Zero Emission Fleet Strategy

June 2025

Saanich

Territory Acknowledgement

The District of Saanich lies within the traditional territories of the Lekwungen peoples known today as Songhees and Esquimalt Nations and the W̱SÁNEĆ peoples known today as W̱JOȽEȽP (Tsartlip), BOḰEĆEN (Pauquachin), SȾÁUTW̱ (Tsawout), W̱SIḴEM (Tseycum) and MÁLEXEȽ (Malahat) Nations.

As we build formal government-to-government relationships with neighbouring First Nations governments, the District will look for opportunities to collaborate on actions and issues of mutual interest, including actions related to climate change. The District respectfully acknowledges the First Nations' long history of land stewardship and knowledge of the land and will look for opportunities to learn from and collaborate with First Nations to help us improve our community's resilience to a changing climate.

Acknowledgements

Thank you to those who contributed to the development of the Zero Emission Fleet Strategy, including: the consultant team (Innotech Fleet Strategies, Betterfleet, and PBX Engineering) for providing data analysis, modelling and stakeholder engagement support; other District of Saanich departmental staff, partners and stakeholders who provided insights, expertise and feedback in the development of the Strategy; BC Hydro who provided funding support; and staff from local governments across BC who continue to collaborate so we may all achieve our climate goals faster.

Executive Summary

The Climate Emergency is upon us, and accelerated action is needed across all sectors to achieve ambitious climate targets and avoid the most devastating of climate impacts. Saanich's road vehicle fleet, comprising over 300 vehicles in total across Municipal, Police, and Fire operations, contributes to approximately half of corporate GHG emissions with the remainder primarily associated with natural gas for building heating. Therefore, transitioning to a zero emission fleet represents one of the largest opportunities for meaningful climate action for the District, while also reducing the associated air and noise pollution in our community.

This Zero Emission Fleet Strategy provides background on the current low and zero emissions vehicle industry; assesses current and future fleet technologies; sets an interim 2030 emissions target; outlines a cost-effective roadmap for net-zero fleet emissions by 2040; includes an electric vehicle (EV) transition plan; and presents the actions necessary to deliver the road map and meet the climate targets based on detailed analysis to optimize cost, mitigate risk, and consider operational resource restrictions. The scope of this strategy is on-road fleet vehicles, while non-road equipment will be addressed separately.

The District of Saanich, in line with other municipalities and the Province of British Columbia, has established a Climate Plan aiming for 100% renewable energy and net-zero greenhouse gas (GHG) emissions by 2040 for our corporate operations. Implementing this Zero Emission Fleet Strategy will enable us to maintain our climate leadership position and achieve our net-zero Climate Target, while providing an interim 2030 GHG reduction of 60% for the Saanich fleet from 2007 levels. The Saanich fleet has built a strong foundation of electrification success for light duty electric municipal vehicles over the last ten years, over 10% of our fleet vehicles are now electric, with recent additions including electric pickup trucks and electric cargo vans.

The Project Team, led by Innotech Fleet Services, used a multi-disciplinary approach to ensure the District was provided with an accurate and representative Zero Emission Fleet Strategy. This approach relied on leveraging industry experience managing similar fleets, combined with world-class software for fleet analysis. Fleet data, current practices and policies were reviewed for anomalies and general accuracy. This information was then compared against industry standards, municipal peers and available technologies. Finally, the Project Team worked with key Saanich stakeholders on recommended scenarios to develop a suitable strategy.

Based on project findings, a total of 16 strategic, operational, and financial actions were identified (Section 7.4), which will reduce fleet emissions and support the District in achieving its goal of net-zero GHG emissions and transitioning to 100% renewable energy by 2040.

The strategy presented aims to achieve the 2040 net-zero emission target through a balanced cost optimized approach to EV fleet expansion, demonstrating the District's commitment to climate action, while minimizing operational and financial risk and maximizing future flexibility. This links into the Saanich Asset Management Strategy to prioritize capital investment plans supporting long-term sustainability, resilience, and service delivery.

Deploying EVs is an essential component of the Strategy, with the Saanich Operations Centre (SOC) redevelopment and electrical infrastructure upgrades playing a key role in successful deployment.

Recognizing the 15-year horizon to our 2040 targets and the dynamic nature of the industry, regulations, and technologies, flexibility is crucial. The Zero Emission Fleet Strategy has embedded adaptability, allowing the District to adjust the approach in response to changes while ensuring the 2040 target is met. The Strategy will help guide decisions in the coming years, while providing the flexibility to respond to operational changes, industry trends, fuel prices, grant opportunities, and technological advancements on our road to zero emissions.

Table of Contents

1.0 Introduction

Our planet is in a state of climate emergency, and the devastating impacts of climate change are now being dealt with by British Columbians every year as we face increasing heat waves, floods, wildfires and more. The vehicles we use are a significant contributor to climate change while also releasing pollutants into our community, which lead to negative health impacts[1]. A shift away from fossil fuels to electrification and improvements to energy efficiency in our existing vehicles have tremendous potential to not only reduce greenhouse gas (GHG) emissions, but improve overall community health and resilience.

This Zero Emission Fleet Strategy delivers on the 2020 Climate Plan[2] action L3.1: Develop a fleet strategy to reduce corporate emissions and Council's 2023-2027 Strategic Plan[3] Initiative 1.3.6: Develop, fund and implement a Zero Emission Fleet Strategy that provides the roadmap to transition Saanich fleets to 100% renewable energy and net-zero emissions by or before 2040. The purpose of the Strategy is to develop a fleet decarbonization pathway to achieve our climate targets, while managing operational risk and total cost of ownership.

1 https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/pollutants/common" \l "vehicle

2 https://www.saanich.ca/EN/main/community/sustainable-saanich/saanich-climate-plan.html

3 https://www.saanich.ca/EN/main/local-government/strategic-and-financial-planning-1/the-strategic-plan.html

2.0 Background

The Saanich Climate Plan includes a target of achieving a 50% reduction from 2007 in corporate GHG emissions by 2025, reaching net-zero corporate GHG emissions by 2040 and transitioning to 100% renewable energy. In 2024 the District reported a GHG reduction of 29% compared to the baseline year of 2007 as shown in Figure 1 below, these GHG emissions primarily relate to the combustion of fossil fuels (natural gas, diesel, and gasoline) for District owned buildings and fleet vehicles.

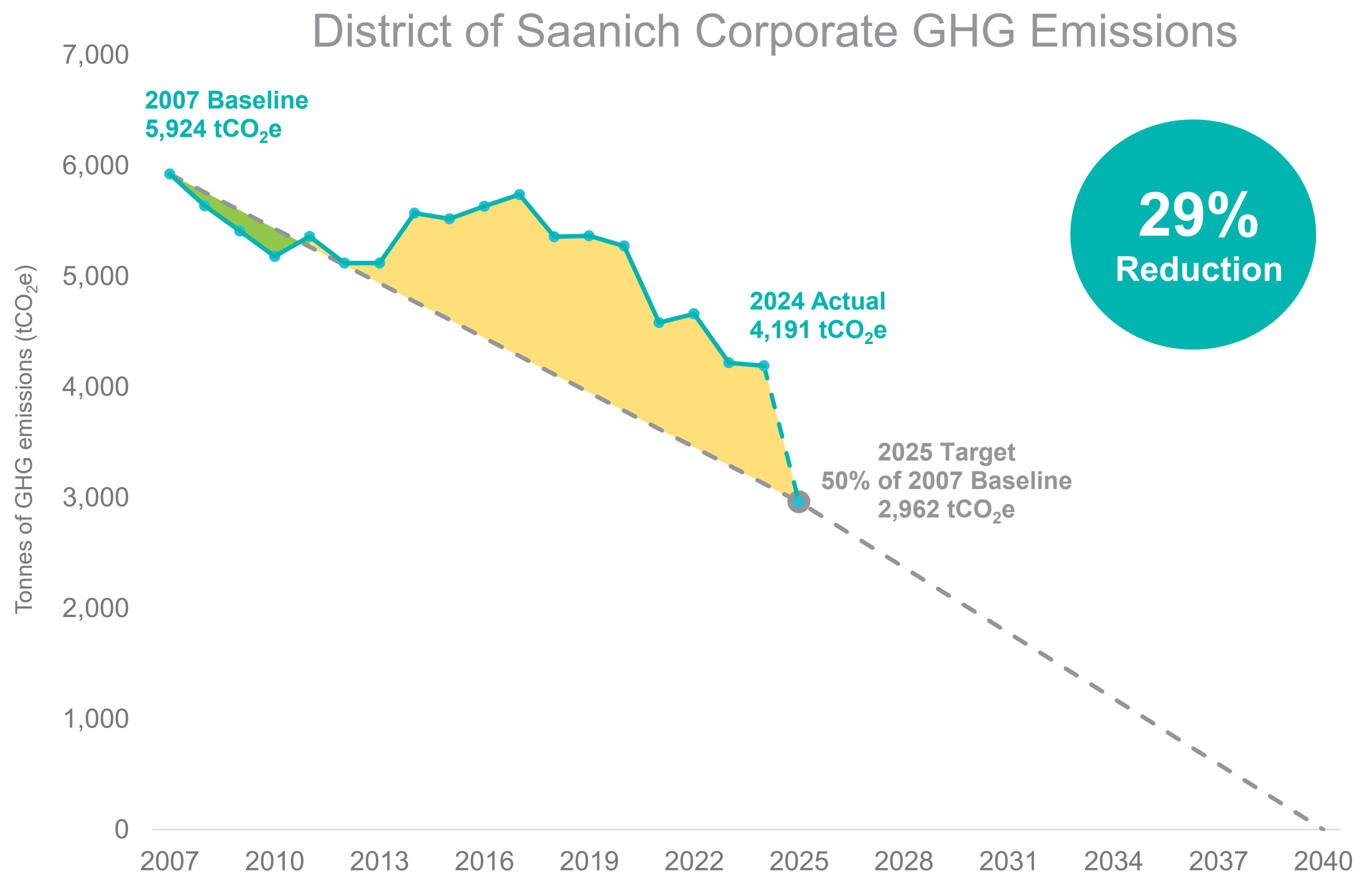


Figure 1: Corporate GHG Emissions to 2024

The corporate vehicle fleet consists of approximately 314 road vehicles for the Police, Fire, and Municipal Operations (Public Works, Parks and offices). Almost 90% of fleet vehicles still run on fossil fuels (gasoline and diesel), with these fleet vehicles responsible for approximately half of the District's GHG emissions, the remaining emissions primarily associated with natural gas use for heating buildings. Significant building decarbonization projects have recently been completed or are underway at major recreation facilities including Saanich Commonwealth Place, Cedar Hill Recreation Centre, and GR Pearkes Recreation Centre; these will further reduce the GHG share for buildings, so the proportion of Fleet GHG emissions will increase without additional decarbonization.

2.1 Alignment with Federal & Provincial governments

Aligning with market sentiment and government policies, many fleets are setting aggressive carbon reduction targets. The Government of Canada has set a mandatory target for all new light-duty cars and passenger trucks sold to be zero emission vehicles by 2035 with interim GHG reduction targets of 20% by 2026 and 60% by 2030. In addition, Canada has set a target of 35% for all new medium and heavy- duty vehicles to be zero emission by 2030 and will develop zero emission regulations for 100% by 2040

The Province of British Columbia has developed accelerated GHG emission reduction targets, 26% by 2026, 90% by 2030 and 100% by 2035 as part of the Zero-Emission Vehicles Act. A zero emission first policy will be developed for public sector fleets, setting the target that 100% of light-duty vehicles purchased will be zero emission by 2040. While this target does not include municipalities, it is notable as it includes some peer organizations. In addition, the Province of British Columbia has Zero Emission Vehicle Regulations (ZEVR) governing the implementation of light-duty zero emission vehicles. They are currently working on developing similar regulations for medium and heavy commercial vehicles[4].

