization, Reuse and/or Recycling, Water Quality and Conservation, and Education and Engagement. When added together, policies and projects to support these goals have the potential to make substantial progress on sustainability for the City of Aurora and improve our quality of life.

In order to support the goals in this Plan, the City of Aurora has identified achieved, ongoing and proposed sustainable projects and maintains additional resources such as the Aurora Energy and Emissions Profile to help guide future sustainable practices. For information on these resources, and other information on sustainable initiatives for Aurora, please visit the City's green webpage at [www.aurora-il.org/green](http://www.aurora-il.org/green) or contact the City of Aurora Planning Division.

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## ACKNOWLEDGMENTS

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Rick Munson, Engineer  
Engineering Division

Aurora Public Library

APPENDIX

City of Aurora Sustainability Plan

City of Aurora

RIVEREDGE PARK ENVIRONMENTAL SUSTAINABILITY

HANDBOOK

Developed by

The RiverEdge Park Environmental and Sustainable Concepts Task Force

Members

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September, 2008

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## INTRODUCTION

The RiverEdge Park Environmental and Sustainable Concepts Task Force first met formally on April 23, 2008. Its purpose was to provide guidance to the consultant team engaged in the development of Aurora's RiverEdge Park. Members include local environmental advocates, professional environmental planners and engineers, and city staff who are interested in the topic of sustainability.

Since our initial gathering in April, we have met monthly, face to face, and have used the RiverEdge Park project website to work collaboratively, uploading documents and communicating with one another to share and refine our ideas. This Environmental Sustainability Handbook is a product of our collaboration. It is our hope that the Handbook will be used as a dynamic planning tool, evolving as we learn more about environmental sustainability and as new technology, products and practices are introduced into the marketplace.

It is our recommendation that the ESC Task Force now take on a new form. First, we would like to add more members from the Aurora community. In its next iteration, the ESC Task Force would become the City of Aurora's Environmental Sustainability Advisory Board. The Advisory Board's chief duty would be to confer the "RiverEdge Park Sustainability Seal of Best Environmental Management Practices" upon qualified designers, vendors, contractors, developers, products, and technology. The REPSS (RiverEdge Park Sustainability Seal) would be displayed on buildings, furnishings, equipment, infrastructure, streetscape elements and promotional/educational materials associated with the park, and ultimately could be displayed city wide by those who qualify after review by the Advisory Board.

The Advisory Board would also recruit volunteers who would be available to conduct tours for visitors to RiverEdge Park. These tours would explain the environmentally sustainable features of the park, and help disseminate these ideas locally and regionally. The Advisory Board could also recruit volunteers to assist with planting and landscaping maintenance.

We are proud to be connected with the planning of RiverEdge Park, and feel confident that it will be a model of environmental sustainability that is "Second to None."

## ENVIRONMENTAL LANDS SUSTAINABLE CONCEPTS TASK FORCE- STATEMENT OF PRINCIPLES

Below is the statement of principles which our Task Force developed to guide our process:

RiverEdge Park will serve as a model of environmentally sustainable practices in its design elements, construction techniques, use of technology, and choice of products. The Environmental and Sustainable Concepts Task Force members hereby request that all consultants and other Task Forces use the following principles in decision making related to development of the park:

1. ~~CALCULATE LIFE CYCLE COSTS: RiverEdge Park will showcase methodologies for evaluating the true cost of a product, technique, or technology over its lifetime. In practice, if a choice is more costly up front, but results in reduced operations, maintenance, and/or replacement costs over its useable lifetime, then it should be selected over a product, technique, or technology whose upfront cost is less.~~
2. ~~EDUCATE THE COMMUNITY ABOUT ENVIRONMENTALLY SUSTAINABLE PRINCIPLES AND PRACTICES: RiverEdge Park will showcase examples of products, techniques, and technology that represent environmentally sustainable choices, thereby serving as a model for the public. Interpretive signage and print materials will convey this message. The RiverEdge Park will function as a dynamic, "real time" display of environmental sustainability.~~
3. ~~USE RIVEREDGE PARK AS AN "EARLY ADOPTER" LABORATORY TO TEST EMERGING ENVIRONMENTALLY SUSTAINABLE PRODUCTS, TECHNIQUES, AND TECHNOLOGY: RiverEdge Park will function as a laboratory to test emerging environmentally sustainable products, techniques and technology. This laboratory can serve to promulgate ideas related to environmental sustainability, disseminating new ideas locally and regionally.~~
4. ~~GIVE PREFERRED STATUS TO COMPANIES DEMONSTRATING BEST ENVIRONMENTALLY SUSTAINABLE PRACTICES; NURTURE AURORA'S GREEN COLLAR ECONOMY: Vendors, consultants, and contractors who demonstrate best management practices in the use of environmentally sustainable products and practices should be given "preferred status" in the procurement process. Such companies will be encouraged to locate their operations in Aurora as a first step toward building a "green collar" economy.~~



RIVEREDGE PARK SUSTAINABILITY SEAL (REPSS) – APPLICATION

The RiverEdge Park Sustainability Seal (REPSS) will be conferred by Aurora’s Environmental Sustainability Advisory Board upon projects, programs, products, techniques, technology, design, and/or businesses that represent the highest possible standards of environmental sustainability.

This application must be submitted by any designer, vendor, contractor, developer, or supplier of products/technology who wishes to qualify for the REPSS.

1. Name of Applicant’s Firm or

Organization: 2. Contact information:

3. Describe the service, program, project or product to be supplied/reviewed:

4. Describe your firm or organization’s best environmental management practices in each of the following categories. If you believe some categories do not apply to your firm or organization, explain why:

Waste Minimization, Reuse, and/or Recycling

Energy Efficiency, Conservation, and Management

Water Conservation and Quality

Air Quality Optimization

Biodiversity Enhancement

Environmental Sustainability Innovation

5. Describe the way in which your service, program, project, or product will maximize and enhance the environmental sustainability of RiverEdge Park (or XXX project or development, if this application is for work outside REP). Use the Statement of Principles outlined on page 3 of this handbook as a reference point for your description.

6. If your project entails the construction of a new facility, please also provide a copy of your operations plan, demonstrating sustainable practices in the following categories:

Waste Minimization, Reuse, and/or Recycling

Energy Efficiency, Conservation, and Management

Water Conservation and Quality

Air Quality Optimization

Biodiversity Enhancement

Environmental Sustainability Innovation

## GREEN PROCUREMENT POLICY

Key to a successful sustainability initiative is a procurement policy that requires consideration of the environmental impacts of a purchasing decision. Environmentally sustainable or “green” procurement policies include a commitment to waste reduction, recycled content, energy and water efficiency and human health, and establish guiding principles to help identify sustainable products and services.

Green procurement programs have several benefits. In addition to minimizing the environmental impact of purchasing decisions, they reduce waste and disposal costs and enhance worker safety and health. They also can minimize liabilities resulting from worker exposure to chemicals or hazardous materials.

Ideally, these will build on and formalize the sustainable procurement decisions already being made by the City of Aurora. The guidelines should reflect the City’s commitment to minimizing its environmental impact, as well as any other considerations relevant to its definition of sustainability. They should offer clear, practical guidance for employees who do not have a detailed understanding of environmental impacts, but must choose among multiple products and services.

To help ensure that the sustainability principles outlined in this document are integrated into everyday purchasing decisions, the Task Force recommends that an environmentally sustainable procurement policy be adopted by the consultant team engaged in the development of RiverEdge Park. This policy should require that procurement decisions include consideration of the following:

**Environmental impact.** In each purchasing decision, the environmental impact of a product or service must be considered, along with its safety, price, performance and availability. In comparing the environmental impacts of competing products or services, the decision maker should consider the reversibility and geographic scale of the impacts, the degree of difference among competing products or services and the overriding importance of protecting human health.

**Waste reduction.** The decision to procure a product or service should be rooted in an ethic that strives to eliminate waste. Products and services that reduce or eliminate solid waste or waste in energy and water consumption should be given preference. In the case of solid waste, reducing consumption is preferable to consuming something and then recycling it.

**Life cycle costs.** Many highly efficient products have higher acquisition costs but lower operating costs than their less efficient counterparts. If a product or service is more costly upfront but results in reduced operation and maintenance costs over its lifetime, then it should be selected over a product or service with a lower initial cost.

Procurement decision-makers need comprehensive, accurate and meaningful information about the environmental impact of products and services. Many purchasers rely on approved third-party certifiers, such as ENERGY STAR<sup>®</sup>, to help ensure their purchases are environmentally sustainable. However, not all products and services are certified, so a comprehensive green procurement policy offers guidance for decision-makers in the absence of certification. Table 1 lists third-party certifiers and other helpful sources of information related to green procurement.

TABLE 1

Product or Service	Certifier/Resource	Website
Building products, office products, landscaping	U.S. EPA Environmentally Preferable Purchasing Program	<a href="http://www.epa.gov/epp/pubs/products/index.htm">www.epa.gov/epp/pubs/products/index.htm</a>
Building products	Greenguard	<a href="http://www.greenguard.org">www.greenguard.org</a>
Building products, janitorial supplies	Green Seal	<a href="http://www.greenseal.org">www.greenseal.org</a>
Building products, janitorial products, office supplies, fleet	U.S. Office of the Federal Environmental Executive	<a href="http://ofee.gov/gp/gp.asp">ofee.gov/gp/gp.asp</a>
Building projects/building design	Leadership for Energy and Environmental Design (LEED)	<a href="http://www.leedbuilding.org">www.leedbuilding.org</a>
Energy using appliances, equipment and technologies	ENERGY STAR (a U.S. EPA/U.S. DOE program)	<a href="http://www.energystar.gov">www.energystar.gov</a>
Energy using products	U.S. DOE Federal Energy Management Program	<a href="http://www.eere.energy.gov/femp/procurement">www.eere.energy.gov/femp/procurement</a>
Wood and paper products	Forest Stewardship Council	<a href="http://www.fscus.org/">www.fscus.org/</a>
Electronics/computer equipment	Electronic Product Environmental Assessment Tool (EPEAT)	<a href="http://www.epeat.net/">www.epeat.net/</a>
Food service	Sustainable Food Service Network	<a href="http://www.sustainablefoodservice.net/">www.sustainablefoodservice.net/</a>
Site sustainability, landscaping practices	ASLA Sustainable Sites Initiative Standards and Guidelines	<a href="http://www.sustainablesites.org/report.html">www.sustainablesites.org/report.html</a>

## SUGGESTIONS FOR PRODUCTS AND PRACTICES

### BUILDINGS

- Motion sensors to activate lights
- Energy-efficient HVAC systems with programmable thermostats
- Solar/wind/hydroelectric/geo-thermal power
- Windows that allow maximum natural light; solar panel awnings over windows
- Green roofs (plants)
- Building materials with high recycled content (e.g., concrete, rebar)
- Sustainable flooring (consider products that are locally grown and easily transported)
- Sustainable insulation (straw, fabric?); recycled-carpet tiles
- Soy membrane roofing
- Low-flow water fixtures
- Graywater system to recirculate water and water landscape
- Low- or no-VOC (volatile organic compounds) adhesives/sealants, paints, carpet and composite wood products
- Sloan brand toilets (“up” flush for liquid waste; “down” flush for solid waste)

### FURNISHINGS

- LED streetscape lighting—limit light diffusion upwards (dark sky)
- Recycling bins (separated)
- Interpretive signage explaining sustainability principles and usage in REP
- Furnishings fabricated from recycled materials
- Shaded bicycle, stroller, wagon parking

### HARDSCAPE

- Permeable pavers
- Pervious concrete and/or asphalt

### BEST MANAGEMENT PRACTICES

- Use sustainable practices to control stormwater, erosion and sedimentation
- Support alternative transportation (information about bicycling and rail; preferred parking for carpools and hybrid vehicles)
- Minimize pollution from lighting
- Use native plants, not only for aesthetics, but also as filters to enhance water quality/runoff and minimize runoff volume
- Use environmentally friendly cleaning products
- Institute a sustainable procurement policy
- Manage construction waste: recycle/reuse construction debris
- Purchase products and materials from local vendors to the extent feasible (within 500 miles?)
- Require concessionaires to use minimal packaging; biodegradable food containers; no Styrofoam

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## BIBLIOGRAPHY AND RESOURCES

### Native Flora and Fauna, Ecological Restoration

- Native Plants and Natural Resources of Kane County, 3<sup>rd</sup> Edition — Dick Young
- Pizzo & Associates (ecological restoration, biodiversity) — [www.pizzo.info](http://www.pizzo.info)
- Morton Arboretum — [www.mortonarb.org](http://www.mortonarb.org)
- Chicago Botanic Garden — [www.chicagobotanic.org](http://www.chicagobotanic.org)
- Chicago Wilderness (ecological restoration, biodiversity) — [www.chicagowilderness.org](http://www.chicagowilderness.org)
- National Wildlife Federation Wildlife Habitat Certification — [www.nwf.org](http://www.nwf.org)

### Sustainable Site Development

- Water Demand and Supply — Chicago Wilderness (file on project website)
- Biodiversity Recovery Plan — Chicago Wilderness (file on project website)
- Standards and Guidelines: Preliminary Report, November 1, 2007, by the Sustainable Sites Initiative (file on project website)
- River Edge Park Wetland Site Assessment (file on project website)
- Phase 1 ESA Report (file on project website)
- Virginia Avenue Park, Santa Monica, California, Koning Eizenberg Architects
- Sustainable Park Development, Seattle Parks and Recreation Department, Richard Geib

### Sustainable Buildings

- Greater Houston Builders Association Green Building Initiative Checklist
- Built Green Remodeler Handbook — Self-Certification Checklist

### Leadership in Energy and Environmental Design

- U.S. Green Building Council publications — [www.usgbc.org](http://www.usgbc.org)
- LEED-ND Pilot (file on project website)
- LEED-ND Pilot Checklist (file on project website)
- LEED-NC Checklist (file on project website)
- LEED-EB (file on project website)
- LEED-Core and Shell Checklist (file on project website)

### Sustainable Procurement

- U.S.E.P.A. Environmentally Preferable Purchasing Program — [www.epa.gov/oppt/epp/](http://www.epa.gov/oppt/epp/)
- Remodel Green — Seven Generations Ahead — [www.sevengenerationsahead.com](http://www.sevengenerationsahead.com)
- Good to be Green Directory — [www.goodtobegreen.com/default.aspx](http://www.goodtobegreen.com/default.aspx)

### Environmental Sustainability — Definitions

- Wikipedia — [www.en.wikipedia.org/wiki/sustainability](http://www.en.wikipedia.org/wiki/sustainability)

