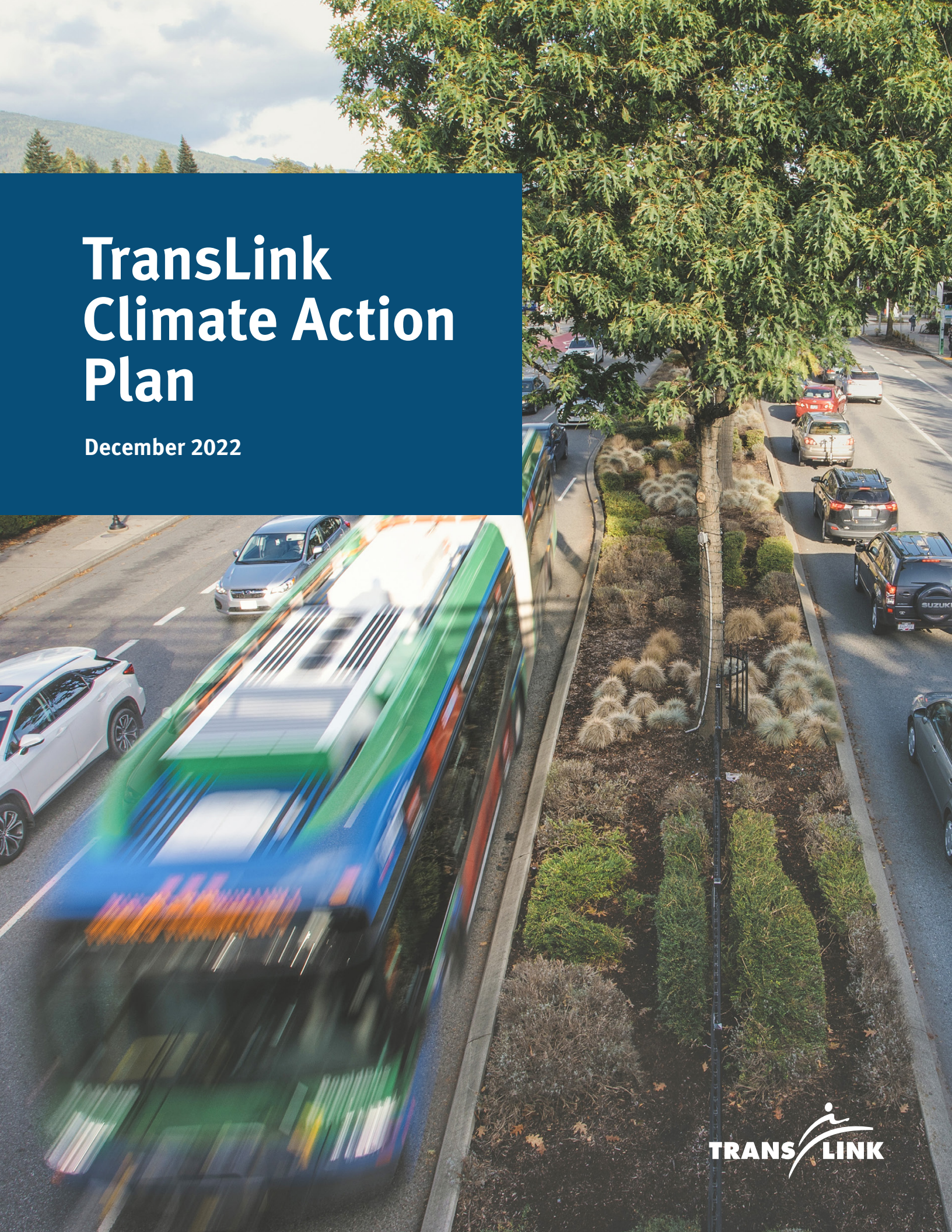


# TransLink Climate Action Plan

December 2022



# TransLink Climate Action Plan

## Table of Contents

|           |  |
|-----------|--|
| <u>1</u>  | A Message from Our CEO                               |
| <u>2</u>  | Executive Summary                                    |
| <u>4</u>  | Introduction   |
| <u>5</u>  | Our Changing Climate                                 |
| <u>8</u>  | About TransLink                                      |
| <u>9</u>  | Policy Frameworks                                    |
| <u>10</u> | Climate Impacts Risk Assessment                      |
| <u>12</u> | Building Climate Resilience<br>Across the Enterprise |
| <u>14</u> | Emergency Preparedness                               |
| <u>15</u> | Design for Seismic and<br>Climate Resilience         |
| <u>16</u> | Our Climate Action Plan                              |
| <u>17</u> | Reduce GHG Emissions                                 |
| <u>22</u> | Adapt to Climate Impacts                             |
| <u>27</u> | Advance Governance & Funding                         |
| <u>29</u> | Appendices   |
| <u>29</u> | 1. Definitions                                       |
| <u>31</u> | 2. Climate Change Projections                        |
| <u>33</u> | 3. Existing Adaptation Initiatives                   |

## Land Acknowledgment

TransLink acknowledges, respects, and celebrates the Indigenous Nations on whose territories we are fortunate to live, work, operate, and serve, and recognizes that, in planning and managing the region's transportation system, we have a role to play in supporting reconciliation with Indigenous Peoples.

Note: we acknowledge that the word resilient for Indigenous Peoples encompasses their efforts to remain a distinct culture, whereas in this document, resilient is defined as the capacity of TransLink's infrastructure and operations to prepare for, avoid, absorb, recover from, and adapt to the impacts caused by our changing climate



## A Message from Our CEO

Our Climate Action Plan sets the stage for the next three years – towards a climate-resilient and net-zero public transportation system by 2050.

Climate change is here and now. With more frequent extreme weather, such as heat waves and intense rainfall, and sea level rise, our region is facing unprecedented challenges. What used to be once-in-a-lifetime events are now becoming common. In a world of intensifying climate impacts, our role, as Metro Vancouver's transportation authority and transit operator, is to ensure our customers are safe and comfortable – and to contribute to a more resilient region.

That's why this detailed corporate Climate Action Plan, building on the groundwork laid by our first-ever Climate Action Strategy, takes a focus on our climate resilience. To protect our customers and assets, and to keep the region moving no matter what the future might bring, whether heat, rain, or floods.

This plan also identifies actions we need to take – as an organization – in the short term so that TransLink achieves a 45 per cent GHG reduction by 2030 and net-zero GHG emissions by 2050. We know the transit fleet of tomorrow – powered by a variety of clean renewables – will look different from today. Offering an unparalleled customer experience, our vision of transit is one where everyone in the region has access to zero emissions transport.

We are partners towards a carbon neutral region by 2050, supporting provincial, federal, and international targets. This includes doing our part to realize a carbon-free regional transportation system over the next three decades.

Working with our customers, funders, local and regional government, Indigenous Nations, and partners, now is the time to make it happen.

Kevin Quinn  
*Chief Executive Officer, TransLink*

# Executive Summary

**With nearly 40% of the region's greenhouse gas (GHG) emissions coming from cars, trucks, and heavy-duty vehicles, TransLink is committed to supporting a carbon neutral region by 2050. As an integrated, multimodal transportation authority we are responsible for both planning the regional transportation system and operating public transit in the Metro Vancouver region.**



**In January 2022, TransLink’s Climate Action Strategy was adopted by our Board of Directors and endorsed by the Mayors’ Council, committing TransLink and its Operating Companies to:**

- Achieve net-zero GHG emissions by 2050, with an interim reduction of 45% from 2010\* levels by 2030; and,
- Ensure our infrastructure and operations are resilient to the impacts of climate change.

Our approach is based on three pillars and seven key strategies.