4 https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/zero-emission-vehicles-act

2.2 Incentives

To support these ambitious targets, the Federal and Provincial governments are providing significant support for organizations to reduce the carbon emissions of their fleets. These include offering sizable incentives intended to offset the incremental capital costs associated with the purchase of electric vehicles and associated charging infrastructure.

The Federal incentive program, introduced in July 2022, provides incentives for up to $200,000 per vehicle. In British Columbia, the provincial government has a similar program with incentives of up to $150,000 per vehicle. These incentives can be combined for eligible vehicles to offset the costs up to 75% of the MSRP[5]. Funding for these incentives is topped up annually and is expected to only be offered for a limited period. These incentives represent just a few of the financial justifications for organizations to convert their fleets to electric.

In addition to incentives for vehicles, the Province of British Columbia updated its Low Carbon Fuel Standard in 2022 to include the owners of EV Supply Equipment (EVSE) i.e. EV chargers, as fuel suppliers. This enables them to declare and collect carbon credits based on the energy supplied to vehicles through the EVSE. These carbon credits can then be traded at market rates to generate revenue. While the carbon market fluctuates, at current rates these carbon credits can still generate additional revenue after paying for EV energy consumption.

5 https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean- transportation-policies-programs/clean-energy-vehicle-program/combining-commercial-rebates

2.3 Zero Emission Fleet Strategy - Development

The Strategy was developed in a multi-phase process, shown in Figure 2 below:

Phase 1

- The scope of the strategy and process for strategy development were defined with the staff Working Group. The scope included decarbonization of road vehicles associated with the Municipal, Fire, and Police fleet to achieve Saanich Climate Plan targets.

Phase 2

- The Project Team worked collaboratively with Saanich staff to define the current baseline fleet.
- The research and analysis then focused on the transition to zero emission vehicles, including a review of technology and supporting infrastructure requirements.
- This analysis included a review of operational best practices, alternative fuels and carbon credits. An option evaluation matrix was developed to compare key criteria for all identified methods of reducing carbon emissions.

Phase 3

- The project team used a robust and multi-disciplinary approach to review specific operational considerations, industry standards, municipal peers and available technologies to develop recommended scenarios.
- The project considered policies, technology, operations, behaviour, facility electrical capacity, capital and operating financial implications including resource requirements and Total Cost of Ownership (TCO), to provide an in-depth review of findings, analysis of various scenarios, and recommendations.
- A full summary of the modelling and analysis process is contained in the supporting Consultant Technical Appendices, this can be found at:
    - » saanich.ca/zeroemissionfleetstrategy

Phase 4

- The final strategy was further developed based on engagement and feedback from staff.
- This strategy provides a comprehensive list of actions to meet an interim 2030 and net-zero 2040 target.

Figure 2: Process for Zero Emission Fleet Strategy Development

3.0 Zero- and Low-Emission Fuels

Various low-carbon and zero emission fuel types were reviewed as part of the Fleet Strategy, including their applicability to the District's operations, infrastructure, and carbon-reduction goals (Consultant Technical Report, Appendix D). These were categorized as follows:

Zero tailpipe emissions:

These are typically defined as "battery electric" or "hydrogen fuel cell":

- **Electric Vehicles** – using BC Hydro renewable electricity
  - Using BC's 98%[6] renewable electricity, BC Hydro have committed to 100% renewable by 2030.
- **Fuel Cell Vehicles** – using green hydrogen generated from renewable electricity
  - There are energy losses in the generation, storage, and use of green hydrogen from electricity leading to a low energy efficiency compared with direct electricity use in an EV.
  - Limited green hydrogen supply - Currently only around 1% of global hydrogen production[7] is classed as low-emissions, with the remaining 99% of hydrogen derived from non-renewable fossil fuel sources.

Renewable combustion fuels:

These fuels have lower non-biogenic GHG emissions than conventional fossil fuels, while still relying on fuel combustion leading to tailpipe air pollution and biogenic GHG emissions (see Figure 3).

- **Renewable Diesel**
  - Typically sourced from food waste (animal fats and vegetable oils).
  - Drop-in replacement for conventional diesel (already delivered to the Saanich Operations Centre).
- **Biodiesel**
  - Typically sourced from food waste (animal fats and vegetable oils).
  - Requires engine modifications to operate over a 20% blend and is unsuitable for operations in cooler weather.
- **Renewable Natural Gas (RNG)**
  - Typically sourced from landfills, agricultural/food waste, and waste water.
  - Limited supply and important to reserve for hard to electrify processes.

Fossil fuel-based combustion fuels:

These non-renewable fuels were not considered further as they produce significant GHG emissions and would not allow us to meet our climate targets:

- **Compressed Natural Gas (CNG)**
- **Liquified Natural Gas (LNG)**
- **Propane**
- **Fossil Fuel Hydrogen**
  - Fossil fuel hydrogen (such as blue and grey hydrogen) have significant climate and environmental impacts associated with the fuel source. Blue hydrogen uses carbon capture, however life cycle assessments have found that burning blue hydrogen produces 20% more GHG emissions than burning natural gas.[8]

6 https://choose.bchydro.com/why-choose-bc/clean-energy
7 https://www.iea.org/reports/global-hydrogen-review-2024/hydrogen-production
8 https://scijournals.onlinelibrary.wiley.com/doi/full/10.1002/ese3.956

Biogenic Emissions

Biogenic GHG emissions are released through combustion of bio-fuels, including Renewable Diesel. These GHG emissions are considered to balance with those released naturally into the environment as part of the planetary carbon cycle, as opposed to non-biogenic GHG emissions from fossil fuels that would not be released naturally and contribute to climate change. Figure 3 illustrates the reduction in non-biogenic GHG emissions when using Renewable Diesel in place of conventional diesel.

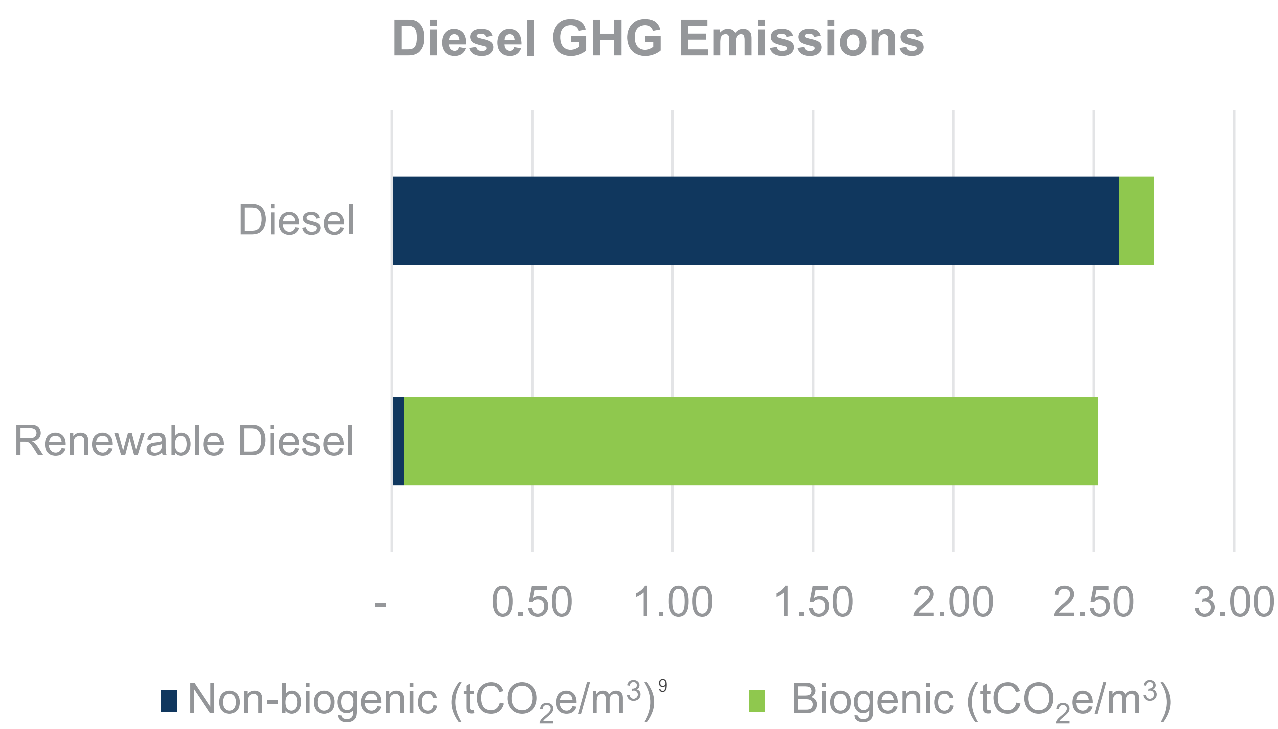


Figure 3: Diesel GHG Emissions – Biogenic and Non-Biogenic

9 tCO_2e = tonnes of Carbon Dioxide equivalent

3.1 Electric Vehicles

An electric vehicle (EV) is an automobile that uses an electric motor as a source of propulsion. There are four main kinds of electric vehicles:

1. **Battery electric / fully electric (BEV):**

   A BEV relies completely on the electric battery and motor to propel the car. These vehicles store electricity onboard with battery packs, and are powered by electricity from an external source by plugging into an outlet or charging station.

2. **Hybrid electric vehicle (HEV):**

   An HEV is a "traditional" or "conventional" hybrid, and has a two-part drive system: a conventional fuel engine and an electric drive. These vehicles do not plug in; electrical energy is generated via an alternator or regenerative braking.

3. **Plug-in hybrid electric vehicle (PHEV):**

   PHEVs have a two-part drive system, and are equipped with an electrical drive and battery storage capacity, in addition to an internal combustion engine (generally with larger battery storage and a smaller engine than Hybrid Electric Vehicles). The batteries can be recharged by plugging into an electrical outlet, as well as via a gas-powered alternator and/or by regenerative braking. These vehicles currently offer longer ranges than battery only vehicles, but they contribute more to climate change and air pollution due to the use of the internal combustion engine.

4. **Fuel cell vehicle (FCV):**

   An FCV is an electric vehicle that uses a fuel cell instead of a battery to power its on-board electric motor. These vehicles are fueled with hydrogen.

3.2 Benefits of Fleet Electrification

Low / Zero GHG Emissions

With the clean electricity in BC, Electric vehicles (EVs) are renewably powered and have considerably lower GHG emissions than gasoline or diesel-powered vehicles. In addition, EVs are significantly more energy efficient than internal combustion engine (ICE) vehicles, reducing energy use and overall lifecycle GHG emissions (energy GHG emissions plus embodied GHG emissions). Therefore, achieving our climate targets will require significant focus on electrification across our fleet and building portfolio, building upon many successes already achieved in this area.

Affordability

While the up-front costs on electric vehicles can be more than comparable gasoline- or diesel-powered vehicles, they are generally cheaper to operate over the life of the vehicle. This is due to fuel (electricity) costs being significantly lower and there is less need for maintenance; EVs have fewer and simpler components, they do not require oil changes, and regenerative braking means that EV brakes wear down much less.

Cleaner Air and Quieter Streets

EVs do not burn fuels, so they do not create exhaust-related air pollution such as particulate matter or smog. Like other motor vehicles, wear of the tires and brakes of EVs and of the road surfaces they drive on create some particulate air pollution, although this is reduced with EV regenerative braking. EVs do not have an internal combustion engine, so they are much quieter than gasoline- or diesel-powered vehicles.

3.3 Recommended Fuel Options

A summary of fuels and their alignment with the District's fleet and carbon reduction goals is shown in Table 1. Given the above constraints, battery electric vehicles are considered the most applicable to the District's fleet operations as there is a good selection of vehicles, infrastructure is in progress or in place for many District facilities and there is significant carbon reduction potential.

