Climate Change Action Strategy

Surrey's roadmap to a zero-carbon resilient city in 2050

CITY OF SURREY

Contents

Little Campbell River in flood, as seen from Semiahmoo First Nation reserve lands (source: City of Surrey)

Recognition of Indigenous Peoples and Lands

We recognize that Surrey is situated on the unceded traditional territories of the Coast Salish peoples, including the Katzie, Kwantlen and Semiahmoo First Nations. We also respectfully acknowledge the many other Indigenous nations that are represented among Surrey's population.

Indigenous Peoples have resided on and stewarded these lands, while thriving through climate variations for millennia. Indigenous leaders in this part of the world, as elsewhere, have been standing up for the protection and sustainable management of the ecosystems we all depend on for many generations. As outlined in the First Nations Leadership Council's *BC First Nations Climate Strategy and Action Plan*, Indigenous Peoples are deeply concerned about and acting to address the climate crisis on their own terms.[1]

Through consultation undertaken for this Climate Change Action Strategy (CCAS), and ongoing feedback on other related projects, staff have heard First Nations representatives express a deep concern and caring for the land. Staff have heard them speak about the interlinked social and environmental harms they continue to experience because of colonization. These issues cannot be addressed within any single project or strategic plan. Reconciliation with First Nations requires respectful dialogue at a government-to-government level to forge new positive relationships.

The City of Surrey is committed to reconciliation, engagement, and collaboration with local First Nations and Métis governments, and the Urban Indigenous communities in Surrey, in implementing the CCAS. This includes working with and learning from Indigenous communities to develop actions, policies and programs.

1 First Nations Leadership Council, 2022. BC First Nations Climate Strategy and Action Plan. https://www.bcafn.ca/sites/default/files/2022-04/BCFNCSAP%20Final%20Draft%20%2822April2022%29.pdf

Wildfire smoke over Surrey, as seen from SkyTrain near Scott Road Station, October 19, 2022 (source: City of Surrey)

A. Introduction

The City of Surrey's Climate Change Action Strategy (CCAS) serves as a unifying call to action, inspired by the collective voice of concerned residents seeking bold leadership at all levels of government to tackle the climate crisis. Effective climate action that addresses the scale of this challenge requires coordinated action by all levels of government, society, businesses, and the community.

The science is unequivocal: excess greenhouse gases (GHGs) from human activities are driving warming of the atmosphere, oceans and land, resulting in widespread disturbances to both natural and human systems. As the planet warms, we witness rising sea levels, intensifying heat waves, more frequent and devastating wildfires, and increasingly powerful storms and floods (refer to "Causes and Impacts of Climate Change," on page 7).

These alarming consequences are unfolding in real time, across the world and in our own back yard. For instance, atmospheric river events – like the one that caused extensive flooding throughout southwest British Columbia in November 2021 – are becoming more probable due to human-induced climate change. In the same year an unprecedented "heat dome" led to the deaths of 619 people across B.C. and the complete destruction of the town of Lytton by wildfire. Researchers firmly concluded that this event would have been "virtually impossible" without human-caused climate change.[2] An independent assessment of these three 2021 disasters (the heat dome, wildfires, and flooding) estimated their combined economic toll at $10 to $17 billion.[3]

2 Phillip et al., 2021. Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the U.S. and Canada June 2021. https://www.worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human-caused-climate-change

3 Lee and Parfitt, 2022. A Climate Reckoning: The economic costs of BC's extreme weather in 2021. Canadian Centre for Policy Alternatives. https://policyalternatives.ca/climate-reckoning

Aerial view of Surrey, looking north from Newton (source: City of Surrey)

These impacts impose a heavy burden on lives and livelihoods, with the most vulnerable populations facing the greatest risks. Recognizing the urgent need for action, Surrey City Council declared a climate emergency in 2019. The declaration committed the City to take bold action in partnership with others; this strategy outlines our response to this immense challenge.

Effective climate action that addresses the scale of this challenge requires coordination and collaboration among all levels of government, society, businesses, and the community. The City cannot act alone, but has an important role to play. This includes coordinating action, reducing the risk of climate impacts to residents and businesses, investing in infrastructure that enables low-carbon choices, and demonstrating leadership to shift markets.

Now is the time to act with urgency and hope. Together we can do our part to halt the emissions warming our planet and prevent the worst impacts, building a sustainable and resilient future for Surrey.

"We are at a crossroads. The decisions we make now can secure a liveable future. We have the tools and know-how required to limit warming. I am encouraged by climate action being taken in many countries. There are policies, regulations and market instruments that are proving effective. If these are scaled up and applied more widely and equitably, they can support deep emissions reductions and stimulate innovation."

Dr. Hoesung Lee, Chair, Intergovernmental Panel on Climate Change (IPCC), 2022[4]

4 Intergovernmental Panel on Climate Change. "The evidence is clear: the time for action is now. We can halve emissions by 2030." Media Release. April 4, 2022. https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease

Causes and Impacts of Climate Change

Earth's climate has changed throughout its history, but the science leaves no doubt: human activities, not natural phenomena, are the driving force behind the exceptionally rapid warming that we are witnessing today.[5] Greenhouse gases (GHGs) in Earth's atmosphere act like a blanket, maintaining the planet's temperature within a range where life can flourish. Since the Industrial Revolution, however, we have added excessive amounts of GHGs, thickening this blanket and causing Earth's surface temperature to rise (Figure A.1).

Human activities are steadily increasing the atmospheric concentration of GHGs, particularly carbon dioxide, methane, nitrous oxides, and fluorinated gases. Energy production and combustion, primarily fossil fuels used in vehicles, buildings and industrial facilities, contributes 73% of these excess emissions. Land-clearing, forestry, and agriculture add another 18%.[6] Atmospheric carbon dioxide is now at its highest level in at least 800,000 years (Figure A.2).

Over the past 12,000 years, Earth's temperature has fluctuated by only about half a degree Celsius, providing a stable environment for the development of complex societies and civilizations. However, we are now leaving this stable zone, as the average temperature rises at an unprecedented rate.

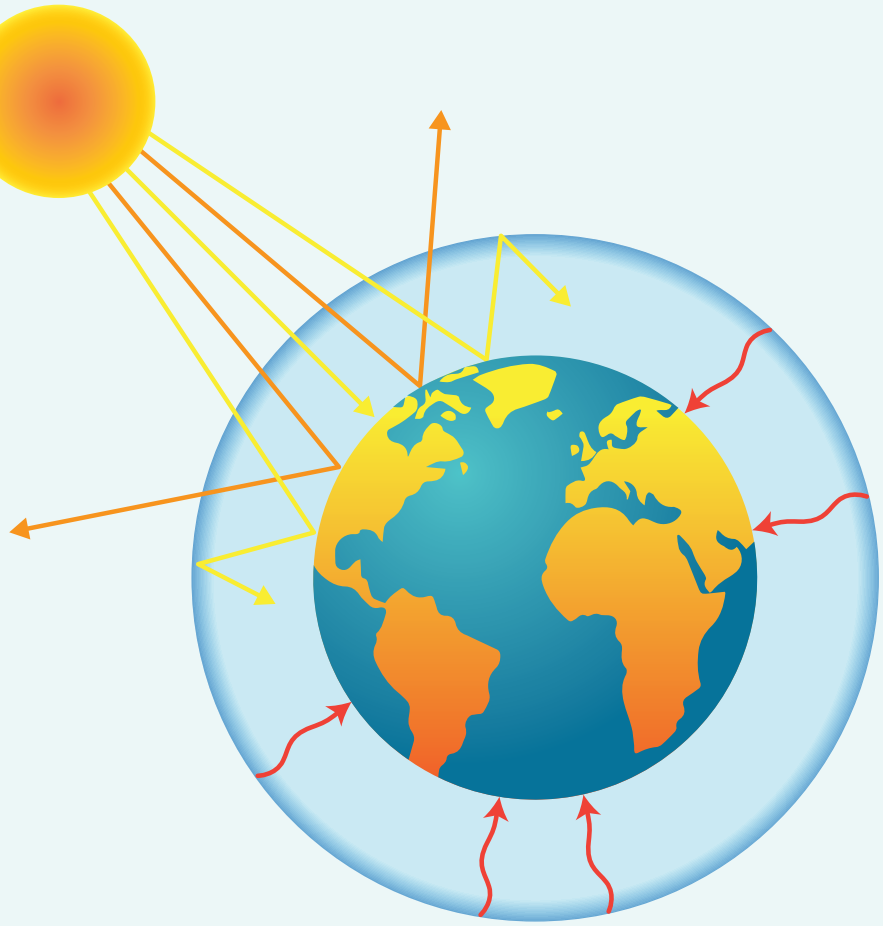


Figure A.1 Excess GHGs in Earth's atmosphere trap more heat from the sun

5 National Aeronautics and Space Administration (NASA). "The Causes of Climate Change." https://climate.nasa.gov/causes/

6 Ritchie, H. et. al. "CO_2 and Greenhouse Gas Emissions." 2020. Our World in Data. Global Change Data Lab. https://ourworldindata.org/co2-and-greenhouse-gas-emissions

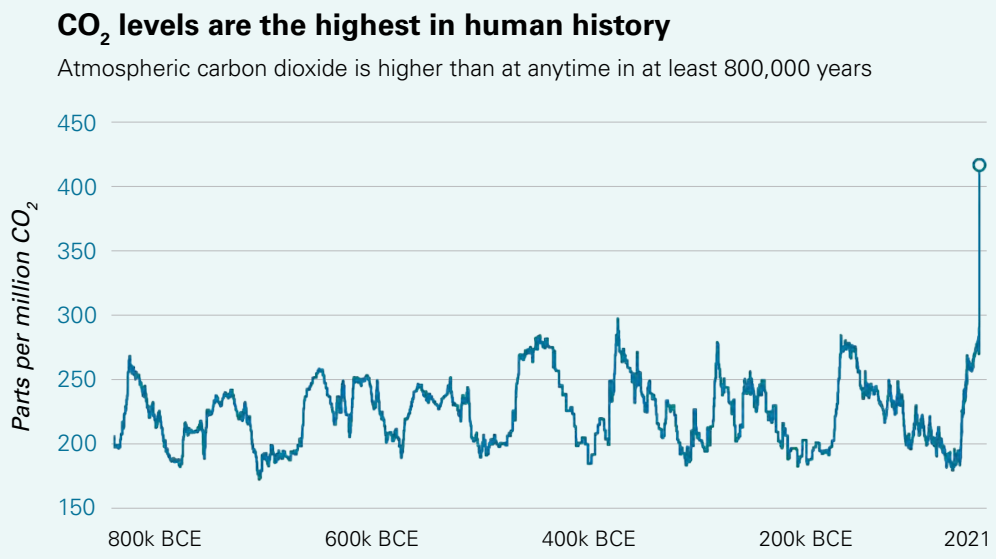


Figure A.2 Atmospheric carbon dioxide (CO_2) levels over the past 800,000 years (source: Bullard, N. "Decarbonization: The long view, trends and transience, net zero." January 2023. Original data: US EPA)

Human activities have already caused the planet's average temperature to increase by about 1.1°C. This warming is melting ice sheets, increasing sea levels, and causing more frequent and extreme weather events both locally and around the world. Climate change is already causing widespread damage to ecosystems and threatening one quarter of Earth's plant and animal species with extinction.

Without immediate and comprehensive action across all levels of government, the Earth's temperature is projected to rise by about 2.8°C by 2050. If governments roll back current policies, temperatures could soar by 4°C or more—a level unseen on Earth for millions of years, long before modern humans existed.[7]

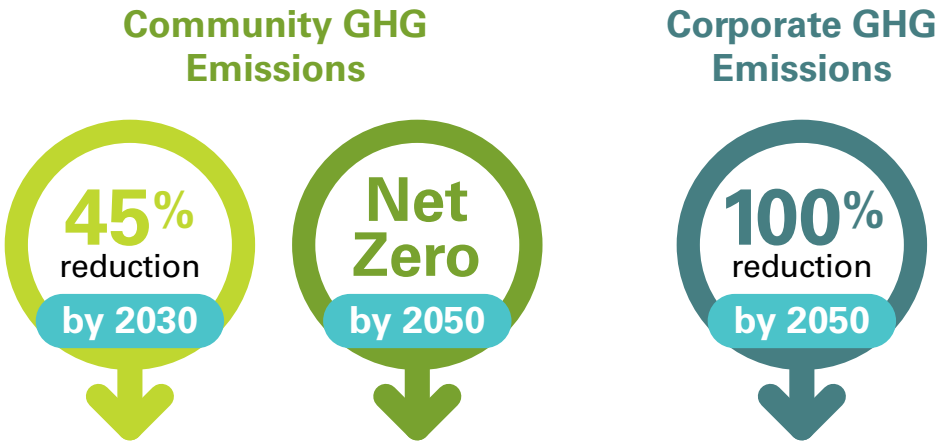
However, if governments pursue aggressive action now, warming could be limited to between 1.5°C and 2°C, a range that would result in far less damage.[8] Every fraction of a degree of warming avoided by reducing GHG emissions will reduce the harm suffered by people and other species. Furthermore, investing in emissions reduction and adaptation to climate change impacts will save money for governments and households, create economic opportunities, and improve environmental and human health.

7 Westerhold et al., 2020. An astronomically dated record of Earth's climate and its predictability over the last 66 million years. Science 369 (6509). Summarized by Stephens, T., in: "High-fidelity record of Earth's climate history puts current changes in context." UC Santa Cruz. https://news.ucsc.edu/2020/09/climate-variability.html

8 Intergovernmental Panel on Climate Change, 2022. Climate Change 2022, Mitigation of Climate Change, Summary for Policy Makers, Working Group III contribution to the Sixth Assessment Report of the IPCC https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

B. GHG Emissions and Targets

Surrey's Climate Commitments



This Climate Change Action Strategy outlines the actions that the City will take, together with other levels of government and partners, to reach the targets adopted by the City. As stated in the City's Official Community Plan, these targets are to:

> Reduce Surrey's community GHG emissions from non-agricultural and non-industrial activities to net zero before 2050.

> Show corporate leadership by demonstrating best practices in climate change mitigation by reducing City of Surrey corporate GHG emissions to absolute zero before 2050.

Following council's direction, the CCAS also establishes an interim target for reducing community GHG emissions which is to:

> Reduce Surrey's community GHG emissions from non-agricultural and non-industrial activities by 45% by 2030 compared with 2010 levels.

Jurisdictions use interim targets to track their progress and calculate how much of the "carbon budget" can be emitted while staying within a given temperature limit. The target stated above is aligned with the Inter-governmental Panel on Climate Change scenarios to limit warming to 1.5°C.[9]

This 2030 interim target is also generally consistent with 2030 targets adopted by other jurisdictions, including the Province, the federal government, Metro Vancouver, and neighbouring local governments.

This strategy takes an integrated approach to both reduce carbon pollution (also called "climate change mitigation"), while reducing risks and adapting to impacts such as extreme heat and flooding (also called "climate change adaptation").

The CCAS includes a review and update of the City's Climate Adaptation Strategy, originally adopted in 2013. Adaptation actions have been integrated in this report, providing a single point of reference for ongoing implementation. (See also: Adaptation and Resilience, Section E.)

9 Intergovernmental Panel on Climate Change, 2022. Climate Change 2022, Mitigation of Climate Change, Summary for Policy Makers, Working Group III contribution to the Sixth Assessment Report of the IPCC, page 21 https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

Understanding the Terms

Greenhouse gas (GHG) emissions refers to gases emitted by human activities that are driving climate change (see "The Causes and Impacts of Climate Change," above), including carbon dioxide (CO_2), nitrous oxides, methane, and fluorinated gases. GHGs are usually quantified as "tonnes of CO_2 equivalent" (tCO_2e), a measure of their potential to contribute to global warming as compared with a tonne of CO_2. The term "carbon pollution" is also used interchangeably with "GHG emissions" in this report.

Net zero GHG emissions means that any remaining human-caused emissions of GHGs to the atmosphere are balanced by the withdrawal of GHGs from the atmosphere through deliberate human activities (e.g. tree planting).[10] This "balancing" of emissions with negative emissions as defined below may be needed to compensate for GHGs that are not feasible to eliminate entirely.

Negative emissions refers to the process of actively removing GHG emissions from the atmosphere. This includes nature-based methods, such as tree planting, as well as direct air capture (DAC) technologies.[11] Tree planting locations are limited in Surrey's urban context, and DAC technology is not yet available at the needed scale, therefore it will be critical for reaching net zero to reduce overall emissions to as close to zero as possible, with negative emissions making up a small balance remaining.

Absolute zero emissions refers to entirely eliminating GHG emissions without relying on negative emissions or offsets. This target is feasible for assets within the City's direct control, principally buildings and fleet vehicles which have known pathways to decarbonization. It also demonstrates the City's commitment to impactful climate action. For these reasons the City's corporate emissions target focuses on a 2050 target of absolute zero emissions.

Surrey's Community GHG Emissions Scope

The GHG inventory for Surrey includes direct emissions (scope 1) and indirect emissions (scope 2). This means it covers GHGs emitted within the city's boundaries and emissions from electricity that is consumed within the city. However, it does not include consumption-based emissions (scope 3) related to producing and transporting materials. Emissions from industry and agriculture are also excluded from Surrey's community targets, with the exceptions listed below.

Surrey's community GHG inventory does not account for emissions from industrial processes, such as cement production, metal fabrication, chemical manufacturing, forest products, and petroleum refining. These emissions are tracked at a regional level.

However, the inventory does include emissions from heating space and hot water in industrial buildings. Emissions from heating large industrial building emissions are labeled as "Industry" in Figure B.1., while emissions from heating small and medium-sized industrial buildings fall under the "Institutional, Commercial, and Industrial (ICI) Buildings" category.

Agricultural GHG emissions consist of methane emitted from the digestive systems of livestock (enteric fermentation), manure management, land-use changes like deforestation for new fields and tilling soils, and on-farm fuel usage. Surrey's inventory does not cover the first three sources as these are tracked at the provincial level.

On-farm fuel usage is covered in the community inventory, specifically emissions from greenhouses and agricultural equipment like tractors. These are categorized as industrial buildings under "ICI Buildings" and as one of the categories of "Non-road Equipment," respectively, in Figure B.1. Due to these scope limitations and the fact that the Province regulates agricultural activities, the CCAS does not focus heavily on actions for agriculture.

10 Intergovernmental Panel on Climate Change, Special Report on 1.5 Degrees - Glossary ipcc.ch/sr15/chapter/glossary/

11 Note: This strategy does not contemplate purchasing emissions "offsets" as a mechanism to reach the City's GHG targets, as this approach remains fraught with accountability and fiscal prudence challenges.

Surrey's Carbon Pollution Sources

Community Emissions

As of 2020, Surrey's total carbon emissions were about 2.4 million tonnes (tCO_2e) per year.

Vehicles are the biggest source of Surrey's community carbon emissions, accounting for 45% of total emissions. Most of these emissions come from the 235,000+ passenger vehicles registered in Surrey (38%), followed by commercial vehicles like freight trucks (7%) and public transit (0.8%). As of 2017, Surrey residents used personal vehicles for about 80% of their trips, while 20% of trips were by public transit, cycling, or walking.

To reduce vehicle emissions, the City can make changes to land use planning, work with TransLink to improve public transit, plan and build roads to prioritize transit vehicles, create safe and connected networks of walking and cycling routes, and support the transition to zero-emissions vehicles. More details about these approaches can be found in the Resilient 15-Minute Neighbourhoods and Safe Zero-Carbon Transportation sections.

Buildings are the second-largest source of Surrey's community emissions, accounting for 42% of total emissions, mainly due to burning gas for heating and cooking. Since 98% of British Columbia's power comes from hydroelectric facilities, switching to electric heating and appliances can greatly reduce these emissions.

To cut building emissions, the City can work with other municipalities and the provincial government to adopt higher energy efficiency standards for new construction, adopt regulations to phase out fossil fuels from buildings, support building retrofits, provide low-carbon heating via the City's district energy system, and promote more efficient building forms in land-use policies. These approaches are outlined in the Healthy Zero-Carbon Buildings, Resilient Energy and Zero-Waste Systems, and Resilient 15-Minute Neighbourhoods sections.

Non-road equipment, like construction and agricultural machinery, contributes 8.2% of total community emissions. Metro Vancouver regulates non-road equipment and the City has limited influence over this sector.

Waste contributes 3% of Surrey's total community emissions, mainly from methane released by decaying organic matter in landfills. The City already has strong programs in place for recycling and organic waste diversion, including a biofuel facility that captures methane.

Industry represents emissions from large industrial facilities, which contribute 0.52% of community emissions. Heating small and medium industrial buildings is accounted for separately in the "Institutional, Commercial and Industrial Buildings" category, as explained in the text box "Understanding Surrey's Community Greenhouse Gas Emissions Scope", above.

Corporate Emissions

The City also generates carbon emissions from its own operations, which amount to 1% of community emissions (Figure B.2.). The City has committed to eliminating these emissions before 2050 to set an example and show its dedication to climate action.

City-owned facilities are the largest source of corporate emissions, mainly from burning gas for heating the City's pools, arenas, community centres, fire halls, libraries, and administration buildings. These emissions can be reduced by upgrading civic facilities and replacing equipment, such as switching out gas boilers for electric heat pumps.

City-owned vehicle fleets account for the next largest source of corporate emissions. The City is beginning to transition some vehicles to electric models and planning for the long-term shift to electric and renewable fuels.

