



# THE WAY WE GREEN

## INVENTORY OF IDEAS

JUNE 15, 2010

**WORKING DOCUMENT:** A summary of the various environmental sustainability and resilience ideas put forward by the authors of The Edmonton Sustainability Papers and by participants of The Way We Green workshops.



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BRINGING OUR CITY VISION TO LIFE

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## This document

This document is a working document that provides a summary of ideas and suggestions put forward by citizens, workshop participants and working paper authors - for consideration in developing The Way We Green. These ideas have been organized according to the sustainability challenge they represent - energy, water supply, food, ambient air, biodiversity, water quality, extreme weather and waste management. (*Note: Climate change is dealt with in each of these categories as one of the possible root causes*). Ideas have been stated as possible goals, suggested directions, suggested policies and suggested initiatives.

Additionally, information is provided on: (a) the current condition of the environment as it pertains to the challenge and (b) current policies/actions that are in place.

When completed, *The Way We Green* will be structured in the following way:

**Corporate sustainability principles** -Principles that collectively define sustainability and serve as the highest level criteria for assessing Edmonton's sustainability.

**Corporate strategic goals** - General statements describing a desired end state, ideal, condition, or quality to be sought in Edmonton's physical, social, or economic development that will help achieve City Council's Vision and strategic goals.

**Corporate strategic objectives** - Specific statements of what the corporation needs to accomplish in order to achieve a strategic goal. Objectives should be achievable within the timeframe of the plan

**Corporate strategic policies** - Specific statements of how the corporation intends to pursue a strategic objective. (Note: the term "policies" can be used if preferred; in this case, policies are defined as preferred courses of actions)



# Energy Challenge

**Challenge Statement (possible scenario):** Over the next 30 years, Edmonton's dependence on fossil fuels will become a serious challenge due to resource depletion and/or the need to reduce greenhouse gas emissions to mitigate climate change.<sup>1</sup>

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## Overview of Current Conditions

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- The vast majority of Edmonton's energy comes from fossil fuels.
- "A central issue in achieving sustainability is reducing fossil fuel dependency. With considerable economic dependence on the extraction of low-grade fossil fuel (oil sands), Edmonton is vulnerable to boom-or-bust cycles caused by swings in oil prices" (Heinberg, Paper 1).
- "If global oil consumption continues at its current rate and we include a broader range of economic sources (i.e. economic oil sands not yet under active development), currently estimated economic reserves will last about 70 years or more, and potentially economic resources at least 200 years or more." (MK Jaccard, Discussion Paper 5a)
- "Edmonton, along with most other major metropolitan areas in Canada, has been built in an era of cheap and abundant energy from fossil fuels. This has resulted in infrastructure which requires high levels of per capita energy consumption as a result of urban sprawl and population densities below the threshold for efficient mass transit, as well as personal levels of energy consumption unparalleled in human history." (Hughes, Discussion Paper 5b)
- "Global oil production is at or near peak production levels. Alternatives to oil and gas such as coal-to-liquids or gas-to-liquids are not scalable to current levels of energy throughput, nor are the multitudes of renewable energy sources purported by some." (Hughes, Discussion Paper 5)
- The majority of GHG emissions from City operations are from electricity use. The main sources of GHG emissions in City operations are: buildings (43%), transit (18%), street lights (17%), wastewater (10%) and municipal fleet (7%).
- The City is not meeting its greenhouse gas emissions (GHG) reduction target (i.e., to reduce emissions 20% below 2008 levels by 2011). As of 2007, emissions from City operations were 17% above 1990 levels.

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<sup>1</sup> In Workshop 1, participants were given three dots and asked to place them on the three challenges they thought represented the most urgent sustainability challenge for Edmonton in the next 30 years. Results: Energy Challenge (96 dots); Water Supply Challenge (71 dots); Food Challenge (44 dots); Biodiversity Challenge (36 dots); Water Quality Challenge (28 dots); Ambient Air Challenge (25 dots); Extreme Weather Challenge (10 dots).

- The Edmonton community is not meeting its GHG reduction target (i.e., to reduce emissions 6% below 1990 levels by 2010). As of 2008, community emissions were 38% above 1990 levels.)
- On the community level, GHG emissions are slowing or even reversing as there was a 3.0% decrease from 2006 to 2007, followed only by a 0.13% increase in 2008.
- In Canada, buildings are responsible for 33% of all energy used.
- According to the Rocky Mountain Institute, 20% of the energy used in the life of a building is embodied energy consumed in the harvesting, processing and transportation of the materials used to construct it and 80% is used to operate the building.

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## Current Policies/Actions

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### **Federal**

- In January 2010, Canada announced its target to reduce greenhouse gas (GHG) emissions by 17% below 2005 levels by 2020.

### **Provincial**

- The Provincial Energy Strategy states that Alberta's energy resources will be a platform for continued economic growth and success.
- Bio-energy initiatives including Renewable Fuels Standard call for 2% renewable fuel in diesel and 5% in gasoline by 2011.
- 2006-2011 business plan for the Alberta Energy Research Institute says, "Given the availability of the right technologies, bitumen, coal and coal bed methane have hundreds of years of production remaining."
- \$15/tonne tax on industry emissions
- \$4 billion fund for carbon capture and storage.

### **City of Edmonton**

- The City is currently developing a GHG Management Strategy that will be submitted to City Council in August/September 2010. The plan will include new targets and mitigation actions.
- The City developed a Sustainable Fleet Management Plan in early 2009 ... resulting in a right-sizing directive and a directive for more fuel efficient vehicles.
- In 2009 the City conducted modelling exercises to understand the effectiveness of the urban forest for carbon storage.
- Greater energy efficiency/conservation is being achieved through LRT expansion.
- To address community GHG emissions the City established the Carbon Dioxide Reduction Edmonton program (CO2RE). Community emissions were reduced by 5,169 tonnes in 2009 through CO2RE initiatives including: (a) high-efficiency furnaces, (b) New Home Builders rebates for Built Green Cold certified homes, and (c) low-income households high efficiency furnace rebates.

- The city of Edmonton is one of the few municipalities in Canada that monitors and reports its GHG emissions.
- All new City-owned buildings and major renovations are designed to meet LEED Silver Standard as a minimum and be formally LEED certified.
- Since 2005, EPCOR has been capturing landfill gas from Clover Bar Landfill to generate electricity.
- Many retrofit projects are underway at the City to reduce energy consumption and GHG emissions.
- The City is currently operating several LED Street Light Pilot Projects in search of more energy efficient options.
- Fuel sense driver education is mandatory for all employees that drive on a regular basis for the City.

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## Goal/Direction/Policies/Initiatives

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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers.

