

DRIVING CHANGE

Green Solutions for Fleet Operators

- Calculating Carbon Emissions
- The E3 Fleet Review Program



Fleet Challenge Ontario

- Since 2004, a not-for-profit program working closely with private and public sector fleets wishing to take action on emissions
- Activities include regional workshops, events, stakeholder consultations, demonstration projects and information sessions
- Facilitates market adoption of existing and emerging green technologies



Mission

To reduce carbon and smog-causing emissions from on-road transportation fleets by helping to responsibly accelerate the adaptation of proven green technologies and best management practices.



Calculating Carbon Emissions

Options



Carbon Emissions

- Carbon, from burning fossil fuels, is the primary greenhouse gas responsible for global warming and climate change
- Scientists believe that between 50 and 80% carbon reduction required to slow global warming
 - Fuel Consumption
 - Fuel Cost
- Transportation causes almost 30% of Canada's greenhouse gas emissions
 - GHG & Air
 - Pollutants
- Greenhouse gas emissions are directly related to fuel consumption – *and fuel cost!*



Calculating Carbon Emissions

- Carbon output calculated either by “*tailpipe*” or “*lifecycle*” methods
- Fleet total carbon output is easily calculated by multiplying the amount consumed of each fuel type (gas, diesel, etc.) by it’s emissions factor

Litres consumed x emissions factor = carbon output

LIFECYCLE Emissions Factors				
	kg eq Co2 / L	Tonnes eq Co2 / L	lbs. eq Co2 / gallon (US)	Tons eq Co2 / gallon (US)
Gas	3.352	0.00335	27.974	0.01399
Diesel	3.543	0.00354	29.568	0.01478
B2 biodiesel	3.488	0.00349	29.110	0.01456
B5 biodiesel	3.406	0.00341	28.424	0.01421
B10 biodiesel	3.269	0.00327	27.281	0.01364
B20 biodiesel	2.995	0.00300	24.994	0.01250
B50 biodiesel	2.173	0.00217	18.135	0.00907
B100 biodiesel	0.803	0.00080	6.701	0.00335
E10 ethanol	3.138	0.00314	26.188	0.01309
E85 ethanol	1.344	0.00134	11.219	0.00561
CNG	2.939	0.00294	24.528	0.01226
Propane	2.107	0.00211	17.584	0.00879
CNG/gasoline	0.000	0.00000	0.000	0.00000
CNG/E10	0.000	0.00000	0.000	0.00000
Gas/propane	0.000	0.00000	0.000	0.00000
H2	0.000	0.00000	0.000	0.00000

Combustion (Tailpipe) Emissions Factors				
	kg eq Co2 / L	Tonnes eq Co2 / L	lbs. eq Co2 / gallon (US)	Tons eq Co2 / gallon (US)
Gas	2.216	0.00222	18.493	0.00925
Diesel	2.717	0.00272	22.674	0.01134
B2 biodiesel	2.664	0.00266	22.232	0.01112
B5 biodiesel	2.584	0.00258	21.568	0.01078
B10 biodiesel	2.452	0.00245	20.461	0.01023
B20 biodiesel	2.187	0.00219	18.248	0.00912
B50 biodiesel	1.391	0.00139	11.608	0.00580
B100 biodiesel	0.065	0.00006	0.542	0.00027
E10 ethanol	2.143	0.00214	17.884	0.00894
E85 ethanol	0.369	0.00037	3.079	0.00154
CNG	2.128	0.00213	17.762	0.00888
Propane	1.525	0.00153	12.727	0.00636
CNG/gasoline	0.000	0.00000	0.000	0.00000
CNG/E10	0.000	0.00000	0.000	0.00000
Gas/propane	0.000	0.00000	0.000	0.00000
H2	0.000	0.00000	0.000	0.00000

Source:

GHGenius version 3.11



Calculating Carbon Emissions

Example 1:

- Gasoline (tailpipe) - 2.216 kg/L
- Fleet “A” consumes 1,000,000 litres gas per year
- $1,000,000 \times 2.216 = 2,216,000 \text{ kg (2,216 tonnes)}$



Calculating Carbon Emissions

Example 2:

- Diesel fuel (tailpipe) - 2.717 kg/L
- Fleet “A” consumes 1,000,000 litres diesel per year
- $1,000,000 \times 2.717 = 2,717,000$ kg (2,717 tonnes)



Calculating Carbon Emissions

Fleet “A” carbon baseline:

- Gasoline: 2,216
- Diesel: 2,717
- **Total: 4,933 tonnes**



Carbon Emissions – Renewable Fuels

Example 3:

- E85 (tailpipe) - 0.369 kg/L
- Fleet “A” consumes 1,000,000 litres gas per year
- $1,000,000 \times 0.369 = 369,000 \text{ kg (369 tonnes)}$





Carbon Emissions – Renewable Fuels

Example 4:

- B20 biodiesel (tailpipe) - 2.187 kg/L
- Fleet “A” consumes 1,000,000 litres diesel per year
- $1,000,000 \times 2.187 = 2,187,000$ kg (2,187 tonnes)





Carbon Emissions – Renewable Fuels

Fleet “A” carbon baseline using renewable fuels:

- E85: 369
- B20: 2,187
- Total: 2,556 tonnes



Carbon Emissions – Renewable Fuels

Fleet “A” net carbon reduction over baseline:

- Before: 4,933
- After: 2,556
- **Total: 2,377 tonnes**

48% carbon reduction by switching to renewable fuels!