Other corporate emissions sources include:

> Solid waste (waste-hauling trucks) - these emissions have recently been canceled; as of April 2023 Renewable Natural Gas produced in the biofuel facility is used to fuel the City's waste-hauling trucks.

> Contracted work, such as road building.

> City infrastructure, such as pump stations.

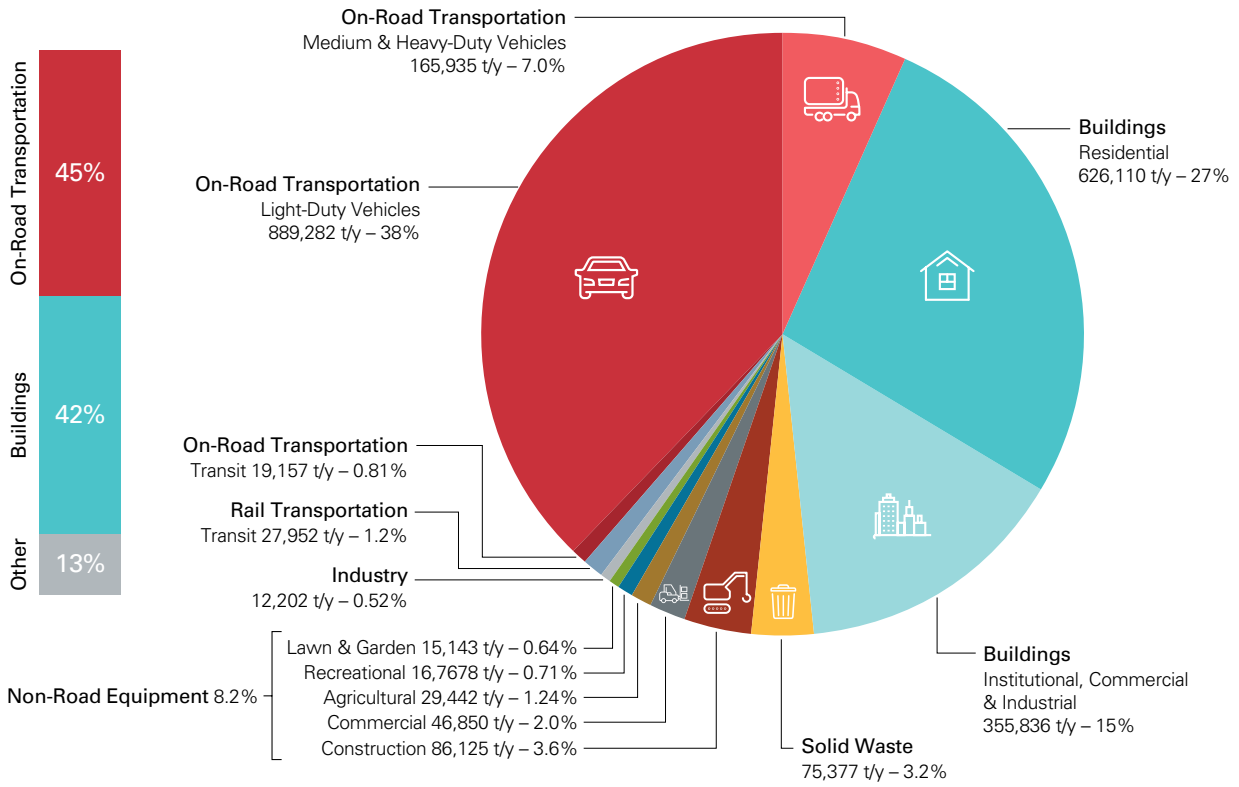


Figure B.1. Estimated amount and sources of Surrey's community carbon pollution in 2019 (total: 2.4 million tCO_2e/y)

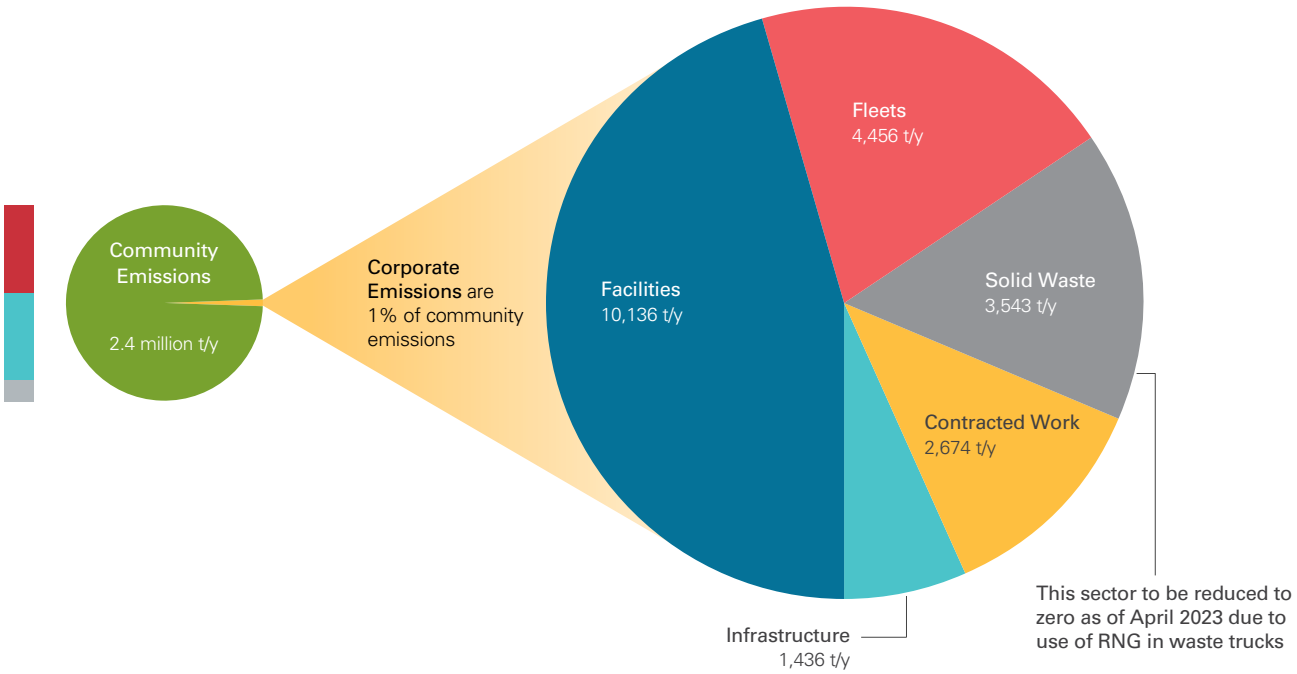


Figure B.2. City of Surrey corporate emissions in 2019 (total: 22,245 t CO_2e/y)

Pathway to 2050

Without taking decisive action, Surrey's community carbon pollution is expected to decrease slightly to around 2 million tonnes per year by 2050. This decrease reflects the impacts of zero emissions vehicle regulations. This "business-as-usual" scenario is illustrated with a dashed line along the top of the graph in Figure B.3. However, this level of emissions is still consistent with dangerous levels of climate disruption at the global scale.

The net zero pathway shown in Figure B.3. represents a course consistent with a stable climate, marked by an interim target for 2030. The coloured bands indicate modelled emissions reductions from different sectors.

To transition to the net zero pathway, the City must quickly phase out fossil fuel combustion, particularly from transportation and buildings, which are the community's two largest sources of emissions. This process primarily involves shifting to sustainable transportation, concentrating new growth in areas well-served by transit, and electrifying both vehicles and buildings.

While the City can directly take action and influence many sources of carbon pollution, success requires partnership with senior governments, industries, partner organizations, as well as the support and involvement of residents and businesses.

Putting this plan into action will require additional resources, on the part of all levels of government, including the City, and in some cases new revenue sources may be needed. Yet the City and the community also stand to benefit from reduced energy costs, improved health, and economic growth opportunities. Some of these considerations are outlined in "Costs and Benefits" on page 71. These investments can therefore support the City of Surrey's broader vision of a thriving, green, inclusive city.

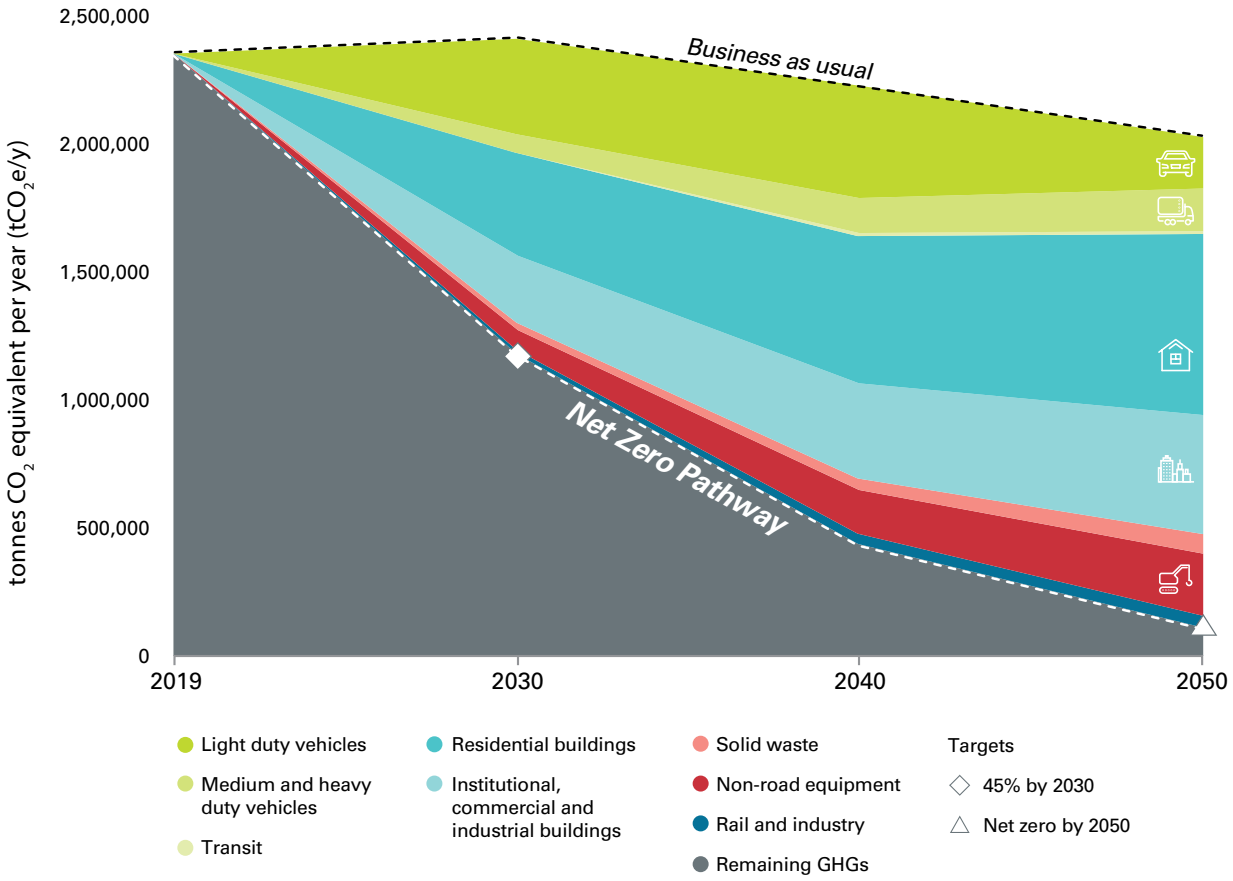


Figure B.3. Projected community emissions, business as usual versus pathway to net zero

C. Strategy Foundations

Community Engagement

The CCAS has been shaped by community feedback. In 2021, City staff sought input from First Nations, the public and stakeholders by sharing a preliminary CCAS framework, organized under five essential components: City Leadership; Neighbourhoods; Transportation; Buildings; and Ecosystems.[12] Each component outlined a draft vision, targets and "key strategies", as outlined in Corporate Report R217; 2021.[13]

Engagement consisted of communications campaigns (social media, newspapers, radio, City website and newsletters, etc.), surveys, online meetings and virtual events. City staff met with interested groups and followed up with letters summarizing their input and how it would be addressed.

Public Surveys

Staff used two complementary survey methods to understand public opinion: a standard "opt-in" survey and a science-based "probability survey" designed to ensure statistical validity and minimize bias. Similar techniques were used for the Surrey Transportation Plan (STP) Phase Three consultation. The results from the STP consultation are relevant given predominance of transportation emissions in Surrey's GHG profile.

What We Heard

Detailed findings from the CCAS surveys are reported in the Community Engagement Summary Report cited above. Some key findings from this work include:

> **84% of Surrey residents are concerned about climate change.** These results align with other probability surveys recently undertaken in the region, the province, and across Canada.

> **Knowledge about emissions sources and local government climate action is limited.** When asked to identify the largest source of community GHG emissions in Surrey, most respondents either stated they did not know, or cited an irrelevant source, similar to results from other regional surveys. This illustrates the need for more education and accessible language.

> **There was high support for the Vision and Key Strategies in the preliminary CCAS framework.** On average, more than 75% of respondents supported the Vision and Key Strategies for each of the five components, with fewer than 6% opposing them. (See Figures C.1 and C.2, below.)

> **The STP probability survey showed strong support for all four proposed Bold Moves:** Put Safety First; Support 15-Minute Neighbourhoods; Connect Communities with Rapid Transit; and Invest in Green Transportation Choices. These Bold Moves align with the priorities of the CCAS.

> **Many Surrey residents called for the City to be bolder in its climate commitments, demonstrate leadership, and address equity concerns.** This included recommendations for the City to demonstrate consistent action and leadership, adopt commitments such as interim GHG targets consistent with other jurisdictions, and ensure accountability such as by aligning decision-making with climate targets.

Based on the feedback received, the CCAS includes an interim GHG target for 2030 and presents a robust framework consisting of six components, each of which includes a Vision, Goals, Shifts, and specific Actions. In addition, Quick-Start actions are prioritized for immediate implementation. Measures and targets are included for some Goals, while staff will develop others pending further analysis. Feedback also informed the Guiding Principles, the integration of Co-Benefits, and Adaptation and Equity sections.

12 A sixth component (Resilient Energy and Zero-Waste Systems) was subsequently added to this initial framework, based on feedback.
13 "Key Strategies" were preliminary statements describing some of the significant policy shifts proposed to achieve the stated vision and targets. They are similar in scope to the Shifts included in the final framework presented in this plan.

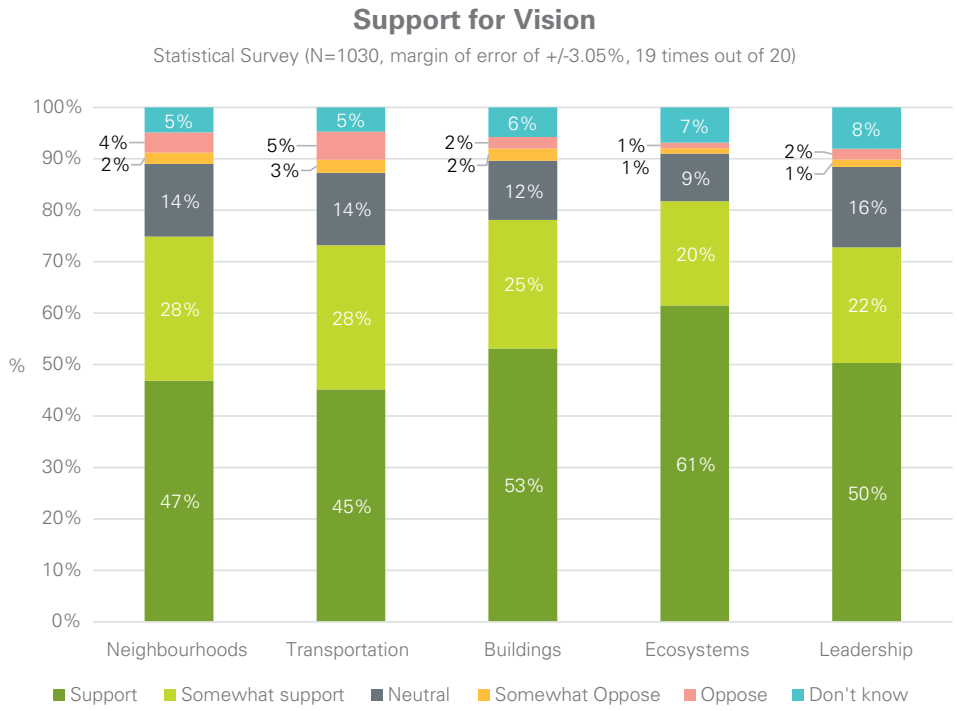


Figure C.1. Support for the draft vision statements for each of five components of the preliminary CCAS framework

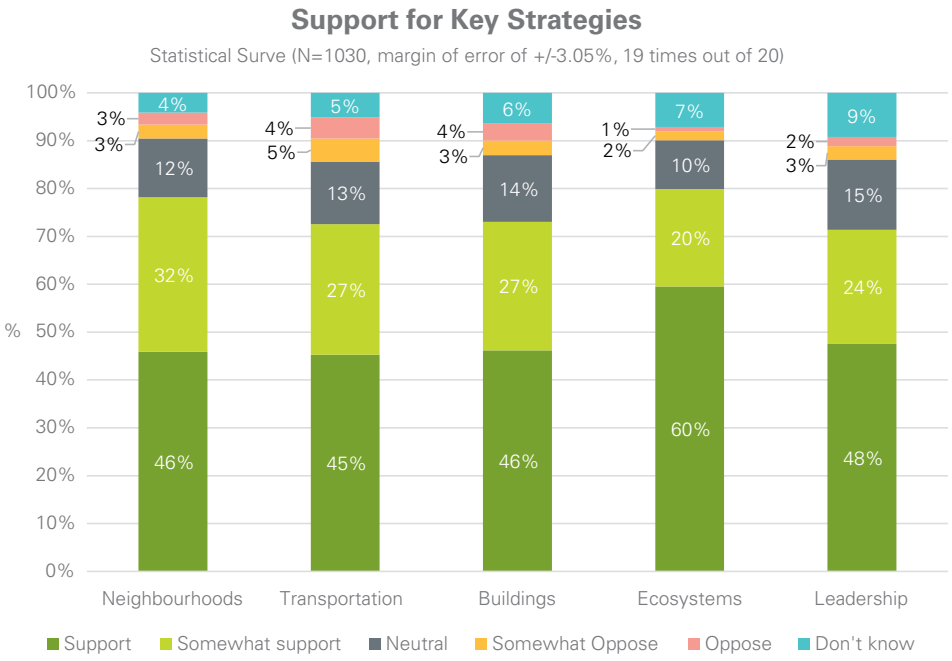


Figure C.2. Support for "Key Strategies" for each of five components of the preliminary CCAS framework

Guiding Principles

The following guiding principles are based on best practices and feedback from public consultation. Staff applied them to develop the CCAS framework described in the next section and the City will use them to guide its implementation.

1. Climate Equity

Climate impacts are inherently unjust, as those who have contributed the least to the problem—such as low-income individuals—often bear the heaviest impacts and have the least capacity to adapt. Climate equity focuses on ensuring a fair distribution of climate action benefits and alleviating the disproportionate burdens caused by climate change. This plan strives to address different aspects of equity, engage thoughtfully and prioritize solutions that support equity-seeking groups and vulnerable individuals. See also "Toward Equity in Climate Action", Section F.

2. Zero-Carbon Resilience

Zero-carbon resilience is a holistic approach to climate action that combines the goals of both reducing emissions and enhancing resilience to climate change impacts simultaneously. This can leverage synergies and maximize the return on investments. For example, designing "complete streets" that provide safe, protected facilities for walking and cycling, together with green infrastructure such as rain gardens, street trees, and absorbent surfaces, helps to reduce carbon pollution, mitigates urban heat impacts, and fosters social and economic opportunities. Whenever possible, holistic, zero-carbon resilient strategies and actions will be pursued through implementation of this strategy.

3. Embedment

Meeting our targets and reducing our exposure to climate impacts requires a coordinated, "all of government" approach across departments. To that end, through this strategy the City will aim to integrate climate action in strategic plans, policies, and regulations, create tools for climate-aligned decision-making, and ensure all departments take responsibility for climate outcomes in their portfolios.

4. Accountability

Accountability will be promoted by defining clear and measurable commitments that are aligned with international standards, communicating and transparently reporting on progress, and incorporating actions into internal work plans and budgets. This includes implementing decision-making tools to account for climate impacts, disclosing the City's climate risks, and documenting when trade-offs must be made or when factors outside the City's control prevent meeting ideal outcomes.

5. Collaboration

Recognizing that climate change doesn't have geographic boundaries, we cannot reach our climate targets and goals alone. The City will foster collaboration, including with Indigenous Peoples, senior governments, industry, businesses, researchers, practitioners, stakeholders, residents, and others. This includes sharing information and best practices, developing trust and strong relationships, and involving the community in coming together for creative solutions.

6. Maximize Co-Benefits

The City will prioritize those actions that can deliver multiple benefits, including but not limited to improved health, equity, prosperity and resilience, as described on the following page. This supports fiscal responsibility and achieving holistic outcomes.

Co-Benefits of Climate Action

Climate action means more than just reducing carbon pollution. It can also yield multiple community benefits, including those listed below.

Equity

Equity is both a guiding principle of this strategy, as outlined above, and a potential outcome when thoughtfully integrated in policies and actions. See "Toward Equity in Climate Action," Section F.