Renewable Diesel was noted as a transition fuel, not as a long-term renewable fuel option for the fleet. This is because Renewable Diesel, while deemed renewable due to the feedstock growing in a relatively short time period, still results in a large number of biogenic emissions and releases a similar level of air pollution (i.e. particulate matter, nitrous and sulphur oxides) as conventional diesel. These issues are the same for other biofuel sources as well as renewable natural gas (RNG) used in buildings. This is further compounded by the fact that this fuel type has a limited long-term supply, with both Renewable Diesel and RNG competing for the same limited feedstock that, if unregulated, can result in environmental impacts like deforestation or reduction in agricultural land available for food production. Such renewable fuel sources should be reserved for hard to electrify sectors, such as industry, or as a transition fuel while piloting new electric vehicle technologies and supporting EV market growth.

Technology	CO_2 emission reduction potential	Local air pollution reduction	Compatible vehicle availability	Fueling infrastructure availability	Equivalent or reduced vehicle maintenance	Financial incentives
Biodiesel			✓	✓		
Renewable diesel	✓		✓	✓	✓	
RNG	✓					
Electric	✓	✓	✓	✓	✓	✓
Green hydrogen (fuel cell)	✓	✓				

Table 1: Renewable Fuel Technology Matrix

3.4 Carbon Credits

In 2022, the Province of British Columbia updated its Low Carbon Fuel Standard (LCFS), which now allows for the accumulation of carbon credits for EVSE owners[10]. In addition to the British Columbia LCFS, there is also a Federal Clean Fuel Regulation which outlines Federal carbon credits. Organizations that own and operate EVSE can collect credits under both programs. These credits can be saved and then sold on the carbon trading market to generate a revenue. These credits are considered commodities and as such, the price fluctuates with market values. Prices average around \$400/tCO_2e for British Columbia and \$100/tCO_2e for Federal credits. There are currently no Provincial or Federal restrictions on how the proceeds from credits can be used; ideally, they would be used to offset EVSE costs, purchase additional electric vehicles, or for a similar carbon reduction initiative.

The District has been collecting carbon credits for EV charging since 2022 with the intention of selling these credits to support further expansion of EV charging infrastructure. However, given the relatively limited value compared with fleet costs and market unknowns, carbon credits have not been considered as part of the fleet strategy cost analysis. The carbon credit industry in British Columbia is still relatively new and expected to evolve over the coming years.

10 Province of British Columbia, https://www2.gov.bc.ca/gov/content/industry/electricity-alternative- energy/transportation-energies/renewable-low-carbon-fuels

4.0 Overview of the current EV market

As organizations shift towards broader adoption of EVs, the demand is driving more available options in both the plug-in hybrid and full electric market. In Canada, governments at all levels are providing significant incentives and programs to assist individuals and businesses in replacing their fossil fuel-powered vehicles with EVs. While the vehicle technology is not yet advanced enough for all duty cycles (operational intensity) and market segments, return-to-base fleets, such as those operated by municipalities, provide the optimal operation and duty cycles for EVs.

While the general shape and intended function of an EV is the same as a gasoline or diesel model, there are many operating nuances. EVs present a different driving experience with different controls, braking performance, lack of engine noise and the need for operators to plan their route when the battery is low. In addition to all the benefits an EV can provide, there are also limitations to current medium- and heavy-duty EV technology (see Table 4 for fleet class categories). Charging time, range, unknown reliability, additional complexity, and availability of vehicle and body combinations are a few of these related to medium- and heavy-duty EVs. These limitations may require operational changes or mean that current EVs may not be available for certain fleet services based on today's technology.

4.1 Light Duty Electric Vehicles

Light-duty EVs, such as cars, SUVs and small pickup trucks, are the most advanced with numerous models available from manufacturers. These vehicles have been proving lower maintenance costs, good performance, and longer battery life than expected. Light-duty vehicles have been successfully used in operational business for many years. Figure 4 below shows rapidly increasing adoption of EVs, with a global average of 18% as new cars in 2023.

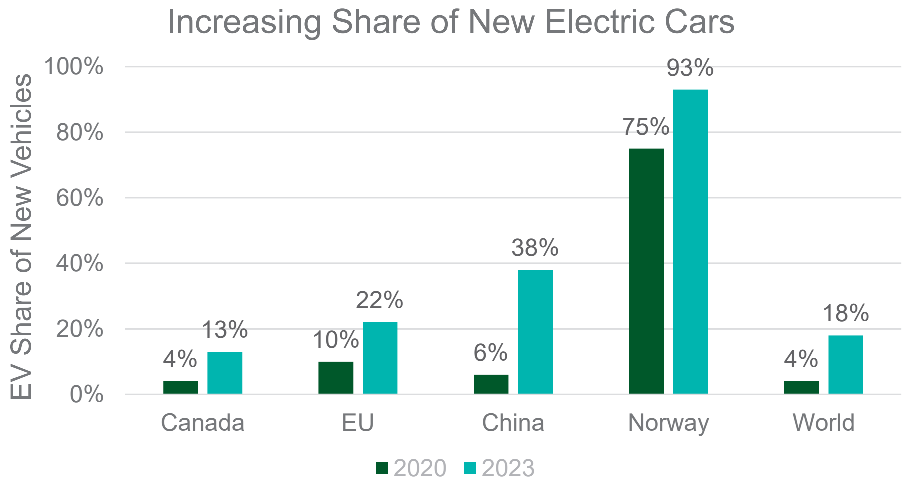


Figure 4: Increasing Share of New Electric Cars[11]

4.2 Medium Duty Electric Vehicles

Medium-duty vehicles, or light commercial, include Classes 3-5 and typically consist of larger service trucks and construction vehicles, such as Ford F350-550, Isuzu cabovers, etc. This market segment is lagging behind both light- and heavy-duty vehicles. However, this is a rapidly growing market with a number of new EV options expected to be available in the next few years. This is expected to expand quickly, and organizations should begin assessing the technology and planning for implementation.

11 https://ourworldindata.org/electric-car-sales

4.3 Heavy-duty Electric Vehicles

Heavy-duty vehicles represent vehicle classes 6-8 and typically consist of fire trucks, dump trucks, garbage trucks, sewer combination trucks, hydro excavators and other large or specialized vehicles such as Fire Engines. These vehicles are lagging behind light-duty vehicles in terms of technological readiness and number of years in the market. Many heavy-duty vehicle manufacturers began commercial production of their heavy-duty electric vehicles in the last few years and with an expanding number of vehicle options.

Given the limited market available options, many heavy-duty electric vehicles are still in the testing phase, which makes them better suited for predictable operational use, such as delivery services. Using these vehicles for unpredictable uses where complex truck bodies are required or where vehicles are used 24/7 or support essential or emergency services e.g. snow clearing and emergency infrastructure repairs, can present some real challenges and risks at this time. In addition, operations where auxiliary equipment is used and/or maximum payloads are required are proving to be difficult to electrify due to the limited range and increased weight of current battery packs. As such, organizations need to manage the risks to service levels when assessing the introduction of these vehicles into their fleet. Given this, many organizations are piloting heavy-duty EVs for only a small portion of their fleet, enabling them to test operational effectiveness, train staff and identify any challenges that further supports industry development. The technology is progressing rapidly, so it is important for organizations to monitor advancements and develop a plan and associated budgets for implementation and procurement.

Globally an increasing number of manufacturers are now offering electric heavy-duty vehicles, including garbage trucks, fire trucks, street sweepers, backhoes, semi-trucks, etc. In BC, a number of heavy-duty municipal vehicles are currently being used:

- Electric garbage trucks
  - City of Burnaby
  - Comox Valley
  - District of North Cowichan
  - District of North Vancouver
  - District of Squamish
  - UBC Endowment Lands
- Electric fire trucks
  - Victoria
  - Vancouver

4.4 Charging Infrastructure

Charging infrastructure is readily available with numerous Level 2[12] and DCFC[13] options from many manufacturers on the market. The majority of Saanich EV's can be supported with Level 2 charging speeds as vehicles can charge overnight, while DCFC will be required for some of the larger vehicles with high energy demands, or critical vehicles that need to be available for deployment. An even faster MCS (Megawatt Charging System) standard is also emerging that could support accelerated charging in the future.

12 (standard rate, 5kW to 19kW, fully charging a small vehicle in around 8 hours)

13 (Direct Current Fast Charger, 25kW to 350kW+, fully charging a small vehicle in under 1 hour)

Utility providers are investing heavily in planning and implementing infrastructure upgrades to support charging networks and the transition of businesses to EVs. BC Hydro is offering incentives and supporting EV fleet strategies to better understand future power needs and plan for infrastructure to support anticipated power requirements[14]. Significant Provincial and Federal grants are available that offer contributions up to 75% of EV projects, including EV Charge infrastructure.

The carbon reduction potential for electrification is high, especially in British Columbia where 98% of electricity generated is clean hydroelectric energy. Many other regions still use a large proportion of fossil fuel (coal and natural gas) for electricity generation, renewable energy generation is expanding (particularly wind and solar) to decarbonize electricity[15] EVs still have lower lifecycle GHG emissions (energy and embodied carbon) in these regions with higher carbon energy, while in BC lifecycle GHG emissions[16] from EVs are estimated to be around 80% less compared with gasoline vehicles even when factoring in all the energy used to manufacture the battery system.

4.5 Battery Recycling

Another environmental consideration for battery electric vehicles is battery recycling. Recycling has seen significant technological advancement over the past few years. Companies, such as Li-Cycle, have developed safe battery recycling technology that can recover up to 95% of the raw materials[17]. The Province of British Columbia has also added EV batteries to recycling regulations, which is expected to help increase investment in local recycling technology and facilities. Some used EV batteries are now being given a second life and deployed as building battery storage systems to reduce peak electricity demand and to provide resilience during power outages.

14 "Electric Fleets", BC Hydro, accessed at: https://www.bchydro.com/powersmart/electric- vehicles/industry/fleets.htm
15 https://ourworldindata.org/renewable-energy
16 https://economics.td.com/ca-lifecycle-emissions-electric-vs-gasoline-vehicles
17 "Services", Li-Cycle, accessed at: https://li-cycle.com/services/

5.0 Saanich Fleet Baseline

It is critical to understand the current state of the District's fleet in order to set future targets and identify gaps and opportunities in the District's processes and infrastructure. This was done by reviewing the District's fleet, how it is used and undertaking a gap analysis to compare it to industry peers. A comprehensive fleet listing, usage profile, fuel consumption data, maintenance costs and other relevant data were used alongside stakeholder feedback to inform the baseline. This data was provided by the three distinct groups; Municipal Fleet, Fire Fleet and Police Fleet, all with different data sets and methods of tracking.

The Municipal Fleet data set was substantially complete and highly detailed. Fire and Police data sets had some gaps and multiple sources, which indicates an opportunity for a more detailed and consolidated tracking system and reporting process. Detailed fleet data is becoming increasingly important given the growing complexity of today's fleet and industry as a whole. Comprehensive data sets are integral for informing decision-making and continuous improvement related to fleet maintenance, vehicle replacement, right-sizing, staffing levels, in order to maximize efficiencies and cost-benefits.

5.1 Fleet Plan & Condition Assessment

The Project Team gathered vehicle data including a complete vehicle listing, capital replacement plans, utilization data, fuel usage, and maintenance data. Data was expanded to include home location, additional operational use data, and other information that allowed for an in-depth analysis to create a realistic EV transition plan. Where necessary, estimates based on similar fleets were used to ensure relative accuracy for fleet modelling.

A typical condition assessment considers vehicle age, mileage, maintenance costs, downtime (or uptime) and fuel costs. The Municipal Fleet had an existing current condition assessment completed on a per- vehicle basis. This was not available for Fire and Police fleets and data gaps made completing a condition score on a per-vehicle level unreliable. Considering this, the condition assessment was completed using broad categories of vehicles where data was sufficient to state with confidence the condition of each category. In addition, underutilized vehicles or any other clear anomalies were identified. Table 2 provides a summary of the condition scores for each category and fleet group.