### **Goal: Edmonton's sources of energy and the way Edmontonians use energy are sustainable.**

**Suggested Direction:** Edmonton's size and physical form promote optimal energy efficiency.

- **Possible Policy: Increase density and reduce sprawl.**
  - **Possible Action:** Create built area growth boundaries.
  - **Possible Action:** Encourage even greater population densification in Edmonton's urban core. Encourage development of low-rise (up to 5 storey), high-density, mixed-use residential in the downtown core to accommodate the shift of residents to the core in the future as fuel prices rise.
  - **Possible Action:** Create greater renewable energy opportunities by increasing density of housing.
  - **Possible Action:** Reduce sprawl by adjusting a number of financial incentives, e.g., higher property development charges to reflect location and cost of servicing; lower development charges to reward denser development and redevelopment of brown/grey fields, developments closer to transit, proximity to existing infrastructure or city centre.
  - **Possible Action:** Reduce property taxes as they discourage efficient use of municipal resources while promoting sprawl. Compensate for lost property taxes by selling City assets like golf courses, giving long term leases for bridges, and leasing/selling sidewalk space. Adjust tax rates downward for denser, multi-family dwellings and upwards for single family dwellings to reduce sprawl.
  - **Possible Action:** Stop subsidizing public transit. Subsidized public transit is a major cause of suburban sprawl. Without the artificial cheapening of public transportation, many suburbs couldn't be economically services.

**Suggested Direction:** Edmontonians are not dependent on the private automobile.

- **Possible Policy: Discourage use of private automobiles.**
  - **Possible Action:** Introduce user fees in vehicular traffic that reflect the costs of using the road.
  - **Possible Action:** Correct current transportation prices that are distorted by a range of subsidies that make it artificially cheap to drive automobiles to and from the suburbs. Consider road pricing, fuel taxes and transit subsidies.
  - **Possible Action:** Market a voluntary “keep your car at home day” once a month. Work with employers to discourage private auto commuting.
  - **Possible Action:** Remove street-side parking on major routes to improve flow and discourage driving.
  - **Possible Action:** Increase the cost to park in downtown, including limiting the number of parking stalls in the downtown core.
  - **Possible Action:** Implement a pedestrian mall pilot project on Jasper or Whyte Avenue.
  - **Possible Action:** Consider implementation of a city carbon charge (considers full cycle carbon content of gasoline, diesel, fuel oil, natural gas and electricity).
  - **Possible Action:** Institute and enforce strict no-idling policies.
  - **Possible Action:** Require all new retail developments to be pedestrian friendly.

**Suggested Direction:** Travel in Edmonton is energy efficient.

- **Possible Policy: Encourage and regulate energy efficient modes of travel.**
  - **Possible Action:** Require charging stations in new buildings for electric cars.
  - **Possible Action:** Convert municipal fleets to high efficiency vehicles (hybrids) and alternative fuels (natural gas and biofuels).
  - **Possible Action:** Work with transit planning and land use authorities to make the city more transit friendly.
  - **Possible Action:** Increase use of public transit.
  - **Possible Action:** Plan for increasing mass transportation by supporting and accelerating the development of the LRT systems.
  - **Possible Action:** Be careful not to design LRT in ways that support sprawl.
  - **Possible Action:** Implement a future ring-road electric bus system that would serve to collect commuters from the more diffuse lower density residential neighbourhoods.

**Suggested Direction:** Edmonton’s building stock is energy efficient.

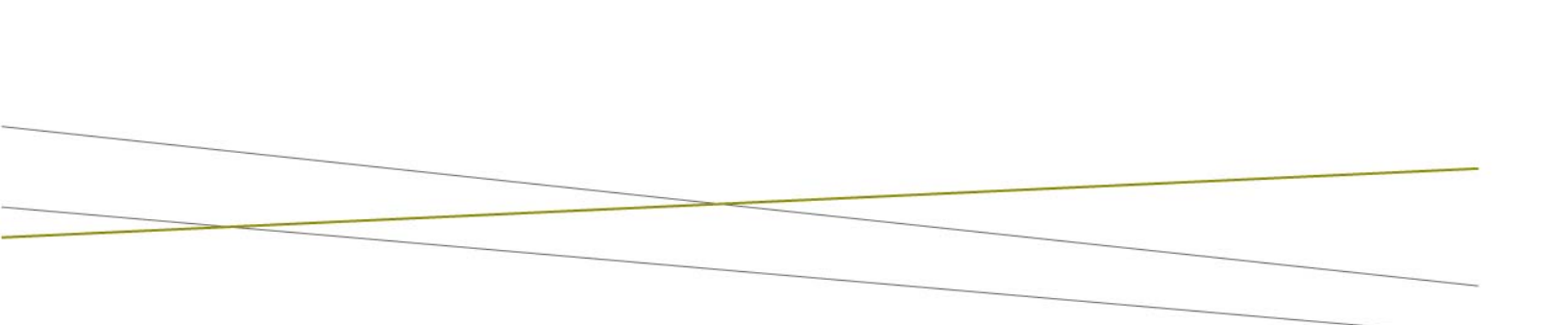
- **Possible Policy: Encourage a more energy efficient building stock through stronger regulations and voluntary actions for new buildings.**
  - **Possible Action:** Work with the government of Alberta to amend Alberta’s building code to reflect greater energy efficiency and pollution management.
  - **Possible Action:** Push for Provincial/Federal policy for dealing with carbon pricing, low emission building and vehicle standards, financial support for technology, infrastructure to help municipalities to transition to a low carbon future.
  - **Possible Action:** Adopt advanced energy efficiency standards for all City-owned buildings and eventually for all new buildings in Edmonton.

- **Possible Action:** Promote the use of the *Model National Energy Code for Buildings (MNECB)* for use in Alberta (all buildings). (Note: The Canadian Government issued the Model National Energy Code for Buildings (MNECB) in 1997 based on the 1989 ASHRAE standards. This model code offers minimum standards for the energy performance of new buildings. It is partially prescriptive and partially performance based, however it is not legally binding and has not yet been adopted in Alberta although it is widely used alongside the ASHRAE 90.1 standard as a best practice within the industry. Similar model codes have been introduced in California (Title 24) and the European Union.
- **Possible Action:** All new public and proposed business buildings should be built to LEED Gold standard.
- **Possible Action:** Zoning regulations that promote: (a) southerly orientation where possible, (b) distance to height ratios to prevent shading, (c) passive solar heading and natural lighting, (d) making sure buildings are built “solar-ready”, (e) water and waste management, (f) provision of energy efficient utilities, (g) and construction of infrastructure (e.g., Toronto requires all new buildings over a certain size must have a green roof, while in Chicago buildings with green roofs are given preferential permit approvals).
- **Possible Action:** Edmonton has a unique opportunity to lead the world in sustainable buildings by inviting the world to explore a sustainable future at EXPO 2017, by developing a site that is a model of community sustainability, and by developing the City Centre Airport Lands into one of the most sustainable communities in the world.
- **Possible Policy: Encourage a more energy efficient building stock through stronger regulations and voluntary actions for older/existing buildings.**
  - **Possible Action:** Focus subsidies on improving insulation in older homes. Even high efficiency furnaces are not all that efficient without a solid building envelope.
  - **Possible Action:** Provide subsidies for high efficient appliances.
  - **Possible Action:** Require all mid- to large-size businesses to develop and implement an energy efficiency plan.
  - **Possible Action:** Plan for the re-skinning of existing buildings to increase their energy conservation and reduce both their carbon footprint and their operating cost.
  - **Possible Action:** Use local improvement charges to finance energy efficiency improvements in residential and/or commercial buildings.
  - **Possible Action:** Edmonton can further accelerate the construction of sustainable building stock by providing “green loans” that could be attached to the property tax bill, similar to a Local Improvement Charge (LIC) in the US which is referred to as PACE (Property Assessed Clean Energy). In Canada, this would require a charter change, which Toronto and Vancouver are actively seeking.



