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Sustainability Initiatives

Data-driven Fleet Procurement

Using historical fleet data to inform go-forward, long-term capital budget plans

About Richmond Sustainability Initiatives

- Canadian environmental not-for-profit corporation
- Provider of fleet support services for private & public fleets
- Since 2005 delivered green fleet initiatives, strategies, plans, analyses, fleet management consulting, 150+ fleet reviews/audits, demonstration and research projects in Canada

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Richmond Sustainability Initiatives - Mission

“To advance the adoption of green fleet technologies, fuel-efficient vehicles and best management practices in commercial vehicle fleets

About Richmond Sustainability Initiatives

Projects and programs focused on reducing fuel consumption, emissions & operating costs…

- Advancing existing and emerging green fleet technologies
- Accelerating adaptation of electric vehicles
- Facilitating the transition to alternate and renewable fuels
- Promoting fleet best management practices

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About Richmond Sustainability Initiatives

Two core programs:

E3 Fleet Standards Program www.e3fleet.com

Fleet Challenge and Fleet Challenge America Inc.
www.fleetchallenge.ca

E3 Fleet Rating Program

- E3 modeled after LEED
- 300+ members
- 14 fleets now in the E3 Rating process
- Points-based rating system
- Independent audit
- Bronze, silver, gold, platinum levels
- Rating begins with E3 Fleet Review

E3 Fleet Review Program

E3 Fleet Review reports…

- Executive Summary
- Fleet Managers Guide
- Capital budget plan
- Exception Report
- Recommendations
- Green Fleet Action Plan

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RSI Projects and Programs

FleetChallenge

E3 fleet
Energy Environment Excellence

PEMS
Police and EMS Idling Reduction Demonstration Project

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MICROTransit
Scoping Study

HIRS™ Hybrid Idle Reduction System

GREENFLEETEXPO

EVAn Electric Vehicle Analysis

Fleet Analytics Review©

FAR©
A Fleet Challenge service

Green Commercial Vehicle Program
Ontario

Topics for this Presentation

- ✓ Using historical data for *defensible* fleet capital budget planning
- ✓ Employing fleet lifecycle analysis to optimize economic lifecycles
- ✓ How cost/benefit approach can balance long-term fleet budgets
- ✓ Using business case approach to adaptation of electric vehicles

Following the presentation we will provide a list of free resources to assist in preparing data-driven capital budgets.

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The Fleet

Most organizations are dependent on their fleet…

- Municipal fleets are essential for civic and emergency services, maintaining roads and infrastructure, snow clearing, etc.
- Utility fleets help crews keep gas, electric, telephone services on
- Private fleets transport their products to market
- Couriers and truck fleets keep the economy rolling

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Fleet's Value to an Organization

- Critical to fulfilling an organization's mission
- Equal in importance to its computer systems, facilities and physical plant
- A top expense item on the corporate balance sheet
- Can - and should be - a source of organizational pride

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Fleet Management Balancing Act

Fleet management is a complex balancing act and each of these are critical elements. Changing any one affects the rest…

- ✓Cost of capital
- ✓Utilization
- ✓Availability (uptime)
- ✓Operating expenses
- ✓Depreciation
- ✓Inflation
- ✓Preventive maintenance
- ✓Fuel consumption
- ✓Fleet aging
- ✓Emissions

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Fleet Uptime

- At it's most basic, fleet management's prime responsibility is to ensure that safe, reliable vehicles are available during business hours
- Maximizing uptime should be among management's highest priorities
- Older fleets have less uptime

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Fleet Uptime

There are only two ways to increase fleet uptime…

1) Ramp up preventive maintenance intensity and frequency (increases operating expenses)

2) Reduce the fleet's average age (requires capital investment)

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The Aging Fleet

Capital investment in fleet modernization is critical…

- As commercial vehicles age, higher operating expenses result from increased reactive repairs
- If vehicles are replaced too soon, value may be lost

Fleet Aging and the Cost of Downtime

Older fleets have higher downtime costs. The cost impacts of downtime should not be ignored…

- Loss of productivity for drivers/crews
- Spares, loaners or rental vehicles
- Spare units lead to a larger overall fleet size, higher operating costs and lower average utilization

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Fleet Capital Budget Cuts

Despite the criticality of having a modern, safe & reliable fleet…

- Fleet capital budgets are often the first to be chopped
- Lack of capital results in delayed vehicle replacements
- Delayed vehicle replacements results in an aging fleet
- Aging the fleet increases operating expenses

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Why are Fleet Capital Budgets Cut ?

The budgeting process can be a "complex stew of politics, compromise and competing visions"…

- In the public sector, re-election cycles and the 'squeaky wheel' syndrome may keep some elected officials focused on here-and-now issues which can influence decision-making

- Senior management in the capital budget approval process may may have competing priorities (City Councilor quote)

From: https://plasticboards.com/long-view-best-practices-municipal-budgeting/

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Why Fleet Capital Budgets Are Cut

- Lack of business case. Lack of cost/benefit or ROI data to inform or support vehicle replacement age decisions

- When vehicle replacement cycles are based on intuition or ‘gut feelings’, whether they are right or wrong, instincts no longer cut it - capital requests are indefensible and will not hold up to scrutiny

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Capital Budgeting Strategies

- **Safe approach:** Some fleet managers base their capital budget "ask" on historical approved spend from previous years – *if approved, they work backwards to decide which vehicle replacements will fit into the approved budget*

- **The 'shoot for the moon' approach:** Some may submit a capital budget that is "through the roof", *knowing it'll be chopped a few times along the way and eventually end up at the amount actually sought*

Neither of these approaches are recommended!