**REDUCE GHG EMISSIONS**

**ADAPT TO CLIMATE IMPACTS**

**ADVANCE GOVERNANCE AND FUNDING**

- 1** Implement Low Carbon Fleet Strategy (LCFS)
- 2** Develop Net Zero Facilities Strategy (NZFS)

- 3** Develop Climate Change Adaptation and Resiliency Roadmap
- 4** Support a More Climate-Resilient Region and a Low-Carbon Economy

- 5** Develop and Implement Supporting Climate Policies, Plans, and Processes
- 6** Enhance Climate Education and Communication
- 7** Secure Funding for Net Zero and Climate Resilience

TransLink’s Climate Action Plan (CAP) accelerates climate action throughout the TransLink Enterprise (TransLink and Operating Companies) by updating and detailing the steps we are taking to create a climate-resilient and net-zero public transportation system. It focuses on the next three years, with an emphasis on climate adaptation and resilience. The CAP will be reviewed and updated in two years, expanding on climate change impacts to our staff and customers.

We will use the CAP to identify resources needed and to hold ourselves accountable to the Mayors’ Council on Regional Transportation, Indigenous Peoples, and regional partners – in service of a more resilient, carbon neutral region.

*\*2010 baseline corporate greenhouse gas emissions were 153,800 tonnes CO<sub>2e</sub>, approximately 1% of the region’s emissions.*

# Introduction

**This Climate Action Plan (CAP) builds upon TransLink’s Climate Action Strategy, which was adopted in January 2022. The CAP provides a progress update and sets more detailed actions for the next three years – in pursuit of a climate-resilient and net-zero public transportation system. In response to unprecedented recent extreme weather, the Climate Action Plan elevates adaptation and resilience while advancing mitigation and other measures.**

**TransLink’s Climate Action Strategy and Climate Action Plan complement our regional transportation actions in support of a carbon neutral region.**



# Our Changing Climate

The impacts of our climate change come in two forms:

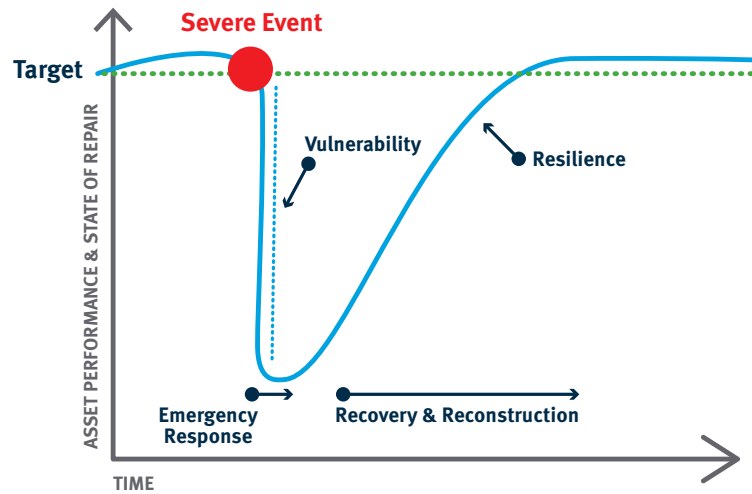
- a) Gradual change in climate norms over time (e.g., sea level rise, maximum and minimum temperatures, average precipitation) and,
- b) More frequent and extreme weather (e.g., heat waves, intense precipitation).

Both of these changes can “shock or stress” infrastructure, businesses, people, property, and communities. Climate change can also amplify the impacts of natural hazards: for instance, sea level rise can increase the severity of coastal floods; heavier rainfall events can influence the likelihood of floods and landslides; and warmer temperatures combined with longer drought periods can increase the risk of wildfires. TransLink needs to understand our risks, hazards, and vulnerabilities, and take action to ensure our transportation system and the region is more resilient.

***A world of intensifying climate impacts:*** in the summer of 2021, an extreme one-week heat wave was associated with 619 deaths across BC. This was followed by one of BC’s most damaging wildfire seasons. Later, in November, a two-day atmospheric river event led to extensive floods and landslides, cutting off Metro Vancouver from the rest of Canada for a time. The disasters destroyed property, homes, highways and bridges, damaged several Indigenous communities, and had a significant impact on ecosystems.

***Resilience can be defined as:*** the capacity to prepare for, avoid, absorb, recover, and adapt to the effects of shocks and stresses in an efficient manner through the preservation, restoration, and adaptation of essential services and functions. The more resilient we are, the less vulnerable we are and the quicker we return to, or exceed, target performance level.

**Figure 1: Asset Performance & State of Repair During Emergency Response and Recovery to Severe Events**



Although our infrastructure has remained resilient throughout recent extreme weather events, our facilities, operations, employees, and customers have still been affected by intense flooding, heatwaves, and wildfire smoke. The primary anticipated climate impacts over the next 30 years include: increases in temperature, precipitation, extreme weather events, and sea level rise (see Appendix 2 for more detail).

**Metro Vancouver Climate Change Projections for 2050**

| Climate Hazards |                           | Impact by 2050   |
|-----------------|---------------------------|--|
| Temperature     | Mean Annual Temperature   | Annual: +2°C; Summer: +3°C   |
|                 | Extreme Heat / Heat Waves | Hottest day temp: +4°C   |
|                 |                           | Heat Days (# of days >30°C): +12 days/year                         |
| Precipitation   | Storm – Heavy Rainfall    | More frequent and intense storms                                   |
|                 | Total Annual Rainfall     | Annual: +5%; Fall: +9%; Summer: -6%                                |
|                 | Freshet Flooding          | ↑ Water damage within the floodplain                               |
|                 | Landslides, Bank Erosion  | ↑ Slope stability issues, erosion, and risk of landslides          |
| Sea Level Rise  | Sea Level Rise            | ↑ Flooding along Fraser River, shorelines, and coastal communities |
| Storms          | Storm - Surge             | ↑ Flooding along Fraser River, shorelines, and coastal communities |
|                 | Storm – High Winds        | ↑  |
|                 | Storm – Extreme Snow/Ice  | ↑  |

For more information on regional and provincial climate change projections and impacts see:  
 Metro Vancouver Climate Projections  
 British Columbia’s Climate Preparedness and Adaptation Strategy  
 Resilience Pathways  
 Pacific Climate Impacts Consortium



## What might the future bring?

We will continue to use the latest data to help us understand and prepare for future climate impacts. Climate projections are constantly being updated as the evidence base accumulates and as the science evolves. As recent experience with extreme weather has shown, we need to plan and prepare for a future where climate impacts are more severe than what current projections would show. In this way, we can contribute to a more resilient region that anticipates “worst case” scenarios or the affects of multiple cascading climate impacts.



# About TransLink

TransLink (officially known as the South Coast British Columbia Transportation Authority) was created in 1999 to serve the Metro Vancouver region. We are one of North America's first integrated, multimodal transportation authorities.

We plan, fund, and manage a regional transportation system that moves people and goods, and supports the regional growth strategy, provincial and regional environmental and emission reduction objectives, and the economic development of the transportation service region. This includes across modes, including walking, biking, rolling, transit and driving, as well as for goods movement.

We operate transit in the Metro Vancouver region, delivering our services through contractors, and our operating companies and subsidiaries such as Coast Mountain Bus Company, British Columbia Rapid Transit Company Ltd. (SkyTrain), Metro Vancouver Transit Police, and West Coast Express Ltd. Our contracted services include: HandyDART, shuttles (First Transit), West Vancouver Blue Bus (District of West Vancouver), and we work closely with PROTRANS, the operator of the Canada Line.

Our regional transit system spans 21 municipalities, as well as the Tsawwassen First Nation and Electoral Area 'A' (the unincorporated areas of the regional district), with a total population of 2.5 million people and a service area of more than 1,800 square kilometres.