**Suggested Direction:** Edmonton has a distributed/decentralized energy system built on renewable energy.

- **Possible Policy:** Encourage the development of a distributed/decentralized energy system that generates significant amounts of renewable energy.
  - **Possible Action:** Establish revolving funds to provide financing to green energy developments.
  - **Possible Action:** All new buildings should be designed with future solar power generation in mind.
  - **Possible Action:** Offer subsidies to installation of solar power for home owners. Provide rebates to encourage initial uptake of renewable energy technology.
  - **Possible Action:** Use zoning to set up green business zones where all businesses must install renewable energy to offset a proportion of energy demands of the business.
  - **Possible Action:** Adjust property and business taxes for residents and businesses that install renewable energy systems.
  - **Possible Action:** Introduce municipal feed-in tariffs. (Note: Under a feed-in tariff, an obligation is imposed on regional or national electric grid utilities to buy electricity generated from renewable sources, such as solar power, wind power, wave and tidal power, biomass, hydropower and geothermal from all eligible participants. The cost-based prices therefore enable a diversity of projects (wind, solar, etc.) to be developed, and for investors to obtain a reasonable return on renewable energy investments. This principle was first explained in Germany's 2000 RES Act)
  - **Possible Action:** Use local improvement charges to help remove some of the barriers to alternative energy development.
  - **Possible Action:** Support the deployment of renewable energy by applying renewable energy requirements to certain development sites and issuing permits only when minimum standards are met (e.g., the City of Medicine Hat municipally sold lots for housing on the condition that buyers install solar systems).
  - **Possible Action:** The City of Edmonton could facilitate the development of a community energy cooperative. Plan for implementing small-scale district co-generation stations that can use mixed fuels (gas and biomass).
  - **Possible Action:** Develop long term plan for the replacement of coal-fired power plants. Increase electricity generation from renewable energy sources including wind, solar, geothermal and biomass.
  - **Possible Action:** City of Edmonton should seek a contract for the provision of up to 100% low-impact renewable power for City operations. The city could procure a portion of its electricity requirements from residents who sell excess power back to the utility. A premium paid for this electricity would provide incentive for residents to install systems larger than what would be required to meet their own needs.
  - **Possible Action:** Adopt policies to encourage electrification and the capacity to eventually switch to electricity for all energy end uses in the city.



**Suggested Direction:** Edmonton has a diversified economy; not largely dependent on fossil fuel extraction and fossil fuel-related industries.

- **Possible Policy:** Diversify Edmonton's economy away from fossil fuel extraction and production.
  - **Possible Action:** Promote a more resilient mixed economy (away from an oil production economy) based on sustainable resources and manufacturing.
  - **Possible Action:** The knowledge and talent gained through catalyst projects (i.e., Expo and development of Airport lands) will generate green jobs within Edmonton and Alberta and will enable Edmonton to begin exporting its technological and strategic expertise as a recognized leader in the sustainable building industry.
  - **Possible Action:** Develop training programs for workers needed in emerging industries such as renewable energy, energy efficiency and alternative fuels (DP11/p6).
  - **Possible Action:** Focus on attracting industries/businesses/jobs that are not energy intensive or polluting (i.e., avoid heavy industry where possible).

**Suggested Direction:** Edmonton is resilient in terms of its ability to withstand energy disturbances.

- **Possible Policy:** Promote the seven principles of resiliency with respect to possible energy disturbances that may happen in the future.
  - **Possible Action:** Purchase necessary municipal gas supply on futures market.
  - **Possible Action:** Establish an energy and carbon accounting system for Edmonton. This account would be for households, businesses and government, by neighbourhoods and according to the vintage of Edmonton's housing stock.
  - **Possible Action:** Introduce redundancy in essential services where possible, especially electricity, water delivery, emergency services.

**Suggested Direction:** Lifestyles of Edmontonians contribute to energy sustainability.

- **Possible Policy:** Promote a community culture that embraces energy sustainability.
- **Possible Policy:** Facilitate community efforts that help to achieve energy sustainability.

# Water Supply Challenge

**Challenge Statement (possible scenario):** Over the next 30 years, the demand for water in Edmonton will exceed supply due to a growing population, receding glaciers, and/or the general effects of climate change.

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## Overview of Current Conditions

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- Currently the North Saskatchewan River is not challenged in providing adequate flows for municipal, agricultural and industrial uses.
- The general consensus is that there is not enough data to say whether there will be an increase or decrease in flow (i.e., in the future due to climate change). However, based on the model most representative of baseline climate in the NSRB, data show a general warming trend with a possibility of increasing overall precipitation and most likely a slight increase in mean annual flows (EPCOR, Discussion Paper 3).
- Extended drought periods have occurred at least once in every century over the past 500 years (EPCOR, Discussion Paper 3).
- Evaluation of stream-flow patterns indicate we have already been experiencing decreases in annual flows in the North Saskatchewan River here in Edmonton over the past 100 years (Weber et al. 2008).
- In the long-term, due to the effects of climate change, we anticipate that disturbances to Edmonton's water capacity will increase significantly in the next one to two decades. (Applegath, Discussion Paper 18)
- "Edmonton's most critical weakness is its dependence on a single, and depleting source of water: the North Saskatchewan River Basin (NSRB). Over 100 municipalities are situated in the NSRB and water use is forecasted to increase by 21% in 2015 and by 37% in 2025 relative to 2005, which will place increasing stress on the basin despite declining per capita household consumption. Edmonton currently has no reservoirs under its direct control. Typically, in most Canadian municipalities, ground level reservoirs and elevated tanks provide the necessary capacity to permit a constant rate of pumpage, with demand in excess of pumpage being provided from the reservoir system and surplus being transmitted to the reservoir system." (Applegath, Discussion Paper 18)
- Currently the total consumptive water usage is only about 4% of mean flow (EPCOR, Discussion Paper 3).
- More than 90% of water withdrawn at EPCOR's water plants is returned to the river via the local wastewater treatment plant. The loss equates to less than 0.2% of the mean river flows (EPCOR, Discussion Paper 3).
- Domestic use has decreased from 232 litres per person per day in 2003 to 223 litres per person per day in 2009 (compared to the Canadian average of 266 l/p/d. (Note: It has been shown that conserving North American households can achieve 150 l/p/d.

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## Current Policies/Actions

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### Provincial

Alberta Environment and the Alberta Water Council have called for major water use sectors across Alberta to develop conservation, efficiency and productivity plans for water use by 2010. The strategies will strive for an overall 30% improvement in overall water efficiency and productivity from 2005 to 2015.

### EPCOR and City of Edmonton Water Efficiency Initiatives

Water conservation initiatives include: (a) system leak detection/water loss program; (b) efficiency upgrades at treatment plants, (c) ongoing cast iron main replacement program, (d) rebate program for ultra low flush toilets, (e) rebate program for water efficient washing machines, (f) residential and commercial advertising and education campaigns (indoor, outdoor, leaks), (g) school education programs, (h) print materials and website education/awareness initiatives, (i) community outreach events, (j) water and energy audits for large commercial/industrial customers, (k) universal metering, (l) summer watering restrictions when needed, (m) water efficiency fixtures bylaw, etc.

