

6.3 What challenges are there around the food system and environment? Is there sufficient information to make informed decisions?

In developing *The Way We Green*, research and stakeholders have highlighted the following priority challenges around food and the environment:

1. **Information gaps:** There is an absence of reliable information on the existing local food system and the benefit of preserving agricultural land within the urban boundaries both to supply food and ecological services. There is not a clear understanding of the extent to which neighbourhood-level food production is contributing to food security. Food system ‘mapping’ for the City and region would ensure decisions are made on accurate information.
2. **Agricultural Land Preservation and Land Valuation:** Edmonton has lost 74% (17,000 Ha) of its Class 1 soils since 1982 (City of Edmonton, 2009). There are various difficulties in preserving this land for agricultural use. Appropriately valuing land within the City of Edmonton for agricultural use purposes (and possibly the ecological services it provides) is a challenge. As indicated by the Greater Edmonton Alliance in *The Way We Eat*, “Of great concern to the City of Edmonton is the financial impact to current land owners [if land was to continue to be used for agricultural purposes]”. Mechanisms need to be explored to value land appropriately and determine how prime agricultural land can be preserved³⁶.
3. **Carbon footprint and Energy:** The global food market is energy intensive which increases the ecological footprint of Edmontonians. Eating local, sustainably farmed food and growing your own food offers an opportunity to lower the ecological footprint. Food consumption makes up 21% of a typical Edmontonians Ecological Footprint which was measured to be 7.94 ha/capita in 2009 which is well beyond ‘one-planet living’ of about 2.1 ha/capita (Mark Anielski, Discussion Paper 12).
4. **Capacity building:** Edmontonians are becoming more disconnected from the food supply and many do not have the skillset to grow their own food or the desire to become involved in agri-business. It has been reported that 41% of farmers in Alberta are above the age of 55, 50% between 35 and 54, and only 9% under the age of 35 (Becky Lipton, Discussion Paper 7). In addition, there is dispersed ownership of the food agenda within the City of Edmonton organization and it is not clear if the capacity and expertise for sustainable urban farming and food systems planning is held within the organization.

Suggested Policy Direction:

That the City collaborate with the University of Alberta, the Capital Region Board, neighbouring municipalities and economic development authorities, and the Government of Alberta to support research surrounding the local food system. Also the City of Edmonton partner with the Government of Alberta and the Capital Region Board to assess mechanisms to better value and preserve urban agricultural land in Edmonton and the region and reduce the carbon footprint of the food consumed in Edmonton and the region.

6.4 What do stakeholders say about the urgency and priority of addressing shortcomings in the local food system?

In early June 2010, *The Way We Green* hosted a set of public workshops to seek feedback on a range of sustainability issues and questions. In one exercise, stakeholders were asked to consider a list of sustainability

³⁶ This is an area that is being explored by governments around the world. The use of non-market valuation techniques that assign monetary value to nonmarket goods and services is something that could be explored.

challenges that Edmonton might face in the future and indicate which of these were the most important for Edmonton to address. Food was ranked the 3rd highest challenge after energy and water supply.

Later in June another set of workshops were held. Stakeholders were asked to consider food security and what types of policies Edmonton should consider. The majority indicated that the City of Edmonton should moderately or urgently increase the pace of working on food security issues and focus its attention on preservation of agricultural land, promoting local food and reducing carbon footprint associated with the food system. In addition to food being an issue in itself, stakeholders often indicated re-localization of the food system as a policy option that must be considered when responding to energy concerns and climate change.

6.5 How should a sustainable society respond to the challenges of food security?

Throughout this project, experts and stakeholders expressed support for a more sustainable local food system in Edmonton. Similar concern was raised by *The Way We Grow*, and a City-wide Food and Agricultural Strategy may be initiated in 2011. Despite strong support for agricultural land to be preserved (for purposes of food security and other ecosystem services) many other Edmontonians believe we can rely on food imports from the region and the globe.

Several discussion paper authors stressed the need to preserve prime agricultural soils. Agricultural class soils are essentially non-renewable within a human timeline, as soil formation takes thousands of years and a complex interplay of climate, biological processes and parent geological material. Becky Lipton (Discussion Paper 7) explained:

“Take an apple and pretend it is the Earth. Now, 75% of the world is water, so cut it in quarters and throw away 3 slices. Cut the remaining quarter in half and throw one chunk away because 50% of dry land is mountains, desert etc. Now cut the 12.5% you have left in half, because that land is too steep, rocky, or wet for food production. Less than the 6% of skin you have left has to grow all of the world’s food. Only a small portion of that is Class 1, the high quality premium soils that we are blessed with here in Edmonton.”

Once the lands have been developed, it would require significant, costly reclamation to become productive land again, if ever. The city has lost 75% of its Class 1 soils since 1982. The reality is that the decisions we make today are the decisions that Edmontonians will need to live with into the future because once the agricultural land is gone, it is essentially gone forever.

Suggested Policy Direction:

Recognize that high quality premium soils currently used for agriculture are a limited and valuable resource, necessary for human sustainability. Recognize that once they are gone, they are gone forever. Consider these implications when developing agricultural lands and demonstrate that their removal will not diminish Edmonton’s long term sustainability.

6.6 What is the municipality’s role in establishing a Food Secure Edmonton?

As the Planning and Development Department indicated in its report to Executive Committee on June 16, 2010 on developing a City-wide Food and Agriculture Strategy, many city departments can play a role in developing the strategy and no one department has ownership of the food agenda. In addition, other orders of government, the region, non government agencies and communities all have roles in Edmonton’s food system.

While there are many stakeholders involved in a sustainable local food system, the City can play a key role through: land use planning, coordination and partnerships, policies and regulations, education and promotion and researching and implementing mechanisms designed to preserve agricultural land.

The City of Edmonton can play an important role in the advancement of a food security strategy in Edmonton, with the aim to establish a Food Policy Council and Food Charter. Key steps towards this Council / Charter might include:

1. Develop a stakeholder list including subject matter experts.
2. Form the Food Policy Council from the stakeholder list including subject matter experts and City representatives. Ideally the Council would include a diverse group of 10 to 12 people who would bring knowledge and expertise relating to issues connected to the development of a resilient food and agriculture system in Edmonton. Membership could include representatives from all parts of the food system (production, food processing, storage and transportation, selling and buying, eating and waste recovery) as well as individuals with expertise in the areas of public education, economic development, urban planning, landscape architecture, social planning, food security, land development, nutritional health, public health, food research, agrology, etc.³⁷
3. Develop a Governance Framework for the Food Agenda (including City Administration).
4. The Edmonton Food Policy Council could have the following functions:
 - Obtain baseline information on urban and peri-urban farms and the overall local food system.
 - Develop the City-wide Food and Agricultural Strategy in close consultation with the City, relevant landowners, and the development and agricultural communities.
 - Develop a Food Charter.
 - Provide input to City Council and City departments in the formulation of Food and Urban Agriculture principles, guidelines and policies.
 - Make recommendations to Council as to changes to other existing bylaws and City policies relevant to Food and Urban Agriculture.
 - Work with City departments to animate and engage the participation of community groups and citizens in supporting the development of a sustainable and local food system.
 - Develop a partnership model for food & agriculture initiatives
5. Develop a sustainable funding model for the organization.

Suggested Policy Direction:

That the City of Edmonton work to establish a Food Policy Council and Food Charter. (Do you agree this is the role of the municipality? Are there other stakeholder groups that are more equipped to lead this endeavour? Is there a partnership model that could be pursued?)

³⁷ This section was developed in consultation with the Greater Edmonton Alliance

Chapter 7: Air Quality

7.1 Air Quality in Edmonton

Achieving good air quality in an industrialized society is a complex challenge – requiring an understanding of the sources of emissions and the specific geographical conditions of the region.

Edmonton lies within the Alberta Capital Airshed. Adjacent to it are the Fort Airshed and the West Central Airshed. Experts suggest that as Edmonton grows from one to two million people (and beyond), new approaches will be needed to monitor air quality and manage their cumulative effects. In developing *The Way We Green*, our main focus around air was to understand:

- The quality of the air and to what extent air quality in Edmonton is being effectively monitored (i.e., is current monitoring and data analysis sufficient to understand emissions sources and determine whether air quality is protective of human health and ecosystems);
- The challenges associated with maintaining or improving the air quality in the face of future growth both in Edmonton and the surrounding region and the steps that are being taken today to mitigate those impacts; and,
- The roles and responsibilities of various groups in monitoring and managing air quality in Edmonton.

7.2 How is the air quality in Edmonton as measured today?

Edmonton's air quality, as currently measured, has improved significantly since the 1970s (largely due to improvements in vehicle technology). The number of "Good" air quality days in 2009 as measured by the provincial Air Quality Index was in the range of 96%. In general, the majority of days with poor air quality involved particulate matter and can largely be attributed to temperature inversions during the winter months.

According to Matthew Dance, *"Although Edmonton has 'good' air quality over 90% of the time, we do have an issue with two specific pollutants - Particulate Matter (PM) and Ozone (O3) – that are components of urban smog. PM is emitted by combustion from a number of sources including vehicles and wood burning (it is also a component of road dust and can be formed by atmospheric photochemical processes). Ground Level Ozone is not emitted by a source, but occurs as a result of a photochemical reaction between vehicle emissions (including oxides of nitrogen), sunlight and heat."*³⁸ Alberta Environment's PM and Ozone Assessment (2006 – 2008) indicated that the Edmonton Region had an increasing intensity of ground level ozone that required the development of an ozone management plan. In response, the region produced an Ozone Management Plan that was approved by the province for implementation in late 2009.

7.3 Is today's monitoring and data analysis sufficient?

Currently, the ambient air quality monitoring network in Edmonton is operated jointly by the provincial government and various industrial approval holders. There are three ambient air quality monitoring stations that are configured to measure air contaminants and calculate the provincial air quality index (AQI). These three stations are directly managed by Alberta Environment. Alberta Environment also operates a fourth station that measures only particulate matter (Edmonton McIntyre).

³⁸ Matthew Dance, *The State of Edmonton's Air Quality*, 2010 Edmonton Sustainability Papers, Discussion Paper 2, available at <http://www.edmonton.ca/thewaywegreen>.

In addition to the Province's stations, there are seven industry-operated stations that are situated around industrial areas in the east and west areas of the City. These seven stations monitor air quality contaminant concentrations that are specific to the provincial approvals that relate to each of the industrial operators.

The City of Edmonton has a combination of regulated and unregulated emissions sources that experts have said "are poorly understood" and given the number of stakeholders conducting monitoring the network is not currently cohesive and functioning as a whole. According to Matthew Dance (Discussion Paper 2) the situation raises many questions, including:

1. What impact do industrial emissions have on Edmonton's air quality?
2. What is the air quality in Edmonton in all of the places where monitoring does not occur? For instance, the AAQ monitor in downtown Edmonton is located away from major arteries and on the top of a building; does this adequately reflect the air that we breathe at street level?
3. What is the impact of older vehicles and single occupancy vehicles on air quality adjacent to the major roadways in Edmonton?
4. What is the impact on regional air quality when there is a facility exceedence in the industrial areas?

Suggested Policy Direction:

- *That air quality monitoring in Edmonton be expanded in accordance to the recommended 2009 Ambient Air Management Strategy of Alberta (which recommends that communities of 20,000 to 50,000 should have regional air quality monitors).*
- *That an expanded regional air quality monitoring network include the monitoring information collected by industry, analyzing how this data relates to regional air quality and public exposure.*

7.4 What challenges are there for maintaining or improving air quality in Edmonton?

There are four main challenges for maintaining and improving air quality in Edmonton:

1. Developing, implementing and maintaining an air quality monitoring network that can inform decisions on air quality, human health and ecological management programs;
2. Continuing to manage the complex interactions of regulated and non regulated point source and area emissions to maintain high air quality standards that contribute to high quality of human and ecological health in a region that is growing both in industrial emissions as well as nonregulated emissions;
3. Establishing a logical management system that is supported by legislation and policy that clearly outlines the roles and responsibilities of stakeholders around air quality monitoring and management in the region; and,
4. Ensuring Edmontonians have access to relevant information in a timely manner so that they can be aware of the relative health risks associated with current air quality.

7.5 What do stakeholders say about the urgency of these air quality challenges?

In early June, 2010, *The Way We Green* hosted a set of public workshops to seek feedback on a range of sustainability issues and questions. In one exercise, stakeholders were asked to consider a list of sustainability challenges that Edmonton might face in the future and indicate which of these were the most important for Edmonton to address. Air quality was the 5th highest ranked challenge after energy, water supply, food, and biodiversity.

Later in June another set of workshops were held. Stakeholders were asked to consider air quality and what types of policies Edmonton should consider. The majority of stakeholders (>75%) indicated that the City of Edmonton should moderately or urgently increase the pace of working on air quality issues and focus its attention on regulations, promoting technological changes and public awareness.

7.6 How should a sustainable society respond to these air quality challenges?

“The most important thing that can be done in managing Edmonton air quality is to understand in greater detail where the problems are and what their cause is” (Matthew Dance, Discussion Paper 2). It is generally true that you cannot manage what you are not effectively measuring. It is also true that in order to communicate potential risks to the population there must be confidence in the measurement that is being used to determine that risk. An effective air quality monitoring network is required for this to happen.

It is also clear that there is a limit to the amount of growth in emissions that the local airshed will be able to absorb and disperse. There must be tools in place to manage the growth in a manner that adverse cumulative effects are prevented. The Natural Step Framework provides guidance on this matter in one of its four sustainability principles that states: *In a sustainable society, nature is not subject to systematically increasing concentrations of substances extracted from the earth’s crust.* Simply put, this principle says it is not sustainable for society to be continually extracting fossil fuels from the earth’s crust, combusting them, and systematically increasing the criteria air contaminant concentrations in the earth’s atmosphere. This principle is also consistent with the provincial Cumulative Effects Management System that is currently being implemented.

Being a sustainable city means taking steps to sufficiently understand air quality in the region and reduce our pollution levels so that they do not exceed the natural capacity of the airshed to disperse them. At the same time we need to understand that we should not see the capacity of an airshed as pollute-up-to levels, as many of the criteria air contaminants cause some level of health or ecosystem risk even at very low levels (i.e. non-threshold).

7.7 How is air quality managed and regulated in Alberta?

The monitoring and management of air quality in the Edmonton region is the shared responsibility of multiple parties including Alberta Environment, various industrial approval holders, and the provincially endorsed Alberta Capital Airshed Alliance (ACAA), which is a multi-stakeholder group that provides a forum for local stakeholders to design solutions to local air quality issues. The City of Edmonton participates in various air quality management programs as an active member of the ACAA and the Strathcona Industrial Association (SIA).

A sizable body of provincial legislation/direction guides airshed planning in Alberta:

- **Environmental Protection and Enhancement Act (EPEA):** This Act promotes and supports the protection, enhancement and wide use of the environment. The Act gives the Minister power to develop

environmental objectives, standards, practices, codes of practice, guidelines and methods to meet the government's environmental goals.

- **Management frameworks currently in effect in Alberta:**

1. **Acid Deposition Management Framework:** Acid deposition results when acid forming pollutants are deposited on the earth's surface. Sulphur dioxide (SO₂) and oxides of nitrogen (NO_x) are the main acid forming pollutants. Many activities, both personal and industrial lead to the emission these compounds. In Alberta, a management framework has been developed and is based on four levels of acid deposition: pre-industrial deposition (background), current level of deposition, target load, and critical load: Each of the levels of deposition corresponds with specific management practices.
2. **Emissions Management Framework for the Alberta Electricity Sector:** This framework is aimed at continuous improvement of air emissions standards for electricity generation.
3. **Particulate Matter and Ozone Management Framework:** Smog is an air quality issue in Alberta, across Canada, and around the world. Fine particulate matter (PM_{2.5}) and Ozone (O₃) are two principal components of smog. In June, 2000, the Canadian Council of Ministers of the Environment established the Canada-wide Standards for Fine Particulate Matter and Ozone. The CASA (Clean Air Strategic Alliance) Particulate Matter and Ozone Management Framework is Alberta's commitment to achieve Canada-wide Standard levels by the 2010 target date. Under the Particulate Matter and Ozone Management Framework, Alberta Environment performs annual assessments of PM_{2.5} and ozone.
4. **Clean Air Strategy for Alberta:** Alberta's first Clean Air Strategy was published in 1991 and since then, many initiatives and programs have led to improved air quality in the province. Alberta Environment, on behalf of the Government of Alberta, is accountable for air quality in the province; however, the province supports a partnership model, based on consensus decision making for local stakeholders to develop local solutions to local air quality issues (i.e. the airshed model).

Airsheds were born out of the original 1991 Clean Air Strategy and continue to be the primary model in place in Alberta to monitor air quality and act on local air quality issues. The Clean Air Strategic Alliance submitted a report to the provincial government in 2009 that will be used to inform the update of the 1991 Clean Air Strategy. The report outlined 14 goals, one of which was for municipal planning and design to incorporate sound air quality management principles.

An ancillary document was produced in support of the Clean Air Strategy, the Ambient Monitoring Strategic Plan (which is also in the process of being updated and a CASA report has been submitted to the province). This document outlines strategies to ensure effective air quality monitoring.

5. **Land-use Framework:** LUF defines the concept of Regional Strategies which requires the development of seven land-use plans based on seven land-use regions. It recognizes the limitations of Alberta's current regulatory system in assessing impacts of new developments on a project-by-project basis (as legislated under EPEA) and identifies a need for a cumulative effects management approach to address the impacts on both existing and new human activities taking place over time.
6. **Cumulative Effects Management Strategy (CEMS):** As stated in LUF, this strategy is about anticipating future pressures and establishing limits on the effects of development on the air, land, water and biodiversity of the affected region. Threshold-based ecosystem management at the local level will be required to establish those limits. The setting of thresholds for ecosystems in regional plans will be supported by watershed planning and the adoption of integrated watershed management plans that include objectives for water quality, in-stream flow needs and healthy aquatic ecosystems.