# ~~PLEDGE OF SUSTAINABILITY~~

~~I, \_\_\_\_\_, hereby pledge to support sustainability locally by taking initiatives to conserve resources and reduce greenhouse gas emissions in my daily activities. I will make a conscious effort to consider life cycle costs and the impact on the environment when making decisions. I will also be a pioneer in educating and engaging my community on improving our quality of life without compromising the ability of future Aurorans to do so as well.~~

~~\_\_\_\_\_~~  
SIGN & DATE

## ~~(OPTIONAL)~~

~~Please leave your contact information for involvement in green initiatives and future environmentally-themed outreach activities and events.~~

~~Email \_\_\_\_\_~~

~~Phone # \_\_\_\_\_~~

~~Address \_\_\_\_\_~~

~~Profession \_\_\_\_\_~~

~~Member Organizations \_\_\_\_\_~~

## Indicate Field(s) of Interest/Expertise:

~~Community Development and Land Use~~

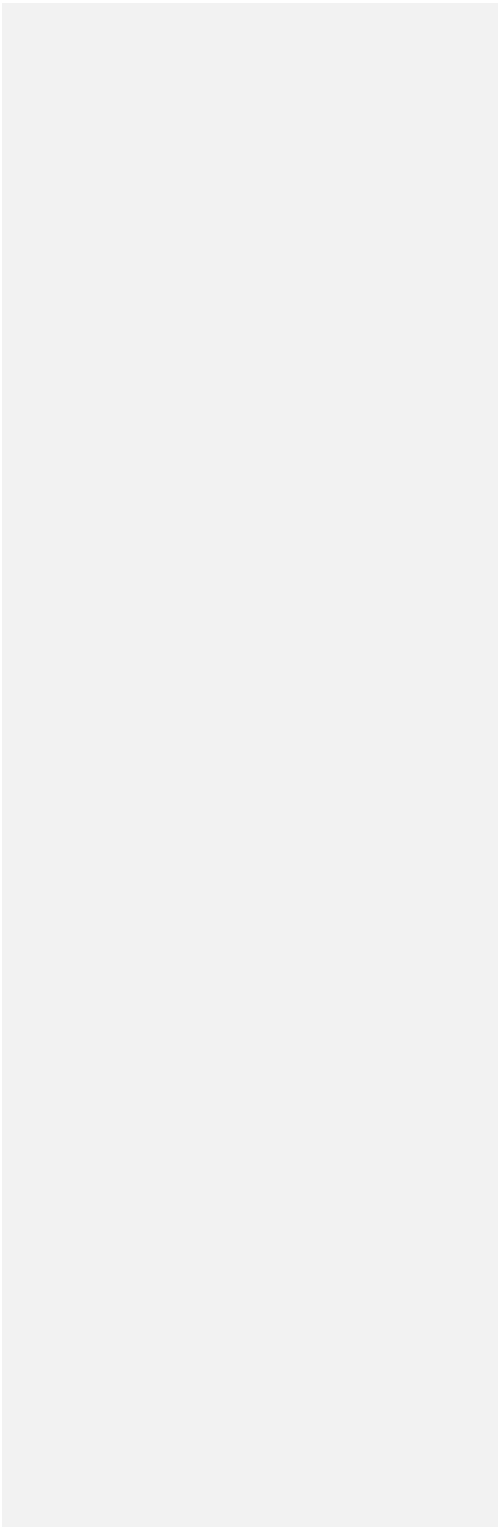
~~Waste and Food Residuals~~

~~Transportation and Infrastructure~~

~~Water Conservation and Quality~~

~~Energy Efficiency and Green Buildings~~

~~Education and Engagement~~



## YOUROWNPLANOFACION

The City There is much work to do to ensure the prosperity and health of our city. As we expand the possibilities of what we can achieve with regional partnerships, we remain always dedicated to making Aurora a beautiful place for families, businesses, and innovators to thrive and prosper. To find out more about current and planned City of Aurora sustainable initiatives, visit [www.aurora-il.org](http://www.aurora-il.org) and consider attending one of our monthly Sustainable Aurora Advisory Board meetings.

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Glossary of Aurora is working towards a more sustainable community by taking initiative in energy efficiency and greenhouse gas emissions reduction. Play an important role and take action on your own initiatives using some of the easy steps listed below. For additional ideas and resources, visit the City's green webpage at:

[WWW.AURORA.IL.ORG/GREEN](http://WWW.AURORA.IL.ORG/GREEN)

#### EASY ACTIONS

By taking these actions you can eliminate 2,125 pounds of GHG emissions per year which is like planting an acre of forest.

- Replace one out of every five auto trips (non-commute) with bike, walking or public transportation
- Replace your drive to work with a bike, walking or public transportation one day a week
- Replace all incandescent and halogen light bulbs with Compact Fluorescents (CFLs) or LEDs and turn off unused lights
- Upgrade to a water saver (2.5 gallons per minute) showerhead
- Turn your water heater down to 120 degrees
- Wash clothes in cold water rather than hot
- Replace your 20 year old refrigerator with a new Energy Star model
- Plug all electronics into power strips and switch off when not in use
- Watch half as much TV each day

#### INTERMEDIATE ACTIONS

By taking these actions you can eliminate 1,070-1,335 pounds of GHG emissions per year which is like planting half an acre of forest.

- Apply weather stripping to doors and windows
- Upgrade your attic insulation to 12 inches
- Reduce amount of weekly waste by at least one garbage bag (increase recycling and consider waste when purchasing new products)

#### ADVANCED ACTIONS

By taking these actions you can eliminate 5,790-9,790 pounds of GHG emissions per year which is like planting 3-4 acres of forest.

- Sell your car and find alternative forms of transportation
- Install solar panel photovoltaic system
- Install solar hot water system

APPENDIX

The City of Aurora Sustainability Plan

Alternative Energy – Usually environmentally friendly, this is energy from uncommon sources such as wind power or solar energy, not fossil fuels.

Aquifer - An underground geological formation or group of formations containing water. Aquifers are natural sources of groundwater for wells and springs.

Bagasse – A dry, fibrous residue remaining after the extraction of juice from the crushed stalks of sugar cane, used as a source of cellulose for some eco-friendly paper products.

Best Management Practices (BMPs) – Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.

Bicycle and Pedestrian Plan – Approved in 2009, this city-wide bicycle and pedestrian plan recommends improvements in the design, construction and promotion of activities that increase bicycle ridership and walkability throughout the city. The Bike and Pedestrian Plan promotes improved transportation safety, reduce congestion, decrease emissions and promotes a viable quality of life.  
[www.aurora-il.org/communitydevelopment/planning](http://www.aurora-il.org/communitydevelopment/planning)

Biodegradable – Substances which, when left alone, break down and are absorbed into the eco-system.

Brownfield - Abandoned, idled, or under-utilized industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.

Carbon Emissions - Polluting carbon substances, such as carbon dioxide and carbon monoxide, released into atmosphere. Also referred to as greenhouse gas emissions (GHGs), carbon emissions are mostly produced by motor vehicles and industrial processes and forming pollutants in the atmosphere.

Carbon Footprint – A measure of impact on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide.

Cathode Ray Tube (CRT) Screen – An older type of television or computer screen that uses a vacuum tube to display images. CRT screens have become much less popular mostly due to LCD screens that use much less space and require less power per display area.

Center for Neighborhood Technology (CNT) – This organization promotes more livable and sustainable urban communities, especially in the areas of climate, energy, natural resources, transportation and community development. CNT has launched two non-profits, one of which being CNT Energy which helps consumers and communities obtain the information and services they need to control energy costs. [www.cnt.org](http://www.cnt.org)

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Chicago Area Clean Cities — Chicago Area Clean Cities (CACC) coalition is a voluntary organization dedicated to encouraging the use of clean fuels and clean vehicle technologies in the Chicago metropolitan area. CACC

is part of the U.S. Department of Energy's Clean Cities program. CACC is one of eighty-nine Clean Cities coalitions across the country that participates in this program. [www.chicagocleancities.org](http://www.chicagocleancities.org)

Chicago Metropolitan Agency for Planning (CMAP) – This regional agency integrates planning for land use and transportation in the seven counties of northeastern Illinois. CMAP combined the region's two previously separate transportation and land-use planning organizations -- Chicago Area Transportation Study (CATS) and the Northeastern Illinois Planning Commission (NIPC) -- into a single agency. CMAP is now developing the region's first truly comprehensive plan for land use and transportation, 'Go To 2040.' [www.cmap.illinois.gov](http://www.cmap.illinois.gov)

Clean Air Counts – Clean Air Counts is a northeastern Illinois regional initiative to reduce ozone-causing emissions, thereby improving air quality and enabling economic development. It is a collaborative effort between the Metropolitan Mayors Caucus, City of Chicago, U.S. Environmental Protection Agency Region 5, and Illinois Environmental Protection Agency. This multi-year initiative seeks to achieve specific and significant reductions in targeted smog-forming pollutants and major reductions in energy consumption. [www.cleanaircounts.org](http://www.cleanaircounts.org)

Climate Change – Term used to imply a significant change from one climatic condition to another. In some cases, 'climate change' has been used synonymously with the term, 'global warming'; scientists however, tend to use the term in the wider sense to also include natural changes in climate.

ComEd Community Energy Challenge – A challenge sponsored by ComEd where a dozen local municipalities have been chosen to participate due to their demonstrated commitment to sustainability. The Challenge is designed to help municipalities in the ComEd service territory develop and implement cost-effective energy efficiency pilot projects to support municipal sustainability objectives.

Combined Sewer Overflows (CSOs) – Discharge of a mixture of storm water and domestic waste when the flow capacity of a sewer system is exceeded during rainstorms.

Compact Fluorescent Lamps (CFLs) – Small fluorescent lights used as more efficient alternatives to incandescent lighting. Also called PL, CFL, Twin-Tube, or BIA-X lamps.

Composting – The controlled biological decomposition of organic material in the presence of air. Controlled methods of composting include mechanical mixing and aerating, ventilating the materials by dropping them through a vertical series of aerated chambers, or placing the compost in piles out in the open air and mixing it or turning it periodically.

Conservation – The protection of plants and animals, natural areas, and interesting and important structures and buildings, especially from the damaging effects of human activity.

Cool Cities – These are cities that have made a commitment to stopping global warming by signing the U.S. Mayors' Climate Protection Agreement. Begun in 2005, the Cool Cities campaign empowers city residents and local leaders to join and encourage their cities to implement smart energy solutions to save money and build a cleaner, safer future. <http://coolcities.us>

Cost-Benefit Analysis – An economic method for assessing the benefits and costs of achieving alternative health-based standards at given levels of health protection.

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**Cost-Effective Alternative** - An alternative method identified after analysis as being the best available in terms of reliability, performance, and cost. Although costs are one important consideration, a cost-effective alternative is not always the least expensive alternative. For example, when selecting a method for street ~~resurfacing~~ ~~re-surfacing~~, upfront cost of materials must be equated with long-term effectiveness and environmental effects of the resurfacing material chosen.

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**Countryside Vision Plan**— Approved in 2006, this plan documents an environmentally sustainable vision for far west Aurora with development working in unison with the natural prairie environment.  
[www.aurora-il.org/documents/planning/Countryside\\_Vision\\_Plan.pdf](http://www.aurora-il.org/documents/planning/Countryside_Vision_Plan.pdf)

**Diesel Oxidation Catalyst Mufflers**— Diesel oxidation catalysts are devices that use a chemical process to break down pollutants in the exhaust stream into less harmful components. Diesel oxidation catalysts can reduce emissions of particulate matter (PM) by 20 percent and hydrocarbons (HC) by 50 percent and carbon monoxide (CO) by approximately 40 percent.

**E85**— An alcohol fuel mixture that typically contains a mixture of up to 85% denatured fuel ethanol and gasoline or other hydrocarbon (HC) by volume. E-85 ethanol is used in engines modified to accept higher concentrations of ethanol. Such flexible fuel vehicles (FFV) are designed to run on any mixture of gasoline or ethanol with up to 85% ethanol by volume.

**Embodied Energy**— The total energy used to extract, process, package, transport, install, and recycle or ~~dispose~~ ~~dis- pose~~ of goods and services. Embodied energy is a methodology which aims to find the sum total of the ~~energy~~ ~~en- ergy~~ necessary for an entire product lifecycle.

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**Emerald Ash Borer (EAB)**— An invasive species of beetle introduced to the US in the 90s. Native to Asia, the EAB is destructive due to its larvae feeding and damaging the inner tissues of North American ash trees. The EAB was discovered in the Chicago area during the summer of 2008.

**Emission** - Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities; from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts.

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**Energy Star**— A joint program of the U.S. Environmental Protection Agency and the U.S. Department of ~~Energy~~ ~~En- ergy~~, helping us all save money and protect the environment through energy efficient products and practices.  
[www.energystar.gov](http://www.energystar.gov) - [www.energystar.gov](http://www.energystar.gov)

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**Energy Efficiency**— Refers to products or systems using less energy to do the same or better job than ~~conventional~~ ~~conven- tional~~ products or systems. Energy efficiency saves energy, saves money on utility bills, and helps protect the environment by reducing the demand for electricity.

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**Global Warming** - An increase in the near surface temperature of the Earth. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of greenhouse gases, otherwise known as climate change.

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**Greenbelt** – A stretch of park, open space or other natural setting functioning as a buffer.

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**Greenhouse Gases (GHG)** – Gases in the Earth’s atmospheres that produce the greenhouse effect. Changes in the concentration of certain greenhouse gases, due to human activity such as fossil fuel burning, increase the risk of global climate change. Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, halogenated fluorocarbons, ozone, perfluorinated carbons, and hydrofluorocarbons.

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**GreenTown Conference** - Is a one-day conference designed to help create sustainable communities. Mayors and elected officials, public works directors, park district directors, planners, developers, architects, landscape/land-scape architects, builders, school leaders and others interested in seeing how a community can become greener.  
[www.greentownconference.com](http://www.greentownconference.com) [www.greentownconference.com](http://www.greentownconference.com)

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**Green Fleets Program** – The Illinois Green Fleets Program is a voluntary program where businesses, government units, and other organizations in Illinois gain recognition and additional marketing opportunities for having clean, green, domestic, renewable, American fuel vehicles in their fleet. It recognizes progressive efforts in using environmentally friendly vehicles and fuels to improve air quality while promoting our domestic fuels for greater national energy security. [www.illinoisgreenfleets.org](http://www.illinoisgreenfleets.org)

**Greywater** – Waste water that does not contain sewage or fecal contamination (such as from the shower) and can be reused for irrigation after filtration.

