Deloitte.

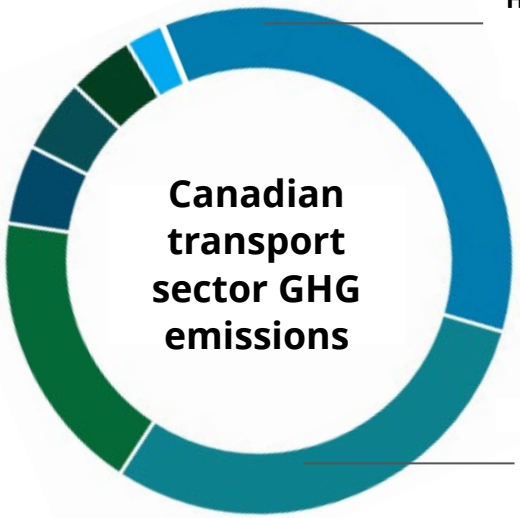
Decarbonizing Fleets

October 2024

A Burning Platform

Transportation sector contributes 25% of Canadian GHG emissions

Transport (25%)



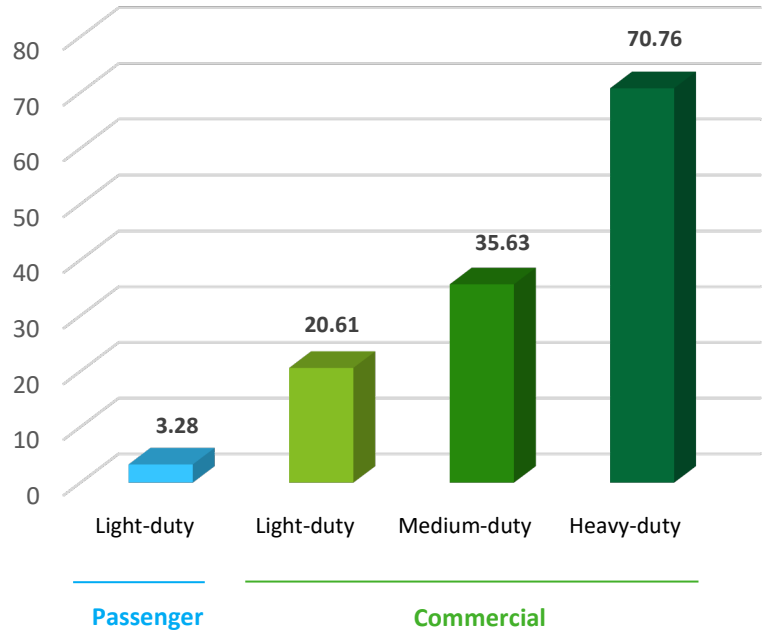
Heavy-duty trucks (36%)

Light-duty trucks (30%)

- Oil and gas 203 Mt Co_2 eq (28%)
- Transport 185 Mt Co_2 eq (25%)
- Buildings 92 Mt Co_2 eq (13%)
- Heavy Industry 77 Mt Co_2 eq (10%)
- Agriculture 67 Mt Co_2 eq (9%)
- Electricity 62 Mt Co_2 eq (8%)
- Waste and others 52 Mt Co_2 eq (7%)

- Heavy duty trucks 65.1 Mt Co_2 eq (36%)
- Light duty trucks 54.3 Mt Co_2 eq (30%)
- Light duty passenger cars 33.2 Mt Co_2 eq (18%)
- Other 9.2 Mt Co_2 eq (5%)
- Aviation 8.6 Mt Co_2 eq (5%)
- Rail 7.7 Mt Co_2 eq (4%)
- Marine 4.4 Mt Co_2 eq (2%)
- Motorcycles 0.3 Mt Co_2 eq (0%)

Annual CO_2e emissions per vehicle type, kg CO_2e/vehicle



There’s a menu of options for decarbonization

Network & process optimization

- **Vehicle enhancements**
- **Demand Management**
- **Rightsizing**
- **Driver Eco-Training**
- **Idle Reduction Technologies**
- **Green Technologies**

Low-carbon fuels

- **Renewable fuels**
- **Alternate fuels**
- **Alt/Renewable Fuelling infrastructure required**

Fleet electrification

- **Electric Vehicles**
- Requires **EV charging infrastructure** which may include capacity upgrades