Taking Action on Carbon Emissions

1. Determine your fleet's baseline
2. Set realistic target for reduction
3. Determine carbon reduction options and implement
4. Regularly monitor progress toward target



Calculating Carbon – Tools Available

- GHGenius: <http://www.ghgenius.ca/>
- Environmental Defense Fund:
<http://innovation.edf.org/page.cfm?tagID=37020>
- E3 Fleet System:
<http://www.e3fleet.com/mc/page.do?sitePageId=87033>



The E3 Fleet Review Program

Overview



What is the Fleet Review Program?

- A key component of the E3 Fleet Rating System



- A customized guide for improvements in energy usage and financial performance, and reduced emissions
- The first step towards an E3 **Green Rating**; E3 is modeled after LEED



What is the Fleet Review Program?

- Fleet Review has been completed for almost 100 Canadian fleets since 2006
- Participants from both private and public sectors
- Ontario, BC and Alberta

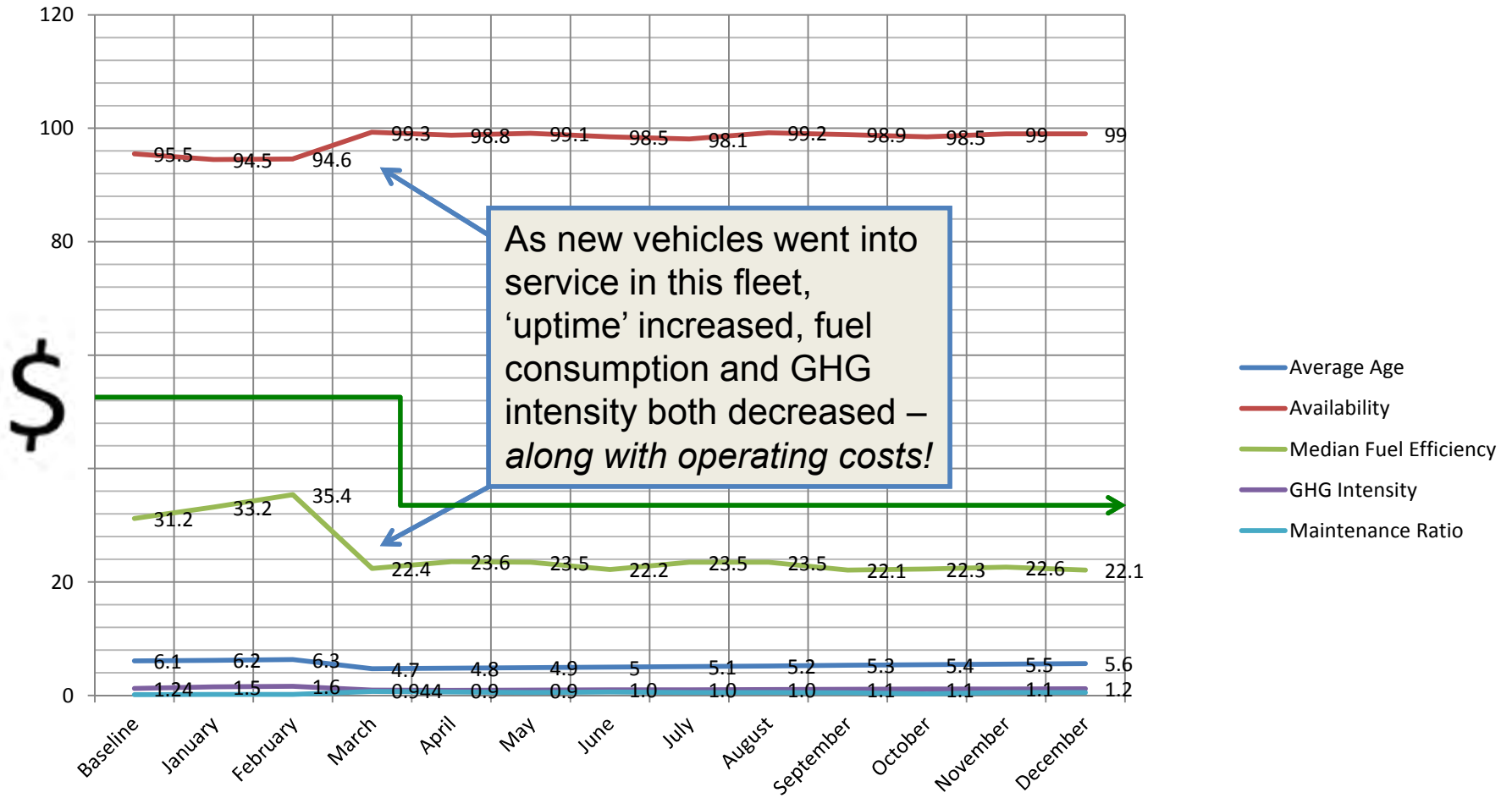


What is the Fleet Review Program?

- A fleet manager's *decision support tool* that enables modeling of “what-if?” scenarios
- Collaboration with individual fleet managers to identify *viable* and *realistic* asset management solutions *via historical data*
- Access to baseline and peer group benchmarking data to normalize issues facing fleet managers today



Effects of Fleet Renewal





Fleet Review – The Deliverables

- E3 Fleet Review reports
- Carbon and financial baseline performance
- Capital plan
- Exception Report
- Executive Summary
- Recommendations
- Fleet Managers Guide
- Green Fleet Action Plan

E3 Fleet
Fleet Management Solutions

Operating Cost Summary

Total Number of Units in Review: 563 Units

Total Cost by Summary: (RPM, Fuel, Capital & Downtime)			
Total Fleet Cost	\$ 8,002,790	Dollars (\$)	
Total Fuel Costs (Excludes Fuel)	\$ 2,606,780	Dollars (\$)	0
Total Repair Costs (Excludes Non-repairable related PM cost)	\$ 4,998,400	Dollars (\$)	
Total PM Costs*		Dollars (\$)	

