Markham Going Green
A Hybrid Experience

Presentation to MEA – November 2007

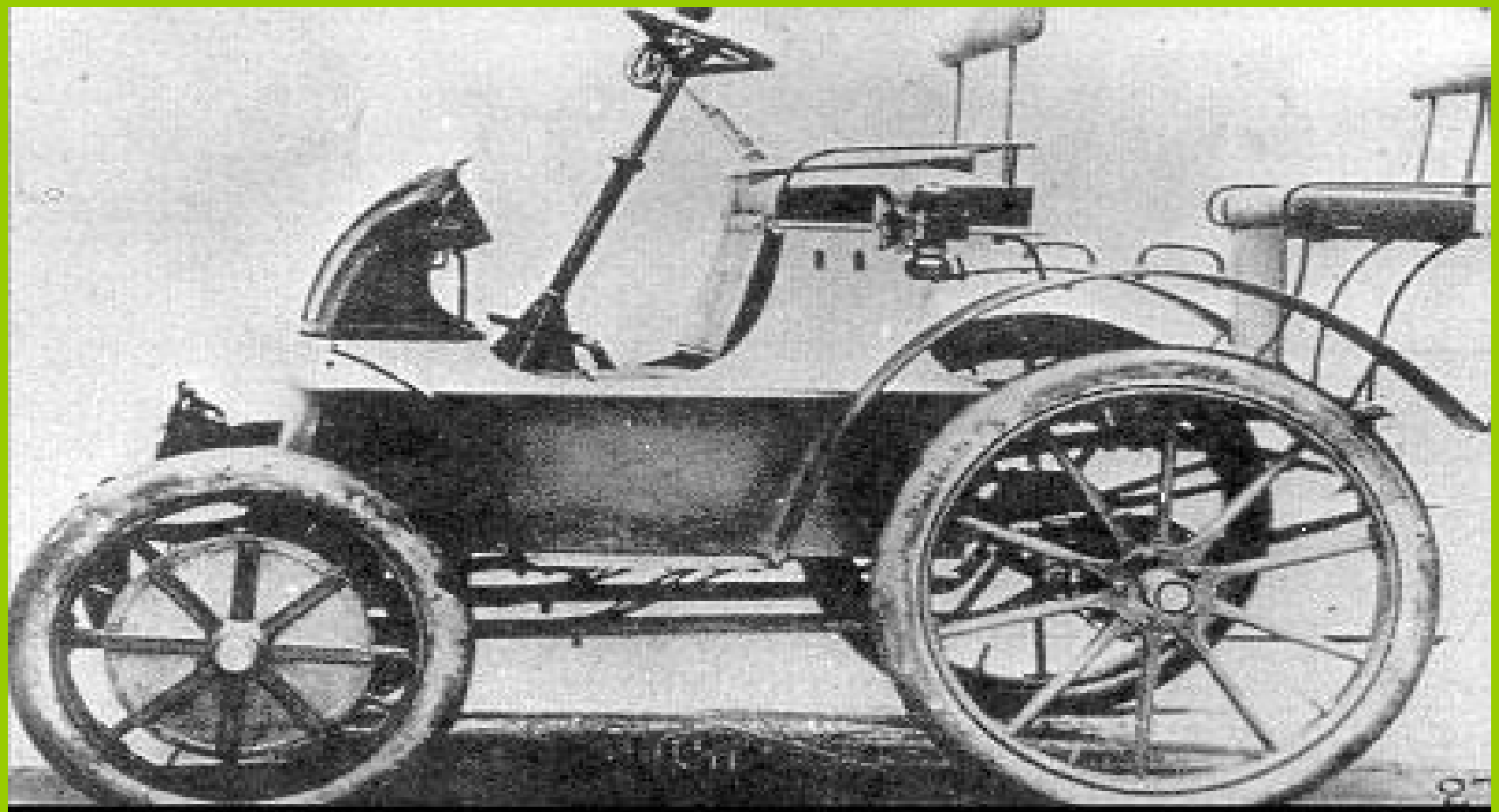
Fleet Statistics

The Fleet Division of the Operations Department is responsible for a very diverse fleet of more than 600 vehicles and equipment units, including fire and Emergency Services vehicles and apparatus. Vehicle and equipment replacement programs and specification development are also part of the Fleet Division’s area of responsibility.