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**Green Washing** - A term used to describe the practice of companies spinning their product lines as being environmentally friendly as a means to appeal to consumers, persuading them to buy that product rather than another or accept a change in a product.

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**Habitat** - The place where a population (e.g. human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

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**Household Hazardous Waste** - Hazardous products used and disposed of by residential as opposed to industrial consumers. Includes paints, stains, varnishes, solvents, pesticides, and other materials or products containing volatile chemicals that can catch fire, react or explode, or that are corrosive or toxic.

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**HVAC** – This stands for "heating, ventilating, and air conditioning". HVAC is sometimes also referred to as climate control, and entails the cooling and heating equipment for a particular building.

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**Illinois Recycling Organization** – A not-for-profit organization, was formed in 1980 as the Illinois Association of Recycling Centers, and changed its name to IRA in 1990. It currently has 250 members consisting of municipal, county, and state recycling coordinators, businesses, haulers and processors, not-for-profit organizations, consultants, and manufacturers of recycled-content products.  
[www.illinoisrecycles.org](http://www.illinoisrecycles.org) [www.illinoisrecycles.org](http://www.illinoisrecycles.org)

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**Light Emitting Diodes (LEDs)** – A highly efficient conventional lighting option that uses a diode to emit visible light when electricity is applied, much like a light bulb. When many LEDs are side-by-side, they can create pictures, such as the scrolling red LED signs found on business advertisements.

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**Life Cycle Analyses** – Evaluating the true cost of a product, technique or technology over its entire lifetime. In practice, a choice may be more costly upfront, but can result in reduced operations, maintenance, and/or replacement costs over its useable lifetime resulting in a more eco-friendly and cost-effective solution.

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**Life Cycle of a Product** - All stages of a product's development, from extraction of fuel for power, to production, marketing, use, and disposal.

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**Light-Emitting Diode (LED)** - A long-lasting illumination technology that requires very little power. For example, LEDs are used in most flat computer screens and energy efficient electronic displays.

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**Pervious Surface** - Surfaces that allow water to penetrate or infiltrate into the underlying soil or rock. For instance, natural soil is highly pervious, while asphalt is impervious.

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**Preservation** - The act of keeping something the same or of preventing it from being damaged.

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**RiverEdge Park Master Plan** - RiverEdge Park is a regional park to be located in the heart of the City of Aurora along the eastern banks of the Fox River. The park will create a dynamic public gathering place paired with blight removal, Fox River restoration and Brownfield clean-up to stimulate significant neighborhood enhancement and reinvestment. Part urban and part natural, RiverEdge Park will provide something for everyone, including mother nature. The Park will be designed utilizing green technology and sustainable practices. Located less than a block from a Pace bus hub and the last Metra stop on the Burlington Northern Santa Fe line, the park is part of a transit-oriented reinvestment strategy for downtown Aurora developed through a public-private partnership with the business community. <http://riveredgeparkaurora.org>

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**Riverfront Vision Plan** - Approved in 2006, this plan documents a vision to maintain and create a sustainable environment that works in unison with development along both sides of the Fox River. The Riverfront Vision Plan plans for open space, public access and open vistas of the river with environmentally friendly site designs that transition to the surrounding neighborhoods. [www.aurora-il.org/documents/planning](http://www.aurora-il.org/documents/planning)

**Renewable Energy Certificates (RECs)** - Also known as green tags, green energy certificates, or tradable renewable certificates, certificates represent the technology and environmental attributes of electricity generated from renewable sources. Renewable energy credits are usually sold in 1 megawatt hour (MWh) units. A certificate can be sold separately from the megawatt hour of generic electricity it is associated with. This flexibility enables customers to offset a percentage of their annual electricity use with certificates generated elsewhere.

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**Roundabout** - A type of road junction at which traffic enters a one-way stream around a central island. In the United States it is commonly known as a "rotary" or a "traffic circle." In the US, the traffic flow around the central island of a roundabout is counterclockwise.

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**Smart Growth** - An urban planning and transportation theory that concentrates growth in the center of a city to avoid urban sprawl; and advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, mixed-use development with a range of housing choices. Smart growth values long-range, regional considerations of sustainability over a short-term focus. Its goals are to achieve a unique sense of community and place; expand the range of transportation, employment, and housing choices; equitably distribute the costs and benefits of development; preserve and enhance natural and cultural resources; and promote public health.

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**Sustainability** - Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

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Tree City USA— The Tree City USA® program provides direction, assistance, attention, and national recognition for urban and community forestry programs in thousands of towns and cities that more than 120 million Americans call home. [www.arboday.org/programs/treeCityUSA](http://www.arboday.org/programs/treeCityUSA)

U.S. Green Buildings Council – A non-profit trade organization founded in 1993 that promotes sustainability in how buildings are designed, built and operated. The USGBC is best known for the development of the Leadership in Energy and Environmental Design (LEED) rating system and GreenBuild, a green building conference that promotes the green building industry, including environmentally responsible materials, sustainable architecture techniques and public policy. [www.usgbc.org](http://www.usgbc.org) [www.usgbc.org](http://www.usgbc.org)

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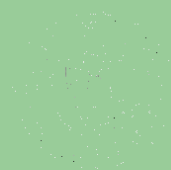
U.S. Mayors Climate Protection Agreement — On February 16, 2005 the Kyoto Protocol, the international agreement to address climate disruption, became law for the 141 countries that have ratified it to date. On that day, Seattle Mayor Greg Nickels launched the US Mayors Climate Protection Agreement to advance the goals of the Kyoto Protocol through leadership and action. Two years later, The U.S. Conference of Mayors launched the Mayors Climate Protection Center to administer and track the agreement, among its other activities. By November 1, 2007, there were more than 710 signatories to the Agreement. [www.usmayors.org/climateprotection](http://www.usmayors.org/climateprotection)

Volatile Organic Compounds (VOCs) - Any organic compound that participates in atmospheric photochemical reactions except those designated by EPA as having negligible photochemical reactivity.

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Zero waste— A philosophy that encourages the rethinking of actions and decisions so that waste is reduced to zero. Zero waste introduces the concept of circular systems in which as much waste as possible is reused, similar to the way that resources are reused in nature.





CITY OF AURORA

# Sustainability Projects

Supplemental Documentation for the City of Aurora Sustainability Plan

July 30, 2009

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Supplemental Documentation for the City of Aurora Sustainability Plan

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\*Provided by the Chicago Metropolitan Agency for Planning (CMAP) on July 13, 2009

\*\*Most definitions taken from the Environmental Protection Agency ([www.epa.gov](http://www.epa.gov)) or are a hybrid of multiple definitions modified to be more applicable to our local environment.

ACHIEVED AND ONGOING SUSTAINABILITY PROJECTS  
Supplemental Documentation for the City of Aurora Sustainability Plan

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Focus Area 01:

COMMUNITY DEVELOPMENT AND LAND USE

- Approval of the Countryside Vision Plan, the Riverfront Vision Plan and the Seize the Future Mater Plan implementing smart growth and sustainable development into long-range planning and policy efforts.
- Planned for the development of a new community gathering place: RiverEdge Park. This regional park along the Fox River will emphasize use of environmental best management practices and create urban green space.
- Coordinated with the Chicago Metropolitan Agency for Planning as part of their regional study to report on local greenhouse gas emissions and energy usage. The Aurora Energy and Emissions Profile illustrates usage across different sectors of Aurora with comparisons between 2000 and 2005, and offers guidance on developing strategies to conserve energy and reduce emissions.
- Developed the Public Art Commission Sculpture Garden along Downer Place incorporating native vegetation, public art and space for public interaction.
- Began enhancing the Fox River Walk by providing uninterrupted green, open space along both sides of the riverfront. Part of this ongoing effort is making progress to close the Fox River Trail gap in collaboration with the Fox Valley Park District and Forest Preserve.
- Completed six long-range neighborhood planning processes to help residents and other local stakeholders (e.g. business owners, employees, school faculty) shape the way their neighborhood will evolve and enhance its quality of life. (Aurora Neighborhood Planning Initiative—ANPI).
- Created the LaSalle Street & Lincoln Avenue Overlay District to maintain the historic character of the neighborhood while encouraging redevelopment that is compatible with and supportive of the positive qualities of the residential neighborhoods nearby.
- Modified residential property zoning designations (downzoning) and offered reconversion incentives (RCIP) to protect overloaded infrastructure and preserve the character of established single-family neighborhoods. In 2007, the City increased its financial commitment to open space and green space by pledging additional funds to create neighborhood parks and density reduction efforts.
- Planned and permitted the ‘new urbanist’ style Hometown development to foster community interaction and energy efficiency. Hometown implements smart growth concepts such as mixed land uses, walkability and public open spaces.
- Established the Aurora Tree Board and approved a new city tree ordinance for arboreal best management practices. The city has been honored by Tree City USA for 12 consecutive years with a Tree City USA Award. The Tree City USA program provides direction, technical assistance, public attention, and national recognition for urban and community forestry programs.

- Instituted the HOME Maintenance Empowerment Program providing financial assistance for income-qualified homeowners who are eligible for electrical upgrades, mechanical upgrades, plumbing, roof repairs and ADA modifications.

**Focus Area 02: TRANSPORTATION AND INFRASTRUCTURE**

- Received the Illinois Environmental Protection Agency's (IEPA) Green Fleets designation in 2006. Aurora was one of the first cities to receive this designation; a voluntary program that recognizes progressive efforts in using environmentally friendly vehicles and fuels to improve air quality.
- Implemented vehicle efficiency standards for the purchase of new fleet vehicles; the City currently operates over 60 E-85 (ethanol mix) flex fuel vehicles and 189 B-5 (soy mix) diesel fuel vehicles. Alternative energy electric vehicles were purchased such as Segways for downtown parking enforcement and Gem cars for transportation in Phillips Park. In addition, the City partnered with Clean Air Counts in 2007 to successfully retrofit nine municipal heavy-duty dump trucks with diesel oxidation catalyst mufflers.
- Instituted a 'No Idle' policy in 2006 for all municipal fleet equipment and vehicles minimizing exhaust emissions, engine wear and petroleum usage. This requires any city vehicle or equipment that isn't performing an emergency operation to turn off the engine after 30 seconds.

1

- Encourage sustainable transportation and infrastructure techniques in private developments such as the use of pervious surfaces in Waubensee Community College's downtown campus. Also, a boulevard street system with trolley service and a street roundabout was specified in the planned development for Station Boulevard.
- Approved the City's first Bicycle and Pedestrian Plan in 2009. This plan identifies improvements in the design, construction and promotion of activities that increase bicycle ridership and walkability throughout the city. The Plan promotes overall improvements to transportation safety, congestion reduction and decreasing greenhouse gas emissions.
- Upgraded multiple traffic signals, street lights and parking lot lights to more energy efficient lighting systems citywide. In 2007, traffic signal bulb replacement in the downtown with LED lamps helped decrease energy usage 12-fold.
- Specify 15% recycled asphalt mix in the resurfacing of streets citywide. In addition, street maintenance services have tested beet-based GeoMelt street treatment to reduce the need for street salting during the winter season.
- Began participation in 'Bike to Work Week' in 2008 leading to City employees biking over 1,100 combined miles. This was complimented by education and engagement efforts in partnership with local bicycle shops.

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- Repaired donated bikes for a green bike-sharing pilot program during the 2008 GreenTown: The Future of Community environmentally themed event in downtown Aurora. These shared bikes are continued to be used by employees for short trip purposes.

Focus Area 03:

### ENERGY EFFICIENCY, CONSERVATION AND MANAGEMENT

- Drafted legislation and partnered with state officials for approval of the GreenCities Grant Program which encourages the incorporation of Leadership in Energy and Environmental Design (LEED) building standards in municipal and private development through incentive programs. The City prioritized energy efficiency through the LEED certification process in the planning and construction of the 200,000 square foot Aurora Police and Courts Facility; one of the largest municipal construction projects in the State of Illinois.
- **1** Conduct code enforcement for commercial redevelopment projects under the 2006 International Energy Conservation Code. This building code section allows flexibility for adaptive reuses of existing buildings.
  - Conducted energy audits of high consumption municipal facilities, such as the Water Treatment Plant. These energy audits helped identify improvement goals for the purposes cost-effective and energy efficient upgrades.
- Retrofitted lighting systems in municipal buildings with technologies such as motion detectors, zoned systems and energy efficient light bulbs; visible example include the LED light fixtures outside the Phillips Park Reptile House.
- Implemented multiple energy savings and conservation techniques in public libraries such as computer automatic shut-off settings, use of eco-friendly office and cleaning supplies and 'green' resources for patrons at the front desks.
- Began sponsoring the Green Historic Preservation Bike Tour in 2008. This tour highlights history and conservation success stories throughout Aurora without the need of automobile transportation.

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Focus Area 04:

### Waste Minimization, Reuse and/or Recycling

- Implemented citywide residential recycling by contracting waste management services to provide curbside recycling. Internally, the City provides comingled recycling in city buildings and provides services for employees to properly dispose toner cartridges and fluorescent tubes. Services were also expanded to public facilities such as the Metra train stations at Route 59 and Route 25.

- Provides recycling services at hosted events such as Downtown Alive and Fiesta De Luces. The City was awarded the Coca-Cola Recycling Grant which supports recycling programs for community events. Recycling contracts are also required for all other city sponsored events. Other environmental disposal services are incorporated into events as well. For example, expired prescription drug collections have been implemented at the Phillips Park Festival and the Kiwanis Club Indian Creek Clean-Up event in partnership with the Fox F.R.E.S.H. Medication Take Back Group.
- Instituted a 'Buy Recycled' procurement policy in 1992 for the purchasing of recycled products. This establishes sound practice of reduction, reuse, recycle and recovery of waste generation within City buildings and facilities. The City's central services also uses wall paints with low volatile organic compounds (VOCs) that are less toxic than conventional paint products.
- Transitions municipal operations from paper to electronic distribution of information when possible through technologies such as Click2Gov and Microsoft SharePoint. Currently, Click2Gov offers online information for building and permitting activities (i.e. inspection scheduling and reports) and current information on development review processes. City staff have begun transitioning to a Microsoft SharePoint intranet service for paperless interaction (i.e. announcements, paid time off sheets, employee information).
- Practices reduction and reuse of office materials across all departments (i.e. ACTV Public Access Channel recycles over a thousand tapes every couple years). Equipment Services, the city division with largest production of waste, reduced landfill waste by 33%. This effort was initiated by a waste audit, and was achieved by implementing new recycling procedures and employee education.
- Replaced fifteen metal garbage barrels with 3 solar powered trash compacting units in the City's Phillips Park. The new trash units have an attached recycling bin for plastic bottles and cans and engage visitors in sustainable waste management practices.