Total Cost By Category:					
	#Units	Avg. Cost (\$)	Total Fuel Costs	Total Repair & PM Costs	
C	Get More Compact, Mid-Size, Linc. 4x3	50	\$ 4,350	\$ 116,600	\$ 106,600
F	Pickup (1/2 Tonne, 1/4 Tonne)	306	\$ 8,541	\$ 1,133,211	\$ 7,204,597
V	Van (Passenger Cap up to 1500 lbs. GVWR)	97	\$ 4,721	\$ 223,342	\$ 19,8411
S	SVN (Sport Utility Vehicle)	38	\$ 2,408	\$ 37,006	\$ 14,774
B	Bus/Coach (Any Passenger Seated)	0	\$ -	\$ -	\$ -
T1	Truck 6,000 lbs. - 11,999 lbs. GVWR	67	\$ 17,546	\$ 276,942	\$ 78,6233
T2	Truck 12,000 lbs. - 14,999 lbs. GVWR	159	\$ 22,054	\$ 819,676	\$ 2,185,238
T3	Truck 15,000 lbs. - 19,999 lbs. GVWR	0	\$ -	\$ -	\$ -
T4	Truck 20,000 lbs. - 14,999 lbs. GVWR	0	\$ -	\$ -	\$ -
T5	Truck 11,000 lbs. GVWR & Greater	0	\$ -	\$ -	\$ -

Average Cost By Distance Traveled:				
	#Units	Avg. Cost (\$/mi)	Avg. Cost (\$/Mile)	
C	Get More Compact, Mid-Size, Linc. 4x3	50	\$ 0.26	\$ 0.42
F	Pickup (1/2 Tonne, 1/4 Tonne)	306	\$ 0.56	\$ 0.89
V	Van (Passenger Cap up to 1500 lbs. GVWR)	97	\$ 0.59	\$ 0.34
S	SVN (Sport Utility Vehicle)	38	\$ 0.46	\$ 0.73
B	Bus/Coach (Any Passenger Seated)	0	\$ -	\$ -
T1	Truck 6,000 lbs. - 11,999 lbs. GVWR	67	\$ 3.75	\$ 5.98
T2	Truck 12,000 lbs. - 14,999 lbs. GVWR	159	\$ 3.89	\$ 6.20
T3	Truck 15,000 lbs. - 19,999 lbs. GVWR	0	\$ -	\$ -
T4	Truck 20,000 lbs. - 14,999 lbs. GVWR	0	\$ -	\$ -
T5	Truck 11,000 lbs. GVWR & Greater	0	\$ -	\$ -

Average Cost By Operating Hour:			
	#Units	Avg. Cost (\$/Hour)	
C	Get More Compact, Mid-Size, Linc. 4x3	50	
F	Pickup (1/2 Tonne, 1/4 Tonne)	306	
V	Van (Passenger Cap up to 1500 lbs. GVWR)	97	
S	SVN (Sport Utility Vehicle)	38	
B	Bus/Coach (Any Passenger Seated)	0	
T1	Truck 6,000 lbs. - 11,999 lbs. GVWR	67	
T2	Truck 12,000 lbs. - 14,999 lbs. GVWR	159	
T3	Truck 15,000 lbs. - 19,999 lbs. GVWR	0	
T4	Truck 20,000 lbs. - 14,999 lbs. GVWR	0	
T5	Truck 11,000 lbs. GVWR & Greater	0	

*Typical in your fiscal year

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Appendix A - Units Due for Replacement