Hybrids

- What is a Hybrid
- Markham’s Hybrid Fleet
- Hybrid Fleet Experience
- Future Plans
- New Incentives ($$$)

Hybrids



The early 1900's Lohner-Porsche, originally electric-powered, then with an internal combustion engine powering hub-mounted electric motors.

1903 Lohner- Porsche

1921 Owen Magnetic Model 60 Touring

Hybrids

Cheap fuel and advances in the internal combustion engine (ICE) and automobile production in general (Henry Ford) gradually killed off the Hybrid "Cars".

Increasing fuel prices, changes in automotive technology along with the world’s concern in extremely high levels of Green Houses Gases (GHG) relating to vehicle emissions began to drive automobile manufactures to look at different ways to propel and power vehicles.

What Is A Hybrid?

A hybrid is any vehicle that uses 2 or more sources of power.

HEV's can offer the very low emissions of electric vehicles with the power and range of gasoline vehicles.

They also offer up to 4.5 litres/100 Km or better fuel economy, perform as well as, or better than, and are just as safe as any comparable gasoline-powered vehicles.

Hybrids never need to be plugged in for recharging. Most systems are also set up to shut off the engine when the vehicle is stopped.

How Do They Work ?

Hybrids can offer tremendous fuel economy and emission benefits because they operate differently than conventional gasoline-fuelled vehicles as described below:

- **Regenerative braking:** The system recovers kinetic energy during braking which in turn charges the batteries.
- **Lighter, smaller engine:** To improve efficiency, the engine is sized to accommodate its average power load, not its peak load. Most gasoline engines are sized for peak power requirements, yet most drivers need peak power only 1% of the time.
- **Better fuel efficiency:** The vehicle consumes less fuel than vehicles powered by gasoline alone — partly because the engine is turned off when it's not needed. Conventional gasoline engines run constantly, regardless of power requirements.
- **Lower emissions:** reduces regulated tailpipe emissions by up to 90% and greenhouse gas emissions by about 50% compared with Tier 2 standards

Hybrid Vehicle Pilot

Hybrid Vehicle Pilot Project

Fleet Services started a Hybrid Electric Vehicle (HEV) pilot project in 2002, which included procurement of a Toyota Prius and a Honda Civic.

It became evident in the pilot project that our plan for replacing conventional powered vehicles with hybrid units would be best suited by fleet users that currently exceed 25,000 km city travel per year.

This type of duty cycle (higher fuel usage) would show considerable reductions in fuel consumption and reduced green house gas emissions for our fleet.

Performance

Positive performance of these vehicles has led to the addition of seven Ford Escape Hybrids.

Three of the Ford Escapes have been put into service in the Parking Control division which currently has the highest vehicle usage averaging 80,000 km of city travel per year.

Hybrid Option Cost

Upgrades to a standard vehicle specification for the hybrid option can vary from $4,500 to $8,000 depending on the make and model purchased.

Hybrid Fleet

Vehicle	Year	Quantity
Honda Civic	2003	1
Toyota Prius	2002	1
Ford Escape	2006	5
Ford Escape	2007	2
Toyota Camry Hybrid	2007	2
Toyota Highlander Hybrid	2007	2
	Total units	13

Hybrids

Hybrids


911
FIRE SERVICES
911
FIRE SERVICES
thunder graphics
date : 11.June.2007
florin@thunder-graphics.com
Production Files\General\Markham Fire\2007\ fire service proposals.cdr
OPTION A