Renewable purchasing & generation

- **Self-generation**
- **Anaerobic biodigesters**

Carbon credits & offsets

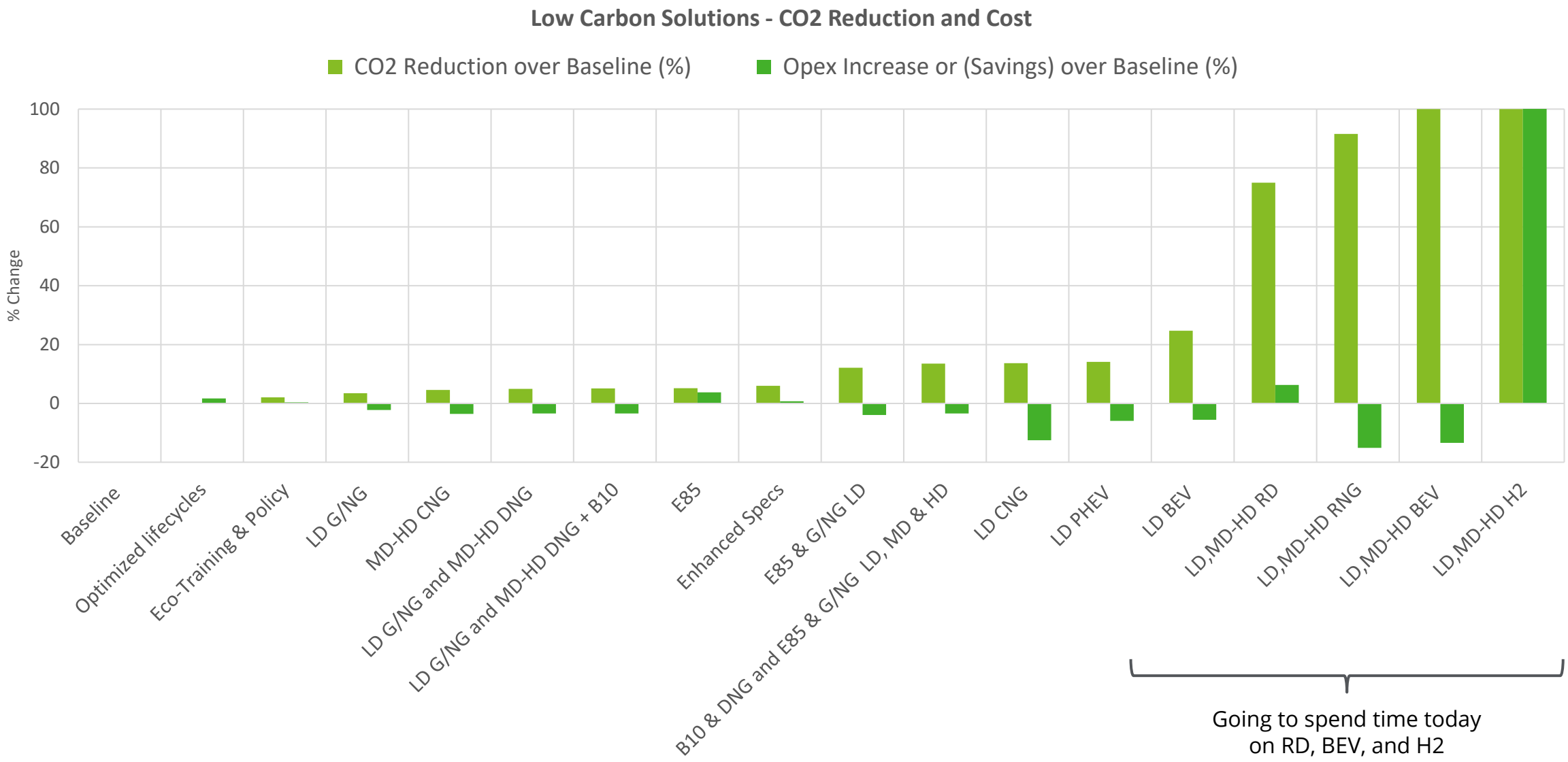
- Purchasing strategies to **offset remaining emissions**

Hydrogen technologies, incl. HPDI & others

- **Hydrogen fuel cell** for medium & heavy duty
- Requires **H2 fuelling** Infrastructure

Sources: Decarbonising Road Freight: Getting Into Gear; Deloitte NL Insights & Analysis

Moving pieces in the puzzle to decarbonization



Fuels to consider: Biofuels

Ethanol

A renewable fuel made from various biomass materials used as a blending agent with gasoline – can be blended up to 15% without engine upgrades

e.g., E85 requires engine upgrades

Renewable Diesel

A renewable fuel made from various biomass feedstocks processed to be chemically the same as petroleum diesel or a “drop-in” replacement

Biodiesel

A liquid fuel produced from vegetable oils, grease, and other fats that is a cleaner replacement for petroleum-based diesel fuel, but must be blended with petroleum diesel – can be blended up to 20% without engine upgrades

Biogas / RNG

A biogas produced from the decomposition of organic matter that is fully interchangeable with conventional natural gas

Source | International Energy Agency, Government of Canada, Navius Research, U.S. EIA, U.S. DoE

Renewable Diesel: 35% of diesel fuel supply in Canada by 2050

- Renewable diesel can be used as a drop-in fuel and requires no reworking of current engine designs**; it meets a need in the fueling of the freight sector**
- **Reduces carbon emissions** in exhaust **by 50-80%**
- Renewable diesel currently has approximately a **20% to 40% premium** over petroleum-based diesel
- While **demand for renewable diesel is expected to continue to grow into 2030, projected Canadian supply is expected to exceed demand**
- **Competition for feedstocks may hinder the efforts to reduce costs** through technological advancement and economies of scale.
- **Supporting infrastructure requires expansion** to link feedstock sources to refineries that are concentrated in different locales.