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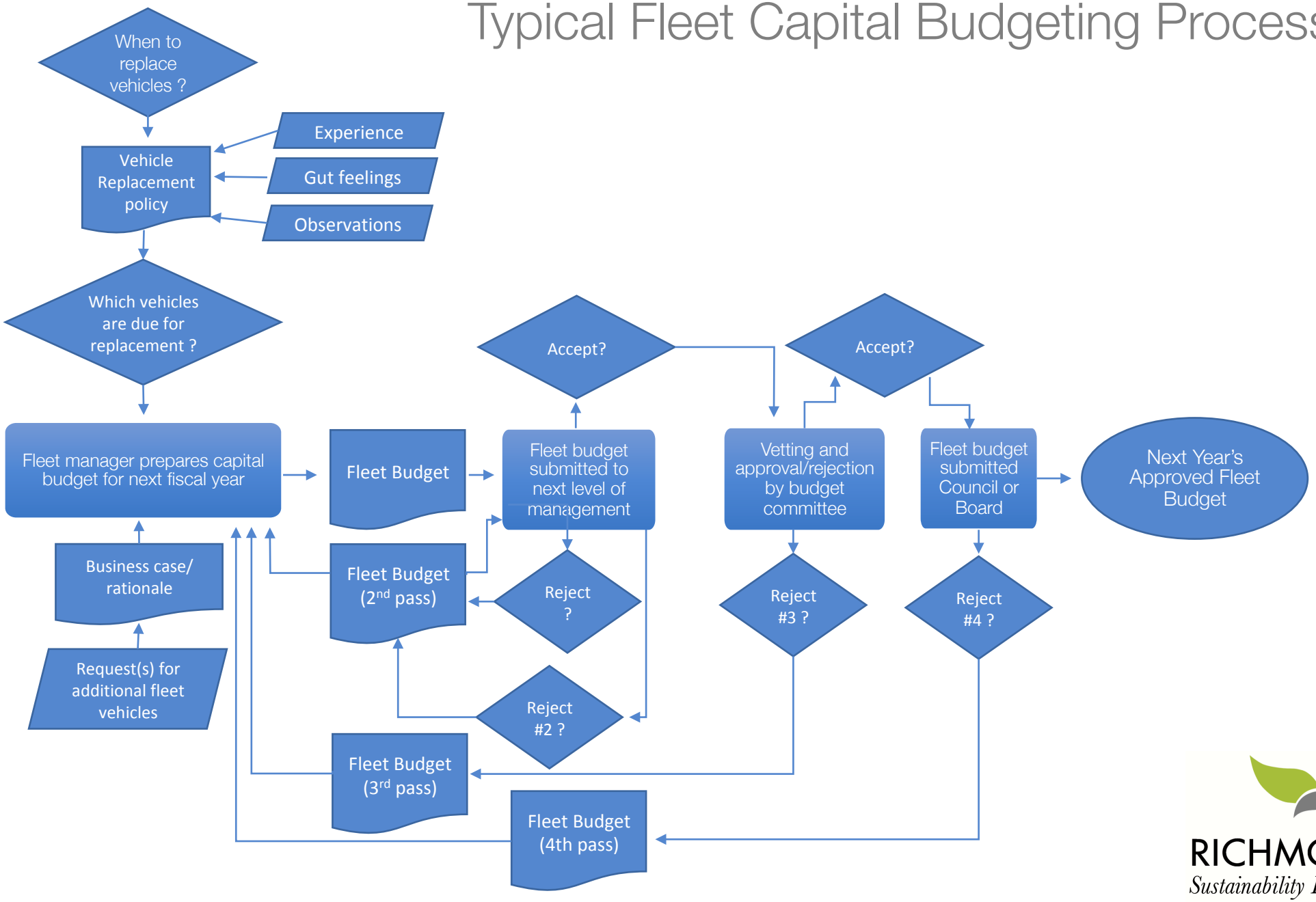
Typical Fleet Capital Budgeting Processes



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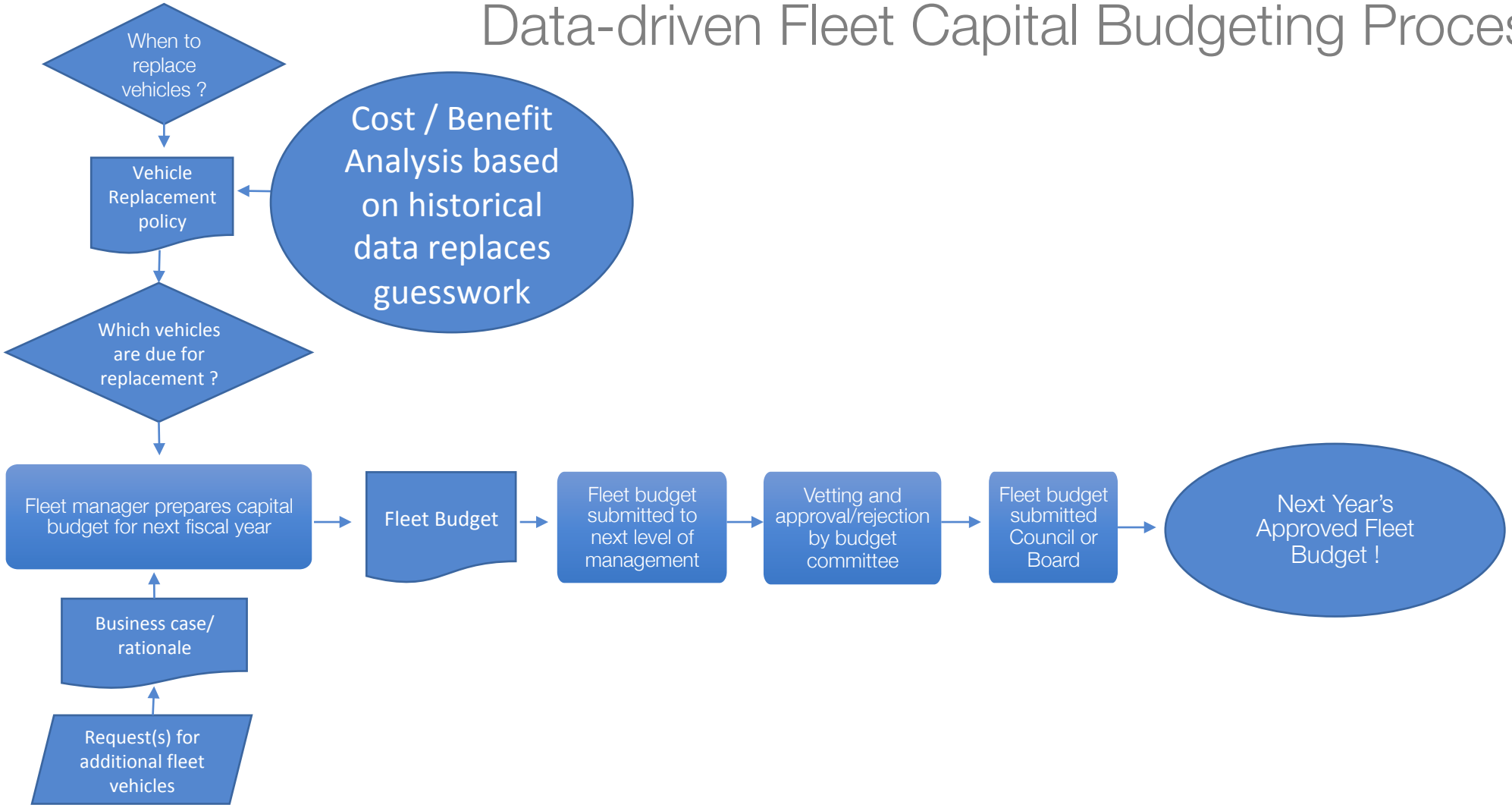
Data-driven Fleet Capital Budgeting Processes