Fleet group	Municipal	Police	Fire
Fleet data tracking	Good	Fair	Fair
Vehicle useful life targets	Good	Good	Good
Fleet policies	Fair	Fair	Fair
Fleet composition	Good	Good	Good

Table 2: Summary Fleet Condition Assessment

5.2 Fleet Composition and GHG Emissions

Municipal vehicles are a significant contributor to Fleet GHG emissions as these form a significant portion of the larger vehicles, such as large trucks and garbage trucks. Police vehicles are also significant on a per vehicle basis due to the high utilization of front-line SUVs. Fire has some larger vehicles such as fire trucks that are GHG intensive, but recent savings have been achieved with automated anti-idle technology. Figure 5 illustrates the GHG breakdown for each group.

The current fleet vehicles are responsible for approximately half of annual corporate GHG emissions. Although heavy-duty commercial vehicles do not constitute the majority of the fleet count, the majority of the GHG emissions are associated with these vehicles.

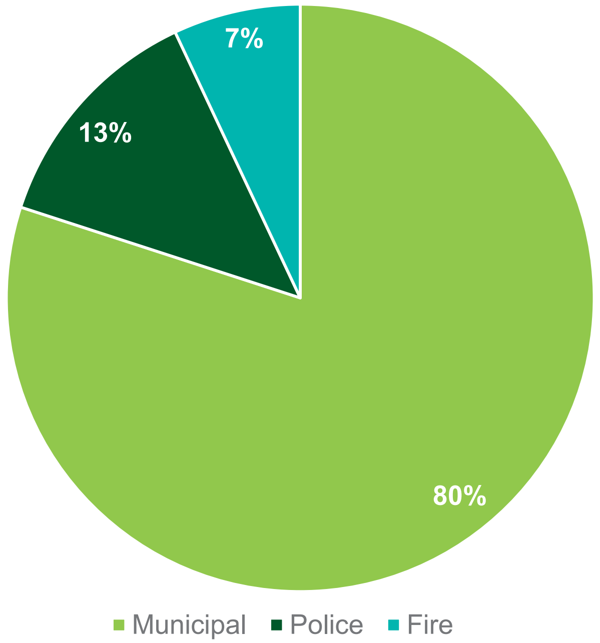


Figure 5: Fleet GHG Emissions by Group

5.3 Facilities & Electrical Infrastructure

Saanich facilities that house majority of the fleet include:

1. Municipal Hall
2. 3500 Blanshard
3. Saanich Operations Centre (Works Yard)
4. Public Safety Building
5. Fire Hall #1
6. Fire Hall # 2

EV charging infrastructure is available at each of these locations for current fleet use, with a total of 43 level 2 chargers (see Consultant Technical Report, Appendix B for detailed information).

Fire Hall #2 and the Saanich Operations Center (SOC) are at various stages of redevelopment, with Fire Hall #2 due for completion in 2026

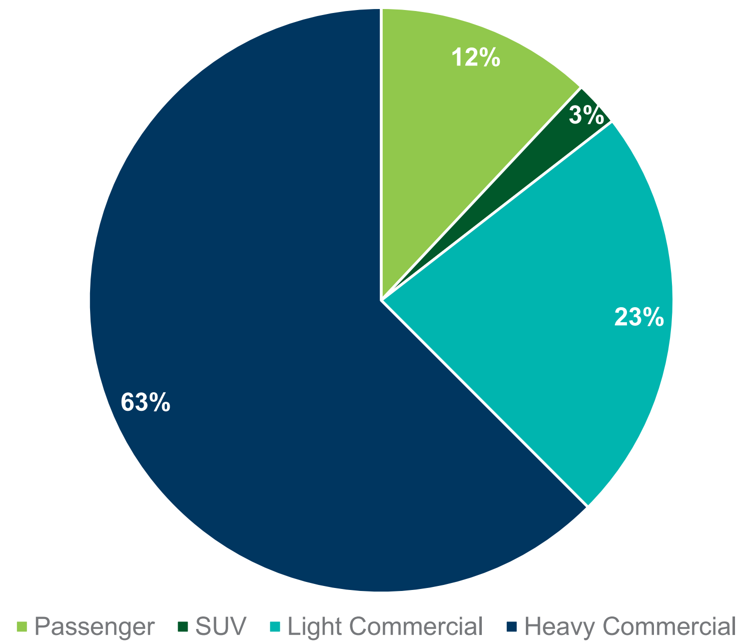


Figure 6: Fleet Emission Breakdown by Vehicle Type

and the SOC due for completion in the next five to eight years. The redevelopment of these facilities will include provisions for sufficient electrical capacity and infrastructure to accommodate full electrification of the current and future fleet at these locations. It is significantly cheaper to design for this at a redevelopment or new build stage compared with retrofitting an existing facility. This will position the District well for its transition to EVs as vehicle replacement timelines and the introduction of a significant number of EVs in the Saanich fleet aligns well with the redevelopment of these facilities.

The redevelopment of SOC is of particular importance given it is home to the majority of the District's heavy-duty fleet, which is responsible for a significant portion of corporate fleet emissions. Alongside EV charging infrastructure, planning and space considerations for future fleet technology will be incorporated into the SOC design, with a re-evaluation of technology readiness during future Fleet Strategy updates.

A detailed analysis of the electrical capacity for all the six key facilities noted above was completed and compared to the energy requirements for anticipated EV usage (See Consultant Technical Report, Appendix B). This has informed the Zero Emission Fleet Strategy in addition to the design for the redevelopment of the Fire Hall #2 and SOC site.

Since this Strategy was initiated, an additional site has been purchased close to the SOC at 4098 Lochside Drive. This location will house the Parks department fleet and is currently being analysed to accommodate future EV charging requirements for this fleet.

5.4 Electric Vehicles at Saanich

The baseline was modeled on the 2023 fleet and shows that Saanich had a total of 33 EVs representing 11% of the fleet vehicles as summarized in Figure 7. This baseline does not include additional electric pickup trucks, passenger cars, and cargo vans that were added to the fleet in 2024.

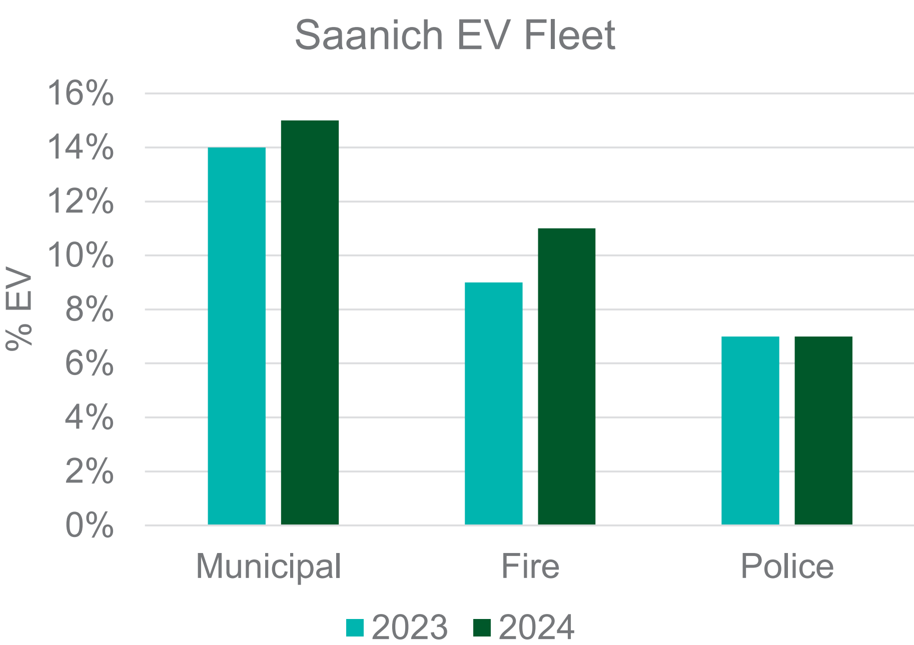
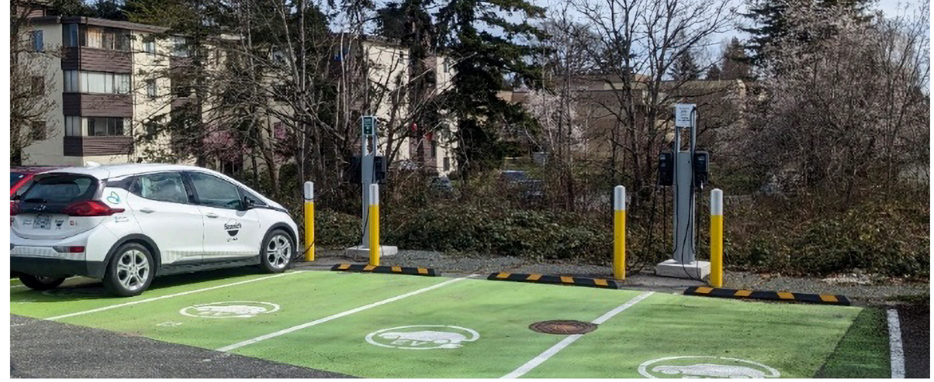


Figure 7: Fleet EV Composition by Group

The District has had considerable success with light duty EVs, initiated with the successful EV Pool Fleet in 2014 and now 100% of Municipal Fleet cars are fully electric.



5.5 Electrical Capacity Assessment & EV Charging Plan

A review of the electrical record information and an electrical capacity assessment were completed for each of the main fleet locations (see Consultant Technical Report, Appendix B for details). Facility redevelopment and current electrical infrastructure upgrade projects were considered, including redevelopment projects at Fire Hall #2, the SOC, and an active service upgrade at the Public Safety Building. Existing electrical peak demand load and projected EV demand were then modelled for each scenario. This was then used to develop an EV charging plan that identified the number and type of EV charger required, by facility up until 2040 (see Consultant Technical Report, Appendix B for Capacity Assessment and detailed Charge Plan). This Charging Plan is based upon current available EV charging infrastructure and will be updated as technology advances. MCS, automated charging, inductive charging or battery swapping are some of the technologies that are emerging, which may be of value to the District's operations as they mature.

The District has benefited from significant grant funding in the past for EV chargers at the Public Safety Building and SOC with some additional grant funding applications underway to support expansion at the SOC and new Parks Site at Lochside Drive. New buildings such as the Fire Hall #2 have been future proofed by the inclusion of EV charging infrastructure in the project design.

6.0 Modelling & Analysis

In-depth fleet modelling and analysis was used to model the District's current and future fleet, and develop pathways to the GHG emissions targets. This modelling and analysis (See Consultant Technical Report, Appendix A) was used to determine when the District's vehicles are technically and commercially suitable for electrification and intended to guide Zero Emission Vehicle (ZEV) and Electric Vehicle Supply Equipment (EVSE) investments in the short, medium, and long-term.

6.1 Methodology

The fleet modelling exercise included the following steps:

1. Map the replacement schedule and emissions for the District's fleets;
2. Based on the District's duty cycles, determine if there are forecasted to be like-for-like ZEV replacements available in the market at each vehicle replacement date;
3. Map the vehicle replacement schedules, market availability for ZEVs, and three scenarios of Business as Usual, Cost Optimized and Technology Leadership; and
4. Model preliminary emissions and costing information for each scenario, excluding out-of-scope considerations such as EV charging infrastructure deployment.

Asset replacement modeling was used to compare the total cost of ownership (TCO) for each scenario, including initial vehicle purchase, maintenance costs, and fuel costs.

This analysis is built on several assumptions based on a combination of empirical data from other jurisdictions, subject matter expertise, and data provided by the District for the fleet composition and usage. While the near-term forecast can be expected to be relatively accurate, the future years are more general estimations based on the current data available and these will need to be updated on a regular basis as the market matures.

The following scenarios were used as the core framework for analysis of the District's fleet.