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## Goal/Direction/Policies/Initiatives

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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers.

**Goal:** Edmonton's sources of water and the way Edmontonians use water are sustainable.

**Suggested Direction:** Edmonton's size, form and infrastructure promote water conservation and water efficiency.

- **Possible Policy:** Encourage water conservation through building and neighbourhood design.
  - **Possible Action:** Subject applications for new business/industrial operations to water use guidelines.
  - **Possible Action:** Develop more stringent water efficiency standards for buildings and water-using appliances.
  - **Possible Action:** Promote Low Impact Development designs that include green roofs, rain gardens, bioswales and other water absorbent landscape features to soak away more of the rainwater that falls on urban land and thereby reduce pollution loading to the river.
  - **Possible Action:** Plan for the implementation of neighbourhood based biological waste-water reprocessing (living machines) that would allow water to be more effectively conserved and re-used.
  - **Possible Action:** Promote xeri-scaping on public as well as private properties.

- **Possible Action:** Conduct water audits as part of larger environmental audits.
- **Possible Action:** Low Impact Development designs that include green roofs, rain gardens, bioswales and other water absorbent landscape features to soak away more of the rainwater that falls on urban land and thereby reduce pollution loading to the river.
- **Possible Policy: Encourage citizens to be water efficient.**
  - **Possible Action:** Encourage use of residential rain barrels. Promote good water management practices such as conservation and rainwater harvesting.
  - **Possible Action:** Consider volume based user fees.
  - **Possible Action:** Orient market incentives in a green direction through Environmental Pricing Reforms (EPR) ... sewage and solid waste charges ... time of use billing for water.

**Suggested Direction:** Edmonton is resilient in terms of its ability to withstand water supply disturbances.

- **Possible Policy: Promote the seven principles of resiliency with respect to possible water supply disturbances that may happen in the future.**
  - **Possible Action:** Develop an inter-district water resources management plan involving all city departments and other key stakeholders.
  - **Possible Action:** Plan for the implementation of a comprehensive water reservoir system capable of providing a minimum 3-day water capacity for city residents.

**Suggested Direction:** Lifestyles of Edmontonians contribute to water supply sustainability.

- **Possible Policy: Promote a community culture that embraces water supply sustainability.**
- **Possible Policy: Facilitate community efforts that help to achieve water supply sustainability.**



# Food Challenge

**Challenge Statement (possible scenario):** Over the next 30 years, Edmonton will experience food security challenges due to a growing world population, vulnerable supply lines, loss of local agricultural land and/or the effects of climate change both here and around the world.

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## Overview of Current Conditions

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- The majority of food items travel between 2500 and 4000 kilometres to get to your plate. (Lipton, Discussion Paper 7).
- There are lots of other reasons why we should be thinking about food security from a global perspective; for reasons such as the **drought** in California to **political unrest** in countries that export food to Canada. Finally, of course, there is **climate change**. Weather has a huge influence on agriculture, and as it warms and becomes more unpredictable, agricultural output will be affected. (Lipton, Discussion Paper 7).
- Although there are no real numbers for Edmonton, predictions for both Toronto, and London, UK, set the total days the city could feed itself with the amount of food currently on the shelves, at 3 days. (Lipton, Discussion Paper 7).
- Another factor driving Edmonton's (ecological) footprint is food consumption, contributing 21.4% to the average Edmonton EF in 2008. The majority of our food is imported from somewhere outside of the Edmonton geographic area and may travel an average of over 2,400 kilometres from the land of production to Edmonton households, thus has a high-embedded carbon footprint. (Anielski, Discussion Paper 12)

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## Current Policies/Actions

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The Way We Grow directs the development of a City-wide Agriculture and Food Strategy.

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## Goal/Direction/Policies/Initiatives

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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers.

**Goal: Edmonton's food system is sustainable.**

**Suggested Direction:** Edmonton has the production, processing and distribution capacity to meet the food needs of Edmontonians.

- **Possible Policy:** Protect existing farmland in Edmonton and the region.
  - **Possible Action:** Prevent sprawl through the creation of growth boundaries.

- **Possible Action:** Protect/preserve high quality farmland in and around Edmonton.
- **Possible Policy:** Establish, implement and maintain a strategy for achieving food security.
  - **Possible Action:** Develop a food charter like Toronto, Vancouver, Manitoba and Victoria.
  - **Possible Action:** Establish a food policy council that brings together citizens, government and experts to advise on policy development.
  - **Possible Action:** Develop a comprehensive strategy for achieving the food security objectives as set out in the food charter, the food policy council and based on a full accounting of our current and potential resources. Develop a strategic plan for implementing local food production.
  - **Possible Action:** Decrease food waste.
  - **Possible Action:** Invest in training programs for new farmers around Edmonton.
  - **Possible Action:** Explore changes in diet to more vegetable-rich diets.
  - **Possible Action:** Regard food as a central component of the economic base by supporting regulations that facilitate community gardens, farmers markets and school gardens.
  - **Possible Action:** Use current enclosed, heated spaces for small-scale growing. Encourage urban agriculture and local food production.
  - **Possible Action:** Use local buildings to produce food. (Note: There are even plans to build vertical farms in the middle of the city. A 30 storey building covering a square block could produce the same amount of food as 2,400 acres of farmland that could thus be decommissioned and returned to nature.

**Suggested Direction:** Lifestyles of Edmontonians contribute to food security/sustainability.

- **Possible Policy:** Promote a community culture that embraces food security/sustainability.
- **Possible Policy:** Facilitate community efforts that help to achieve food security/sustainability.



# Ambient Air Challenge

**Challenge Statement (possible scenario):** Over the next 30 years, Edmonton's outdoor air quality will be seriously impacted due to a growing population, growing industry and/or effects of climate change.

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## Overview of Current Conditions

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- Edmonton's air quality was "good" 96.46% of the time in 2009 (as per Alberta Environment's Air Quality Index), slightly below the provincial target of 97%.
- Edmonton's air quality has improved significantly since the 70s.
- The majority of poor air quality days resulted temperature inversions during winter months.
- Increasing levels of ozone in the Edmonton Census Metropolitan Area between 2002 and 2004 triggered the "action" threshold when compared to the Canada Wide Standards.
- During the last year, the average distance traveled for the municipal fleet increased from 21.7 million km to 24.8 million km (i.e., the fleet expanded as the city grew, thus adding to Edmonton's air quality challenge).

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## Current Policies/Actions

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### Provincial/Regional

- The ambient air quality monitoring network in Edmonton is operated jointly by the Province and various industrial approval holders. Three stations in Edmonton are configured to calculate the provincial air quality index (AQI) and are directly managed by Alberta Environment. A fourth measures only particulate matter concentrations. Six industry-operated stations are situated around industrial areas, monitoring contaminant concentrations that are specific to the industrial operators.
- The Ozone Management Plan (called for by Alberta Environment ) was accepted by the Province in 2009. It contains 19 recommendations.
- In 2009, the Alberta Capital Airshed Alliance initiated an evaluation of the existing ambient air monitoring network within the airshed. The goal includes plans to develop a state-of-the-art air monitoring network.