R20
A blend of 20% renewable diesel and 80% petroleum diesel

B20R20
A blend of 20% biodiesel, 20% renewable diesel, and 60% petroleum diesel

B20R80
A blend of 20% biodiesel and 80% renewable diesel is called B20R80 to make a 100% biofuel

R100
100% renewable diesel.

Source | Canada Energy Regulator, Government of Canada, IRENA, HDT: Trucking Info, S&P Global Commodity Insights, Veolia, U.S. DoE

Making a Case for Electrification

Technological improvements, government regulations and incentives, and significant pressure from consumers make now the right time for electrification in certain scenarios.

Expectations of Pubic and Consumers

Reduction of Fleet Operating Costs

Decrease in EV Prices & Increase of Models

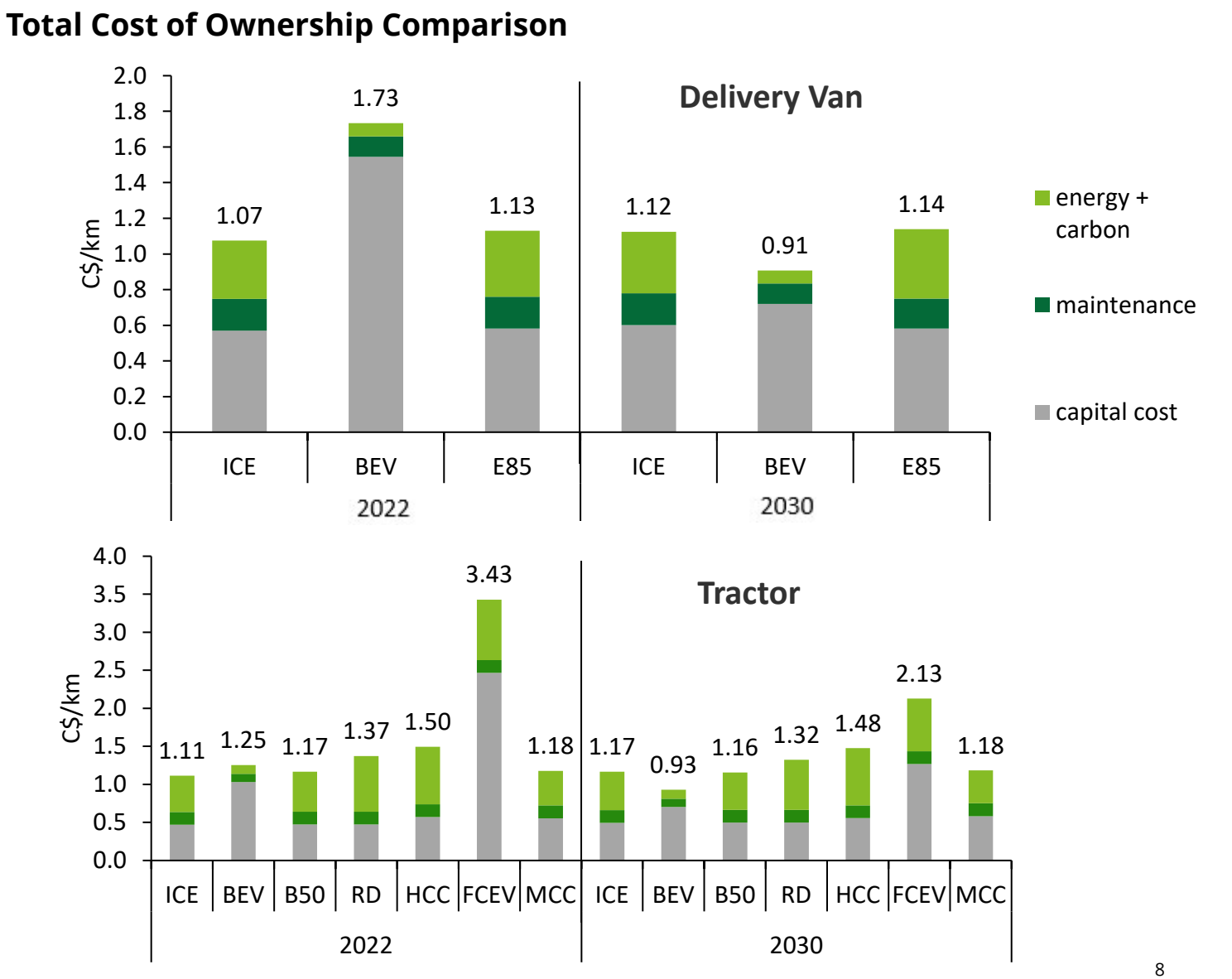
Government Incentives and Regulation

What are the Challenges?