Scenario name	Description
Business-as-usual (BAU)	Procurement of ZEVs is excluded under this scenario regardless of TCO outcome. This is intended to outline a consistent baseline from which the ZEV transition scenarios can be compared. The intention of BAU is that it is reflective of how the District would continue to procure vehicles if there were no mandates or initiatives related to emissions reduction or fleet electrification.
Cost-optimized	In this scenario, the lowest TCO replacement vehicle is modelled. The lowest TCO vehicle may be ZEV, hybrid or ICE. This scenario generally results in higher initial capital costs than BAU due to the higher purchase price of ZEVs, however life cycle costs (TCO) are lower than BAU.
Technology leadership	The technology leadership scenario seeks to position the District as an industry leader in fleet electrification. In this scenario, only ZEV vehicles are purchased, except in the case where there are not projected to be any comparable ZEV alternatives available in the market. ZEV vehicles are modelled as replacements regardless of the cost. This results in a faster transition to ZEVs, however life cycle costs (TCO) are higher than BAU.

Table 3: Fleet Decarbonization Scenarios

The Cost-Optimized scenario assumes that ICE vehicles are replaced with EVs when the total cost of ownership is lower, while the Technology Leadership scenario assumes that ICE vehicles are replaced with EVs when technologically suitable EVs are projected to be available, regardless of cost. Both scenarios assume that any fleet vehicles that are already EVs, continue to be replaced with EVs in future. Both scenarios also assume that the vehicles are only replaced once they are at end-of-life, not before.

There is the opportunity for ICE vehicles to be replaced with EVs before they reach their end-of-life and for the ICE vehicle to have resale value; while this was not considered in the modelling, this option should be explored in future years as EV technology progresses.

6.2 Fleet Modelling

Figure 8 provides an overview of the current modelled Saanich fleet composition (Municipal, Fire and Police), indicating how many vehicles are already Battery Electric (BEV) or Hybrid electric, compared with those that still only use diesel or gasoline Internal Combustion Engines (ICE). See Consultant Technical Report, Appendix A for complete fleet composition and analysis details.

There are 129 light commercial vehicles (including pickup trucks and vans), 68 passenger cars (including EV's) and 33 SUVs, for a total of 230 light-duty vehicles in the fleet. The remaining 83 vehicles are heavy commercial vehicles. These vehicles typically include dump trucks, garbage trucks, fire trucks, and anything larger than a one-tonne truck. Fleet vehicles are primarily ICE vehicles with only 11% of fleet currently EVs. See Table 4 below for example vehicles in each category.

Category	Example Vehicles
Passenger Vehicle	Staff pool car
SUV	Police SUV
Light Commercial (medium duty)	Pickup truck / cargo van
Heavy Commercial	Garbage truck / fire truck / dump truck

Table 4: Modelled Fleet Categories

6.3 Financial Modelling

Net Present Value (NPV) was modelled as part of the Strategy and includes both capital and operating costs related to the vehicles but excludes other building infrastructure-related costs that relate primarily to EV charging infrastructure.

EV charging infrastructure costs are considerably lower with new developments versus retrofitting. Many of the fleet vehicles are located at the Saanich Operations Centre (SOC) and Fire Hall 2, which are undergoing major future redevelopments that include for the electrical capacity and charging infrastructure necessary to support fleet electrification.

Modelled NPV's do not include applicable electric vehicle grants and incentives. These can be substantial and greatly reduce the costs of fleet electrification, but it is unknown how many years these will continue to be offered. This means that the cost analysis completed for the scenarios can be considered the worst-case NPV results.

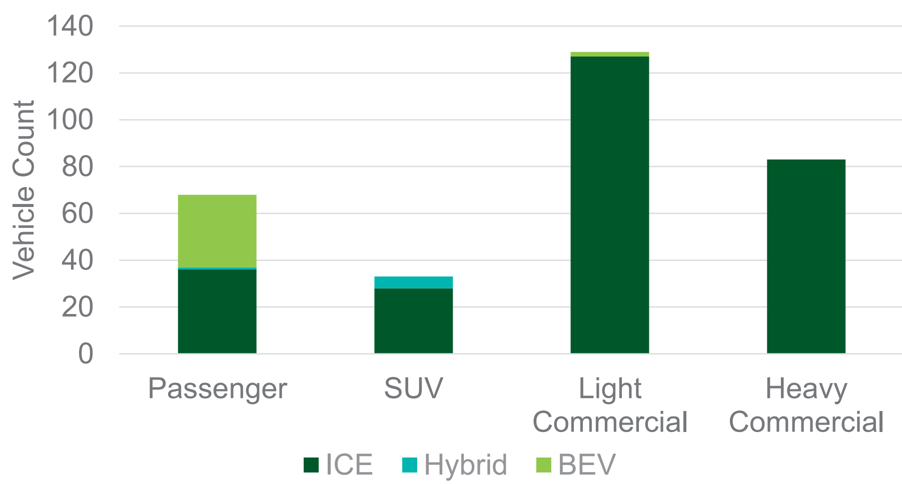


Figure 8: Existing Modelled Fleet Composition

6.4 Cost Optimized Scenario

The Cost-Optimized scenario looked for comparable ZEVs and compared the difference in TCO and emissions with the existing ICE fleet. When a vehicle reaches its retirement year, if it has a viable ZEV option that has a lower or equal TCO than its ICE counterpart, the Cost-Optimized Scenario assumes that the ICE vehicle is replaced with the ZEV.

If a viable ZEV option is not available or the TCO is greater than the ZEV option, the model assumes that the ICE vehicle is replaced like-for-like with another ICE vehicle - a large portion of the light commercial (medium duty) vehicles remain ICE over the period because of this metric. SUVs and passenger vehicles do not share the same economic factors, so a larger portion is available to transition to ZEVs, particularly in later years of transition when an increasing number of ZEV models are expected to reach cost parity. Figure 9 outlines the Cost Optimized fleet transition scenario.

Overall, the Net Present Value (NPV) of the Cost-Optimized transition through the year 2040 was estimated at -4%, compared to Business-As-Usual. This NPV includes both capital and operating costs related to the vehicles but does not include incentives that would offset these capital costs, nor does it include other infrastructure-related costs that relate primarily to EV charging infrastructure. The resulting 2040 vehicle composition profile is shown in Figure 10.

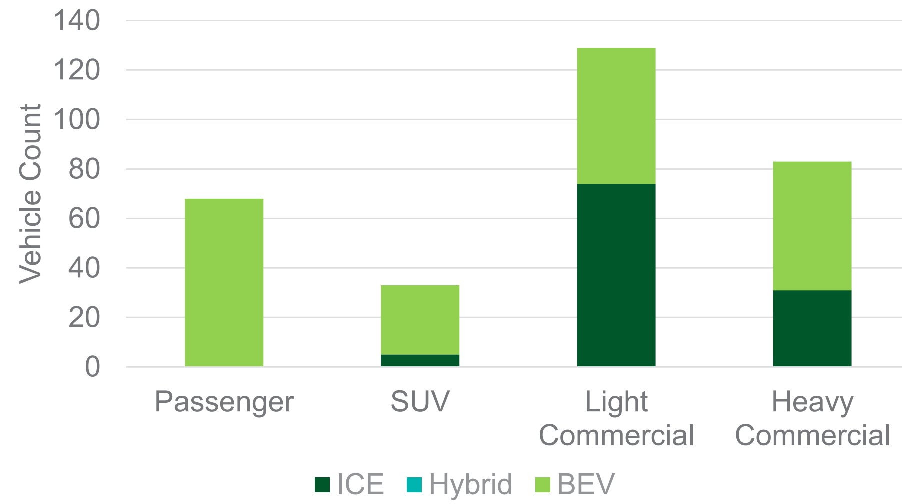


Figure 10: Vehicle Profile in 2040 - Cost-Optimized Scenario

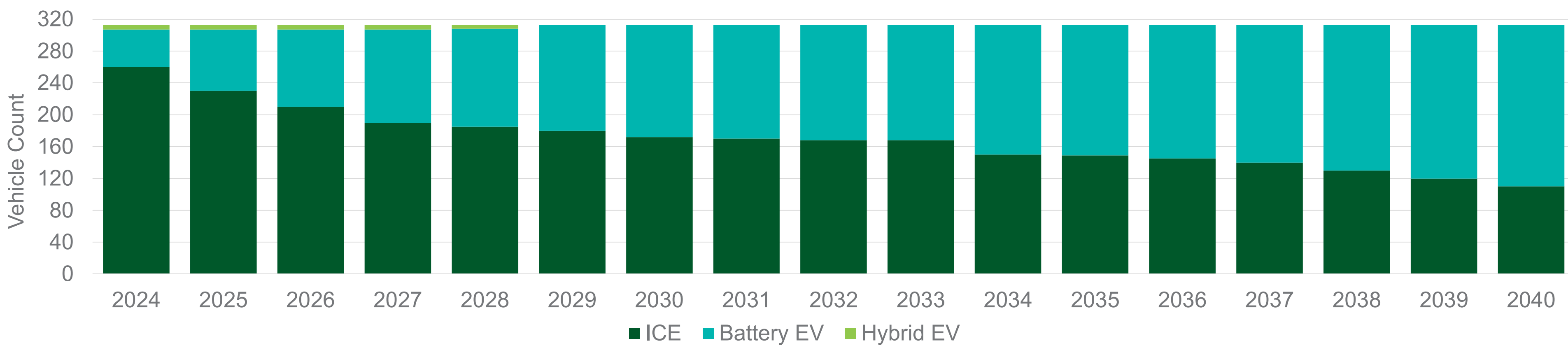


Figure 9: Yearly Fleet - Cost Optimized Scenario

6.5 Technology Leadership Scenario

Unlike the Cost-Optimized scenario, the Technology Leadership scenario identifies comparable ZEVs for fleet transition exclusively based on projections of what EVs will be available on the market and fit-for-purpose (i.e. matching current vehicle specifications) regardless of the TCO. Figure 11 outlines the Technology Leadership fleet scenario.

Overall, the NPV of the Technology Leadership scenario through the year 2040 estimated at +7% compared to Business-As-Usual. As with the Cost-Optimized Scenario, this NPV includes both capital and operating costs related to the vehicles but does not include incentives that would offset these capital costs, nor does it include other infrastructure-related costs that relate primarily to EV charging infrastructure. The resulting 2040 vehicle composition profile is shown in Figure 12.