### City of Edmonton

- Fuel Sense training is mandatory for employees that drive on a regular basis for the City.
- The City has adopted anti-idling policies. Audits conducted in 2009 in Edmonton Transit revealed high levels of compliance.
- The City conducts opacity tests on its conventional bus fleet. In 2009, one bus out of 211 exceeded the criterion.



- Normal fleet replacement over the next 15 years will result in an 80% reduction in NOx and a 95% reduction in particulate matter (PM2.5) from the City's fleet of buses/vehicles. In 2009 the City retired 47 municipal fleet vehicles and 48 older buses, replacing them with lower emitting vehicles/buses
- The City's Ambient Air Odour Monitoring Program provides detailed analysis of calls originating in the Gold Bar Industrial Area. 278 calls were registered in 2009.
- As of 2010, the City uses water-borne paint for traffic line stripping; not volatile organic compounds.
- The City has adopted an integrated approach to urban and transportation planning that will reduce dependency on the private automobile.
- The Way We Move emphasizes the use of roads for transportation of goods and LRT/Transit/Active Transportation network as the primary means of moving people.
- *Be Idle Free: A Minute or Less is Best* is a new City program encouraging Edmonton motorists to turn off their car's engine if they idle for more than 1 minute, except in traffic.

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## Goal/Direction/Policies/Initiatives

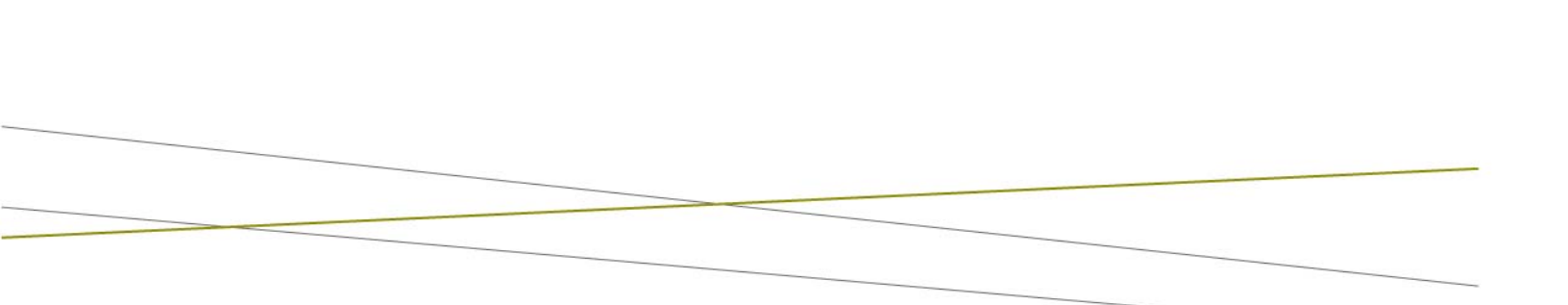
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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers.

### **Goal: Edmonton's air quality supports high standards of human and ecosystem health.**

**Suggested Direction:** Minimal impacts from point source emissions, area source emissions and transportation source emissions.

- **Possible Policy: Reduce emissions from transportation source emissions.**
  - **Possible Action:** Improve air quality through more efficient transit (rail, light rail, streetcars, subways, trolley).
  - **Possible Action:** Establish vehicle inspection program/clinics for older or propane fuelled vehicles.
  - **Possible Action:** Implement congestion zone charges in highly congested areas.
  - **Possible Action:** Limit number of parking stalls in downtown core.
  - **Possible Action:** Increase the cost to park in downtown.
  - **Possible Action:** Implement a pedestrian mall pilot project on Jasper or Whyte Avenue.
  - **Possible Action:** Institute and enforce strict no-idling policies.
  - **Possible Action:** Improve infrastructure and incentives for low carbon transportation modes including transit, carpooling, cycling and walking.
- **Possible Policy: Reduce emissions from area source emissions.**
  - **Possible Action:** Adopt higher air emission standards for new buildings.

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- **Possible Action:** Work with the government of Alberta to amend Alberta's building code to reflect greater energy efficiency and pollution management.
  - **Possible Action:** Encourage development of more stringent air pollution regulations as well as increased enforcement.
  - **Possible Action:** Encourage a shift to electricity generated from renewable sources of energy including wind, solar, geothermal and biomass.
  - **Possible Policy: Reduce emissions from point source emissions.**
  - **Possible Policy: Actively monitor and report ambient air quality**
    - **Possible Action:** Encourage organizations like Strathcona Industrial Association to provide ambient air quality data in an open and transparent manner.
    - **Possible Action:** Document at a community or neighbourhood level general emissions sources (residential, light industrial, transportation, rail yards etc. Then deploy a distributed ambient air quality monitoring network to document impacts from these sources.

**Suggested Direction:** Lifestyles of Edmontonians contribute to clean ambient air.

- **Possible Policy:** Promote a community culture that embraces clean ambient air.
- **Possible Policy:** Facilitate community efforts that help to achieve clean ambient air.

# Biodiversity Challenge

**Challenge Statement (possible scenario):** Over the next 30 years, the loss of biodiversity and related ecosystem services will seriously affect Edmonton's wellbeing (e.g., loss through habitat destruction, degradation, fragmentation and/or climate change).

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## Overview of Current Conditions

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### Natural Areas

- Priority natural areas comprise 8.3% (5783 ha) of Edmonton's area. Of this, only 3715 ha are secured (i.e., protected from development). Most of this protected area is in the river valley and ravines (3336 ha), with only 379 ha of tablelands protected.
- Approximately ¼ of the city is within a 5 minute walk of a secured natural area, almost ½ within a 10 minute walk. Areas greater than a 20 minute walk are generally industrial areas.
- If we lose 20% of these species by 2050, as some have predicted our world will change dramatically. This would mark our era as the 6<sup>th</sup> major extinction episode in the 3.5 billion year history of the Earth, and with those species we'll also irrevocably lose many of the ecological processes on which our own lives depend (Cassady St. Clair, Discussion Paper 8).
- In 2008, Edmonton's Ecological Footprint (EF) of 8.56 gha/capita was 4.1 times greater than the planet Earth's 2.1 gha of biocapacity per person (2005) currently available on the planet and 3.2 times greater than the world's average EF of 2.7 gha/capita (2005). The world's population, as a whole, is already in a significant ecological deficit with an EF 'overshoot' of 28.5% above the earth's biocapacity. (Anielski, Paper 12):

### Compliance with Regulatory Requirements

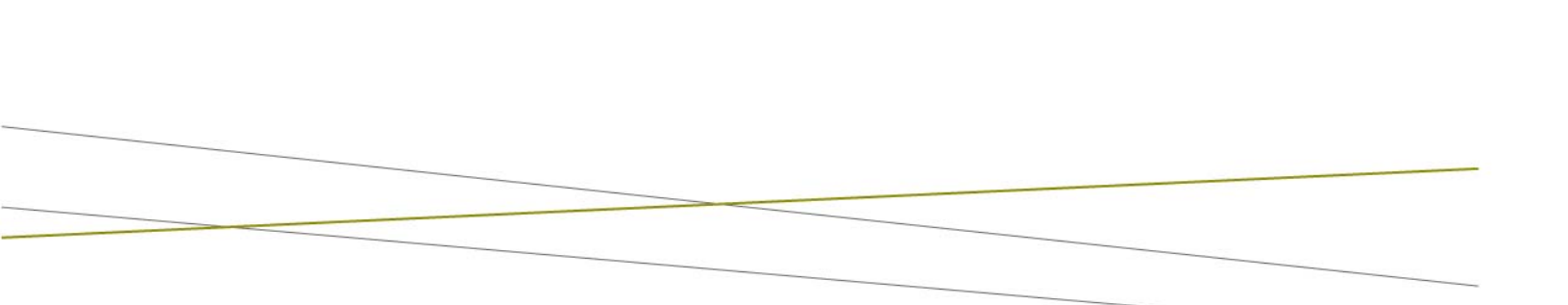
- Over the past 5 years the City has not received warning letters, environmental protection orders, administrative penalties or prosecutions from Alberta Environment or Environment Canada.