7. **Alberta Land Stewardship Act (ALSA):** The purpose of this Act is to enable the Government of Alberta to identify economic, social and environmental objectives, and enable sustainable development by taking into account and responding to the cumulative effects of human activity and other impacts. It makes regional plans binding on Albertans. ALSA transforms Alberta’s planning process, allowing watershed plans to be inserted into regional plans.
8. **Municipal Government Act (MGA):** The Act defines the broad powers or general jurisdiction of municipalities, requiring every municipality to have a land-use bylaw, and larger municipalities to adopt a Municipal Development Plan. Municipalities will have to align their plans, bylaws and decisions with regional plans. The MGA does not specifically outline a municipality’s responsibility around air quality management.

7.8 What is the Clean Air Strategic Alliance, what is the Alberta Capital Airshed Alliance, and why is Edmonton’s involvement in these organizations so important?

The Clean Air Strategic Alliance (CASA) is a multi-stakeholder partnership, composed of representatives selected by industry, government and non-government organizations, which recommends strategies to assess and improve air quality in Alberta. A City of Edmonton Councillor is currently representing the municipal sector on the Board of Directors of CASA. Airshed zones, of which the Alberta Capital Airshed Alliance (ACAA) is one, are local organizations that enable stakeholders in a shared geographical area to identify air quality concerns and implement suitable management solutions. In the Business Plan for 2003-2006, Alberta Environment restates that it “support(s) development of a comprehensive network of airshed alliances.”

Recognizing the importance of addressing urban air quality, a group of stakeholders (including the City of Edmonton) came together to form an airshed in the part of the Edmonton CMA not yet served by an airshed. This led to the formation of the ACAA in 2006 through the commitment of a number of key stakeholders in the Edmonton area. Since that time the organization has grown and completed a significant piece of work: an ozone management plan for the Edmonton CMA.

The zone approach to managing air quality in Alberta was first proposed in the 1991 Clean Air Strategy, and the primary objective of the Zone Air Quality Management System (CASA, 2003) was to “establish a new approach for dealing with identified air quality problems in specific zones throughout Alberta.” The first formal use of airshed zones for this purpose didn’t appear until 2003 with the CASA consensus recommendations included in the Particulate Matter and Ozone Management Framework (CASA, 2003). The City of Edmonton participated in the development of the ozone management plan in conjunction with the ACAA and continues to be active in the airshed as it sits on its Board of Directors.

The business plan of the ACAA has the following goals:

1. Ensure comprehensive Air Quality Management in the region
2. Implement a program to measure , monitor and collect scientifically defensible data related to ACAA regional air quality
3. Provide comprehensive and timely air quality information and reporting that is transparent, high quality and accessible.

Suggested Policy Direction:

- *That the City work actively within the Alberta Capital Airshed Alliance to achieve the City’s air quality objectives.*

(The roles and responsibilities associated with air quality management are evolving as the province implements the Land Use Framework and the Cumulative Effects Management System. Through an established provincial partnership model, the City of Edmonton is in a position to work closely with the regional body (i.e. the Alberta Capital Airshed Alliance provided the forum for local stakeholders to develop local solutions to air quality issues).

Chapter 8: Biodiversity / Healthy Ecosystems

8.1 What is “biodiversity”?

Key Definitions:

- Biodiversity: *The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.* (UN Convention on Biological Diversity)
- Ecosystem: *A dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit.*
- Ecosystem Services: *The benefits people receive from ecosystems.*

In her discussion paper, Colleen Cassady St. Clair explained “biodiversity is a comprehensive concept, encompassing every form of life on Earth and all of the ecological processes associated with life.”³⁹

8.2 Why is biodiversity important?

*Interdependence between the human species and ecosystems is at the basis of human survival. So closely is biodiversity intertwined with human needs, that it can be considered an element of basic national security and future global prosperity. Yet, around the world, the number of species, the genetic variations within them, and the range of habitats are being affected by human activity. Overpopulation, deforestation, pollution – of the air, water and soil – along with global warming are exerting a cumulative effect on biodiversity. As species disappear, the world’s ecosystems are become less stable and more fragile. Living within and sustainably developing the biodiversity around us is central to human existence.*⁴⁰

Biodiversity delivers ecosystem services that are sometimes grouped into four categories: (1) Provisioning (goods obtained from ecosystems such as food, fresh water, timber and fibre), (2) Regulating (benefits obtained from natural processes such as climate, disease, erosion, water flows and pollination), (3) Cultural (non-material benefits obtained from ecosystems such as recreation, spiritual values and aesthetic enjoyment), and (4) Supporting natural processes such as nutrient recycling and primary production that maintain all other ecosystem services. Many scientists think that ecosystem services extend beyond the ones mentioned here, including ones that we have yet to discover, understand and appreciate.

8.3 What are Edmonton’s biodiversity challenges? What are the challenges from beyond our borders?

Colleen Cassady St. Clair’s discussion paper commented on a number of biodiversity challenges facing Edmonton:

- *Between 2000 and 2007, 31% of its designated natural areas were permanently lost to development. This rate of loss exceeds the rate at which other natural areas have been protected at a ratio of 5:2.*

³⁹ Colleen Cassady St. Clair, *Urban Biodiversity – Why it matters and how to protect it*, 2010 Edmonton Sustainability Papers, Discussion Paper 8, available at <http://www.edmonton.ca/thewaywegreen>.

⁴⁰ From the Website of The National Round Table On the Environment and the Economy, August 30, 2010.

- *Natural areas outside the river valley and ravines, the so-called tablelands, are most at risk. Only 2.3% of the protected areas in Edmonton fall into this category.*
- *Wetlands are also at considerable risk with few protected sites and no policy of preventing net loss of wetlands, in contrast to Calgary.*
- *The most important contributor to biodiversity is the retention of natural habitat and the window is closing on Edmonton's opportunity to protect what remains.*
- *More often, potential natural habitat is degraded by procedures like mowing and pesticide application to support human activities or traditional aesthetic values. In the US, over 80% of US households apply fertilizer to their lawns and about 65% apply pesticides.*
- *In Edmonton, mowed parkland has dramatically fewer small mammals and bird species than grassland habitat that is not mowed. Additional degradation of habitat occurs passively through the spread of noxious weeds, competition with aggressive urban-exploiting species, and the insidious effects of climate change.*
- *One of the most prevalent forms of habitat degradation is seldom acknowledged; it is caused by the dissection of natural areas to support the transportation network. This problem is already prevalent in the city core, but it is rising rapidly on the fringes of the city to support the sprawl of residential neighbourhoods.*

A recent article in Science magazine (May 28, 2010, Volume 328) provided this global perspective on biodiversity loss:

*In 2002, world leaders committed, through the Convention on Biological Diversity, to achieve a significant reduction in the rate of biodiversity loss by 2010. We compiled 31 indicators to report on progress toward this target. Most indicators on the state of biodiversity (covering species' population trends, extinction risk, habitat extent and condition, and community compositions) showed declines, with no significant recent reductions in rate, whereas indicators of pressures on biodiversity (including resource consumption, invasive alien species, nitrogen pollution, overexploitation, and climate change impacts) showed increases. Despite some local successes and increasing responses, (including extent and biodiversity coverage of protected areas, sustainable forest management, policy responses to invasive alien species, and biodiversity-related aid), **the rate of biodiversity loss does not appear to be slowing.**⁴¹ (bolded for emphasis)*

While it is unclear how much biodiversity loss can be sustained on Earth before there are serious consequences for human society, there is no doubt that this trend is not sustainable. Arguably, biodiversity loss on the planet is one of the most serious challenges facing Edmontonians over the long term.

8.4 What commitments has Edmonton made to biodiversity?

The City of Edmonton's commitment to biodiversity is best exemplified by its signing of **The Durban Commitment – Local Governments for Biodiversity** in 2008. In signing this commitment, the City formally acknowledged:

- Biodiversity is increasingly under pressure with unprecedented rates of loss due to human activities including the over-consumption of natural resources;
- Increasing global trends towards urbanization are placing increased direct pressure on biodiversity at both the local area level and globally through increased resource consumption and ecological footprints;

⁴¹ Sturt H.M. Butchart et al, Global Biodiversity: Indicators of Recent Declines, Science, Volume 328, May 28, 2010.

- The impacts of climate change on biodiversity pattern and process will be significant and therefore we need to build appropriate programs to address, mitigate and adapt to these changes;
- Future sustainable development and human well-being are dependent on our ability to meet the biodiversity challenges we face;
- Ecosystem services can play an important role in poverty alleviation and as a result the consequences of biodiversity loss and ecosystem disruption are harshest for the poor;
- It is our collective responsibility to reverse the current trends of biodiversity loss; and
- Local government, which works most closely with communities and biodiversity, has a critical role and responsibility (globally, nationally and locally) to ensure that biodiversity is conserved, protected, restored and used in sustainable ways for the benefit of current and future generations.

In signing this Commitment, the City also agreed to carry out a number of actions including, but not limited to:

- Promoting, increasing and enhancing biodiversity within the City's administrative area and integrate biodiversity considerations into all aspects of our governance and development planning.
- Regularly publish *biodiversity reports* on the state of biodiversity within our administrative area and our progress in protecting biodiversity, which will stand as public record;
- Contribute towards the formulation of globally relevant local authority biodiversity good practice guidelines;
- Develop and implement a long-term local *biodiversity strategy* for our administrative area and governance practices, which will address, for example:
- The consideration of biodiversity in all aspects of local planning including, amongst other things: land-use planning, mobility planning, economic development planning, and conservation planning;

In addition to this declaration, the City has taken many tangible steps to protect/preserve/enhance natural areas and ecological networks, restore ones that are damaged, and protect wetlands and the river valley.

- Prior to endorsing the Durban Commitment In 2007, City Council passed the Natural Area Systems that lays out the City's commitment to protecting the last of our natural space and endorsed the Natural Connections Strategic Plan which lays out the City's strategy to protect nature. The implementation strategy is outlined the City's Biodiversity Action Plan.
- In 2009 City Council passed the Natural Areas Acquisition Strategy and authorized the Administration to borrow \$20 million to accelerate the purchase of natural areas before they are lost, as well as an ongoing commitment of \$1 million per year to purchase significant wetlands.
- The City of Edmonton fostered the creation of the Edmonton and Area Land Trust. A community-based non-profit company, it is designed to conserve natural areas.
- One of City Council's 3 year priority goals is to increase citizen access to ecological systems.
- The City continues to make significant advances in securing natural areas. In 2009, 110 ha were secured for a total of 3715 ha. This area represents 5.3% of Edmonton area that is secured in a natural state, relative to the target of 8%.
- The Province is currently reviewing the planning section of the Municipal Government Act and will likely introduce a new Provincial Wetland Policy in 2010. Positive changes will grant broader authority to municipalities to protect nature. (Note: As the Alberta Land Stewardship Act takes precedence over other

provincial legislation including the MGA, there will be a need to undertake a careful review of this new legislation and the implications that it will have for biodiversity protection.)

- In new neighbourhoods at least one natural area is conserved as part of the City park system, (as per the Natural Areas Systems Policy and the Natural Connections Strategic Plan that were approved in 2007).

Despite these outstanding accomplishments and the City's leadership in the field, Edmonton continues to lose natural areas faster than they are being secured.

8.5 What more can the City do to achieve its Durban Commitment – to increase biodiversity?

The City of Edmonton's commitment to "increase" biodiversity represents a sizable challenge. As cities expand outward and intensify, lands that are rich in biodiversity are developed for other uses. While the City of Edmonton has been a leader in stemming the loss of natural areas, more natural areas are lost than are protected in any given year. New tools will be needed to achieve its Durban Commitment – to actually "increase" biodiversity.

Biodiversity Offsets

Experts generally agree that the best practice for promoting biodiversity is to prevent or minimize the loss of biodiversity in the first place. Nevertheless, some losses are unavoidable, and other forms of compensation are required when these losses occur. One strategy that is commonly used around the world involves "biodiversity offsets". A biodiversity offset is "*an action undertaken to counterbalance an impact that causes a loss of biodiversity values*" (Queensland Government, Australia).

Currently, the Government of Alberta requires offsets for wetlands that are lost in Edmonton. According to this regulatory requirement, developers must restore or create wetlands elsewhere to compensate for ones lost, i.e., no net loss. While the City would prefer the offsets to be located within Edmonton, the Province often allows them in locations that are far from Edmonton. The City of Calgary has taken measures to counteract this practice, requiring full compensation for wetland losses to occur within Calgary. Some stakeholders who participated in The Way We Green project encouraged the City of Edmonton to consider a similar offset policy for Edmonton wetlands and forests.

Edmonton is also experiencing biodiversity loss (trees, shrubs, tree canopy) in its inner neighbourhoods due to intensification. As in the case of wetlands, offsets may be a useful strategy for stemming further loss of tree canopy. In jurisdictions where this approach is used, developers are required to replant/replace trees and shrubs that are lost through development. Currently, the City requires trees and shrubs to be planted in some land use zones as a condition of obtaining a development permit. However, there is no consideration given for the planting of native species. However, this practice is not universal. Some stakeholder who participated in the Way We Green project encouraged the City to apply this approach more widely to the entire development permitting process.

Suggested Policy Direction:

- *That the City use: (a) biodiversity offset strategies to replace biodiversity that is lost through developments and (b) other appropriate tools as provided for in the Alberta Land Stewardship Act.*

8.6 Would the City benefit from a more unified strategy for managing Edmonton's biodiversity?

The City's main strategies for conserving biodiversity are outlined in the Natural Connections Strategic Plan and the accompanying Biodiversity Action Plan. These plans focus principally on natural areas with some acknowledgement of the importance of biodiversity throughout the City. The City of Edmonton is the largest landowner in Edmonton and administers numerous biodiversity related activities and applications that are subject-specific, including: the Urban Forest Management Plan, Zoning Bylaw landscaping requirements, parks landscaping requirements in the Blue Book, and planting for the LRT.

While the City has developed an excellent set of policies to protect/preserve/manage natural areas, some stakeholders encouraged the expanding of this strategy to address biodiversity in its entirety with a unified strategic approach. Questions that would be addressed in such a strategy would include: Should Edmonton have more trees? Where should they be located? Should Edmonton have more ecological connectivity? What is the appropriate mix of native and non-native species? Should there be more green roofs and green walls? How can we design and build our infrastructure in ways that support ecological function?

One approach for addressing these issues would be the development of a **City-wide Integrated Biodiversity Strategy** that lays out the City's biodiversity aspirations and the detailed strategies for achieving them. A key component of this plan would be the ongoing monitoring and measurement of biodiversity throughout Edmonton, including: Are we losing or gaining trees and shrubs? Are some species showing signs of stress because of climate change? How is biodiversity being protected/enhanced/lost on both private and public lands? The introduction of this approach could lead to significant biodiversity gains for Edmonton whereby the whole could be greater than the sum of the parts.

Suggested Policy Direction:

- *That the City, in keeping with The Durban Commitment, establish, implement and maintain an overarching City-wide Integrated Biodiversity Strategy that encompasses the existing Natural Connections Strategic Plan, providing additional focus on non traditional ways of increasing biodiversity in Edmonton.*

In keeping with the need for a greater focus on biodiversity, The Way We Green will provide an umbrella strategy statement that placing increased emphasis on the following items:

- *The need for Edmonton to assign even higher priority to biodiversity: The strategy will recognize the central importance of biodiversity (locally, regionally and globally) to Edmonton's sustainability.*
- *The need to protect natural areas as anchors: The strategy will recognize the need for protected areas that serve as anchors for Edmonton's biodiversity system (taking a "no net loss" approach and a "no further loss of priority natural areas" approach). The strategy statement will also stress the importance of this approach throughout the region and beyond.*
- *The need for strong natural connections: The strategy will recognize that in isolation, individual protected areas are not self-sustaining. They need to be connected to other natural areas in the region and beyond. This requirement applies equally to protected areas in the river valley /ravines and tablelands. The strategy will recognize the need to work actively to protect, preserve and create natural connections throughout the city, region and beyond that will support high levels of biodiversity.*
- *The need for areas that surround natural areas to also be healthy, i.e. conservation planning for whole landscapes: Recognize that the health of these protected areas depends on the health of the land around them. Much can be done to improve the health of surrounding roads, parking lots, buildings, residential yards and commercial / industrial areas. Work aggressively to improve biodiversity in all parts of Edmonton, including efforts to significantly increase Edmonton's forest cover from 10% to 20%-30%.*

The need for a strong supporting management system: The strategy will stress the need for a management system to implement the existing body of biodiversity policies, previously approved by the City (as per Part 13 of this White Paper). [Expert panel member, Guy Swinnerton, stressed “It is critical that this supporting management system includes a comprehensive assessment and reporting system that monitors the on-going success of the suggested policy direction actions and ensures timely feedback in order that an effective adaptive management approach is adopted in protecting biodiversity.”]

- *The need to consider biodiversity in all of its decision making, plans, and designs.*

The main driver of this strategy is the serious loss of biodiversity that is happening globally. The strategy will call for strong local action to stop biodiversity loss (i.e., think globally, act locally) and the need for Edmonton to advocate for biodiversity protection regionally and beyond.

Chapter 9: Waste Management

9.1 *What waste management challenges/opportunities face Edmonton?*

The City of Edmonton has developed a national/international reputation for its leadership in waste management. While its success has been largely in the area of residential waste and its diversion from landfill, it is now in the early stages of expanding services to include non-residential waste (and similarly, its diversion from landfill).