1. **Upfront Capital Costs**
2. **Perceived Operational Risk**
3. **MHZEV Availability**
4. **Infrastructure Capacity**

EV costs expected to be a benefit by 2030

- The cost of EVs is largely driven by the cost of batteries
- Although commercial EVs have a higher upfront capital cost, they can already achieve price parity with ICE vehicles on a Total Cost of Ownership basis due to **lower energy, maintenance, and other costs**
- With expected declines in battery electric technology costs, most commercial EVs are expected to reach Total Cost of Ownership price parity with ICE vehicles by 2030



Selecting the right decarbonization technology

Vehicle duty cycles, operations, refueling times and distance travelled will greatly affect whether battery electric vehicles or hydrogen propulsion technologies are best suited to replace an existing internal combustion engine vehicle

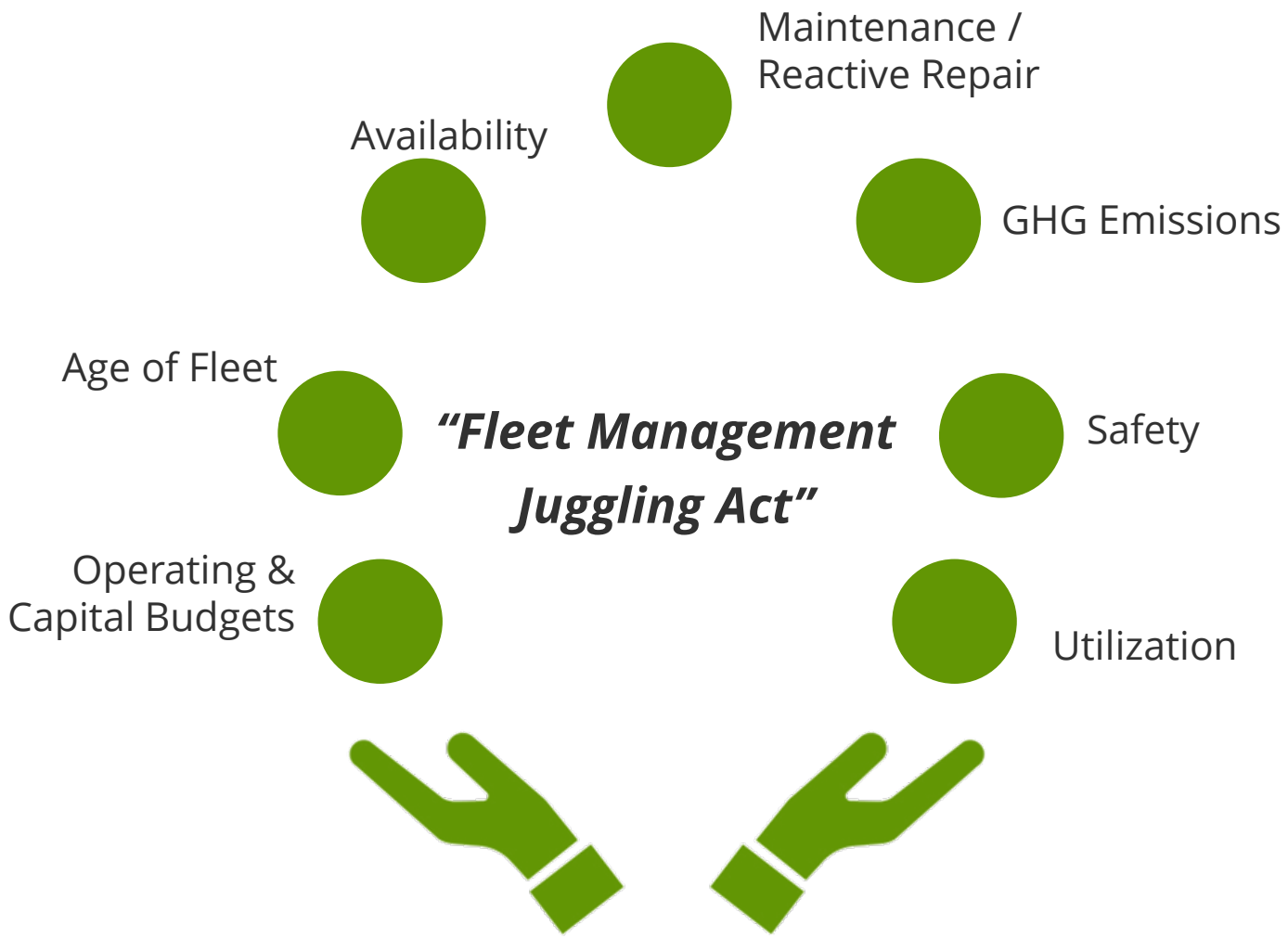
		Idle Time per Day	Medium-Duty Vehicles	Heavy-Duty Vehicles	Summary
	Last-mile transport (<100km/day)	2-3x~0.5h 1x~10h	BEV		• Short distances make BEV more applicable • Possible use of personal vehicle charging infrastructure • Low-emission zones in cities require faster transition
Medium Distance	Urban transport (<250km/day)	3-5x~0.5h 1x~15h	BEV	BEV and / or FCEV	• Medium distances and enough breaks for medium-duty vehicles to use BEV • In heavy-duty vehicles, battery size and charging time may be impractical
	Regional transport (250-500km/day)	8-12x~1h	BEV and / or FCEV	BEV and / or FCEV	• BEV may be viable in the longer term if opportunity charging infrastructure is widely and densely available • FCEV may be viable sooner, with less need for a dense fueling infrastructure, if price of hydrogen declines
Long Distance	Multi-day long haul transport (500- 1000km/day)	1-2x~0.5h 1x~1h 1x~12h		FCEV	• FCEV likely more viable given long distances and few breaks • BEV only if batteries significantly improve density or if very fast charging becomes available
	Long haul delivery (>1200km/day)	1-2x~0.5h 2x~1h		FCEV	• FCEV likely the only option in foreseeable future