#### Focus Area 05:

### WATER QUALITY AND CONSERVATION

- Awarded the Nonpoint Source Pollution Control Program Grant by the IEPA in 2007 to assist in preparing a plan that integrates green infrastructure and stormwater best management practices (BMPs) in a study area adjacent to the Fox River. Efforts have also been increased to decombine sewer systems, especially in the downtown areas, to reduce the amount of diverted overflow into the river.
- Partnered with the State of Illinois to pass Rivers Edge Redevelopment Initiative legislation allocating EPA grants in the amount of \$2 million to help with environmental remediation along the Riverfront. This legislation also allows up to 20 million dollars in tax incentives and funding to help revitalize downtown riverfronts in Aurora, Rockford and E. St. Louis (River Edge Redevelopment Zones). In 2007, the

City partnered with the IEPA and cleaned a 1.5-acre landfill site (KiddieKar) adjacent to the Fox River. This former landfill site is planned to be part of the future RiverEdge Park development.

- Began an annual water conservation education campaign and permanent summer watering restrictions in 2006. Developers are also provided educational information on water efficiency measures for new construction projects during the permitting process.
- Recognized for exceptional tap water quality and received the Illinois Section American Water Works Association Water award in 1999, 2000, 2007, 2008 and 2009. Aurora has also won the Kane County Water Association Water Taste Test award in 1998, 2000, 2006 and 2008.
- Initiated water quality and conservation pilot projects in the City's Phillips Park such as concrete pervious surfaces (softball field parking lot) and a rain gardens (near Mastodon Lake parking lot).

#### Focus Area 06: EDUCATION AND ENGAGEMENT

- Aurora is the first among five other communities to receive the Clean Air Counts Platinum Award. This award requires a multifaceted, rigorous approach to air quality improvement. Examples of outreach include the "What You Can Do To Improve Air Quality" and the "Together We Care for Clean Air" informational brochures. In addition to education and outreach efforts, participating communities report on energy efficiency, low VOC, and native landscaping or workplace transportation options. In 2007, the City partnered with Clean Air Counts and held two public events handing out over 200 environmentally friendly gas cans in exchange for aged gas cans. The Clean Air Counts program was also promoted to the business sector through a partnership with the Aurora Chamber of Commerce.
- Conducts ongoing water conservation and quality outreach as part of the EPA Clean Waters Act Section 319 which emphasizes nonpoint source water pollution reduction. Outreach has included information on rainbarrels and other resource conservation practices at events such as the City Expo and Fiesta de Luces.
- Includes 'green' information in the quarterly Aurora Borealis newsletter that is distributed citywide. Past editions have incorporated information on resource conservation, emissions reduction, recycling and local environmentally themed events.
- Host annual Mayor's Awards for Historic Preservation and Excellence in Downtown Property Improvements. This engages and awards adaptive reuse property owners for redeveloping in the city core.
- Operate the Aurora Farmers Market from June to October in partnership with local product and service providers such as organic farmers and local craftspeople.
- Implemented and promoted employee recycling by placing media such as 'Green Guideline' posters at the Central Garage and informing and training employees on proper use.

- Partnered with the World Wildlife Foundation to promote Earth Hour 2008 in a symbolic effort to reduce energy consumption by turning off all non-essential lights for one hour. Earth Hour 2008 was described as the largest demonstration of public concern about climate change in history; lights went out in 4,085 cities in 88 countries worldwide.



PROPOSED SUSTAINABILITY PROJECTS

Supplemental Documentation for the City of Aurora Sustainability Plan

Focus Area 01:

COMMUNITY DEVELOPMENT AND LAND USE

GOAL TO ALIGN PLANNING AND ZONING POLICIES TO ENCOURAGE SUSTAINABLE GROWTH

Revise Zoning and Subdivision Ordinance. Adopt provisions which will promote development which is walkable, bicycle friendly, and easily accessible by transit. These provisions would establish standards placing priority on assuring a safe, comfortable, and attractive pedestrian environment, with convenient interconnection to transit in appropriately planned areas. And incorporate community design features that reduce vehicular usage through techniques such as shared parking regulations, street connectivity, mixed land uses and attractive urban design.

Develop 'Green Zone' Enterprise Districts. Focus energy efficient incentives and funding in areas effectively geared for green development. Areas with deteriorated infrastructure lend themselves to adaptive re-development and upgrades. A "Green Zone" would offer opportunity to implement energy efficiency and other green initiatives in areas already in need of re-development.

Adopt the RiverEdge Park Environmental Sustainability Handbook. Approval of document drafted in September of 2008 by the RiverEdge Park Environmental and Sustainable Concepts Task Force. This dynamic planning tool will be used to set principles in sustainable decision making related to the development of 35-acre RiverEdge Park in downtown Aurora. The handbook will also be used as a guiding document to assess the sustainability of future developments based on best environmental management practices. Approval of the RiverEdge Park Environmental Sustainability Handbook sets local standards for sustainability with the ability to evolve as new technology, products and practices are introduced into the marketplace.

Implement RiverEdge Park Sustainability Seal (REPSS). As part of the RiverEdge Park Environmental Sustainability Handbook, the Sustainability Seal is a cost-free and local recognition of green developments. The REPSS award will be conferred by Aurora's Environmental Sustainability Advisory Board upon projects, programs, products, techniques, technology, design, and/or businesses that represent the highest possible standards of environmental sustainability.

Add Alternative Energy Provisions to Zoning Ordinance. Adopt modifications to the zoning ordinance to permit alternative energy facilities and infrastructure. Modifications would eliminate barriers to implementing wind, solar and hydroelectric technologies promoting application of local alternative energy sources.

Modify Municipal Air Pollution Ordinance. Modify Chapter 4 of the City of Aurora Code of Ordinances to

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~~align with current national standards and enforcement. The modification of this ordinance, originally approved in 1969, would make it current with the 1990 Clean Air Act Amendment and address non-attainment~~

~~emissions. Ordinance modifications should also take into account air pollution legislature specific to our region.~~

#### GOAL TO PROMOTE PLANTING OF NATIVE VEGETATION

~~Conduct an Urban Ecosystem Analysis. Conduct a comprehensive inventory of tree cover citywide. This analysis would utilize land cover data and mapping to inform local stakeholders, developers and government on local tree cover needs. An urban ecosystem analysis could offer essential backtracking information which has increased significance due to the proliferation of the invasive Emerald Ash Borer beetle.~~

~~1.1~~

~~Develop local 'NeighborWoods' Program. Develop a comprehensive community streetscape beautification program involving community partners and neighborhood stakeholders to restore the local tree canopy. The program would identify planting sites along local public rights of way and work with property owners to plant and maintain trees. This program would encourage improved streetscapes, environmental stewardship and community partnerships.~~

~~1.2~~

~~Adopt Plan to Mitigate Effects of the Emerald Ash Borer Beetle (EAB). Adopt plan to identify areas affected by the Emerald Ash Borer beetle to contain the infestation and implement guidelines for replanting trees. As technologies and best management practices emerge, solutions to treat diseased ash trees and prevent further spreading will be applied locally.~~

~~Modify Municipal Weed Ordinance. Modify current city ordinance to address appropriate and properly maintained native vegetation under the property standards code. Code modifications should not compromise property maintenance but allow for traditional and native landscaping. A guidebook on choosing, implementing and understanding native vegetation will promote use and help identify benefits.~~

~~Training for Parks Department on Maintaining Native Landscapes. Proactively seek training and education opportunities for the Parks Department maintenance staff for on maintenance of native landscaping. This would enable the staff to properly maintain such native landscaping installed on public properties throughout the City.~~

#### GOAL TO SUPPORT A SUSTAINABLE LOCAL ECONOMY AND DEVELOP GREEN COLLAR WORKFORCE

~~Implement 'GreenWorks Aurora' Job Training Program. A program to provide local residents who face barriers to employment an opportunity to be trained for high quality, entry level employment in the green collar industry. The recruitment priority will focus on at risk and homeless young adults, young adults with a history in juvenile/criminal justice system, and young adults living in disadvantaged neighborhoods to compete for green collar careers. The objective of 'GreenWorks Aurora' is to provide sustainable economic, environmental, and social equity opportunities locally.~~

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~~Attract Green Sector Businesses. Develop a marketing and incentive program to cultivate and attract the emerging green movement. Attracting green sector businesses can fuel our local economy and promote viable businesses focusing on environmentally friendly products and services.~~

~~Initiate 'Shop Local' Campaign. A campaign to promote the patronization of local businesses. This campaign would support the economy in Aurora through marketing promotion and partnerships among businesses and with the City. Promotion of local businesses will improve the viability of our economy, and reduce vehicle-miles traveled.~~

~~Develop 'City of Lights Center for Sustainable Technology and the Arts'. Identify and re-develop an existing downtown building as a 'state-of-the-art' incubator for new technology entrepreneurs. Combine with space for artists, students, and cultural creatives; incubate exchange of sustainable ideas, products and services.~~

~~Develop 'One Watt' Pilot Project. Development of a building that can be heated and cooled with approximately one watt per square foot of energy. A 'One Watt' building is predominantly heated and cooled passively with little or no conventional HVAC systems needed. This project would educate and provide an opportunity for local trades people to test emerging technologies in weatherization and energy efficiency.~~

Focus Area 02: TRANSPORTATION AND  
INFRASTRUCTURE

GOAL TO ENCOURAGE ALTERNATIVE TRANSPORTATION, REDUCE VEHICLE MILES TRAVELED AND SUPPORT  
RENEWABLE ENERGY USE

Implement the City of Aurora Bike and Pedestrian Plan Recommendations. Initiate bike and sidewalk interconnections recommended in the plan and complete projects identified in the City's Capital Improvement Plan. The Bike and Pedestrian Plan promotes improved transportation safety, reduce congestion, decrease emissions and promotes a viable quality of life.

Develop Bike/Walk to Work Incentives. Provide incentives to encourage biking and walking to work among City staff, lead by example, and educate the community on benefits. Pedestrians and cyclists can reduce commuting costs and alleviate traffic congestion and greenhouse gas emissions.

Expand the Citywide Green Bikes Program. Green bikes are bicycles shared by the general public, free of charge, to provide alternative transportation around Aurora. Strategically placed nodes could be interconnected with bike sharing facilities; the focal point would be downtown.

Expand Alternative Fuel Filling Stations Availability to Local Government Agencies. Encourage the availability of alternative fuels by promoting the sale of E-85 fuel and electric car charging to other government entities. The City can open its existing municipal filling stations to local governments.

Establish Circulator Trolley Systems to Major Nodes of Transportation. As traditional neighborhoods in older cities become the location of choice for more Americans—singles, young couples, families, and empty nesters alike—there is an emerging need to provide comfortable and convenient transit service to these areas. Implementing trolley systems at major nodes of transportation in key corridors such as downtown, Route 59, Orchard Road and Farnsworth Avenue would serve a multitude of residents and businesses along them and lessen automobile dependency. In addition to environmental and economic benefits, these systems develop and promote a sense of 'community.'

Coordinate with Pace and Metra on Local Public Transportation Systems. As Aurora continues to develop and attract residents and businesses, City staff will proactively work with public transportation entities such as Pace and Metra to plan for efficient local systems. Effective public transportation routes and stops require coordination from local government agencies and an understanding of the needs of neighborhoods, the downtown and major corridors. Access, affordability and efficient routes, stops and nodes are essential to having a viable public transportation system.

Participate in RTA/CTA Transit Benefit Fare Program. By participating in this employee benefit program, the City of Aurora can allow staff taking public transportation to deduct \$230 per month (\$2,760/year) from their pre-tax paychecks to cover transit expenses. Similar to the Bike Commuter Benefit Program, this would pro-

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promote public transportation use to those employed by the City. City staff can lead by example and promote the transit benefit program to other local employers.

**Implement Carpooling Network.** Implementation of a citywide carpooling database places residents in touch with others that may have a similar commute. Residents would register details online and get matched to commuters across Aurora. Carpooling networks in Australia estimate commuter savings up to \$2,500 per year. Reducing vehicle operation also cut on emissions, operating costs, and traffic congestion while providing a network for residents to interact and promote environmental stewardship.

**Partner with Car Sharing Program.** In an effort to expand green businesses and offer accessibility to alternative forms of transportation, partnering with a car sharing program would give residents an environmentally friendly alternative to owning a personal car. Similar partnerships such as the one between the City of Chicago and I-Go Car Sharing allow residents to save up to \$3,000 per year and reduce carbon emissions by up to 28%. Participating residents could reserve a car online or by phone, use and return the car to assigned parking spots across Aurora for one hourly rate that covers gas and insurance. Car sharing programs can also significantly reduce the increased need for parking and promote environmentally friendly and accessible transportation options.

#### GOAL TO EXPAND THE CITY'S GREEN FLEETS PROGRAM

**Adopt Green Fleet Purchasing Policy.** Municipal policy to purchase hybrid fleet equipment or equipment which operates on alternative environmentally friendly fuels. The City purchases approximately 45 new fleet vehicles per year, and would apply this policy for the purchase of new fleet vehicles or modifications to existing equipment. Vehicles in good operating condition should not be discarded for the purposes of this policy as this would create unnecessary waste and materials.

**Convert Fleet Trucks to Biodiesel Fuel.** Convert diesel fleet to utilize non-petroleum based fuel, such as B-20 biodiesel, to reduce emissions, petroleum dependency and engine wear. Conversion to biodiesel fleet also increases the US demand for alternative fuel, thereby fostering growth of the green economy.

**Retrofit Remaining Heavy Dump Trucks with Emissions Reducing Mufflers.** Install emissions reducing mufflers to the municipal heavy dump truck fleet. There are approximately 36 municipal heavy dump trucks remaining without these environmentally friendly mufflers.

#### GOAL TO IMPLEMENT SUSTAINABLE ROADWAYS

**Use Best Management Practices for Road Paving and Street Resurfacing.** Implement the use of environmentally friendly materials and practices to traditional petroleum-based asphalt road paving projects. The City resurfaces approximately 50 miles in asphalt road surface a year at a continuously increasing price and frequency. By analyzing life cycle costs and impact on the environment, we can improve the ecosystem and reduce resurfacing costs over time. Municipalities worldwide are testing materials and techniques such as Rub-

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berized Asphalt Concrete (RAC), porous concrete, white topping, adding manufacturing 'fly ash' to concrete mixes and permeable brick paver installations and environmentally friendly and cost-effective solutions to traditional asphalt paving.