Health

The health impacts of climate change are real and significant. A recent national report found that, without further action, Canadians could be paying $87 billion per year in health costs associated with climate change impacts.[14] Many of the actions in this plan will improve health. For example, reducing reliance on fossil fuel combustion can reduce outdoor and indoor air pollution. Land use planning that enables more people to access their daily needs close to home promotes walking and cycling. Protecting and planting trees can help to clean and cool the air, while access to nature improves physical and mental health.

Resilience

This strategy includes actions that will reduce risk to the organization and the community and improve resilience to climate impacts such as extreme heat, flooding, storms, and sea level rise. Resilience means that the City's assets and systems are designed for flexibility to absorb disturbances and continue to function. For example, trees and green infrastructure (e.g. rain gardens, green roofs) help reduce flooding, provide cooling, improve biodiversity, and help to purify the air and water. These functions reduce the stress of extreme weather on people and ecosystems. (See also "Adaptation and Resilience," Section E.)

Prosperity

This strategy's commitments to action and leadership can help to attract investment and businesses that seek to align with the emerging zero-carbon economy. For example, as people improve the energy efficiency of their homes and businesses, companies are starting up and expanding to build, supply, and install the needed products and services—such as new high-performance windows and electric heat pumps. Prosperity also means spending public money wisely. This means not simply cutting costs today, but investing in solutions that reduce lifecycle costs, generate value, and help us prepare for the future.

Potential co-benefits are highlighted in the CCAS Framework with the icons shown above.

14 The Canadian Institute of Climate Choices. (2021). The Health Costs of Climate Change https://climatechoices.ca/wp-content/uploads/2021/06/ClimateChoices_Health-Report_-Summary_June2021.pdf

"Complete streets" that combine green infrastructure with safe routes for cycling and walking help to deliver co-benefits for health, equity, resilience, and prosperity (source: City of Surrey)

Costs and Benefits of Climate Action

The report "The Causes and Impacts of Climate Change" by the Canadian Climate Institute emphasizes the growing financial burden of dealing with extreme weather events caused by climate change. The study projects that unchecked climate change could slash Canada's GDP by $25 billion by 2025, resulting in reduced income to all households, and even deeper cuts for low-income households. This economic damage would accumulate, potentially reaching up to $105 billion by 2055.[15]

However, the same study reveals that we can collectively diminish the impact on GDP by 75% by focusing both on reducing emissions and investing in adaptation. Moreover, every dollar spent on climate adaptation can capture up to $15 in direct and indirect economy-wide benefits.

As risks associated with stranded assets in a high-carbon economy rise, unparalleled investment opportunities also emerge in low-carbon technologies on a global scale.[16] The transition is also presenting local opportunities. A regional study by the Vancouver Economic Commission in 2019 concluded that, due to energy efficient building regulations, Surrey-based building technology companies could capture a cumulative revenue of $712 million by 2032. This opportunity allows Surrey to leverage its growth and innovation to play a leadership role in the global transition to a low-carbon economy.

15 Canadian Climate Institute, 2022. The GDP costs of climate change for Canada https://climateinstitute.ca/the-gdp-costs-of-climate-change-for-canada/

16 Bloomberg New Energy Finance. Energy Transition Investment Trends. https://about.bnef.com/energy-transition-investment/

Relationship of CCAS to Other Plans and Policies

Climate change touches all aspects of our society, economy, and environment, and we need to make many systemic changes to meet our targets. That's why this strategy places climate action at the heart of the City's decision making. The Guiding Principle of embedment means that the CCAS is not a stand-alone document. Instead, it integrates climate action across the organization, to inform and influence all relevant strategic plans and policies, as illustrated in the diagram below (Figure C.1.).

Figure C.1. Relationship of Climate Change Action Strategy to other City of Surrey plans and policies

D. Climate Action Framework

Organization of CCAS Framework

The CCAS is organized around a long-term vision of **a zero-carbon climate-resilient city in 2050**, supported by six **components**, or critical areas of action:

1. Bold City Leadership
2. Resilient 15-Minute Neighbourhoods
3. Safe Zero-Carbon Transportation
4. Healthy Zero-Carbon Buildings
5. Climate-Positive Resilient Ecosystems
6. Resilient Energy and Zero-Waste Systems

This overall structure is shown in the graphic on the preceding page.

Each component in turn includes the following hierarchy, illustrated in Figure D.1.

- **Vision:** A narrative description of the desired future state for that component in 2050.
- **Goals:** The outcomes needed to reach the vision.
- **Shifts:** The changes needed to achieve each goal.
- **Actions:** The specific policy or program interventions needed to achieve a Shift.

Actions flagged as "**Quick-Starts**" are well-defined priorities to be initiated within two years and are illustrated with this icon.

Figure D.1. Structure of the Climate Change Action Strategy Framework

2050 Vision

The overall 2050 vision for Surrey is ***a zero-carbon, climate-resilient city***. This vision encompasses the 2050 and interim GHG targets described previously and integrates climate adaptation.

"Resilient" means designing flexibility into our interrelated economic, social, ecological systems so they can more readily absorb the stresses and disturbances of climate impacts and continue to function to deliver critical services.

The CCAS is organized around six key components, or areas of action needed to achieve a zero-carbon, resilient city in 2050. The following six vision statements support the overall 2050 vision.

Bold City Leadership

Vision for 2050: The City of Surrey stands among this region's leaders in placing equitable climate action at the heart of decision-making. The City's own vehicles, buildings, and infrastructure are free of carbon pollution and well-prepared for climate change impacts well before 2050. With support from the City and other partners, residents are empowered and engaged in tackling the climate crisis. Surrey's actions set a path for many others to follow, and support a thriving, local green economy.

Resilient 15-Minute Neighbourhoods

Vision for 2050: Residents can meet their daily needs within a safe and easy walk, roll, or cycle trip from home. Most neighbourhoods have a mix of housing types, with shops, services and inclusive public spaces. Lush trees and greenspaces provide cooling, beauty and connection with nature.

Safe Zero-Carbon Transportation

Vision for 2050: People can easily get around within and between neighbourhoods via networks of safe, accessible sidewalks, bike paths, and frequent transit. As these sustainable choices increase, there is less need for people to use a car. All vehicles are zero-emissions, resulting in cleaner air and a quieter city.

Healthy Zero-Carbon Buildings

Vision for 2050: All buildings across Surrey are healthy, energy efficient, and zero-carbon in operational emissions. They are constructed to minimize lifecycle emissions, are comfortable year-round, and help to protect occupants from the impacts of climate change.

Climate-Positive Resilient Ecosystems

Vision for 2050: Surrey is threaded with protected and restored forests, streams, and wetlands, along with parks, urban trees and rain gardens. These ecosystems provide places for people to enjoy nature, support biodiversity, store carbon, reduce air and water pollution, and improve climate resilience.

Resilient Energy and Zero-Waste Systems

Vision for 2050: Surrey's energy systems are free of carbon pollution, primarily rely on electricity and support on-site renewable energy production, while renewable fuels are prioritized for the most difficult to decarbonize uses. Goods and materials are produced and reused in a circular manner that avoids waste and generates value for the community.

Clayton Community Centre - North America's first Passive House certified community centre (source: @andrewdoranphoto, courtesy of hcma)

1. Bold City Leadership

Where We Are Today

In Surrey we have many existing examples of climate leadership to build upon. For example:

> The Clayton Community Centre, North America's first Passive House certified community centre, burns no fossil fuel and uses 90 per cent less energy than a community centre built to the minimum legal requirements.

> The Surrey Biofuel Facility turns yard waste and kitchen scraps into renewable fuel for waste collection vehicles.

> Surrey City Energy, a City-owned neighbourhood energy utility that provides heat to large buildings in City Centre, is being transitioned to use waste heat from the sewer system instead of natural gas. The new energy centre is planned to be up and running in 2026.

> Surrey was among the first cities in British Columbia to require electric vehicle charging for all residential parking in new developments, and the City continues to expand the public charging network.

> The City has strong policies, such as a Biodiversity Conservation Strategy, and the BC Energy Step Code for new construction.

> Surrey has an award-winning Coastal Flood Adaptation Strategy (CFAS), supported by $76 million in federal funding. The CFAS applies engineering with "nature-based solutions" to protect lands and infrastructure from climate-related flooding.[17]

These and other examples provide a strong base to build on, but there's more to do to meet the City's community and corporate GHG targets. This includes making "flagship" projects like the Clayton Community Centre the new business as usual, ensuring City resources are sufficient to support scaling up our efforts, investing in climate-resilient assets, and developing new tools, processes, and partnerships.

However, the City cannot act alone. Meaningful progress in the zero-carbon transition also requires regulatory changes and financial support from senior governments and agencies such as BC Hydro and TransLink, as well as leadership and participation of businesses and the community.

17 For example, see the Mud Bay "living dyke" pilot project https://www.surrey.ca/services-payments/water-drainage-sewer/flood-control-and-prevention/coastal-flood-adaptation-projects/mud-bay

Goals and Shifts

> The goal to ***align decision-making and financial planning with climate commitments*** is critical to the Guiding Principles of embedment and accountability. This includes developing decision-making and reporting tools, considering climate in capital budgets, and developing financial and resourcing strategies.

> The goal to ***transition to zero-carbon and resilient City*** assets addresses the Guiding Principle of zero-carbon resilience, and requires a two-fold approach:

- New assets, such as facilities, vehicles, and infrastructure, can be designed to avoid carbon pollution and (where relevant) improve resilience at the outset. This is a cost-effective investment in the future that can help to avoid stranded assets and the higher costs of retrofits.
- Existing assets like facilities and vehicle fleets require a strategic approach to prioritize the largest emitters and, to the extent possible, align upgrades with replacement cycles. Decision-making tools can also support climate-aligned purchasing for these upgrades.

> The goal to ***collaborate with and empower the community*** supports the Guiding Principles of collaboration and equity. This includes developing a stronger emphasis on equity (see Section F), developing partnerships with businesses, and supporting community-led climate action.

These Goals are supported by the Shifts outlined on the following page, and the Actions and Quick-Starts shown in the Implementation Table, Section G.

Potential Outcomes and Co-Benefits

The Shifts and supporting actions for Bold City Leadership represent foundations needed to achieve outcomes across the other components of the CCAS. They can act as catalysts to spark bigger changes in the community, build trust, and foster collaboration with and among residents, businesses, industry, academia, and others. They can also set direction for responsible fiscal management and risk management in line with the recommendations of the Task Force on Climate-Related Climate Financial Disclosures.

Summary Sheet Graphics

Summary sheets are included for each component, presenting the Vision, Goals, Shifts and Measures and Targets, along with context including the two graphics described below.

This dial gives a relative indication of the City's current status compared to each 2050 Goal. The needle may point to one of the following five positions on the dial:

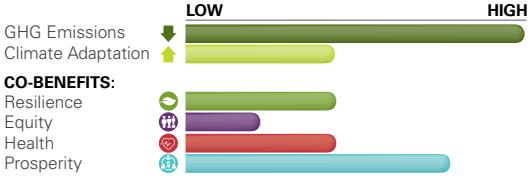
0. Preparing to Start	No existing policies or programs are in place
1. Getting Started	Initial steps have been taken, but it's early in the journey
2. Building Foundations	Some policy/pilots are in place but are not yet business-as-usual
3. Progressing	Practices are gaining momentum and are being scaling up
4. Well on Our Way	Policies and programs are well established
5. Nearly There	Only small changes are needed to reach this goal

The bar graph below shows an indication of the potential for these shifts to deliver the outcomes of GHG reduction and climate adaptation, and co-benefits for resilience, equity, health, and prosperity.

This is a relative scale ranging from low to high:

> **Low** means the potential impact/benefit is minor, indirect, or uncertain

> **High** means there is large potential impact or benefits, with well-established evidence



Bold City Leadership

Vision for 2050

The City of Surrey stands among this region's leaders in placing equitable climate action at the heart of decision-making. The City's own vehicles, buildings, and infrastructure are free of carbon pollution and prepared for climate change impacts well before 2050. With support from the City and other partners, residents are empowered and engaged in tackling the climate crisis. Surrey's actions set a path for many others to follow, and support a thriving, local green economy.

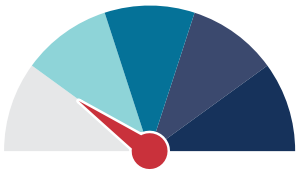
Measures and Targets

Interim corporate GHG targets will be developed pending further analysis.

GOAL 1

Align the City's decision making and financial planning with climate commitments

Where We Are Now



"Getting Started"

Strengths to Build On

> Advanced data and systems, e.g. Surrey Excels, data-driven decision making, data and analytics

> Sustainability Charter sets broad direction

> Financial Plan Reporting can be leveraged for climate-related financial disclosure

Shifts* – What is needed to reach this Goal?

L1 Advocate for senior government regulations and funding to accelerate ambition and action to meet local, provincial, national, and global climate commitments.

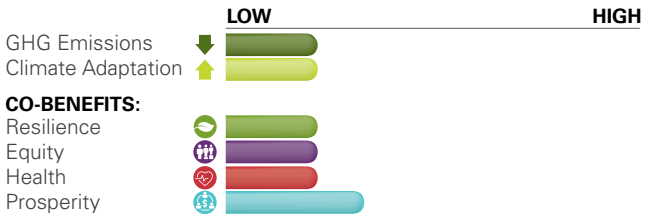
L2 Assess staff capacity and financial resources needed to meet climate commitments and seek to fill gaps.

L3 Develop tools and programs to embed climate action in the City's financial decision-making and reporting.

Potential outcomes and benefits of implementing these Shifts

> Create critical foundations for success of all other CCAS goals

> Set direction for addressing climate risk in financial planning

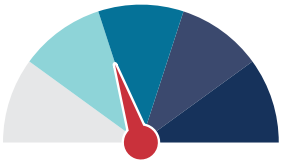


*See Implementation Table (Section G) for specific Actions supporting these Shifts

GOAL 2

Transition to zero-carbon and resilient City assets

Where We Are Now



"Building Foundations"

Strengths to Build On

> Leading civic projects and infrastructure (e.g. Clayton Community Centre, district energy)

> Exemplary Coastal Flood Adaptation Strategy

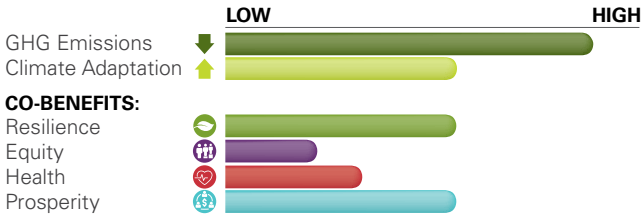
Shifts* – What is needed to reach this Goal?

L4 Ensure new civic facilities, vehicles, and other assets are zero-carbon and designed for climate resilience from the outset.

L5 Develop strategic plans to phase out carbon pollution from existing City facilities, vehicle fleets and waste collection.

L6 Design and manage City infrastructure and assets to reduce climate risk and improve resilience, prioritizing nature-based solutions.

Potential outcomes and benefits of implementing these Shifts



> Reduce **corporate** GHG emissions

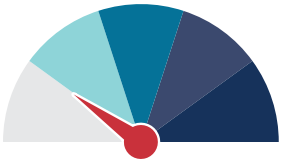
> Enhance resilience of critical infrastructure (nature-based solutions)

> Save costs in avoided damages

GOAL 3

Collaborate with, support and empower the community and businesses in climate action

Where We Are Now



"Getting Started"

Strengths to Build On

> Business and industry partnerships

> Strong community groups

> Culturally diverse community

> Emergency management programs

Shifts* – What is needed to reach this Goal?

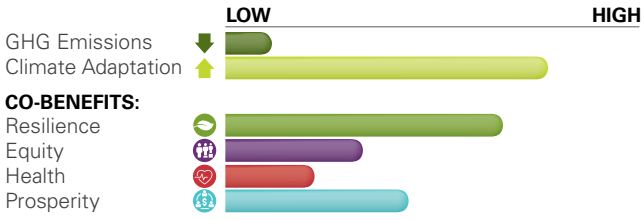
L7 Continue to update emergency management programs and resources to enhance community resilience to climate-related extreme weather events.

L8 Work with businesses, industry groups, and educational partners to position the City as a leader in Canada's equitable transition to a zero-carbon economy.

L9 Support and enable Surrey residents, employees, and groups to take meaningful climate action in their work and daily activities.

L10 Embed equity in climate action policies and implementation.

Potential outcomes and benefits of implementing these Shifts



> Support resilience through emergency management

> Improve equity with strengthened policy

> Leverage economic opportunities of the zero-carbon transition

*See Implementation Table (Section G) for specific Actions supporting these Shifts

Concept drawing from Semiahmoo Town Centre Plan (source: City of Surrey)

2. Resilient 15-Minute Neighbourhoods

Where We Are Today

Planning our communities determines the distances we need to travel and the transportation modes we use to visit friends, shop, and commute to work or school. Vehicles are the leading source of carbon pollution and a major source of health-harming air contaminants in Surrey. The most effective way to reduce this pollution is to reduce the distance we need to travel in the first place.

Decades ago, Surrey was designed as a suburb, in a time when getting around by car was the norm. As a result, many homes remain far from essential services and amenities. Today, the City is focusing on creating complete neighbourhoods with mixed-use development, more affordable and energy- efficient multi-unit homes, and boosting employment opportunities in rapid transit areas such as City Centre. The City's Official Community Plan and Zoning Bylaw are two key regulations that direct where new growth will occur and its forms. Pending and future updates to these plans provide an ideal opportunity to enhance livability and reduce carbon pollution as the city grows.

For example, the City can encourage infill development, which involves increasing housing density in existing single-detached neighbourhoods within walking distance of the Frequent Transit Network,[18] such as laneway houses, multi-plexes, row houses, townhouses, low- to mid-rise apartments, etc. Concentrating growth in areas that are already serviced with infrastructure, instead of undeveloped areas, also helps to protect ecosystems.

What Daily Needs Are Most Important?

Preliminary public consultation results for the STP showed that residents prioritize access to **frequent transit, groceries, parks, and schools** within a 15-minute walk. These destinations are highlighted with stars in Figure D.2.

Local jobs and a variety of civic facilities are important in Surrey's context, especially in town centres. However, these destinations are not required in every 15-minute neighbourhood, as long as residents can reliably access

18 Metro Vancouver's Frequent Transit Network (FTN) is a network of corridors where transit service runs at least every 15 minutes in both directions throughout the day and into the evening, every day of the week. https://www.translink.ca/plans-and-projects/projects/frequent-transit-network

them with transit. Through the pending update to the Official Community Plan, the City will conduct further analysis to define ideal destinations and distances and develop policies supporting 15-minute neighbourhoods.

What is a 15-Minute Neighbourhood?

A 15-minute neighbourhood offers daily necessities, such as shops, services, and transit access, within a short distance from home, typically equivalent to a 15-minute walk or less. The neighbourhood features safe and accessible routes for walking, cycling or using mobility devices. Transit connects these neighbourhoods and link with employment centres and other regional destinations.

For those who may still need or choose to drive, having more close-by amenities means shorter trips and the option to spend more time enjoying other activities. This type of neighbourhood is not new – in fact it's how cities were planned and built for thousands of years. The concept can be reintroduced to help communicate the linkages between land use, transportation, and climate action, and measure the City's progress toward more complete communities.

Goals and Shifts

> The goal to ***plan and build 15-minute neighbourhoods*** embodies the Guiding Principles of zero-carbon resilience and maximizing co-benefits. It represents a holistic approach to reducing emissions that also has the potential to improve equity, health, resilience, and economic prosperity. This Goal is supported by Shifts focused on updating policies and regulations for new growth to align with the vision of resilient 15-minute neighbourhoods, including through intensification and infill development and other actions that will help reduce vehicle reliance.

> The goal to ***improve the resilience of new and existing neighbourhoods*** also addresses the Guiding Principle of zero-carbon resilience by planning for resilient, green features including green infrastructure (such as rain gardens, natural assets, and shade trees) that help lessen climate impacts. These features can also help reduce emissions by sequestering carbon, and by creating more comfortable public spaces that support increased walking and cycling.

This approach can achieve mutually reinforcing benefits: reduced transportation emissions, cleaner air, healthier ecosystems, strengthened social connections and healthier lifestyles, and a vibrant local economy.

These Goals are supported by the Shifts outlined on the following pages, and the Actions shown in the Implementation Table in Section G.

Potential Outcomes and Co-Benefits

The Goals, Shifts, and supporting Actions for Resilient 15-Minute Neighborhoods can help to accelerate Surrey's evolution from a suburban community to a more mature and well-connected mosaic of higher-density town centres, medium density urban villages, and other varieties of mixed-use and walkable neighbourhoods. By prioritizing intensification and infill development, more natural features in other less-developed areas can be preserved, and more residents can live closer to their daily needs. With less need for driving, there is less carbon pollution and more public space that support health, social connections, and prosperity, with features such as trees and gardens and play areas.

The City can proactively improve equity by directly involving equity-seeking groups and vulnerable individuals in planning processes and implementing programs to address concerns such as displacement. Engaging with Indigenous communities can also create opportunities for reconciliation, such as partnerships to develop and celebrate culturally important sites and features.

Resilient 15-Minute Neighbourhoods

Vision for 2050

Residents can meet their daily needs within a safe and easy walk, roll, or cycle trip from home. Most neighbourhoods have a mix of housing types, with shops, services and inclusive public spaces. Lush trees and greenspaces provide cooling, beauty and connection with nature. Surrey's actions set a path for many others to follow, and support a thriving, local green economy.