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Capital Budget Preparation – 3 Best Practices

There are many approaches to fleet capital budgeting, but a good budget includes these three attributes…

1. Long-term perspective
2. Linkage to organizational goals
3. Focus on results and outcomes

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Best Practice #1 – Long Term Perspective

- Long-term budgets give a big-picture view and can be more easily balanced year-to-year
- Long-term budgets are from five to twenty years
- Five-year budgets have a degree of certainty - *but beyond that can be sketchy*

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Best Practice #2 – Link to Organizational Goals

- Fleet should be aligned with the organization's objectives and participate as an internal support service provider

- Examples include corporate service level, cost containment and/or environmental objectives – *Example: a modern, reliable and fuel-efficient fleet is necessary to support the organization's goals*

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Best Practice #3 – Focus on Outcomes

Examples:

- **Service:** Fleet will deliver average vehicle uptime rate of x%
- **Environment:** Greenhouse gas emissions reduction of x%
- **Cost:** Operating expenses reduction of x%

Each of these outcomes are easily achievable through fleet modernization and hence tied to capital budget requirements

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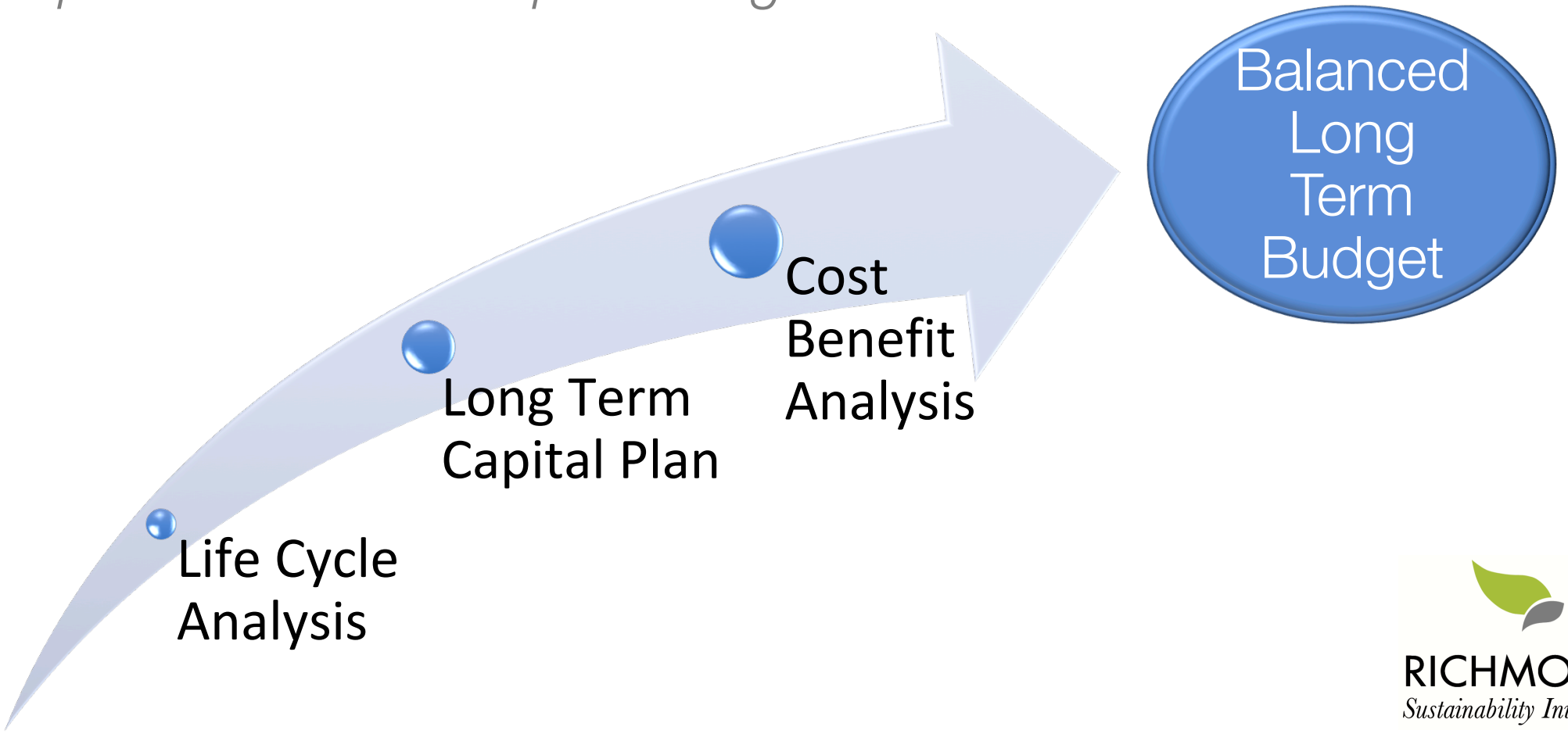
Using Fleet Data in Capital Budgeting