~~Increase Street Roundabouts Applications. Increase the number of street roundabouts within Aurora. Roundabouts reduce idle time and the need for traffic lights, and can calm and mitigate traffic. Incorporated into the planning of the Station Boulevard and Hometown developments, roundabouts have been installed in established areas as well. Locations would be identified and redesigned when necessary street improvements and maintenance are performed~~

~~Implement Energy Efficient Street Lighting Pilot Project. This pilot project will consist of removing existing high pressure sodium (HPS) street light fixtures and replacing them with energy efficient light fixtures at approximately 19 identified locations. Currently, the City has implemented LED street lighting at the intersection of Edgelawn Drive and Prairie Road, and at two locations around the former Aurora Christian High School site on Aurora's near west side. This project reduces energy consumption, and increases the reliability and quality of the street lighting.~~

~~Use Energy Efficient Lighting for Traffic Signals. Currently, there are 126 intersections across Aurora using about 7,500 lights. This retrofitting would target the 111 intersections that currently operate on dated HPS lighting. From February 2006 through December of 2007 the City converted 15 intersections to LED lighting, mostly in the downtown, and experienced a 12 fold reduction in energy consumption. The LED fixtures not only reduced energy usage, but also provided the ability to run on batteries during power outages, increased the quality of lighting and visibility, increased life expectancy and offered improved quality and visibility. Modifications should examine tried and tested retrofitting projects to further increase public safety through techniques such as elongated and preemptive blinking lights to indicate signal change.~~

~~4~~

~~Enhance Interconnection and Synchronization of Traffic Signals. Interconnecting and synchronizing traffic signals along major arterials can improve efficiency in traffic flow without constructing new roads and increasing paved areas. Fine-tuned traffic and crosswalk signals reduce automotive trips and traffic, but also reduce air pollution, improve roadway efficiency, and decrease fuel consumption. The enhancement of the current system would identify major arterials with increased traffic concerns and implement a monitoring and detection system to enable traffic engineers to improve efficiency.~~

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## ENERGY EFFICIENCY, CONSERVATION AND MANAGEMENT

### GOAL TO ENHANCE SERVICES AND PROGRAMS FOR RESIDENTIAL AND COMMERCIAL PROPERTIES

~~Develop Energy Audit Program. Partnering with outside entities this program would offer energy audits to households and businesses at a reduced cost and/or implement audits into the building permitting process. Residential and commercial property owners waste money annually on energy loss due to poor insulation, poorly maintained heating and cooling systems, inefficient appliances, etc. Energy audits would include comprehensive analyses of energy consumption and loss, cost-effective improvement recommendations, and information on practices and available resources to increase energy efficiency within buildings.~~

~~Partner on Smart Metering Pilot Program. Partnering with ComEd this pilot program would install utility meters on single-family, multi-family and commercial buildings to increase awareness of usage amounts and promote conscious decisions on time/frequencies of use. Meters can inform building tenants of real-time utilities pricing via an easily accessible and interactive interface such as the Internet.~~

~~Implement Home Energy Savings Program. This program would offer interest-free loans to implement energy efficiency measures for income-qualified residents. Energy efficiency home improvement projects such as roofing, furnace replacement, insulation and weather-proofing upgrades would be included. The Home Energy Savings Program would help enhance home energy efficiency and improve the quality of life for residents most in need.~~

~~Create a Wind and Solar Energy Design Guidelines and Incentives. Promote wind and solar renewable energy applications for homes and businesses. Provide incentives to the community that would assist homeowners in reducing their energy bills and also reduce load and demand on electrical utility infrastructure. Guidelines based on information from other communities and real-life applications would be drafted, approved and distributed to the public along with ordinance specifications and financial incentives for installation.~~

~~Develop a Pilot Green Roof Program in Downtown Aurora. Encourage retrofitting of the approximately 200 downtown individual rooftops to incorporate native vegetation and environmentally sustainable roofing materials, a.k.a. green roofs, through grants and other incentives. Green Roofs improve the surrounding environment by reducing non-point source pollution to the river, managing stormwater runoff on site, reducing the urban heat island effect, and providing pockets of urban wilderness. At an estimated cost of \$5-\$10 per square foot for installation and maintenance, green roofs can significantly improve energy efficiency, increase roof life and provide additional useable open space in downtown buildings.~~

~~Adopt Current International Energy Conservation Code (IECC). Take a proactive step to work with state government and adopt the current International Energy Conservation Code for all developments. As part of this project, City staff will work with entities such as the US Metropolitan Mayor's Caucus to receive training and~~

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help link licensed contractors to available training. As many developers use the most current international

code, the adoption of the 2009 code should not be burdensome to the development community. Adoption of the most recent code would apply the best management practices and code enforcement for energy efficiency locally. The City currently processes over 5,500 building permits a year on average under the 2000 IECC with the exception of commercial development enforcements under the 2006 IECC.

**Develop Green Building Permitting Program.** Develop a green permit process to incentivize projects exceeding the International Energy Code and incorporate innovative green building practices such as those outlined in the RiverEdge Park Sustainability Handbook.

**Implement Adaptive Reuse Incentives.** Provide financial and technical assistance to redevelop existing buildings and attract new businesses and residents. Redevelopment of existing structures can conserve embodied energy, encourage infill development instead of sprawl and greenfield sites, and also preserve Aurora's architectural and cultural heritage.

**Implement Window Restoration and Weatherization Grant.** Provide grant funding for window restoration and weatherization that would promote installation of new storm windows, screens and restoration of original wood windows. As energy efficiency techniques gain popularity, building owners tend to replace historic wood windows with newer energy efficient options. The results can lead to the erosion of building character, waste of historic resources and a potential net loss in energy conservation. This grant program would be supplemented with information on how window restoration can be the most sustainable option and can be rehabbed to be as energy efficient as new windows.

**Promote the Downtown Interior Rehab Program for Energy Efficiency Projects.** The interior rehab program is designed to encourage the location of new enterprises, and the retention or expansion of existing residential, office, and commercial businesses in the downtown Tax Increment Financing (TIF) District. The City offers matching grants to downtown properties that generate sales or property tax revenue. Typically this program targets building upgrades and code compliance, but will be promoted for energy efficiency projects that meet the criteria as well.

**GOAL TO INCREASE ENERGY SUSTAINABILITY IN CITY-OWNED BUILDINGS**

**Adopt an Energy Efficient New Building Policy.** Using guiding resources such as the RiverEdge Park Environmental Sustainability Handbook, USGBC LEED rating system and International Energy Conservation, this policy can require new municipal facilities to be more energy efficient. Best practices for future development would include prioritizing the adaptive reuse of existing buildings to promote sustainability and provide a new life to abandoned or underused facilities. This policy would be developed and adopted in coordination with electrical, HVAC and plumbing inspectors. Buildings can be reviewed for energy efficiency compliance during the permitting process.

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**Implement Public Building Energy Efficiency Standards.** The City of Aurora has many facilities ranging from administrative to fleet maintenance that represent a noteworthy portion of citywide energy use. A majority of the City's facilities are located in the downtown and are in historic buildings built in the early and mid 20th century. Currently, facilities across municipal government are managed by multiple staff and departments. Through a necessary combined forum among all building managers, this retrofitting would identify and complete cost-effective energy efficiency upgrades including modifications of lighting, HVAC systems, weatherization, water heating and other equipment.

**Energy Efficient Retrofit of the Water Treatment Plant.** Aurora's Water Treatment Plant is the largest energy user of all municipal facilities, and also one of the largest citywide. Built in 1992, this 75,000 square foot facility has much of its original equipment which has increasing maintenance needs and is nearing the end of its life expectancy. Through a partnership with the Illinois Smart Energy Design assistance Center, the Water Treatment Plant underwent an energy audit and was determined to be one of Aurora's highest energy users. The facility uses about 8.46 million kWh of energy to treat over 6,500 million gallons of water a year. Aurora's Water Treatment Facility offers many opportunities to increase energy efficiency.

The Water Treatment Plant's HVAC system uses five rooftop units (RTUs) with a combined 50-ton cooling capacity and 900,000 BTU/hour heating capacity. The replacement of the RTUs cannot be justified based on the energy savings alone. However, due to the age of the existing RTUs, these units would be removed and replaced with high-efficiency rooftop unit counterparts. The selected replacement units should also include automated economizer controls to take advantage of free cooling during milder temperatures.

The Water Treatment Plant's lighting system has approximately 377 T12 fluorescent lighting fixtures throughout the building. Converting all T12 fluorescent lamp fixtures to high-performance T8 lamps and electronic ballasts would significantly increase energy efficiency. All replacement fixtures should be specified as high-efficiency lamps and low-watt electronic ballasts. More research may need to be done on maintenance concerns after electrical power surges.

The Water Treatment Plant also utilizes an aerator blower motor that provides necessary aeration for the City's water supply and works 24 hours a day, 365 days per year. The current blower motor should be replaced with a premium efficiency motor. Benefits will include a reduction in operational energy usage and operational costs of this motor.

**Energy Efficient Retrofit of the Water and Sewer Maintenance Building (WSMB).** The WSMB is a 23,500 square foot facility that shows significant visual evidence of minimal insulation and natural light. An analysis and implementation of cost-effective improvements can notably decrease natural gas consumption at this facility. Through installation of increased insulation, solar heating methods and effective heat control methods, energy efficiency upgrades can minimize electric and natural gas use while providing ample heat for maintenance staff. Through installation of day-lighting methods, energy efficiency upgrades can minimize electric use while providing ample working light for maintenance staff.

**Energy Efficient Retrofit of Fire Station Lighting Systems.** The City of Aurora has eight fire stations serving over 40 square miles of the City. Through a proactive partnership with the Illinois Clean Energy Association,

these fire stations have been identified as cost-effective locations for energy-efficient lighting upgrades. By replacing the aging lighting systems with new energy-efficient fixtures and bulbs, energy consumption and electrical infrastructure wear can be significantly improved.

**Energy Efficient Retrofit of the Aurora Transportation Center (ATC) Heating System.** The Aurora Transportation Center is a major commuter hub located in the downtown. Not only does it serve as a center of activity for Pace, Greyhound and taxi services, but it is also the endpoint of the Metra-BNSF Railway Line which serves over 100,000 commuters per year. Installing a passive renewable energy source, such as solar panels, would supplement the current boiler heating system and significantly reduce natural gas consumption. Additionally, this would provide education on 'real world' renewable energy use to commuters.

#### GOAL TO INCREASE ENERGY SUSTAINABILITY IN THE DELIVERY OF PUBLIC SERVICES

**Develop and Implement Sustainable Municipal Energy Supply.** Develop alternative sustainable energy sources, such as wind and solar, for Aurorans preferably through partnerships. Accommodate a shift away from non-renewable energy sources can ultimately offer electricity to Aurorans at a lower financial and environmental cost. Developing renewable energy infrastructures, such as large wind farms and solar energy farms, promotes local economies and the green collar sector. Particular attention will be paid to foresee unintended harm on the surrounding environment, such as disrupting natural bird migrations and attracting additional lightning strikes.

**Optimize Unit Power Consumption for Water Production.** Municipal water production can be further improved by monitoring unit electrical energy consumption for water collection, treatment, and distribution. Adjustments to the percentage of river water to total raw water collected can have energy saving effects. Operating staff will pursue efforts to maximize use of river water, which requires far less energy to collect than deep well groundwater. River intake requires only about 12% of water travel distance compared to well intake. Analyze relative energy efficiency of wells and increase use of those wells which are more efficient, where possible.

**Use Energy Efficient Lighting Systems in City Parking Lots.** Upgrade all city-owned parking lot lighting to energy-efficient options and adopt a policy to guide design and implementation for future parking lots. Development of a new parking lot for the Aurora Transportation Center (ATC) offers a timely opportunity to implement this initiative and also assess the upgrading needs for all ATC parking. The City owns and operates many parking lots. Energy-efficient upgrades can reduce the electrical consumption for the lighting by 45% with options such as LED.

**Retrofit Lighting at Phillips Park Softball Field.** Upgrade light systems at the softball field to a more energy-efficient option such as LED. The softball field is an area for recreation and has a pervious surface parking lot. Upgrades to the lighting system would reduce energy use and increase reliability, and highlight the other 'green' elements of the field.

