



City of Surrey

# Community Climate Action Strategy

Reducing Emissions and Adapting to Climate Change



## A Prosperous and Resilient Community

Strategic action on climate change will strengthen the resilience of our community in the face of inevitable and uncertain change. The City of Surrey has two complementary climate action plans. The Community Energy and Emissions Plan will guide the community in reducing energy spending and greenhouse gas emissions. The Climate Adaptation Strategy will guide the community in reducing vulnerability to climate change impacts. Together, these two plans reinforce the City's broader efforts at establishing a prosperous and resilient 21st century urban centre.

Taking action is more than just reducing our GHG emissions and preparing for stranger weather. A community that is resilient to climate change has a localized economy, strong and healthy ecosystems, a great transit network, tight-knit neighbourhoods and a strong social fabric; it is walkable, energy efficient, and can thrive through disruptions such as rising energy and food prices or a natural disaster. Through proactive action in Surrey, we can achieve these goals and simultaneously realize a host of community benefits, including economic development, community health and wellness, affordability, and liveability.

The global climate is rapidly changing, and the need for communities to respond has never been greater. Leading scientists have pronounced the warming of the world's climate as "unequivocal" and point to mounting evidence, including rising average air and ocean temperatures, sea level rise, changing precipitation patterns and extensive melting of icecaps and glaciers worldwide. Post-industrial human activities and the release of greenhouse gas (GHG) emissions

into the atmosphere are the primary drivers of these changes. Human-caused GHG emissions increased by an unprecedented 70% between 1970 and 2004 and are likely to continue their upward trend over the coming decades. The global atmospheric concentration of carbon dioxide alone has increased from a pre-industrial value of about 280 parts per million (ppm) to 383 ppm in 2007.

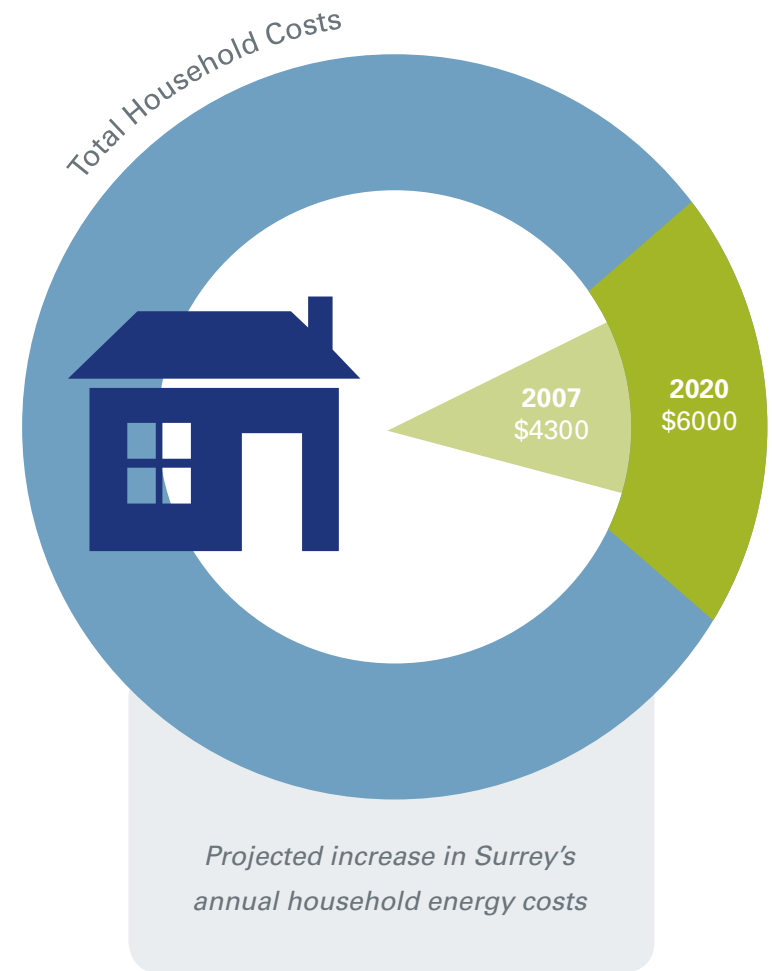
While climate change is global, the local impacts in different regions of the world vary widely. Climate changes projected for Surrey over the long term include:

- Sea level rise and associated erosion, flooding and disturbance of natural and built environments;
- Hotter, drier summers with more high temperature events and droughts impacting human health, ecosystems, water security and agriculture;
- Increased frequency and intensity of rain and wind events causing flooding and disturbance of natural and built environments;
- Increased risk of forest fire, adversely impacting local air quality, human safety and the built environment; and
- Local implications from disruptions in other parts of the world such as rising prices and periodic constraints in agricultural production.