Key steps to defensible capital budgets…



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1) Life Cycle Analysis

- Life cycle analysis (LCA) is a structured approach in determining the best time to replace vehicles and equipment in terms of age, mileage or other pertinent factors
- LCA provides the empirical justification for replacement policies and facilitates the analysis and communication of future replacement costs
- LCA can help determine when replacement should occur (ideally before costs rise and reliability/safety is reduced, and before capital expenditure or refurbishment is necessary)

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Life Cycle Analysis

- Vehicle life cycles are determined by modeling the expected cash flows for owning and operating the vehicle
- Involves forecasting a stream of costs over a study horizon for each type of vehicle and determining the replacement cycle that results in the lowest total cost of ownership
- LCA discounted cash flow analysis is completed for each vehicle class and based on actual historical costs by model year

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Life Cycle Analysis

- Net Present Value (NPV) is calculated for outgoing cash flows: (vehicle purchase cost, maintenance cost, the impact of downtime on driver productivity cost, improved fuel efficiency of new vehicle compared to the old vehicle) and incoming cash flows (vehicle residual value) to calculate the total life cycle cost for various vehicle retention periods

- The NPV amounts for cash flows are converted to Annual Equivalent Cost (AEC) to provide a dollar amount that is easy to relate to, and easy to compare alternative life cycle costs

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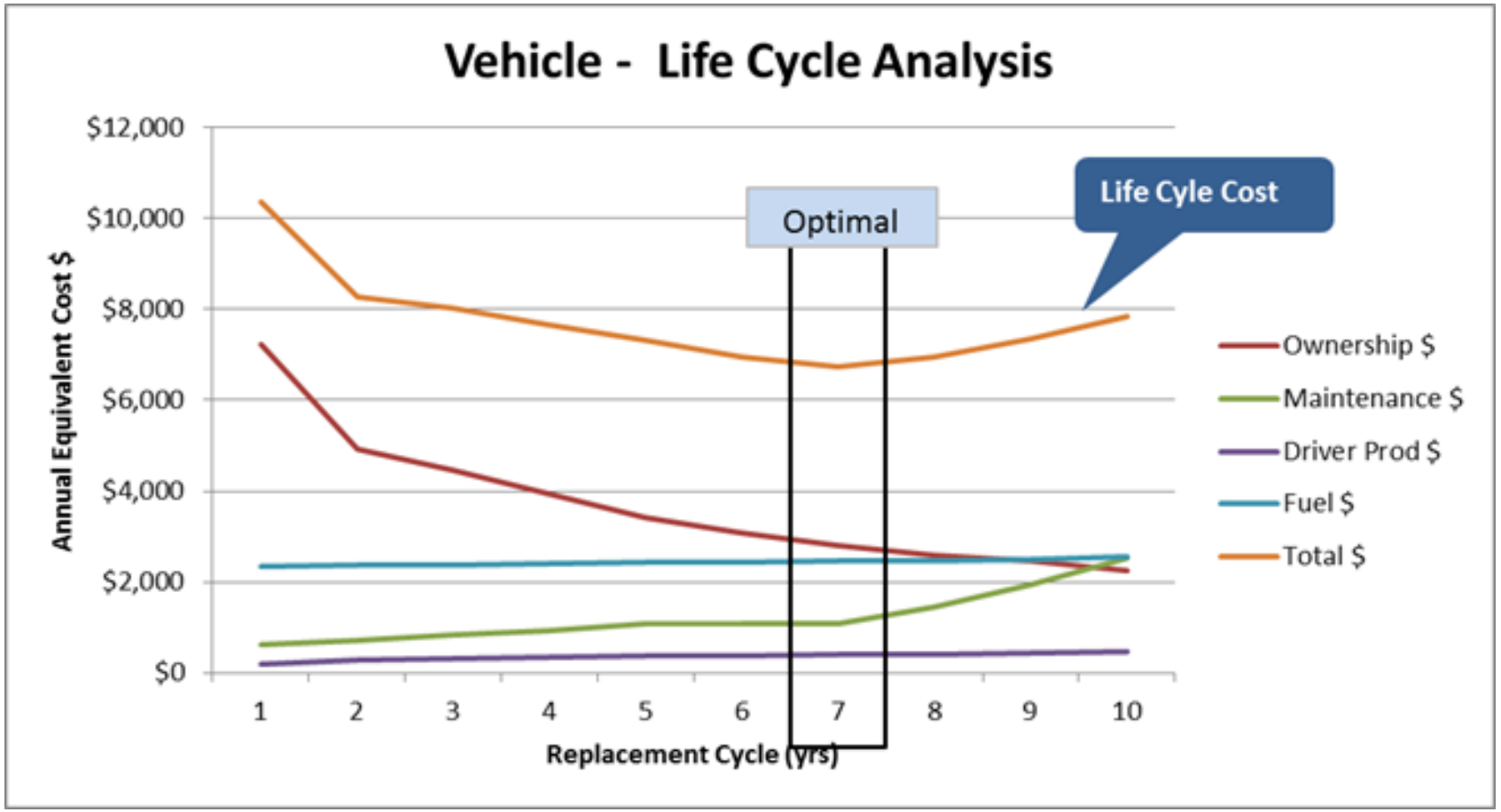
Life Cycle Analysis