~~Implement Hydro-Electric Turbine Pilot Program. Installation of a hydro-electric turbine on a downtown Fox River dam and connect this energy supply to the electrical grid for renewable source energy. Similar 'run-of-river' projects such as the hydroelectric plant in Kankakee produce up to 6,500,000 kWh of electricity a year. Hydropower is currently the largest source of electricity from renewable resources, generating roughly 10% of the electricity used in the United States. The Fox River provides an opportunity to harvest the natural force of water power for environmentally friendly energy production.~~

~~Install Stormwater Sewers Small Hydropower Pilot System. Implement a small hydropower system using an existing storm sewer with constant flow to produce a renewable source of energy. Sections of our sewer system provide enough gravitational water flow to operate a small hydropower system and return renewable energy source electricity to the grid.~~

~~Install Solar Lighting on Gateway Monument Signs. Rather than using traditional floodlights connected to the electrical grid, the City's gateway signs implements solar energy. Located adjacent to arterial streets, gateway sign lighting sometimes requires significant electrical conduit to reach the existing electrical grid. Solar lighting eliminates this need and can provide sustainable and aesthetically pleasing alternatives to traditional, electrical grid floodlighting. Two existing gateway signs are currently utilizing solar energy, the first near the Provena Mercy Medical Center on Lake Street and the second on East New York due west of Route 59; future signs will implement the same technology.~~

~~Upgrade Cathode Ray Tube (CRT) Monitors for Desktops Computers. Promote program to replace all CRT monitors used by city staff. Currently, city staff uses approximately 550 monitors. Many have been replaced successfully by LCD flat screen monitors. This program offers smart investments in energy efficiency with significant cost savings in computer operation.~~



~~Incorporate Computer Energy Saver Settings. PC energy saving and monitoring settings on all City computers (approximately 550) would include 'sleep mode' settings for desktop computers idle time, and can reduce energy consumption from 30 watts/hour to 2 watts/hour. 'Green' computer settings can help reduce computer energy consumption and costs, and help educate by calculating overall computer energy savings to see how it relates to emission reductions.~~

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Focus Area 04:

## Waste Minimization, Reuse and/or Recycling

### GOAL TO IMPLEMENT SUSTAINABLE PROCUREMENT POLICIES AND TECHNIQUES

~~Adopt a New Purchasing Policy. Adopting a comprehensive sustainable purchasing policy would facilitate the analysis of life cycle costs, waste production, embodied energy and overall impact on our procurement policy. Provisions of the RiverEdge Park Sustainability Handbook would be used as well as the specification of products and maintenance techniques that are certified by nationally reputable programs such as the U.S. EPA Environmentally Preferable Purchasing Program, Green Seal and GreenGuard.~~

~~Institute an Office Recycling Network. Connect City departments to exchange office equipment, thereby reducing waste, unnecessary purchases, and office clutter and ultimately give 'a new life' to unused or under-used office equipment. Non-essential equipment that is either stored or unused may be exactly what another city staff person needs. This network would connect city staff and allow them to interchange unused equipment without spending money.~~

~~Install Green Printing Software. Install green printing software on the 500+ computers used by City staff. Green printing software monitors volume and waste of network printing while offering options to significantly reduce print paper used. This would allow employees to be more efficient. Administrators would have the capability to aggregate results City-wide and receive reports on trees saved and carbon emissions reduced. Green printing software promotes education on minimizing waste and can reduce paper consumption by staff.~~

### GOAL TO MINIMIZE WASTE, EXPAND REUSE AND RECYCLING OPTIONS

~~Adopt and Enforce Construction Debris Recycling. Draft and approve an ordinance to promote responsible recycling of construction and demolition (C&D) debris to help contractors and individuals save on costly disposal fees while protecting the environment. Contractors must keep track of how much waste is generated at project sites and strive to meet citywide recycling goals. In the U.S., C&D debris accounts for 30% of all solid waste produced. Most of this waste goes to landfills. Recycling C&D debris conserves valuable landfill space and reduces consumption of resources.~~

~~Mandate Recycling for Multiple Family Properties. Require or incentivize building owners to offer an effective recycling program to multiple family tenants. This can be done through modification to the city ordinance and rental licensing program.~~

~~Develop Municipal Resource Management Recycling Facility. Develop a facility that would sort recyclable materials with the sole purpose of bundling for sale or for re-use. This facility would accept all recycled materials from households in Aurora and neighboring communities by agreement. Currently, our hauler either~~

receives payment from, or pays for, recycled material, depending on the market and economy. We would stock materials appropriately for re-sale if the market price is low at the time. Raw recyclable materials can pay for services and offer recycling at no cost to the community.

**Develop Household Hazardous Waste and Electronics Recycling Program.** Offer residents local waste collection services to promote environmentally friendly disposal of hazardous waste. Household hazardous wastes can include paints, medicines, batteries, electronics and other materials not fit for conventional trash disposal. Other examples of such programs include one-day collection events or development of a permanent facility to take in such material. This can reduce hazards entering our ecosystem, promote sustainable education and services, help remove hazardous waste from residences and offer opportunities to partner with existing, experienced environmental groups. Modifications to the City's waste removal contracts can be made to achieve this goal.

**Begin Home Composting Initiative.** Partner with local organizations to offer compost bins and educational resources for residents interested in starting a compost bin/system in their own homes. Composted material is great for home gardens and can significantly reduce waste sent to landfill. Not only can residents save money, but composting is a great way to introduce green initiatives in the home without being overwhelming.

**Adopt Resolution of Support for Statewide Commercial Composting.** By supporting statewide commercial composting at a municipal level, private sector composting and food residuals services would be more feasible. The lack of local composting facilities makes it difficult to reduce waste production and promote sustainable practices. Compostable products such as bagasse have a strong educational potential and help support green businesses. Full 'zero waste' potential cannot be met without the availability of local composting services.

**Adopt 'No Polystyrene' Policy.** Adopt a policy to discontinue the purchase and use of polystyrene, a.k.a. Styrofoam, for municipal activities and events. This would be similar to the 'No Idle' policy for the municipal fleet. Polystyrene contains chemicals harmful to the environment. It is costly to purchase and demands significant amounts of energy to be recycled.

Focus Area 05:

## WATER QUALITY AND CONSERVATION

### GOAL TO CLEAN, CONSERVE AND REPLENISH NATURAL WATER SOURCES

~~Rehabilitate Brownfields near Natural Water Sources. Work with public and private partners to rehabilitate brownfield properties, and return them to a higher use. This initiative can be enhanced to proactively identify brownfield sites, funding, and partners and focus efforts near natural water sources.~~

~~Revise Naturalized Stormwater Management Corridor Plan (NSMCP). The NSMCP is intended to evaluate stormwater best management practices that will effectively help the City address nonpoint source pollution for purposes of reducing pollutant loads to the Fox River, focusing on the river's watershed area. The revision of this document would analyze current best management practices and implement advances in technology and sustainability.~~

~~As part of efforts to reduce pollutant loads to the Fox River, stenciling of stormwater drain covers with a 'No Dumping' notice can be initiated. A 'No Dumping' notification will help deter the detrimental effects of dumping oil and other environmentally harmful liquids and materials into the stormwater drains. These chemicals can ultimately find their way into our ecosystem untreated. This project involves stenciling that can be done with low-VOC paint and may be implemented into already scheduled street servicing.~~

~~Implement Environmental Best Management Snow Plowing Practices. Installation of salt dispersal control systems on City snow plow trucks can adjust the amount of salt dispersed based on the speed traveled. Heavy use of road salts can adversely affect the surrounding ecosystem, affect water quality and increase cost. The City of Aurora used approximately 24,000 tons of salt in 2007-2008 and 2008-2009 at an average cost of \$53 per ton.~~

~~Snow plowing techniques, both public and private, can also be modified to have less of an impact on our environment. Storage (snow banks) of snow can be regulated through city ordinance to be located in areas where natural ground filtration can occur, therefore replenishing natural aquifers and reducing the load on stormwater systems. Rather than allowing storage on impervious surfaces, such as asphalt parking lots, city ordinance can identify storage on pervious surfaces such as open grass areas. Pervious surface snow storage can reduce sediment and pollutants from reaching our stormwater systems and natural waterways.~~

~~Implement Stormwater Credits for Pervious Surfaces. By using calculations and best management practices from other communities, the City can promote increased surface percolation and allow the earth below to function as a natural filter. Implementation of stormwater credits can be done through ordinance modification and increased education and training. Surface percolation is integral to replenishing the water table and reducing pollutants entering the Fox River. Allowing credit for pervious surfaces can make site development more viable; specifically where land is limited and requirements for stormwater detention may be difficult to implement.~~



~~Partner on Annual Fox River Clean Up. Partner with local organizations to conduct and/or participate in collaborative clean-ups to further reduce pollution and provide more chances to get involved proactively in environmentally friendly events. By taking responsibility to clean up the Fox River, we will nurture respect for our natural resources.~~

~~Modify Fox River Dams. Modify dams along the Fox River to increase regional water-based recreational opportunities, enhance habitat and improve water quality. By modifying the dams, the river will be more accessible to the public and will enhance downtown revitalization. In addition, dam modification increases public safety and improves the ecosystem of the watershed.~~

~~Partner on Rainbarrels Program and Promote Above Ground Rainwater Cisterns. Partner with local organizations to implement a rainbarrel program to promote the harvesting and reuse of natural rain water. Instead of using fresh tap water, rainbarrels can capture rain from gutter systems and store it for reuse. Incorporating more rainbarrels reduces the load on municipal stormwater systems and runoff which carries surface pollutants to our water systems.~~

~~Above ground rainwater cisterns can also be promoted and provide stormwater detention credit to harvest and reuse natural rainwater. Promoting and crediting above ground rainwater cisterns to local developments and redevelopments can provide stormwater management solutions and maximize water efficiency through 'greywater' systems. Retrofitting municipal facilities would provide an alternative use to tap water, and can be used for non-potable municipal operations such as landscape maintenance. Harvesting and reusing natural rainwater reduces stormwater runoff, reduces stormwater infrastructure load and can also provide marketing and educational opportunities.~~

~~Implement Water-Saving Rebate Program. Establish a program offering rebates to owners of residential properties for replacement of older toilets with new, Ultra Low Flow Toilets (ULFT) or High Efficiency Toilets (HET). Rebates would be defined as a percentage of purchase prices up to a maximum amount, with specified amounts for ULFT and HET fixtures. A maximum number of eligible units would be defined for single-family (3) and multiple-family (5) buildings. The property owner would submit a form with proof of purchase, resulting in a credit to his/her City water billing account.~~

~~Expand the Rooftops to Rivers Program. The Rooftops to Rivers program was created as a pilot program in the Indian Creek watershed to address the quality and absorption of rainwater from the rooftops of the residential and commercial structures all the way to the Fox River. This successful program can greatly reduce the rainwater that makes it into our storm sewers and can be expanded to other watersheds throughout the City.~~

Focus Area 06: EDUCATION AND ENGAGEMENT

GOAL TO INITIATE PUBLIC RELATIONS CAMPAIGN

~~Media Outreach to Deliver Energy Efficiency Incentives. Develop a program to assist in delivering energy efficiency incentives to homes, businesses, not for profit organizations and schools in Aurora. Through newsletters, programs, events, neighborhood meetings, and public information outreach the City of Aurora has multiple contacts with its residents and businesses. Many public entities such as utilities and government agencies offer incentives that can assist in increasing energy efficiency and resource conservation throughout the community.~~

~~Include Sustainable Information on Customer Service Phone Line. The Customer Service Division receives over 55,000 phone calls a year. While callers wait, they hear music. Citywide phone networks would be combined to offer callers on hold information about cultural events and green initiatives. Information would be updated on a regular basis. community gardening, recycling, energy efficiency at home, water conservation, bicycle safety, etc. A sustainable education initiative would not only inform residents and maximize green initiative efforts, but also promote community building and fun events.~~

~~Begin Sustainable Educational Initiative. Proactively promote education, focusing on the youth and older adults, about sustainable initiatives through the City's schools and libraries. Children can educate their families about easy solutions to reduce energy needs. In coordination with regular events and seminars in Aurora's libraries, residents of any age or income level can have access to resources and information on sustainable practices. Topics can focus on environmentally friendly practices such as composting, community gardening, recycling, energy efficiency at home, water conservation, bicycle safety, etc. A sustainable education initiative would not only inform residents and maximize green imitative efforts, but also promote community building and fun events.~~

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~~Promote~~ the Sustainability Plan. This would be an ongoing campaign through newsletters, programs, events, neighborhood meetings, and public information outreach to inform Aurorans' of the progress the City has made towards the focus areas and goals outlined in this plan.

~~Host Green Cultural Events. The first step to engaging the public is fun. An environmentally friendly movie viewing, celebrating Earth Day, involvement in summer parades, including local arts and artists. Tying green initiatives to fun and innovative events can help engage the public and put a positive spin on sustainability.~~

~~Implement Annual Mayor's Awards for Excellence in Sustainability. This program recognizes that citizens and business owners play an important role in advancing the City's sustainability agenda. Awards may range from environmentally friendly businesses and products to motivated stakeholders and innovation. Similar to the Mayor's Award for Historic Preservation, this program would be instrumental to motivate and recognize progressives, and draw outside interest to ongoing advances in sustainability within our city.~~

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~~Distribute Free Energy Efficient Light Bulbs. Distribution of free energy efficient lights to Aurorans is an effective method of introducing green initiatives into households. Not only can energy efficient bulbs be an easy measure to promote sustainability, but it can also noticeably reduce resident bills and energy use. Through a partnership with the Metropolitan Mayors Caucus, the City of Aurora has been able to distribute over 34,000 CFL bulbs to Aurora residents.~~

~~Hold Annual Gas Can Exchange Event. An annual gas can exchange event allows residents to dispose of aged and vented gas containers that emit evaporative gases into the atmosphere, and receive a new, leak proof gas container. An annual event, coupled with other environmental services, would promote the use of environmentally friendly gas cans by Aurorans and reduce harmful fuel emissions leaking into the environment.~~

~~Host Downtown Alternative Fuel Car Show. Host a car show in the downtown exhibiting automobiles powered on alternative fuels to promote education, and alternative energy use. This could be incorporated as part of Downtown Alive, which already showcases cars on Friday nights over the summer. Owners of alternative fuel cars can exhibit their cars as well as view municipal green fleet cars. Actively seek like minded partners to provide additional resources and education.~~

~~Expand Farmers Market Event. Expand and develop opportunities for quality purveyors of locally grown and manufactured foodstuffs. From farm to plate, buying locally reduces transportation and storage costs and in some cases eliminates them completely. The City of Aurora already hosts Farmers Markets at 3 locations from June through October.~~

~~Host additional GreenTown Conferences. Hosting another GreenTown or similar conference in downtown to promote the development of eco friendly communities. Hosting another green conference would allow us to showcase Aurora's progress in sustainability and revisit advances in green technologies and initiatives.~~

~~Go Live with City of Aurora 'Green' Webpage. A webpage for the public identifying green initiatives within the City and showcasing sustainable resources to the general public. Aurora is positioned as a regional leader in green initiatives and can exhibit this through the Internet, which is the most commonly used vehicle for information gathering. Aurorans would have a central location for finding green resources such as recycling and energy efficiency available in our City.~~

#### GOAL TO INCREASE AWARENESS AMONG CITY STAFF AND ELECTED OFFICIALS

~~Approve Resolution of Support for the U.S. Conference of Mayors Climate Protection Agreement. Draft and approve a resolution of support through City Council to increase education and awareness on our local commitment to the international Kyoto Protocol. In 2005, the international Kyoto Protocol became law for 141 signatory countries addressing climate change and reducing greenhouse gas emission. The U.S. Conference of Mayors Climate Protection Agreement advances the goals of the Kyoto Protocol on a national level. The City of Aurora has endorsed and signed this agreement and a resolution of support would increase awareness beginning with City staff and elected officials.~~

~~Implement 'Green Office' Policy. This policy would address ways to 'green' municipal offices in regards to emailing, recycling, computer use, office supplies purchasing, lighting, HVAC, water and transportation. The Green Team worked to draft a checklist to promote sustainability within our own offices. This checklist can be implemented as policy, and thereafter be posted on a City 'green' webpage for general public use as well.~~

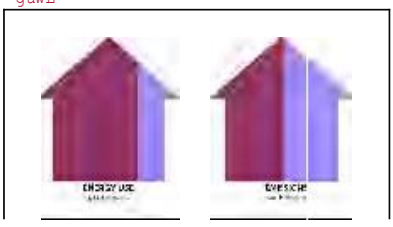
~~Increase Eco-Friendly Practices and Techniques Training. Proactively seek training and education opportunities that reflect environmental best management practices. As green technologies advance, it is important to advance knowledge of them. City staff and elected officials can participate in ongoing training and education in regard to environmental best management practices.~~

~~Implement a Paper Reduction Policy for Meeting Packets. Reduce or eliminate the multiple sets of documents that are required for meeting packets. Currently all packets of information for the City's councils, commissions and committees are in paper form. By working with new technologies digital web-based versions could be made available in lieu of these large paper packets.~~



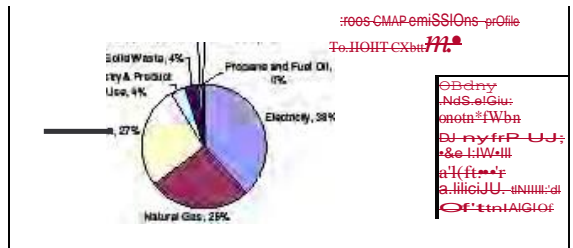
...carbon dioxide per unit of energy will be compared to natural gas, while crude oil combustion will be between the Midwest's electricity is roughly half from coal, half from nuclear with some natural gas used for peak power production. In contrast, the Northeast United States has significant natural gas base load generation (and very little coal, while the Northwest has significant hydro electric generation. In short, because of the mix of regional generation sources electricity consumption in the Midwest is likely to have a higher role of emissions compared to petroleum (transportation sector) or natural gas than it might in other areas of the country.