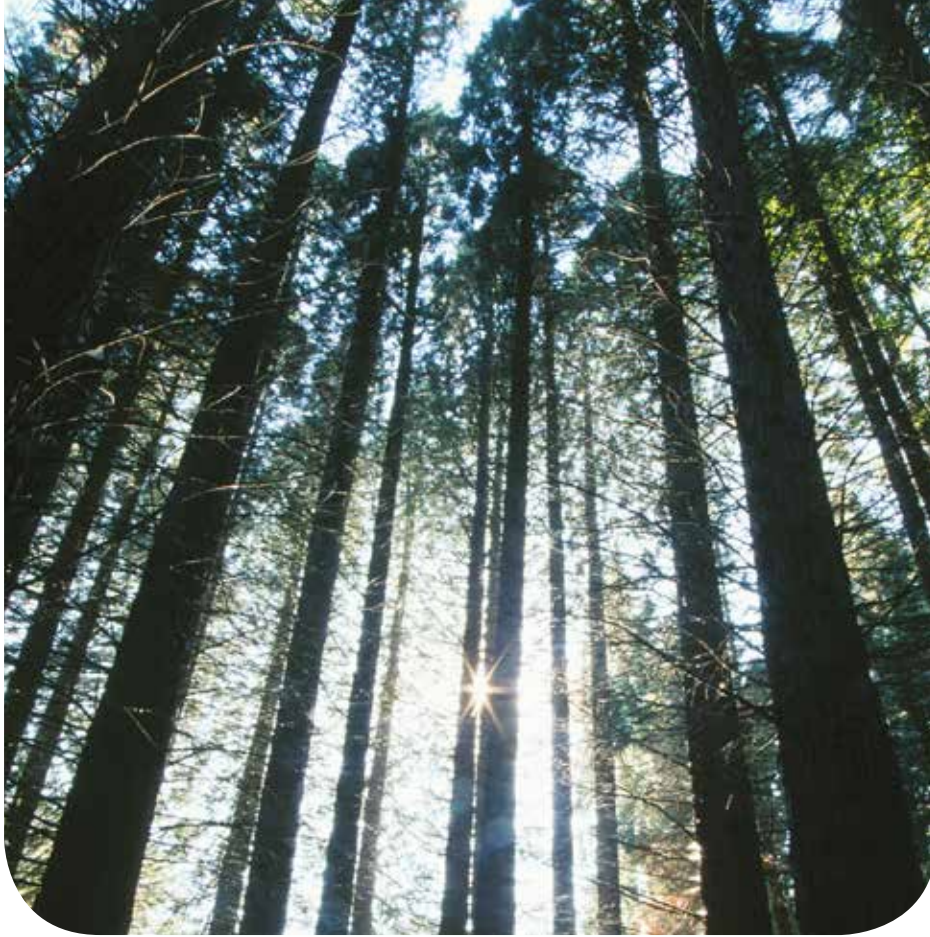
## Why does this matter to communities?

Local governments have a unique interest and opportunity in planning for a changing climate. Communities are vulnerable to climate change due to an extensive infrastructure supporting high concentrations of people and economic activity. Over the coming decades, municipalities will contend with the challenges of extreme weather events, water shortages, rising sea levels, and community health issues exacerbated by climate change. As the level of government closest to community-scale circumstances, municipalities are well-placed to proactively plan for and respond to affected services.

Municipalities also have the ability to influence and lead GHG reductions through land use planning, energy supply such as local district energy solutions, and buildings. As rising energy costs confound efforts to maintain affordability in communities, reducing energy use will become a higher priority.



*The cost of property damage from natural catastrophes has doubled every 5 to 10 years in Canada (Insurance Bureau of Canada, 2003)*