Replacement Cost	Vehicle to be Replaced							Replacement Vehicle (if specified)			
	ID	Make	Model	MPG	Annual Cost	MPV	Make	Model	Annual Cost	Capex Cost	
P-1	1	FORD	F350 FLAT DECK	2002	\$ 13,643	\$ 9,212	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
P-1	10	CHEVY	SILVER 2500	2002	\$ 6,274	\$ 7,174	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
V-1	17	FREIGHTLINER	SERVICE VAN	2001	\$ 17,184	\$ -	BIC	High Performance Van	\$ 1,440	\$ 45,300	
V-1	20	OMC	DRUMMAN VAN	1997	\$ 2,089	\$ -	BIC	High Performance Van	\$ 1,440	\$ 45,300	
P-1	22	FORD	F150 PICKUP 4WD	2002	\$ 10,242	\$ 6,164	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
S-2	25 - R	FORD	FOCUS WAGON	2001	\$ 1,078	\$ 7,809	Retired	No unit	\$ -	\$ -	
S-3	25 - N	FORD	FOCUS 4 DOOR	2009	\$ 3,603	\$ 30,848	Replaced	Current Unit	\$ 2,593	\$ -	
P-1	30	GMC	SONOMA	2001	\$ 3,227	\$ 1,900	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
C-1	32	CHEVY	CAVALIER	2002	\$ 1,637	\$ 1,400	BIC	Hybrid Car	\$ 880	\$ 35,000	
V-1	33	OMC	SAVANNA VAN	2001	\$ 8,723	\$ 2,500	BIC	High Performance Van	\$ 1,440	\$ 45,300	
P-1	34	FORD	F150 PICKUP 4WD	2002	\$ 8,590	\$ 6,164	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
T2-1	39	VOLVO	TA DUMP	1996	\$ 19,574	\$ 21,200	BIC	Class T2 Truck	\$ 2,600	\$ 170,000	
P-2	40 - R	CHEVY	3/4 TON	1999	\$ 4,083	\$ 2,500	Retired	No unit	\$ -	\$ -	
P-3	40 - N	FORD	F250 PICK UP	2009	\$ 4,569	\$ 29,284	Replaced	Current Unit	\$ 3,625	\$ -	
P-1	42	CHEVY	1500 PICK UP	1997	\$ 977	\$ 3,500	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
T1-1	43	STERLING	SA DUMP	2000	\$ 15,979	\$ 18,800	BIC	Class T1 Truck	\$ 1,920	\$ 102,000	
P-2	45 - R	CHEVY	2500 EXPRESS	1999	\$ 3,804	\$ 2,400	Retired	No unit	\$ -	\$ -	
V-3	45 - N	CHEVY	CARGO VAN	2009	\$ 3,978	\$ 27,427	Replaced	Current Unit	\$ 2,118	\$ -	
P-1	46	GMC	F150 PICKUP 4WD	2002	\$ 13,000	\$ 5,345	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
P-2	48 - R	FORD	F150 PICK UP	2002	\$ 7,363	\$ 5,301	Retired	No unit	\$ -	\$ -	
P-3	48 - N	GMC	SERRA PICK UP	2009	\$ 4,230	\$ 18,234	Replaced	Current Unit	\$ 3,625	\$ -	
P-1	49	GMC	2500 EXT CAB	2001	\$ 10,198	\$ 3,500	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
T2-1	50	STERLING	SA DUMP	2000	\$ 12,392	\$ 18,800	BIC	Class T2 Truck	\$ 2,600	\$ 170,000	
P-2	53 - R	CHEVY	1/2 TON PICKUP	1997	\$ 901	\$ 3,500	Retired	No unit	\$ -	\$ -	
S-3	53 - N	FORD	ESCAPE HYBRID	2008	\$ 3,570	\$ 27,650	Replaced	Current Unit	\$ 2,593	\$ -	
V-2	54 - R	FORD	E250 VAN	1997	\$ 1,504	\$ -	Retired	No unit	\$ -	\$ -	
V-3	54 - N	GMC	SAVANNA VAN	2008	\$ 5,903	\$ 24,587	Replaced	Current Unit	\$ 2,118	\$ -	
P-2	57 - R	FORD	F430 PICK UP	2001	\$ 16,437	\$ 8,975	Retired	No unit	\$ -	\$ -	
P-3	57 - N	FORD	F350 PICK UP	2009	\$ 10,961	\$ 101,965	Replaced	Current Unit	\$ 3,625	\$ -	
T1-1	65	FORD	F350 FLAT DECK	2001	\$ 10,432	\$ 6,700	BIC	Class T1 Truck	\$ 1,920	\$ 102,000	
C-1	72	FORD	FOCUS WAGON	2003	\$ 2,805	\$ 4,490	BIC	Hybrid Car	\$ 880	\$ 35,000	
P-1	84	GMC	SONOMA	2001	\$ 6,869	\$ 1,900	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
P-1	87	GMC	SONOMA	2001	\$ 5,127	\$ 1,900	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
P-1	89	GMC	SONOMA	2001	\$ 4,311	\$ 1,900	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
P-1	90	GMC	SONOMA	2001	\$ 1,572	\$ 1,900	BIC	Hybrid Pickup	\$ 1,400	\$ 35,000	
P-2	91 - R	FORD	RANGER	1999	\$ 2,371	\$ 2,620	Retired	No unit	\$ -	\$ -	
S-3	91 - N	FORD	ESCAPE HYBRID	2009	\$ 3,894	\$ 34,073	Replaced	Current Unit	\$ 2,593	\$ -	
S-2	98 - R	FORD	RANGER	1999	\$ 3,814	\$ 2,100	Retired	No unit	\$ -	\$ -	
S-3	98 - N	FORD	ESCAPE HYBRID	2009	\$ 3,602	\$ 34,073	Replaced	Current Unit	\$ 2,593	\$ -	
C-1	99	CHEVY	CAVALIER	2002	\$ 982	\$ 1,400	BIC	Hybrid Car	\$ 880	\$ 35,000	
C-1	100	CHEVY	CAVALIER	2002	\$ 1,191	\$ 1,400	BIC	Hybrid Car	\$ 880	\$ 35,000	
P-2	101 - R	GMC	1500 EX CAB	2000	\$ 4,038	\$ 3,400	Retired	No unit	\$ -	\$ -	
P-3	101 - N	FORD	F150 4X4	2009	\$ 3,700	\$ 40,788	Replaced	Current Unit	\$ 3,625	\$ -	
V-2	115 - R	FORD	1500 EXT CAB VAN	1996	\$ 2,321	\$ 3,700	Retired	No unit	\$ -	\$ -	
V-3	115 - N	CHEVY	CARGO VAN	2009	\$ 2,526	\$ 27,427	Replaced	Current Unit	\$ 2,118	\$ -	
P-2	116 - R	GMC	1500 CAB PICKUP	2002	\$ 5,488	\$ 7,963	Retired	No unit	\$ -	\$ -	
P-3	116 - N	FORD	F150 4X4	2009	\$ 4,137	\$ 40,788	Replaced	Current Unit	\$ 3,625	\$ -	
P-2	119 - R	GMC	1500 CAB PICKUP	2002	\$ 6,874	\$ 6,775	Retired	No unit	\$ -	\$ -	
P-3	119 - N	FORD	F150 4X4	2009	\$ 4,440	\$ 40,788	Replaced	Current Unit	\$ 3,625	\$ -	
V-1	128	GMC	1/2 TON VAN	2002	\$ 4,203	\$ 4,996	BIC	High Performance Van	\$ 1,440	\$ 45,300	