Figure 1 shows a comparison of a household's energy consumption in kWh (following U.S. standards) and how many hours would be required to use the same unit of energy. While only 75% of total energy consumption can be attributed to natural gas use and the remainder electricity, at most half of household emissions are due to electricity consumption.



The importance of understanding energy consumption in buildings in the Chicago Region: 1310 household emissions involve energy consumption in buildings makes up about 64% of total greenhouse gas emissions. Another 27% can be attributed to transportation. This is a shift into over 90% of our region's total emissions being due to energy consumption. (Figure 2.) These emissions are doing exactly like elsewhere in the nation and worldwide, and will continue to do so if we persist with business as usual. The harmful effects of global warming are already being seen in parts of the world and will become more evident in places closer to home if we do nothing. If we seek to reduce our emissions with our climate change strategies, however, understanding our energy consumption patterns becomes imperative, since the consumption of energy is a major component of our region's emissions.

Figure 2



More information about our region's energy-related emissions can be found in CMAP's Regional Energy Snapshot and Regional Greenhouse Gas Inventory.

<sup>3</sup> The Changing Structure of the Electric Power Industry 2000: An Update, Chapter Three. [http://www.eia.doe.gov/cneaf/electricity/chg\\_stru\\_update/chapter3.html](http://www.eia.doe.gov/cneaf/electricity/chg_stru_update/chapter3.html)



## Energy Consumption in Aurora

### Natural Gas

#### Total Consumption

In 2005, the amount of natural gas consumed in Aurora was 80,480 therms (Table 1). To put this in perspective, Aurora's consumption accounts for about 9.2% of the total consumption in Kane and DuPage Counties, counties in which Aurora's 2005 population of 170,400 is heavily based. Aurora's consumption accounts for about 1.4% of the entire 7-county region's electricity consumption.

#### Natural Gas by Sector

Fifty-five percent (55%) of Aurora's natural gas consumption occurred in the residential sector (Figure 3), which is comparable to both the region and DuPage County. Aurora's average consumption per household is 808 therms (Table 2). This number is simply an average and varies depending on factors including building size, age of the building and building envelope efficiencies, the efficiency of the furnace/boiler and water heater.

Aurora is lower than the average household consumption in the region, as well as Kane and DuPage Counties. This is likely due to Aurora's housing stock in the city, which is generally more efficient. 41% of the city's existing housing stock was built within the last 20 years.

Table 1.

Natural Gas Consumption (in therms)	DuPage	%	C&I	%	Total
Region	3,122,788,779	57	2,328,905,728	43	5,451,694,507
Kane	141,615,345	46	167,417,662	54	309,033,007
DuPage	296,676,156	53	258,328,544	47	555,004,700
Aurora	43,946,810	55	36,533,738	45	80,480,548

Note: Aurora is situated within four counties, but the majority of the city lies between Kane and DuPage Counties.

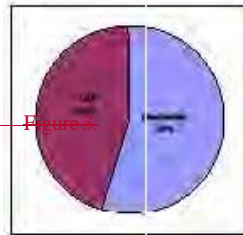


Table 2.

Estimated natural gas consumption per household, 2005 ACS	3946, 808 therms
Aurora's population per household	170,400 / 210 = 811

### Electricity

#### Total Consumption

In 2005, the amount of electricity consumed in Aurora was 1.4 billion kWh (1,416,848,000) (Table 3). To put this in perspective, Aurora's consumption accounts for about 10% of the total consumption in Kane and DuPage Counties. Aurora's consumption accounts for about 2% of the entire 7-county region's electricity consumption.

#### Electricity by Sector

Sixty-two percent (62%) of Aurora's electricity consumption occurred in the commercial and industrial sector (Figure 4), which is comparable to both the region and Kane County. Aurora's

U.S. Census Bureau, U.S. American Community Survey, Added to the Aurora population makes up 12.15% of population in Kane and DuPage Counties.

U.S. Census Bureau, U.S. American Community Survey



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average consumption per household is 9,556 kWh. (Table 4.) This number is simply an average and varies depending on factors including square footage, the presence of air conditioning, and the efficiency of lighting, appliances and systems. However, Aurora's average is higher than the region and both Kane and DuPage Counties.

Table 3.

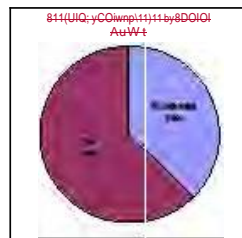
Electricity Consumption (in kWh)	Residential	%	C & I	%	Total
Region	25,178,375,288	34	48,465,369,055	66	73,643,744,343
Kane	1,207,007,675	34	2,294,455,940	66	3,501,463,615
DuPage	3,009,397,425	30	6,865,868,510	70	9,875,265,935
Aurora	536,345,985	38	880,502,445	62	1,416,848,430

Note: Aurora is situated within four counties, but the majority of the city lies between Kane and DuPage Counties.

Table 4.

Residential electricity consumption (kWh)	536,345,985 kWh
Commercial electricity consumption (kWh)	880,502,445 kWh
Total electricity consumption (kWh)	1,416,848,430 kWh

Figure 4.



## Transportation

In addition to energy use in buildings, it is important to also consider another major user and emission source: transportation. This was done by evaluating the Vehicle Miles Traveled (VMT) for households in Aurora.

### Vehicle Miles Traveled

VMT was tabulated from travel statistics provided by the Illinois Department of Transportation (IDOT). Next a scale factor was used to determine VMT attributed to a household. In 2015, the number of VMT in Aurora was 1.08 billion miles, with 929 million attributed to households. We then divide total VMT by number of households and arrive at an average number of 17,079 VMT per household in Aurora (Table 5.) This is higher than the regional average, and just slightly lower than the average in both Kane and DuPage Counties.

It should be noted that VMT per household is simply an average and varies depending on many things, including land use mix, walkable community, and access to amenities and public transportation. These variations are influenced by many different demographic factors including income, household size, and dual workers per household. For example, larger households with higher incomes may own multiple cars, and drive them more, which is reflected in higher VMT relative to the average. Households situated close to reliable public transit or major employment centers may experience decreased annual VMT because they do not have to depend on their cars as much.

### Tables

VMT	Total On-Road VMT	Total HH VMT	Number of HH	VMT per HH
Region	60,527,014,013	43,994,702,713	2,989,996	14,714
Kane	3,520,486,524	2,802,927,201	155,090	18,073
DuPage	8,675,394,497	5,665,198,683	330,340	17,139
Aurora	1,075,400,980	929,404,540	54,416	17,079





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### Aurora 2000 and 2005 Community Greenhouse Gas Inventory

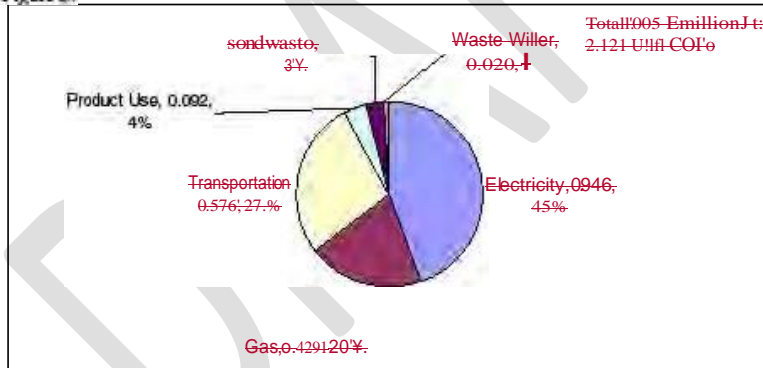
The first step in addressing Aurora's contribution to global warming is understanding the scope, size and source of the existing emissions. An inventory of energy use in the community serves as the basis for conducting a utility greenhouse gas inventory. This greenhouse gas emissions inventory was developed by calculating emissions for the previously reported data on transportation and energy use, and adding the emissions estimates for waste, waste water, product use, and industrial processes.

The 2005 greenhouse gas emissions for Aurora were 2,121 MMt CO<sub>2</sub>e. This represents a 2.8 percent increase over 2000 emissions of 1,727 MMt CO<sub>2</sub>e.

Table 6.

Year	Electricity	Gas	Transportation	Product Use	Waste	Waste Water	Total (MMt CO <sub>2</sub> e)
2000	0.675	0.404	0.516	0.059	0.055	0.017	1,727
2005	0.945	0.428	0.576	0.092	0.060	0.020	2,121

Figure 5.



Aurora's per capita emissions in 2005 were 1,242 tons CO<sub>2</sub>e in 2005, which is higher than both Kane County's per capita rate of 13.7 tons and DuPage County's per capita rate of 16.85 tons of CO<sub>2</sub>e, as well as the region's rate of 18.40.



Table 7. Per Capita Emissions (Tons)

Year	Aurora	W. Cov.	DuPage	CMAAP region
2000	12.08	13.91	15.58	14.09
2005	12.42	13.73	16.85	15.40

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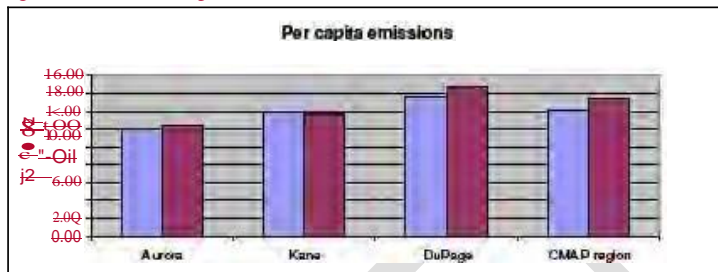
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Figure 6. Annual Per-Capita Emissions



### Developing Mitigation Strategies

The greatest opportunity to reduce greenhouse emissions is to develop mitigation strategies targeting the highest emitting sectors, energy used in buildings and transportation. Further investigation should focus on evaluating potential mitigation strategies, measuring their reduction potential, and developing an action plan. For best results, it is recommended that performance be continuously measured over time.

### Regional Carbon

The regional per-capita greenhouse gas emissions footprint was calculated for the year 2005 using United Nations Intergovernmental Panel on Climate Change (IPCC) methods and local ammonia's combination with modification of coefficient from local data. All data presented are in metric tons (ton) or million metric tons (MMT) CO<sub>2</sub>e. 1000 metric tons = 1 MMT.

Emissions reported for the six major gases of the Kyoto Protocol: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). Emissions were converted into CO<sub>2</sub>e using global warming potentials from the IPCC Third Assessment Report. Activity data were translated into emissions using standard emission factors and global warming potentials.

Non-traditional CO<sub>2</sub>e emissions include primarily electricity and natural gas, but also include other greenhouse gases. Emissions were calculated using global level data from local utility companies. The CO<sub>2</sub>e emissions were also added with the local North American Electric Reliability Council regional U.S. EPA's Emissions & Generation Resource Inventory Database (eGRID) to calculate indirect emissions.

Direct transportation emissions include on-road vehicles, trucks, aircraft, and water, calculated using emission data from the Illinois EPA for the state and DOT for the VMT.

Waste and wastewater regional and county emissions were calculated using reported data from the Illinois EPA. Wastewater emissions were calculated using groundwater gas emissions calculations from the MWRD based on population.

For the use of local data, the emissions of the sector are estimated as a proportion of national emissions as reported by the US EPA.

Adjusted and Annualized Non-Fossil Fuels CO<sub>2</sub>e in the building sectors within the boundary of the city, were



residual and built-up consumption or agricultural products, air travel, and fuel delivery contribute to greenhouse gas emissions from the sector, not part of the margin.

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### Strategies for Reducing Consumption

Having established the connection between energy consumption and greenhouse gas emissions, reducing the region's energy consumption becomes the main element of my regional response to climate change. While emissions reductions from my source will help address global warming, electricity, natural gas, and transportation are the main sources of the region's emissions. Transportation strategies already defined within the three GO TO 2040 planning scenarios.

The strategy matrices below outline those that pertain to energy in buildings and energy behavior and habits, which were developed for the larger Regional Energy Snapshot or transportation strategies already defined within the three GO TO 2040 planning scenarios.

EM/11 strategies (Table 8) may or may not be applicable to every municipality. Feasibility factors are listed below, but each municipality will need to consider the financial, legal and political feasibility of these as well. Please refer to the Regional Energy Snapshot for a full description, with potential regional energy savings and emissions reduction for each strategy.

Table 8.

Strategy	Financial Feasibility	Legal Feasibility	Political Feasibility
<b>Energy In Buildings</b>			
Residential Retrofits	X		
Commercial Retrofits	X		
Industrial Retrofits	X		
Green Building Renovation	X		
<b>Green Building New Construction</b>		X	
Office Building New Construction			X
Energy CHO		X	X
Household RTO	X	X	
<b>Behavior Change</b>			
Behavior Change - Residential	X	X	X
Behavior Change - Commercial	X	X	X
Applicable Transportation	X	X	

Transportation strategies (Table 9) are not looked at under the same lens of feasibility factors, but potential for municipal action versus action that requires of a larger, more coordinated regional, state or national approach. Please refer to CMAA's Go To 2040 Planning Scenarios for a full description of each strategy.