Residential Waste

An estimated 40% of all waste generated in Edmonton is from the residential sector. Sixty percent of this is diverted from landfill – twice the Canadian waste diversion rate average. Edmonton's impressive diversion rate is accomplished through recycling (approximately 20%), municipal composting (approximately 35%) and an additional 5% waste reduction practiced by residents through composting, grasscycling and reuse. An even higher rate of diversion (a remarkable 90%) is expected by 2013 when the waste-to-biofuels facility becomes operational. This facility will process non-recyclable and non-compostable waste, converting it to alcohol. It will be the first municipal waste-to-biofuels facility that accepts processed mixed residential waste.

Non-residential Waste

An estimated 60% of all waste generated in Edmonton is from the non-residential sector which includes:

- Industrial, commercial and institutional waste (ICI); and,
- Construction and demolition waste (C&D).

While some ICI and C&D waste is delivered to the Edmonton Waste Management Centre (EWMC), the majority is hauled to privately owned landfills in the Capital Region, making it difficult to estimate total volume and diversion rate for Edmonton. It is estimated that approximately 10%-15% of C&D waste is currently recycled in Alberta. The latest available national data from 2006 by Environment Canada show a waste diversion rate of municipal solid waste, including residential, ICI, and C&D waste streams of 22%.

Given this situation, Edmonton's greatest waste management opportunities lie with non-residential waste, and the potential to recycle significant quantities of waste that are currently being landfilled throughout the region. The City is keenly aware of this challenge and is aggressively pursuing solutions such as the development of a commingled C&D waste recycling operation that will handle up to 50% of material generated in Edmonton. As well, City services are being expanded to include additional collection and processing of non-residential refuse and recyclables.

Similarly, the Provincial Government's waste strategy, *Too Good to Waste*, identifies a goal of recycling and recovering 80% of Alberta's waste. A provincial C&D waste reduction program will help provide incentives to reduce, reuse, and recycle more of this waste stream. This program is expected to be implemented by the Province in late 2011 or 2012. One of its key recommendations is a deposit-refund program whereby builders apply for a refund of their pre-development deposit by submitting documentation of material diverted for recycling and waste sent for disposal.

A second important opportunity involves residential waste. Although Edmonton's waste management technologies and systems have made it a leader in waste diversion from landfill, Edmontonians still continue to

generate large quantities of waste. Based on 2004 data, Albertans produce more waste per capita than any other province in Canada. According to the Conference Board of Canada (2005 data) Canada generates more municipal waste per capita annually than any of its peer countries and twice as much as Japan (who generated the least of the peer countries).

Also, according to the Conference Board of Canada, “To achieve more sustainable municipal waste management practices, the challenge will be to reduce the amount of solid waste generated, while increasing the amount of waste diverted from landfills through recycling and other initiatives in an economically feasible way.”⁴² The good news is that Edmonton has the second part of this challenge well in hand – it is and will continue to be a leader in waste diversion.

9.2 How should a sustainable society respond to this waste management challenge?

Why should Edmontonians be concerned about the increasing amount of waste they are generating, as long as it can be composted, recycled or converted to biofuels? Mainly because high levels of waste mean high levels of consumption, and all indicators tell us that Edmontonians are consuming resources at a level that is unsustainable. As noted by Discussion Paper author Laura Franceschini, *“The most significant environmental challenge facing humanity today is natural resource depletion, which contributes to all other global environmental issues. Tied into natural resource depletion is the issue of waste management, as consumption of natural resources produces large amounts of waste. Currently the footprint of humanity is larger than the global carrying capacity of the Earth, which means that we are consuming resources faster than they can be produced or processed.”*

In 1988, Edmonton collected 164,000 tonnes of residential waste. The total is about 40% higher today. While this increase is generally in line with Edmonton’s population increase, the trend is not sustainable. Continual increase in the amount of waste we generate is counter to a number of the sustainability principles in Section 2.2 of this paper, most notably Principle #10 by Richard Heinberg which states: *Population growth and/or growth in the rates of consumption of resources cannot be sustained.*

Some experts on this subject suggested that this high amount of waste was probably a combination of our own behaviour and what industry provides through packaging. It was felt that packaging represented a large percentage of the problem and that amendments to provincial and federal standards would need to address it.

Suggested Policy Direction

- *That the City develop and administer programs to encourage reduction of residential waste production per person with a goal to reduce residential waste produced in Edmonton regardless of population and economic growth.*
- *That the City work with the non-residential sectors to achieve the same waste diversion rate that will soon be achieved by Edmonton’s residential sector.*
- *That the City work to influence provincial and federal legislation and standards to reduce the amount of packaging waste.*

⁴² Laura Franceschini, Stantec Consulting Ltd, *Environmental Impacts Beyond Edmonton’s Borders – Why we should be worried about butterflies in Africa*, 2010 Edmonton Sustainability Papers, Discussion Paper 11, available at <http://www.edmonton.ca/thewaywegreen>.

Chapter 10: One Planet Living

10.1 Global Biocapacity Equity

A number of the Edmonton Sustainability Papers talked about the average Canadian's large ecological footprint. Laura Franceschini⁴³ said, *"The average Canadian has the third largest ecological footprint in the world – 7.25 hectares per person. This means that we consume a disproportionate share of the earth's resources – almost 4 times the average. We are fortunate that Canada is a vast and sparsely populated country, thus we technically have a domestic surplus of natural capital. However, this pattern is not sustainable is not equitable.* Discussion Paper author Mark Anielski expanded the discussion saying, *"In 2008, Edmonton's ecological footprint of 8.56 gha/capita was 3.2 times greater than the world's average of 2.7 gha/capita and 4.1 times greater than the planet Earth's biocapacity of 2.1 gha per person."*

Anielski also raised the question, "should we feel comfortable enjoying a healthy biocapacity surplus or feel an ethical and ecological sense responsibility to other world citizens to reduce our footprint to a one-planet lifestyle.

Clearly this is a complex and controversial topic. Even if Edmontonians were to live in a much more sustainable way, their average ecological footprint would still be much larger than the world's average, given the energy demands of a winter city. Is this a topic The Way We Green should be addressing? Should Edmonton be striving to achieve an ecological footprint that reflects a one-planet lifestyle?

Expert Panel Member, Pong Leung (Principal Advisor, The Natural Step Canada) offered his insights on growth, stating, *"I like the idea of reframing growth away from GDP, towards genuine progress indicators."* He suggested that society should consider the possibility of defining growth in terms of *the things that are most important to us ...protection, security, affection, understanding, participation, leisure, recreation, identity and freedom."*

Suggested Policy Direction:

That the City, working closely with citizens, set an ecological footprint target that represents: (a) the realities of a winter city, and (b) the tradeoffs it is prepared to make in moving toward global biocapacity equity (i.e., one planet living).

For Discussion: *Sustainability experts suggest that we need to start to look at what prosperity could look like without growth and that we need to acknowledge that promoting unlimited growth in a finite world is problematic from an environmental conservation and preservation perspective. Is this a concept that should underlie long-term environmental sustainability planning in The Way We Green?*

⁴³ Laura Franceschini, Stantec Consulting Ltd, *Environmental Impacts Beyond Edmonton's Borders – Why we should be worried about butterflies in Africa*, 2010 Edmonton Sustainability Papers, Discussion Paper 11, available at <http://www.edmonton.ca/thewaywegreen>.

Chapter 11: The Way We Green – A Regional Context

The Way We Green will focus primarily on the environmental sustainability challenges facing Edmonton and their corresponding strategies. Despite this “Edmonton” focus, The Way We Green understands that Edmonton’s environment is part of the global ecosystem and must be considered within a larger regional, provincial and global context. Think globally, act locally.

While it is beyond the jurisdiction of the City of Edmonton to control environmental matters beyond its borders, this White Paper identifies a number of areas where it is important for Edmonton to partner with stakeholders in the Alberta Capital Region and other Alberta regions to achieve objectives related to biodiversity, air quality, river ecosystem health and food security.

In recent years, a regional planning framework has been established that will allow Edmonton to promote its environmental goals to the region. The following is an overview of that framework.

Alberta Land Stewardship Act

On October 1, 2009, the *Alberta Land Stewardship Act (ALSA)* was proclaimed. The ALSA sets out a regional planning process developed to improve the management of land and natural resources. ALSA provides direction for the development of regional plans, including strategies that will need to be implemented as part of regional plans. ALSA requires that these plans account for the cumulative environmental effects that planned activities have on the land. Although municipalities have the same decision-making authority as they did before the ALSA, they will have to align their plans, bylaws and decisions with regional plans.

Land Use Framework

Prior to the ALSA being proclaimed, the province developed the Land-use Framework (LUF). The LUF “is a comprehensive approach to planning to better manage public and private lands and natural resources to achieve Alberta’s long-term economic, environmental and social goals.” There are seven regions defined under the LUF based on major watersheds; Edmonton resides in the North Saskatchewan region. LUF and the *Water for Life Action Plan* call for the completion of a management plan for the North Saskatchewan River focusing on cumulative effects. Each region will eventually need to develop a regional plan as well as sub plans.

Capital Region Board and the Capital Region Growth Plan

In April 2008, the Province of Alberta passed legislation creating the Capital Region Board (CRB), a body made up of the City of Edmonton and 24 surrounding municipalities. The CRB was tasked to create one of the first of the aforementioned sub plans. *The Capital Region Growth Plan: Growing Forward*, was submitted to the Minister of Municipal Affairs in stages beginning on April 2, 2009 and ending on December 31, 2009. The CRB was required to include four component plans in the Capital Region Growth Plan:

- A comprehensive, integrated regional land use plan that identifies priority growth areas and sets density targets;
- A regional inter-municipal network transit plan;
- A plan to coordinate geographic information services; and,

- A plan for social and market affordable housing.

The Province adopted the *Capital Region Growth Plan* by regulation effective March 31, 2010. *The Capital Region Growth Plan* sets the stage for growth in and around Edmonton and will have a direct link to Edmonton's long term environmental sustainability.

The Capital Region Growth Plan and Environmental Sustainability

The following Land Use Principles were adopted by the CRB to guide the decisions in the Capital Region Growth Plan:

1. Protect the Environment and Resources
 - a. Preserve and Protect the Environment
 - b. Preserve Agricultural Land
 - c. Protect Natural Resources
 - d. Minimize the Impact of Development on Regional Watersheds and Airsheds
 - e. Minimize the Impact of Heavy Industrial Developments
2. Minimize Regional Footprint
3. Strengthen Communities
4. Increase Transportation Choice
5. Ensure Efficient Provision of Services
6. Support Regional Economic Development

Agricultural Land

Although the growth plan does not directly deal with agricultural land, the CRB has indicated its willingness to work with the province on establishing mechanisms and approaches to preserving agricultural land. The CRB recommended that the province provide legislative provisions for the preservation of agriculture land, in the context of the Land Use Framework, by end of 2010.

Public Transit

The Inter-municipal Transit Network Plan is being promoted as improving the long-term sustainability of Alberta by aligning with the provincial Energy Strategy and policies targeted at reducing Greenhouse Gas (GHG) emissions. The plan states that a more effective, higher usage regional transit system will consume less energy, emit fewer GHGs and emit fewer pollutants.

Implementing Regional & Sub-regional Plans: Cumulative Effects Management

The Cumulative Effects Management System (CEMS) has been developed by the province to assist in implementing the regional and sub-regional plans. The CEMS defines a formal process that considers *place-based* environmental outcomes in the context of continued economic prosperity and promotion and development of liveable communities. The CEMS is intended to acknowledge the limits of local ecosystem capacity and shift away from single medium, incremental environmental management to multi-media, cumulative effects management.

Chapter 12: Principles of Resilience & their Application

Resilience is *the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks*. As explained in Section 1.3, Edmonton's resilience will be one of the main focuses in *The Way We Green*.

Previous sections of this White Paper outlined sustainability and resilience challenges Edmonton might face relative to energy, climate change, river water quality and supply, air quality, food security, and biodiversity. They also proposed policy directions aimed at making Edmonton a more sustainable and resilient city.

Without repeating these challenges and proposed policies, this section highlights some general approaches to becoming a resilient city, as proposed in one of the Edmonton Sustainability Papers: *Resilient Edmonton – How and Why*, by Craig Applegath.

12.1 Principles for Creating Capacity for Greater Resilience

Applegath suggests there are “seven key planning and design principles that apply to creating the capacity for greater resilience in cities”:

1. **Carbon neutrality:** *Clearly, we must aim not to increase the net amount of carbon dioxide or other greenhouse gases in the atmosphere. Design and planning must be predicated on low fossil fuel usage in both the construction and operation of buildings and the cities they comprise.*
2. **Redundancy of Systems and Functions:** *The downward slope of the peak oil curve, in combination with increasingly more energetic weather, means cities and their communities will need to withstand more frequent and powerful environmental stressors. This forces a need for redundancy of infrastructure systems—including electrical power, fresh water supply, fuel supply, waste-water processing and, most importantly, food supply.*
3. **Systems Diversity:** *This is important because with greater diversity comes greater ability to thrive, survive and bounce back from external stressors. In the case of cities, we will need different business types, institutions, food sources, and industries.*
4. **Systems Durability:** *In many parts of the world, global warming will increase the frequency of storms, the velocity of peak winds, and the volume and duration of precipitation. As a result, we will require more durable systems and structures that can withstand these increased stresses.*
5. **Loop Tightness:** *This is a system's ability to detect and respond to changes in its parts. The more quickly a system detects and responds to changes the greater its potential for resilience. Hence, we will need social, economic, and technical systems with tight feedback loops.*
6. **Local Self-Sufficiency:** *Cities and their communities will need a sustainable supply of goods and services including food, fuel and power, water—and basic manufacturing of clothing, building materials, and tools. In larger cities, self-sufficiency should be aggregated at the neighbourhood level.*
7. **Responsive to Natural Systems:** *This will reduce the cost of creating and maintaining technical infrastructure. It should, for example, incorporate passive solar energy into urban planning – the layout of streets and neighbourhoods – and building design.*

12.2 The Concept of “Resilience Centres”

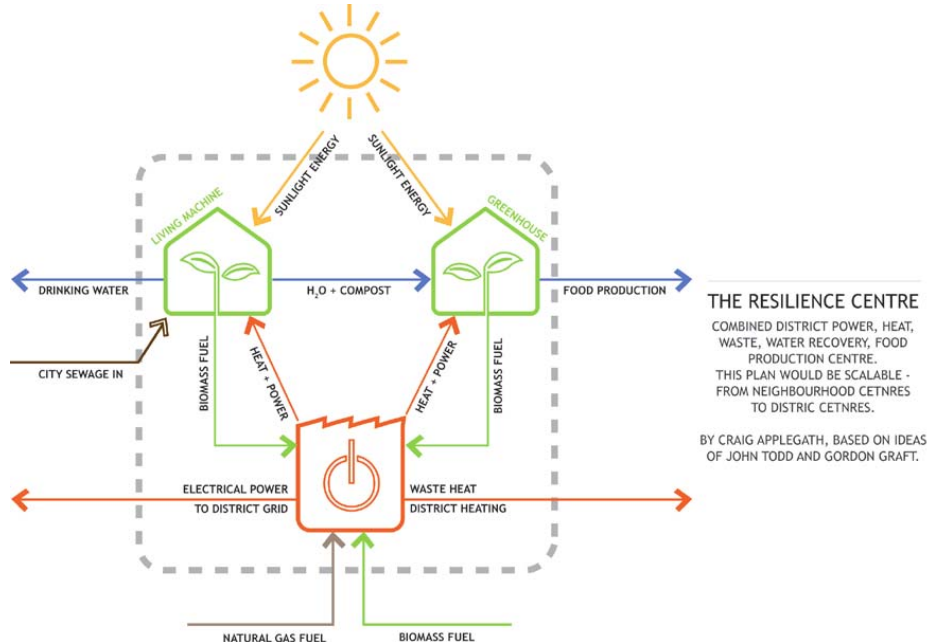
Building on these principles, Applegath undertook a Threats, Weaknesses, Opportunities and Strengths (TWOS) analysis in five areas: (1) water, (2) food, (3) energy, (4) transportation and (5) miscellaneous. From this, he sketched out how Edmonton might be able to implement some of the key opportunities using what he termed “Resilience Centres” (i.e., neighbourhoods that integrate opportunities for capacity-building in three critical systems – water, energy, and food – into a single, self-contained unit.)

Key features of Applegath’s Resilience Centres included:

- Integrated use of a district co-generation, able to burn both natural gas and biomass as fuel;
- A biological waste water reprocessing unit (often referred to as a Living Machine); and
- A hydroponic greenhouse for food production. These centers could be implemented at either a neighbourhood scale or a district scale.