Exception Management

Sorted Fleet Detail Sheet - Welland 09.xls

Category (input-see table)	Repair Costs (input repair costs for period)	Factor: Relative to vehicle type AVG	Unit (input unit number)	Category (input-see table)	PM Costs (input PM costs for period)	Factor: Relative to vehicle type AVG	Unit (input unit number)	Category (input-see table)	Fuel Costs (input fuel costs for period)	Factor: Relative to vehicle type AVG	Unit (input unit number)	Category (input-see table)	Annual GHGs produced (tonnes, combustion only, projected)	Factor: Relative to vehicle type AVG	Unit (input unit number)	Category (input-see table)	Annual GHGs produced (tonnes CO2e projected)	Factor: Relative to vehicle type AVG	Unit (input unit number)	Category (input-see table)	
High alert level:	1.500			High alert level:	1.500			High alert level:	1.500			High alert level:	1.500			High alert level:	1.500			High alert level:	1.500
Low alert level:	0.500			Low alert level:	0.500			Low alert level:	0.500			Low alert level:	0.500			Low alert level:	0.500			Low alert level:	0.500
C	0	0.000	450-0	C	0	0.000	449-0	C	149	0.128	242-0	C	1	0.314	242-0	C	2	0.314	242-0	C	
C	0	0.000	449-0	C	0	0.000	450-0	C	173	0.149	449-0	C	2	0.620	449-0	C	3	0.620	424-0	C	
C	0	0.000	242-0	C	132	0.485	242-0	C	180	0.634	290-0	C	4	0.644	290-0	C	4	0.644	444-0	C	
C	390	0.539	444-0	C	151	0.532	249-0	C	180	0.634	290-0	C	4	0.719	450-0	C	4	0.719	290-0	C	
C	548	0.757	249-0	C	180	0.634	290-0	C	491	1.730	444-0	C	5	0.858	426-0	C	5	0.858	426-0	C	
C	550	0.760	425-0	C	491	1.730	444-0	C	507	1.787	426-0	C	5	0.903	444-0	C	5	0.903	450-0	C	
C	751	1.037	426-0	C	507	1.787	426-0	C	534	1.882	424-0	C	10	1.754	424-0	C	10	1.754	449-0	C	
C	1162	1.605	290-0	C	534	1.882	424-0	C	559	1.970	425-0	C	14	2.567	425-0	C	14	2.567	242-0	C	
C	3114	4.302	424-0	C	559	1.970	425-0	C	0	0.000	204-0	P	3	0.265	204-0	P	3	0.265	439-0	P	
P	0	0.000	447-0	P	0	0.000	448-0	P	83	0.234	448-0	P	4	0.389	439-0	P	4	0.389	204-0	P	
P	0	0.000	438-0	P	83	0.234	448-0	P	144	0.406	297-0	P	4	0.414	439-0	P	4	0.414	204-0	P	
P	35	0.019	448-0	P	177	0.499	439-0	P	177	0.499	439-0	P	5	0.488	428-0	P	5	0.488	362-0	P	
P	110	0.059	231-0	P	184	0.519	428-0	P	184	0.519	428-0	P	6	0.515	363-0	P	6	0.515	434-0	P	
P	128	0.068	121-0	P	186	0.525	447-0	P	186	0.525	447-0	P	6	0.541	438-0	P	6	0.541	383-0	P	
P	140	0.075	438-0	P	225	0.635	363-0	P	225	0.635	363-0	P	6	0.570	231-0	P	6	0.570	448-0	P	
P	167	0.089	442-0	P	272	0.767	231-0	P	272	0.767	231-0	P	7	0.621	161-0	P	7	0.621	231-0	P	
P	178	0.095	353-0	P	286	0.807	438-0	P	286	0.807	438-0	P	7	0.642	367-0	P	7	0.642	438-0	P	
P	584	0.301	383-0	P	294	0.829	161-0	P	294	0.829	161-0	P	8	0.721	146-0	P	8	0.721	297-0	P	
P	763	0.406	204-0	P	303	0.855	367-0	P	303	0.855	367-0	P	9	0.820	375-0	P	9	0.820	353-0	P	
P	827	0.442	375-0	P	322	0.908	146-0	P	322	0.908	146-0	P	9	0.841	362-0	P	9	0.841	367-0	P	
P	1100	0.586	384-0	P	327	0.922	375-0	P	327	0.922	375-0	P	9	0.849	159-0	P	9	0.849	443-0	P	
P	1155	0.617	144-0	P	330	0.931	162-0	P	2247	0.944	448-0	P	7	0.881	447-0	P	7	0.881	375-0	P	
P	1173	0.627	434-0	P	355	1.001	159-0	P	2263	0.951	447-0	P	7	0.959	162-0	P	7	0.959	422-0	P	
P	1389	0.742	146-0	P	363	1.024	362-0	P	2327	0.976	376-0	P	8	0.986	448-0	P	8	0.986	146-0	P	
P	1550	0.826	394-0	P	366	1.032	150-0	P	2331	0.979	162-0	P	8	1.007	150-0	P	8	1.007	162-0	P	
P	1721	0.919	297-0	P	371	1.046	353-0	P	2550	1.071	150-0	P	8	1.028	353-0	P	8	1.028	384-0	P	
P	1998	1.066	150-0	P	396	1.117	442-0	P	2672	1.123	422-0	P	8	1.050	376-0	P	8	1.050	448-0	P	
P	2384	1.273	443-0	P	399	1.125	153-0	P	2679	1.126	353-0	P	9	1.136	153-0	P	9	1.136	153-0	P	
P	2488	1.329	159-0	P	407	1.148	422-0	P	2723	1.144	434-0	P	9	1.171	422-0	P	9	1.171	394-0	P	
P	2515	1.343	387-0	P	418	1.173	389-0	P	2758	1.159	121-0	P	9	1.167	369-0	P	9	1.167	159-0	P	
P	2827	1.403	446-0	P	417	1.176	376-0	P	2857	1.192	153-0	P	9	1.193	434-0	P	9	1.193	150-0	P	
P	2878	1.537	382-0	P	422	1.190	434-0	P	3231	1.356	442-0	P	9	1.213	121-0	P	9	1.213	144-0	P	
P	3321	1.774	428-0	P	452	1.275	446-0	P	3321	1.395	389-0	P	9	1.222	442-0	P	9	1.222	144-0	P	
P	3340	1.784	153-0	P	457	1.289	394-0	P	3521	1.479	384-0	P	9	1.253	384-0	P	9	1.253	428-0	P	
P	3471	1.854	376-0	P	487	1.374	384-0	P	3539	1.487	394-0	P	9	1.257	394-0	P	9	1.257	447-0	P	
P	3818	2.083	422-0	P	496	1.389	121-0	P	3812	1.602	144-0	P	12	1.526	144-0	P	12	1.526	436-0	P	
P	4561	2.436	389-0	P	533	1.503	144-0	P	4110	1.727	436-0	P	12	1.541	436-0	P	12	1.541	376-0	P	