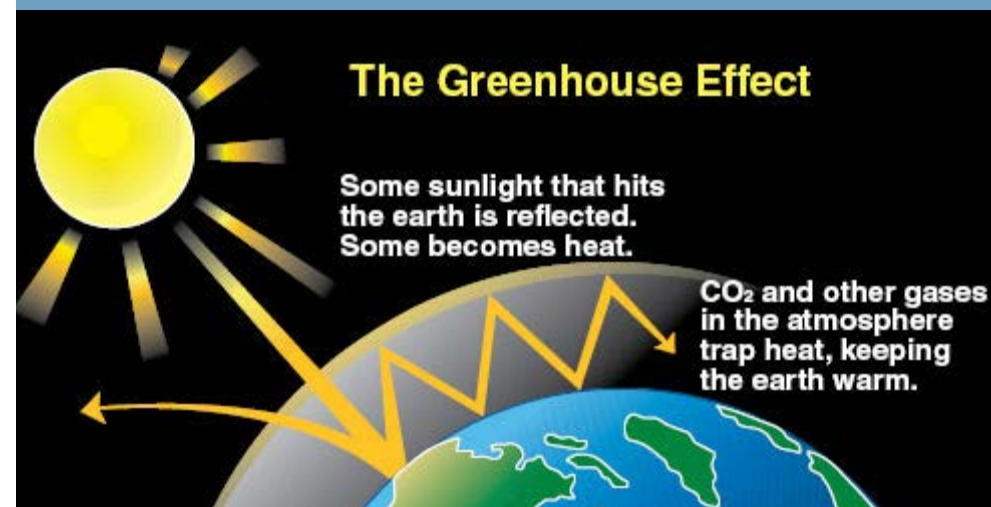
While municipalities may bear the greatest and most immediate impacts of a changing climate, there are many areas in which local governments have limited jurisdiction. Senior levels of government, for instance, have sole regulatory authority over building codes and automobile efficiency standards, and far greater financial authority in sectors such as public transit, community energy supply development, and flood protection infrastructure.

This makes the need for collaboration between Surrey, neighbouring municipalities, utilities, and senior levels of government critical to making a difference on climate change.

## The Greenhouse Effect and Climate Change

Greenhouse gases (GHGs) including carbon dioxide, methane and water vapour occur naturally in the atmosphere, maintaining a temperature that has been favourable for ecosystems and human civilization for 10,000 years. This is the natural greenhouse effect.

Burning oil, coal and gas for energy and clearing forests for cities and agriculture has accelerated the release of carbon dioxide into the atmosphere. Methane emissions have increased from livestock and decomposition of solid waste in landfills. Increased presence of these gases has created an enhanced greenhouse effect. This effect has trapped more heat in the atmosphere, leading to climatic changes such as shifting precipitation patterns, intensifying storms, increasing floods and droughts, reducing snow packs and glaciers, and rising sea levels. Deep GHG reductions will allow us to avoid the most serious consequences of climate change.



## Avoid the Unmanageable and Manage the Unavoidable

The release of GHG emissions and the resulting impacts on our climate have far-reaching consequences for our economies, our ecosystems and our social well-being. Mitigation, or efforts to reduce GHG emissions, is critical to limit the extent of climate change we have to deal with in the years to come. However, the persistence of GHGs in the atmosphere means we will experience and must adapt to, or prepare for, some climate change impacts regardless of global efforts to reduce GHG emissions over the coming decades. Mitigation is an insurance policy; proactive adaptation is a disaster prevention plan.

Taking action on climate change therefore requires both mitigation and adaptation. Mitigation is essential to “avoid the unmanageable”, while adaptation concurrently aims to “manage the unavoidable.” Moreover, a strategic, proactive effort to reduce emissions and plan for anticipated impacts is fiscally prudent, and more cost effective than taking no action.

Adaptation and mitigation activities have the potential to be mutually supportive, but require careful planning to ensure strategies do not undermine each other. For example, there are different options to keep people cool as summer temperatures increase. One option would be to increase the installation of air conditioning systems, but the added energy use would be in conflict with the mitigation objective to decrease GHG emissions. By contrast, increasing tree canopy, vegetative cover, and green roofs in the City also has a cooling effect, and acts to make buildings more energy efficient. In this way, the latter option is supportive of both mitigation and adaptation goals.