## Operational footprint



**2000+**  
buses, shuttles, and  
HandyDART vehicles



**421**  
support  
vehicles



**382**  
SkyTrain  
cars



**239**  
facilities



**50**  
West Coast  
Express cars and  
locomotives



**4**  
marine  
vessels

Addressing climate change requires collaboration and cooperation across TransLink Enterprise, our contracted service providers, fuel and utility providers, all levels of government, Indigenous Nations, and many others.

# Policy Frameworks

TransLink is required by the South Coast British Columbia Transportation Authority Act to support Metro Vancouver's Regional Growth Strategy (Metro 2050), air quality and greenhouse gas reduction objectives, and the economic development of the region. TransLink's effort and response to the climate emergency supports the Regional Transportation Strategy (Transport 2050) and efforts at other levels of government. This includes working with Metro Vancouver on developing an implementation pathway to achieving the regional 2030 light-duty vehicle GHG emissions target.

- TransLink
  - » *Corporate Plans*
    - » *Climate Action Strategy*
    - » *Climate Action Plan (this document)*
    - » *10 Year Investment Plan*
  - » *Regional Strategies & Plans*
    - » *Regional Transportation Strategy (Transport 2050)*
    - » *Transport 2050: 10-Year Priorities*
- Metro Vancouver Regional District
  - » *Clean Air Plan*
  - » *Climate 2050 and Climate 2050 Transportation Roadmap*
  - » *Regional Growth Strategy (Metro 2050)*
  - » *Regional Resilience Framework*
- Province of BC
  - » *Climate Preparedness and Adaptation Strategy*
  - » *CleanBC and CleanBC Roadmap to 2030*
- Government of Canada
  - » *2030 Emissions Reduction Plan*
  - » *Net-Zero Emissions Accountability Act*
- International (United Nations Framework Convention on Climate Change)
  - » *Paris Agreement*

# Climate Impacts Risk Assessment

Our Climate Impacts Risk Assessment conducted in 2021 using the Public Infrastructure Engineering Vulnerabilities Committee (PIEVC) High Level Screening Guide as a framework, identifies key asset and operational vulnerabilities across the transit and transportation system. With the frequency and extent of many impacts projected to increase over time, we need to be prepared for the potential of multiple climate risks occurring at the same time (e.g., storm surge and sea level rise). This high-level screening assessment informed the prioritization of our actions for the climate change adaptation and resilience roadmap (Strategy 3 below).

**Table 1: Climate Impacts Risk Assessment Summary**

| Climate Hazards |                         | High Risk  | Medium Risk  |
|-----------------|-------------------------|--|--|
| Temperature     | Mean Annual Temp 🌡️     | <ul style="list-style-type: none"> <li>• SkyTrain Substations</li> <li>• West Coast Express Mission &amp; Waterfront Layover Areas</li> </ul>  |  |
|                 | Extreme Heat            | <ul style="list-style-type: none"> <li>• SkyTrain Substations</li> <li>• West Coast Express Mission &amp; Waterfront Layover Areas</li> </ul>  | <ul style="list-style-type: none"> <li>• Rail track switch machines</li> </ul>   |
| Precipitation   | Total Annual Rainfall   | None   | None   |
|                 | Storms – Heavy Rainfall | <ul style="list-style-type: none"> <li>• Port Coquitlam Transit Centre – wastewater treatment plant</li> <li>• Trolley Overhead Haro rectifier station</li> <li>• Tunnels</li> </ul> | <ul style="list-style-type: none"> <li>• Some bus loops, Park-n-Ride lots</li> <li>• West Coast Express platform stations</li> <li>• Columbia SkyTrain station</li> <li>• Burnaby, Richmond, and Surrey Transit Centres</li> <li>• Trolley buses</li> <li>• Data center at Vancouver Transit Centre</li> </ul> |

**Table 1: Climate Impacts Risk Assessment Summary**

| Climate Hazards |                                  | High Risk   | Medium Risk   |
|-----------------|----------------------------------|---|---|
| Precipitation   | <b>Freshet Flooding</b>          | <ul style="list-style-type: none"> <li>• Some bus loops &amp; Park-n-Ride lots</li> <li>• Hamilton, Port Coquitlam, Richmond, Vancouver Transit Centres</li> <li>• Scott Road, Bridgeport, Olympic Village SkyTrain Stations</li> <li>• Operations and Maintenance Centre Richmond (Canada Line)</li> <li>• Sapperton, New Westminster, Scott Road, Surrey Central Sub-Stations</li> <li>• Bridges</li> <li>• SkyBridge</li> <li>• West Coast Express right of way (Mission)</li> </ul> | <ul style="list-style-type: none"> <li>• Trolley Overhead rectifiers at Vancouver Transit Centre and Knight St</li> <li>• Data center at Vancouver Transit Centre</li> </ul>  |
|                 | <b>Landslides, Bank Erosion</b>  | <ul style="list-style-type: none"> <li>• West Coast Express right of way</li> <li>• VCC-Clark SkyTrain station</li> <li>• Bridges</li> </ul>  |   |
| Sea Level Rise  |                                  | <ul style="list-style-type: none"> <li>• SeaBus terminals</li> <li>• Bridges</li> </ul>   | <ul style="list-style-type: none"> <li>• SeaBus maintenance dock</li> </ul>   |
| Storms          | <b>Storm Surge</b>               | <ul style="list-style-type: none"> <li>• Vancouver SeaBus Terminal, Elevator &amp; Escalator Building</li> </ul>  |   |
|                 | <b>Storm – High Winds</b>        | <ul style="list-style-type: none"> <li>• Bus loops with Trolley Overhead Assets</li> <li>• SkyTrain Stations</li> <li>• SkyTrain Advanced Radio System (STARS)</li> <li>• Pattullo Bridge</li> <li>• Radio Tower</li> </ul>   | <ul style="list-style-type: none"> <li>• Some bus loops, Park-N-Ride lots</li> <li>• SeaBus terminals</li> <li>• Transit Centers</li> <li>• Operations and Maintenance Centre, SkyTrain substations, guideway</li> <li>• West Coast Express maintenance yard, substation</li> <li>• BC Parkway</li> </ul>   |
|                 | <b>Storm – Extreme Snow/ Ice</b> | <ul style="list-style-type: none"> <li>• Pattullo Bridge, Golden Ears Bridge</li> </ul>   | <ul style="list-style-type: none"> <li>• Bus loops, Park-n-Ride lots, West Coast Express platform stations</li> <li>• Transit center, OMC</li> <li>• SkyTrain stations</li> <li>• Bridges (not SkyBridge)</li> <li>• SkyTrain fleet</li> <li>• Offices (Gateway, Sapperton, CPP, Compass Building, Transit Police Admin and Sub-buildings)</li> </ul> |