Units highlighted in blue are operating 50% lower and those in red are, 50% above average



Peer Benchmarking

Key Performance Indicator (averages)	Urban	Rural
Fleet Age (total fleet)	5.7	5
Utilization (kilometres, per unit)	15,532	26,707
Median Fuel Efficiency (total fleet)	29.9	32
Operating cost (cost per km/unit)	\$2.13	\$1.53
Maintenance Ratio (PM: Reactive)	.50	.45
Availability (uptime)	96.6%	93.9%
Area covered per vehicle (km ²)	788	3,090
Constituents served per vehicle	881	1,123
GHG Intensity (kg/km)	.83	.88



Ontario Municipal Database

Municipality	Sudbury	Windsor	Timmins	Guelph	Burlington	Orillia	Vaughan	London	Markham	Welland	Clarington	Total	Average
Number of units - high GHGs	26	33	21	18	10	4		57	24	14	12	1,530	46
GHG emissions (lifecyle tonnes)	4,457	3,382	1,555	2,538	889	484		6,276	1,571	891	1,149	145,242	4,401
GHG intensity - lifecycle	1.54	0.92	1.00	1.19	0.441	1.177		1.26	0.628	0.967	1.489	36	1
GHG emissions (tailpipe tonnes)	3,177	2,445	1,118	1,873	467	351		4,683	1,097	636	844	101,054	3,158
GHG intensity - tailpipe	1.10	0.66	0.72	0.86	0.299	0.853		0.94	0.436	0.691	1.094	26	1
Total annual distance travelled (km)	2,897,634	3,690,424	1,553,815	2,127,792	1,560,884	411,574		4,981,573	2,502,500	921,107	771,889	130,562,906	3,956,452
Average unit utilization (km)	17,045	13,133	13,998	12,371	18,806	11,759		13,427	16,573	11,809	14,031		19,028
C	11,122	16,915	9,676	11,343	20,984			10,679	9,905	15648	17,254		16,666
P	16,248	12,525	15,974	12,796	18,443	14,791		12,687	16,834	12,201	19,453		15,438
V	18,261	12,600	11,265	12,310	17,595	14,007		11,238	15,728	11,079	9,639		12,279
S	13,252	10,727			17,004			10,189	25,207	15,245			20,336
B		2,208											49,041
T1	15,062	13,032		10,802		16,517		13,727	20,901	6,099			13,226
T2	10,356	10,654	10,682	11,882		7,807		12,263	15,536	10,260			11,226
T3	29,861	13,226	14,015	13,407		7,635		18,636	11,355		10,390		11,774
T4	15,030	11,487	336			16,929			14,733				14,997
T5													7,514
Number of units - low utilization	36	51	18	30	18	5		60	33	13	9	1,896	57
Average availability (%)	96.8	91		98	100	98.8		99	98.7	98.8	100		98
Average downtime (days)	3	33		5		3.1		3	4.8	3		149	7
Average cost of downtime (\$CDN/day)													
Annual total cost of downtime (\$CDN/year)		\$5,135		\$26,490		\$778		\$619				\$87,574	\$7,961
Annual cost of repairs (\$CDN) (may include preventive maintenance if data not provided)		\$1,448,189		\$4,900,260		\$27,217		\$229,691				\$10,739,122	\$976,284
Annual cost of repairs (\$CDN)	\$620,040	\$1,632,356		\$1,182,015		\$197,130		\$1,368,503	\$402,666	\$239,070	\$407,091	\$36,429,352	\$1,280,978
Annual cost of preventive maintenance (\$CDN)	\$169,820	\$343,738	\$749,347	\$164,627		\$53,990		\$1,023,709	\$131,543	\$35,643		\$23,816,202	\$916,008
Annual cost of R&M, Fuel, Capital & Downtime (\$CDN)	\$2,148,098	\$4,652,071	\$1,188,197	\$7,081,824	\$399,459	\$425,413		\$4,255,399	\$899,373	\$546,397	\$836,666	\$123,819,099	\$3,752,094
Average operating costs (\$/km)	\$1.70	\$1.95	\$3.24	\$3.45	\$0.32	\$1.25		\$0.80	\$0.73	\$1.11	\$0.61		\$4.81
C	\$0.39	\$0.42	\$0.30	\$0.62	\$0.28			\$0.26	\$0.22	\$0.23	\$0.15		\$0.41
P	\$0.61	\$0.86	\$0.94	\$0.64	\$0.32	\$0.52		\$0.58	\$0.44	\$0.48	\$0.36		\$0.55
V	\$0.60	\$0.46	\$0.35	\$0.45	\$0.29	\$0.63		\$0.38	\$0.22	\$0.54	\$0.35		\$0.54
S	\$0.51	\$0.51			\$0.37			\$0.23	\$0.21	\$0.24			\$0.37
B		\$1.75											\$12.37
T1	\$0.87	\$2.13		\$1.20		\$0.85		\$1.04	\$0.42	\$3.37			\$6.14
T2	\$2.41	\$2.87	\$3.37	\$2.23		\$1.16		\$1.23	\$0.94	\$1.82			\$2.35
T3	\$4.37	\$4.96	\$2.04	\$15.58		\$2.26		\$1.90	\$1.93		\$1.56		\$6.56