Building hydrogen – fueling solution for long haul

Fueling networks are being set up across Canada on strategic trucking routes like: Edmonton to Calgary, Edmonton to Prince George, and the Trans-Quebec 1 project

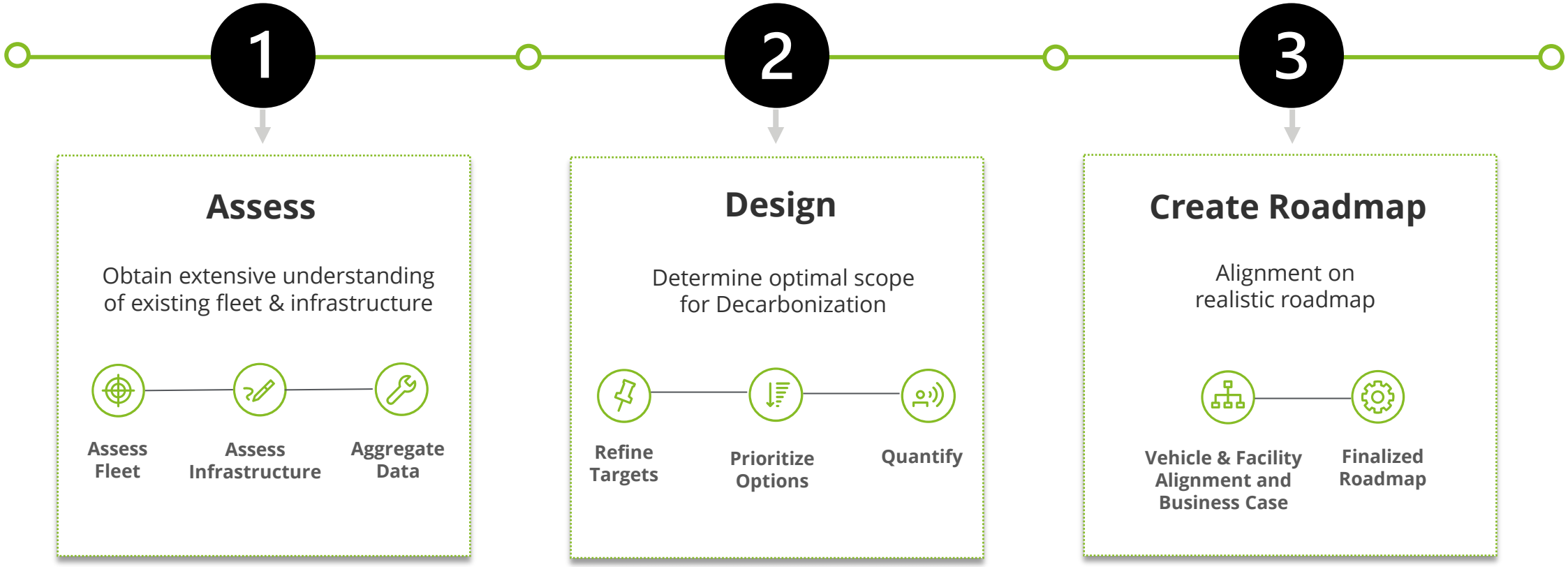
1. **Prince George , BC** — hydra
2. **Metro Vancouver, BC** — HTEC FUELING THE DRIVE TO HYDROGEN
3. **Edmonton, Alberta** — AIR PRODUCTS, HYLA
4. **Calgary, Alberta** — AIR PRODUCTS
5. **Toronto, Ontario** — CARLSUN ENERGY, Toronto Pearson
6. **Trans-Quebec 1 Project** — Hydrolux