# Building Climate Resilience Across the Enterprise

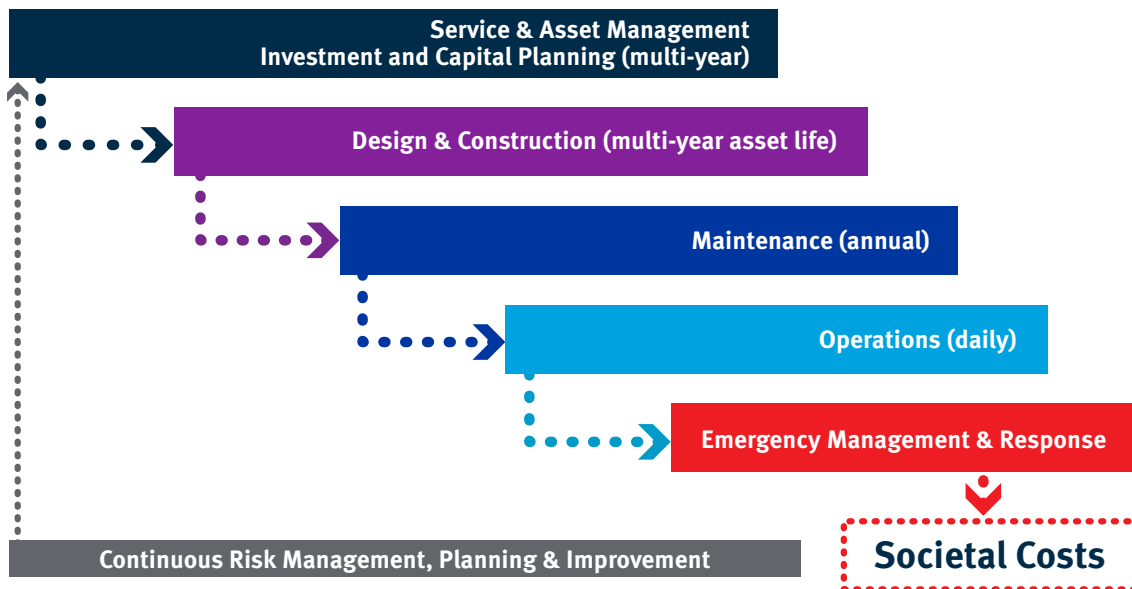
As part of the development of our Climate Action Plan, TransLink conducted:

- A review of climate change adaptation/resilience strategies among peer agencies in North America, through the UBC Sustainability Scholar Program;
- A high-level assessment of its assets based on the PIEVC High Level Screening Guide; and
- Climate change adaptation planning workshops with subject-matter experts from TransLink and its Operating Companies.

This work fostered an understanding that key functions, at different levels of the organization, have a shared responsibility for managing the risks associated with climate change (Figure 2). It also identified and validated the assets that are at medium and high-risk to climate vulnerabilities.

**Figure 2: TransLink Functions and Mitigating Climate Risks**

*Appropriate funding is needed at each level, to enable the entire organization to manage risk, reduce costs, keep assets in good states of repair, and reduce costs to society. Illustration concept courtesy Metrolinx.*



Managing the risk posed by climate change starts with multi-year investments and capital planning. This ensures our infrastructure protects our staff and keeps our customers comfortable from now, and well into the future. It also means that our infrastructure is designed to be climate resilient, through upgrading or lifecycle renewals.

Once new infrastructure becomes operational, annual maintenance and daily processes help ensure continuing functionality, a state of good repair, and assets that can withstand extreme weather events.

Each function plays a critical role in helping us prevent and prepare for the impacts of our changing climate. If everyone does their part, emergency responses and societal impacts are limited. By applying continuous risk management, planning, and improvement, we can help mitigate the impacts of climate change through all TransLink functions. This will reduce risks to infrastructure, employees, and customers – improving our resilience.



# Emergency Preparedness

Metro Vancouver is situated on the Fraser River delta, among many forested areas and steep slopes, and in one of the most seismically active zones in Canada. As a result, the region is susceptible to a variety of natural hazards, including earthquakes, wildfires, landslides, and floods.

TransLink has a well-established emergency management framework that includes identification of hazards and risks, mitigation, planning, response, and recovery. The mitigation phase of emergency management overlaps and intimately connects with climate change and seismic resilience. This includes a joint understanding of the hazards and risks posed from severe weather, other climate impacts, seismic activity, and how we can reduce or eliminate the anticipated impacts. To prepare for the outcomes of these critical events, emergency preparedness and response plans need to be in place.

Through this planning, we work closely with regional local governments and other partners (e.g., Emergency Management BC, Health Authorities) to identify how we can support their planning and response activities. As part of our planning efforts, we participate in regional groups such as the Integrated Partnership for Regional Emergency Management which develops region-wide response strategies. Our goal is to create a disaster-resilient TransLink that ensures impacts to our community and society are minimized (Figure 2).

During the initial stages of a disaster, time is of the essence and lives are at stake. A key component of our response is TransLink's Emergency Coordination Centre (ECC). It enables us to have a coordinated enterprise response, which has been significantly tested during the COVID-19 pandemic, cyberattack, weather emergencies, and freshet flood threats. As a key community partner, TransLink is committed to local governments and other partners to provide transportation support for evacuees and response resources whenever possible. Within our capacity, we will respond to the requests of our partners and provide human and physical resources (e.g., buses) to move evacuees out of areas that have been impacted by a climate emergency.



## Design for Seismic and Climate Resilience

Large earthquakes could inflict significant and potentially catastrophic damage to infrastructure, businesses, communities, and people. Like climate change, the risk of earthquakes will continue to influence the development and design of our infrastructure assets. As such, it is important to consider multiple hazards throughout the asset lifecycle to improve resilience.

Engineering design standards and our understanding of seismic events (earthquakes) have advanced over time, and so has our understanding of climate change. Designing to be resilient in one can result in increased resilience in the other. For example, designing dikes for increasing sea level rise, is an opportunity to integrate seismic requirements, resulting in dikes that can mitigate future flood risk and protect communities in case of an earthquake.

Understanding compound risk exposure, vulnerabilities and responses is therefore critical to climate and seismic resilience. Risk assessments need to consider interactions between multiple risks and hazards. This focus on “compound” extreme events needs to be integrated into our understanding of exposure, vulnerability and how best to design our infrastructure and assets.



# Our Climate Action Plan



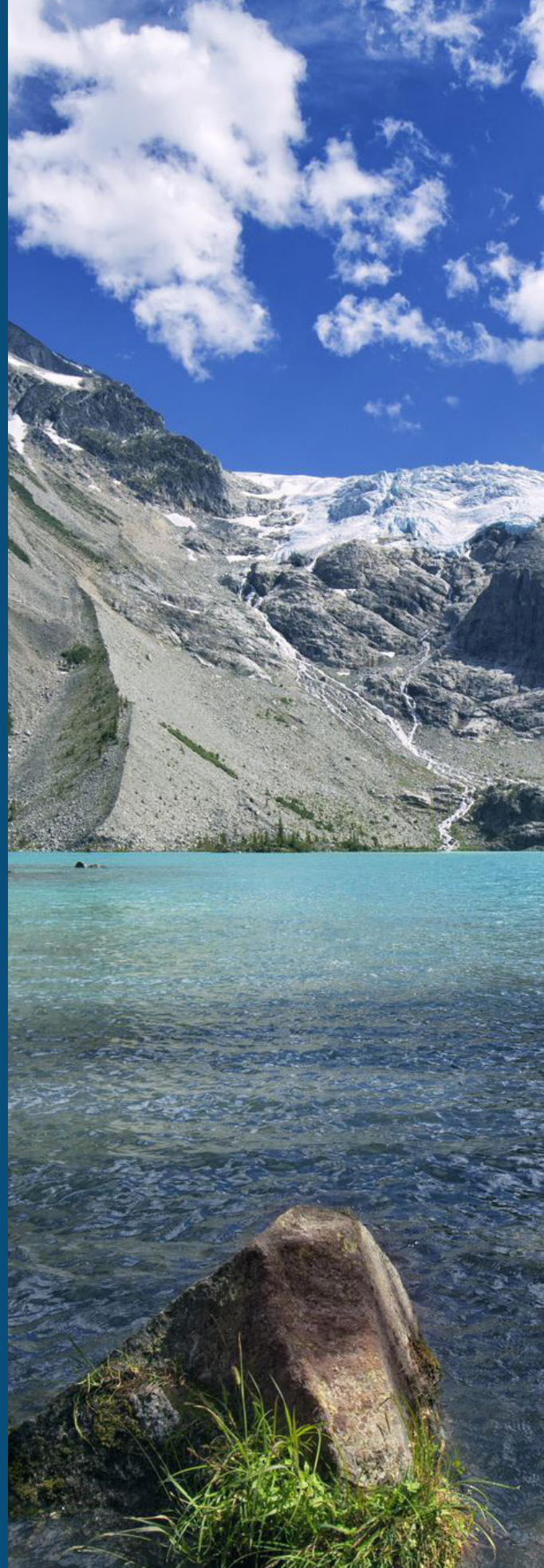
**Reduce GHG Emissions**



**Adapt to Climate Impacts**



**Advance Governance and Funding**





## Reduce GHG Emissions

In 2021, TransLink generated approximately 130,342 tonnes of CO<sub>2</sub> equivalents, of which 95% came from fleet operations, with the remaining 5% from facilities operations. With a substantial electrified SkyTrain, electric trolley bus fleet and compressed natural gas bus fleet that will soon be fuelled by renewables, we have a good foundation of low-carbon transit to build on.