### Urban Development

- In 2009, housing stock density was 8.1 units per hectare, up from 7.9 in 2008.
- In 2009, population density was 18.57 people per hectare, pretty much unchanged from 18.59 in 2003.
- In 2009, 5.1% of new housing was built in mature areas, downtown and premium transit locations (i.e., 94.9% was built in the suburbs).

### Transportation

- In 2009, transit ridership averaged 87.54 rides per Edmontonian, down slightly from 2008.

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- In 2009, there were 0.59 vehicles registered per Edmontonian, down slightly from 0.60 in 2008.

### **Pesticides**

- In 2009, City operations recorded their lowest use of pesticides in 17 years.

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## **Current Policies/Actions**

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### **Province**

- The province is currently reviewing the planning section of the MGA and will likely introduce a new Provincial Wetland Policy in 2010. Positive changes will give municipalities broader authority to protect nature.
- Combination fertilizer-herbicide products were removed from the Alberta marketplace in January 2010.

### **City of Edmonton**

- In 2009 an additional 110 ha of natural areas was secured (compared to the target of 82 ha/year) and 100 ha of priority natural area were lost.
- City Council approved borrowing of \$20 million in 2009 to secure a number of large natural areas (far more than any other Canadian city).
- In new neighbourhoods at least one natural area is conserved as part of the City park system.
- The new ecological network model in new neighbourhoods results in the linking of open spaces including natural areas, constructed wetlands, park sites, school sites and linear rights of way.
- Other recent biodiversity enhancing initiatives include: ICLEI World Congress, Urban Nature Forum, Natural Areas Borrowing Initiative, Natural Areas Acquisition Strategy, Biodiversity Action Plan, Master Naturalist Program, etc.
- The Way We Grow has set a target for 25% of new housing to be in mature areas, downtown and premium transit locations.
- The Way We Grow (Edmonton's municipal development plan) was recently approved. It contains principles for sustainable land use and development and a growth coordination strategy.
- The Way We move was approved by City Council in 2009, emphasizing use of roads for goods movement and the use of transit for moving people.
- The LRT Network Plan would see LRT service expand into a network of multiple lines radiating from the city core to all sectors of Edmonton with potential for connections into the Capital Region.
- The City launched a long-term fuel station renewal plan in 2007 (for City operations) to meet its fuelling needs and address environmental issues associated with underground storage tanks. New infrastructure meets the highest of environmental standards.

- In 2009 the City developed a Sustainable Purchasing Policy. A number of green procurement procedures and toxic reduction initiatives are happening in City departments.
- Various initiatives have been introduced in recent years to reduce pesticide use by City operations.

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## Goal/Direction/Policies/Initiatives

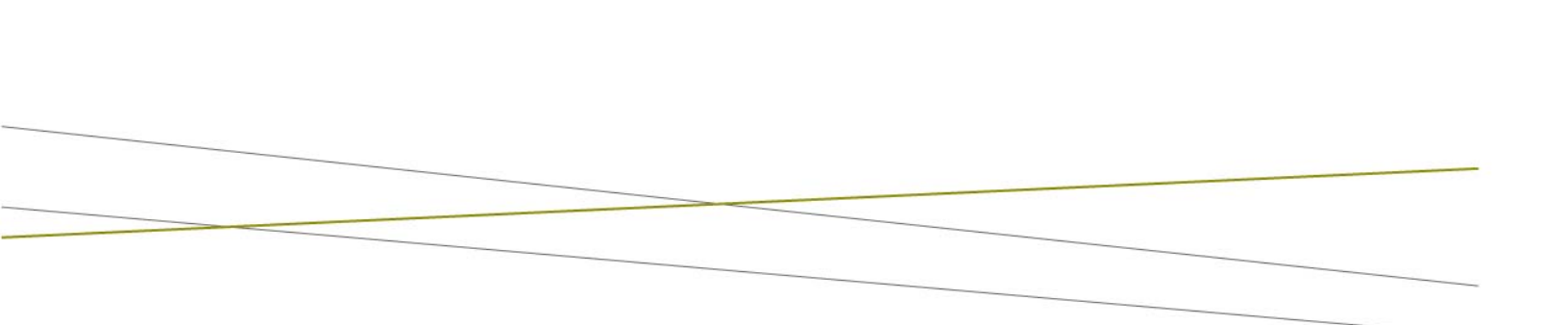
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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers

**Goal: Edmonton's biodiversity is rich and its natural ecosystems are healthy, plentiful and connected.**

**Suggested Direction:** Edmonton meets high standards of biodiversity. Its ecosystems are healthy and robust.

- **Possible Policy: Protect and preserve biodiversity and ecosystem services.**
  - **Possible Action:** Prevent sprawl through the creation of growth boundaries. Discourage urban sprawl.
  - **Possible Action:** Plan green spaces to serve as ecological corridors for migrating species and for drought tolerance. Be prepared to develop response plans for exotic species invasions.
  - **Possible Action:** Galvanize the society around the goal of retaining biodiversity through strategies that will (a) inform citizens about the consequences of their actions, (b) think about the effects on biodiversity of land use decisions, (c) seek encourage citizens to seek out local opportunities to support biodiversity, (d) increase awareness, tolerance and compassion for other species, and (e) encourage citizens to get engaged and share views (DP8/p8)
  - **Possible Action:** Increase local protected forest areas.
  - **Possible Action:** Use forest products certified by the Forest Stewardship Council.
  - **Possible Action:** Find alternative sources for forest products.
  - **Possible Action:** Support migration and retraining for communities affected by deforestation.
  - **Possible Action:** Contribute local species to the global seed vault.
  - **Possible Action:** Inventory/identify biodiversity.
  - **Possible Action:** Require proactive guidelines and bylaws that cause developers to develop in ways that improve and/or consider biodiversity and ecological functions.
  - **Possible Action:** Provide guides for residential property owners to encourage backyard and front yard wildlife.
- **Possible Policy: Promote brownfield development (taking pressure off of the development of natural areas).**



**Suggested Direction:** Lifestyles of Edmontonians contribute to biodiversity and healthy ecosystems.

- Possible Policy: Promote a community culture that embraces biodiversity.
- Possible Policy: Facilitate community efforts that help to achieve biodiversity.

# Water Quality Challenge

**Challenge Statement (possible scenario):** Over the next 30 years, the quality of Edmonton's water will be seriously affected by the growing population within the watershed and/or reduced flows in the North Saskatchewan River (i.e., climate change) that are unable to handle pollution loads.