Fleet Management is Complex, so is Any Strategy Concerning Fleet



Making a change to any one of the critical fleet management considerations impacts all of them

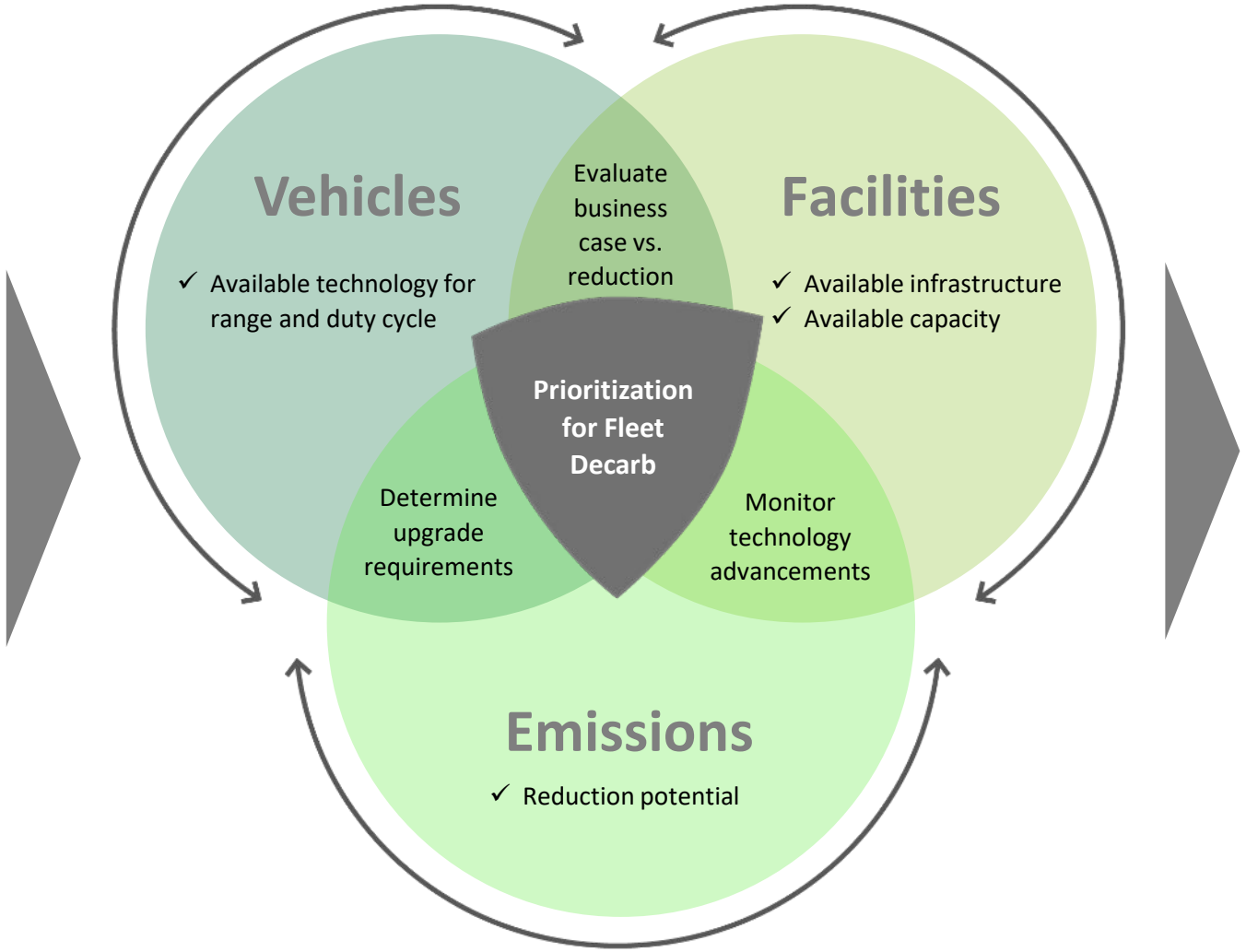
What you need and how you get there?