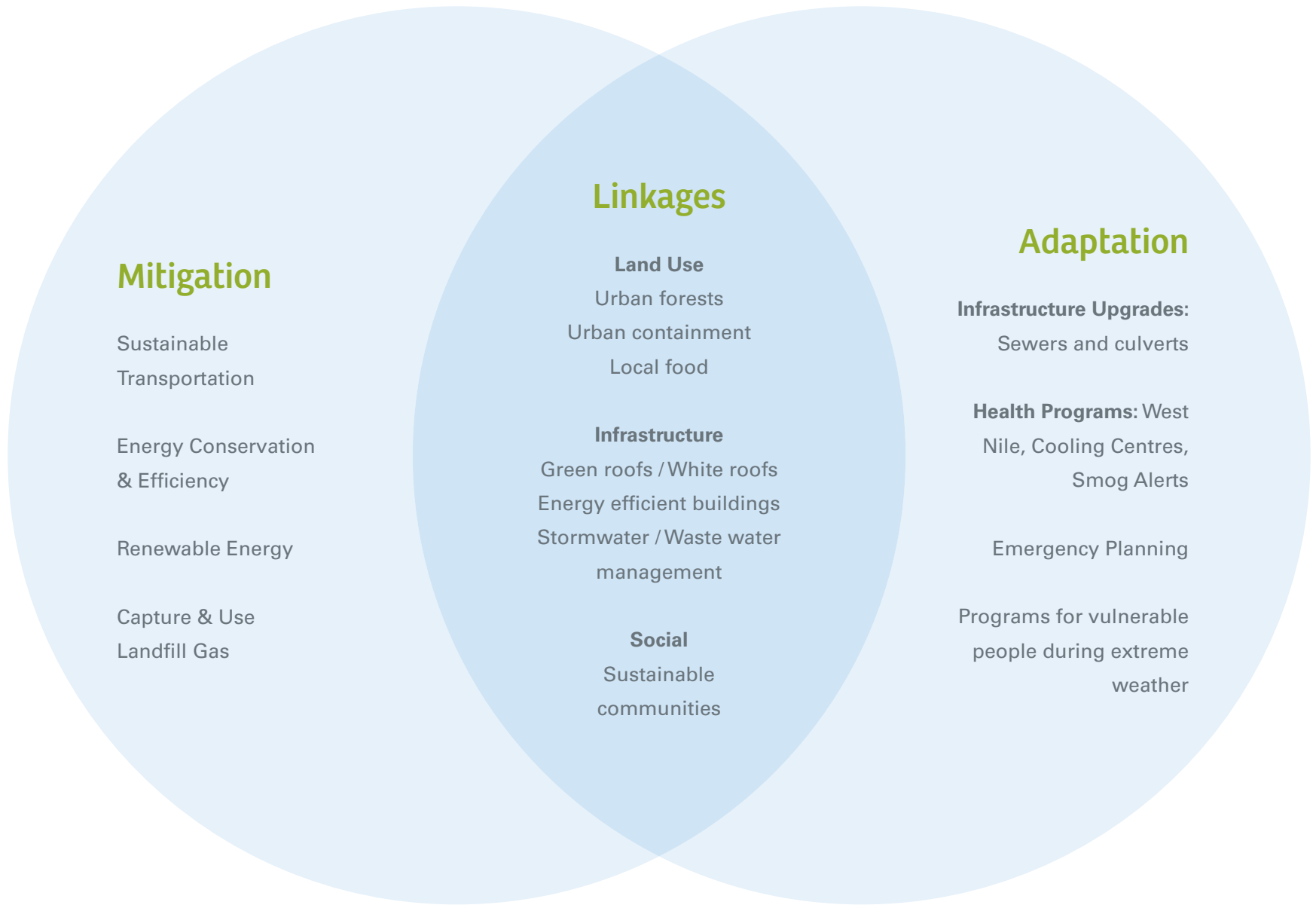
Adaptation: the initiatives or measures to reduce the vulnerability of human and natural systems to the actual or anticipated effects of climate change.

Mitigation: human intervention to reduce and absorb greenhouse gases.

*The **Economics of Climate Change** report authored by former World Bank Chief Economist Nicholas Stern concluded that “the benefits of strong, early action on climate change outweigh the costs.”*



# The Linkages Between Mitigation and Adaptation



## Climate Action in Surrey

Over the past decade, the City of Surrey has increasingly been integrating sustainability into policy, planning and daily business in both corporate operations and the broader community.

In 2007, the City of Surrey became a signatory to the Province of British Columbia's Climate Action Charter committing to create "complete, compact, more energy efficient" communities and to make progress towards carbon neutrality in its corporate operations.