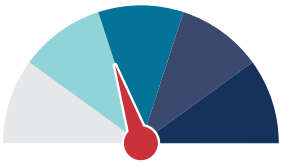
Measures and Targets

Measures and Targets for Resilient 15-Minute Neighbourhoods will be defined through the Official Community Plan update process.

GOAL 1

Plan and build a network of 15-minute neighbourhoods

Where We Are Now



"Building Foundations"

Strengths to Build On

> Urban structure of five town centres with higher density, mixed use, and transit

> Planning for complete communities around SkyTrain stations, including the new Surrey-Langley line

> An Official Community Plan that is undergoing a detailed review and update

Shifts* – What is needed to reach this Goal?

N1 Update land use planning regulations— including the City's Official Community Plan, Zoning Bylaw and other plans— to support creating more 15-minute neighbourhoods.

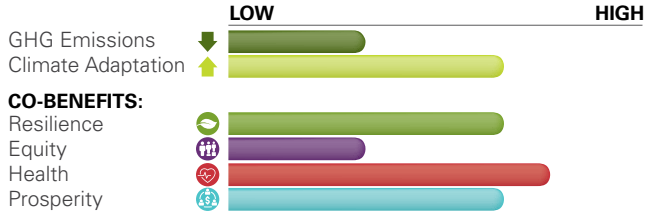
N2 Update regulations and policies for new development to support reduced automobile reliance.

Potential outcomes and benefits of implementing these Shifts

> Avoiding greenfield development improves adaptation and resilience

> Walkable 15-minute neighbourhoods improve happiness and health

> 15-minute neighbourhoods can improve economic activity and support local businesses



*See Implementation Table (Section G) for specific Actions supporting these Shifts

GOAL 2

Improve climate resilience of new and existing neighbourhoods

Where We Are Now

"Building Foundations"

Strengths to Build On

> Rapid growth creates opportunities to design and build climate-resilient neighbourhoods

> Green Infrastructure Network provides backbone to build off to protect more ecological features

> Existing practices and policies for climate adaptation, such as Coastal Flood Adaptation Strategy

Shifts* – What is needed to reach this Goal?

N3 Design and retrofit neighbourhoods with green and inclusive public spaces that improve climate resilience.

N4 Encourage food growing in new developments and in publicly accessible spaces in existing neighbourhoods.

N5 Integrate climate adaptation in land-use planning regulations and development policies.

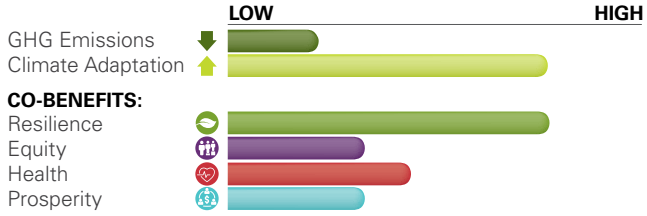
Potential outcomes and benefits of implementing these Shifts

> Enables GHG reduction from buildings and transportation

> More greenspace and access to nature improves health and resilience

> Proactive planning for adaptation and resilience saves on infrastructure costs

> Potential for economic development and improved equity



*See Implementation Table (Section G) for specific Actions supporting these Shifts

105 Avenue, Surrey (source: City of Surrey)

3. Safe Zero-Carbon Transportation

Where We Are Today

Like most North American cities, Surrey's infrastructure has historically focused on personal vehicles. Today, transportation contributes 45% of Surrey's community GHGs, with the large majority coming from passenger vehicles, while roads occupy roughly 20% of the non-agricultural land in Surrey. Reliance on personal vehicles also leads to traffic congestion, traffic-related injuries and fatalities, and emits health-harming air contaminants. By 2041, Surrey is expected to become the most populous city in B.C. In this context, we need to significantly update our transportation system by shifting to sustainable modes that will curb these negative impacts.

Transitioning to electric and zero-emissions vehicles is also critical for reducing emissions and air pollution. This transition is already underway thanks to a combination of market trends, federal and provincial regulations, and City policies and investments. In 2021, council approved the City's Electric Vehicle (EV) Strategy. The City provides public EV charging at various public facilities, and plans to more than double the number of chargers in the next three years (see text box on page 31). The City also established one of the first EV-ready bylaws for new development.

However, EVs are not an equitable or affordable option for many residents. And we simply don't have the space for wider roads, regardless of whether they are gas-powered or electric. Figure D.3. compares the overall carbon pollution and public space impacts of various transportation modes.

Considering these factors, this strategy takes a holistic approach by prioritizing a shift to walking, cycling, and transit while continuing to support vehicle electrification.

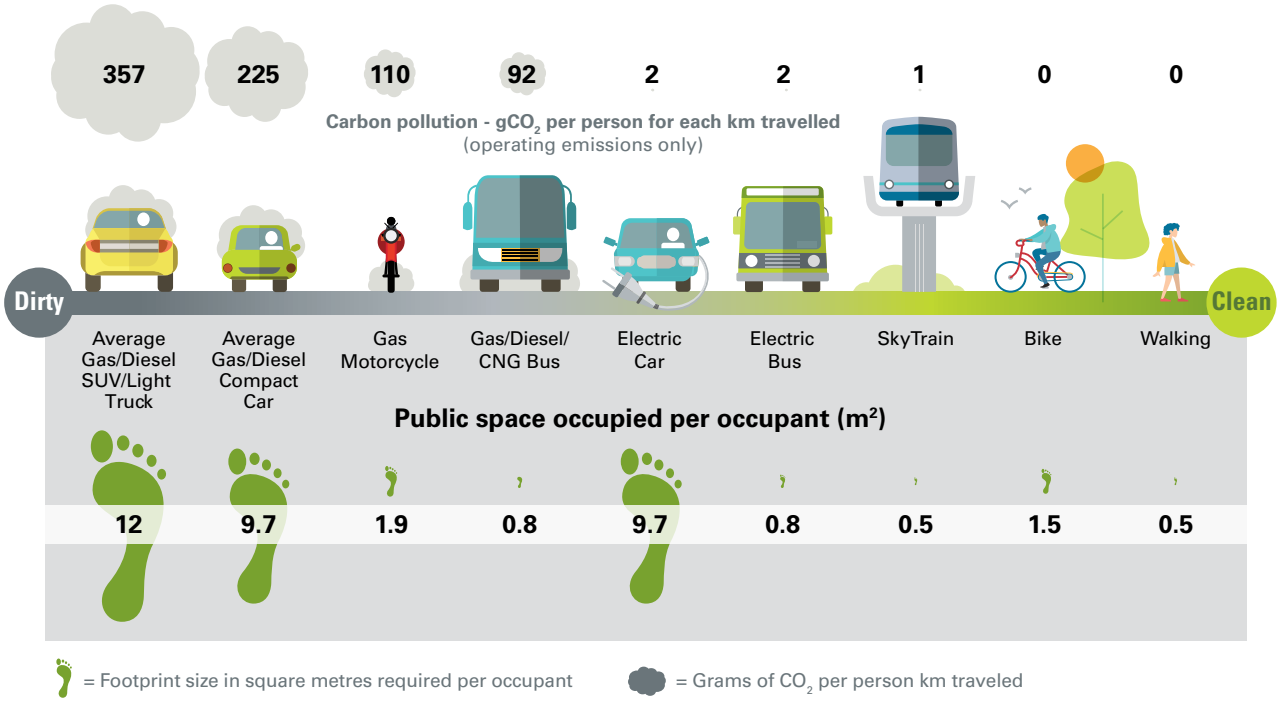


Figure D.3. Carbon pollution and public space impacts by transportation mode in Metro Vancouver, B.C.[19]

Prioritizing Healthy Modes

Figure D.4. illustrates transportation modes that contribute the most to a healthy community. This puts walking, cycling, public transit, and shared vehicles ahead of personal vehicles. "Walking" encompasses mobility aids, such as wheelchairs and seated mobility scooters that operate at walking speeds and use sidewalks. "Cycling" refers to bicycles, adaptive cycles, e-bikes, kick-scooters, etc.

Transporting goods is shown separately in Figure D.4. Surrey's size and strategic location give the city a crucial role in both the national and local economy, facilitating long-distance goods movement via air, ship and rail, and local goods movement within communities.

While it will not always be feasible to prioritize more sustainable modes on every road due to space limitations and site-specific factors, applying this hierarchy to guide decision-making over time will help reduce carbon pollution, save lives, and improve health and equity.[20] This hierarchy echoes a similar diagram in the provincial CleanBC Roadmap to 2030. Both the City and the Province will need to apply this hierarchy to reach the provincial targets for sustainable modes.

19 Image concept inspired by the Institute for Sustainable Transport (sensibletransport.org.au); data from TransLink, Province of BC, and Natural Resources Canada

20 Certain roads or road segments will have different priorities depending on their role in the network, for example arterials leading to industrial areas may have a higher priority for goods movement requiring adjustment of the hierarchy.

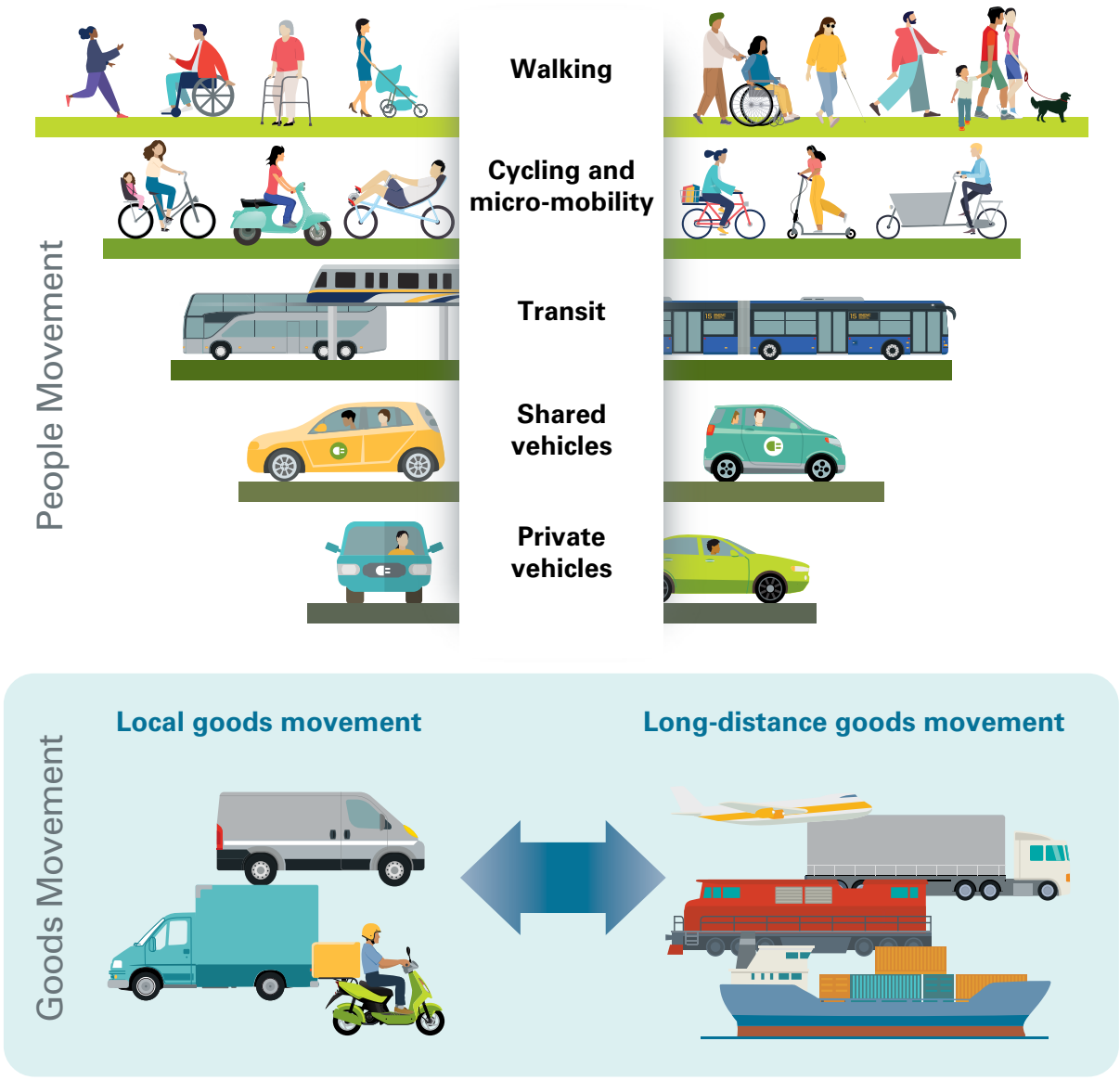


Figure D.4. Hierarchy of sustainable transportation modes

Goals and Shifts

Achieving the vision for Safe Zero-Carbon Transportation relies on a holistic, two-fold approach.

> The goal to ***prioritize walking, cycling, and public transit over personal vehicles*** addresses the Guiding Principle of maximizing co-benefits. This approach can deliver cleaner air, healthier ecosystems, strengthened social connections, healthier lifestyles for residents, and a vibrant local economy. This goal also addresses the Guiding Principle of equity, since these modes impose fewer societal costs and provide mobility for residents of a wider range of incomes, ages and abilities.[21] Achieving this goal relies on Shifts to update policies and plans, build active transportation infrastructure, review parking policies, work with TransLink to improve transit, and support micro-mobility options. The forthcoming Surrey Transportation Plan will provide more detailed plans and actions to support these Shifts.

> Even as we shift to more sustainable transportation modes, as outlined in the previous goal, many residents will still need personal vehicles for many years to come. The goal to ***transition to zero-emissions vehicles*** is critical for meeting the City's GHG targets and will help to improve air quality by cutting tailpipe emissions. The Shifts under this goal aim to build on the current momentum in the EV transition to support a more rapid transition to zero-emissions passenger and freight vehicles.

These Goals are supported by the Shifts, outlined on the following page, and the Actions and Quick-Starts shown in the Implementation Table in Section G.

Public Electric Vehicle (EV) Charging in Surrey

Currently provided and planned public EV charging in Surrey consists of:

> **51 City-owned level 2 charging ports** in place at 18 City-owned sites

> **36 new City-owned level 2 charging ports to be added** at City-owned sites by the end of 2023

> **Two BC Hydro-owned DC fast-charging ports** in place at a City-owned surface parking lot in Cloverdale Town Centre

> **Ten new BC Hydro-owned DC fast-charging ports to be installed** by the end of 2023 on City-owned sites, two at the Cloverdale site and eight at a new hub at the Surrey Sport and Leisure Complex

> **Publicly accessible Level 2 or fast-charging ports** at approximately 30 locations across the city (according to the PlugShareBC website).

21 Litman, T. Victoria Transport Policy Institute. 2022. Evaluating Transportation Equity Guidance for Incorporating Distributional Impacts in Transport Planning. https://www.vtpi.org/equity.pdf

Potential Outcomes and Co-Benefits

Taken together, the Goals, Shifts, and supporting Actions for Safe Zero-Carbon Transportation will go a long way to reducing Surrey's community carbon pollution to meet the interim and 2050 targets. Shifting to prioritize walking, cycling and transit over personal vehicles has well-documented co-benefits for health and equity, reducing congestion and improving climate resilience. Investing in walking and cycling infrastructure has also been shown to have positive economic impacts on surrounding businesses, while supporting job creation and helping to reduce the cost of living.

The CCAS, together with the STP underway, offers a timely opportunity to turn the corner toward a healthier, safer, and more equitable transportation system.

"Attaining and sustaining high rates of walking and cycling—also known as active mobility, and the lowest carbon modes of transport—are among the most powerful changes communities can make to achieve their sustainability, economic and social goals. Prioritizing pedestrians and cyclists over motor vehicles and ensuring safety of all road users is best achieved by investing in active mobility infrastructure and initiatives."

World Resources Institute (2021), "Insights: Invest in Walking and Cycling for Sustainable, Safe Cities"

Safe Zero-Carbon Transportation

Vision for 2050

People can easily get around within and between neighbourhoods via networks of safe, accessible sidewalks, bike paths, and frequent transit. As these sustainable choices increase, there is less need for people to use a car. All vehicles are zero-emissions, resulting in cleaner air and a quieter city.

Measures and Targets

MEASURE	2030	2050
GHG emissions from light-duty vehicles (% reduction from 2010)	30	100
Resident trips taken by walking, cycling, and transit (%) – currently 20% as of 2019	30	50
Total resident vehicle km travelled (% reduction from 2019)	TBD	TBD

GOAL 1

Prioritize walking, cycling and public transit over personal vehicles

Where We Are Now

"Building Foundations"

Strengths to Build On

> Surrey-Langley SkyTrain provides opportunities to test policies for reduced vehicle reliance around rapid transit stations

> Bus ridership in Surrey increased by 50% between 2015 and 2019 and Surrey is leading the region in post-COVID-19 bus ridership recovery (as of 2023, 15% above 2019 levels)

> Walking trips grew by 77% in Surrey between 2011 and 2017

Shifts* – What is needed to reach this Goal?

T1 Update transportation practices, policies, standards, and capital plans to prioritize walking, cycling, and public transit.

T2 Build networks of accessible and protected walking, cycling, and rolling routes connecting popular destinations and 15-minute neighbourhoods.

T3 Encourage more equitable and sustainable use of public space through revisions to on-street parking policies.

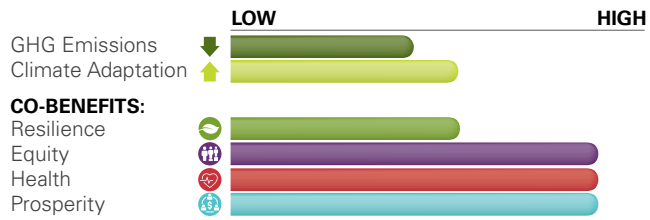
T4 With support of senior governments, expand and improve frequent and rapid transit networks to connect all town centres, and provide transit service to connect 15-minute neighbourhoods.

T5 Encourage personal and shared bicycles and other micro-mobility options through programs and infrastructure.

Potential outcomes and benefits of implementing these Shifts

> Reduced congestion and pollution plus more walking/cycling leads to better health

> Safe, walkable streets benefit business



*See Implementation Table (Section G) for specific Actions supporting these Shifts

GOAL 2 Transition to zero-emissions vehicles

Where We Are Now

"Progressing"

Strengths to Build On

> Council adopted an EV Strategy in 2021

> Growing network of public EV charging

> Market trends and senior government funding opportunities driving rapid EV uptake

> Rapid growth provides opportunity for EV charging in new development

Shifts* – What is needed to reach this Goal?

T6 Support and accelerate the transition of personal vehicles from internal-combustion to zero-emissions technologies.

T7 Advocate for and support efficient and zero-emissions goods movement.

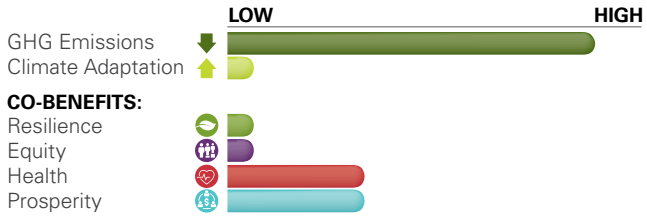
T8 Support and encourage shared electric vehicles as an alternative to personal vehicles.

Potential outcomes and benefits of implementing these Shifts

> Eliminating vehicle emissions significantly reduces community GHGs

> Reduced air pollution supports health

> Potential for revenue from sale of charging as low-carbon fuel to partially offset costs of infrastructure



*See Implementation Table (Section G) for specific Actions supporting these Shifts

4. Healthy Zero-Carbon Buildings

Where We Are Today

Most buildings in Surrey are heated by burning natural gas in furnaces and boilers. As a result, about 42% of the community's GHG emissions come from buildings, nearly as much as transportation. As shown in Figure D.6, electric homes pollute less than gas-heated buildings. We also need to prepare buildings for heat waves and smokey air, events that are becoming more common due to climate change.

Surrey is growing fast. Over the past five years, around 4,500 new homes were added each year. This presents opportunities for standards that lead to healthy, zero-carbon buildings at the outset. In 2018, the City adopted the BC Energy Step Code for new buildings, which requires higher energy efficiency. However, most new buildings still rely on gas for space heating, hot water and cooking.

The best time to reduce a building's carbon footprint and increase its climate resilience is when it's being designed. The Province recently introduced a Zero Carbon Step Code that local governments can enact through their bylaws. This will allow the City to update the Step Code policy to phase out gas usage in new buildings.

We must also aim to decrease the embodied carbon emissions from buildings—those that come from the production, shipping and disposal of building materials. This can be achieved by opting for sustainably sourced wood over standard concrete and steel, and by designing buildings that require fewer of these materials.

The bigger challenge is reducing emissions from existing buildings. But this change has significant benefits, including lower energy bills, improved comfort, and cleaner air. Federal, provincial and BC Hydro programs already offer rebates to help offset costs, but more needs to be done.

The practices and technologies for these changes are well known and do not necessarily cost more in the long-term but require changes to the industry and markets.