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2) Long-Term Capital Plan

- Use the LCA-optimized lifecycles to determine the replacement year for each unit in each year of the long-term horizon
- For each year of the budget, total the net expected replacement costs for each vehicle (acquisition cost, plus upfitting, minus trade-in or auction proceeds)
- Add a factor for inflation for future years

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3) Cost-Benefit Analysis

- This step determines return on investment (ROI) for each fleet vehicle due/overdue for replacement
- Since LCA is based on averages it is advisable to drill down and look at each unit individually from a cost/benefit perspective
- Some units in the long-term capital plan based on LCA may still be in good condition, with low usage or recent refurbishment

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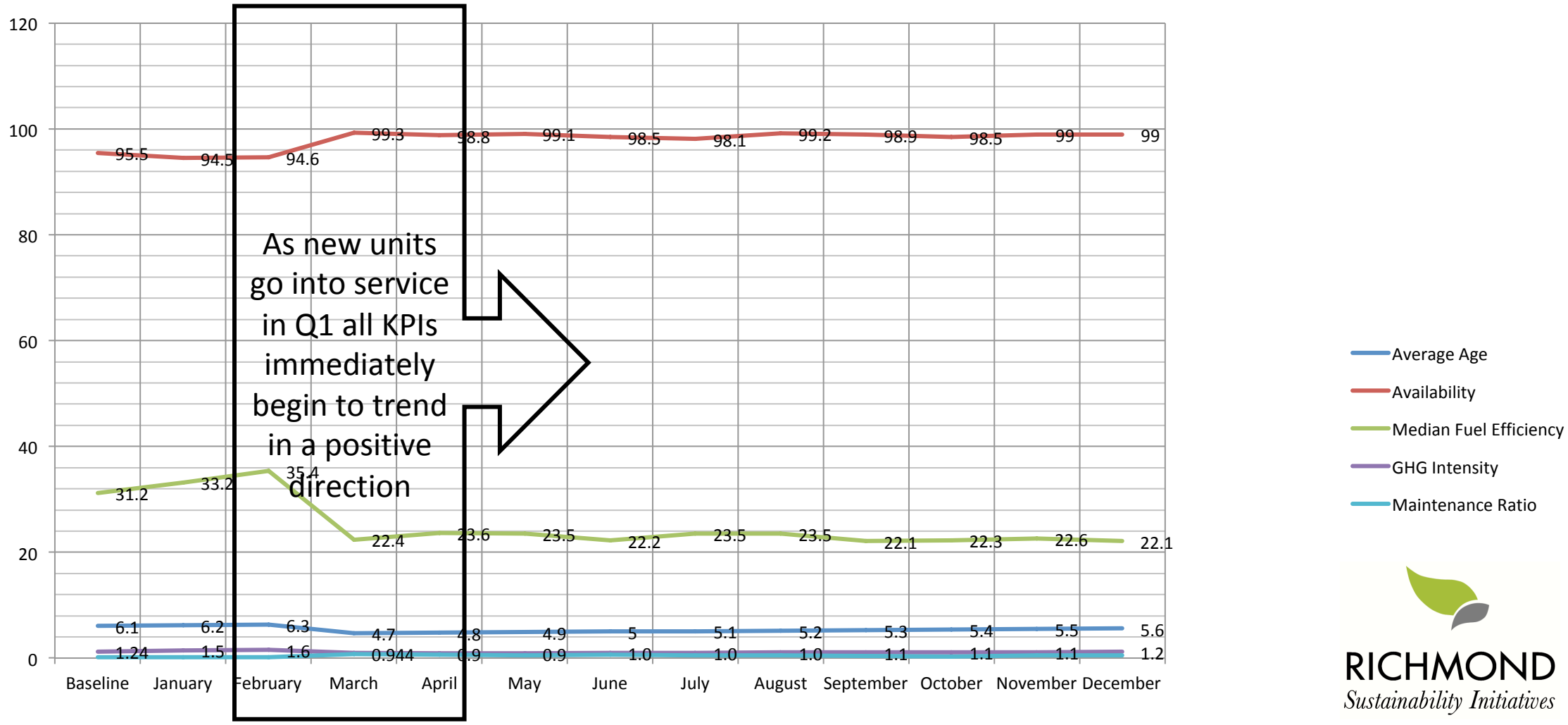
Positive Impacts of New Vehicles



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Cost-Benefit Analysis

- For each unit due for replacement, compare cost of a similar one-year older vehicle to operating costs of a new replacement vehicle
- Include only the controllable costs – capital, depreciation, repairs, maintenance and fuel
- RSI's proprietary Fleet Analytics Review™ (FAR) software is used to assess cost benefit unit-by-unit for our clients
- Similar approach can be used by anyone with Excel skills

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4) Balance the Long Term Capital Plan

- For older fleets a “saw tooth” effect will be evident in the long-term capital plan – a capital spike will result because many units are due for replacement at once
- The budget will need to be balanced by reviewing all units due for replacement and their cost/benefit analysis
- Replacement should be deferred to an ensuing year in the long-term plan for those with negative or low cost/benefit

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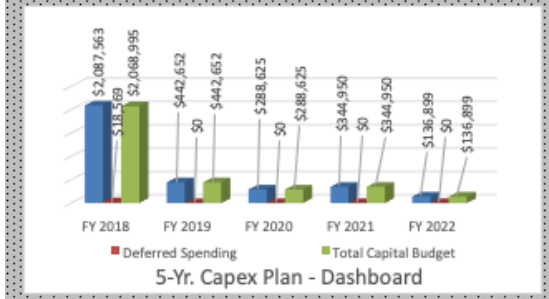
Balancing the Long-Term Capital Plan