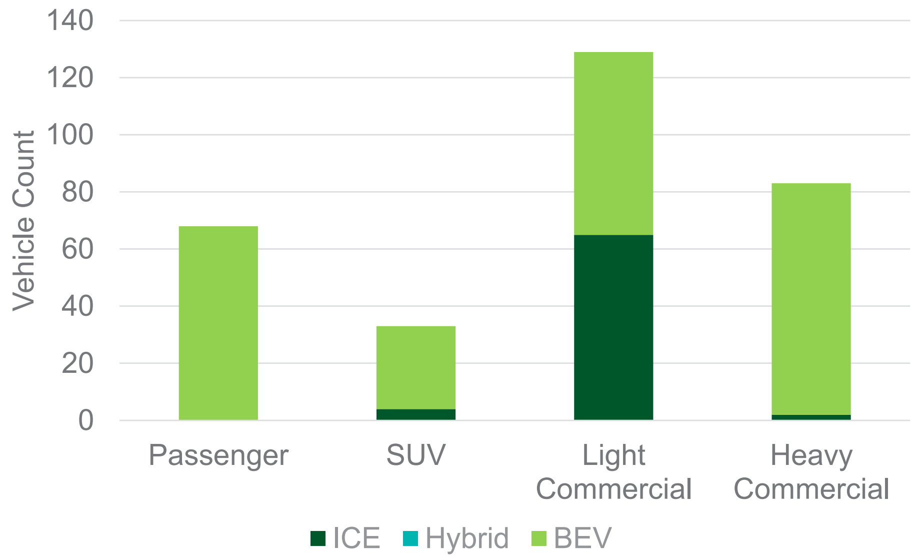


Figure 12: Vehicle Profile in 2040 - Technology Leadership Scenario

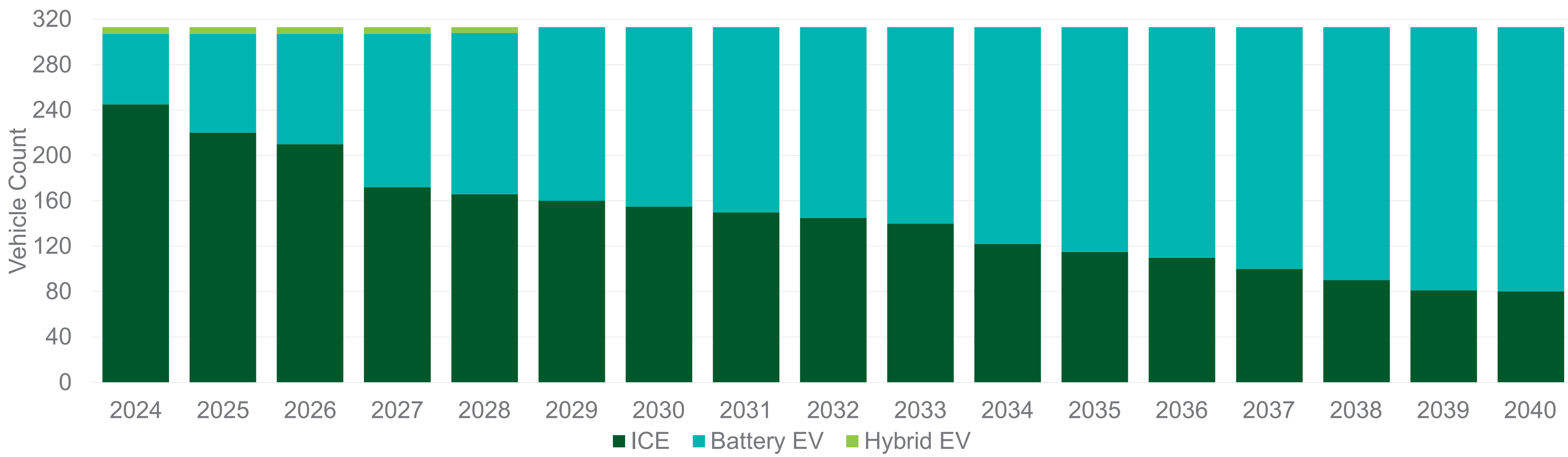


Figure 11: Yearly Fleet - Technology Leadership Scenario

6.6 Emissions Analysis

The impact on total GHG emissions was modelled for each scenario. Figure 13 provides a summary of the projected emissions reductions for all fleet scenarios.

- Under the Business as Usual (BAU) Scenario, GHG emissions continue close to the current levels.
- Under the **Cost-Optimized Scenario**, GHG emissions decrease from baseline by 39% and 67% for the 2030 and 2040 years respectively.
- Under the **Technology Leadership Scenario**, GHG emissions decrease from baseline by 67% and 84% for the 2030 and 2040 years respectively.

These emission profiles from electrification alone are insufficient to achieve net-zero corporate GHG emissions by 2040 as some ICE vehicles remain in use for all scenarios. In order to achieve this target the following is required:

- Cost-Optimized Scenario: an additional 1,000 tCO_2e reduction annually by 2040.
- Technology Leadership Scenario: an additional 500 tCO_2e reduction annually by 2040.

For both scenarios, all remaining 2040 ICE vehicles would utilize diesel as all gasoline vehicles would have been replaced by EVs. This means that all remaining operational GHG emissions can be reduced to near

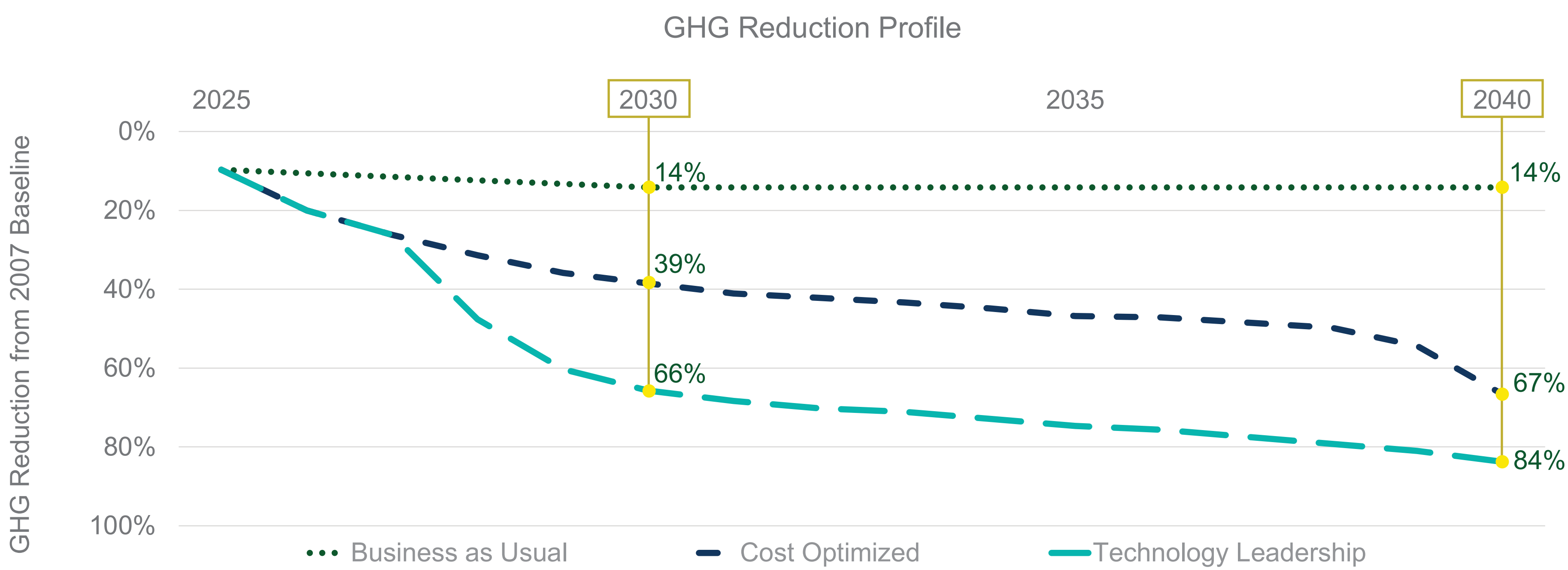


Figure 13: GHG Reduction Profile for each Scenario

zero through the purchase of Renewable Diesel (R100), should this fuel be available and assuming supply constraints do not significantly increase the cost. Additional technologies may arrive in the market over this period to accelerate decarbonization.

It should be noted that there are significantly greater cumulative emissions associated with the Cost-Optimized Scenario compared with the Technology Leadership Scenario over this period, which will further contribute to climate change.

A number of key milestones and variables will impact the opportunity to broadly adopt EV's, including:

- SOC redevelopment with opportunities for EV infrastructure expansion.
- Opportunity and resources to pilot larger commercial vehicles such as garbage trucks and fire engines.
- Availability and cost of Renewable Diesel and viability of standard diesel elimination by 2040.

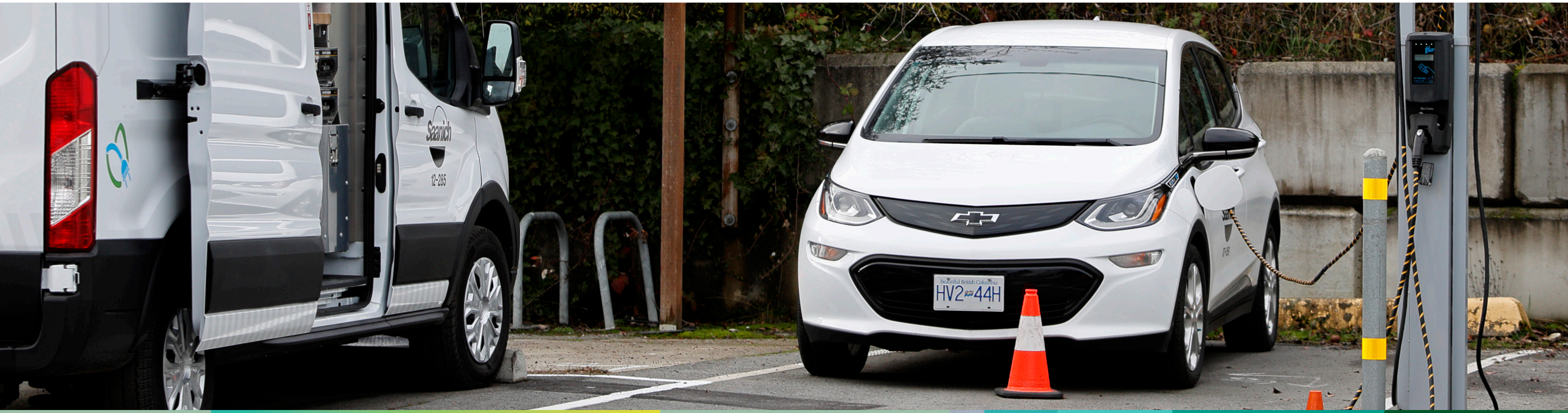
The proposed Strategy and Action Plan are outlined in Section7.

6.7 Fleet Management Best Practice & Policy Analysis

In addition to analysis of fleet electrification and the purchase of renewable fuels, fleet management best practices from municipal peers across Canada were also reviewed. This analysis was completed to identify additional or expanded policies and practices that could result in cost and resource efficiencies, further GHG emissions savings and operational improvements at the District. These are categorized as follows:

1. Sustainable procurement and right sizing policy
2. Anti-idle policy
3. Route optimization

Many best practice fleet initiatives are influenced by progressive provincial government policies, strong municipal climate targets, community expectations and local climate. The District already has an excellent foundation with specific policies and practices in place related to telematics, social and economic declarations for procurement, fleet procurement committees, and the pool EV and e-bike fleet for staff use. Additional actions to supplement the progress already made in this area are included in the Strategy and Action Plan in Section 7.



6.8 Technology & Fuel Scenario Options Evaluation

Key zero emission and low carbon technologies were evaluated against specific categories to rank options for the District as shown in Table 5. The technology and fuel scenarios were evaluated using the following criteria:

1. **Local Air Pollution (Tailpipe Emissions)**
   Impact on the local pollution emitted from the vehicle - ICE vehicles score low, while non combustion vehicles (EV and fuel cell hydrogen) score high.
2. **GHG Emissions Reduction**
   Impact on non-biogenic GHG emissions released from the vehicle's fuel – i.e. those emissions that directly contribute to climate change.
3. **Vehicle Availability**
   Some vehicles are readily available (e.g. passenger car EVs), or existing vehicles are compatible with a renewable fuel (e.g. Renewable Diesel), while some vehicles have limited or no availability (e.g. heavy duty electric vehicles).
4. **Infrastructure & Fuel Availability**
   Some infrastructure and fuel types are readily available (EV chargers and electricity), while some have very limited availability (green hydrogen and Renewable Diesel in future).
5. **Maintenance Impact**
   Some technologies result in lower maintenance (e.g. EV's), some require the same level of maintenance with drop-in fuel replacement (e.g. Renewable Diesel), while some require additional maintenance infrastructure (e.g. green hydrogen).
6. **Financial Impact**
   Overall financial impact over the life of the vehicle (NPV), including initial vehicle expenditure, maintenance costs, and fuel costs. This considers both short term and longer term estimated costs, which are expected to be impacted by limited global supply.
7. **Implementation Feasibility**
   Some technologies are easy to implement (Renewable Diesel is already being blended as a drop-in replacement at the SOC), while some require more effort (e.g. EV charging infrastructure). Some technologies are still maturing and future feasibility is currently unknown (e.g. green hydrogen fuel cells).

The scoring is defined as follows (higher scores are better, with a maximum score of 5 for each category):

- Lower Score: Not beneficial to reach targets; negative impact to operations or finances; limited availability;
- Higher score: Highly beneficial to reach targets; minimal impact to operations; financially beneficial; available.