Hybrid Fleet Experience

Hybrid Benefits

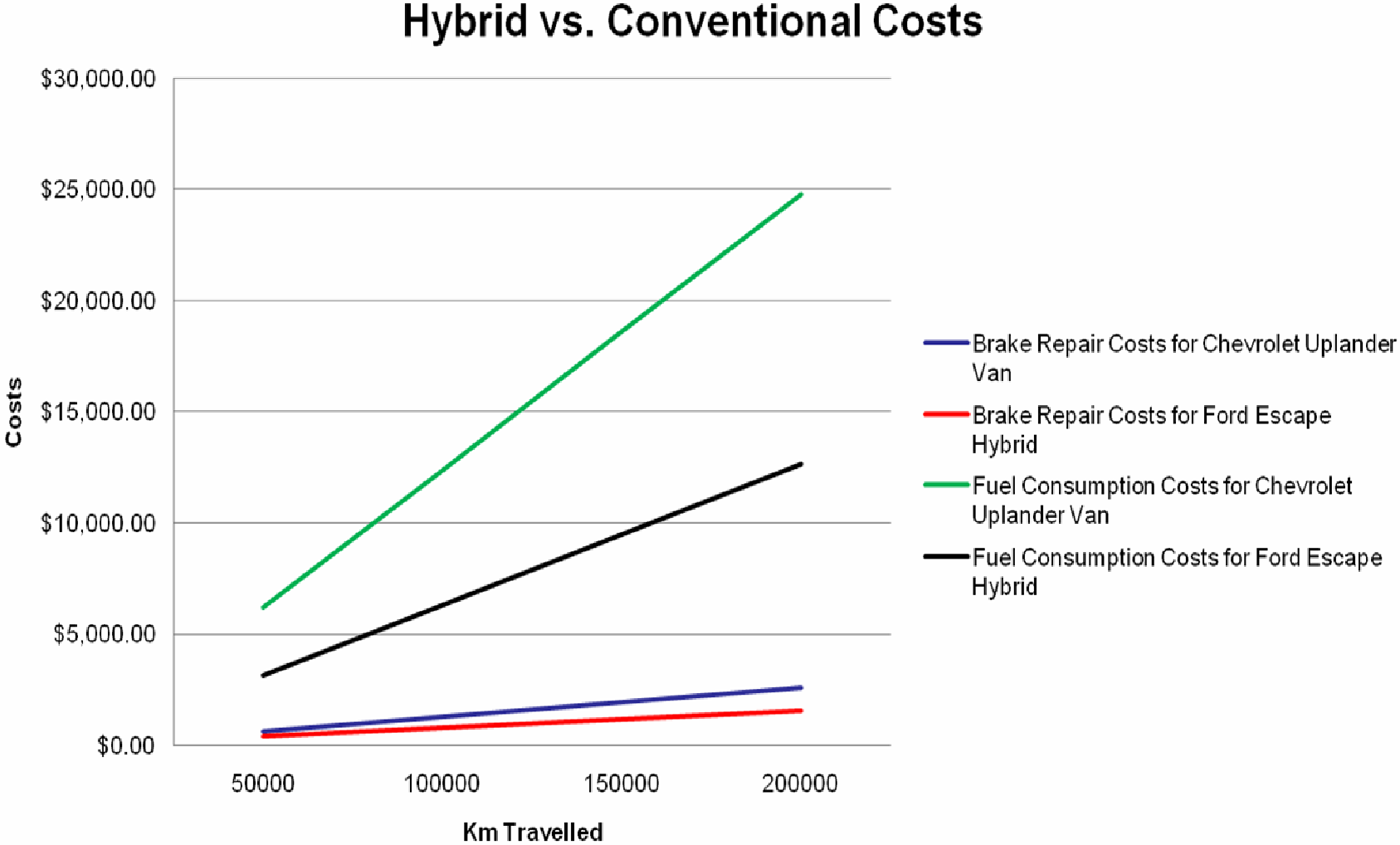
The use of Hybrid vehicles has proven to be a good fit with our fleet.