Planning for decarbonization

Priority decarbonization opportunities initiatives exist when vehicle usage, existing infrastructure or facilities capacity, and emissions savings all justify transitioning

Merging fleet data with infrastructure and emissions data to enable data driven decision making



Roadmap Outputs

- Annual charger count by type by facility
- Annual vehicle count by type by facility
- Annual GHG emissions reduction

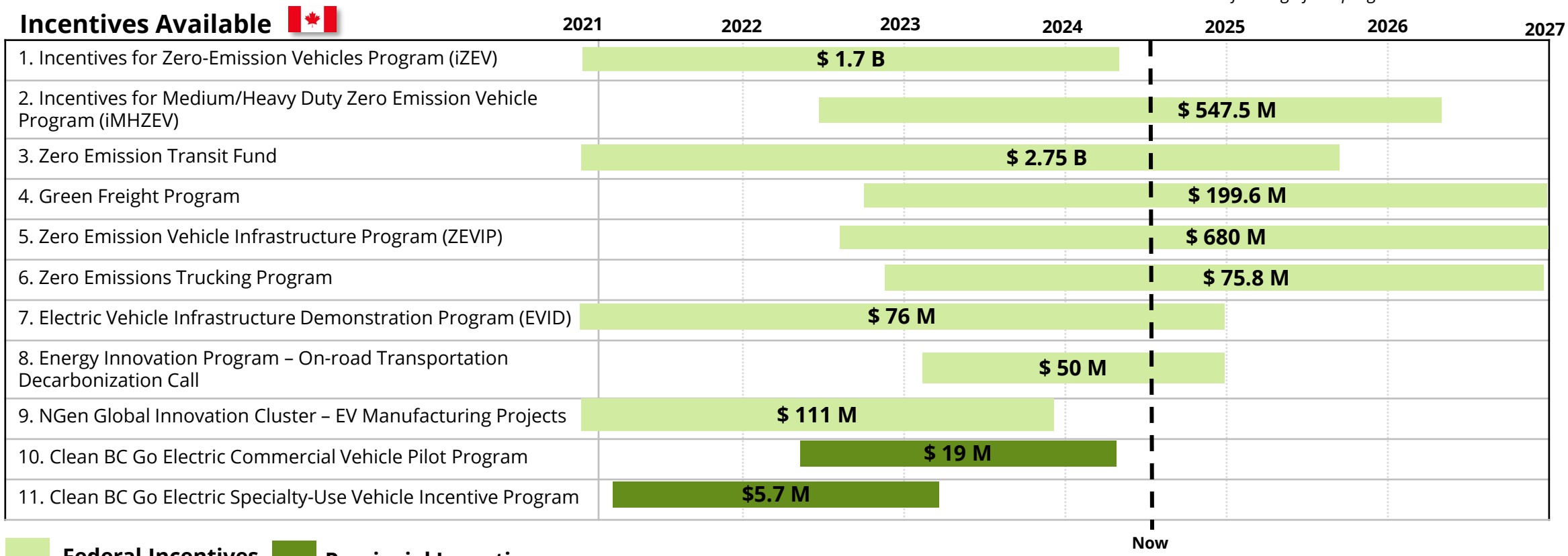
Cost Model Outputs

- Infrastructure capital costs
- Vehicle capital costs – lease vs. buy
- Vehicle O&M costs, including energy/fuel
- Infrastructure O&M costs
- Available incentive programs

How to pay for it

Current incentive programs offer **$3B** + in EV related funding available for a **limited time or** until programs expire*.

Chart shows total available funding of the program when announced



** Note: This is not an exhaustive list of Federal & Provincial Incentives available in Canada*

Additional Incentive Programs:

- Federal tax write-offs for purchasing ZEVs, 2019-2028: Two new CCA classes, 54 & 55
- Zero Emissions Vehicle Awareness Initiative (ZEVAI)
- Canada Infrastructure Bank, Charging and Hydrogen Refuelling Infrastructure Initiative
- Clean BC Go Electric Fleets Program
- BC Hydro, Incentives for electric fleet planning and infrastructure

- Manitoba Efficient Trucking Program
- Ontario Vehicle Innovation Network (OVIN), EV R&D Partnership Fund
- Écocamionnage Program – Technology Acquisition (Stream 1)
- Transportez Vert Program – DC Fast Charging Station (Stream 4)
- SouthGrow Regional Initiative – EV Charging Program
- Plug-in NB Electric Vehicle and Charging Station Rebates
- Electrify Nova Scotia Rebate Program

Uncomfortable truths

Cost:

- **High cost of vehicles (EVs or FCEVs) when combined with low kms-driven/fuel usage** makes the business case challenging
- **High cost of charging infrastructure**, including utility upgrades, parking lot construction etc.
- Infrastructural **upgrades take a long time** to materialize
- **Stakeholder concerns shifting** from range-anxiety to infrastructure anxiety

Supply Chain:

- Ongoing challenges with **shortages in procurement of critical EVs**
- **Ethical concerns** arising with origin of procured raw materials

Uncertainty:

- Continued **evaluation of hydrogen vs. EV** for medium and heavy trucks, and heavy machinery
- Energy surcharges to be assessed in **replacement of fuel surcharge**