5-Yr. Capex Plan - Dashboard

Fiscal Year 2019

Fleet Analytics Review©

FAR© A Fleet Challenge service

FAR© Version 1.2 Business as Usl

Unit km at End of Review Period	Operating Expense Increase or Savings (-)	Unit #	Type	Planned Year for Replacement	Planned Capital Budget 2019 (includes all previous deferrals)	Enter "1" to defer unit to next year or "2" to nix unit entirely	Deferred Capital Spending for 2019	2019 Total Capital Budget	Opex Increase or -Reduction from Capex Investment in New Replacement Vehicle	Net CO_2 Reduction from Vehicle Replacement & Greening Plan	Planned Capital Budget 2020 (includes deferrals from 2019)	Enter "1" to defer unit to next year or "2" to nix unit entirely	Deferred Spending for 2020	2020 Total Capital Budget 2020	Planned Capital Budget 2021 (includes deferrals from 2020)	Enter "1" to defer unit to next year or "2" to nix unit entirely	Deferred Spending for 2021	20
73,386	-$23	400	Smart	2016	$18,569	1	$18,569	$0	$0	0.00	$18,754		$0	$18,754	$0		$0	$0
40,826	-$505	18	Chevrolet	2022	$0		$0	$0	$0	0.00	$0		$0	$0	$0		$0	$0
48,548	-$541	203	Ford	2019	$26,072		$0	$26,072	-$541	0.16	$0		$0	$0	$0		$0	$0
52,298	-$551	226	Ford	2019	$31,561		$0	$31,561	-$551	0.14	$0		$0	$0	$0		$0	$0
62,309	-$255	228	Chevrolet	2016	$55,399		$0	$55,399	-$255	0.00	$0		$0	$0	$0		$0	$0
58,015	-$466	24	Dodge	2019	$39,325		$0	$39,325	-$466	0.15	$0		$0	$0	$0		$0	$0
20,959	-$1,024	15	Ford	2024	$0		$0	$0	$0	0.00	$0		$0	$0	$0		$0	$0
12,494	-$862	38	Ford	2024	$0		$0	$0	$0	0.00	$0		$0	$0	$0		$0	$0
49,514	-$1,443	223	Ford	2023	$0		$0	$0	$0	0.00	$0		$0	$0	$0		$0	$0
30,543	-$820	225	Ford	2023	$0		$0	$0	$0	0.00	$0		$0		$0		$0	$0

Fiscal Year 2020

Fiscal Year 2021

Screenshot

Electric Vehicle Cost Benefit Analysis

A new EV cost/benefit tool for fleets considering electrification

New! Electric Vehicle Cost Benefit Tool

- Electric vehicles (EVs) are quickly being adopted
- Many fleets are transitioning to EVs
- EVs are ideal for municipal and return-to-base fleet operations

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New! Electric Vehicle Cost Benefit Tool

- Light-duty EVs are here now; pickups, medium and heavy-duty trucks are coming soon
- The quandary is to determine if EVs are right for the fleet
- That is the purpose of the new RSI cost-benefit tool

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Controllable Costs Considered in Analysis

- Energy equivalency of electricity as a fuel type
- Additional acquisition capital cost for EVs
- Maintenance (less/more)
- Charging system (EVSE) capital costs
- Depreciation

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Statistical peer fleet data used in analysis

- The tool auto populates average fleet data for each fleet type (municipal, courier, utility, trucking etc.)
- The tool auto populates average fleet data for each vehicle type (LD cars through to class 8 trucks)
- Optionally, user can over-write our data if desired

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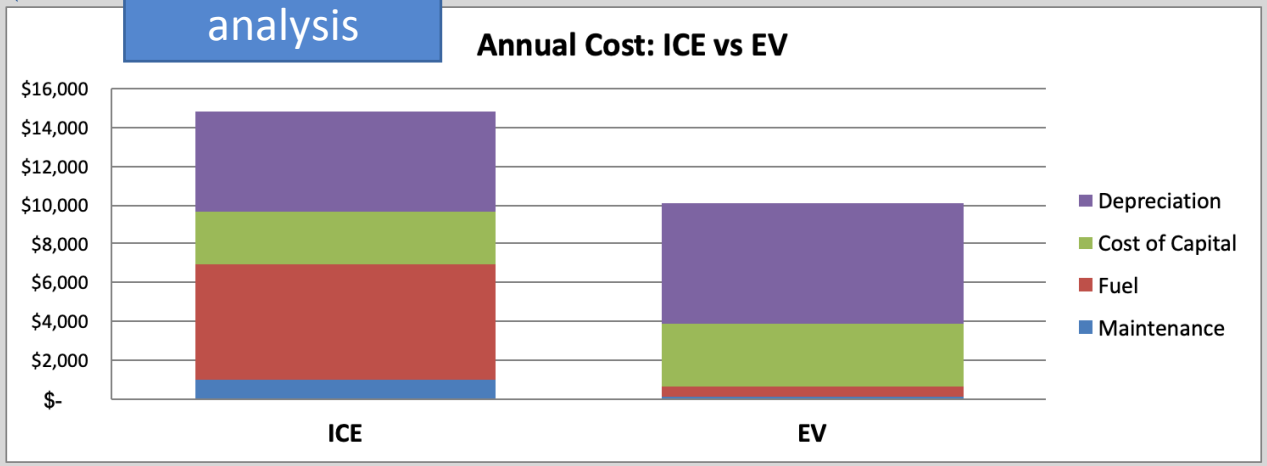
Advance look at the EV/ICE Cost Benefit Tool