Expected benefits of these centres included :

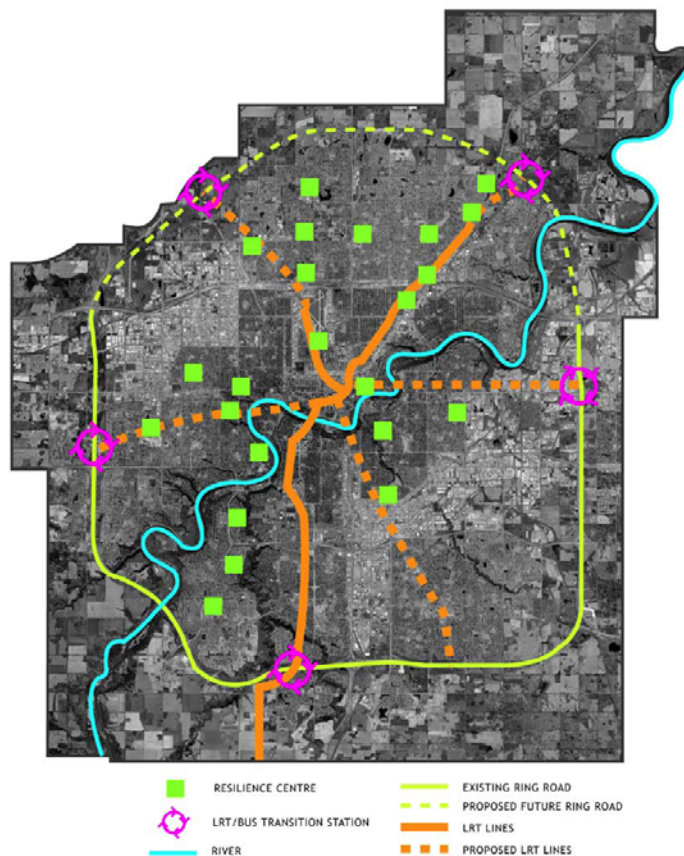
- Reprocessing and conservation of water – potable water could be extracted from waste water.
- Creation of biomass for use as fuel and as compost
- Creation of district electrical power – from either natural gas or biomass⁴⁴
- Creation of district heat – as a byproduct of the creation of electricity
- Creation of food – as a by-product of waste heat, and compost.



⁴⁴ Reviewers of this White Paper commented that the amount of biomass available to Edmonton was limited.

Applegath expanded on this model, noting, “... extensive oil refinery operations in Refinery Row in the Southeast end of Edmonton produce a tremendous amount of hot water that could be used for district heating. In fact, just next-door is Sherwood Park, is an industrial park that could be heated with this waste heat. A modified Resilience Centre could take advantage of this wasted heat, capturing it for greenhouses that could be set up for the production of food. As a discussion paper by the Pembina Institute observes, this kind of co-generation offers considerable potential for reducing emissions because it is highly efficient, loses less power from transmission, and burns biomass or natural gas, which produces as much as 50% fewer greenhouse gas emissions than coal-burning. And the emphasis on district power provides the city a chance to promptly address priority areas with more urgent problems instead of waiting for larger, more distant power plants to come online. For example, the southwest and northeast Edmonton has experienced brownouts due to insufficient power supply. Using a Resilience Centre to provide district power in the four quadrants of Edmonton would allow the city to address this problem immediately.”

Strategy Map Showing Possible Location of Resilience Centres



12.3 Urban Design Principles

Applegath's discussion on resilience with a set of Urban Design Principles which he recommended for Edmonton:

1. **Density, Diversity and Mixed-use:** *Creating resiliency and reducing the carbon footprint of urban development requires the use of space and land to be maximized. A vibrant and sufficiently densely populated urban environment, by contrast, is well-used around-the-clock, all days of the week, and during all seasons.*
2. **Pedestrians First:** *Resilient cities and neighbourhoods should prioritize walking as the preferred mode of travel, and as a defining component of a healthy quality of life. Reducing car dependency is a key objective and imperative.*
3. **Transit Supportive Planning:** *Resilient cities and neighbourhoods should be planned and developed to be transit supportive. After walking and cycling, public transit is the most sustainable mode of transportation.*
4. **Place Making:** *To increase its resiliency, Edmonton should focus energy and resources on conserving, enhancing and creating strong, vibrant places which are a significant component of the neighbourhood's structure and of the community's identity.*
5. **Complete Communities:** *Resilient neighbourhoods should provide for the needs of daily living within walking distance (a 500 m radius)⁴⁵. Resilient communities reduce their carbon footprint by ensuring people opt to walk or cycle, instead of using a car.*
6. **Integrated Natural System:** *Resilient cities and their neighbourhoods should conserve and enhance the health of natural systems and areas of environmental significance and aim to mitigate the impacts of climate change.*
7. **Integrated Technical and Industrial Systems:** *The importance of reducing negative environmental impacts of economic activities and processes, as well as reducing their dependence on fossil fuels will require us to develop more integrated and more highly efficient industrial processes and technical systems that ensure a maximum of efficiency in the use of both materials and energy resources, as well as the elimination of wasteful and potentially harmful by-products.*
8. **Local Sources:** *Resilient regions, cities and neighbourhoods should support and encourage growing, producing and manufacturing the resources they need in close proximity (200 kilometre radius).*
9. **Engaged Communities:** *The development of resilient cities and neighbourhoods will require the active participation of community members at all scales. Residents and stakeholders must be part of planning and designing their cities and their communities. They must also be part of delivering a new vision: by choosing to walk, by engaging each other, by generating awareness and by demanding higher standards.*
10. **Redundant and Durable Life Safety and Critical Infrastructure Systems:** *Resilient cities and neighbourhoods should plan and design for redundancy and durability of their life safety and critical infrastructure systems. Planning and design of these systems will aim for levels of redundancy and durability that are commensurate with the increasing environmental, social and economic stresses associated with the impacts of climate change and peak oil. Key infrastructure such as drinking water supply, electrical power, and residential heating in winter and key life safety systems such as police, fire and emergency response services ...*

⁴⁵ In its review of this White Paper, the City's Transportation Planning Branch noted that 800m (not 500m) is the distance most widely accepted by the planning profession.

11. **Resilient Operations:** *Resilient cities and neighbourhoods should develop building types and urban forms that provide for reduced serving costs and reduced environmental footprints. Urban sprawl is extremely expensive to service and maintain – the amount of land, roads, pipes and infrastructure required per capita is disproportionately large. A compact, mixed-use urban environment, by contrast is far more efficient in its demand for municipal services and infrastructure requirements.*

Suggested Policy Direction:

- *That the feasibility of Resilience Centres be formally evaluated.*
- *That Applegath’s Principles for Creating Capacity for Greater Resilience and Urban Design Principles be adopted as the basis for resilience planning in the City of Edmonton.*

Chapter 13: Implementing *The Way We Green*

13.1 Key Success Factors in Implementing *The Way We Green*

The Way We Green is a transformative plan that will take 30 years (or more) to fully implement. It will fundamentally challenge the way Edmontonians think about the environment and how they live within its limits. Implementation of this multi-faceted plan will require a deliberate, designed and sustained effort, with special consideration for the following:

- A well defined management/implementation process;
- Leadership;
- Community engagement; and,
- Statutory tools.

13.2 A Well Defined Management / Implementation Process

Building on the ISO 14001 Standard

For any strategic plan, the ultimate measure of success is the achievement of its stated goals / outcomes. In order for *The Way We Green* to be successful, it will need to do more than just describe sustainability/resilience goals and the path leading to them. It will need to establish, implement and maintain a process that will continually move Edmonton along this path; not stopping until the goals are reached. Generally, this will involve: (1) continual effort to implement the policies contained in *The Way We Green*, (2) regular checking to assess whether desired results are achieved and implementation is being carried out as intended, (3) periodic management review to evaluate the effectiveness of the strategy and the implementation process, and (4) periodic revision of the strategy and implementation process to reflect new information and lessons learned. (See Figure 3)

This cyclical process is part of many management systems including the City's ISO 14001 environmental management system (i.e., Enviso). ISO 14001 is an international standard, designed to help organizations continually improve their environmental performance. It is built on a continual improvement model developed by William Deming in the 1950s – the same model used to transform the Japanese auto industry in the 1960s and 70s.

The following are some of the key requirements of ISO 14001 that could be used in implementing *The Way We Green*:

- Edmonton's sustainability/resilience goals (i.e., ultimate end states), objectives (i.e., how these end states will be accomplished) and performance measures / targets will be documented in *The Way We Green*, as approved by City Council. Responsibility for establishing, implementing and maintaining *The Way We Green* should be formally assigned to a senior level manager or committee (such as the Environmental Policy Leadership Committee).
- Detailed plans should be developed for each of the objectives contained in *The Way We Green*. Responsibility for establishing, implementing and maintaining these plans should be formally assigned (perhaps at the General Manager or Branch Manager level). Responsibility for implementing the

various initiatives in these plans should also be specifically assigned (perhaps to Director-level staff) along with implementation timeframes and resources.

- Implementation of the various initiatives should be effectively managed / controlled according to the risks they pose. In particular, competencies related to the various initiatives should be determined and met, training and awareness needs would be determined and met, operational control procedures would be developed where needed, documents and records would be controlled, communication plans would be developed to ensure staff was appropriately informed about the plan and its progress.
- Processes should be established to ensure implementation occurs according to plan, including: (a) monitoring/measuring tools to let management know whether initiatives are being completed according to budget and schedule, (b) monitoring/measuring tools to let management know whether targets (related to objectives and goals) are being met, and (c) internal audits to let management know whether the implementation process is being carried out as intended.
- The Way We Green should undergo formal management reviews at least once a year. These reviews should begin at the branch and department level, focusing on the detailed plans developed for each of the objectives in The Way We Green. As part of these reviews, management would evaluate the achievement of goals and objectives, the overall effectiveness of individual initiatives, the need to revise the strategy based on new information, and the overall effectiveness of the implementation process. This information would be summarized in the City's annual report on the environment (i.e., Ecovision Annual Report) for: (a) review by Environmental Policy Leadership Committee, (b) approval by the Corporate Leadership Team, and (c) information to City Council. Any proposed changes in Council-approved direction would be tabled with City Council for review and approval.
- The Way We Green would be updated on an ongoing basis to reflect any approved change in strategy.
- This cyclical, continual improvement process would continue throughout the life of The Way We Green.

Figure 2 presents an implementation model for The Way We Green that is based on the ISO14001 system.

The Sustainability Toolbox

Although an ISO14001 environmental management system is an important framework for implementation of The Way We Green, other more specific tools will be required within its framework. A variety of tools that can support the implementation were evaluated as part of The Way We Green development process. The recommended tools and a short description of each are below:

- ***Triple Bottom Line Framework:*** A Triple Bottom Line (TBL) framework establishes a methodology that can be consistently applied to ensure that “environmental, social and economic impacts are taken into consideration in all aspects of local government service delivery and operation. This approach is a way of implementing sustainability practically and methodically”⁴⁶. The philosophy behind TBL is that there needs to be a full valuation and accounting for non-market and non-financial aspects of performance. The TBL framework is often challenged to consistently value non-market items such as ecosystem services; however, this can be overcome by managing, measuring and publicly reporting on the TBL conclusions. The system is one that is designed to evolve as the organization gets more sophisticated and the global financial system begins to account for externalities (e.g. costs of carbon).

⁴⁶ Discussion Paper 19

- **Life Cycle Assessment:** The ultimate goal of a life cycle assessment (LCA) is to compare a range of financial (e.g. operating and maintenance), environmental (e.g. costs of carbon) and social effects (e.g. health) that can be assigned to infrastructure construction or other relevant products and services that are being considered for purchase and then use that information to choose the least burdensome option over the life cycle of the asset. LCA is by definition a decision making tool that forces the assessor to look at long-term planning and operations. The City of Edmonton is using LCA to varying degrees throughout the organization. A consistently applied, financially viable LCA tool that can incorporate externalities is required.
- **Energy Density Mapping:** Energy Mapping provides the information necessary to provide direction to the City and inform the private sector about the potential to reduce greenhouse gas emissions and encourage the use of alternative energy systems through considerations such as the design of buildings and encouragement of more compact, mixed-use and high density communities. Recent energy mapping that has been done has also included transportation and water mapping in its analysis. Energy mapping is an essential tool to make informed decisions about urban form and how a City the size of Edmonton can make an economical transition to a more sustainable energy system.
- **Sustainability Project Evaluation Methodology:** Well defined sustainability principles (as discussed in Section 3.2) are important not just for visioning and setting high-level strategic goals but also as a means to evaluate decisions; a lens through which to look at each and every thing that the organization does. This being said, it can be a challenge to implement/operationalize principles and make sure they are consistently applied on a day to day basis.

As part of the Natural Step framework there is a process that is followed to evaluate major decisions in the context of the established sustainability principles. The sustainability evaluation “incorporates organizational learning and change methods, essential elements to move people into new ways of thinking and working together.”⁴⁷ Operationalizing the sustainability principles will help the City of Edmonton stay on course and contextualize day- to-day operations and projects with the long-term planning.

Although The Way We Green is transformational in many respects, it is unrealistic to expect the achievement of sustainability goals will occur immediately; rather, it will take systematic and consistent decision making over a long period of time. The Natural Step calls this “systematically making investments that will provide benefits in the short-term, while also retaining a long-term perspective.” In order for the City of Edmonton to achieve this operationalization of the long-term sustainability principles, an evaluation methodology is required. This may take the form of an easy to use checklist or in some circumstances it may require something more complex (e.g. a process similar to value management). More work is required to develop these tools for their application within the City of Edmonton; therefore, the development of these tools has been captured as an implementation planning action. It should be noted that the tools that have been recommended are the key corporate level tools that are believe to be required to ensure consistent application of the principles of The Way We Green; this is not to say that other important and relevant tools may not emerge as implementation plans are formalized.

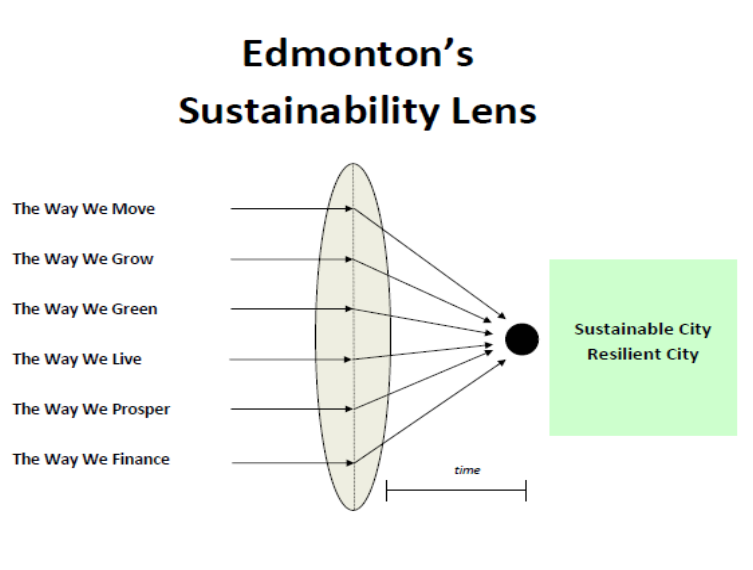
⁴⁷ The Natural Step <http://www.thenaturalstep.org/> (Accessed August 31, 2010)

Applying Sustainability Principles

All major decisions made by the City should help to make Edmonton more sustainable; not less. The Way We Green Management System (Figure 4) is a principle-based system that calls for all major decisions to be judged relative to a set of sustainability principles suggested in Section 2.2 of this Paper. According to this model, all major operating and capital decisions would be formally evaluated against these principles at some early point in the investment approval process. While this Paper does not spell out an exact procedure for applying sustainability principles, the idea is that formal written analyses would be produced by expert staff and submitted to senior decision makers for final review and approval.

This concept is conveyed graphically in Figure 3. The City’s environmental sustainability principles are represented by the lens, through which all decisions must pass. Compliance with these principles, over time, would lead to a sustainable and resilient city.

Figure 3



13.3 Leadership

Transformation is a journey that calls for leaders – Edmontonians who are eager to lead hundreds of initiatives that will make Edmonton a more sustainable and resilient city. Expert Panel member, Pong Leung (Principal Advisor, The Natural Step Canada) encouraged a process that would allow community leaders to help shape and take ownership of The Way We Green. That is precisely the purpose of this White Paper. In coming months, community leaders will be asked to read and respond to the paper, make suggestions, and identify initiatives they want to lead.

Mr. Leung also explained that in order for community leaders to embrace The Way We Green, the City of Edmonton would need to be credible in terms of its sustainability decisions and practices. *“This means demonstrable leadership commitment from Council, but also, more importantly, that every interaction with the City needs to be consistent with sustainability. This implies creating a culture of sustainability and the change in the status quo will take time.”*

In implementing The Way We Green, the City of Edmonton will actively seek out community leadership by:

- Inviting community leaders to refine the White Paper and help define the Way We Green;

- Inviting community leaders to suggest and lead sustainability initiatives in areas where they are most interested and inspired;
- Assisting/facilitating community leaders with these initiatives by providing information, advice and/or resources;
- Connecting /networking leaders to one another to foster partnerships; and,
- Profiling the success of community leaders to the larger community.

13.4 Community Engagement

Becoming a sustainable city means building a culture of sustainability at the citizen level. Sharing his thoughts on this matter, Expert Panel member Pong Leung noted, *“There seems to be a growing sentiment that in large cities it makes more sense to work at the neighbourhood level. This is consistent with the ideas of resilience centres in the White Paper as well as movements like the eco-districts movement in the Pacific Northwest.”* He also noted that community engagement would require effective, ongoing communication with citizens: *“I think it will be important to have an easily accessible (web based) system to monitor and report on progress. Ideally there would be a system that the community can easily access and monitor to understand Edmonton’s progress towards sustainability. A great example is with the Resort Municipality of Whistler’s Whistler2020 site.”*

In implementing The Way We Green, the City of Edmonton will strive to engage citizens and build a sustainability culture by:

- Supporting and encouraging the development of grass root/neighbourhood programs that promote Edmonton’s sustainability;
- Delivering education/awareness programs that help Edmontonians understand and respond to sustainability/resilience challenges; and,
- Reporting regularly to citizens on the implementation of The Way We Green.

13.5 Statutory Tools for Implementing The Way We Green

The statutory tools available to implement the policies and strategies described in this Paper are provided by the *Municipal Government Act (MGA)*. The *MGA* authorizes certain powers for Alberta municipalities. These powers provide Edmonton the ability to (among other things): regulate, tax, and license within our jurisdiction.