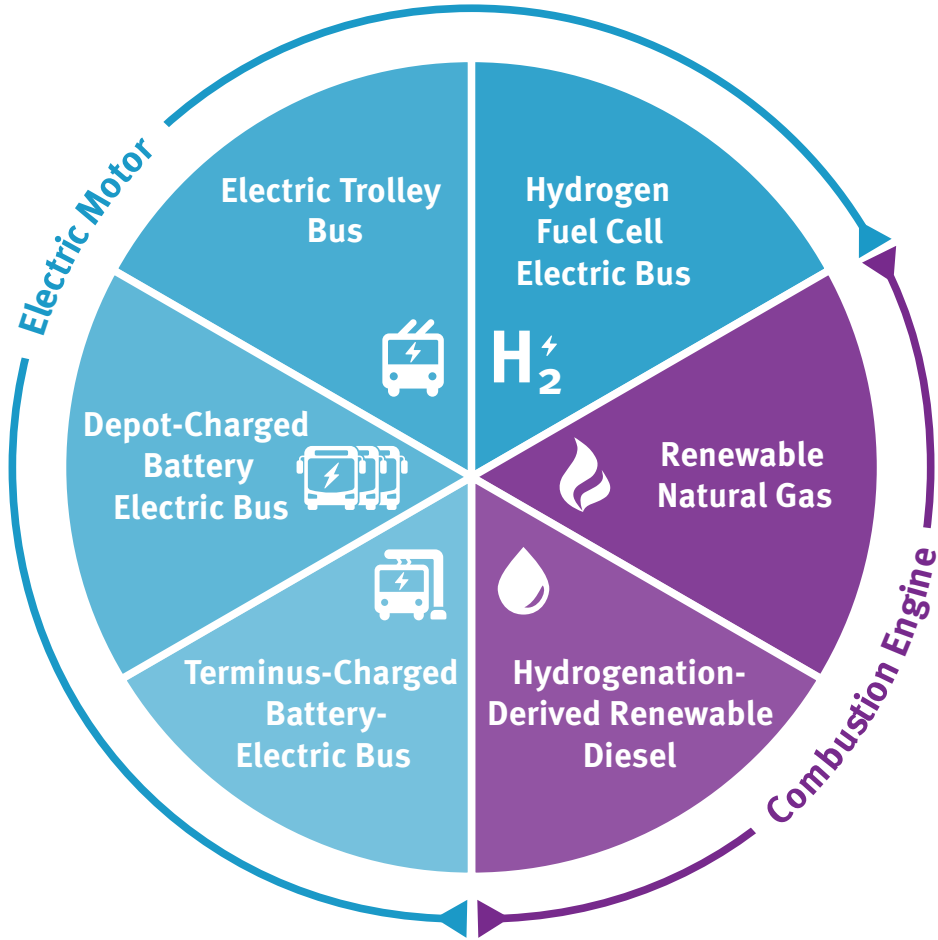
In 2020, TransLink began implementing its Low Carbon Fleet Strategy (LCFS). In 2022, TransLink developed its Roadmap to Net Zero by 2050 as part of the Climate Action Strategy, which laid out a high-level pathway to eliminate GHG emissions from its fleet and facilities. Key upcoming milestones, within our 2022 Investment Plan include:

- **2024** - Route 100 fully served by 19 battery-electric buses
- **2024** - Expanded CNG fleet (383 buses) fueled 100% by Renewable Natural Gas (RNG). Operating from Surrey, Hamilton, and Port Coquitlam Transit Centres
- **2023-24** - Pilot renewable diesel
- **2025** - Port Coquitlam Transit Centre and In-Route Charging (five locations) to serve 136 battery-electric buses
- **2027** - Marpole Transit Centre to serve 350 battery-electric buses
- **2030** - Total of 462 zero-emissions battery-electric buses will be in service

These projects will achieve a 37% reduction in our total emissions by 2030. To achieve our interim target of 45% reduction, we still need to realize an additional 8% reduction. That's why in 2023, TransLink and CMBC will be undertaking the development of a Zero-Emissions Fleet Transition Plan (ZEFTP) that will supersede the Low Carbon Fleet Strategy.

The ZEFTP will include all revenue (bus, shuttle, HandyDART) and non-revenue/support fleets. The ZEFTP will evaluate rapidly maturing propulsion technologies, fuel and energy sources, such as hydrogen and renewable diesel (Figure 3). The results from this review will be incorporated into TransLink’s next Investment Plan and will help us reach our net-zero 2050 goal.

**Figure 3: Typology of Zero-Emissions/Low-Carbon Fuels for Transit**



Each technology, fuel and energy option has distinct advantages and disadvantages. We expect to implement a diversity of solutions, matched to service needs and route characteristics. The future of our fleet transition is diverse. There is no one perfect solution to the fuel, energy, and propulsion questions we face – particularly as we also strive to create a climate-resilient public transportation system that is less vulnerable to severe weather events and energy/fuel disruptions.

**Table 2: Comparison of Different Transit Propulsion Technologies**

|   | Conventional Diesel   | Electric Trolley Bus  | Renewable Natural Gas  | Battery-Electric Bus  | Renewable Diesel   | Hydrogen Fuel Cell   |
|---|---|---|--|---|--|--|
| <b>Pros</b>                             | <ul style="list-style-type: none"> <li>• Tested and reliable</li> </ul>     | <ul style="list-style-type: none"> <li>• Tested and reliable</li> <li>• Energy efficient</li> <li>• No air pollution</li> <li>• Less noise</li> </ul> | <ul style="list-style-type: none"> <li>• Tested and reliable</li> <li>• Low air pollution</li> </ul> | <ul style="list-style-type: none"> <li>• Energy efficient</li> <li>• No air pollution</li> <li>• Less noise</li> </ul>  | <ul style="list-style-type: none"> <li>• Drop-in fuel</li> <li>• Potential O&amp;M efficiency</li> </ul> | <ul style="list-style-type: none"> <li>• Long range</li> <li>• Short refueling time</li> </ul> |
| <b>Cons</b>                             | <ul style="list-style-type: none"> <li>• Air pollution and noise</li> </ul> | <ul style="list-style-type: none"> <li>• Requires trolley overhead infrastructure on set routes</li> </ul>  | <ul style="list-style-type: none"> <li>• Limited # of suppliers/producers</li> </ul>                 | <ul style="list-style-type: none"> <li>• Requires charging infrastructure</li> <li>• Charging time and range</li> </ul> | <ul style="list-style-type: none"> <li>• Growing # of suppliers/producers</li> </ul>                     | <ul style="list-style-type: none"> <li>• Limited # of hydrogen suppliers/producers</li> </ul>  |
| <b>Carbon Intensity (g CO2e/MJ) [1]</b> | • 98.96   | • 7.31  | • 14.37 [2]  | • 7.31  | • 15-44 [3]  | • 18.68  |

[1] Based on diesel litre equivalency to reflect drivetrain and associated energy choice. Sources: Approved Carbon Intensities – Current Information Bulletin RLCF-012, Ministry of Energy Mines and Low Carbon Innovation. Revised: August 15, 2022.