Example #1 - Recommendations

Key Performance Indicator	E3 Fleet Analysis	
Fleet median fuel efficiency	29.5 (l/100 km)	
Fleet annual GHG emissions	*High fuel consumption rate	
Annual GHG emissions	of GHGs	
Fleet GHG emissions	age	
Annual GHG emissions		
Corporate GHG emissions		
Corporate GHG emissions		
Fleet average age		
Units due for replacement		
Projected cost of replacement		
Projected annual capital and operating costs		
Fleet availability (%)	n/a	
Fleet average downtime (days)	n/a	
Maintenance ratio (PM vs. RM)	n/a	

4. Review the current vehicle charge-back system to ensure that user departments pay the true cost of vehicle use encouraging fleet right-sizing and ensuring maximum utilization of all vehicles.

5. Implement duty cycles for the fleet based on age as high utilization applications are most cost effectively served by newer units

Recommended Actions - Capital budget and Vehicle Replacement

1. Review current vehicle replacement and retention strategy. Your current strategy will require capital funding of approximately \$416,000 for 10 new vehicles, reducing the age of the fleet from 9.4 years to 5.9 years with the following impacts:

- a. Decreased GHG output (29.5 tonnes)
- b. Fuel consumption reduction of 11,569 litres
- c. Fuel cost reduction of \$10,870 (based on historical fuel per-liter costs)
- d. Increased cost of capital for the 10 new vehicles of \$16,640
- e. A net cost increase (when all factors are considered including cost of capital, repairs and all other op. costs) of \$17,530/year

2. Make vehicle right-sizing a priority. Select the right sized vehicles for the job at hand. One strategy which has been particularly successful in other municipalities has been to begin with supervisors vehicles – often full-size pickup trucks – which can be downsized to compact pickups or cars in order to reduce fuel

E3 Fleet Rating System Copyright Fraser Basin Council 2007 – All Rights Reserved Page 4 of 5

Example #2

2008

2009

Key Performance Indicator	Key Performance Indicator	E3 Fleet Analysis
Fleet median fuel efficiency	Fleet median fuel efficiency	21.2 (l/100 km)
Fleet annual fuel usage	Fleet annual fuel usage	227,337 (l/yr)
Fleet GHG intensity (tailpipe)	Fleet GHG intensity (tailpipe)	0.644 (kg/km)
Annual GHG emissions (tailpipe)	Annual GHG emissions (tailpipe)	498 tonnes CO ₂ equivalent
Corporate Average Utilization (km)	Fleet GHG intensity (lifecycle)	0.933 (kg/km)
Corporate Average Utilization (hrs)	Annual GHG emissions (lifecycle)	722 tonnes CO ₂ equivalent
Fleet average age	Corporate Average Utilization (km)	10,598 (km)
Units due for replacement	Corporate Average Utilization (hrs)	417 (hrs)
Projected capital budget	Fleet average age	5 (yrs)
Fleet availability (%)	Units due for replacement	23
Fleet average downtime (days)	Projected capital budget	1,534,964
Maintenance ratio (PM vs. RM)	Projected annual costs (R&M, fuel, capital and downtime)	1,118,797
	Fleet availability (%)	97.6
	Fleet average downtime (days)	5.6
	Maintenance ratio (PM vs. RM)	2.16