Regulation

The legal powers given to the City of Edmonton under the *MGA*, are broad, so as to provide Councillors the ability to respond to present and future issues within our city.⁴⁸ The safety, health and welfare of Edmontonians are inextricably linked to the health and welfare of the environment in which we live. The *MGA* provides Edmonton with the jurisdiction to pass **bylaws** for the safety, health and welfare of people and property.⁴⁹ Bylaws are powerful tools. They are regulatory laws passed by Council. They provide the ability to

⁴⁸ Section 9, *Municipal Government Act*, R.S.A. 2000, c. M-26

⁴⁹ Section 7, *Municipal Government Act*, R.S.A. 2000, c. M-26

regulate, prohibit, as well as deal with any development, activity, industry, or business.⁵⁰ Edmonton has the power to both create new bylaws and amend existing ones.

Barriers: Though bylaws are powerful tools, they are limited in their scope. A bylaw cannot conflict or supersede Federal or Provincial legislation and regulations. If there is an inconsistency between a bylaw and a Provincial or Federal enactment, the bylaw is of no effect to the extent of the inconsistency.⁵¹ What this means is that Edmonton bylaws cannot exceed requirements of Provincial or Federal regulations. The *Alberta Building Code 2006* is an example of a standard developed under Provincial legislation (*Safety Codes Act*). If a bylaw purports to regulate a matter that is regulated under the *Safety Codes Act*, the bylaw may be deemed to be inoperative.⁵²

Overcoming barriers: Although Edmonton does not have the power to regulate matters that are under the jurisdiction of Provincial and Federal enactments, the City does have the ability to influence these issues indirectly. Edmonton cannot set standards on these regulated matters, but can: 1) Set standards for matters that can influence regulated standards but which themselves are not regulated; and 2) Create general requirements that speak to regulated matters without specifying how to achieve the results.

Taxation

The *MGA* provides Edmonton the ability to levy taxes. These taxes are used to pay for municipal services. One form of taxation available to Edmonton is collecting property taxes. Property tax rates are calculated and assigned based on property assessments of either residential, non-residential, farm land and machinery and equipment. Council, by bylaw, can divide residential and non-residential assessment classes into subclasses on any basis it considers appropriate.⁵³ The tax rate for these subclasses may be different.⁵⁴

Other forms of taxation available to Edmonton are collecting business taxes and local improvement taxes. Local improvement taxes are taxes for projects that are considered to be a greater benefit to a specific area of Edmonton rather than to the whole municipality. Streetscaping is an example of a project subject to a local improvement tax.

Barriers: Edmonton is limited on the type of taxes it can implement. For example, Edmonton cannot levy taxes on goods and services (which are taxed at a federal level) or retail sales (which are taxed at a provincial level).

Overcoming Barriers: Though Edmonton is limited on what taxes it can implement, Edmonton has a great deal of flexibility in how it will administer the taxes under its control. For example, Edmonton historically imposed a business tax. However, at the end of a four year phase-out (2008-2011) the business tax revenue will be fully shifted to property taxes (decreases in business taxes will be offset by an increase in non-residential property taxes).

Licensing

Licences are documents that grant permission to do a specific activity. The *MGA* provides that Council may in a bylaw provide for a system of licences, permits or approvals. This includes: establishing fees; providing terms and conditions that may be imposed on any licence, permit or approval, the nature of the terms and

⁵⁰ Section 8, *Municipal Government Act*, R.S.A. 2000, c. M-26

⁵¹ Section 13, *Municipal Government Act*, R.S.A. 2000, c. M-26

⁵² Section 66, *Safety Codes Act*, R.S.A. 2000, c. S-1

⁵³ Section 297(2), *Municipal Government Act*, R.S.A. 2000, c. M-26

⁵⁴ Section 354(3), *Municipal Government Act*, R.S.A. 2000, c. M-26

conditions and who may impose them; and setting out the conditions that must be met before a licence, permit or approval is granted or renewed, the nature of the conditions and who may impose them.⁵⁵ Edmonton issues licences for the development, construction and use of all commercial, industrial, institutional or residential properties and buildings. Edmonton also requires all business owners to have a Business Licence.⁵⁶

Barriers: As stated previously, a bylaw cannot conflict or supersede Federal or Provincial legislation and regulations. As licensing is done through a bylaw, Edmonton cannot refuse a licence based on requirements that exceed requirements of Provincial or Federal regulations.

Overcoming Barriers: Although Edmonton cannot impose conditions on licences that exceed requirements under Provincial and Federal laws, the City does have the ability to impose conditions on matters that are not regulated by other laws. For example, the *Edmonton Business Licence Bylaw No. 13138* places conditions on After Hours Dance Clubs. These conditions require compliance with an approved noise control plan, etc. Similarly, Edmonton could place various conditions on business licences for implementing strategies in this Paper such as pollution testing of business/fleet vehicles.

Implementation Examples

Example #1: NetZero New Homes, Energy Efficient Building Stock, and Green Roofs

The implementation of these strategies requires the ability to control, to some extent, how buildings are constructed and renovated.

Barriers: The *Alberta Safety Codes Act* is the enabling legislation for various Regulations that establish Codes (such as the *Alberta Building Code 2006*). These Codes provide the minimum standards of construction. All commercial and residential construction, including new buildings, renovations, and alteration of existing structures, must follow the Codes. Edmonton does not have the jurisdiction to make construction standards that are in excess of Code requirements, such as more energy efficiency buildings. A bylaw regulating energy efficiency would be dictating matters that are regulated under the *Safety Codes Act*, and would therefore be inoperative. This is significant as zoning and municipal development plans are done by bylaw. Therefore, Edmonton cannot require higher energy efficiency standards through obvious instruments such as development approvals, building permits, or zoning laws.

Overcoming barriers: Though Edmonton does not have the jurisdiction to dictate how a building is to be constructed (as it is regulated provincially), Edmonton does have the ability to impose requirements and conditions on matters that are not regulated by other enactments. These matters can indirectly, without specifying how, influence energy efficiency. For example, Edmonton could not dictate that buildings require Green Roofs. However, Edmonton could create a bylaw for improving, beautifying and maintaining rooftops over a certain size. Such a bylaw could accomplish the same outcome (Green Roofs) without specifying how to achieve the result. By not dictating the construction aspects for the roof (which would be found in the Building Code), the bylaw would not be in conflict with Provincial legislation.

Example #2: Increase property taxes in outlying areas and decrease it in the city centre to encourage re-development and discourage sprawl

⁵⁵ Section 8(c), *Municipal Government Act*, R.S.A. 2000, c. M-26

⁵⁶ Section 4, *Edmonton Business Licence Bylaw No. 13138*: No Person shall engage in or operate a Business in the City unless the Person holds a Licence authorizing the Person to engage in or operate that Business.

Edmonton has the ability to control how properties will be taxed. Edmonton can tax certain properties at a higher rate than others. This can be accomplished by dividing residential property into subclasses, such as city centre or suburban. Edmonton can then set different tax rates for these subclasses (i.e. a lower tax rate in the city centre).

Example #3: Introducing a City Carbon Tax

Introducing a carbon tax, for example on the price of gasoline and diesel, would require the ability to tax the sale of those products.

Barriers: Municipalities do not have the ability to tax goods, services or retail sales.

Overcoming barriers: Though Edmonton could not impose an additional sales tax on the carbon content of fuels; there are means available to indirectly achieve a similar outcome. Edmonton has the power to establish fees for licences, including business licences. One possible means is a higher licensing fee for businesses such as fuel stations. Another possible method is to divide non-residential property into subclasses and create a fuel station subclass. This new subclass could then be taxed at a higher rate.

13.6 What will it cost to implement The Way We Green?

In developing this White Paper, some stakeholders suggested that the Project Team should estimate the costs of the various suggested policies, i.e., how much more will it cost (over and above what is spent today) to become this resilient and sustainable city? This section of the White Paper responds generally to that question, assuming that the following suggested policies may have the most significant financial implications:

- A more energy efficient built form (for the entire city);
- A more energy efficient building stock (city buildings and Edmonton's overall building stock);
- A Green Building Strategy for Edmonton;
- Greater use of renewable energy;
- A more distributed energy system;
- Diversification to industries that are less energy intensive;
- Requirements for buildings to be more durable, to last 200+ years;
- Leadership in testing new energy technologies;
- Purchase of green power (City operations);
- Elimination of carbon credit sales by City departments;
- Efforts to better understand and manage the health of the North Saskatchewan River watershed.
- Stormwater management strategies;
- Continued reduction / elimination of combined sewer overflows;
- Continued investment in wastewater treatment plant (capacity and new technology);
- Support and involvement in a local Food Policy Council;

- Investments in air quality monitoring, and subsequent actions that may follow based on better information and the adoption of higher standards
- Increased efforts to protect, maintain and enhance current levels of biodiversity. .

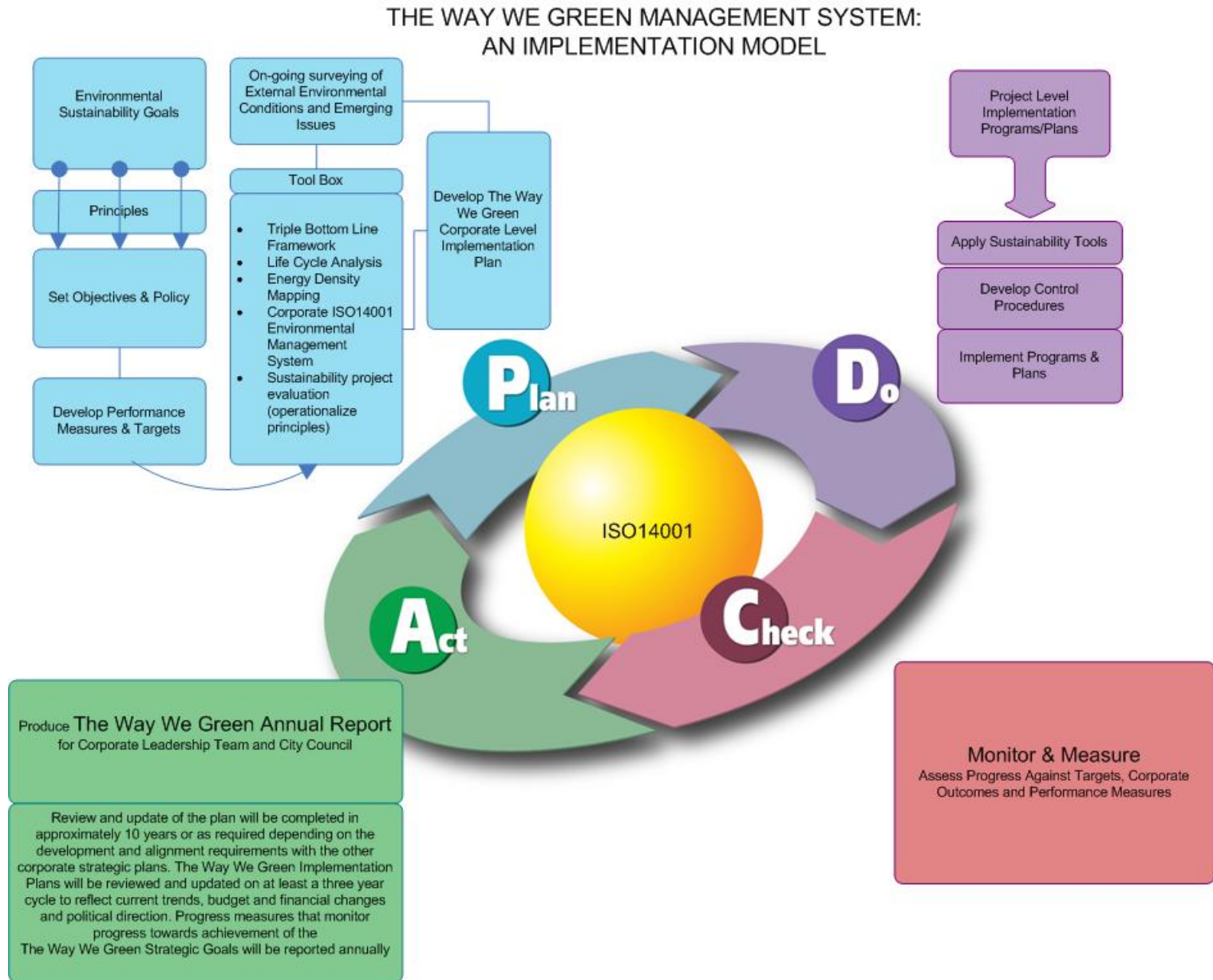
As a rule, the initial capital outlay for high-standard, green infrastructure will be greater than for infrastructure built to a less sustainable standard. However, based on limited analysis undertaken by the Office of Environment and other Canadian municipalities, it appears in many situations that the higher, green standards may be more economical when considered over the long term lifecycle of the investment. Moreover, when externalities⁵⁷ are factored into the decision, greener alternatives becomes even more attractive. The City of Edmonton’s Greenhouse Gas Management Strategy (currently under development) takes this life-cycle costing approach in analyzing and recommending actions that are most cost effective.

As explained in Section 4.3 of this Paper, communities are coming to realize that green solutions can also contribute to financially sustainable: *“By acting decisively today, cities can: (a) avoid much higher costs in the future related to building retrofits (i.e., it’s cheaper to build to the highest possible standard today and avoid costly retrofits in the future), (b) avoid investments in major transportation infrastructure (i.e., sprawl will eventually require a big investment in transportation infrastructure), (c) avoid expensive alternative energies (future energies will be expensive).”* In other words, there appears to be a strong correlation between environmental sustainability and financial sustainability.

In building a resilient and sustainable city it will be necessary to advance our decision making process beyond traditional financial thinking that place disproportionately high importance on initial outlay costs. New decision making models will need to adopt a lifecycle approach that includes consideration of externalities and an overall triple bottom line assessment (social, economic and environmental). While this may not result in the lowest capital outlay for every investment, it will lead a sustainable solution that is aligned with the City’s social, economic and environmental principles.

⁵⁷An **externality** is a cost or benefit, not transmitted through prices, incurred by a party who did not agree to the action causing the cost or benefit. For example, the costs associated with climate change are generally borne by all of society in a variety of ways, and are not reflected in the price of a litre of gasoline.

Figure 4 – The Way We Green Management System



Chapter 14: Sustainable City Benchmarks

Table 2 provides a summary of what some benchmark cities around the world are doing to be sustainable and resilient, with Edmonton comparing favourably in many of the categories. The new policies that are proposed in this discussion paper will be put Edmonton on the path to becoming one of the most sustainable cities in the world.

Criteria	Benchmark	Edmonton
Energy – City-wide Conservation	In Copenhagen, Denmark large scale cogeneration power plants collect the waste heat that is produced and distribute it into buildings throughout the city. Due to cogeneration of electricity and heat, the fuel use is 94% efficient, and now 97% of buildings in Copenhagen are heated this way.	Edmonton's efforts in this area include: <ul style="list-style-type: none"> • Construction of buildings (and major retrofits) to the LEED Silver level as well as 30% more energy efficient than the national building code. • Hybridization of the City's light duty fleet. • Incentives in the form of residential rebates; Green new home construction, energy efficient furnace and washer rebates. HomeSavers booklets on all aspects of home energy-efficiency are made available free of charge to the public. Support for commercial energy-efficiency initiatives. Education programs with schools and outreach events and public access to CO₂RE programs through the 311 hotline. • The City has started work on a green building strategy, a comprehensive City-wide guide for green, energy-efficient new building.
Energy – Peak Oil	Portland, Oregon has developed an 86 page document in response to Peak Oil called: "Descending the Oil Peak: Navigating the Transition from Oil and Natural Gas." It focuses on the issues around peak oil and suggests policies and actions to move forward.	Although Edmonton currently does not have a peak oil declaration, the policies put forward in <i>The Way We Green</i> are part of transitioning Edmonton away from fossil fuel dependence and towards renewable energy and lower consumption.
Energy – Use of Renewable	Oakland, California has over 650 solar roof installations that produce over 7,000 KW of electricity. 17% of the total electricity being used by the city is from renewable sources. The City of Calgary currently has a goal for all electricity used by City operations to come from green sources by 2012.	Edmonton's Renewable Energy Task Force is currently evaluating the opportunities, barriers and potential technical, economic, and policy solutions for the generation and use of renewable energy in Edmonton. The City's Solar Electric Pilot Project, implemented in 2010 has provided financial incentives in the form of residential and commercial rebates aimed at boosting renewable energy generating capacity in Edmonton. Both programs are now fully subscribed.
Climate Change – Adaptation	Toronto has developed a 46 page document in response to climate change called "Ahead of the Storm, Preparing Toronto for Climate Change." The report details the potential issues surrounding climate change and suggests short and long term action plans to deal with them.	Although Edmonton has no official climate change adaptation document, the policies put forward in <i>The Way We Green</i> address many of the concerns inherent in climate change adaptation. Some of these policies include: increasing green space and strengthening our food security.