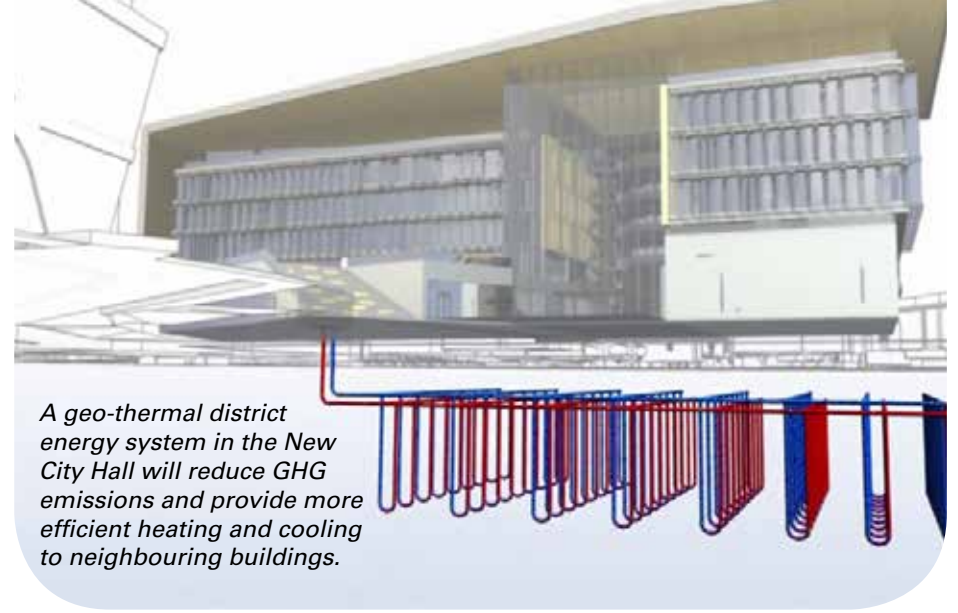
In September 2008, Surrey City Council unanimously adopted the Sustainability Charter, a comprehensive framework for implementing a progressive, long-term 50-year vision for a Sustainable City. The Sustainability Charter includes a commitment to complete the five milestones in the Federation of Canadian Municipalities (FCM) and ICLEI - Local Governments for sustainability's Partners for Climate Protection (PCP) program, including developing a local action plan to minimize GHG emissions. A further Sustainability Charter commitment was to create an adaptation strategy to deal with the unavoidable impacts of climate change.

The City has undertaken numerous plans and programs to reduce energy use and GHG emissions across the community. Some of the highlights include:

- Surrey City Centre Community Energy Plan (2007)
- Integrated Energy Master Plan for the Semiahmoo Town Centre (2008)
- Community GHG Reduction Targets in Official Community Plan (2010)
- Creation and co-funding of a Community Energy Manager position with BC Hydro
- Surrey becomes a Solar Community (2010)
- Climate Smart partnership for businesses (2010-2012)
- City Centre Energy Utility created for geo-exchange based district energy (2011)
- Walking Plan (2011)
- Rethink Waste program and organics collection for single family homes (2012)
- Cycling Plan (2012)
- Greenways Plan (2012)
- Student Climate Change Outreach & Education (ongoing)



*The new Maple Drainage Pump Station in Crescent Beach improves drainage and reduces the risk of flooding.*



*A geo-thermal district energy system in the New City Hall will reduce GHG emissions and provide more efficient heating and cooling to neighbouring buildings.*

Surrey's strategies for adaptation also aim to build on or complement existing policies and plans that the City has in place. Many of the City's existing initiatives align with or explicitly address climate change adaptation, including:

- Crescent Beach Climate Change Adaptation Study;
- Serpentine / Nicomekl Lowlands Flood Control Plan;
- Development within the Nicomekl and Serpentine River Floodplain Policy;
- Nicomekl and Serpentine Sea Dam Upgrades Options Report;
- Serpentine, Nicomekl and Campbell Rivers – Climate Change Floodplain Review;
- Rainfall Trending Analysis for the City of Surrey;
- Ecosystem Management Study and the Biodiversity Conservation Strategy (forthcoming);
- Natural Areas Management Plan (includes the Vegetation Management Strategy, Tree Hazard Management Strategy, and Fire Management Strategy);
- Community Wildfire Protection Plan;
- ShadeTree Strategic Management Plan (forthcoming); and
- Agriculture Protection and Enhancement Strategy

## Surrey's Community Energy and Emissions Plan and Climate Adaptation Strategy

Two Plans are presented here that form Surrey's Community Climate Action Strategy: the Community Energy and Emissions Plan (CEEP) and the Climate Adaptation Strategy.

As a Plan to reduce energy use and greenhouse gas emissions in key sectors across the community, the goal of the CEEP is to establish Surrey as a model community in the areas of energy supply, reliability, sustainability and climate responsibility. The CEEP provides guidance on how to move towards meeting the ambitious community-wide GHG reduction targets as outlined in Surrey's Official Community Plan. The Plan also encourages local job creation and community re-investment; promotes vibrant, healthy neighbourhoods; and helps residents and businesses proactively address rising energy cost. Strategies are identified to reduce emissions in five areas: land use, buildings, energy supply, transportation, and solid waste.