Technology and fuel approach	Local air pollution (tail pipe emissions)	Non-Biogenic GHG reduction	Biogenic GHG reduction	Vehicle availability	Infrastructure and fuel availability	Maintenance impact	Financial impact	Implementation feasibility	Total score
Electric - cost optimized	4	4	4	5	5	4	5	4	35
Electric - technology leadership	5	5	5	4	5	4	3	2	33
Renewable diesel (as a top-up transition fuel to the electric options	1	5	1	5	4	4	3	5	28
Green hydrogen fuel cell	5	5	4	1	1	1	1	1	19
Renewable natural gas	1	5	1	3	3	1	1	1	16

Table 5: Technology Options Evaluation

6.8.1 Evaluation Summary

When reviewing the technology evaluation matrix, the Electric – Cost Optimized scenario scores the highest but does not achieve the zero-carbon 2040 target and results in greater cumulative GHG emissions than the Electric – Technology Leadership scenario. However, there are upfront financial and feasibility restrictions associated with the Technology Leadership scenario. While there are limitations associated with Renewable Diesel, namely biogenic and tailpipe emissions and future supply constraints that are expected to lead to increased costs in the longer term, this fuel presents a drop-in option for the existing diesel fleet that works well with the District's current infrastructure and knowledge, greatly reduces non-biogenic emissions and is currently relatively cost effective. Therefore, the Electric – Cost Optimized Scenario combined with Renewable Diesel as an interim, short-term fuel, is identified as the proposed approach for the Zero Emission Fleet Strategy and forms the basis for the Fleet Strategy Road Map and Action Plan outlined in Section 7.

6.9 Opportunities, Challenges, & Risks

The EV industry is growing rapidly, with significant government support, regulations and mandates. As a result organizations may feel pressure to purchase all new vehicles as electric, municipalities have several critical operational risks to consider, including the ability to provide reliable emergency services as well as the responsible use of taxpayer dollars. Table 6 identifies risks along with options to eliminate or mitigate them.

Table 6: Risk and Mitigation Strategies

#	Risk	Mitigation
1	**High downtime for medium-and heavy-duty fleet** – The light-duty EV industry is relatively mature from a technology development perspective. Most of the major original equipment manufacturers (OEMs) offer several light-duty models that have already been in production for up to 10 years. However, medium-and heavy-duty EVs are relatively new with most major OEMs beginning production of their first vehicles in 2022. Many of these vehicles have limited mileage with unknown reliability and performance over the typical 8 to 15-year life. Implementation of these vehicles presents a risk to daily operations.	Monitor other larger fleets that are already operating medium-and heavy-duty EVs. When comfortable with vehicle performance in other fleets, begin to purchase in small quantities and pilot.

#	Risk	Mitigation
2	**Financial incentives not guaranteed** – the Federal and Provincial governments are providing significant financial incentives for EVs. While these incentives are projected to be available for several years, they are expected to be time limited. The industry is also expecting the capital cost of EVs to decrease and ideally this will coincide with the phase out of incentives. However, the timeline for this to happen is largely an unknown.	Plan for increased capital costs for vehicle purchases. Maintenance and fuel savings on EVs can be used to offset the increased capital budget requirements. Also, review TCO of electric vs gasoline or diesel vehicles prior to asset purchase.
3	**Charging infrastructure** – vehicles and charging infrastructure need to be compatible to work correctly. There are several charging standards, plug styles, charging levels, and voltage architectures.	Ensure vehicle voltage architecture is compatible with charging infrastructure. Also, check if the vehicle has an onboard charger, which allows for level 2 charging or if only DCFC can be used.
4	**Power outages** – power outages are commonly outlined as a risk for EV fleets. This is a complex risk, though, as vehicle-to-grid technology progresses and a fleet of EVs is able to act as a backup power source. It should be noted that power outages in Saanich are limited and of short duration.	Monitor technology advancements and the possible effect on critical EV use during power outages. Expected solutions include backup battery banks, EV to grid or traditional generators. It is expected that more options will be available in five to ten years when the District electrifies some of its more critical vehicles. Ensure this operational constraint is evaluated and tested when piloting new vehicles.
5	**Fires** – While EV fires are reported in the media, data suggest they occur significantly less frequently than in ICE vehicles. A 2022 study[18] demonstrated that EV fires are infrequent compared with gasoline and hybrid vehicles; EV fires were found to occur 61 times less than ICE fires and 328 times less than hybrid fires per vehicle sold.	Ongoing Fire Department training for managing EV fires. Ensure facilities that store EV are equipped with applicable fire mitigation requirements as regulations change and/or provide operational training and requirements to staff to prepare for an event.

18 Auto Insurance EZ, "Gas vs. Electric Car Fires", November 2022. Accessed at: https://www.autoinsuranceez.com/gas-vs-electric-car-fires/

#	Risk	Mitigation
6	**Technology obsolescence** – technology for the EV industry is advancing extremely quickly. Some vehicle manufacturers are implementing updated batteries within a year of the previous generation. Charging infrastructure is also advancing rapidly with the need for higher power for medium-and heavy-duty vehicles.	When specifying and purchasing vehicles, ensure that the specifications meet the operational needs and plan for a maximum use of 80% of the battery. This will provide a buffer for battery degradation over the vehicle's life. Ensure vehicles are purchased from reputable manufacturers with appropriate support systems and certifications. Manufacturers are required to support their vehicles for a minimum of 10 years.
7	**Operational risk** – some EVs are still not currently capable of working in all of the same conditions and duty cycles as internal combustion vehicles. Typically, the vehicles do not have the ability to integrate some of the more complex service bodies (e.g. aerial trucks, large dump truck plows, hydro excavators, and large backhoe equipment) and vehicles do not have the battery range or speed of charging for continuous 24/7 operational use.	Plan to implement EVs in lower-risk operations aligned with this Strategy. This will allow the District to still meet strategic goals, while allowing for operations to understand EV limitations and ensuring ICE vehicles continue to be used in high-risk operations until EV options and the supporting rapid chargers are in place to mitigate these risks.
8	**Emergency services** – emergency services such as Fire, Police, large dump truck plows, etc. use frontline vehicles that need to perform consistently and reliably. While EV technology has advanced significantly over the past decade, it is still not necessarily suitable for all of these operational uses at the current time, although with advancing technology and vehicle availability it is considered the ultimate pathway.	When implementing EVs as frontline vehicles for use in these emergency services, develop a risk-mitigation plan specific to the operational use of that vehicle. Pilot EVs while preserving spare fleet capacity, and develop learnings that can be applied to subsequent EV purchases and operational planning.
9	**Development of Carbon Credit Markets** – the carbon credit and trading market in British Columbia is relatively new. There are still regulatory changes that are expected to be implemented as the market matures.	Stay current on the carbon credit market trends and changes in British Columbia.

7.0 Strategy & Action Plan

This section builds on the modeling and analysis and outlines the strategic roadmap and associated actions necessary to deliver on the Saanich climate targets through the most cost effective approach, considering multiple other risk factors and co-benefits.

The District will use this Strategy to help guide decisions in the coming years while continuing to evaluate vehicle best practices and industry trends through annual operational reviews. The Strategy provides the flexibility for unforeseen operational changes, future technological advancements and pursuit of grant opportunities, and will be updated approximately every five years.

The key components of the Strategy are outlined in Figure 14 . The specific technical requirements needed to implement this approach are outlined within the Consultant Technical Report and include:

- Types of vehicles and the proposed EV replacements
- Timelines for vehicle replacement with EVs
- Estimated costs
- Electrical charging requirements by location
- Operational and training needs

7.1 Recommended Approach

The evaluation matrix resulted in a combination of EV's and Renewable Diesel as the recommended approach, along with implementing industry best practices. This balanced approach considers technology readiness, financial impacts (without incentives and grants), risk to operational service levels, SOC site redevelopment, and emissions. The **Cost-Optimized Scenario** naturally results in vehicles transitioning when the technology is mature, and the vehicle manufacturers' initial development costs have stabilized. To complement this approach, it will be important to find opportunities to pilot medium and heavy vehicles to test their technology readiness and support staff training and knowledge. This will position the District as a leader in EV implementation while making informed decisions around technology readiness and operational risk.

The Cost-Optimized Scenario also provides a higher likelihood of success as the electrical and charging infrastructure required for the early stages of implementation are more reasonable to accommodate during the SOC redevelopment, which is expected to be complete by 2029. It also allows greater time for market development, piloting of new EVs, staff training, and other operational changes such as vehicle routing needed to support a fully electric fleet.

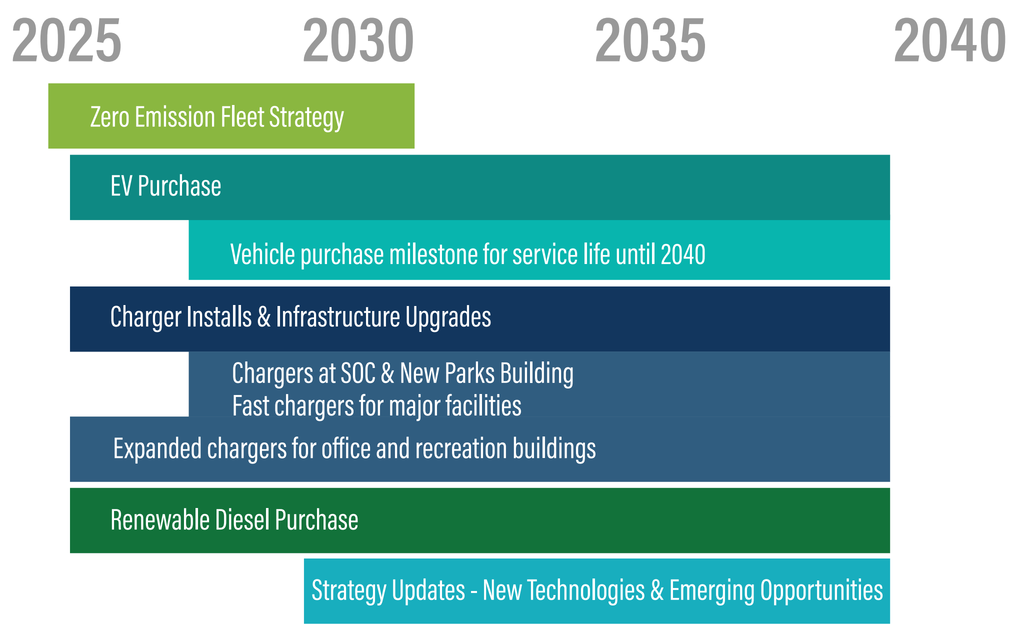


Figure 14: Zero Emission Fleet Strategy Roadmap

7.2 Roadmap to Net-zero

The Roadmap to net-zero by 2040 is shown in Figure 15 and includes:

- Cost Optimized Scenario – this is represented by the uppermost line and modelled with the GHG reductions associated with this partial fleet electrification to 2040.
- A combination of the Cost Optimized Scenario plus Renewable Diesel and to meet GHG targets—this is represented by the lower line.

Following this overall pathway (Cost optimized Scenario plus Renewable Diesel) will achieve net-zero emissions by 2040 and a 60% GHG reduction in corporate fleet emissions from the 2007 municipal GHG baseline by 2030.