Criteria	Benchmark	Edmonton
Climate Change – Mitigation	Copenhagen, Denmark has a goal to become the first carbon neutral capital city by 2025. The city has presented 50 specific initiatives that will lower their GHG emissions. Some of these include: transition to renewable energy, cogeneration facilities, more green spaces and encouraging alternative transportation. Vancouver has the lowest GHG emissions per capita at 4.6 TCO ₂ e	Edmonton's current community GHG emissions are at 23.1 TCO ₂ e per capita, over 5 times as much as Vancouver. Policies put forward in <i>The Way We Green</i> aim to lower our emissions by increasing efficiency and practices in many industries.
Water – Pollution from Waste Water	In London, England the Thames and Wandle river were both declared biologically dead, with the Wandle river even being zoned as an open sewer in the 1960s. Recent efforts to reduce pollution have restored the cleanliness and biodiversity throughout the city.	Since water quality measurements started in the 1940s, the North Saskatchewan River has become much cleaner. Strict regulations around water quality and the world class Goldbar Waste Water Treatment Plant are ensuring that the river remains clean. The city is currently upgrading combined sewers to lower the storm water overflow during high rain periods.
Water – Conservation	In Copenhagen, Denmark personal water use dropped from 174L/day in 1985 to 110L/day in 2007. This was achieved through public awareness campaigns, new policies and the installation of water meters to monitor household use.	Edmonton's current per capita water consumption is 223L/day. Although the number is much larger than that of Copenhagen, the North Saskatchewan River supplies Edmonton with much more available water and over 95% of the water we consume is treated and returned to the river.
Air Quality – Standards	Vancouver, BC maintains excellent and constantly improving air quality standards. Their clean air has been achieved through cooperation between businesses and residents through the entire Greater Vancouver area. Vancouver has adopted extremely high air quality standard put forward by the World Health Organization.	Air quality in Edmonton is considered 'good' over 96% of the time. Low population density in Edmonton has the effect of spreading any emissions but also requires people drive further causing more emissions. The large amount of green area in Edmonton creates a healthy natural lung that helps keep our air clean.
Air Quality – Monitoring	In 1994 Vancouver, BC became the first Canadian city to adopt an Air Quality Management Plan. Since then they have continued to improve and maintain high standards of air quality. An online website is available for anyone to view up to date air quality measurements for whole areas or for any specific monitoring station.	Edmonton has four air quality monitoring stations. Although our air is considered 'good' over 96% of the time, the quality of measurements still needs to improve. Current stations are located away from high traffics areas and may not accurately represent the air quality where people are breathing it in.
Biodiversity – Natural Areas	Stockholm, Sweden has green spaces covering over 40% of the inner city area. They have also conducted a large scale study to understand and catalog the biodiversity within the city.	Edmonton's river valley, at 7,400 ha, is North America's largest stretch of urban parkland, and makes up a major part of the green spaces covering 20% of the city. In 2006 Edmonton released an updated State of Natural areas report, updating and cataloging the biodiversity and conditions of all ecosystems in Edmonton.
Food Security	Vancouver has an active Food Policy Council that meets regularly and is open to the public. Initiatives so far have included the development of over 2000 community gardens as well as policies allowing citizens to raise chickens in the city.	Edmonton has been developing a food strategy as part of the Municipal Development Plan. Guided in part by the Greater Edmonton Alliance, Edmonton has released a series of policies concerning food security.

Criteria	Benchmark	Edmonton
Ecological Footprint	Although many cities have a much lower ecological footprint than Edmonton, it is important to compare Edmonton to cities with a similar climate and size. Stockholm, Sweden has an ecological footprint of 5.1 global hectares/capita. That is significantly lower than Edmonton's EF, but still nearly doubles the global average.	Edmonton's ecological footprint is estimated to be 8.56 gha/capita. This is over 3 times the global average of 2.7 gha/capita and over 4 times larger than the estimated biocapacity of earth at 2.1 gha/capita. All of the plans and policies in <i>The Way We green</i> work towards lowering our impact on the environment.
Waste – Diversion from landfill	Waste management facilities in Yorkshire, UK divert approximately 80% of the waste they receive.	Edmonton is a world leader in waste management. With our current recycling and composting facilities, over 60% of residential waste is diverted away from landfills. With the completion of the waste-to-biofuels facility finishing in 2012, we expect to divert over 90% of residential waste.
Waste – Amount Generated	Freiburg, Germany has had aggressive waste reduction targets for over a decade. Through public awareness campaigns, separate collection of recyclables and a tax on non recyclable waste; per person waste was reduced from 205Kg in 1996 down to 100Kg in 2007.	Although there is currently a small downward trend, Edmontonian's produce an average of 350Kg/person. <i>The Way We Green</i> is proposing policies and encouraging everyone to reduce their personal waste.
Environmental Management	Copenhagen, Denmark has ISO 14001 certified environmental management programs operating in 5 out of 7 municipal departments.	Edmonton has high standards for environmental management and has ISO 14001 certified programs in all relevant branches of the city.

The Office of Environment retained a consultant (who was familiar with sustainability initiatives around the world) to help identify communities that were considered to be sustainability leaders. Calgary, Copenhagen, Helsinki, Kingston (Ontario), Malmo, Minneapolis, Montreal, Newcastle, Ottawa, San Francisco, Toronto and Vancouver were short-listed for further review. The following plans were reviewed to better understand sustainability initiatives and approaches in those cities.

- Calgary: *Imagine Calgary 2006, Calgary MDP, 2009*
- Copenhagen: *Our Vision for Copenhagen 2015, 2007*
- Helsinki: *The Helsinki Action Plan for Sustainability, 2002*
- Kingston: *Sustainable Kingston, 2010*
- Malmo: *Environmental Programme for the City of Malmo, 2009-2020*
- Minneapolis: *Minneapolis GreenPrint, 2009 Report*
- Montreal: *Montreal's First Strategic Plan for Sustainable Development, Aprils 2005*
- Newcastle: *Sustainable Community Strategy, March 2010*
- Ottawa: *Getting Greener: On the Path of Sustainability, 2007*
- San Francisco: *2010-2012 Strategic Plan, 2009*
- Vancouver: *Vancouver 2020: A Bright Green Future,*

Appendix A

Suggested Goal, Objectives, Policies and Progress Measures

Energy & Climate Change

Suggested Goal 1: Edmonton's use and sources of energy are: (a) sustainable, and (b) resilient to disturbances that might occur to Edmonton's energy supply and/or distribution system.

Possible Progress/Performance Measures:

- *Edmonton's energy footprint: Reduced energy consumption in Edmonton by x% (from 2008 levels) by 20XX*
- *Per person energy footprint: Reduced per capita energy consumption in Edmonton by x% (from 2008 levels) by 20XX*
- *Reduced dependence on oil: Reduced use of oil(total) in Edmonton by x% a year*
- *Energy efficient building stock: Improve energy efficiency of existing building stock by x% by 20XX*
- *NetZero new homes: New buildings constructed in Edmonton are net-zero by 20XX*
- *Shift to renewable energy: x% of Edmonton's energy is renewable by 20XX*
- *Local generation of electricity: x% of Edmonton's electricity is generated locally*
- *% of trips made by walking / cycling / public transit*
- *Average length of trips / Average energy consumption per trip*

Suggested Objective: Edmonton's built form is designed to promote energy efficiency and minimize Edmonton's energy footprint.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 3.1.1.6:** Develop a growth coordination strategy to address timing and phasing of new residential growth in developing and planning neighbourhoods. The strategy will relate to the City's strategic goals, current and future public infrastructure investment, long term financial sustainability and the amount, location and pace of population and employment growth.
- **TWWGrow: Policy 3.2.1.1:** Ensure a combination of single family and multi-family housing development potential is available for the next 30 years.
- **TWWGrow: Policy 3.6.1.6:** Support contiguous development and infrastructure in order to accommodate growth in an orderly and economical fashion.
- **TWWGrow: Policy 3.1.1.1:** Integrate higher density development with LRT stations and transit centres.
- **TWWGrow: Policy 3.1.1.2:** Encourage a minimum of 25 percent of city-wide housing units growth to locate in the Downtown and mature neighbourhoods and around LRT stations and transit centres where infrastructure capacity supports redevelopment.

- **TWWGrow: Policy 3.2.1.5:** Develop the Edmonton City Centre Airport lands over time to create a complete and sustainable residential and business community that is transit oriented, through the provision of mixed use, medium to higher density residential, business and institutional uses.
- **TWWGrow: Objective 3.3.1:** Edmonton’s transit system becomes the primary framework for urban form.
- **TWWGrow: Policy 3.3.1.1:** Promote medium and higher density residential and employment growth around LRT stations and transit centres (see Map 5) to support and ensure the viability of transit service.
- **TWWGrow: Policy 3.3.1.7:** Consider the need for family oriented housing and the infrastructure necessary to support families with children in the preparation of TOD plans.
- **TWWGrow Objective 3.4.1:** Create a strong downtown characterized by high density, mixed-use, transit and pedestrian orientation and excellent urban design.
- **TWWGrow: Policy 3.4.1.2:** Promote the Downtown as the prime focus of Edmonton’s central growth.
- **TWWGrow Objective 3.5.1:** Establish neighbourhoods gain a greater portion of new growth, accommodating changes and growth with certainty.
- **TWWGrow: Policy 3.5.1.1:** Support redevelopment and residential infill that contribute to the livability and adaptability of established neighbourhoods (Map 1) and which are sensitive to existing development.
- **TWWGrow: Policy 3.5.1.1:** Direct the location and design of residential infill in mature neighbourhoods (Map 3) through planning and design guidelines supported by regulation.

Suggested Additional Policy Direction

- ✓ The City will evaluate and approve Area Structure Plans, Neighbourhood Structure Plans and neighbourhood redevelopment plans based on their energy implications and ability to achieve predefined energy targets.
- ✓ The City will establish development pricing strategies and taxation strategies to encourage densification and discourage outward growth.
- ✓ The City Centre Airport Development be undertaken as a model for future development in Edmonton and a catalyst for creating more market demand for inner city / mature neighbourhood living.
- ✓ The City will develop a strategy for retaining and repopulating schools in mature neighbourhoods.
- ✓ The City will develop / redevelop inner city neighbourhoods to make them a superior living experience, by creating: (a) special places that foster a sense of authentic human attachment and belonging, (b) durable buildings and communities that can last 200+ years, responding to issues of noise, fire, odours, sunlight, and need for privacy, (c) buildings that are adaptive to different uses over time, (d) beauty everywhere, (e) high quality public spaces, (f) less intrusion from automobiles, (g) natural spaces and biodiversity, (h) balance (age, demographics, housing, uses) and (i) design features that help to moderate climate.
- ✓ The City will encourage green developments by placing green development requirements on the City owned properties that it sells.

Suggested Objective: Edmonton’s building stock is energy efficient.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Objective 5.1.1:** Embrace high quality urban design throughout Edmonton.
- **TWWGrow: Policy 5.1.1.1:** Establish City expectations for high quality urban design through the preparation of city wide urban design guidelines.
- **TWWGrow: Policy 5.1.1.5:** Take a leadership role in facilitating the creation of environmentally sustainable neighbourhoods, buildings and public spaces and encourage private sector approaches to environmental sustainability.
- **TWWGrow: Policy 5.1.1.6:** Coordinate significant urban design projects and planning initiatives with the direction of the Great Neighbourhoods Initiative.
- **TWWGrow: Policy 5.1.1.8:** Encourage urban design that reflects Edmonton is a winter city, allowing residents to enjoy the city in all seasons.
- **TWWGrow: Policy 5.6.1.5:** Ensure new City owned facilities and major renovations to City owned facilities are designed and built to meet or exceed the Leadership in Energy and Environmental Design Green Building Rating System silver standard.

- **TWWGrow: Policy 3.1.1.6:** The City will develop and implement design guidelines for new neighbourhoods, which will include the following elements: ... higher density mixed-use development where an LRT station or transit centre is to be located ... the protection of natural and built heritage features within the neighbourhood to provide a physical identity or marker for the community ... multiple transportation options for residents including: walking, cycling, driving and transit ... the reduction and mitigation of the environmental impacts of new neighbourhoods ... sustainable building design.
- **TWWGrow: Policy 5.6.1.5:** Encourage new buildings and public spaces to incorporate design features that mitigate impacts on the natural and ecological environment.
- **TWWGrow: Policy 6.3.1.10:** Evaluate and adapt infrastructure standards and promote site and building design based on eco-industrial development methods and sustainable building standards.
- **TWWLive: Objective 6.2:** The City of Edmonton is an environmentally sustainable society.
- **TWWLive: Policy 6.2.10:** The COE promotes environmental best practices in urban design, construction and re-use of materials.
- **TWWLive Policy 6.2.11:** The COE promotes the use of the highest environmental standards through a civic culture of environmental planning, conservation, preservation and protection.
- **TWWGrow: Policy 3.1.1.6:** The Growth Coordination Strategy will address demand for land, housing units, and housing choice at the region, city-wide and sector level.

Suggested Additional Policy Direction

- ✓ The City will establish, implement and maintain a Green Building Strategy for Edmonton.
- ✓ The City will establish, implement and maintain world-class energy-efficiency standards for all City-owned buildings.
- ✓ The City will encourage and where appropriate require world-class energy-efficiency standards for all new buildings constructed in Edmonton (e.g., to be zero net energy by 20XX).
- ✓ The City will establish, implement, maintain and encourage programs to significantly improve the energy efficiency of Edmonton's existing building stock.
- ✓ The City will **adopt zoning regulations** that promote energy efficiency, e.g., (a) southerly orientation where possible, (b) distance-to-height ratios to prevent shading, (c) passive solar heating and natural lighting, and (d) requirements that new buildings be built "solar ready".

Suggested Objective: Edmonton is not overly reliant on fossil fuels for energy. Much of Edmonton's energy comes from renewable sources that are produced locally.

Existing Policies Promoting Sustainability (and this Objective)

- None

Suggested Additional Policy Direction

- ✓ The City recognizes Peak Oil and will respond to this risk with strategies that will reduce Edmonton's energy footprint and shorten supply chains that currently rely on inexpensive energy.
- ✓ The City will establish, implement and maintain an Energy Descent Strategy detailing how Edmonton (including City operations) will reduce its energy footprint and how it will transition to alternative energies and more efficient /effective use of existing fossil fuels (especially coal).
- ✓ The City will establish, implement and maintain a Renewable Energy Strategy for Edmonton that considers the use of wind, solar, geothermal, biomass and small-scale district co-generation stations that can use mixed fuels.
- ✓ The City will establish green zones where properties will be required to install renewable energy to offset a portion of energy demands.
- ✓ The City will create incentives for businesses and residents to install renewable power generating equipment / infrastructure.
- ✓ The City will introduce municipal feed-in tariffs.
- ✓ The City will use local improvement charges to help finance alternative energy development.
- ✓ The City will take action to electrify and eventually switch to electricity for all energy end uses in the City.

Suggested Objective: Travel in Edmonton is energy efficient, with the majority of trips made by public transit, walking and cycling.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 5.2.1.8:** Identify and encourage the creation of key pedestrian streets in each quadrant of the city to provide a focus for a walkable urban lifestyle.
- **TWWGrow: Policy 5.7.1.2:** Support the design of street systems to be easily navigated by pedestrians, cyclists and vehicles and to provide clear and direct connections between major activity areas in the community.
- **TWWGrow: Policy 5.7.1.4:** Support opportunities to reallocate existing road space for use by pedestrians, cyclists and transit service.
- **TWWMove Objective 5.1:** The City will pursue expansion of the LRT to all sectors of the city with a goal to increase transit ridership and transit mode split and spur the development of compact, urban communities. (Includes: developing the LRT as shown in Figure 5.1, developing new LRT lines that do not tie into the existing system using low floor technology, pursuing an urban style system for the existing LRT and new LRT lines, assessing/developing a central area circulation concept, providing feeder bus service to provide direct or near-direct access to the LRT for neighbourhoods surrounding LRT stations/stops, pursuing opportunities, alone or in partnership with others to provide and improve pedestrian and cycling connections between LRT stations/stops, transit centres and adjacent developments.)
- **TWWMove Objective 5.2:** The City will develop an efficient, effective, accessible and integrated bus network to serve Edmonton with connections to the Region. (Note: includes expanding the bus network, optimizing route design, improving reliability and efficiency of the services through transit priority measures, providing premium transit along high passenger corridors ... pursuing opportunities to provide and improve pedestrian and cycling connections to bus stops and transit centres.)
- **TWWMove Objective 5.4:** The City will develop Park and Ride facilities located towards the extremities of LRT lines or at key transit centres where land cannot be used for more intensive transit orientation development. (Note: This includes developing a Park and Ride Strategy, developing Park and Ride facilities in conjunction with LRT extension to attract regional commuter trips to locations where the land cannot be used for TOD, particularly with the TUC, etc.)
- **TWWMove Objective 5.5:** The City will implement essential supporting measures to enhance the viability and success of the Public transportation system. (Note: This includes: Progressing towards and working with the Capital Region to implement a regionally integrated, easily understood cashless transit fare system.)
- **TWWMove Objective 6.2:** The City will create a cycle-friendly city. (Note: This includes adopting and implementing a bicycle transportation plan ..., designing and constructing bicycle facilities in accordance to Crime Prevention Through Environmental Design Principles, and developing and reviewing best practices adapted to the Edmonton context to increase the attractiveness and safety of cycling.)
- **TWWMove Objective 6.3:** The City will create an integrated network of multi-use trail facilities. (Note: This includes developing a coordinated network of multi-use trails throughout the city; planning constructing and maintaining these trails; integrating them with LRT and transit corridors; making them safe and secure.)
- **TWWMove Objective 7.1:** The City will develop a comprehensive program to continually optimize the efficiency of the existing roadway system using traffic management and transportation supply measures. (Note: This includes developing a program to proactively identify, evaluate and design projects to optimize the operation of the roadway in key corridors and areas of congestion using traffic management and transportation supply measures; developing and implementing transit priority corridors; using transportation supply management strategies to promote increased use of travel modes other than the single occupant vehicle including reallocation of existing road space; supporting continued development of the Traffic Management Centre; etc.)
- **TWWMove Objective 7.2** The City will initiate and support comprehensive programs for Transportation Demand Management to encourage a reduction in single occupant vehicle use. (Note: This includes initiating and coordinating coherent and comprehensive programs for TDM for both the City as a corporate entity and a municipality as well as for major employers and institutions; systematically undertaking and expanding TDM pilot projects; developing measures that support walking, cycling, public transit, carpooling and tele-working.)
- **TWWMove Objective 7.3** The City will focus major roadway improvements on the efficient movement of goods, services and transit vehicles. (Note: This includes giving priority to maintaining or improving the level of service for transit and goods and services movements; focusing road capacity improvements on the Inner Ring Road and Highway Connectors; giving

diminished focus on catering to commuter vehicle traffic growth through the roadway expansion program; completing City obligations for staged construction of 4 lane arterial roadways to provide basic access to new neighbourhoods; undertaking roadway and intersection improvement projects to address safety concerns, transit priority or good and services movements...)