As part of adaptation strategy planning, Surrey has taken part in a Climate Adaptation Initiative organized by ICLEI Canada – Local Governments for Sustainability. The collaboration has offered participating cities the opportunity to plan for anticipated impacts related to local and regional climate change. Surrey's Climate Adaptation Strategy identifies actions to increase resilience in six areas: infrastructure, flood management and drainage, ecosystems and natural areas, urban trees and landscaping, human health and safety, and agriculture and food security.



# Community Energy and Emissions Plan and Climate Adaptation Strategy Linkages

Strategies have been developed to reduce GHG emissions and simultaneously increase Surrey's resilience to climate change impacts. These mutually reinforcing actions are categorized into five areas:

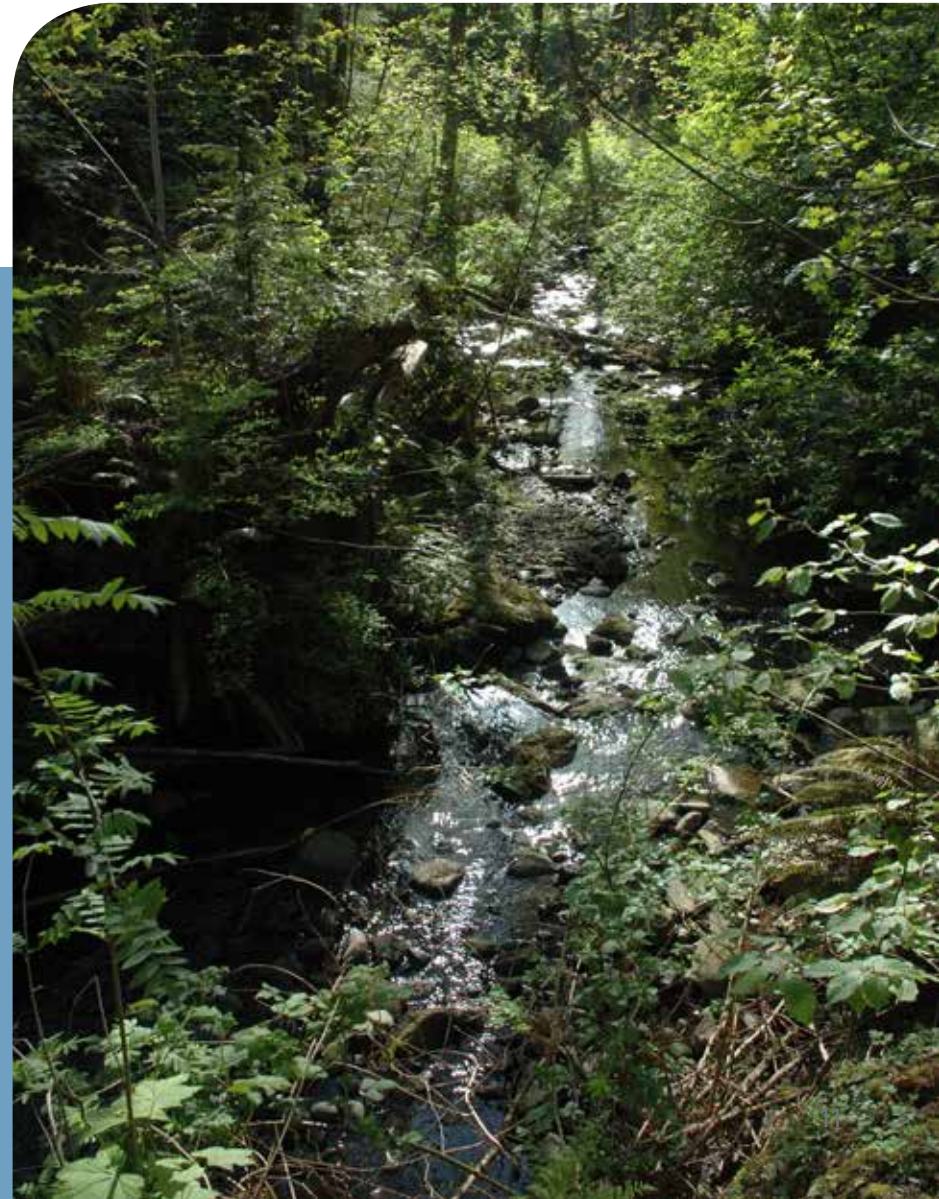
## Ecosystem Protection, Hazard Avoidance and Compact Land Use

### MITIGATION STRATEGIES WITH ADAPTATION BENEFITS

Focusing growth into dense urban areas supports the protection of green space, which can strengthen the resilience of ecosystems and improve stormwater management. Directing growth away from hazardous areas like floodplains and steep slopes also reduces exposure to impacts from climate change.