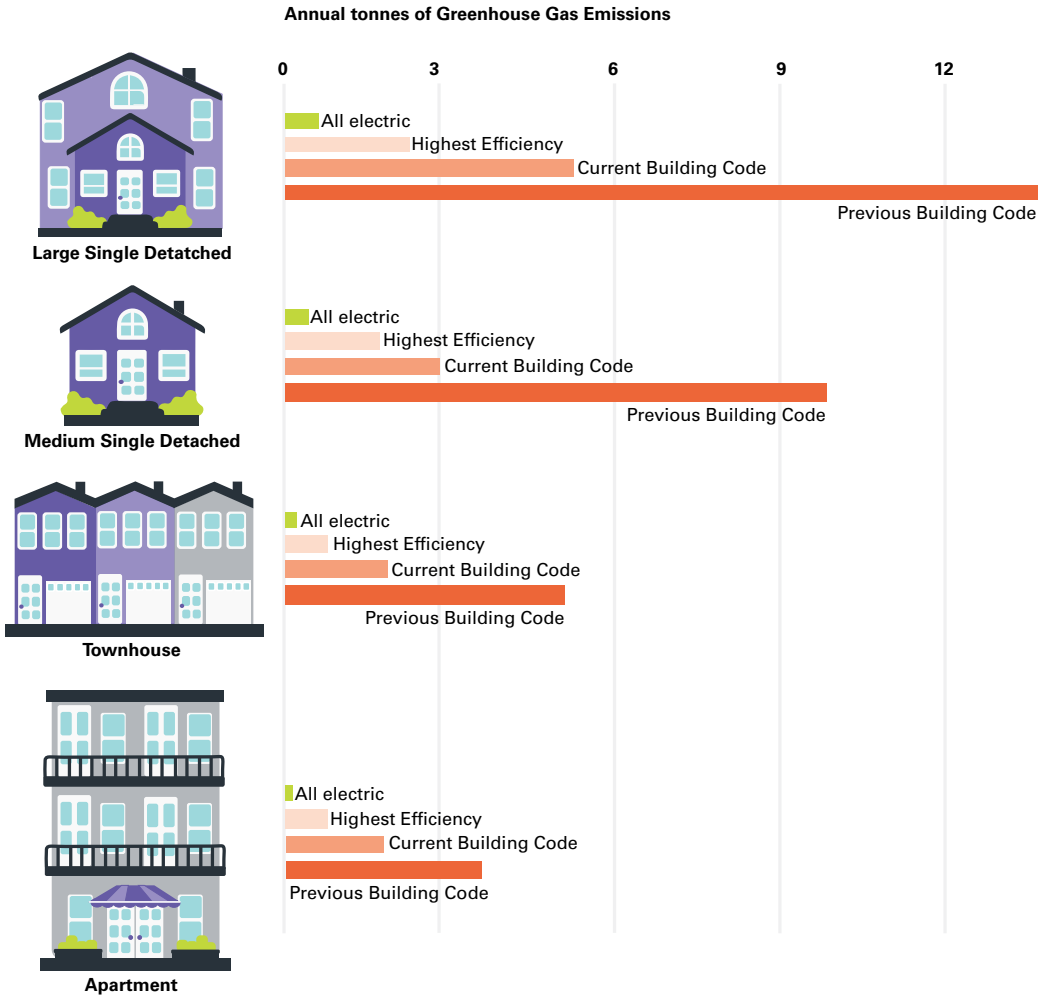


Figure D.6. GHG emissions from residential buildings by type and energy source

What makes a climate-resilient building?

Our homes and buildings provide us with refuge from the elements. Since buildings can last for 50 years or more, we need to make sure they are designed not just for today's weather but also for the future climate. In the coming years, we can expect more intense heat waves, temperature extremes, rainfall, and wildfire smoke. A first step requires incorporating future weather predictions (e.g., for 2050) in building models and designs. A climate-resilient building might include some of the following specific characteristics:

- **Building envelopes**—including insulation, air sealing and windows—that conserve energy and maintain more comfortable indoor temperatures.
- **Windows** that are carefully sized and placed to avoid overheating and with better insulation values.
- **Cooling systems** such as electric heat pumps, which provide air conditioning in summer and heating in winter, in one highly efficient and zero-carbon system.
- **Ventilation and air filtration systems** that are efficient, maintain healthy indoor air quality and filter out pollution, including wildfire smoke. Some systems can also capture and reuse waste heat.
- **Trees and landscaping** that require minimal irrigation and contribute to healthy ecosystems, while providing shade and cooling.
- **Rainwater systems**—such as rain gardens, permeable pavement and planted roofs—that capture rainwater from hard surfaces, reducing runoff and protecting waterways.
- **Emergency preparedness**, including features such as backup energy systems (e.g., batteries or generators), safe places to take shelter, and storage areas for emergency supplies.
- **Cool roofs and landscapes** that reduce the urban-heat-island effect, for example by using lighter colours, reflective materials, water features, and vegetation.

We expect some of these features to be delivered in new buildings as an outcome of energy and GHG requirements for new construction, or through future provincial regulations, while others could be encouraged with incentives. As for existing buildings, senior levels of government will need to explore new policies and programs to encourage these systems.

Goals and Shifts

> The goal to ***avoid carbon pollution and improve energy efficiency and resilience to climate impacts in new buildings*** is critical to avoid increasing Surrey's second-largest source of community carbon pollution and to protect residents from extreme weather. This goal is the easier and least costly of the two Buildings-related goals, since designing higher performing buildings at the outset has minimal impact on cost. This goal will rely heavily on leadership from senior levels of government, and collaboration with other local governments, industry, and utilities. Shifts under this goal focus on updating the City's regulations, streamlining processes and monitoring outcomes.

> The goal to ***phase out carbon pollution and improve energy efficiency of existing buildings*** is more complex and long-term, but just as important. It includes retrofitting existing buildings to make them more efficient and less drafty and replacing gas-burning appliances with highly efficient electric equivalents. This goal will also require senior governments to implement regulations such as codes and standards for equipment and retrofits and to provide funding for local governments and building owners. Shifts under this goal focus on advocating for leadership and support from senior levels of government and utilities, and developing programs and policies. As these programs evolve, additional, more specific actions will be added.

These Goals are supported by the Shifts outlined on the following page and the Actions and Quick-Starts shown in the Implementation Table in Section G.

Potential Outcomes and Co-Benefits

The goals, shifts and supporting actions have the potential to significantly cut GHG emissions, reduce energy costs, and protect residents from climate impacts such as extreme heat. Replacing gas-burning appliances with highly efficient electric equivalents eliminates a source of indoor air pollution, protecting health. Ensuring that new housing is energy efficient and supporting retrofits for low-income residents can help to avoid energy poverty and improve equity.

Healthy Zero-Carbon Buildings

Vision for 2050

All buildings across Surrey are healthy, energy efficient, and zero-carbon in operational emissions. They are constructed to minimize lifecycle emissions, are comfortable year-round, and help protect occupants from the impacts of climate change.

Measures and Targets

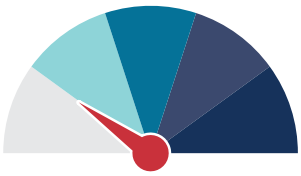
> By 2050, all operational GHG emissions from existing buildings are to be eliminated.

> By 2030, all new buildings are to be designed to avoid operational GHG emissions.

GOAL 1

Avoid carbon pollution and improve energy efficiency and resilience to climate impacts in new buildings

Where We Are Now



"Getting Started"

Strengths to Build On

> Surrey was an early adopter of Energy Step Code

> Rapid growth rate creates opportunity for new construction standards to make an impact

> Strong local expertise and building industry leadership

Shifts* – What is needed to reach this Goal?

B1 Update City policies and bylaws to rapidly phase out fossil fuel combustion in new buildings and improve their energy efficiency and climate resilience.

B2 Align City zoning, policies, processes, and permitting to reduce barriers to and enable the rapid construction of new resilient zero-carbon buildings.

B3 Advocate to senior levels of government, BC Hydro, and other agencies to increase capacity and growth of the resilient zero-carbon building industry.

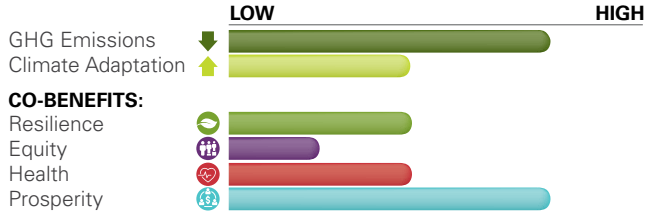
B4 Implement policies for zero-carbon resilient buildings through continuous improvement processes.

Potential outcomes and benefits of implementing these Shifts

> Zero-emissions new buildings avoid carbon pollution

> Improved health and resilience by designing for future climate (e.g. heat) and improved air quality/comfort

> Reduces costs of future retrofits; large economic development potential



*See Implementation Table (Section G) for specific Actions supporting these Shifts

GOAL 2

Phase out carbon pollution and improve energy efficiency of existing buildings.

Where We Are Now

"Preparing to Start"

Strengths to Build On

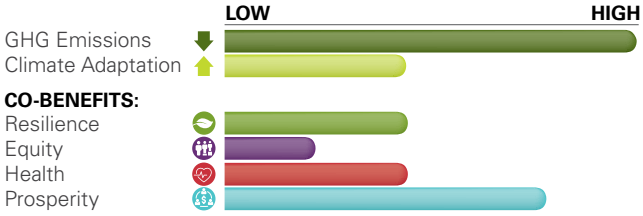
> Strong regional collaboration and leadership
> Aligned provincial and federal policies
> Strong and engaged local construction industry

Shifts* – What is needed to reach this Goal?

B5 Advocate for and implement programs and policies to accelerate affordable and inclusive zero-carbon resilience retrofits.

Potential outcomes and benefits of implementing these Shifts

> One of largest GHG emissions reduction opportunities, but action will take time
> Improved comfort and air quality (health)
> Switching to heat pumps provides cooling (adaptation/resilience)
> Large economic development potential



*See Implementation Table (Section G) for specific Actions supporting these Shifts

Bear Creek, Surrey (source: City of Surrey)

5. Climate-Positive Resilient Ecosystems

Where We Are Today

Surrey is endowed with many protected areas, open streams, and wetlands, and leading policies that aim to protect them. For example, Surrey's Biodiversity Conservation Strategy commits to protect and restore ecosystems, while the Green Infrastructure Network outlines a plan to protect and connect open spaces and natural areas that provide homes and for wildlife and plants. Surrey's tree canopy currently covers 29% of the city outside of the Agricultural Land Reserve (ALR). The Urban Forest Management Strategy has established a target to increase the tree canopy to 30% by 2038, and commits to updating policies, standards and decision-making to reach this target.[22] In the context of Surrey's growth, this target is significant.

Agriculture and Climate Change

About 30% of Surrey's land area is farmland, mostly located within the ALR. While farming releases GHG emissions and typically reduces biodiversity compared to native ecosystems, many farmers are committed to sustainable practices that minimize these impacts. For example, "regenerative agriculture" practices seek to protect habitat, store more carbon in soils, and manage manure to capture energy, nutrients and emissions. Farmers are also on the front lines of climate change and suffer damages from flooding, heat waves, and changes in the growing season.

As noted in Section B ("GHG Emissions and Targets"), most agricultural emissions fall outside the scope of the City's GHG inventory however, this strategy includes a few general actions addressing opportunities in the agricultural sector.

22 Surrey Urban Forest Management Strategy https://www.surrey.ca/renovating-building-development/trees-yard-garden/protecting-surreys-urban-forest

Goals and Shifts

> The goal to ***protect, connect, and restore*** ecosystems is critical for adaptation to climate impacts. Incorporating nature-based solutions alongside actions that reduce emissions supports the Guiding Principle of zero-carbon resilience. For example, this could include incorporating green infrastructure in road standards along with protected walking and cycling facilities. Shifts under this goal aim to bolster existing policies and programs for ecological management, assess and evaluate existing conditions and risks, and create and implement plans for improving ecosystem health.

> The goal to ***encourage opportunities for regenerative agriculture and negative emissions*** also supports improving adaptation and resilience alongside meeting the 2050 target for net-zero community GHG emissions. The two Shifts under this goal are exploratory in nature since these areas of action are not yet well defined and will require partnerships and collaboration. As this knowledge grows, additional actions may be added.

These Goals are supported by the Shifts outlined on the following page and the Actions and Quick-Starts shown in the Implementation Table in Section G.

Potential Outcomes and Co-Benefits

Healthy ecosystems and green infrastructure can improve resilience to climate-related impacts, support biodiversity and provide the ecosystem services we rely on for health and well-being. This can help to reduce the community's risk and improve adaptation. The financial benefits of ecosystem services are also well established; for example, preserving streams and wetlands, and building absorbent landscapes that allow rainwater to soak into the ground can reduce the impact of large storm events.

Ecosystems and agricultural lands can pull carbon dioxide from the air and store it in plant materials, soils, and wetlands. These "negative emissions" will be critical to reach the City's net-zero 2050 target and represent an important area for research alongside regenerative agriculture.

We need to build on the City's policy foundations with more on-the-ground actions to protect Surrey's natural assets and account for their value in decision-making as climate impacts intensify and as the city continues to grow.

Climate-Positive Resilient Ecosystems

Vision for 2050

In 2050, the City is threaded with protected and restored forests, streams, and wetlands, along with parks, urban trees and rain gardens. These ecosystems provide places for people to enjoy nature, support biodiversity, store carbon, reduce air and water pollution, and improve climate resilience.

Measures and Targets

> The Urban Forest Management Strategy includes a 2038 target of 30% urban forest tree canopy.

> Other Measures and Targets for Climate-Positive Resilient Ecosystems will be defined in the future, such as for carbon sequestration by natural areas, estimation of the value of ecosystem services, and parkland acquisition.

GOAL 1 Protect, connect, and restore ecosystems

Where We Are Now

"Progressing"

Strengths to Build On

> Large geographic area with variety of ecosystems such as forests and streams

> Policies such as Biodiversity Conservation Strategy, Urban Forest Management Strategy

> Pilot projects exploring nature-based solutions, natural assets inventory

Shifts* – What is needed to reach this Goal?

E1 Explore opportunities to further protect, manage, and restore ecosystems, and incorporate green infrastructure on City-owned lands, to improve ecological and climate resilience.

E2 Implement policies and practices to manage natural assets and biodiversity for ecological and climate resilience.

E3 Review opportunities to strengthen environmental review processes, bylaws and policies for development and infrastructure projects to better support climate resilience and biodiversity.

E4 Inventory, assess, and monitor ecosystems and green infrastructure to support decision-making, education, and compliance.

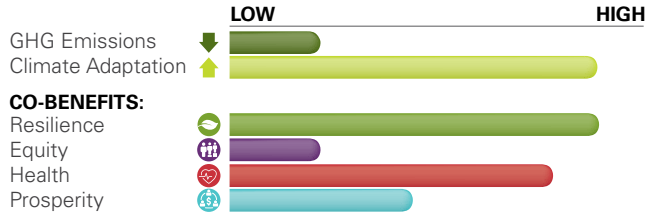
E5 Manage rainwater to improve ecological and climate resilience.

Potential outcomes and benefits of implementing these Shifts

> Green infrastructure (natural assets and nature-based solutions) improves resilience

> Healthy ecosystems help clean the air and water, support mental health and wellbeing

> Protecting natural assets reduces costs of upgrading engineered infrastructure

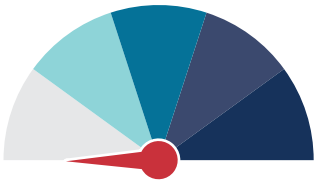


*See Implementation Table (Section G) for specific Actions supporting these Shifts

GOAL 2

Explore opportunities for regenerative agriculture and negative emissions

Where We Are Now



"Preparing to Start"

Strengths to Build On

> 30% of the city's lands are agricultural lands
> Strong partnerships with academia
> Interest and leadership from agricultural operators

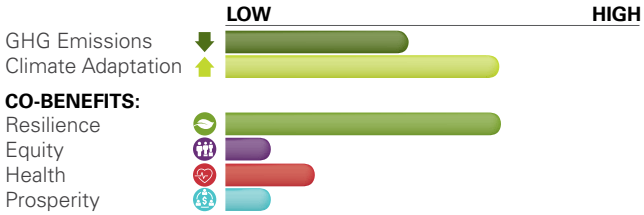
Shifts* – What is needed to reach this Goal?

E6 Explore opportunities and partnerships to support ecologically regenerative agriculture and land use practices in the Agricultural Land Reserve for GHG reduction, carbon sequestration, and improved climate resilience.

E7 Explore opportunities for negative emissions, especially through ecosystem restoration, to remove carbon from the air and store it in plants and soil.

Potential outcomes and benefits of implementing these Shifts

> Negative emissions can help reach 2050 net zero target, but this potential is not well quantified
> Large potential to improve resilience of farming and ecosystems to climate impacts



*See Implementation Table (Section G) for specific Actions supporting these Shifts

Surrey Biofuel Facility (source: City of Surrey)

6. Resilient Energy and Zero-Waste Systems

Where We Are Today

Today, 98% of B.C.'s electrical power is generated from renewable sources.[23] This means that when a Surrey resident, building- or business-owner replaces a natural gas furnace or hot water tank with an electric heat pump, or swaps out a gasoline vehicle for an EV, they immediately make a big dent in their carbon footprint.

On a smaller scale, the City generates some energy locally. The municipally owned Surrey City Energy utility operates a district energy system that heats homes, businesses and institutions throughout Surrey City Centre. A planned new renewable energy centre will harvest waste heat from sewers. When that plant is operational in 2026, it will supply up to 80% of the energy needed for buildings connected to the rapidly growing system. The first phase of this project will reduce over 10,000 tonnes of GHG emissions annually with further reductions to come from future phases.

The City also owns and operates the Surrey Biofuel Facility, North America's first closed-loop organic waste system. The facility turns organic waste such as food scraps and yard trimmings into Renewable Natural Gas (RNG) for use in City waste-hauling vehicles. RNG is gaseous biofuel that is mostly composed of methane. It is produced primarily from anaerobic digestion of organic material and can be substituted directly in natural gas-burning equipment as a renewable, low-carbon alternative to fossil natural gas. Through this process, more than 3,500 tonnes of GHG emissions from waste-hauling vehicles is being eliminated from the City's corporate emissions inventory each year, equivalent to taking 754 gasoline-powered cars off the road.

Currently about 70% of the solid waste the City collects from residences is diverted from the landfill through recycling and processing organic materials in the biofuel facility. Surrey's commitment to sustainability goes further by moving toward a "circular economy" approach that avoids waste in the first place by redesigning, repairing, and repurposing products and materials, in line with the region's zero-waste programs.

23 BC Hydro. "Our Clean System." https://www.bchydro.com/toolbar/about/sustainability/our-clean-system.html

Transforming our Energy Systems

Meeting the City's climate targets, as well as those of senior governments, will require large-scale changes in our energy systems to transition away from fossil fuels and accelerate the transition to 100% clean, renewable, and resilient energy. A strategic and integrated approach to planning this transition will rely on ongoing engagement with both the electric and gas utilities that provide most of the energy used across the province.

Prioritizing electrification for most energy needs, including buildings and passenger vehicles, is likely to be the main pathway to achieving Surrey's targets. This approach is well aligned with international, national, and regional studies and modeling.[24] The provincial government has committed to increase the proportion of renewable energy in the electrical system from 98% today to 100% by 2030. According to BC Hydro's 2021 Integrated Resource Plan and 2020 Electrification Plan, the electrical utility expects to meet the increased demand for clean and renewable electricity over the next couple of decades through a combination of energy efficiency programs to reduce demand and adding new energy supply sources such as solar and wind.

The City will work closely with BC Hydro to plan for distribution systems to meet the anticipated demand for Surrey's rapid growth, and will advocate to the Province for electrical rates and pricing systems that are competitive with fossil fuel options.

While grid electricity is expected to be the mainstay for Surrey's energy needs, some energy uses are more difficult to electrify. For example, certain buildings, large equipment and industrial processes face unique challenges that may not be addressed through electrification. In these cases, other forms of renewable energy such as hydrogen, RNG and other forms of biofuels can play an important role. However, these are still emerging technologies that require careful consideration to prioritize limited supplies for the most appropriate uses, minimize negative side-effects, and ensure verifiable low-carbon outcomes. Finally, district energy systems like Surrey City Energy and on-site energy production such as solar and geo-exchange can also play a growing role to increase energy self-sufficiency and resilience.

Goals and Shifts

> The goal to ***work toward zero waste and a circular economy*** will build on the strengths of the existing waste management practices to accelerate waste reduction and diversion while reducing GHGs.

> The goal to ***transition to zero-carbon, resilient energy systems*** outlines several general shifts addressing the overall energy system. B.C.'s clean electrical grid will be the primary energy source across the community, while the City's district energy system continues to play a role in heating buildings in the City Centre neighbourhood. Locally produced biofuel can fill niche roles for sectors such as heavy-duty vehicles.

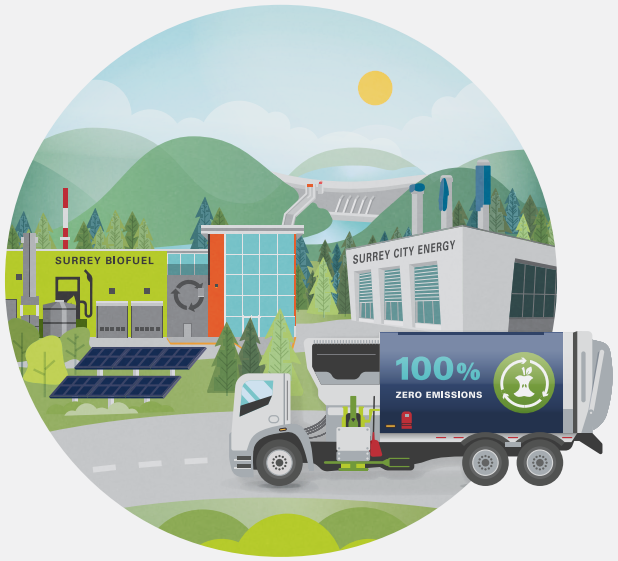
These Goals and Shifts, outlined below, are supported by the Actions and Quick-Starts shown in the Implementation Table in Section G.