- **TWWMove Objective 7.4** The City will develop a parking management strategy through a combination of Bylaws and Policies to ensure the livability and economic vitality of the city and to promote appropriate land use and public transit initiatives. (Note: This includes managing on-street and on-site parking; developing land use and parking policies that manage the supply of parking provided for a development with a focus on providing only essential parking and supporting Transportation Demand Management; developing a parking policy including parking pricing strategies to discourage the use of single occupancy vehicles in appropriate locations in favour of other modes; modifying local and collector roadway designs to rationalize the roadway infrastructure space provided for on-street parking; recognizing winter city requirements within parking policies ...)
- **TWWLive: Objective 6.2:** The City of Edmonton is an environmentally sustainable society.
- **TWWLive: Policy 6.2.10:** The COE provides and promotes facilities for active transportation modes.

Suggested Additional Policy Direction

- ✓ None

Suggested Objective: Edmonton is resilient in its ability to withstand energy disturbances.

Existing Policies Promoting Sustainability (and this Objective)

- None

Suggested Additional Policy Direction

- ✓ The City will promote a system of distributed energy generation with combined heat and power, including district heating.
- ✓ The City will actively promote the concept of Resilience Centres in new and existing neighbourhoods.
- ✓ The City will require new buildings and communities to be durable; able to last 200+ years, and respond to issues of noise, fire, odours, sunlight and need for privacy,
- ✓ The City will adopt the *Applegath Principles for Creating Capacity for Greater Resilience* and *Urban Design Principles* as the basis for resilience planning in the City of Edmonton.

Suggested Objective: Edmonton is a leader in the advancement, testing and adoption of new energy technologies, i.e., an energy city.

Existing Policies Promoting Sustainability (and this Objective)

- To be discussed further with EEDC.

Suggested Additional Policy Direction

- ✓ The City will actively explore, test and (where feasible) adopt new energy technologies that will reduce City operations' dependence on fossil fuels.
- ✓ The City will work with community partners to explore, test, and (where feasible) encourage community adoption of new energy technologies that will reduce Edmonton's dependence on fossil fuels and overall energy consumption.
- ✓ The City will work to apply the Energy City concept to reduce energy consumption and diversify its economic base.

Suggested Goal 2: Edmonton is: (a) climate change neutral and (b) resilient to the disturbances that might occur as a result of climate change.

Possible Progress/Performance Measures:

- GHG emissions: Reduce GHG emissions from City operations (from 2008 levels) by x% by 2020
- GHG emissions: City operations are carbon neutral by 20XX.
- GHG emissions: Reduce community GHG emissions (from 2008 levels) by x% by 2020.
- GHG emissions: Edmonton is carbon neutral by 20XX.
- GHG emissions per person.

Suggested Objective: City operations are carbon neutral – no net contribution to increased concentrations of greenhouse gases in the atmosphere.*Existing Policies Promoting Sustainability (and this Objective)*

- None

Suggested Additional Policy Direction

- ✓ The City will purchase green power as required to meet its corporate greenhouse gas reduction targets.
- ✓ The City will not sell carbon credits from City operations (apart from legal contracts that are currently in place).
- ✓ The City will establish, implement and maintain world class energy efficiency standards for new City buildings.
- ✓ The City will establish, implement and maintain world class energy efficiency standards for City building retrofits.
- ✓ The City will establish, implement and maintain world class energy efficiency / carbon emission standards for its municipal fleet and transit.

Suggested Objective: The Edmonton community is carbon change neutral – no net contribution to increased concentrations of greenhouse gases in the atmosphere.*Existing Policies Promoting Sustainability (and this Objective)*

- None

Suggested Additional Policy Direction

- ✓ The City and community partners will establish, implement and maintain a Community Greenhouse Gas Management Plan for Edmonton.

Suggested Objective: Edmonton is prepared / adapted to all significant risks arising from climate change.*Existing Policies Promoting Sustainability (and this Objective)*

- None

Suggested Additional Policy Direction

- ✓ The City and community partners will establish, implement and maintain a climate change adaptation plan for Edmonton.

Water Quality & Supply

Suggested Goal 3: Water quality in the North Saskatchewan River is so high that human and environmental health does not suffer.

Possible Progress/Performance Measures:

- Loading to the NSR from the GBWTP
- Loading to the NSR from storm sewers
- Loading to the NSR from CSO

Suggested Objective: The ecosystems of the North Saskatchewan River watershed are healthy.

(Existing objective from The Way We Grow, Objective 7.5.2) Protect, maintain and continually enhance the water quality of the NS Watershed.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.5.1.2:** Work proactively with the Province to ensure that Crown interests in water bodies are addressed as early as possible in the planning process.
- **TWWGrow: Policy 7.5.1.3:** Use environmental reserve to protect water bodies that meet the definition of environmental reserve but are not claimed by the Province.
- **TWWGrow: Policy 7.5.2.1:** Work proactively with provincial, regional and municipal neighbours, citizens and non-profit groups, such as the River Valley Alliance, by participating in activities and supporting organizations that work to maintain the integrity of the NS Watershed.
- **TWWGrow: Policy 7.5.2.2:** Adopt and enforce regulations and guidelines that will enhance the quality of Edmonton's watershed.

Suggested Additional Policy Direction

The City will work in partnership with the North Saskatchewan Watershed Alliance and Alberta Environment to achieve the COE's goals for:

- ✓ Development, implementation and enforcement of reach-specific water quality objectives for the mainstem of the NSR;
- ✓ Effective programs to monitor and measure total loads from all point and non-point-sources to ensure water quality objectives are met;
- ✓ Development, implementation and enforcement of Instream Flow Needs (IFN) objectives in the mainstem of the NSR;
- ✓ Effective monitoring and measuring programs to make sure IFN objectives are met;
- ✓ Development, implementation and enforcement of water quality objectives for all tributaries of the NSR;
- ✓ Development of aquatic ecosystem health objectives for all water bodies and riparian areas;
- ✓ Development of programs to maintain, improve, restore and protect wetlands that are part the NSR watershed;
- ✓ Development of programs to maintain and improve riparian area health;
- ✓ Development of a range of strategies to prevent / mitigate damage to the watershed from municipal, commercial, industrial, agricultural, forestry activities;
- ✓ Establishment and achievement of fish management objectives in the NSR mainstem, tributaries and lakes; and,
- ✓ Protecting groundwater quality and quantity in the watershed.

Suggested Objective: The North Saskatchewan River and its tributaries are protected from pollution and erosion caused by storm water runoff from Edmonton's built areas.

(Existing objective from The Way We Grow, Objective 7.5.1) Mitigate impacts upon Edmonton's water resources by ensuring that new developments in Edmonton embody an exemplary standard of ecological design.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.5.1.1:** Require new developments to demonstrate that it has incorporated ecological design best-practices into the design of neighbourhoods and buildings to reduce stormwater run-off.
- **TWWGrow: Policy 7.5.1.2:** Work proactively with the Province to ensure that Crown interests in water bodies are addressed as early as possible in the planning process.
- **TWWGrow: Policy 7.5.1.3:** Use environmental reserve to protect water bodies that meet the definition of environmental reserve but are not claimed by the Province.
- **TWWGrow: Policy 7.5.3.1:** Support the best management practices and principles of Edmonton’s Stormwater Quality Control Strategy.
- **TWWGrow: Policy 7.5.3.2:** Ecological design best practices will be used in the operation and design of City owned and / managed facilities and infrastructure.

Suggested Additional Policy Direction

- ✓ The City will establish, implement and maintain a storm water management strategy that gives priority to Low Impact Development approaches over traditional storm water management approaches.
- ✓ The City will establish, implement and maintain LID guidelines for application in all developments in Edmonton.

Suggested Objective: The North Saskatchewan River and its tributaries are protected from the pollution caused by combined sewer overflow.

Existing Policies Promoting Sustainability (and this Objective)

- None

Suggested Additional Policy Direction

- ✓ The City will continue to reduce and eventually eliminate combined sewer overflows to the North Saskatchewan River.

Suggested Objective: The North Saskatchewan River and its tributaries are protected from the pollution caused by discharges from the Goldbar Wastewater Treatment Plant.

Existing Policies Promoting Sustainability (and this Objective)

- None

Suggested Additional Policy Direction

- ✓ The City will continually reduce loadings of all types from the GBWTP to meet the requirements of a healthy river ecosystem.

Suggested Goal 4: Edmonton has reliable sources of water that meet its needs.

Possible Progress/Performance Measures:

- *Amount of water taken from and not returned from the North Saskatchewan River: x% of average river flow*
- *Amount of water used per person per day: x litres/capita/day*

Existing objective from The Way We Grow, Objective 7.5.3: Water resources are conserved and used efficiently by the public, industry and the City of Edmonton.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.5.3.1:** Support the best management practices and principles of Edmonton’s Stormwater Quality Control Strategy.

- **TWWGrow: Policy 7.5.3.2:** Ecological design best practices will be used in the operation and design of City owned and / managed facilities and infrastructure.
- **TWWGrow: Policy 7.5.3.3:** Integrate indigenous vegetation, specifically low-maintenance drought tolerant species, and where feasible include edible plant species into City and private landscaping.
- **TWWGrow: Policy 7.5.3.4:** Encourage designs and standards that accommodate the exchange of waste and grey water between various businesses and industry in business and industrial areas.
- **TWWGrow: Policy 7.5.3.5:** Design, arrange and locate new infrastructure and buildings to mitigate impacts upon the water system.
- **TWWGrow: Policy 7.5.3.6:** Collaborate with stakeholders to support the adoption and enforcement of regulations and guidelines that reduce the consumption of Edmonton's water resources.

Suggested Additional Policy Direction

- ✓ EPCOR will lead Edmonton's efforts to conserve and reduce water usage, with a goal to reducing water usage in Edmonton.
- ✓ The City, in conjunction with EPCOR, will develop a risk management plan to deal with possible reduced flows in the NSR.

Food Security

Existing Goal 5: Edmonton has a resilient food and agriculture system that contributes to the local economy and the overall cultural, financial, social and environmental sustainability of the city⁵⁸.

Possible Progress/Performance Measures:

- Amount of edible landscaping: City facilities to include at least x% edible landscaping by 2020
- Number of community gardens: xx community gardens by 2020
- Preservation of prime agricultural land: Preserve ___% of prime agricultural land by 2020
- Reduced carbon footprint for food: Reduce the carbon footprint of Edmonton food by xx% by 2020

Existing objective from The Way We Grow: Increase access to local food through regional, city-wide and neighbourhood-level approaches to sustainable urban food systems and build resilience into the food and urban agriculture system to withstand both gradual and sudden changes in the food supply

Existing Policies Promoting Sustainability (and this Objective)

- **TWAhead:** Liveability Principle: Environment: An environment sustained for current and future generations through responsible practices. Clean air and water, access to local food supplies and the healthy co-existence of natural and urban environments
- **TWWGrow: Objective 10.1.1.1:** Support, in principle, the establishment of a community based Edmonton Food Policy Council, through mechanisms that may include clerical support and/or meeting space.
- **TWWGrow: Objective 10.1.1.2:** Work collaboratively with the community to create and endorse an Edmonton Food Charter

⁵⁸ Quoted from The Way We Grow: Municipal Development Plan Bylaw 15100: Goal 10

- **TWWGrow: Objective 10.1.1.3:** Work with the Region to develop a Regional Food Policy Council and Regional Food Charter
- **TWWGrow: Objective 10.1.1.4:** Collaborate with the Government of Alberta, Alberta Health Services, the Food Policy Council, and other stakeholders to develop and implement a City-Wide Food and Agriculture Strategy. This strategy could include: (i) Overall principles for food and urban agriculture in the city, (ii) An examination of the agricultural potential of peri-urban agricultural lands in the northeast, southeast and southwest Urban Growth Areas, (iii) Models for integrating food systems into urban development, based on best practices from other jurisdictions, (iv) Mechanisms for addressing food systems in statutory plans for new and retrofitted urban development, (v) Guidelines to protect agricultural operations, (vi) Community engagement and education, (viii) Coordination with the regional plans and strategies.
- **TWWGrow: Objective 10.1.1.5:** Assess the economic development potential in agriculture and food related industries to identify key opportunities and challenges for expansion of these companies and businesses.
- **TWWGrow: Objective 10.1.1.6:** Establish guidelines for integrating urban agriculture into public realm and private improvements and developments.
- **TWWGrow: Objective 10.1.1.7:** Collaborate with communities, landowners and other organizations to identify potential areas to develop temporary or permanent urban agriculture.
- **TWWLive: Objective 6.2:** The City of Edmonton is an environmentally sustainable society.
- **TWWLive: Objective 6.2.8:** Partner to educate Edmontonians about the importance of a community food network.
- **TWWLive: Objective 6.2.9:** Promote sustainable urban agricultural practices.
- **Capital Region Growth Plan:** There is a land use principle established in the plan around air: Protect the Environment & Resources: b.Preserve Agriculture Lands.

Suggested Additional Policy Direction

- ✓ The City will lead the establishment of a Food Policy Council, responsible for overseeing the development of a Food Charter and City-wide Food and Agriculture Strategy.
- ✓ The City-wide Food and Agriculture Strategy will give consideration to:
 - Mapping of the local food system;
 - Evaluation of the ecological services that urban agricultural lands are currently providing;
 - Establishment of an Agricultural Lands Trust;
 - Establishment of a 'Local' labeling system;
 - Maximizing the potential for food production on City properties and suitable unused lands through projects like edible landscaping and community gardens; and,
 - Developing a Small Plot Intensive Farming program which allows urban farmers to grow food on under-used land (through rental or barter arrangements with property owners).

Ambient Air

Suggested Goal 6: Edmonton’s air is fresh, clean and safe today and into the future⁵⁹

Possible Progress/Performance Measures:

- *Air Quality Index in Edmonton indicating good air quality at least 97% of the time.*
- *Always meet or exceed World Health Organization air quality guidelines, which are stronger than Canadian guidelines*
- *Assess and implement the network improvement recommendations for an effective monitoring network for the region by _____.*

Suggested Objective: Edmonton’s air quality is understood and monitored in a manner where all relevant information is available and analysed to determine whether or not the air quality is acceptably protective of human health and the urban ecosystem

Existing Policies Promoting Sustainability (and this Objective)

- **TWAhead:** Livability Principle: Environment: An environment sustained for current and future generations through responsible practices. Clean air and water, access to local food supplies and the healthy co-existence of natural and urban environments
- **TWAhead:** Environmental health of the city improves (e.g. air and water quality, hazardous waste) Indicators: 1. Air quality index Three-year priority goals: Improve air, water and soil quality (in city operations)
- **TWWGrow: Objective 7.6.1:** Monitor and improve air quality in Edmonton
- **TWWGrow: Policy 7.6.1.1:** Establish baseline air quality levels for the city and collaborate with other orders of government by supporting initiatives to reduce carbon dioxide and protect air quality for future generations by supporting environmentally progressive design (including City Policy – Leadership in Energy and Environmental Design (LEED) Silver), public transportation, car pooling, walking or cycling and by reducing travel distances by encouraging infill.
- **TWWGrow: Policy 7.6.1.2:** Partner with government agencies, public agencies, industry and others to monitor and maintain standards for good air quality.
- **Capital Region Growth Plan:** There is a land use principle established in the plan around air: Protect the Environmental & Resources: d. Minimize the impact of development on regional watersheds and airsheds.
- **Alberta Capital Airshed Alliance** Three Year Business Plan (the mandate of the ACAA is derived from the Provincial Clean Air Strategy) Goals:
 - i. Ensure comprehensive Air Quality Management in the region
 - ii. Implement a program to measure , monitor and collect scientifically defensible data related to ACAA regional air quality
 - iii. Provide comprehensive and timely air quality information and reporting that is transparent, high quality and accessible.
- Alberta Capital Airshed Alliance through Capital Air Partnership is implementing the ozone management plan. The Ozone Management Plan outlines 19 recommendations with 32 activities to be undertaken in the near and long term. Implementation is being undertaken jointly by the Alberta Capital Airshed Alliance (ACAA), Fort Air Partnership, West Central Airshed Society, Alberta Environment and the various municipal and industrial partners.

Suggested Additional Policy Direction

⁵⁹ This is the goal of the Alberta Capital Airshed Alliance of which Edmonton is a member

- ✓ The City, in conjunction with the Alberta Capital Airshed Alliance and Alberta Environment, will increase air quality monitoring throughout Edmonton (to a standard that is in line with the recommended 2009 Ambient Air Management Strategy of Alberta) and make information available to Edmontonians on a real time basis.
- ✓ The City will encourage, undertake and support studies to determine the air quality in Edmonton and the sources of emissions and determine how they affect the health of Edmontonians and the urban ecosystem.
- ✓ The City will adopt and strive to achieve air quality guidelines recommended by the World Health Organization.