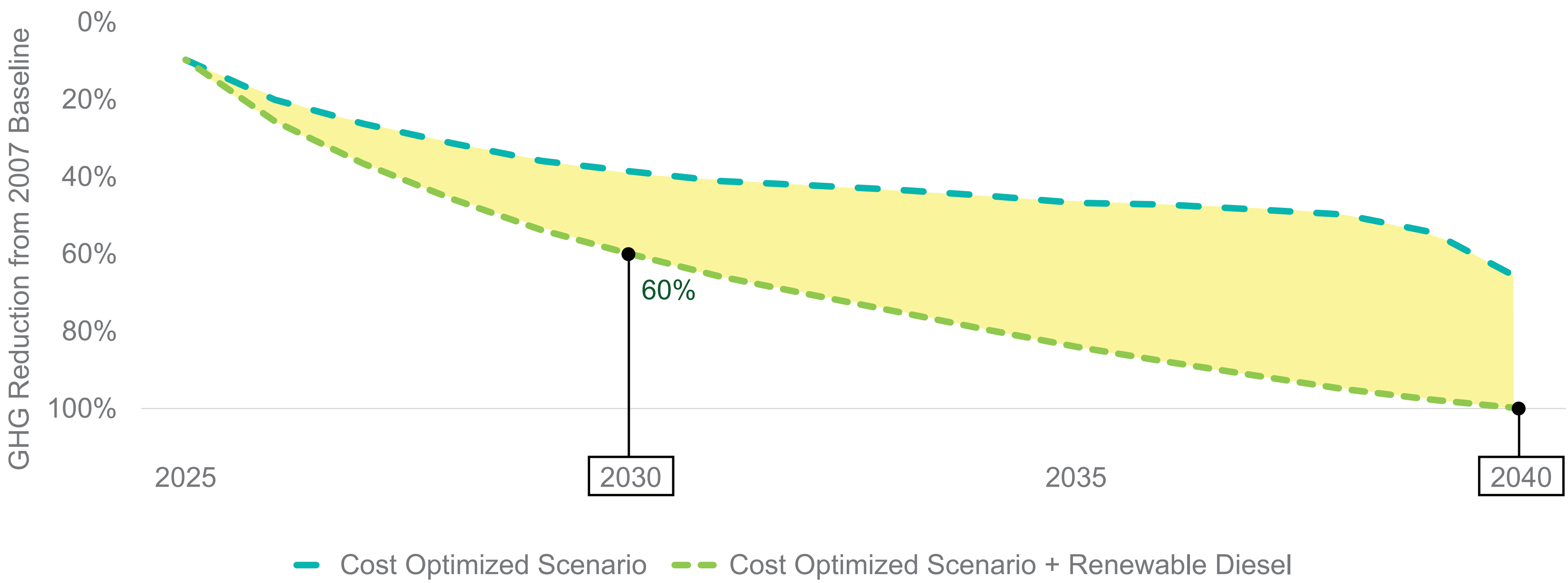


Figure 15: Strategy Roadmap to Net-zero

7.3 Action Plan

Tables 8 through 10 summarize the strategic, operational and financial actions necessary to deliver the Strategy and achieve the 2030 and 2040 targets.

Table 7: Action Plan – Strategic Actions

#	Action	Description	Initiation (completion)	Priority
1	Implement the - Cost-Optimized Scenario.	Implement the – Cost Optimized Scenario as outlined within the Consultant Technical Report. This includes in general: ▪ the partial replacement of municipal, police and fire fleet ICE vehicles with Electric Vehicles within proposed timeframes; ▪ the implementation of supporting electrical vehicle charging infrastructure; ▪ submission of the associated budget and resource requests; ▪ grant and incentive applications; and ▪ allowing for flexibility to maximize opportunities from technology and market advancements.	2025 (2040)	High
2	Increase the purchase of Renewable Diesel as an interim fuel to achieve GHG targets.	Increase the purchase of Renewable Diesel in combination with the implementation of the Cost-Optimized Scenario in order to deliver on the Zero Emission Fleet Strategy Roadmap. Monitor the supply and associated costs of Renewable Diesel over time.	2025 (2040)	High

#	Action	Description	Initiation (completion)	Priority
3	Monitor EV market, technologies and incentives to identify additional medium- and heavy-duty vehicle electrification opportunities.	Monitor the EV market and technologies closely, alongside fleet electrification incentives to identify additional medium- and heavy-duty vehicle electrification opportunities beyond those outlined within the Electric- Cost Optimized Scenario in the Fleet Technical Report. Update resource requests, vehicle purchases and plans accordingly.	2025 (ongoing)	High
4	Embed Zero Emission Fleet Strategy requirements within key facility plans and strategies, building purchases and redevelopments.	Ensure the inclusion of key fleet and sustainability stakeholders within the updated Key Facilities Masterplan, the redevelopment of SOC and other facilities in order to inform designs and ensure alignment with the Zero Emission Fleet Strategy targets and requirements. Ensure flexibility for future vehicle technologies.	2025 (ongoing)	High
5	Expand fleet EV charging infrastructure at Saanich Facilities.	Expand fleet EV charging infrastructure and any associated electrical capacity upgrades at Saanich facilities to support EV expansion logistics, aligning with the Zero Emission Fleet Strategy roadmap and supporting future EV pilots and purchases. Continue to apply for grant funding to support feasibility studies, design and the purchase and installation of this EV charging infrastructure.	2025 (2040)	High
6	Develop and implement a policy for the collection and sale of Low Carbon Fuel Standard (LCFS) carbon credits and use of associated funds.	Develop a policy for the collection and sale of Low Carbon Fuel Standard (LCFS) carbon credits and use of associated funds. Implement the sale of carbon credits to support implementation of the Zero Emission Fleet Strategy.	2026 (2027)	Medium

Table 8: Action Plan – Operational Actions

#	Action	Description	Initiation (completion)	Priority
7	Pilot medium and heavy-duty commercial electric vehicles.	Pilot medium and heavy-duty electric vehicles to increase knowledge of these emerging technologies and identify associated operational needs, benefits, costs and risks. Include drivers and maintenance staff in pilots to analyse results, to inform vehicle specifications for future procurement and to support a successful transition to electrification. Leverage external grant opportunities to support vehicle pilots.	2026 (ongoing)	High
8	Develop and implement a sustainable fleet procurement & right sizing policy.	Develop a data informed sustainable fleet procurement policy that aligns with the Zero Emission Fleet Strategy and Asset Management Program. The policy should be based on best practices including specific operational needs, GHG emissions, life cycle costing, prioritizing EV purchases, with implementation through the existing Fleet Replacement Committee.	2025 (2026)	High
9	Develop and implement shop workflow and safe work practices for maintenance and repairs on EVs.	A safe work practice should be developed for safely de-energizing and working on high voltage systems in an EV when required. This should include safety equipment, tools, workshop locations and workflow.	2026 (2027)	High
10	Improve fleet data to better inform decision making.	Improve fleet telematics tracking and utilization data (run time, distance, idle time, etc.) to assist with making informed decisions on vehicle replacement timelines, TCO analysis, and general vehicle performance.	2026 (ongoing)	High
11	Route optimization	Review and implement route optimizations that reduce fuel use and support service delivery and efficiency e.g. for solid waste garbage vehicles.	2025 (ongoing)	High
12	Continuous improvement of fleet management.	Continue to develop and implement best practices in fleet management, including asset management, data analytics, telematics, efficient maintenance, etc.	2025 (ongoing)	Medium

#	Action	Description	Initiation (completion)	Priority
13	Develop and implement a fleet anti-idle policy.	Build upon existing Saanich guidance and regional CRD anti idle policy to reduce GHG emissions, local air pollution, and noise in our community. Include clear exemption definitions, time constraints, technology opportunities, and education and awareness. Explore and implement automatic anti-idle technology on vehicles where appropriate (already in use for some Fire vehicles).	2027 (2028)	Medium

Table 9: Action Plan – Financial Actions

#	Action	Description	Initiation (completion)	Priority
14	Budget for capital costs associated with EV purchases.	Prepare 5 year capital plans, budgets and any necessary resource requests for capital costs to implement the Zero Emission Fleet Strategy.	2025 (2040)	High
15	Budget for capital costs associated with EV charging and electrical infrastructure.	Prepare 5 year capital plans budgets and any necessary resource requests for the capital costs associated with the electrical and EV charging infrastructure required to implement the Zero Emission Fleet Strategy.	2026 (2040)	High
16	Research and apply for incentives.	Continue to research and leverage the many incentives available for EVs, charging stations and electrical infrastructure to offset costs.	2025 (ongoing)	High

8.0 Implementation & Monitoring

Implementation and monitoring of the Zero Emission Fleet Strategy will be led by the Sustainability Division, working in collaboration with both internal staff and external consultants. This will require support from fleet divisions and departments including Engineering, Parks, Fire, Police, Finance and Communications.

Progress on implementation of the Zero Emission Fleet Strategy will be reviewed annually and reported publicly as part of the Climate Plan Report Card. The following metrics will be used for monitoring and reporting on success:

- Overall annual corporate fleet GHG emissions and % reduction from 2007 baseline (including biogenic emissions);
- Percentage and amount of fuel used for fleet by fuel type;
- Number and percentage of fleet vehicles converted to electric allocated by fleet type and vehicle type:
- Percentage of total vehicles with access to EV charging by facility;
- Number of EV charging stations by level (i.e. DC Fast Charger or Level 2) and facility;
- Percentage of new vehicles purchased that are smaller than previous vehicle and with a smaller overall GHG footprint (i.e. downsizing); and.
- Reducing fleet numbers by combining assets (i.e. rightsizing).

An annual review of vehicle replacements is also necessary to monitor industry progression, review changing operational needs, and assess the suitability of any EV adoption for each replacement vehicle. The Action Plan will therefore be updated on a rolling basis in consultation with relevant departments. Information on funding requirements will be presented to Council and brought forward through annual budget requests and capital plans.

The Zero Emission Fleet Strategy will be reviewed and updated every 5 years to ensure it remains accurate and to take advantage of new opportunities and rapidly emerging technologies.

9.0 Glossary

Biogenic and Non-Biogenic Emissions	Biogenic GHG emissions are released through combustion of bio-fuels, including Renewable Diesel and biomass. These emissions are considered to balance with those released naturally in the environment as part of the planetary carbon cycle, as opposed to non-biogenic emissions from fossil fuels that would not be released naturally and contribute to climate change.
Battery Electric Vehicle (BEV)	A BEV is powered by electricity and has no internal combustion engine. No air pollution. Less noise than vehicles with an internal combustion engine. Example: Nissan Leaf
Vehicle Duty Cycle	A measure of vehicle use intensity.
Fuel Cell Vehicle (FCV)	An electric vehicle that uses a hydrogen fuel cell to power an electric motor. No air pollution from vehicle. Significant environmental impacts from fossil fuel hydrogen production, unless using renewable green hydrogen.
Hybrid Electric Vehicle (HEV)	Use a small internal combustion engine in combination with a small battery to save fuel. Emit air pollution. No ability to plug in to charge battery. Example: Toyota Prius
Plug in Hybrid Electric Vehicle (PHEV)	Use an internal combustion engine in combination with a small battery to save fuel and can also use an EV charger to top up the battery. Emits air pollution. Example: Toyota Prius Plug-in Hybrid
Carbon Dioxide Equivalent (CO2e)	A unit that allows different greenhouse gases (GHGs), which have different global warming potentials over a set amount of time, to be compared against each other.
Fossil Fuel	Fuels such as coal, gasoline, natural gas, oil, diesel, etc., that are sourced from organic materials formed over a long geological time period. Fossil fuel energy sources are non-renewable.
Green Hydrogen	Hydrogen produced by the electrolysis of water, using renewable electricity. Production of green hydrogen causes significantly lower environmental impact than fossil fuel hydrogen which is typically derived from natural gas. However, electrolysis is a water intensive process that results in an inefficient use of renewable electricity.
Resilience	Capacity to withstand and/or recover from hazards, risks and challenges associated with a changing climate.
Sustainable Procurement	Sustainable procurement is a process whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money on a life-cycle basis, while contributing to a healthy, equitable, prosperous, and climate-resilient future.

10.0 Acronyms

BAU Business As Usual

BEV Battery Electric Vehicle

CAPEX Capital Expenditure

CO_2e Carbon Dioxide Equivalent

DCFC Direct Current Fast Charging (also known as level 3 charging)

EV Electric Vehicle (also known as BEV: Battery Electric Vehicle)

ESVE Electric Vehicle Supply Equipment

GHG Greenhouse Gas

ICE Internal Combustion Engine

MCS Megawatt Charging System

LCFS Low Carbon Fuel Standard

TCO Total Cost of Ownership

tCO_2e Tonnes Carbon Dioxide Equivalent

ZEV Zero Emissions Vehicle


Braefoot Rd
Saanich
09-170
100% Electric
saanich.ca/ev
LIGHTNING