Potential Outcomes and Co-Benefits

The shifts and actions in this section set the foundation for the overall energy transition to significantly reduce GHGs by relying primarily on clean electricity. Electrification protects health by reducing indoor and outdoor air pollution. Equity considerations for energy systems are complex and require holistic solutions. For example, electrifying older buildings with inefficient heaters and quick fixes could impose higher heating costs on already-vulnerable residents, exacerbating energy poverty. But done right, a whole-building approach could save money and create more comfortable and healthier homes. This will require senior government funding and support.

24 For example, The Canadian Climate Institute, "The Big Switch—Powering Canada's Net Zero Future," https://climateinstitute.ca/reports/big-switch

Resilient Energy and Zero-Waste Systems



Vision for 2050

Surrey's energy systems are free of carbon pollution. Most uses rely on electricity, while renewable fuels are prioritized for the most difficult to decarbonize uses. Goods and materials are produced and reused in a circular manner that avoids waste and generates value for the community.

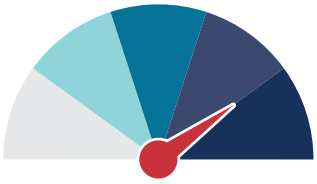
Measures and Targets

OUTCOME	MEASURE	2030	2050
District Energy GHGs	Surrey City Energy GHG intensity (kg CO_2e/MWh)	70	0
Solid Waste GHGs	GHG emissions from City-collected solid waste (tCO_2e/y)	TBD	0

GOAL 1

Work toward zero waste and a circular economy

Where We Are Now



"Well On Our Way"

Strengths to Build On

> City biofuel facility is a leading facility in North America

> City diverts 70% of organics and recyclable materials from landfill

> Waste collection vehicles generate net zero emissions by using biofuel

Shifts* – What is needed to reach this Goal?

Z1 Support and collaborate with Metro Vancouver to update the regional Integrated Solid Waste and Resource Management Plan.

Z2 Continue to enhance waste reduction, diversion and circular economy programs and services for residential and commercial sectors.

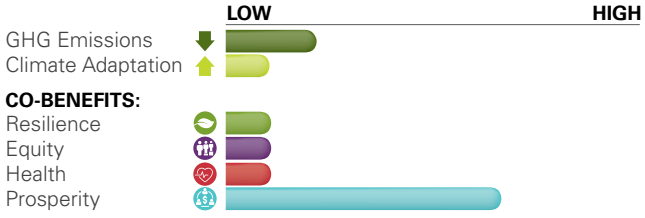
Z3 Increase diversion and reuse of waste materials generated from construction and demolition.

Potential outcomes and benefits of implementing these Shifts

> Diverting organic waste reduces methane emissions (a potent GHG), but waste is a small contributor to community emissions

> Biofuel system generates low-carbon fuel standard credits, generating revenue

> Waste collection vehicles fueled by RNG provides a leading example of circular economy



*See Implementation Table (Section G) for specific Actions supporting these Shifts

GOAL 2

Transition to zero-carbon, resilient energy systems

Where We Are Now

"Progressing"

Strengths to Build On

> BC's electrical grid is 98% renewable

> Surrey has a leading district energy system in process of transitioning to zero-emissions energy

> Rapid acceleration of and investment in renewable energy technologies is occurring globally

Shifts* – What is needed to reach this Goal?

Z4 Support broad-scale electrification and zero-carbon resilient energy networks.

Z5 Transition Surrey City Energy to zero carbon and scale the system to best support zero-carbon buildings.

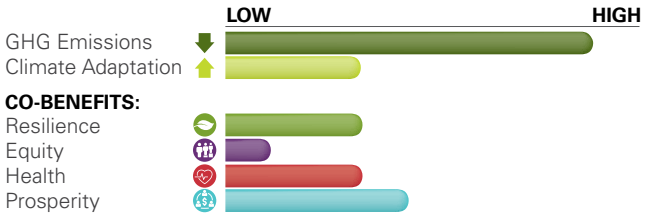
Potential outcomes and benefits of implementing these Shifts

> Electrification is the primary pathway to drive down global and local GHGs

> Renewable district energy will significantly cut GHGs from buildings in City Centre

> Decentralized energy systems can improve resilience to energy grid disruptions

> The zero-carbon transition creates clean energy job growth opportunities



*See Implementation Table (Section G) for specific Actions supporting these Shifts

Flooding in South Surrey after the November 2021 atmospheric river event (source: City of Surrey)

E. Adaptation and Resilience

Every action we collectively take to reduce our carbon pollution will help limit the impacts of climate change. Concurrently, we need to prepare for and adapt to the local climate impacts that we are already experiencing, and those still to come. These impacts carry risks for our own health and safety, the lives of our loved ones, and our ecosystems.

Rising average global temperatures are changing seasonal temperatures, increasing sea levels, disrupting ocean currents and marine ecosystems, and leading to more extreme weather events (see Section A, "Causes and Impacts of Climate Change"). Climate change projections for the region for 2050 include longer, hotter and drier summers, warmer and wetter fall and winter seasons with decreased snowpack, and more extreme weather events. Surrey is also prone to effects of sea level rise. These impacts are summarized in Figure E.1.

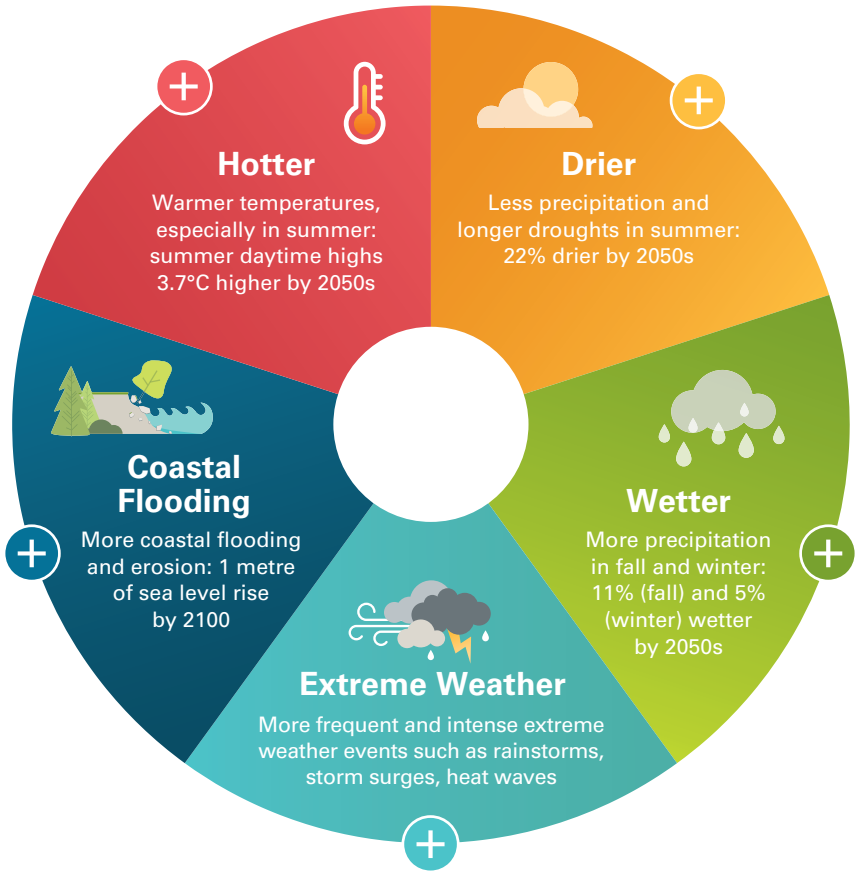


Figure E.1. Summary of projected local climate impacts[25]

Resilience and Green Infrastructure

Engineered approaches are needed to prepare and adapt to climate impacts, for example raising dykes to protect shorelines from rising seas and storm waves. At the same time, we can improve resilience to climate impacts by protecting ecosystems and designing systems that mimic nature to absorb disturbances while providing multiple benefits. Green infrastructure includes natural, enhanced and engineered assets, as illustrated in Figure E.2., and plays an important role in maintaining and improving resilience.

An example of resilient green infrastructure is a "living dyke." The City is implementing this approach as part of Surrey's Coastal Flood Adaptation Strategy. A "living dyke" establishes a more gently sloping natural shoreline stabilized with deep-rooted salt marsh plants that still allow sediment to ebb and flow. The aim is to create a nutrient-rich ecosystem teeming with invertebrates, fish and birds, among other important coastal species, while still providing effective flood protection. Other examples of green infrastructure are listed in Figure E.2.

These and other types of green infrastructure can help protect residents and ecosystems by absorbing the energy of smaller-scale climate disturbances and saving on the costs to upgrade and maintain hard infrastructure.

We can also enhance social resilience when we design our neighbourhoods and support services. By creating places and supporting programs for people to come together and build community, we can be better prepared to look out for one another in the event of a severe climate event.

25 Sources: Metro Vancouver Climate Projections. (2016); The Arlington Group Planning + Architecture Inc. (2013). Sea Level Rise Adaptation Primer. Prepared for BC Ministry of Environment

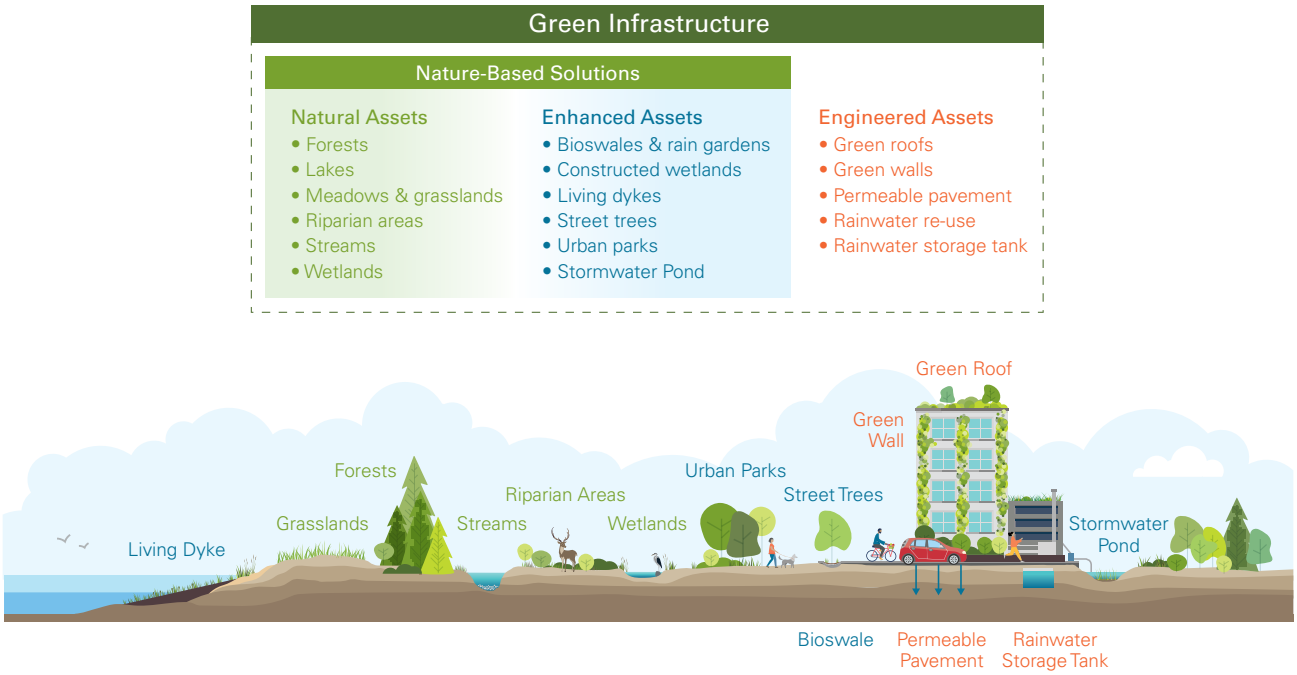


Figure E.2. Green Infrastructure types and examples

2013 Climate Adaptation Strategy

In 2013, the City adopted a Climate Adaptation Strategy (CAS), following the ICLEI Building Adaptive and Resilient Communities approach, a widely recognized adaptation planning framework. A key early step in developing the CAS included undertaking a hazard, risk and vulnerability assessment (HRVA). An internal cross-disciplinary team of staff applied its professional expertise to rate the city's risk and vulnerability to 18 climate hazards identified based on regional climate projections. The CAS then outlined 91 adaptation actions to address these hazards. The CAS spurred a range of projects, including the Coastal Flood Adaptation Strategy and Disaster Mitigation and Adaptation Fund program.

Climate Adaptation Strategy Update

As a part of the process to develop this strategy, in 2021 the City undertook a preliminary update of the HRVA and reviewed the CAS. This process determined the status of the 91 CAS actions, identified gaps and the most relevant actions were integrated into the CCAS framework. A summary of this process and the status/treatment for all CAS actions is provided in a supplemental report.

Since so many mitigation and adaptation actions complement one another, climate strategies such as the CCAS are increasingly combining recommendations for both in one document. For example, Shifts and Actions for Resilient Zero-Carbon Buildings look to both reduce GHG emissions, such as by transitioning to primarily electric heating systems, and protect occupants from climate impacts such as extreme heat and wildfire smoke. Other examples are found in the Resilient 15-Minute Neighbourhoods section. By shifting toward more compact and complete communities, we can reduce GHG emissions from transportation while creating more areas for public greenspace and ecosystems, which improve neighbourhood resilience.

Adaptation and resilience actions are included throughout the plan and identified with a resilience icon. Key Shifts supporting adaptation and resilience are also listed in the table on the following page.

Nicomekl River (source: City of Surrey)

A Planned Park Responds to Sea Level Rise with Nature-Based Solution

One of Surrey's 800 parks is uniquely adapting to climate change by making more room for the river. The future 32-hectare (80-acre) Nicomekl Riverfront Park will extend for three kilometres along the south side of the Nicomekl River in South Surrey, from Elgin Road to 40 Avenue.

The park will combine environmental, cultural, art, heritage, recreation and social spaces. A nature-based design approach will protect flora, fauna, creeks and the park's natural water system. Based on Surrey's Coastal Flood Adaptation Strategy, the park will turn planning into action to address sea level rise and coastal flooding.

Summary of Adaptation and Resilience Shifts

A compilation of Shifts with Adaptation co-benefit as illustrated in Section G

Bold City Leadership

L1. Advocate for senior government regulations and funding to accelerate ambition and action to meet local, provincial, national, and global climate commitments.

L2. Assess staff capacity and financial resources needed to meet climate commitments and seek to fill gaps.

L3. Develop tools and programs to embed climate action in the City's financial decision-making and reporting.

L4. Ensure new civic facilities, vehicles, and other assets are zero-carbon and designed for climate resilience.

L6. Design and manage City infrastructure and assets to reduce climate risk and improve resilience, prioritizing nature-based solutions.

L7. Continue to update emergency management programs and resources to enhance community resilience to climate-related extreme weather events.

Resilient 15-Minute Neighbourhoods

N1. Update land use planning regulations— including the City's Official Community Plan, Zoning Bylaw and other plans— to support creating more 15-minute neighbourhoods.

N3. Design and retrofit neighbourhoods with green and inclusive public spaces that improve climate resilience.

N5. Integrate climate adaptation in land-use planning regulations and development policies.

Safe Zero-Carbon Transportation

T3. Encourage more equitable and sustainable use of public space through revisions to on-street parking policies.

Healthy Zero-Carbon Buildings

B1. Update City policies and bylaws for new construction to rapidly phase out operational carbon pollution and improve energy efficiency and climate resilience.

B2. Align City zoning, policies, processes, and permitting to reduce barriers to and enable the rapid construction of new resilient zero-carbon buildings.

B3. Advocate to senior levels of government, BC Hydro, and other agencies to increase capacity and growth of the resilient zero-carbon building industry.

B4. Implement policies for zero-carbon resilient buildings through continuous improvement processes.

B5. Advocate for and implement programs and policies to accelerate affordable zero-carbon resilience retrofits.

Climate-Positive Resilient Ecosystems

E1. Explore opportunities to further protect, manage, and restore ecosystems, and incorporate green infrastructure on City-owned lands to improve ecological and climate resilience.

E2. Implement policies and practices to manage natural assets and biodiversity for ecological and climate resilience.

E3. Review opportunities to improve environmental review processes for development and infrastructure projects to better support climate resilience and biodiversity.

E4. Inventory, assess and monitor ecosystems and green infrastructure to support adaptive management.

E5. Manage rainwater to improve ecological and climate resilience.

E6. Explore opportunities and partnerships to support ecologically regenerative agriculture and land use practices in the Agricultural Land Reserve for GHG reduction, carbon sequestration, and improved climate resilience.

E7. Explore opportunities for negative emissions, especially through ecosystem restoration, to remove carbon from the air and store it in plants and soil.

Resilient Energy and Zero-Waste Systems

Z4. Support broad scale electrification and zero-carbon resilient energy networks.

Z5. Transition Surrey City Energy to zero carbon and scale the system to best support zero-carbon buildings.

F. Toward Equity in Climate Action

As one of this strategy's six guiding principles, equity is core to the City's approach to climate action.

Climate change tends to add to the hardships faced by those already coping with one or more tough problems such as poverty, disability, homelessness, immigration hurdles, and skills gaps. For instance, during the 2021 heat dome event, 91% of the 619 British Columbians who succumbed to heat-related illnesses had chronic diseases, both physical and mental, while a majority were also elderly and living alone.[26] Individuals with lower incomes also frequently live in housing at higher risk of climate impacts such as heatwaves, flooding, and high energy costs. Meanwhile, those with more advantages often benefit the most from actions to reduce GHG emissions, like using an electric car or retrofitting their home to use less energy.

While no universal definition of equity yet exists, it is generally understood to have the following attributes:[27]

> a principle of fairness and justice to ensure everyone has access to the resources and opportunities they need to reach their potential;

> a process to recognize and overcome intentional or unintentional barriers resulting from bias or systemic structures;

> an approach to provide support and resources based on an individual's level of need, instead of providing everyone with the same level of support (this distinguishes equity from equality; see Figure F.1.).

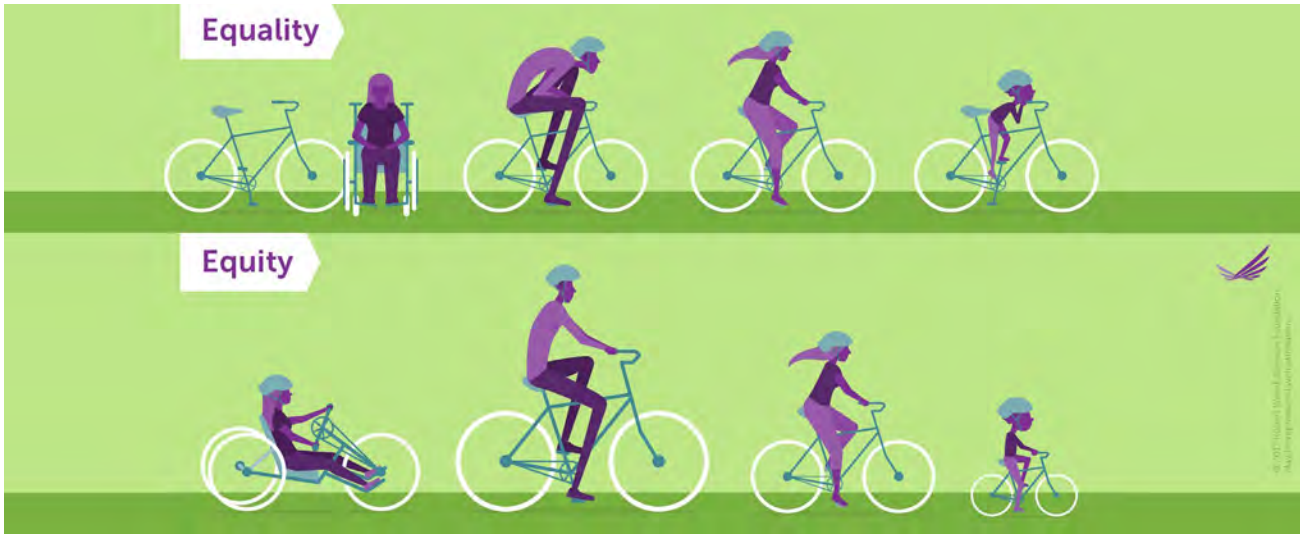


Figure F.1. Equity vs. equality (image source: Robert Wood Johnson Foundation)

26 Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021. Report to the Chief Coroner of British Columbia. June 7, 2022 https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf

27 Government of Canada. Guide on Equity, Diversity and Inclusion Terminology. https://www.noslangues-ourlanguages.gc.ca/en/publications/equite-diversite-inclusion-equity-diversity-inclusion-eng; BC Federation of Labour https://bcfed.ca/equity; University of British Columbia; https://equity.ubc.ca/resources/equity-inclusion-glossary-of-terms/; McGill University https://www.mcgill.ca/equity/resources/definitions; BC Healthy Communities http://bchealthycommunities.ca/the-issue-equity

Certain groups of people face systemic barriers impacting their well-being and access to resources. Sometimes called equity-seeking or equity-denied groups, they may include Indigenous people, women, people with disabilities, LGBTQ2+ communities, religious minority groups, and racialized people in Canada. Other equity-seeking groups may include youth, immigrants, refugees, low-income earners, and those experiencing barriers to employment and public participation. Individuals not belonging to these groups can also be vulnerable to climate hazards. The specific groups and individuals subject to these inequities can vary by context. Currently, the City is analyzing data and working towards a better understanding of equity challenges and opportunities in Surrey.