Solve the puzzle one piece at a time with a view to the big picture

Procurement of Chargers and Vehicles	• Treat the procurement function as an innovation process • The vehicle & infrastructure process should be looked at holistically • Piloting technologies
Infrastructure Strategy	• Do not delay facility electrification – upgrades take a long time to materialize • Fleet decarbonization strategies and facility assessments are an important first step • Facility upgrades can be staggered to minimize the lag between charging infrastructure installation and vehicle deployment
Future Proofing	• Have an in-depth understanding of current and future fleet operation needs • Negotiate for an extended warranty from a manufacturer of at least 30-36 months • Staggering procurement can aid with future proofing • Ensure EV charger vendors are Open Charge Point Protocol (OCPP) compliant

Deloitte's Green Fleet Tool Set

Fleet Management & Greening Strategy

A rigorous analysis to help strategize / plan and determine the business case and investment plan

Fleet Analytics Tool

A comprehensive approach to scenario-building and green fleet planning, which includes fuel type changes, vehicle changes, and numerous additional low-carbon interventions.

Lifecycle Tool

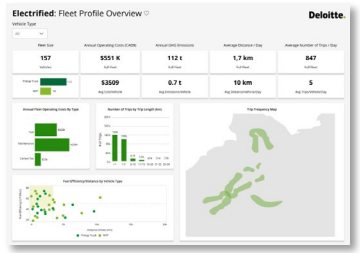
A detailed approach, which includes car condition rating, average usage, and historical data collected over the years for deeper analysis.

EVSE Planning Tool

A robust Electric Vehicle Supply Equipment approach along with vehicle data collected over the years to define the infrastructure requirements (where telematics data is not available)

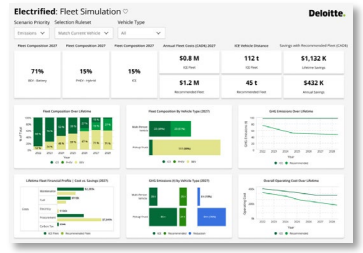
Telematics-informed Analytics and Dashboards

*Interactive dashboards that assess the potential for fleet electrification and support **decision-making for planning and implementation***



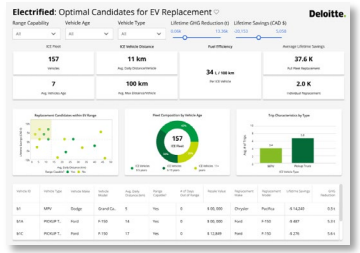
Fleet Profile Overview

Baseline for the existing fleet's utilization, operational costs, and GHG emissions.



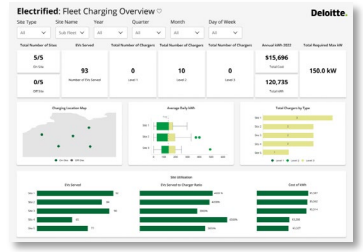
Optimal Candidates for EV Replacement

Recommends replacement vehicles based on multiple factors like range, vehicle age, and opportunities for cost savings and GHG reduction.



Electrification Simulation

Generates a multi-year plan to electrify the fleet within an annual budget through the lens of different priorities such as GHG reduction, savings, or vehicle obsolesce, projecting annual cash flow and GHG reduction.



Charging Infrastructure

Determines the infrastructure required what to install and where to install it to enable fleet electrification and optimize operations while measuring its electricity costs and impacts on the grid.

Step by Step to Successful Decarbonization

1 Program Management

- ❑ Execution team support with defined roles and responsibilities
- ❑ Governance structure and communications to be implemented including detailed project plan, risks and issues log with mitigation plans / action items, status updates

2 Vehicle Procurement & Deployment

- ❑ Vehicle procurement / OEM partnership
- ❑ Determine vehicle fit to operations (routing / network optimisation)
- ❑ Receive and fit-out vehicles
- ❑ Deploy vehicles
- ❑ Redeployment of ICE vehicles

3 Infrastructure Management

- ❑ Assessment and Design:
  - Needs and site assessment
  - Engineering design
  - Backup power
  - Cyber considerations
- ❑ Procurement and permitting / supplier partnership
- ❑ PM construction and installation
- ❑ PM commissioning and operation

4 Incentives

- ❑ Applications to federal and provincial incentive programs
- ❑ Bringing focus to federal and provincial financial incentive programs with limited timelines

5 Change Management

- ❑ Change preparation
- ❑ Stakeholder engagement essential
- ❑ Leadership alignment
- ❑ Change readiness and sustainment
- ❑ Change networks
- ❑ Communications (internal and external)
- ❑ End user training

6 Monitoring & Evaluation

- ❑ KPIs to be monitored and measured using a dashboard
- ❑ Course corrections if/as needed
- ❑ Data flow and analytics management

Deloitte.

Thank You!

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