### ADAPTATION ACTIONS WITH MITIGATION BENEFITS

Directing growth away from hazardous areas and setting aside green space for ecosystems helps to focus growth, which enables compact, transit-oriented communities and associated lower transportation and building GHGs.





## Ecosystem Health and Carbon Sequestration:

### ADAPTATION ACTIONS WITH MITIGATION BENEFITS

Healthy trees and ecosystems provide free ecosystem services such as improving water and air quality, providing shade and wind protection, reducing erosion and soil loss, and mitigating flood and stormwater runoff. These natural services increase resilience to climate impacts such as increased rainfall and warmer summer temperatures. They also play an important climate change mitigation role by absorbing carbon from the atmosphere.

### MITIGATION STRATEGIES WITH ADAPTATION BENEFITS

While planting trees and maintaining ecosystem health absorbs carbon and has associated benefits for adaptation, this approach to GHG reduction is not a focus in the CEEP, as reflected by the three columns in the 'CEEP Strategy Summary and Adaptation Linkages' table on the following pages.

## Heat Management and Passive Solar:

### MITIGATION STRATEGIES WITH ADAPTATION BENEFITS

Many passive solar strategies designed to improve thermal performance and reduce GHGs (e.g. trees, reduced asphalt, improved insulation and green roofs) also help reduce the urban heat island effect and moderate health risks during heat waves.

### ADAPTATION ACTIONS WITH MITIGATION BENEFITS

Designing cool and climate-resilient buildings and nurturing urban trees are passive solar design strategies that can reduce energy use in buildings.



## Community Energy Systems and Self-sufficiency:

### MITIGATION STRATEGIES WITH ADAPTATION BENEFITS

Increasing storms, rainfall variability, and shrinking snowpack are projected to lead to more disruptions of traditional supplies of hydroelectricity, natural gas, and gasoline. Investing in community energy systems such as district energy, as well as local, renewable energy supplies such as geo-exchange and biomass, increases resilience to a fluctuating energy supply by increasing energy self-sufficiency.

### ADAPTATION ACTIONS WITH MITIGATION BENEFITS

Becoming more self-sufficient in the production of essential commodities such as energy and food increases resilience as well as reduces GHG emissions associated with transportation. Developing community energy systems reduces emissions by increasing low-carbon and renewable energy supplies.



*Community energy plant*



The following pages provide a summary of the goals and strategies in Surrey’s Climate Adaptation Strategy and Community Energy and Emissions Plan respectively, as well as a matrix of where these two climate action efforts are mutually supportive.

## Climate Adaptation Strategy Summary and Mitigation Linkages

Climate Adaptation Strategy Goals by Sector	Ecosystem Protection, Hazard Avoidance, and Compact Land Use	Ecosystem Health and Carbon Sequestration	Heat Management and Passive Solar Design	Community Energy Supply and Self-Sufficiency
<b>Cross-Cutting Actions</b>				
Reinforce the Implementation and Enforcement of City Policies and By-laws that Support Resilience				
Educate and Engage Surrey Residents and Staff on Climate Impacts and Solutions				
<b>Flood Management and Drainage</b>				
Reach Consensus on a Regional Approach to Flood Management	✓			
Update Planning and Development Guidelines for Floodplains	✓			

Climate Adaptation Strategy Goals by Sector	Ecosystem Protection, Hazard Avoidance and Compact Land Use	Ecosystem Health, Carbon Sequestration	Heat Management, Passive Solar Design	Community Energy Supply, Self-Sufficiency
<b>Infrastructure</b>				
Deliver Proactive Climate Analysis and Management Practices for City Infrastructure		✓		
Support the Design of Climate-Resilient Buildings in Surrey			✓	✓
Advance Energy Self-Sufficiency Within the Community				✓
<b>Ecosystems and Natural Areas</b>				
Optimize Space for Habitat and Species Migration	✓	✓		
Actively Manage City's Ecological Assets	✓	✓		
Support Viability of Highly Sensitive Ecosystems	✓	✓		
Protect Ecosystem Services Through Development	✓	✓		
<b>Urban Trees and Landscaping</b>				
Provide the Required Growing Environment to Sustain Trees		✓	✓	
Plant Appropriate Species		✓	✓	
Increase Tree Maintenance Management		✓	✓	