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Table 9:

	Prioritised Vehicle Emission	Priority Vehicle Emission	Priority Vehicle Emission
Land use changes that support transit development (such as transit-oriented development)	X	X	X
Transportation demand management			
Parking policy changes including shared parking or reduced parking requirements			
Alternative fuel conversion and use of advanced vehicle technologies			



## GLOSSARY OF TERMS AND RESOURCES

### Supplemental Documentation for the City of Aurora Sustainability Plan

**Alternative Energy**—Usually environmentally friendly, this is energy from uncommon sources such as wind power or solar energy, not fossil fuels.

**Aquifer**—An underground geological formation or group of formations containing water. Aquifers are natural sources of groundwater for wells and springs.

**Bagasse**—A dry, fibrous residue remaining after the extraction of juice from the crushed stalks of sugar cane, used as a source of cellulose for some eco-friendly paper products.

**Best Management Practices (BMPs)**—Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.

**Bicycle and Pedestrian Plan**—Approved in 2009, this city-wide bicycle and pedestrian plan recommends improvements in the design, construction and promotion of activities that increase bicycle ridership and walkability throughout the city. The Bike and Pedestrian Plan promotes improved transportation safety, reduce congestion, decrease emissions and promotes a viable quality of life.  
[www.aurora-il.org/communitydevelopment/planning](http://www.aurora-il.org/communitydevelopment/planning)

**Biodegradable**—Substances which, when left alone, break down and are absorbed into the eco-system.

**Brownfield**—Abandoned, idled, or under-utilized industrial and commercial facilities where expansion or re-development is complicated by real or perceived environmental contamination.

**Carbon Emissions**—Polluting carbon substances, such as carbon dioxide and carbon monoxide, released into atmosphere. Also referred to as greenhouse gas emissions (GHGs), carbon emissions are mostly produced by motor vehicles and industrial processes and forming pollutants in the atmosphere.

**Carbon Footprint**—A measure of impact on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide.

**Cathode Ray Tube (CRT) Screen**—An older type of television or computer screen that uses a vacuum tube to display images. CRT screens have become much less popular mostly due to LCD screens that use much less space and require less power per display area.

**Center for Neighborhood Technology (CNT)**—This organization promotes more livable and sustainable urban communities, especially in the areas of climate, energy, natural resources, transportation and community development. CNT has launched two non-profits, one of which being CNT Energy which helps consumers and communities obtain the information and services they need to control energy costs. [www.cnt.org](http://www.cnt.org)

**Chicago Area Clean Cities**—Chicago Area Clean Cities (CACC) coalition is a voluntary organization dedicated to encouraging the use of clean fuels and clean vehicle technologies in the Chicago metropolitan area. CACC

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is part of the U.S. Department of Energy's Clean Cities program. CACC is one of eighty-nine Clean Cities coalitions across the country that participates in this program. [www.chicagocleancities.org](http://www.chicagocleancities.org)

Chicago Metropolitan Agency for Planning (CMAP) — This regional agency integrates planning for land use and transportation in the seven counties of northeastern Illinois. CMAP combined the region's two previously separate transportation and land use planning organizations — Chicago Area Transportation Study (CATS) and the Northeastern Illinois Planning Commission (NIPC) — into a single agency. CMAP is now developing the region's first truly comprehensive plan for land use and transportation, 'Go To 2040.' [www.cmap.illinois.gov](http://www.cmap.illinois.gov)

Clean Air Counts — Clean Air Counts is a northeastern Illinois regional initiative to reduce ozone-causing emissions, thereby improving air quality and enabling economic development. It is a collaborative effort between the Metropolitan Mayors Caucus, City of Chicago, U.S. Environmental Protection Agency Region 5, and Illinois Environmental Protection Agency. This multi-year initiative seeks to achieve specific and significant reductions in targeted smog-forming pollutants and major reductions in energy consumption. [www.cleanaircounts.org](http://www.cleanaircounts.org)

**Climate Change** — Term used to imply a significant change from one climatic condition to another. In some cases, 'climate change' has been used synonymously with the term, 'global warming'; scientists however, tend to use the term in the wider sense to also include natural changes in climate.

ComEd Community Energy Challenge — A challenge sponsored by ComEd where a dozen local municipalities have been chosen to participate due to their demonstrated commitment to sustainability. The Challenge is designed to help municipalities in the ComEd service territory develop and implement cost-effective energy efficiency pilot projects to support municipal sustainability objectives.

Combined Sewer Overflows (CSOs) — Discharge of a mixture of storm water and domestic waste when the flow capacity of a sewer system is exceeded during rainstorms.

Compact Fluorescent Lamps (CFLs) — Small fluorescent lights used as more efficient alternatives to incandescent lighting. Also called PL, CFL, Twin Tube, or BIAx lamps.

Composting — The controlled biological decomposition of organic material in the presence of air. Controlled methods of composting include mechanical mixing and aerating, ventilating the materials by dropping them through a vertical series of aerated chambers, or placing the compost in piles out in the open air and mixing it or turning it periodically.

Cool Cities — These are cities that have made a commitment to stopping global warming by signing the U.S. Mayors' Climate Protection Agreement. Begun in 2005, the Cool Cities campaign empowers city residents and local leaders to join and encourage their cities to implement smart energy solutions to save money and build a cleaner, safer future. <http://coolcities.us>

Cost-Benefit Analysis — An economic method for assessing the benefits and costs of achieving alternative health-based standards at given levels of health protection.

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**Cost-Effective Alternative**—An alternative method identified after analysis as being the best available in terms of reliability, performance, and cost. Although costs are one important consideration, a cost-effective alternative is not always the least expensive alternative. For example, when selecting a method for street resurfacing, upfront cost of materials must be equated with long-term effectiveness and environmental effects of the resurfacing material chosen.

**Countryside Vision Plan**—Approved in 2006, this plan documents an environmentally sustainable vision for far-west Aurora with development working in unison with the natural prairie environment.  
[www.aurora-il.org/documents/planning/Countryside\\_Vision\\_Plan.pdf](http://www.aurora-il.org/documents/planning/Countryside_Vision_Plan.pdf)

**Diesel Oxidation Catalyst Mufflers**—Diesel oxidation catalysts are devices that use a chemical process to break down pollutants in the exhaust stream into less harmful components. Diesel oxidation catalysts can reduce emissions of particulate matter (PM) by 20 percent and hydrocarbons (HC) by 50 percent and carbon monoxide (CO) by approximately 40 percent.

**E85**—An alcohol fuel mixture that typically contains a mixture of up to 85% denatured fuel ethanol and gasoline or other hydrocarbon (HC) by volume. E-85 ethanol is used in engines modified to accept higher concentrations of ethanol. Such flexible fuel vehicles (FFV) are designed to run on any mixture of gasoline or ethanol with up to 85% ethanol by volume.

**Embodied Energy**—The total energy used to extract, process, package, transport, install, and recycle or dispose of goods and services. Embodied energy is a methodology which aims to find the sum total of the energy necessary for an entire product lifecycle.

**Emerald Ash Borer (EAB)**—An invasive species of beetle introduced to the US in the 90s. Native to Asia, the EAB is destructive due to its larvae feeding and damaging the inner tissues of North American ash trees. The EAB was discovered in the Chicago area during the summer of 2008.

**Emission**—Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities; from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts.

**Energy Star**—A joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.  
[www.energystar.gov](http://www.energystar.gov)

**Energy Efficiency**—Refers to products or systems using less energy to do the same or better job than conventional products or systems. Energy efficiency saves energy, saves money on utility bills, and helps protect the environment by reducing the demand for electricity.

**Global Warming**—An increase in the near-surface temperature of the Earth. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of greenhouse gases, otherwise known as climate change.

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**Greenbelt** — A stretch of park, open space or other natural setting functioning as a buffer.

**Greenhouse Gases (GHG)** — Gases in the Earth's atmospheres that produce the greenhouse effect. Changes in the concentration of certain greenhouse gases, due to human activity such as fossil fuel burning, increase the risk of global climate change. Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, halogenated fluorocarbons, ozone, perfluorinated carbons, and hydrofluorocarbons.

**GreenTown Conference** — Is a one day conference designed to help create sustainable communities. Mayors and elected officials, public works directors, park district directors, planners, developers, architects, landscape architects, builders, school leaders and others interested in seeing how a community can become greener. [www.greentownconference.com](http://www.greentownconference.com)

**Green Fleets Program** — The Illinois Green Fleets Program is a voluntary program where businesses, government units, and other organizations in Illinois gain recognition and additional marketing opportunities for having clean, green, domestic, renewable, American fuel vehicles in their fleet. It recognizes progressive efforts in using environmentally friendly vehicles and fuels to improve air quality while promoting our domestic fuels for greater national energy security. [www.illinoisgreenfleets.org](http://www.illinoisgreenfleets.org)

**Greywater** — Waste water that does not contain sewage or fecal contamination (such as from the shower) and can be reused for irrigation after filtration.

**Green Washing** — A term used to describe the practice of companies spinning their product lines as being environmentally friendly as a means to appeal to consumers, persuading them to buy that product rather than another or accept a change in a product.

**Habitat** — The place where a population (e.g. human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

**Household Hazardous Waste** — Hazardous products used and disposed of by residential as opposed to industrial consumers. Includes paints, stains, varnishes, solvents, pesticides, and other materials or products containing volatile chemicals that can catch fire, react or explode, or that are corrosive or toxic.

**HVAC** — This stands for "heating, ventilating, and air conditioning". HVAC is sometimes also referred to as climate control, and entails the cooling and heating equipment for a particular building.

**Illinois Recycling Organization** — A not for profit organization, was formed in 1980 as the Illinois Association of Recycling Centers, and changed its name to IRA in 1990. It currently has 250 members consisting of municipal, county, and state recycling coordinators, businesses, haulers and processors, not for profit organizations, consultants, and manufacturers of recycled-content products. [www.illinoisrecycles.org](http://www.illinoisrecycles.org)

**Light Emitting Diodes (LEDs)** — A highly efficient conventional lighting option that uses a diode to emit visible light when electricity is applied, much like a light bulb. When many LEDs are side by side, they can create pictures, such as the scrolling red LED signs found on business advertisements.

**Life Cycle Analyses** — Evaluating the true cost of a product, technique or technology over its entire lifetime. In practice, a choice may be more costly upfront, but can result in reduced operations, maintenance, and/or

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replacement costs over its useable lifetime resulting in a more eco-friendly and cost-effective solution.

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**Life Cycle of a Product**—All stages of a product's development, from extraction of fuel for power to production, marketing, use, and disposal.

**Light-Emitting Diode (LED)**—A long-lasting illumination technology that requires very little power. For example, LEDs are used in most flat computer screens and energy-efficient electronic displays.

**Pervious Surface**—Surfaces that allow water to penetrate or infiltrate into the underlying soil or rock. For instance, natural soil is highly pervious, while asphalt is impervious.

**RiverEdge Park Master Plan**—RiverEdge Park is a regional park to be located in the heart of the City of Aurora along the eastern banks of the Fox River. The park will create a dynamic public-gathering place paired with blight removal, Fox River restoration and Brownfield clean-up to stimulate significant neighborhood enhancement and reinvestment. Part urban and part natural, RiverEdge Park will provide something for everyone, including mother nature. The Park will be designed utilizing green technology and sustainable practices. Located less than a block from a Pace bus hub and the last Metra stop on the Burlington Northern Santa Fe line, the park is part of a transit-oriented reinvestment strategy for downtown Aurora developed through a public-private partnership with the business community. <http://riveredgeparkaurora.org>

**Riverfront Vision Plan**—Approved in 2006, this plan documents a vision to maintain and create a sustainable environment that works in unison with development along both sides of the Fox River. The Riverfront Vision Plan plans for open space, public access and open vistas of the river with environmentally friendly site designs that transition to the surrounding neighborhoods. [www.aurora-il.org/documents/planning](http://www.aurora-il.org/documents/planning)

**Renewable Energy Certificates (RECs)**—Also known as green tags, green energy certificates, or tradable renewable certificates, certificates represent the technology and environmental attributes of electricity generated from renewable sources. Renewable energy credits are usually sold in 1 megawatt-hour (MWh) units. A certificate can be sold separately from the megawatt-hour of generic electricity it is associated with. This flexibility enables customers to offset a percentage of their annual electricity use with certificates generated elsewhere.

**Roundabout**—A type of road junction at which traffic enters a one-way stream around a central island. In the United States it is commonly known as a "rotary" or a "traffic circle." In the US, the traffic flow around the central island of a roundabout is counterclockwise.

**Smart Growth**—An urban planning and transportation theory that concentrates growth in the center of a city to avoid urban sprawl; and advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, mixed-use development with a range of housing choices. Smart growth values long-range, regional considerations of sustainability over a short-term focus. Its goals are to achieve a unique sense of community and place; expand the range of transportation, employment, and housing choices; equitably distribute the costs and benefits of development; preserve and enhance natural and cultural resources; and promote public health.

**Sustainability**—Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

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Tree City USA — The Tree City USA® program provides direction, assistance, attention, and national recognition for urban and community forestry programs in thousands of towns and cities that more than 120 million Americans call home. [www.arborday.org/programs/treeCityUSA](http://www.arborday.org/programs/treeCityUSA)

U.S. Green Buildings Council — A non-profit trade organization founded in 1993 that promotes sustainability in how buildings are designed, built and operated. The USGBC is best known for the development of the Leadership in Energy and Environmental Design (LEED) rating system and GreenBuild, a green building conference that promotes the green building industry, including environmentally responsible materials, sustainable architecture techniques and public policy. [www.usgbc.org](http://www.usgbc.org)

U.S. Mayors Climate Protection Agreement — On February 16, 2005 the Kyoto Protocol, the international agreement to address climate disruption, became law for the 141 countries that have ratified it to date. On that day, Seattle Mayor Greg Nickels launched the US Mayors Climate Protection Agreement to advance the goals of the Kyoto Protocol through leadership and action. Two years later, The U.S. Conference of Mayors launched the Mayors Climate Protection Center to administer and track the agreement, among its other activities. By November 1, 2007, there were more than 710 signatories to the Agreement. [www.usmayors.org/climateprotection](http://www.usmayors.org/climateprotection)

Volatile Organic Compounds (VOCs) — Any organic compound that participates in atmospheric photochemical reactions except those designated by EPA as having negligible photochemical reactivity.

Zero waste - A philosophy that encourages the rethinking of actions and decisions so that waste is reduced to zero. Zero waste introduces the concept of circular systems in which as much waste as possible is reused, similar to the way that resources are reused in nature.

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