- Fuel efficient
- Reducing harmful emissions
- Reduced scheduled brake servicing and repair
- Hybrids are exempt from Drive Clean Inspections
- Battery warranty of 8 years

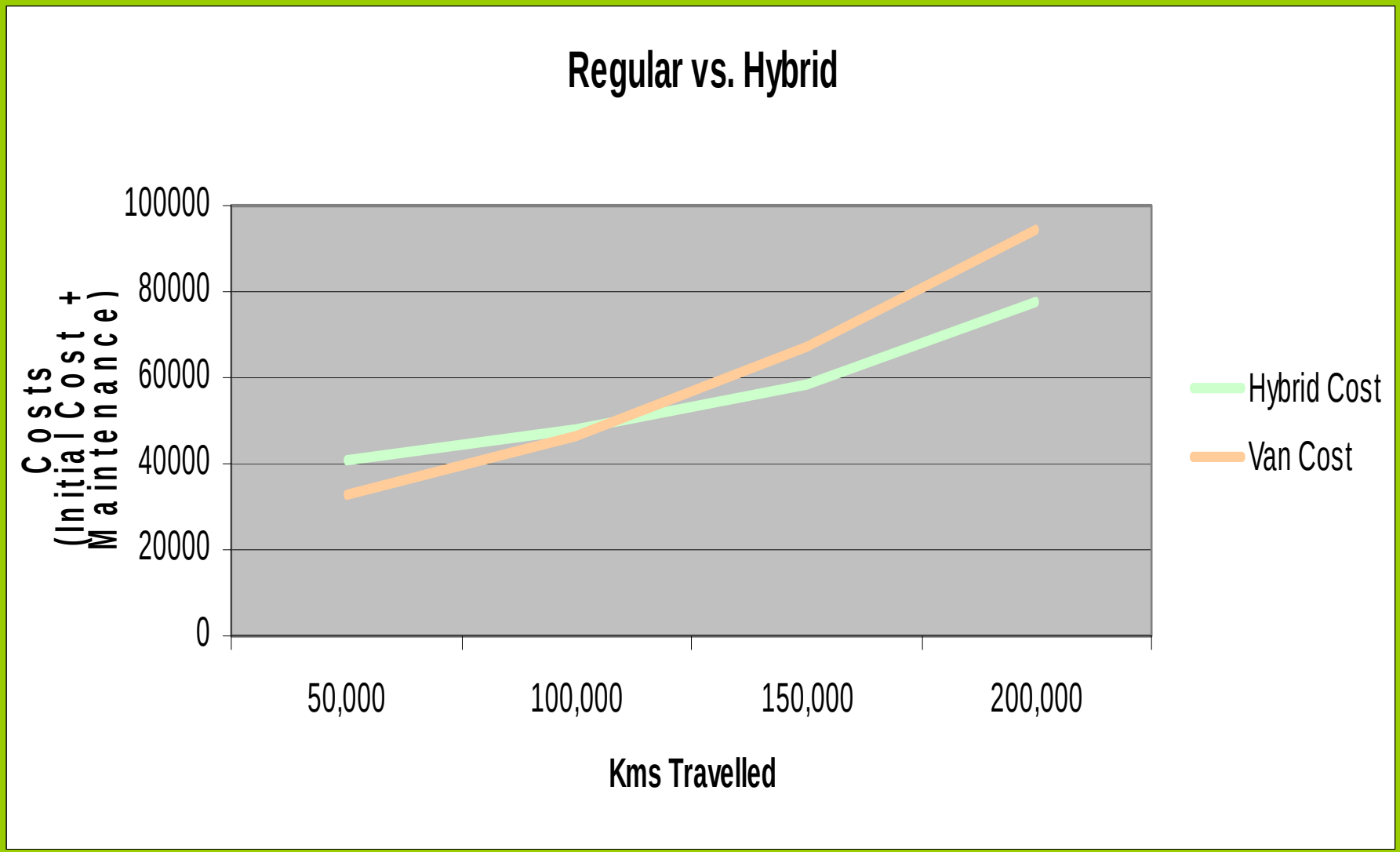
Hybrid Fleet Experience

Vehicle	Km Travelled	Brake Repair costs	Fuel Consumption Costs
Chevrolet Uplander Van	50000	$644.26	$6,192.00
	100000	$1,288.52	$12,384.00
	150000	$1,932.78	$18,576.00
	200000	$2,577.04	$24,768.00
Ford Escape Hybrid	50000	$392.54	$3,168.00
	100000	$785.08	$6,336.00
	150000	$1,177.62	$9,504.00
	200000	$1,570.26	$12,672.00