Action Plan

Green Fleet Action Plan

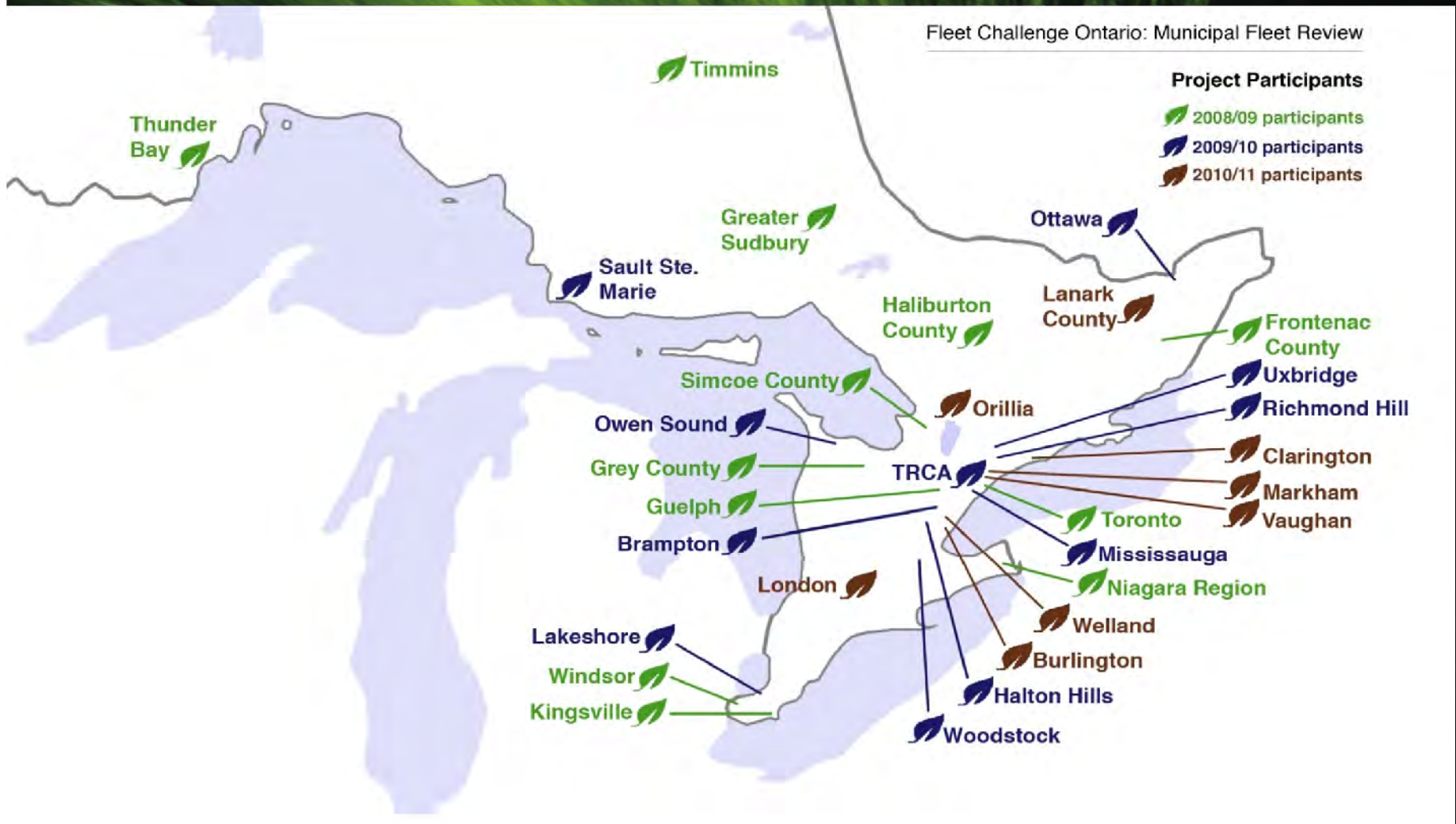
Prepared for the City of xxxxxxxx, Ont.

Prepared by Fleet Challenge Ontario



No.	Item	Recommended Action(s)	Completed?	E3 Points Available
1.0	Green Fleet Action Plan	1.1 Determine fuel & GHG baseline	√	3
		1.2 Accept/commit to this Green Fleet Action Plan (or create your own)		5
		1.3 Seek Senior Management support for Plan		1
		1.4 Seek support from internal communications personnel		1
2.0	Training and Awareness	2.1 Implement a fuel efficiency orientation program		1
		2.1 Implement a fuel efficient Driver Awareness/Communications Program		3
3.0	Idling Reduction	3.1 Complete an idling cost evaluation study		1
		3.2 Implement a corporate idling reduction strategy/policy		3
		3.3 Implement an idling awareness program		3
4.0	Vehicle Purchasing	4.1 Implement an energy efficient vehicle procurement strategy		5
5.0	Fuel Data Management	5.1 Implement a fuel data management system	√	3
		5.2 Monitor and report fuel consumption	√	3
		5.3 Implement a fuel consumption peer benchmarking program	√	3
6.0	Operations & Maintenance	6.1 Implement a preventive maintenance program		3
		6.2 Implement a Recycle, Reuse, Recover, Reduce program		1
		6.3 Track PM: Reactive Ratio (optional)		1
7.0	Trip & Route Planning	7.1 Consider trip and route planning strategy/plan (optional)		3
		7.2 Minimize empty trips (optional)		1
8.0	Utilization Management	8.1 Monitor utilization & exception units		1
		8.2 Consider a target for minimum utilization (optional)		1
9.0	Fuel Efficiency	9.1 Make demonstrated improvements in fuel efficiency		5
10.0	GHG Reductions	10.1 Make demonstrated reductions in GHG emissions		5
		10.2 Use alternate fuels (biodiesel, ethanol, etc.) (optional)	√	3

Fleet Review Participants





2007 – 2010 Cumulative Results

- Over 7,000 vehicles
- Total GHGs released - 115,889 tonnes (lifecycle)
- Total fuel usage – 34,162,746 litres
- Total cost of fuel - \$31,360,732
- Total distance travelled – 106,038,045 kilometers



2007 – 2010 Potential Savings

- Fuel savings: 2,192,729 litres
- Fuel cost savings: \$2,095,503
- GHG reduction: 5,482.4 tonnes
- Net cost savings: \$7,203,931



Participant Feedback

“In my 14 years as a City Councilor, I had no idea of the issues that the fleet faced and their need for capital budget to manage the fleet properly.”

“Fleet Review has helped me make the business case for a newer and more efficient fleet.”

“Fleet Review has helped us validate our fleet’s greening plans.”

“Very valuable...”

“Brought our fleet together...”

“haven’t seen this type of data before...”



Summary

- Fleet Review will help you green your fleet
- Download our Best Practices Manual (V2 soon to be released)
- Fleet Review will enable you to set challenging, yet achievable carbon and cost reduction targets
- Get involved and **Go Green** - *request your Fleet Review today!*

DRIVING CHANGE

Green Solutions for Fleet Operators

Questions?

416 207 9774 | 1 866 312 5659

fleetchallenge.ca