User selects their vehicle type for analysis

INPUTS

		Default	-OR-
Class			Class_3
Application			
Fuel cost per liter (ICE)			1.41
Fuel type (G)as or (D)iesel			
Cost of electricy per kWh			0.09
Planned Life Cycle (years)			12.00
Maintenance costs (ICE)	$	954.78	
Liters/100km (ICE)		32.20	
Purchase price (ICE)	$	68,289	
Maintenance costs (EV)	$	79.32	
kWh/100km (EV)		47.60	
Purchase price (EV)	$	81,947	
Annual km traveled		13,220	
Annual Cost of Capital		4.0%	
End of Life Salvage Value		10.0%	

Car
SUV
PU
Van
Bus
Class_3
Class_4
Class_5
Class_6
Class_7
Class_8



REPORT

Annual Cost		**ICE**		**EV**	**Annual Saving (-loss)**
Maintenance	$	955	$	79	$875
Fuel	$	6,002	$	566	$5,436
Cost of Capital	$	2,732	$	3,278	-$546
Depreciation	$	5,122	$	6,146	-$1,024
TOTAL	$	14,810	$	10,070	$4,741

Advance look at the EV/ICE Cost Benefit Tool

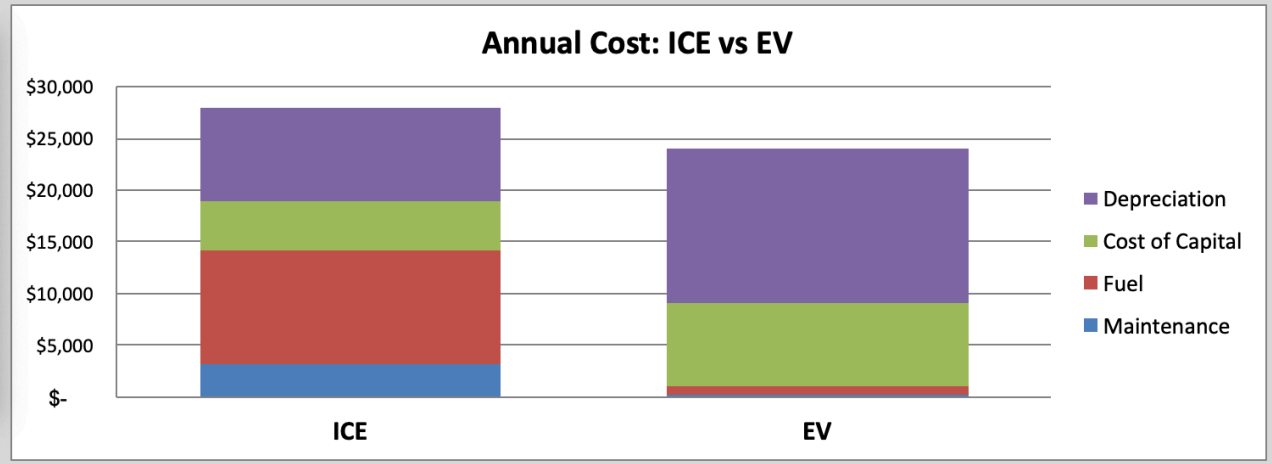
INPUTS

		Default -OR-
Class	Class_8	
Application	Municipal	
Fuel cost per liter (ICE)		$ 3,175.12
Fuel type (G)as or (D)iesel		72.40
Cost of electricy per kWh		$ 120,000
Planned Life Cycle (years)		129.59
		.20
		,328
		10,799
		4.0%
		10.0%

- Municipal
- Gas Utility
- Electric Utility
- Telephone Utility
- Urban Distribution
- Courier
- Heavy Haul
- Liquid Bulk
- Long Haul
- Regional
- Salt/Sander/Plow
- Refuse/Recycle

User selects their fleet type

EV/ICE Cost Benefit Tool
V0.7



REPORT

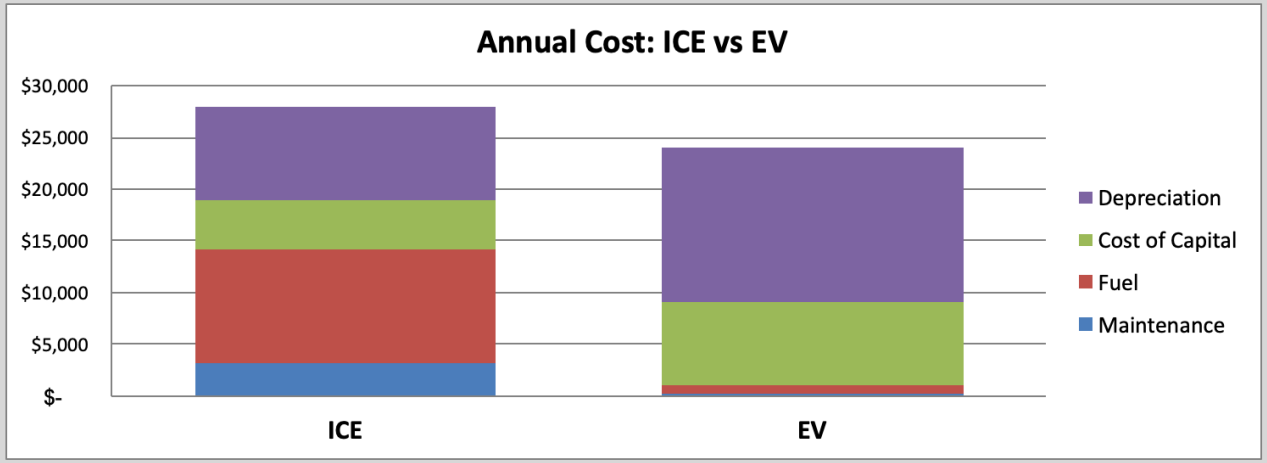
Annual Cost	**ICE**	**EV**	**Annual Saving (-loss)**
Maintenance	$ 3,175	$ 130	$3,046
Fuel	$ 11,024	$ 906	$10,118
Cost of Capital	$ 4,800	$ 8,013	-$3,213
Depreciation	$ 9,000	$ 15,025	-$6,025
TOTAL	$ 27,999	$ 24,073	$3,926