Climate Adaptation Strategy Goals by Sector	Ecosystem Protection, Hazard Avoidance and Compact Land Use	Ecosystem Health and Carbon Sequestration	Heat Management and Passive Solar Design	Community Energy Supply and Self-Sufficiency
<b>Agriculture and Food Security</b>				
Provide Appropriate Infrastructure for Agricultural Viability				✓
Encourage Greater Diversity in Local Products and Growing Methods				✓
Increase Food Self-Sufficiency in the City and Region				✓
Help Farmers Build Capacity to Adapt				✓
<b>Human Health and Safety</b>				
Collaborate with Key Partners on Improving Population Health				✓
Minimize the Urban Heat Island Effect			✓	
Minimize Risks from Urban-Wildland Interface Fire	✓			
Build Emergency Response Capacity at the City				✓



## Community Energy and Emissions Plan Strategy Summary & Adaptation Linkages

Community Energy and Emissions Plan Strategies by Sector	Ecosystem Protection, Hazard Avoidance and Compact Land Use	Heat Management and Passive Solar Design	Community Energy Supply and Self-Sufficiency
<b>Land Use</b>			
A. Focused Growth	✓		✓
B. Complete, Compact, Connected Corridors	✓		✓
C. Compact and Live/Work Housing			
D. Low Carbon Development Permit Areas	✓	✓	✓
E. Neighbourhood Sustainable Energy Pilot	✓	✓	✓
F. Sustainable Development Checklist Update	✓	✓	
G. Grid Scale Energy Infrastructure Planning & Coordination			

*Note: The CEEP does not focus on ecosystem health and carbon sequestration in its strategies for GHG reduction. Therefore, these strategy linkages are not explored in the table above, as reflected by the three columns.*

Community Energy and Emissions Plan Strategies by Sector	Ecosystem Protection, Hazard Avoidance and Compact Land Use	Heat Management and Passive Solar Design	Community Energy Supply and Self-Sufficiency
<b>Transportation</b>			
<b>Public Transit Strategies</b>			
A. Rapid Transit Development	✓		✓
B. Bus Service Improvements			✓
<b>Active Transportation &amp; Transportation Demand Management</b>			
C. Integrated Active Transportation Improvements			✓
D. Bicycle Infrastructure Improvements			✓
E. Pedestrian Infrastructure Improvements			✓
F. Transportation Demand Management			✓
<b>Low Emission Vehicles</b>			
G. Green Fleet Management & Efficiency Support			✓
H. Car Sharing Promotion			✓
I. Low Emission Vehicle Infrastructure Development			✓

Community Energy and Emissions Plan Strategies by Sector	Ecosystem Protection, Hazard Avoidance and Compact Land Use	Heat Management and Passive Solar Design	Community Energy Supply and Self-Sufficiency
<b>Buildings</b>			
<b>Cross-Cutting Building Strategies</b>			
A. Capacity Building for Low Carbon, High Efficiency Buildings		✓	✓
<b>Existing Buildings</b>			
B. Third Party Retrofit Program Integration		✓	✓
C. Affordable Housing Energy Retrofit Strategy		✓	✓
<b>New Construction</b>			
D. Third Party Incentive Promotion		✓	✓
E. Local Incentive Program Development		✓	✓
F. Basic Building Standards Strategy		✓	✓
<b>District Energy</b>			
A. City Centre District Energy Extension			✓
B. New District Energy Node & Corridor Evaluation			✓
C. Integrated District Energy Policy & Planning			✓
<b>Solid Waste</b>			
A. Zero Waste Residents, Businesses & Institutions			
B. Zero Waste Construction & Deconstruction			
C. Senior Government Sustainable Packaging & Extended Producer Responsibility			
D. Sustainable Planning & Design for Energy Recovery from Waste			✓



## CONCLUSIONS

These two climate action plans form Surrey’s Community Climate Action Strategy, fulfilling key commitments made in the Sustainability Charter and under the Partners for Climate Protection Program. The City is taking an innovative, integrated approach in bringing these two Plans forward together, and identifying ways to better link mitigation and adaptation efforts.

The Community Energy and Emissions Plan outlines how the City will move towards the GHG reduction targets as outlined in the Official Community Plan; it identifies critical initiatives to reduce energy consumption and spending, and limit GHG emissions in the areas of transportation, buildings, waste, energy supply and

land use. The Climate Adaptation Strategy provides a framework for managing the uncertainty and risks of future climate change impacts, so that the City becomes more resilient to these changes.

The Community Climate Action Strategy will lead to a range of community benefits beyond reduced emissions and energy use, including economic development, community health and wellness, affordability, and liveability. The strategic actions outlined in the respective plans will further reinforce the City’s broader efforts at establishing a prosperous and resilient 21st century urban centre.



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