Carbon Intensity Records Information Bulletin RLCF-006. Ministry of Energy Mines and Low Carbon Innovation. Revised: March 2018. URL: <http://www.gov.bc.ca/lowcarbonfuels>

[2] 2021 Average Carbon Intensity from RNG suppliers to FortisBC, verified by Ministry of Energy Mines and Low Carbon Innovation, under Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act.

[3] Range reflects supply source

## STRATEGY 1 – IMPLEMENT LOW CARBON FLEET STRATEGY (LCFS)

| #   | Action  | Status          | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|---|-----------------|---------------|---------------|-----------------|
| 1.1 | By 2024, expand the compressed natural gas (CNG) bus fleet to 383, replacing 84 diesel buses, and use renewable natural gas for 100% of the CNG fleet (pending funding approval by Metro Vancouver).  | In Progress     |               | X             |                 |
| 1.2 | By 2030, replace 34% of the diesel bus fleet with 462 battery-electric buses, and redevelop/build new Transit Centres and charging infrastructure at Marpole, Hamilton, Port Coquitlam, and Burnaby transit centres.                                  | In Progress     |               |               | X               |
| 1.3 | Complete a feasibility study on charging infrastructure for a zero-emission, battery-electric next-generation SeaBus by 2022.   | Completed       |               |               |                 |
| 1.4 | Explore, test, and analyze emerging innovative low and zero-carbon technologies and fuels (e.g., electric, hybrid, fuel cell, gondola, renewable fuels) and adopt those based on optimum total cost of ownership and life cycle environmental impact. | Ongoing [1]     | X             | X             | X               |
| 1.5 | Regularly (two-/three-year cycle) review and refine the LCFS to guide the transition to zero-emission buses, Community Shuttles, HandyDART, West Coast Express, SeaBus, and non-revenue fleet vehicles, along with associated investment planning.    | In Progress [2] | X             |               |                 |

X = TARGET COMPLETION DATE

[1] Start Renewable Diesel (HDRD, R100) pilot in 2023.

[2] Develop Zero-emissions Fleet Transition Plan (ZEFTP) in 2023 to supersede Low Carbon Fleet Strategy.

To eliminate the 5% our GHG emissions that come from our facilities, TransLink is developing a Net Zero Facilities Strategy (NZFS). In 2018, TransLink completed its Facilities Renewable Energy Plan (FREP) for transitioning its facilities' operations to net-zero emissions. Recommendations from the FREP, along with several actions identified in the Adaptation Roadmap (Strategy 3) will form the basis for the NZFS and will play a role in eliminating emissions from facilities. Energy management programs across the enterprise will continue to reduce energy consumption by such measures as retrofitting lighting to LEDs, installing motion sensors, optimizing operations, and installing overhead bay door sensors.



## STRATEGY 2 – DEVELOP NET-ZERO FACILITIES STRATEGY (NZFS)

| #   | Action  | Status   | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|---|----------|---------------|---------------|-----------------|
| 2.1 | Develop a Net Zero Facilities Strategy (NZFS) and implementation plan based on the Facilities Renewable Energy Plan and planned facility renewal or expansion   |          |               | X             |                 |
| 2.2 | Explore, test, and analyze emerging innovative net-zero facility technologies/systems/materials (e.g., heat pumps, renewable fuels, passive design, wood construction, solar) and adopt those based on optimum total cost of ownership and life cycle environmental impacts | On-going | X             | X             | X               |
| 2.3 | Regularly refine – on a two-/three-year cycle – the NZFS to guide the transition to net-zero facilities, along with associated investment planning  |          |               |               | X               |



# Adapt to Climate Impacts

In 2022, experts across the Enterprise (infrastructure, planning, policy, operations, emergency management, safety, customer communications, and environment) developed a plan on how TransLink can become more climate resilient and help reduce risks to our staff, customers, and communities we serve. Using Regional Climate Projections (Appendix 2) and the high-level Climate Risk Assessment of Key Infrastructure Assets (Table 1), the team revised and advanced Strategy 3: Develop Climate Change Adaptation and Resiliency Roadmap, and Strategy 4: Adapt to Climate Impacts – Support a more Climate-Resilient Region and Low-Carbon Economy. The team also shared many initiatives already underway to improve the resilience of our infrastructure and operations (Appendix 3).

To become more climate resilient, TransLink will leverage three “spheres of influence” (Figure 4).

**Figure 4: Climate Change Adaptation Spheres of Influence**



Over the next three years, we will continue to learn, developing processes and procedures for integrating climate change into our business processes. We’ll begin planning and funding projects that will both make us more resilient and maintain our assets to reduce risk while ensuring a state of good repair.



### STRATEGY 3 – DEVELOP CLIMATE CHANGE ADAPTATION AND RESILIENCY ROADMAP

| #   | Action  | Status  | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|---|---------|---------------|---------------|-----------------|
| 3.1 | Complete risk and vulnerability assessment and develop a Flood Risk Management and Service Response Strategy for key Transit Centre assets (Vancouver in Year 1, followed by Hamilton, Richmond, Port Coquitlam and Marpole in future years). Engage municipal partners, landowners, Indigenous Peoples, and utilities as required. | Ongoing | X             | X             | X               |
| 3.2 | Complete risk and vulnerability assessment and develop a Flood Risk Management and Service Response Strategy for key power Sub-Station assets (Sapperton in Year 1, followed by New Westminster, and Scott Road in future years). Engage municipal partners, landowners, Indigenous Peoples, and utilities as required.             | Ongoing | X             | X             | X               |
| 3.3 | Complete risk and vulnerability assessment and develop a Flood Risk Management and Service Response Strategy for Waterfront Road and West Coast Express Mission Layover yard. Engage municipal partners, landowners, Indigenous Peoples, and utilities as required.   |         |               | X             | X               |
| 3.4 | Complete risk and vulnerability assessment and develop Risk Management Plans for TransLink Bridge Assets (Knight Street Bridge in Year 1, followed by Golden Ears Bridge, Westham Island Bridge, SkyBridge, and Canada Line Bridge in future years) and inform municipal partners, landowners, and Indigenous Peoples on findings.  | Ongoing | X             | X             | X               |
| 3.5 | Engage City of Vancouver and appropriate Railways to confirm risk, vulnerability, and potential slope stabilization projects for Grandview Cut (VCC-Clarke SkyTrain) and rail line right of way between Waterfront Station and Mission (West Coast Express).  |         |               | X             |                 |
| 3.6 | Conduct risk and vulnerability assessment and develop tunnel ventilation systems to manage increasing summer temperature, heat waves, and wildfire smoke risk.  |         |               | X             |                 |