As the City develops and implements climate action programs, the City will aim to engage equity-seeking groups and vulnerable individuals in respectful, reciprocal dialogues. The City is already taking steps to address equity, including the following:

> The City is initiating a Social Equity Plan that will include developing a shared understanding and definition of equity as it pertains to Surrey's context.

> Mapping and analyzing data to identify neighbourhoods with lower tree cover that are subject to more intense summer heat, which can overlap with neighbourhoods with a higher equity need. The City is now prioritizing these neighbourhoods for tree planting as part of the City's Urban Forest Management Strategy.

> In the Disaster Mitigation Adaptation Fund program—a part of the Coastal Flood Adaptation Strategy—the City piloted a social procurement policy to foster employment opportunities through purchasing decisions for equity-seeking groups.

> The City includes equity in its internal project evaluation criteria for allocation of provincial Local Government Climate Action Program funding.

> The City engaged Community Ambassadors from community agencies to gather input from equity-seeking groups on climate equity considerations for CCAS, and the Surrey Transportation Plan, and the Housing Needs Report among other strategic initiatives.

The City will seek to meaningfully embed climate equity in all stages of this strategy's planning, engagement, policies, and programs. Some of the approaches the City is planning include:

> Identify opportunities to support staff in consistent approaches to equity across departments.

> Continue to build and nurture relationships with community organizations that provide services to and represent equity-seeking groups and vulnerable individuals.

> Use data, metrics and analysis to inform decision-making, including disaggregated data to identify potential opportunities for and impacts on equity-seeking populations and vulnerable individuals.

> Undertake equity-informed engagement to ensure equity-seeking groups and vulnerable individuals have opportunities for meaningful input to inform policies and programs, and that feedback is representative of community demographics.

> Embed equity goals from project outset to ensure relevant data and tools are used to achieve the desired results.

> Consider equity in decision making for prioritizing project implementation.

In addition to applying the approaches listed above, the table below highlights the CCAS Shifts with the most potential to advance climate equity.

Summary of Equity-Related Shifts

A compilation of Shifts with Equity co-benefit as illustrated in Section G

Bold City Leadership

L7. Continue to update emergency management programs and resources to enhance community resilience to climate-related extreme weather events.

L8. Work with businesses, industry groups, and educational partners to position the City as a leader in Canada's equitable transition to a zero-carbon economy.

L9. Support and enable Surrey residents, employees, and groups to take meaningful climate action in their work and daily activities.

L10. Embed equity in climate action policies and implementation.

Resilient 15-Minute Neighbourhoods

N1. Update land use planning regulations— including the City's Official Community Plan, Zoning Bylaw and other plans— to support creating more 15-minute neighbourhoods.

N2. Update regulations and policies for new development to support reduced automobile reliance.

N3. Design and retrofit neighbourhoods with green and inclusive public spaces that improve climate resilience.

Safe Zero-Carbon Transportation

T1. Update transportation practices, policies, standards, and capital plans to prioritize walking, cycling, and public transit.

T2. Build networks of accessible and protected walking, cycling, and rolling routes connecting popular destinations and 15-minute neighbourhoods.

T3. Encourage more equitable and sustainable use of public space through revisions to on-street parking policies.

T4. With support of senior governments, expand and improve frequent and rapid transit networks to connect all town centres, and provide transit service to connect 15-minute neighbourhoods.

T5. Encourage personal and shared bicycles and other micro-mobility options through policies, programs and infrastructure.

Healthy Zero-Carbon Buildings

B1. Update City policies and bylaws for new construction to rapidly phase out operational carbon pollution and improve energy efficiency and climate resilience.

B2. Align City zoning, policies, processes, and permitting to reduce barriers to and enable the rapid construction of new resilient zero-carbon buildings.

B5. Advocate for and implement programs and policies to accelerate affordable zero-carbon resilience retrofits.

Resilient Energy and Zero-Waste Systems

Z4. Support broad-scale electrification and zero-carbon resilient energy networks.

G. Actions

The following Implementation Table outlines the actions that the City will take to achieve each of the Visions, Goals and Shifts described in the preceding sections. Each Action references supporting City policies, and lists lead and supporting divisions.

Quick-Start actions are also noted, representing key catalysts to make progress toward the Shifts, and prioritized to be completed within three years. This list of actions is necessarily limited to those that are known opportunities and priorities today. Along with annual review and reporting, new actions may be added, and any significant updates to this framework will be communicated to Council. Icons and abbreviations used in the table are shown below and in Table G.1.

Acronyms and Abbreviations

Policies and Regulations

AHS – Affordable Housing Strategy
BCS – Biodiversity Conservation Strategy
BBL – Building Bylaw
CAC – Community Amenity Contribution policy
CCAS – Climate Change Action Strategy
CFAS – Coastal Flood Adaptation Strategy
DCC – Development Cost Charge
DCM – Design and Construction Manual
DTS – Digital Transportation Strategy
EDS – Economic Diversification Strategy
EVS – Electric Vehicle Strategy
HLDPA – Hazard Lands Development Permit Area
ISMP – Integrated Stormwater Management Plan
NCP – Neighbourhood Concept Plan ·
NAMP – Natural Areas Management Plan
OCP – Official Community Plan
PAS – Parkland Acquisition Strategy
SC – (Energy) Step Code ·
SEDPA – Sensitive Ecosystems Development Permit Area
STP – Surrey Transportation Plan
STS – Shade Trees Strategy
UFMS – Urban Forest Management Strategy
ZB – Zoning Bylaw

Departments and Divisions

Community Svcs – Community Services
Corp Svcs – Corporate Services
Eng – Engineering
    Ops. – Operations
    D&C – Design and Construction
    SES – Sustainability and Energy Services
    Transp. – Transportation
Fire – Surrey Fire Service
I&IR – Investment and Intergovernmental Relations
    Econ Dev – Economic Development
    IR – Intergovernmental Relations
M&C – Marketing and Communications
P&D – Planning and Development
    AP – Area Planning
    CP – Community Planning
PRC – Parks, Recreation and Culture
    PES WG – Public Engagement Strategy Working Group

Table G.1. Description of icons used in Implementation Table beginning on the following page.

Type of Icon	Icon	Description
Quick-Start Action		An action that can be initiated within two years.
CO-BENEFITS		
Equity		Shift has strong potential to improve equity, as defined in Section F.
Resilience		Shift has strong potential to improve resilience to climate impacts, as described in Section E.
Health		Shift has strong potential to improve human health, including personal safety, physical health, and mental health.
Prosperity		Shift has strong potential for economic benefits, including by reducing costs, generating economic activity, and efficiently using resources.

Bold City Leadership

Vision for 2050: The City of Surrey stands among this region's leaders in placing equitable climate action at the heart of decision-making. The City's own vehicles, buildings, and infrastructure are free of carbon pollution and prepared for climate change impacts well before 2050. With support from the City and other partners, residents are empowered and engaged in tackling the climate crisis. Surrey's actions set a path for many others to follow and support a thriving, local green economy.

Measures and Targets

Interim corporate GHG targets for 2030 will be developed to ensure leadership and consistency with community targets, pending completion of costing studies and transition plans for corporate fleets and facilities.

Goal 1: Align the City's decision making and financial planning with climate commitments

Shift L1. Advocate for senior government regulations and funding to accelerate ambition and action to meet local, provincial, national, and global climate commitments.

Shift L2. Assess staff capacity and financial resources needed to meet climate commitments and seek to fill gaps.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
L2.1.	(QS) Explore options to develop a financing strategy to meet 2030 climate commitments, including capital and operating budgets.	Finance *Eng – SES*	✓	
L2.2.	(QS) Undertake periodic budget reviews for opportunities to improve alignment with climate commitments.	Finance *Eng – SES*	✓	
L2.3.	Pending findings of resourcing review, explore new revenue sources to support climate action, such as external funding, partnerships, potential increased taxation, etc.	Co-led: Finance; Eng – SES		
L2.4.	Develop strategies and seek council approval to address resource and capacity gaps needed to deliver on CCAS commitments.	Eng – SES *Corp Svcs– HR*		
L2.5.	Provide education and training opportunities in climate action and CCAS priorities for staff involved in CCAS actions.	Eng – SES *Corp Svcs – HR*		

Shift L3. Develop tools and programs to embed climate action in the City's financial decision-making and reporting.

L3.1.	(QS) Develop and implement a "climate test" to evaluate and document the climate implications of significant capital projects and policy decisions.	Eng – SES *Finance*	✓	
L3.2.	(QS) Develop and implement a system to efficiently track and report progress toward CCAS targets and actions across departments.	Eng – SES *Corp Services – IT*	✓	
L3.3.	(QS) Explore reporting options on climate risks and actions, based on Climate Related Financial Disclosure (TCFD) guidelines.	Co-led: Finance; Eng - SES	✓	
L3.4.	(QS) Develop criteria and procedures for the management, allocation, and spending of climate-related funds on high-priority initiatives.	Co-led: Finance; Eng - SES	✓	

Goal 2: Transition to zero-carbon and resilient City assets

Shift L4. Ensure new civic facilities, vehicles, and other assets are zero-carbon and designed for climate resilience.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
L4.1.	(QS) Explore climate and sustainability standards and design guidelines for new civic facilities.	P&D – Facilities *Eng – SES*	✓	
L4.2.	(QS) Initiate a review of the City's procurement policies to identify potential options to encourage zero-carbon and climate-adaptive technologies and practices.	Finance *Eng – SES*	✓	
L4.3.	Explore opportunities for social procurement criteria (e.g. community benefits) for climate-related projects.	Finance *Eng – Utilities*		
L4.4.	Identify opportunities for leading low-carbon construction practices in City design and construction standards, purchasing guidelines and contracts.	Eng – D&C *Eng – SES*		

Shift L5. Develop strategic plans to phase out carbon pollution from existing City facilities, vehicle fleets and waste collection.

L5.1.	(QS) Prepare a climate and energy transition plan to identify, prioritize and implement opportunities to improve energy efficiency and phase out fossil fuel combustion across all City facilities, aligned with meeting corporate GHG reduction targets.	P&D – Facilities *Eng – SES*	✓	
L5.2.	(QS) Complete the second phase of the green fleet transition plan to meet corporate GHG reduction targets.	Eng – Ops. *Eng – SES*	✓	
L5.3.	Account for GHG emissions reduction and climate resilience in day-to-day facilities operating and management practices and procedures, and in Facility Condition Assessments.	P&D - Facilities		

Shift L6. Design and manage City infrastructure and assets to reduce climate risk and improve resilience, prioritizing nature-based solutions.

L6.1.	(QS) Explore options for funding climate adaptation in capital projects.	Eng – SES *Finance*	✓	
L6.2.	(QS) Update the City's hazard, risk, and vulnerability assessment to incorporate current climate projections, best practices, and provincial regulations and guidelines.	Eng – SES *Eng - Utilities*	✓	
L6.3.	Continue to plan for and implement climate resilient infrastructure and ecological management.	Eng – Utilities *PRC - Parks*		CFAS

Goal 3: Collaborate with and empower the community and businesses in climate action

Shift L7. Continue to update emergency management programs and resources to enhance community resilience to climate-related extreme weather events.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
L7.1.	In partnership with other agencies, build capacity in the community for managing climate-related emergencies prioritizing equity-seeking groups and vulnerable individuals.	Fire *Eng - Utilities*		
L7.2.	Partner with academic and training institutions, health authorities and others to undertake, share, and apply research and best practices to assess and reduce risk and vulnerability to climate-related hazards such as extreme heat and flooding.	Fire		

Shift L8. Work with businesses, industry groups, and educational partners to position the City as a leader in Canada's equitable transition to a zero-carbon economy.

L8.1.	Update economic development strategies using an equitable climate lens, to encourage innovative companies that are working to address risks and opportunities of the zero-carbon transition in Surrey.	I&IR - Econ Dev		EDS
L8.2.	Explore opportunities to promote economic development in the green building industry.	I&IR - Econ Dev		

Shift L9. Support and enable Surrey residents, employees, and groups to take meaningful climate action in their work and daily activities.

L9.1.	Develop education campaigns to increase public awareness and understanding of CCAS key priorities and individual actions that can make the biggest impact.	Eng – SES *PRC – M&C* *Library*		
L9.2.	Complete a consumption-based GHG inventory to support residents and businesses in reducing lifecycle emissions from products and materials.	Eng – SES		
L9.3.	Explore opportunities to encourage community grant applicants to incorporate climate action, prioritizing equity-seeking groups and vulnerable individuals in their grant applications.	Finance *Eng – SES* *Community Svcs*		

Shift L10. Embed equity in climate action policies and implementation.

L10.1.	Work across City departments toward the development of shared understanding and definition of equity that fits Surrey's context to support and guide staff in incorporating equity considerations in plans and policies.	Community Svcs		
L10.2.	(QS) Leverage data to develop climate equity mapping tools, consistent with strategic corporate equity policy.	Eng – SES *Community Svcs*		
L10.3.	Engage communities, especially equity-seeking groups and vulnerable individuals, in the development and implementation of climate change-related policies and programs.	Eng – SES *PRC – PES WG* *Library*		

Resilient 15-Minute Neighbourhoods

Vision for 2050: Residents can meet their daily needs within a safe and easy walk, roll, or cycle trip from home. Most neighbourhoods have a mix of housing types, with shops, services and inclusive public spaces. Lush trees and greenspaces provide cooling, beauty and connection with nature.

Measures and Targets

15-Minute neighbourhood metrics will be developed pending analysis supporting the City's Official Community Plan update.

Goal 1: Plan and build a network of 15-minute neighbourhoods

Shift N1. Update land use planning regulations— including the City's Official Community Plan (OCP), Zoning Bylaw and other plans— to support creating more 15-minute neighbourhoods.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
N1.1.	(QS) Prepare proposed updates to the Zoning Bylaw to support a wider variety of types of homes (e.g. multiplexes up to four storeys) in existing residential neighbourhoods, along with small scale commercial uses (e.g. corner stores).	P&D – CP *P&D – AP*	✓	OCP; ZB
N1.2.	(QS) Integrate climate objectives and targets in the update of the OCP.	P&D – CP *P&D – AP* *Eng – SES*	✓	OCP
N1.3	In the process of planning 15-minute neighbourhoods, review policy options to improve adding affordable housing supply.	P&D – CP *P&D – AP* *Comm Svcs*		AHS; OCP; ZB; NCPs
N1.4.	(QS) Expand the policy framework within the OCP to support density near rapid transit corridors.	P&D – CP *P&D – AP* *Eng – Transp.*	✓	OCP; NCPs; ZB
N1.5.	(QS) Consider introducing a new designation in the OCP to encourage more neighbourhood centres with services and commercial amenities at key locations across the City.	P&D – CP *P&D – AP*	✓	AHS; OCP; ZB; NCPs
N1.6.	Encourage more office, employment and commercial uses within town centres, frequent transit development areas and neighbourhood centres.	P&D – CP *P&D – AP*		OCP; NCPs
N1.7.	Update the urban design framework and policy within the OCP to prioritize 15-minute neighbourhood objectives.	P&D – CP P&D – AP		OCP; NCPs; ZB
N1.8	In the process of planning 15-minute neighbourhoods, continue to collaborate with the Surrey School District and Province to align school capacity increases with neighbourhood growth.	P&D – CP *I&IR*		OCP; NCPs; ZB
N1.9.	(QS) Undertake an analysis of development economics to quantify long-term impacts of greenfield development vs. intensification and infill.	Co-led: P&D – CP; Engineering	✓	
N1.10.	Explore opportunities to price in future costs of operations and maintenance for major infrastructure that is funded by new growth.	Co-led: P&D – CP; Engineering		
N1.11.	Establish targets for new growth within urban redevelopment areas.	P&D – CP		

Shift N2. Update regulations and policies for new development to support reduced automobile reliance.			
	Lead Div. *Support Div*	Quick Start	Supporting City Policy
N2.1. (QS) Develop transportation demand management strategies for new development in rapid transit areas.	Eng – Transp.		STP; ZB;OCP
N2.2 Continue to consider opportunities to adjust parking requirements and on-street parking management to support infill development (adding housing density to existing residential areas near frequent transit).	Eng – Transp.		STP; ZB;OCP
N2.3. Consider encouraging designs for off-street parking that allow structures to be adapted for purposes other than vehicle storage in the future.	Eng – Transp. *P&D – AP*		

Goal 2: Improve climate resilience of new and existing neighbourhoods

Shift N3. Design and retrofit neighbourhoods with green and inclusive public spaces that improve climate resilience.			
N3.1. Design and retrofit public plazas and parks with built and natural features that provide cooling, refuge and shelter from heat and rain, prioritizing neighbourhoods with higher equity need.	PRC – Parks *P&D – AP*		
N3.2. Build and retrofit more public multi-use leisure spaces with green infrastructure (such as landscaping, trees) within road rights of way.	Eng – Transp. *PRC – Parks*		
Shift N4. Encourage food growing in new developments and in publicly accessible spaces in existing neighbourhoods.			
Shift N5. Integrate climate adaptation in land-use planning and development policies.			
N5.1. Continue to review and update land development regulations to protect people and property from climate risks (e.g. Hazard Land Development Permit Areas).	P&D – AP *Eng – Utilities*		HLDPA
N5.2. Provide for more greenspace, ecological services and amenities that provide climate resilience in the City's Official Community Plan and Neighbourhood Concept Plans.	P&D – CP P&D – AP *PRC – Parks*		OCP; NCPs
N5.3. Identify areas prone to climate risks and look for opportunities to mitigate them through land use plans and redevelopment.	Eng – SES *Eng – Utilities* *P&D – CP*		OCP; NCPs

Safe Zero-Carbon Transportation

Vision for 2050: People can easily get around within and between neighbourhoods via networks of safe, accessible sidewalks, bike paths, and frequent transit. As these sustainable choices increase, there is less need for people to use a car. All vehicles are zero-emissions, resulting in cleaner air and a quieter city.

Measures and Targets

OUTCOME	MEASURE	2030	2050
Transportation GHGs	GHG emissions from light-duty vehicles (% reduction from 2010 baseline)	30	100
Mode Shift	Resident trips taken by walking, cycling, and transit (%) (approx. 20% as of 2019)	30	50
Mode Shift	Total resident vehicle km travelled (% reduction from 2019)	TBD	TBD

Goal 1: Prioritize walking, cycling, and public transit over personal vehicles

Shift T1. Update transportation practices, policies, standards, and capital plans to prioritize walking, cycling, and public transit.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
T1.1.	(QS) Explore options for funding to accelerate the build-out of infrastructure for walking, cycling, and transit.	Eng – Transp. *Finance* *Eng – Ops.*		STP
T1.2.	Integrate green infrastructure (e.g. rain gardens and street trees) as a core element of "complete streets" to support climate resilience including protection from extreme heat.	Eng – Utilities *Eng – D&C*		
T1.3.	(QS) Pilot complete street retrofits on key corridors, providing protected walking/cycling facilities and green infrastructure such as rain gardens and street trees.	Eng – Transp. *PRC – Parks* *Eng – D&C*		STP; UFMS
T1.4.	Increase public awareness of the need to prioritize active modes and transit, for the benefit of road users and climate action.	Eng – Transp.		STP
T1.5.	(QS) Pilot a pedestrian "green" street conversion in each of Surrey's five town centres, including tactical interventions to create safe areas for non-motorized mobility and public space, along with trees and landscape features.	Eng – Transp.		

Shift T2. Build networks of accessible and protected walking, cycling, and rolling routes connecting popular destinations and 15-minute neighbourhoods.

T2.1.	(QS) Finalize the implementation plan for delivering the Strategic Cycling Network for North Surrey town centres.	Eng – Transp. *Eng – Ops.* *Eng – D&C*		STP
T2.2.	By 2030, complete Phase 1 of the Strategic Cycling Network and sidewalk network upgrades, prioritizing locations near Skytrain stations and City Centre.	Eng – Transp. *Eng – D&C*		

Shift T3. Encourage more equitable and sustainable use of public space through revisions to on-street parking policies.