Advance look at the EV/ICE Cost Benefit Tool

INPUTS

Class			Class_8
Application			Municipal
Fuel cost per liter (ICE)			$ 1.41
Fuel type (G)as or (D)iesel			G
Cost of electricy per kWh			$ 0.09
Planned Life Cycle (years)			12.00
			(Blank uses default)
		Default -OR-	**User Input**
Maintenance costs (ICE)	$	3,175.12	
Liters/100km (ICE)		72.40	
Purchase price (ICE)	$	120,000	
Maintenance costs (EV)	$	129.59	
kWh/100km (EV)		93.20	
Purchase price (EV)	$	200,328	
Annual km traveled		10,799	
Annual Cost of Capital		4.0%	
End of Life Salvage Value		10.0%	

EV/ICE Cost Benefit Tool
V0.7



REPORT

Annual Cost		**ICE**	**EV**	**Annual Saving (-loss)**
Maintenance	$		130	$3,046
Fuel	$		906	$10,118
Cost of Capital				-$3,213
Depreciation				-$6,025
TOTAL				$3,926

Data for users unique fleet type is auto-populated – *or the user can over-write*

Advance look at the EV/ICE Cost Benefit Tool

INPUTS

Class			Class_8	
Application			Municipal	
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Fuel type (G)as or (D)iesel			G	
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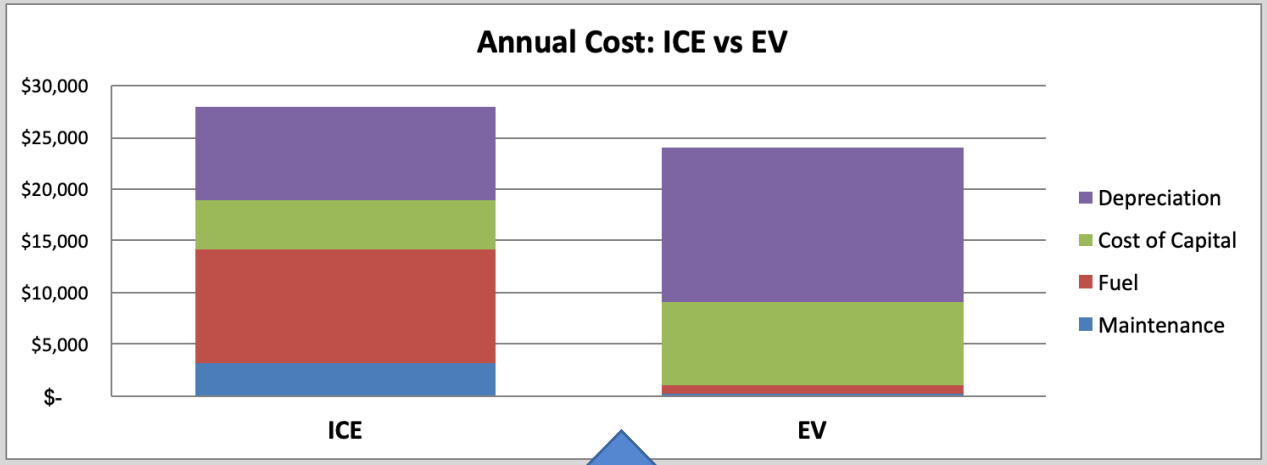
EV/ICE Cost Benefit Tool
V0.7



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Fuel	$	11,024	$	906	$10,118
Cost of Capital	$	4,800	$	8,013	-$3,213
Depreciation	$	9,000	$	15,025	-$6,025
TOTAL	$	27,999	$	24,073	$3,926

EV and ICE cost comparisons displayed here

Fleet-Wide Impact Screen

INPUTS

	Default	-OR-	User Input
Cost of new EV Level 1 charging infrastructure (PER UNIT)	$	-	
Cost of new EV Level 2 charging infrastructure	$	1,250	
Cost of new EV Level 3 charging infrastructure	$	100,000	
Number of units serviced by one L3 infrastructure		50	
Annual Cost of Capital		4.0%	

EV/ICE Cost Benefit Tool
V0.7

Class	Application	Notes	Unit Count	L1, L2 or L3 Charging?	Savings or (-cost) per Unit	GHG Emissions (kg CO2e) per ICE unit	Total Savings (-cost)	Total ICE GHG Emissions TONNES CO2e
Class_8	Salt/Sander/Plow		50	L3	$14,941	10,000	$747,038	500.0
Car	Municipal		100	L2	$1,076	4,775	$107,648	477.5
							$0	-
							$0	-
							$0	-
							$0	-
							$0	-
							$0	-
							$0	-
							$0	-
							$0	-
							$0	-

Ease of Reference: Currently Showing in Cost Tool

Class_3	Municipal	$4,740.61

FLEEET IMPACT REPORT

Units Using L1 Charging	0
Units Using L2 Charging	100
Units Using L3 Charging	50
Number of L2 Stations Needed	50
Number of L3 Stations Needed	1
Total Savings (Cost) of Units	$854,686
Annual Capital Cost: L1	$0
Annual Capital Cost: L2	$2,500
Annual Capital Cost: L3	$4,000
Total Annual Savings (-cost)	$848,186
Total Tailpipe GHG Savings (Tonnes CO2e)	977.5

On the Fleet-Wide Impact Tab users can tally all their analyses by vehicle types – and also add costs for EVSE

Free Analysis Tools and Resources

- Basic lifecycle analysis tool
- Electric vehicle cost/benefit tool
- Total cost of ownership analysis tool
- Other tools and calculators

Available free of charge by contacting:

info@fleetchallenge.ca

info@e3fleet.com

Thank you!

Roger Smith, President

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