| #    | Action  | Status  | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|------|---|---------|---------------|---------------|-----------------|
| 3.7  | Confirm scope and conduct Risk and Vulnerability Assessment on SkyTrain guideway infrastructure and Flood Risk Assessment on SkyTrain tunnels.  |         |               |               | X               |
| 3.8  | Integrate climate change adaptation into the revision of Asset Management Policy, and future Strategic Asset Management Plan.   |         |               | X             |                 |
| 3.9  | Incorporate climate change risk and hazard data into enterprise GIS for use by internal departments/divisions (e.g., Engineering, Transportation Planning & Policy, Emergency Management).  |         |               |               | X               |
| 3.10 | Revise next version of Transit Passenger Facility (TPF) Design Guidelines (2011) with strategies for climate change adaptation and net-zero GHG emissions.  |         |               |               | X               |
| 3.11 | Develop a "Transit Operations Facility and Infrastructure Climate Adaptation Design Guideline" for major renovations and new construction projects generally over \$50 million (e.g., Operations and Maintenance Centres, Transit Centres).   |         |               |               | X               |
| 3.12 | Monitor regional climate change projections and notify the Enterprise of any changes.   | Ongoing | X             | X             | X               |
| 3.13 | Integrate climate change projections into CMBC's Site Utilities Assessment.   | Ongoing | X             | X             | X               |
| 3.14 | Develop and implement process for tracking and evaluating service disruptions due to climate changes (e.g., severe weather events).   |         |               | X             |                 |
| 3.15 | Establish maintenance/operations procedure for snow/ice response for battery-electric bus charging infrastructure, including pantographs.   |         |               |               | X               |
| 3.16 | Review and revise Bus Service/Business Continuity Plans to ensure preparedness for, and continuity of service during, severe weather events.  |         |               |               | X               |
| 3.17 | Research efficacy and feasibility of personal cooling technology and revised uniform specifications for Technician, SkyTrain Attendants, Operators, and Transit Police to reduce risk of employee heat stress while maintaining functionality and protection from other hazards. If feasible, implement in future uniform contracts (e.g., STA, Technicians 2023) or employee apparel/point system. |         | X             |               |                 |

In addition to adapting our own infrastructure and operations to climate change, TransLink continues to support a more climate-resilient region as well as a low-carbon economy by working with Indigenous Peoples, regional partners, suppliers, contracted services, and utilities.

#### STRATEGY 4 – SUPPORT A MORE CLIMATE-RESILIENT REGION AND LOW-CARBON ECONOMY

| #   | Action  | Status         | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|---|----------------|---------------|---------------|-----------------|
| 4.1 | Work with Indigenous peoples on collective approaches to climate knowledge coexistence, knowledge generation, and decision-making to ensure they are part of the solution.  | Ongoing        | X             | X             | X               |
| 4.2 | Continue to collaborate with regional, provincial and private sector partners on integrated adaptation and resilience planning for infrastructure.  | Ongoing [1]    | X             | X             | X               |
| 4.3 | Share knowledge with and gain insights from peers on climate change impacts, adaptation, and resiliency planning.   | Ongoing [1]    | X             | X             | X               |
| 4.4 | Work with our suppliers and partners to test and evaluate zero-emissions technologies and resilient infrastructure solutions for fleet and facilities.  | Ongoing [2, 3] | X             | X             | X               |
| 4.5 | Integrate climate change adaptation considerations into the planned review of Municipal Funding Programs, by considering adaptation planning and projects (e.g., culvert resizing, tree canopies, storm water/flood management, cooling corridors, slope stabilization), active transportation, and multi-modal transportation. |                |               | X             |                 |

| #   | Action  | Status | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|---|--------|---------------|---------------|-----------------|
| 4.6 | Revise next version of Transit-Oriented Communities Design Guidelines (TOCDGs) (2012) with strategies for climate resilience.   |        |               |               | X               |
| 4.7 | Develop a Customer & Community Cooling and Tree Canopy Program that identifies and implements shading infrastructure, cooling/misting systems, and shade trees at transit passenger facilities wherever feasible to enhance social equity and benefit vulnerable populations. Align with municipal and regional plans where possible. |        |               | X             |                 |
| 4.8 | Create a Multi-Modal Safe Travel Planning Resource for use by customers prior to and during extreme weather events/ transit disruptions; this document will support health authority requirements and the safety and health of vulnerable populations, and also encourage use of multiple paths/modes for urban travel.               |        |               | X             |                 |

[1] Development of this plan included consultations with staff from Metro Vancouver, including the Regional Transportation Advisory Committee and Regional Planning Advisory Committee and BC's Climate Action Secretariat and Ministry of Transportation and Infrastructure. TransLink continues to work with the Fraser Basin Council as a participant in the Lower Mainland Flood Management Strategy (LMFMS) and the Integrated Partnership for Regional Emergency Management.

[2] TransLink is currently evaluating submissions to the 2022 Open Call for Innovation which focused on decarbonization of transportation in the region.

[3] PROTRANS, our contracted service provider for the Canada Line, has voluntarily committed to eliminating use of its four carbon-based fuels (propane, gasoline, natural gas and diesel), with two of the four being fully eliminated by 2025.



# Advance Governance & Funding

To reduce our contribution to global greenhouse gas emissions and become more climate resilient, we all need to work together. Sharing knowledge, ideas, challenges, and solutions will help all of us to support and implement climate policies, plans and processes, and obtain the needed funding to accomplish our goals. Many of the actions in this section are cross-cutting and relate to others throughout this plan.

## STRATEGY 5 – DEVELOP AND IMPLEMENT SUPPORTING CLIMATE POLICIES, PLANS, AND PROCESSES

| #   | Action   | Status      | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|--|-------------|---------------|---------------|-----------------|
| 5.1 | Develop and implement a Climate Action Policy and include Scope 1, 2, and 3 emissions.   |             | X             |               |                 |
| 5.2 | Implement a Sustainable Procurement Plan and Policy that incorporates TransLink’s priorities associated with climate change adaptation and mitigation.   | In progress | X             |               |                 |
| 5.3 | Integrate climate change adaptation and mitigation considerations into capital planning, asset management, strategic sourcing, project delivery, and operations and maintenance practices and processes. | Ongoing     | X             | X             | X               |
| 5.4 | Investigate an internal carbon price to guide project decision-making and strengthen business cases for low-carbon projects and investments.   | In progress | X             |               |                 |
| 5.5 | Continue to apply total cost of ownership and life cycle impact principles in business cases, capital planning, financial analysis, and project decision-making.   | Ongoing     | X             | X             | X               |
| 5.6 | Continue to monitor, document, and report progress via TransLink’s annual Accountability Reports.  | Ongoing     | X             | X             | X               |
| 5.7 | Biennially review and update the Climate Action Plan with operating companies, regional partners, and Indigenous communities.  |             |               | X             |                 |
| 5.8 | Continue to leverage TravelSmart expertise to encourage sustainable commuting practices with employees.  | Ongoing     | X             | X             | X               |

## STRATEGY 6 – ENHANCE CLIMATE EDUCATION AND COMMUNICATION

| #   | Action   | Status  | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|--|---------|---------------|---------------|-----------------|
| 6.1 | Regularly engage and communicate with key stakeholders, regional partners, and Indigenous communities to strengthen climate mitigation and adaptation efforts, and to raise awareness of climate impacts on the region’s transportation systems. | Ongoing | X             | X             | X               |
| 6.2 | Engage marginalized disproportionately impacted communities and integrate equity into our climate action planning.   | Ongoing | X             | X             | X               |
| 6.3 | Provide staff with climate change information, their role in climate action and how TransLink is responding to the climate emergency.  | Ongoing | X             | X             | X               |
| 6.4 | Develop change management and training plans as needed for implementation of actions.  | Ongoing | X             | X             | X               |

## STRATEGY 7 – SECURE FUNDING FOR NET ZERO AND CLIMATE RESILIENCE

| #   | Action  | Status  | Year 1 (2023) | Year 2 (2024) | Year 3+ (2025+) |
|-----|---|---------|---------------|---------------|-----------------|
| 7.1 | Continue to work in partnership with the Mayors’ Council and provincial and federal governments to support TransLink’s transition to net-zero operations, including through the next Investment Plan. | Ongoing | X             | X             | X               |
| 7.2 | Work in partnership with energy and fuel providers to enable financially feasible transition to net-zero operations.  | Ongoing | X             | X             | X               |
| 7.3 | Continue to explore other funding programs, revenue sources, and business opportunities to support our climate goals.   | Ongoing | X             | X             | X               |