Suggested Objective: Edmonton’s air quality is managed to meet the highest standards in a manner that supports health and ecosystem well being.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.6.1.3:** Support a reduction in residential, industrial, institutional and commercial building emissions through the promotion of Leadership in Energy and Environmental Design Green Building Rating System
- **TWWGrow: Policy 7.6.1.4:** Utilize the Leadership in Energy and Environmental Design Green Building Rating System in all new City facilities.
- **TWWGrow: 8.1.4.4** Work with the Capital Region to monitor the Region’s air quality.
- **TWWLive: Objective 6.2:** The City of Edmonton is an environmentally sustainable society.
- **TWWLive: Policy 6.2.10:** The COE promotes environmental best practices in urban design, construction and re-use of materials.
- **TWWLive Policy 6.2.11:** The COE promotes the use of the highest environmental standards through a civic culture of environmental planning, conservation, preservation and protection.
- **TWWMove Policy 6.1** The City will create a walkable environment.
- **TWWMove Policy 6.2** The City will create a cycle-friendly city.
- **TWWMove Policy 7.1** The City will develop a comprehensive program to continually optimize the efficiency of the existing roadway system using traffic management and transportation supply measures.
- **TWWMove Policy 7.2** The City will initiate and support comprehensive programs for Transportation Demand Management to encourage a reduction in single occupant vehicle use.

Suggested Additional Policy Direction

- ✓ The City, in partnership with organizations such as the Alberta Capital Airshed Alliance, will support and participate in management activities including (not limited to) the development and implementation of air quality management plans that are designed to address specific local air quality issues.

Biodiversity

Suggested Goal 7: Biodiversity is valued and maintained.

Possible Progress/Performance Measures:

- Total Priority Natural Areas Secured: 8% of city area (currently at 3715 ha; needs to go to 5600 ha)
- Priority Natural Areas secured in the NS River Valley (currently 3336 ha; needs to go to 4800 ha)
- Priority Natural Areas secured in the Tablelands (currently 379 ha; needs to go to 800 ha)
- Amount of natural area protected in the region
- Measures of protected area connectivity
- Measures of biodiversity in protected areas and within the city as a whole
- Canopy cover

Existing objectives from *The Way We Grow*, Objective 7.1.1: Protect, preserve and enhance a system of conserved natural areas within a functioning and interconnected ecological network.

Existing goals from the *Natural Connections Strategic Plan*: Goal: Secure a functioning ecological network: The City of Edmonton will secure a protected and functional ecological network. Goal: Manage Edmonton’s ecological network: The City of Edmonton will manage Edmonton’s ecological network effectively and will work collaboratively with other conservation agencies to do so. Goal: Engage Edmontonians: The city of Edmonton will work with the community to support conservation goals, and will form partnerships with conservation leaders in the community.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.1.1.1:** Support the implementation of the City of Edmonton’s Natural Connections Strategic Plan.
- **TWWGrow: Policy 7.1.1.2:** Acquire and manage the most ecologically sensitive areas in Edmonton.
- **TWWGrow: Policy 7.1.1.3:** Develop procedures to support, encourage and promote innovative ways to acquire, preserve and maintain natural areas and connections on private and public lands, such as land swapping, easements, buffers and bylaws.
- **TWWGrow: Policy 7.1.1.4:** Determine appropriate buffer areas around the periphery of natural areas identified for protection.
- **TWWGrow: Policy 7.1.1.5:** Acquire critical natural linkages and buffer zones to ensure natural areas of ecological value remain sustainable within an urban context.
- **TWWGrow: Policy 7.1.1.6:** Act proactively to acquire ecologically sensitive and environmentally valuable land in the NS River Valley where necessary.
- **TWWGrow: Policy 7.1.1.7:** Public projects, new neighbourhoods and developments will protect and integrate ecological networks, as identified in the Natural connections Strategic Plan, by adopting an ecological network approach to land use planning and design.
- **TWWGrow: Policy 7.1.1.8:** Apply Ecological Information Requirements to develop proposals that will affect, or potentially could affect natural systems or ecological processes.

- **TWWGrow: Policy 7.1.1.9:** Work with the Capital Region Board and adjacent municipalities to acquire, protect and restore natural systems and linkages, recognizing that Edmonton’s ecological network is part of a larger regional network (Map 17).
- **TWWGrow: Policy 7.1.1.10:** Utilize the full legislative entitlements of environmental reserve in accordance with the MGA during the land development process.
- **TWWGrow: Policy 7.1.1.11:** Require new developments adjacent to natural areas to demonstrate that they have incorporated ecological design best practices to mitigate negative consequences.
- **TWWGrow: Policy 7.1.1.12:** Lands and features that meet the definition of environmental reserve but are not claimed by the Province should be taken by the city as environmental reserve and protected.
- **TWWGrow: Policy 7.1.1.13:** Utilize urban agricultural lands to complement and enhance biodiversity, linkages, habitat and overall health of Edmonton’s ecological network its air and water quality and its people.
- **TWWLive: Objective 6.2:** The City of Edmonton is an environmentally sustainable society.
- **TWWLive: Policy 6.2.4:** The City of Edmonton builds on the City’s leadership role in environmental best practices.
- **TWWLive: Policy 6.2.5:** The City of Edmonton provides programs and education to businesses and residents about the importance of individual environmental responsibilities.
- **TWWLive: Policy 6.2.7:** The City of Edmonton enforces community standards through municipal by-laws for environmental best practices.
- **TWWLive: Policy 5.3.1:** The COE designs, builds and partners to protect and maintain city boulevards and green spaces and the North Saskatchewan River Valley as an integral part of an attractive city.
- **TWWLive: Policy 5.3.2:** The COE **designs, builds, provides and protects public access to the top of bank and ravine system.**
- **TWWLive: Policy 5.3.3:** The COE provides activities and events in city green spaces throughout all seasons.
- **TWWLive: Policy 5.3.4:** The COE promotes the river valley as the centrepiece of an integrated regional park system.
- **TWWLive: Policy 5.3.5:** The COE promotes the beauty of our green spaces, parks, aquatic and natural areas.
- **TWWLive: Policy 5.3.6:** The COE promotes the enhancement and protection of significant lands, trees, views and streets in its neighbourhoods.
- **TWWLive: Objective 6.2:** The City of Edmonton is an environmentally sustainable society.
- **TWWLive: Policy 6.2.2:** The City of Edmonton protects, maintains, conserves and restores the biodiversity of Edmonton’s natural environment.
- **TWWLive: Policy 6.2.3:** The City of Edmonton protects, preserves and expands its parks, green and natural areas.
- **TWWLive: Policy 6.2.6** The City of Edmonton maintains and conserves natural spaces and ecological connectivity in the NS River Valley.

Suggested Objective: The City integrates biodiversity considerations into all aspects of its governance and development planning.

Suggested Additional Policy Direction

- ✓ That the City use: (a) biodiversity offset strategies to replace biodiversity that is lost through developments and (b) other appropriate tools as provided for in the Alberta Land Stewardship Act.
- ✓ The City will develop an overarching Biodiversity Strategy that encompasses the existing Natural Connections Strategic Plan, providing additional focus on non traditional ways of increasing biodiversity in Edmonton.
- ✓ As well, The Way We Green will emphasize the key importance of biodiversity in Edmonton’s sustainability framework, including:
 - *Recognize the central importance of biodiversity (locally, regionally and globally) to Edmonton’s sustainability.*
 - *Establish protected areas as essential anchors for Edmonton’s biodiversity system (taking a “no net loss” approach and a “no further loss of priority natural areas” approach). Encourage the same approach throughout the region and beyond.*

- Understand that in isolation, individual protected areas are not self-sustaining. They must be connected to other natural areas in the region and beyond. This principle applies equally to protected areas in the river valley /ravines and tablelands. Work actively to protect, preserve and create natural connections throughout the city, region and beyond that will support high levels of biodiversity.
- The health of these protected areas depends on the health of the land around them. Much can be done to improve the health of surrounding roads, parking lots, buildings, residential yards and commercial / industrial areas. Work aggressively to improve biodiversity in all parts of Edmonton, including efforts to significantly increase Edmonton's forest cover from 10% to 20%-30%.
- Establish procedures to measure / gauge biodiversity in Edmonton and the region. Establish procedures for monitoring, measurement, and reporting the state of biodiversity in Edmonton. Also establish formal procedures that require developments to undergo thorough reviews to evaluate their impacts on biodiversity (with the goal of achieving 'no net loss' and "no loss of priority natural areas").

Existing Objective from The Way We Grow, Objective 7.1.2: Restore ecologically degraded and / or damaged ecological systems and linkages to protect, expand and enhance biodiversity.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.1.2.1:** Work in cooperation with developers, land owners and conservation organizations to encourage the reintegration of native and / or semi-native vegetation into Edmonton's ecological network.
- **TWWGrow: Policy 7.1.2.2:** Restore degraded natural areas and ensure ongoing protection of areas that have undergone restoration where feasible.

Suggested Additional Policy Direction

- ✓ None

Existing Objective from The Way We Grow, Objective 7.2.1: Protect, manage and integrate natural wetlands into new and existing developments as key assets in Edmonton's ecological network.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.2.1.1:** Cooperate with the Government of Alberta to actively support and complement its Wetland Policy through the following:
 - In partnership with the Province, the Capital Region board and the adjacent municipalities, develop a comprehensive plan for wetland conservation and integration of wetlands into the urban environment.
 - Where appropriate, acquire wetlands, riparian areas and buffers according to the MGA definition of environmental reserved.
 - Where privately held wetlands cannot be protected through other means, encourage their dedication through conservation easements.
 - Work with land owners to see that compensation required by the Province as a result of the alteration or destruction of wetlands is carried out within city boundaries.

Suggested Additional Policy Direction

- ✓ None

Existing Objective from The Way We Grow, Objective 7.3.1: Protect, preserve and enhance the NS River Valley and Ravine System as Edmonton's greatest natural asset.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.3.1.1:** The City will work in partnership with local, regional and provincial organizations to conserve, protect, restore and enhance the NS River Valley and Ravine System for its ecological, recreational, aesthetic, educational and natural resource value.
- **TWWGrow: Policy 7.3.1.2:** That the City undertake a program to restore creek beds associated or aligned with industrial areas.

Suggested Additional Policy Direction

- ✓ None

Existing Objective from The Way We Grow, Objective 7.3.2: Protect, preserve and enhance the NS River Valley and Ravine System as an accessible year round place for recreation and activity for people of all ages.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.3.2.1:** Ensure that the NS River Valley and Ravine System remain primarily an area of unstructured, low-intensity and passive recreation, while accommodating appropriate balance of recreation activity within park nodes as described in the Urban Parks Management Plan and the Ribbon of Green.
- **TWWGrow: Policy 7.3.2.2:** Ensure the NSRV&RS remains integrated and connected with other natural areas across the city.
- **TWWGrow: Policy 7.3.2.3:** Ensure that the lands within the NSRVRS Areas Redevelopment Plan boundary will be acquired for parks purposes and natural areas protection.
- **TWWGrow: Policy 7.3.2.4:** Make selected areas of the NSRVRS accessible to all citizens regardless of age or mobility, where feasible.
- **TWWGrow: Policy 7.3.2.5:** Provide pedestrian and bicycle connections to increase movement and accessibility.
- **TWWGrow: Policy 7.3.2.6:** Provide and maintain space for multi season users.

Suggested Additional Policy Direction

- ✓ None

Existing Objective from The Way We Grow, Objective 7.3.3: Mitigate the impact of development upon the natural functions and character of the North Saskatchewan River Valley and Ravine System.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.3.3.1:** New development within the NSRV&RS will be planned according to, and will demonstrate that it embodies the following priorities:
 - Conservation and protection of natural areas and the connections that link them to, from and within the NSRV&RS.
 - Low intensity, passive outdoor and trail based recreation or educational opportunities and appropriate facilities to service these.
 - Facilities that provide passive recreational or educational services to the public.
 - Public utilities installations, services and facilities.
- **TWWGrow: Policy 7.3.3.2:** Maintain adequate separation between new urban developments and the NSRV&RS through the City's Top of Bank Policy and viewsapes and public access to the River Valley preserved.
- **TWWGrow: Policy 7.3.3.3:** Require development projects within the NSRV&RS to undertake an Environmental Assessment as specified in North Saskatchewan River Valley Area Redevelopment Plan.
- **TWWGrow: Policy 7.3.3.4:** When City owned facilities must be located within or adjacent to the NSRV&RS they will be located, designed and operated in a way that mitigates ecological impacts.

Suggested Additional Policy Direction -

✓ None

Existing Objective from The Way We Grow, Objective 7.4.1: Utilize park and open spaces to complement and enhance biodiversity, linkages, habitat and the overall health of Edmonton’s ecological network.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.4.1.1:** Link parks and open spaces with natural systems through development and design to strengthen the connectivity of Edmonton’s ecological network, where feasible.
- **TWWGrow: Policy 7.4.1.2:** Enhance the habitat value of parks by incorporating native plant species into park design; implementing invasive plant removal and restoration programs as needed.
- **TWWGrow: Policy 7.4.1.3:** Maintain a healthy urban forest by continuing to invest in and expand the City’s tree inventory and adopt a “no net loss” approach to the replacement of public trees.
- **TWWGrow: Policy 7.4.1.4:** Public utility functions will not be considered in parks and open spaces where they significantly compromise ecological value and integrity.

TWWGrow: Policy 7.4.1.5: Design parks and open spaces to include and maximize the use of ecological design best-practices.

Suggested Additional Policy Direction

✓ None

Existing Objective from The Way We Grow, Objective 7.4.2: Expand and enhance Edmonton’s inventory of parks and open spaces for the ecological, health, recreation and educational benefits they provide.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 7.4.2.1:** During the residential subdivision process, the City will look first to use its municipal reserve authority to acquire land. Cash-in-lieu of land will be considered only when the acquisition of land is not deemed to further City goals to increase opportunities for park development and expansion.
- **TWWGrow: Policy 7.4.2.2:** Cash-in-lieu of municipal service received through subdivision of industrial or commercial areas will be used for the Parkland Acquisition Fund to purchase River Valley land.
- **TWWGrow: Policy 7.4.2.3:** Actively explore and seek out new ways of acquiring, funding and managing parks and open spaces.

Suggested Additional Policy Direction

✓ None

Existing Objective from The Way We Grow, Objective 9.1.1: Mitigate the negative impacts of resource extraction activities to protect people and the natural environment.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 9.1.1.1:** Resource extraction is prohibited within the NSR&RS in order to preserve its ecological value except where resource material is required to be removed to the extent necessary to accommodate an approved development.
- **TWWGrow: Policy 9.1.1.2:** Protect for future use significant deposits of natural resources such as sand and gravel and promote appropriate rehabilitation and reclamation after extraction.

Suggested Additional Policy Direction

- ✓ None

Existing Objective from The Way We Grow, Objective 9.5.1: Promote the responsible management of contaminated sites to protect public health and the environment.

Existing Policies Promoting Sustainability (and this Objective)

- **TWWGrow: Policy 9.5.1.1:** Remediate contaminated sites to a level suitable for the intended use prior to develop or redevelopment.
- **TWWGrow: Policy 9.5.1.2:** Require investigation of potentially contaminated sites for selected planning applications and require remediation to ensure site suitability.
- **TWWGrow: Policy 9.5.1.3:** Promote and facilitate brownfield redevelopment to add vitality to established communities.

Suggested Additional Policy Direction

- ✓ None

Waste Management

Suggested Goal 8: Edmonton’s residential and non-residential waste is diverted from landfill.

Possible Progress/Performance Measures:

- 90% diversion of residential waste from landfill by 2013
- 100% diversion of residential waste from landfill by 20XX
- x% diversion of residential waste from landfill by 2020.
- 100% diversion of residential waste from landfill by 20XX

Suggested Objective: Non-residential sectors achieve the same waste diversion rate achieved by Edmonton’s residential sector.

Existing Policies Promoting Sustainability (and this Objective)

- To be determined

Suggested Additional Policy Direction

- To be determined

Suggested Goal 9: The amount of waste generated by Edmontonians is continually decreasing (regardless of population and economic growth).

Possible Progress/Performance Measures:

- *x kg of residential waste generated per Edmontonian by 2020*
- *x tonnes of residential waste (total) generated in all of Edmonton by 2020*
- *x kg of non-residential waste generated per Edmontonian by 2020*
- *x tonnes of non-residential waste (total) generated in all of Edmonton.*

Suggested Objective: Edmontonians generate low levels of residential waste; on par with their waste efficient peer cities/countries.

Existing Policies Promoting Sustainability (and this Objective)

- To be determined

Suggested Additional Policy Direction

- To be determined

Note: The City of Edmonton’s Waste Management Strategy is currently undergoing revision. Details of that plan will be shared ASAP.

One Planet Living

Goal 10: *Lifestyles of Edmontonians contribute to: energy sustainability; climate neutrality; clean air; water conservation; clean water; food security; biodiversity; and, effective waste management in a manner that promotes global biocapacity equity and one planet living.*

Possible Progress/Performance Measures:

- *Ecological Footprint of X by 20____; or,*
- *Reduce Ecological Footprint X by _____*

Suggested Objective: Reduce Edmonton’s Ecological Footprint

Existing Policies Promoting Sustainability (and this Objective)

- Sustainable Purchasing Policy C556

Suggested Additional Policy Direction

- The City will promote the concepts of one-planet living and how Edmontonians can reduce their ecological footprint through social marketing campaigns, outreach, education and awareness, Incorporate aggressive demand management for things within the influence of City operations.
- The City, in conjunction with citizens, will set an ecological footprint target that represents: (a) the realities of a winter city, and (b) the tradeoffs Edmontonians are prepared to make in moving toward global biocapacity equity (i.e., one planet living).
- Incorporate aggressive demand management for things within the influence of City operations.