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## Overview of Current Conditions

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- In 2008, river water downstream of Edmonton scored 85 (i.e., good quality) on Alberta Environment's River Water Quality Index. This was a slight improvement from 2007 (scored 83).
- In 2008, river water upstream of Edmonton scored 93 (i.e., good quality) on Alberta Environment's River Water Quality Index. This was less than 2007 (scored 98).
- In 2009, the Edmonton Watershed Contaminant Reduction Index scored 7.9 (Good). The index is a performance measure that compares combined annual loading data and the City's population data to the established baseline and represents the progress towards reaching the ultimate target of zero loads in the NASR. An index >7.4 is considered good.
- Upgrades to the Gold Bar Wastewater Treatment Plant in Edmonton, and recent changes to the Capital Region WWTP have contributed to improvements in downstream water quality. Current values for nutrients are in accordance with water quality objectives recently proposed (2010) by the North Saskatchewan Watershed Alliance (NSWA). They are also below CCME and Alberta surface water quality guidelines for the protection of aquatic life, and below water quality objectives outlined by the Prairie Provinces Water Board. However phosphorus levels are approaching 70% of the NSWA's objective values and increased loadings must be managed accordingly. Similarly, pathogens numbers have shown decreases in recent years, but values are still above NSWA's proposed water quality objectives and established guidelines for irrigation and recreation. Total suspended sediment values have not shown marked decreases in recent years, largely because the majority of the suspended sediment load originates from upstream non-point sources, or from City of Edmonton storm sewers. Stemming from the EMP program, recent work has shown that during precipitation and snowmelt events storm sewers are a significant source of non-point sediment loads to the NSR within the City of Edmonton's boundaries, as well as a source of other contaminants. ( Neufeld, Discussion Paper 4).

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## Current Policies/Actions

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### **North Saskatchewan Watershed Alliance (NSWA):**

- In late 2005 the North Saskatchewan Watershed Alliance began developing the Integrated Watershed Management Plan for the basin (to set land use, water quantity and water quality objectives).
- Mainstem water quality objectives for the North Saskatchewan River were set in 2009. The report and objectives are undergoing stakeholder review. Suggested policy is “no further degradation in water quality” in the NSR. Improvements in water quality are proposed in areas downstream of Edmonton (for some parameters).
- Both EPCOR and the City of Edmonton are heavily involved with water quality monitoring and management in the NSR basin, including working closely with the NSWA.
- The Government of Alberta has established several pilot projects to test its Cumulative Effects Management Framework (including the Industrial Heartland region)
- The Government of Alberta enabled cumulative effects management on a landscape level with the release of the Land-use Framework in December 2008, followed by the Alberta Land Stewardship Act in spring 2009.
- The LUF and ALSA divide the province into 7 regions and commit the province to taking a cumulative effects approach to environment management. Regional Advisory Councils will be established to set landscape objectives .

### **Other**

- End-of-pipe treatments (e.g., Kennedale wetland facility in Hermitage Park, completed in October 2009, which includes oil/grit separators, park space improvements and serves as the last barrier for treatment for urban runoff from the 7,250 ha basin.)
- Edmonton has over a dozen constructed wetlands, located in upstream reaches of urban storm basins serving local neighbourhoods primarily for flood protection.
- Low Impact Development designs are being pursued in new neighbourhoods.
- The Combined Sewer Overflow Strategy: Has been underway since 1995. Rather than discharging these combined flows to the river untreated, they will be conveyed to the Gold Bar Waste Water Treatment Plant using a new pipeline to be completed in 2011 and treated using the new built enhanced primary treatment (EPT) process. Further improvements are expected to come in 2011 with the on-site construction of Digesters #7 and #8 which are needed to manage the additional mass of solids expected from sludge in the new built EPT facility.
- Biosolids Management Plan: Expected in 2011, will identify new technology options and regional opportunities for uses of biosolids generated from the waste water treatment plant.
- Sanitary Servicing Strategy Fund: Used to finance major sanitary trunk construction. Includes a 75 year construction plan for four major sanitary trunk sewers in the City.



- Wetland Acquisition Plan: Plan was initiated in 2009 to facilitate acquisition of wetlands to help support flood protection and stormwater quality goals. Phase 1 involved a desktop review of 300 sites. Phase II will be completed by December 2010 and is a more detailed review of these sites.
- It is expected that the Government of Alberta will endorse the draft Water Quality Objectives set out in the Integrated Watershed Management Plan for the NSR. If endorsed, these objectives will require point and non-point source reductions be examined on the basis of a *no net further degradation* principle.

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## Goal/Direction/Policies/Initiatives

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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers

### **Goal: Edmonton's water quality supports high standards of human and ecosystem health.**

**Suggested Direction:** Edmonton's surface water quality is high, meeting human health and healthy ecosystem needs.

- **Possible Policy:** Adopt low impact development designs to protect the NSR and retain water where it falls.
  - **Possible Action:** Adopt Low Impact Development (LID) designs that include green roofs, rain gardens, bioswales and other water absorbent landscape features to soak away more of the rainwater that falls on urban land and thereby reduce pollution loading to the river.
  - **Possible Action:** The Renewal of the City's downtown core provides a unique opportunity to improve stormwater quality by including LID features. The Downtown can be a showcase of LID features to demonstrate the city's vision of modern urban design that integrates green infrastructure into the urban core.
  - **Possible Action:** Proposed Groat Road end -of-pipe treatment wetland facility in Government House Park.

**Suggested Direction:** Lifestyles of Edmontonians contribute to clean water.

- **Possible Policy:** Promote a community culture that embraces clean water.
- **Possible Policy:** Facilitate community efforts that help to achieve clean water.



# Extreme Weather Challenge

**Challenge Statement (possible scenario):** Over the next 30 years, Edmonton will face increasingly severe weather that will lead to property loss, productivity loss and possible loss of life (as a result of climate change).

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## Overview of Current Conditions

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- According to Barrow and Yu, global circulation models provide a range in forecasted temperature increases for Edmonton of 2-4°C by the 2020s, 4-7°C by the 2050s, and 5-11°C by the 2080s (Barrow and Yu, Figure 27, p. 49, See Figure 3) (Davidson, Discussion Paper 6).
- The most significant events of concern (associated with climate change) are extreme droughts and flooding (Lemmen et al. 2008; Weber et al. 2008).
- Increases in the number and intensity of heat waves, extreme storm events such as hail storms and tornadoes, and fires are also in Edmonton's forecast. The implications of heat waves will be particularly severe for cities due to the "heat island effect" (Koppe et al. 2004) that characterizes densely built neighbourhoods with limited green space, because concrete absorbs a greater amount of heat. High density residences that lack air-conditioning are of particular concern (Davidson, Discussion Paper 6).