# Appendices

## 1. Definitions

(Definitions are based on industry standards and adjusted to reflect the scope of TransLink’s Climate Action Plan)

| TERM                          | DESCRIPTION   |
|-------------------------------|---|
| <b>Adaptation</b>             | Anticipating, planning for, and responding to the adverse effects of climate change and taking appropriate action to prevent or minimize the damage it can cause, or taking advantage of opportunities that may arise.  |
| <b>Asset</b>                  | Individual component of TransLink’s infrastructure or operations; examples include buildings, buses, light rail guideway, SeaBuses, or trains.  |
| <b>Climate Change</b>         | A persistent, long-term change in the state of the climate, measured by changes in the mean state and/or its variability. Climate change may be due to natural internal processes, natural external forcings such as volcanic eruptions and modulations of the solar cycle, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. |
| <b>Exposure</b>               | The likelihood that an inventory of assets will experience a hazard. It is possible to be exposed but not vulnerable to a hazard.   |
| <b>Extreme Weather Events</b> | Significant anomalies in temperature, precipitation and winds that can manifest as heavy precipitation and flooding, heatwaves, drought, wildfires, and windstorms.   |
| <b>Impact</b>                 | The consequences of realized risks on ecosystems, economies, infrastructure and communities – and more specifically, on TransLink’s customers, employees, and/or service. Impacts may be referred to as consequences or outcomes and can be adverse or beneficial.  |

|                        |   |
|------------------------|---|
| <b>Hazard</b>          | A natural or human-induced physical event that may have adverse effects on exposed and vulnerable elements (assets).  |
| <b>Net-zero</b>        | Completely negating the amount of greenhouse gases produced by human activity; achieved by reducing amount of greenhouse gases emitted and/or absorbing carbon dioxide from the atmosphere.   |
| <b>Resilience</b>      | The capacity to prepare for, avoid, absorb, recover, and adapt to the effects of shocks and stresses in an efficient manner through the preservation, restoration, and adaptation of essential services and functions.  |
| <b>Risk</b>            | A potential action or event that could adversely affect the achievement of TransLink’s objectives if it occurs or does not occur. Measured as a combination of likelihood of occurrence of the event (or of failure of occurrence of the event), and impact (consequence) if it does occur (or fails to occur). |
| <b>Risk assessment</b> | An analysis used to determine the risk different hazards pose to a system or asset(s).  |
| <b>Vulnerability</b>   | The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes.  |



## 2. Climate Change Projections

The Metro Vancouver region has increasingly witnessed significant extreme weather events in the past several years. Intense rain events in 2021 caused significant flooding in the Fraser Valley as well as catastrophic failure of the provincial highway network that the region is dependent on. Intense heatwaves contributed to 619 fatalities during BC's "heat dome" in 2021. Between 2010 and 2020, wildfires created over \$2.9 billion in damages and impacted the respiratory health of millions of residents across BC. The Metro Vancouver region can expect extreme events such as intense rain and heatwaves to increase in both frequency and intensity. Both the incremental changes in the climate and extreme weather events have a range of impacts to our human, natural and built systems. Examples include:

- increased risk of health and safety impacts;
- increased vulnerabilities of new and existing buildings and infrastructure to new climate norms;
- increased street, property, and shoreline flooding; and,
- increased loss of trees and vegetation.

Furthermore, climate change impacts and risks are becoming increasingly complex and more difficult to manage. The Intergovernmental Panel on Climate Change (IPCC) expects that multiple climate hazards will occur simultaneously, and multiple climatic and non-climatic risks will interact, resulting in compounding overall risk and risks cascading across sectors and regions.

The "Climate Projections for Metro Vancouver" (2016) are:

- **Warmer temperatures:** global climate models project an annual average increase of 2°C, with a summer average increase of 3°C by the 2050s. This will result in increased daytime and nighttime temperatures, more hot summer days and fewer winter days with frost or ice.
- **Heat waves:** double number of summer days above 25°C, from an average of 22 days per year to 55 days per year; the number of heat days above 30°C will increase from two to 12 days/year by 2050 and to 29 heat days per year by the 2080s; hottest day temperatures projected to increase from 34°C to 38°C by 2050.
- **Longer summer dry spells:** Summer precipitation will experience a decline of 19% by the 2050s, and a decline of 29% by the 2080s. The average longest period of consecutive days without rain (under 1 mm) will increase from 21 days to 26 days by the 2050s, and 29 days by the 2080s.

- **Wetter fall, winter, and spring:** although the average total annual rainfall is only projected to increase by 5% by 2050s and by 11% by the 2080s, the increases will be in fall, winter, and spring. Fall precipitation will increase by 11% by the 2050s and 20% by the 2080s. Winter precipitation will increase by 5% by the 2050s and 14% by the 2080s. Spring precipitation will increase by 8% by the 2050s and 12% by the 2080s.
- **More extreme precipitation events:** significantly more precipitation is expected to fall during the 1-in-20 (or 5% chance) wettest day extreme storm events in the future. Larger 1-in-20 wettest day events could mean up to 36% more rain in low-lying areas by the 2050s, and 59% by the 2080s. In the past, on average, 154 mm of precipitation fell during the entire month of January, but by the 2080s, there will be a 5% chance that this amount of rain could fall in a one-day event.
- **Decreased snowpack:** in the winter months, projections indicate a 56% decrease in snowpack by the 2050s, resulting in much lower spring and summer snow levels. This trend is expected to magnify by the 2080s with a 77% decrease in winter snowpack and 84% decrease in spring snowpack, averaged across the three watersheds (Capilano, Seymour, Coquitlam).
- **Sea level rise:** in addition to these weather-related changes predicted in our region, warming global temperatures will result in sea level rise. The Government of BC currently recommends using half a metre for planning to 2050, one metre to 2100 and two metres to 2200. However, in combination with storm surges and extreme precipitation, increased risk of flooding is predicted (particularly along the Fraser River).

These climate change predictions indicate TransLink's transportation systems will need to operate through warmer, wetter winters and hotter, drier summers, with increased incidences of storms and flooding. Tackling climate change and enhancing the environment is very important to us, and we have a responsibility to operate a low-carbon network that is also resilient to any changes to the climate.

## 3. Existing Adaptation Initiatives

### INFRASTRUCTURE & FLEET

- Already in place / standard procedure
  - » Retaining wall upgrades at bus loops/exchanges (rainfall/climate resiliency, seismic, etc.)
  - » Technical specification adjustments for all bus and SkyTrain cars to integrate climate change
  - » Annual freshet flood risk monitoring and service continuity planning for key Transit Centres
  - » Protocols to manage the impacts of power outages
- Developing / currently implementing
  - » Research feasibility of reflective/light colours for fleet livery (rail and bus) to reduce heat gain, cooling loads, and improve customer comfort
  - » Risk reduction program for data centres
  - » Air conditioning on all buses by 2028

### OPERATIONS

- Already in place / standard procedure
  - » Maintenance/operational procedures for snow/ice on trolley overhead lines
  - » Heat assessment and cooling strategies at worksites conducted depending on temperature
- Developing / currently implementing
  - » Emergency response guidelines updated for extreme heat events
  - » Employee training on emergency response roles and responsibilities, exercises, and planning

### PLANNING, POLICIES AND COMMUNICATIONS

- Already in place / standard procedure
  - » Changes to regional, provincial, and federal climate change policies monitored to ensure CAP is in alignment
- Developing / currently implementing
  - » Climate change risk considered in the Enterprise Risk Management Registry
  - » Enterprise Crisis Communications Program (for responding to provincial emergency alerts)