Hybrid Fleet Experience



Fleet Experience



Future Plans

Vehicles Ordered Awaiting Delivery

Vehicle	Unit Replacing	Year	Quantity
Ford Escape Hybrid	**1040 Traffic Engineering 10,000 km /yr 1999 GMC Safari Van**	**2007**	**1**
Compact Hybrid (SUV)	**Enforcement / Licencing 25,000 km/yr 2002 Chevrolet Cavaliers**	**2007**	**2**
Compact Hybrid (SUV)	**Waterworks 25,000 km/yr 2002 Chevrolet Venture Vans**	**2007**	**2**
Compact Hybrid (SUV)	**Operations 26,000 km/yr**	**2007**	**1**

Future Plans

- Investigating the possible opportunity to purchase hybrid cab and chassis with a GVW of 9800 kg.
- Heavy truck manufacturers like Peterbuilt and International have partnered with Eaton truck components to promote a hybrid option
- To add the hybrid option to a chassis like this will cost somewhere around $50,000 - $60,000.
- Expect the hybrid to deliver a 40 to 60% increase in fuel economy along with similar reductions in GHG.

Medium Duty Hybrids

2007 Peterbuilt MD Hybrid

Medium Duty Hybrids

International MD Hybrid

New Incentives

- Federal government has offered rebates for efficient cars (and levies on gas-guzzlers) based on fuel efficiency
- Purchasers of most hybrids would get $2,000 rebate
- Efficient gas vehicles would get $1,500-$1,000 rebate
- Gas guzzler buyers would pay an extra $1,000-$4,000 green levy

New Incentives

- Based on L/100 km
- Most cars are in the 8.4 - 12.9 L range and are not affected

Vehicle Efficiency Incentive (VEI) Structure

Fuel Efficiency[1]	New Rebate		New Green Levy
	Cars	Minivans SUVs and Light Trucks	Passenger Vehicles (Other Than Trucks)
(L/100 km)		(dollars)	
5.5 or less	2,000	2,000	
5.6 – 6.0	1,500	2,000	
6.1 – 6.5	1,000	2,000	
6.6 – 7.3		2,000	
7.4 – 7.8		1,500	
7.9 – 8.3		1,000	
8.4 – 12.9			
13.0 – 13.9			1,000
14.0 – 14.9			2,000
15.0 – 15.9			3,000
16.0 or more			4,000

[1] Vehicle fuel efficiency is based on combined 55 per cent city/45 per cent highway fuel consumption ratings.

Summary

- Hybrids may not fit into every Fleet operation
- By year end Markham's fleet will consist of 19 units
- There is an added cost for the hybrid option that may not be justifiable if annual travel is less than 20,000 km.
- Resale value of hybrids can be lower due to buyers fearing costly repairs
- All fleet operators should have the commitment to do what they can to help with the environment
- Yes there is a financial impact, but considering the impact that GHG have on our fragile environment the cost may not be that hard to justify

More Information

- General info websites:
  - http://vehicles.gc.ca
  - http://vehiclefuels.gc.ca
- To compare fuel consumption ratings: http://oee.nrcan.gc.ca/transportation/tools/compare/compare-search-one.cfm?attr=8
- Rebate info: http://www.tc.gc.ca/en/menu.htm
- Review your emissions tests: http://www.driveclean.com
- To start up or participate in a car pool: http://markham.carpoolzone.smartcommute.ca