T3.1.	Explore parking management and/or alternative uses of curb space in Town Centres and around SkyTrain stations.	Eng – Transp.		STP
T3.2.	Consider a curbside management strategy to achieve other uses of public space in lieu of parking.	Eng – Transp. *Eng – Ops.*		STP

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
Shift T4. With support of senior governments, expand and improve frequent and rapid transit networks to connect all town centres, and provide transit service to connect 15-minute neighbourhoods.				
T4.1.	Work with TransLink and Metro Vancouver to identify and deliver frequent transit network improvements needed to meet the Metro Vancouver and Surrey 2030 and 2050 land use and transportation GHG targets.	Eng – Transp. *P&D – CP*		STP
T4.2.	Implement transit priority measures along high priority corridors using a data-driven approach.	Eng – Transp. *Eng – D&C*		STP
Shift T5. Encourage personal and shared electric bicycles and other micro-mobility options through policies, programs and infrastructure.				
T5.1.	(QS) Initiate an e-bike sharing pilot program in Surrey City Centre and Guildford for launch in 2024.	Eng – Transp.		STP
T5.2.	(QS) Explore options to provide secure cycle parking at City facilities.	P&D – Facilities *Eng – Transp.*		STP

Goal 2: Transition to zero-emissions vehicles

Shift T6. Support and accelerate the transition of personal vehicles from internal-combustion to zero-emissions technologies.				
T6.1.	Install public electric vehicle charging stations at existing and new City facilities to meet anticipated demand.	Eng – Transp. *P&D - Facilities*		EVS
T6.2.	Advance opportunities and partnerships for expanding public electric vehicle charging infrastructure.	Eng – Transp. *Finance*		EVS
T6.3.	(QS). Define more specific electric vehicle infrastructure requirements in the Zoning Bylaw for non-residential building typologies.	Eng – Transp. *P&D – AP*		EVS
T6.4.	Develop data supported tools for implementing public charging infrastructure and related programs and policies.	Eng – Transp. *Eng – SES* *Corp Svcs – IT*		EVS
T6.5.	Advocate to BC Hydro for funding and programs to help existing multiple-unit residential buildings add electric vehicle charging, and review opportunities for supportive City processes.	P&D – Building *Eng – Transp.*		EVS
Shift T7. Advocate for and encourage efficient and zero-emissions goods movement.				
T7.1.	Advocate for senior government policies and programs to transition to zero-emissions freight vehicles.	Eng – Transp. *Eng – SES*		
T7.2.	Explore opportunities to encourage zero-emissions commercial vehicles through collaboration with other jurisdictions and industry.	Eng – Transp. *Eng – SES*		
Shift T8. Support and enable shared electric vehicles as an alternative to personal vehicles.				
T8.1.	Work with partners to expand access to electric vehicle sharing.	Eng – Transp.		EVS
T8.2.	Leverage data, digital technology and economic tools to support the shift to active modes, public transit and shared electric vehicles.	Eng – Transp.		DTS; EVS

Healthy Zero-Carbon Buildings

Vision for 2050: All buildings across Surrey are healthy, energy efficient, and zero-carbon in operational emissions. They are constructed to minimize lifecycle emissions, are comfortable year-round, and help protect occupants from the impacts of climate change.

Measures and Targets

> By 2050, all operational GHG emissions from existing buildings have been eliminated.

> By 2030, all new buildings are designed to avoid operational GHG emissions.

Goal 1: Avoid carbon pollution and improve energy efficiency and resilience to climate impacts in new buildings

Shift B1. Update City policies and bylaws for new construction to rapidly phase out operational carbon pollution and improve energy efficiency and climate resilience.[28]

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
B1.1.	(QS) Update the Surrey Building Bylaw to enable greenhouse gas limits and/or offer low-carbon compliance pathways to rapidly phase out operational carbon pollution across all types of new buildings, alongside Energy Step Code updates for energy efficiency.	P&D – Building *Eng – SES*	✓	SC; BBL
B1.2.	Develop and publish a schedule of anticipated future updates to climate related building standards.	P&D – Building *Eng – SES* *P&D – AP*		SC; BBL
B1.3.	Require Part 3 development applicants to incorporate future weather data in building modelling and report to the City on results and implications.	P&D – Building *Eng – SES*		SC; BBL
B1.4.	Advocate to senior governments for building code standards to ensure buildings are designed to avoid overheating.	P&D – Building *Eng – SES* *I&IR – IR*		SC; BBL
B1.5.	Collaborate with non-profit housing agencies, and advocate to senior governments for funding, to support and streamline zero-carbon resilient affordable housing developments.	P&D – CP *Community Svcs* *P&D – AP*		SC; BBL
B1.6.	Develop incentives to encourage industry leaders to build to higher standards in advance of minimum regulatory requirements.	P&D - CP *P&D - AP* *Eng - SES*		
B1.7.	Develop policies and requirements to assess and reduce embodied carbon and improve climate resilience in new buildings, beginning with reporting requirements.	P&D – Building *Eng – SES* *P&D – AP*		SC; BBL

28 A "zero-carbon resilient" building means a building that that avoids on-site combustion of fossil fuels, is energy-efficient, and designed to protect occupants from future climate hazards such as over-heating and wildfire smoke. Ideally it also minimizes embodied carbon in materials and construction, and incorporates sustainable site features (e.g. for habitat and rainwater management). A mix of approaches will be taken to phase in requirements, encourage best practices, and/or advocate for senior government regulations.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
Shift B2. Align City zoning, policies, processes, and permitting to reduce barriers to and enable the rapid construction of new resilient zero-carbon buildings.				
B2.1.	(QS) Undertake a scan to identify existing or potential barriers to resilient zero-carbon buildings in City policies and/or bylaws (e.g., urban design, floor area, and setbacks).	P&D – CP P&D – AP *Eng – SES*		SC; BBL; OCP; NCPs
B2.2.	(QS) Replace the Sustainable Development Checklist with a tool to encourage resilient zero-carbon buildings and sustainability features.	Eng – SES *P&D – AP* *P&D – CP*		
B2.3.	Provide training opportunities for City staff in the current and emerging technologies and practices needed to deliver resilient zero-carbon buildings.	P&D – Building *HR*		
B2.4.	Consider zoning approaches to encourage resilient zero-carbon building forms (e.g., heights conducive to mass timber buildings).	P&D – CP *P&D – AP* *Eng – SES*	ZB; OCP	
B2.5.	Demonstrate leading energy and climate performance in new City buildings and recognize local industry leaders.	P&D – Facilities *Eng – SES*		SC; BBL; OCP; NCPs
Shift B3. Advocate to senior levels of government, BC Hydro, and other agencies to increase capacity and growth of the resilient zero-carbon building industry.				
Shift B4. Implement policies for zero-carbon resilient buildings through continuous improvement processes.				
B4.1.	(QS) Review green building program implementation needs including staffing, data collection, and processes for quality assurance of submissions.	P&D – Building *P&D – Administration*		
B4.2.	(QS) Develop a strategy for integrating energy and GHG data from permit applications and reports and integrate into City business application tools for analysis and tracking.	P&D – Building		
B4.3.	Explore opportunities to evaluate and improve the quality and completeness of submissions for compliance with building energy and emissions regulations and policies.	P&D – Building *P&D – Area Planning*		

Goal 2: Phase out carbon pollution and improve energy efficiency of existing buildings

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
Shift B5. Advocate for and implement programs and policies to accelerate affordable zero-carbon resilience retrofits.				
B5.1.	Advocate for senior government regulations, funding, education programs and program supports to phase out GHG emissions from existing buildings.	Eng – SES *P&D – Building*		BBL
B5.2.	(QS) Develop a data-based decision support tool to inform action planning, policy making, and program development for retrofitting buildings.	Eng – SES *P&D – Building*		
B5.3.	Develop a comprehensive existing buildings strategy for resilient, zero-carbon building retrofits.	Eng – SES *P&D – Building*		
B5.4.	Implement home energy labelling to encourage informed decision-making by home buyers.	P&D – Building		

Climate-Positive Resilient Ecosystems

Vision for 2050: The city is threaded with protected and restored forests, streams, and wetlands, along with parks, urban trees and rain gardens. These ecosystems provide places for people to enjoy nature, support biodiversity, store carbon, reduce air and water pollution, and improve climate resilience.

Measures and Targets

> The Surrey Urban Forest Management Strategy target is to increase the urban forest canopy (not including lands within the Agricultural Land Reserve) to 30% by 2038, from 29% in 2021.

> Other measures and targets to support climate-positive resilient ecosystems may be developed in the future, such as for carbon sequestration by natural areas, estimation of the value of ecosystem services, and parkland acquisition.

Goal 1: Protect, connect and restore ecosystems

Shift E1. Explore opportunities to further protect, manage, and restore ecosystems, and incorporate green infrastructure on City-owned lands, to improve ecological and climate resilience.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
E1.1.	Incorporate green infrastructure in City projects, such as rain gardens, street trees, absorbent and biodiverse landscaping, and wildlife-friendly road crossings in key locations.	Eng – Utilities *PRC – Parks* *Eng – D&C*		BCS; BDG; UFMS
E1.2.	(QS) Explore opportunities to better integrate green infrastructure such as robust street trees in road rights of way, including supportive maintenance programs and budgets.	PRC – Parks *Eng – D&C*		BCS; BDG; UFMS
E1.3.	Improve biodiversity and resilience of City parks and greenspaces, such as by controlling invasive species and including more native plants, pollinator habitat and water-conserving landscaping features.	PRC – Parks		BCS; BDG; UFMS
E1.4.	Develop a strategy to enhance boulevards to address loss of trees and landscaping in existing neighbourhoods.	PRC – Parks		UFMS; BCS

Shift E2. Implement policies and practices to manage natural assets and biodiversity for ecological and climate resilience.

E2.1.	Apply leading standards and practices to plant and maintain structurally and biologically diverse, long-lived, healthy and climate-resilient trees in parks and street boulevards.	PRC – Parks *Eng – D&C*		UFMS; BCS; BDG
E2.2.	Increase public awareness and understanding of the value of the City's natural assets through communication and engagement. Ensure this information is accessible to the city's diverse and multi-lingual communities.	PRC – Parks *PRC – M&C* *Library*		
E2.3.	Explore opportunities to encourage retaining and planting trees on private land.	P&D – Trees & Landscape *PRC – Parks*		
E2.4.	Ensure that budgets and staffing are sufficient to implement the Urban Forest Management Strategy and Biodiversity Conservation Strategy.	PRC – Parks *Finance*		
E2.5.	Consider approaches to prioritize equity-seeking groups and vulnerable individuals in urban forestry and biodiversity policies and programs.	PRC – Parks		UFMS; BCS

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
Shift E3. Review opportunities to strengthen environmental review processes, bylaws and policies for development and infrastructure projects to better support climate resilience and biodiversity.				
E3.1.	Continue to coordinate with senior government agencies to ensure City bylaws and policies align with and support provincial and federal regulations for ecosystem protection.	P&D – AP		BCS; SEDPA
E3.2.	Strengthen policies and work with developers to protect and restore ecosystems and implement the City's Biodiversity Conservation Strategy objectives on development sites.	P&D – AP *PRC – Parks*		UFMS; BCS; BDGs
E3.3.	Review opportunities to improve climate resilience through regulatory and policy updates, such as to the Official Community Plan and Zoning Bylaw.	P&D – CP *PRC – Parks*		UFMS; BCS
Shift E4. Inventory, assess, and monitor ecosystems and green infrastructure to support adaptive management.				
E4.1.	Inventory, assess and monitor the health and value of Surrey's natural assets, including by leveraging community and academic partnerships and technologies (e.g., remote sensing, digital monitoring artificial intelligence).	PRC – Parks		BCS; UFMS
E4.2.	(QS) Explore methods to better quantify and maximize carbon sequestration in Surrey's natural systems and identify opportunities to integrate in City policies and initiatives.	PRC – Parks		UFMS; BCS
E4.3.	Assess the vulnerability of Surrey's natural systems to extreme heat and other climate impacts.	PRC – Parks		UFMS
E4.4.	Estimate the economic value of natural assets and ecosystem services and include in decision-making.	PRC – Parks *Eng – SES*		BCS; UFMS; NAMP; STS
Shift E5. Manage rainwater to improve ecological and climate resilience.				
E5.1.	Review and update requirements for on-site rainwater management on development sites to support natural hydrology and reduce flood risk.	Eng – Utilities *P&D – AP*		ISMPs
E5.2.	Look for opportunities to restore and daylight creeks and riparian areas in partnership with developers.	P&D – AP *Eng – Utilities*		BCS; ISMPs

Goal 2: Encourage opportunities for regenerative agriculture and negative emissions

Shift E6. Explore opportunities and partnerships to support ecologically regenerative agriculture and land use practices in the Agricultural Land Reserve for GHG reduction, carbon sequestration, and improved climate resilience.				
E6.1.	Advocate to the Province to develop a strategy for managing irrigation and stream flows for improved climate resilience.	Eng – Utilities		NAMP; STS
E6.2.	Develop a strategy for ecologically sensitive management of City parks within the Agricultural Land Reserve.	PRC – Parks		
E6.3.	Support research and encourage innovative practices for regenerative and climate-resilient agriculture.	PRC – Parks *P&D – CP*		
Shift E7. Explore opportunities for negative emissions, especially through ecosystem restoration, to remove carbon from the air and store it in plants and soil.				
E7.1.	(QS) Collaborate with universities, senior governments, First Nations and stakeholders to research opportunities for carbon sequestration in natural areas.	PRC – Parks *Eng – SES*		
E7.2.	(QS) Undertake a pilot project exploring the opportunity for soil carbon sequestration and regenerative agriculture in the Agricultural Land Reserve.	PRC – Parks		

Resilient Energy and Zero-Waste System

Vision for 2050: Surrey's energy systems are free of carbon pollution. Most uses rely on electricity, while renewable fuels are prioritized for the most difficult to decarbonize uses. Goods and materials are produced and reused in a circular manner that avoids waste and generates value for the community.

Measures and Targets

OUTCOME	MEASURE	2030	2050
District Energy GHGs	Surrey City Energy GHG intensity (kg CO_2e/MWh)	70	0
Solid Waste GHGs	GHG emissions from City-collected solid waste (tCO_2e/y)	TBD	0

Goal 1: Work toward zero waste and a circular economy

Shift Z1. Support and collaborate with Metro Vancouver to update the regional Integrated Solid Waste and Resource Management Plan.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
Z1.1.	Collaborate with Metro Vancouver to identify opportunities for further reducing waste and associated GHG emissions and fostering a circular economy through the regional solid waste management plan update.	Eng – Ops.		

Shift Z2. Continue to enhance waste reduction, diversion and circular economy programs and services for residential and commercial sectors.

Z2.1.	Continue supporting and educating residents to divert remaining organics and recyclables from the garbage stream.	Eng – Ops.		
Z2.2.	Explore opportunities to expand local production of biofuel from waste.	Eng – Ops.		
Z2.3.	Advocate to Recycle BC and Metro Vancouver for new global recycling and waste reduction initiatives that have greatest potential to reduce waste and GHG emissions.	Eng – Ops.		
Z2.4.	Review repair and reuse options to advance circular economy principles and practices, in collaboration with Metro Vancouver.	Eng – Ops.		

Shift Z3. Continue to enhance waste reduction, diversion and circular economy programs and services for residential and commercial sectors.

Z3.1.	(QS) Explore policies to require and encourage building deconstruction, and diversion of demolition and construction waste.	P&D – Building *Eng – Ops.*		
Z3.2.	Explore opportunities to encourage low-waste building technologies and materials (e.g. modular; recycled content).	P&D – Building		

Goal 2: Transition to zero-carbon, resilient energy systems

Shift Z4. Support broad scale electrification and zero-carbon resilient energy networks.

		Lead Div. *Support Div*	Quick Start	Supporting City Policy
Z4.1.	Advocate to utilities and the Province of British Columbia for energy prices that support affordable zero-carbon energy.	Eng – SES *I&IR – IR*		
Z4.2.	Advocate to BC Hydro for improved planning and provision of sufficient electrical supply and distribution in new growth areas, accounting for increased electrification.	I&IR - IR *Eng – SES* *P&D – CP* *P&D - AP*		
Z4.3.	Explore opportunities to encourage on-site and distributed energy and self-production (e.g., solar, battery, smart grid systems).	P&D – Building *Eng – SES* *P&D – AP*		
Shift Z5. Transition Surrey City Energy to zero carbon and scale the system to best support zero-carbon buildings.				
Z5.1.	(QS) Establish a zero-carbon rate class for Surrey City Energy customers to meet requirements for new building energy and emissions standards.	Eng – SES		

H. Implementation and Conclusion

The public engagement undertaken for this strategy indicates strong community support for decisive action to address the climate crisis in Surrey. This was reflected in the range of comments expressing heartfelt concern for the environment and for the wellbeing of residents, including vulnerable populations and future generations, and in the statistically representative data from the probability surveys. This strategy focuses on actions that are within the City's ability to influence meaningful outcomes. Successful GHG emissions reduction and climate adaptation will require a similar level of action from all levels of government, the private sector, and the participation and support of residents and businesses.

Continuous Improvement, Accountability and Embedment

Many of the key practices and technologies supporting the CCAS are rapidly evolving. Implementing this strategy will require embracing change and innovation and adopting a "continuous improvement" approach. This will include identifying new opportunities for action and updating the strategy as needed. The guiding principles of accountability and embedment will also be leveraged to ensure the framework delivers tangible and measurable results.

Accountability means the City is transparent in decision-making, publicly discloses risks and progress, and makes corrections as necessary to remain on track. Embedment means incorporating climate initiatives in programs across the organization and supporting them with the necessary resources. These organizational changes will in turn allow us to make the big shifts needed to reach our targets. Key commitments for accountability, embedment, and continuous improvement include:

> Developing additional measures and targets and incorporating these into strategy updates and internal processes, including for sectors under development where noted in this report, such as corporate interim GHG targets, 15-minute neighbourhood metrics, mode shift and build-out of active transportation infrastructure.

> Developing internal systems to track progress and integrate this strategy's actions, alongside measures and targets, into departmental work plans and the City's corporate strategic framework (Surrey Excels).

> Initiating all the Quick Starts identified in the Implementation Table within two years.

> Reporting out each year, including on progress toward the targets, actions taken, and adjustments made in the approach.

> Updating the City's hazard, risk and vulnerability assessment for climate risk, and incorporating reporting on climate risks and actions in the Annual Financial Report.

> Updating our community and corporate GHG inventories every two years.

Costs and Benefits

The CCAS outlines both immediate actions and long-term transformations needed to achieve our GHG reduction targets and enhance resilience to climate impacts. To bring this strategy to life, resources and budgets may need to be reallocated, including capital investments and operating budgets.

Given the strategy's long timeline, precisely estimating costs and return on investment is challenging and complex. For example, technologies such as batteries, heat pumps, and solar energy are rapidly evolving, becoming more affordable and efficient.

Secondly, it is important to note that costs and benefits affect various stakeholders differently. Consider, for example, the case of building retrofits: The City can take action by developing policies and programs to aid building developers. While developers themselves might incur capital costs to undertake improvements, building occupants will enjoy improved comfort and reduced energy costs. Table H.1. below presents an outline of some of the general types of costs and benefits associated with various climate actions in the CCAS and potential strategies that may offset or manage costs.

In some cases, new revenue may be needed. This may involve re-allocation of existing budgets, sourcing external grants and financing, partnerships with industry, allocation of development driven revenue, or increased taxation. Specific requests for new resources and financing proposals, and future CCAS related projects with significant resource and budget implications, will be presented for council review on a case-by-case basis. The City will also engage in further public and stakeholder consultation as appropriate.

Table H.1. Type of costs and benefits associated with generalized CCAS actions

Type of climate action	Main impacted party - cost	Main impacted party - benefit	Possible funding strategies to offset costs
Zero carbon resilient new City facilities	City – capital cost increment vs. standard design	City – energy cost savings	Potential cost savings; Potential council approval for additional funding; Potential federal and provincial grants
City facility retrofits for energy efficiency and GHG reduction	City – capital cost for upgrades	City – energy cost savings	Asset management planning (e.g. time upgrades with equipment lifecycles); Potential federal and provincial grants
City vehicle fleet electrification	City – capital cost increment vs. gas and diesel vehicles	City – reduced fuel and maintenance cost	Technology and market shifts Asset management planning (e.g. time upgrades with equipment lifecycles)
Zero carbon resilient new construction (community scale)	Developers – capital cost increment for some features and technologies	Building owners and occupants – enhanced health/comfort, reduced energy cost	Industry learning (new practices become standardized); Market shifts (e.g. heat pumps become more affordable; gas becomes more expensive with carbon tax increase)
Building retrofits for efficiency and GHG reduction (community scale)	Building owners – capital cost of retrofits	Building owners – energy cost savings; improved comfort and health	Potential federal and provincial grants
Infrastructure investment to enable and prioritize walking, cycling and transit	City – capital costs of construction; maintenance costs	Residents and businesses – improved safety and health; reduced vehicle congestion; improved accessibility	Potential reclassification of costs; Potential increase to Road and Safety Levy; Potential federal, provincial, and Translink grants
Green infrastructure investments – tree planting, nature-based solutions, parkland acquisition	City – costs to acquire land and maintain natural assets	City – reduced stress on drainage infrastructure from extreme events; Residents – health and resilience (e.g. cooling); Ecosystems – biodiversity and resilience	Green City Program, BCS DCC; Potential council approval for additional funding
Overall resources for CCAS implementation	City – operating costs	Residents, builders, home owners, businesses	Reprioritization of staff roles and responsibilities; Potential federal and provincial grants; Potential council approval for additional resources

Conclusion

The City of Surrey has a strong foundation of leadership, policies and partnerships. Meeting our climate commitments will mean building on this foundation with courage and innovation, shifting focus, scaling up our efforts and developing new "business-as-usual" practices that put us on track for a safe climate.

The City can't act alone. Meaningful progress in the zero-carbon transition also requires regulatory changes, infrastructure investment and financial support from senior governments and agencies such as BC Hydro and TransLink, as well as leadership and participation of businesses and the community.

Fortunately, there are examples from around the world where governments at all levels, organizations and businesses are following up their bold promises with action, adopting new practices, and collaborating with communities on actions that reduce emissions, improve resilience to climate impacts, and provide multiple benefits.

Climate change is a complex problem, but it's solvable. We know what is happening, we know the causes, and we know most of the solutions.

It's time to get to work.