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## Current Policies/Action

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## Goal/Direction/Policies/Initiatives

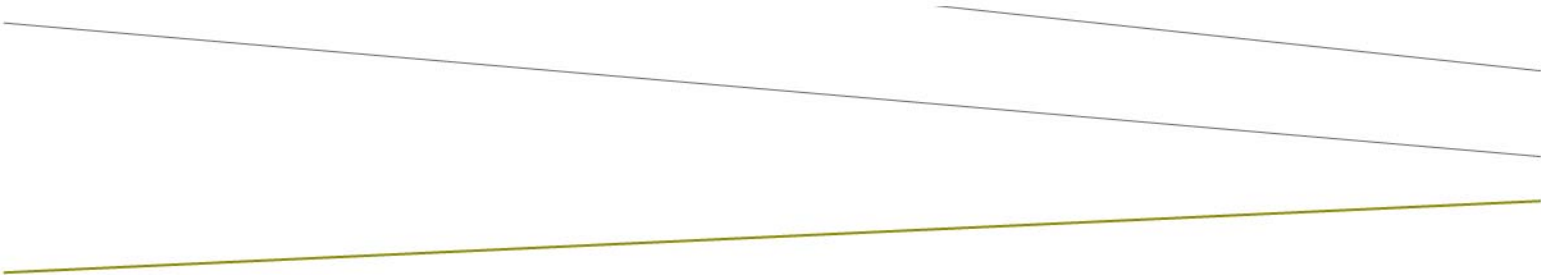
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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers.

**Goal:** Edmonton's is resilient - able to withstand extreme weather events that might occur.

**Suggested Direction:** Edmonton is prepared for extreme weather events including droughts, severe storms and floods.

- **Possible Policy: Enhance preparedness for extreme events.**
  - **Possible Action:** Review current emergency evacuation plans and shelter capacity.
  - **Possible Action:** Develop and regularly update a municipal climate change plan.

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- **Possible Action:** Develop and practice emergency response communication strategy. Clarify organizational jurisdiction.
  - **Possible Action:** Identify at-risk housing (flooding, storm damage and heat stress) and target upgrades.
  - **Possible Action:** Introduce redundancy in essential services where possible, especially electricity, water delivery, emergency services.
  - **Possible Policy:** Increase the durability of infrastructure including housing to withstand severe weather.



# Waste Management Challenge

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## Overview of Current Conditions

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- In 2009, residents produced 350 kg per person, down 7% from 2008.
- In recent years, approximately 60% of residential waste has been diverted from landfill. In 2009 the diversion rate was 41% due to shutdown of the composting facility to accommodate construction of the new Transfer facility.
- Construction of the new Waste-to-Biofuels facility will enable Edmonton to divert close to 90% of residential waste from landfill by 2013.

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## Current Policies/Action

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- Edmonton was one of the first major cities in Canada to implement a sustainable integrated waste management system, including reduction of waste at source, several collection services, diversion of waste from landfill through reuse, recycling and composting, and recover of products and energy from residual waste materials.
- Edmontonians have shown commitment to the plan through practices like recycling, using Eco Stations, backyard composting, grass cycling and reuse activities.
- The City's waste system is at the early stages of expanding its services to include non residential sector to influence diversion from landfill (i.e., 60% of Edmonton's waste is from the non-residential sector).
- Edmonton's current commitment is 60% diversion of residential waste from landfill (twice the Canadian average waste diversion rate).
- By 2013, The City expects to divert 90% of waste from landfill through the operation of a waste-to-biofuels facility (facility will process non-recyclable and non-compostable waste and convert it to methanol and ethanol).

### **Strategies for Reducing Waste Production**

- Reuse Centre and reuse education
- School tours, presentations and resources
- Volunteer programs
- Compost demonstration site and workshops

### **Key components of system focusing on recycling**

- Blue bags (single family households), blue bins (multi-family, and recycling depots for all residents)
- Eco Stations (3 existing and 1 in planning stage).
- Big Bin Events (12 community events for drop-off of large bulky items).
- Materials Recovery Facility (sorting recyclables)

- Integrated Processing and Transfer Facility
- Edmonton Composting Facility
- Electronics and Electrical Recycling
- Research and Development

#### **Other**

- Landfill gas recovery
- Monitoring of groundwater and landfill gas emissions at clover Bar Landfill and two former landfills.
- Leachate Treatment.
- ISO 14001 environmental management system

#### **Future**

- Close loop recycling (establishing businesses at the Edmonton Waste Management Centre that use recycled materials).
- Enhanced construction and demolition waste recycling.
- Recycling collection services for commercial sector
- Alternative fuel sources from waste products.

#### **Provincial**

- The Provincial waste strategy “Too good to Waste” identifies a goal of recycling and recovering 80% of Alberta’s waste and disposing 20%.
- Province is developing a leaf& yard waste strategy.
- Province is developing a construction and demolition stewardship program.
- Province is developing a packaging and printed materials stewardship program.

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### **Goal/Direction/Policies/Initiatives**

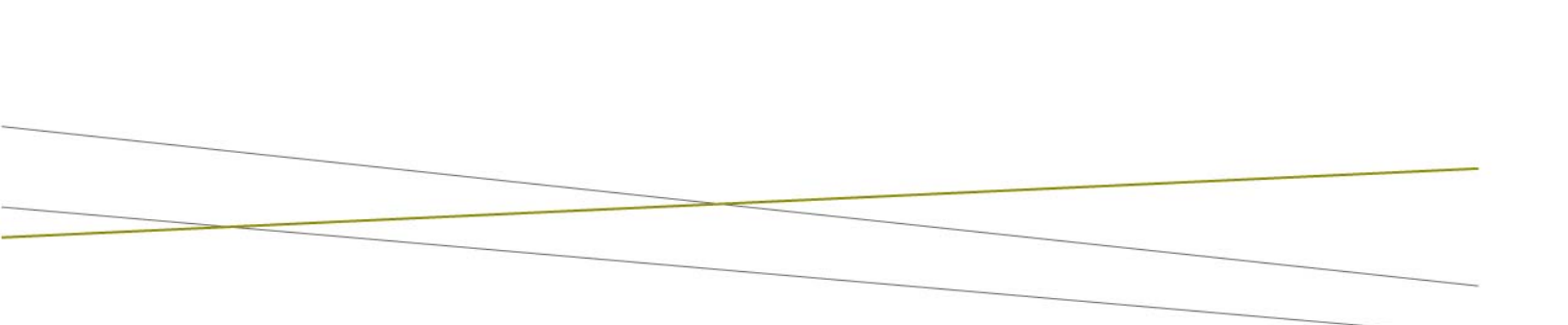
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The many ideas we heard at Workshop 1 and through The Edmonton Sustainability Papers.

**Goal: Quantities of waste produced in Edmonton and methods used to manage it are sustainable.**

**Suggested Direction:** Edmonton produces minimal amounts of residential and non residential solid waste, and what is produced is managed in a sustainable and ecologically friendly way.

- **Possible Policy: Non-residential sector:** Expand the City of Edmonton’s role in processing waste generated by the non-residential sector.
- **Possible Policy: Research & innovation:** Continue the City’s commitment to research and innovation ... in areas such as creating alternate fuels from waste and closed loop recycling.

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- **Possible Policy: Environmental Pricing Reforms:** Orient market incentives in a green direction through Environmental Pricing Reforms (EPR), re: solid waste charges.

**Suggested Direction:** Lifestyles of Edmontonians contribute to resource conservation, low levels of consumption and overall low levels of waste production.

- **Possible Policy:** Promote a community culture that embraces minimal waste production, reuse, and recycling.
- **Possible Policy:** Facilitate community efforts that help to reduce waste production reuse and recycle.