

INTEGRATING EV CHARGING INTO FLEETS

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CITY OF SEATTLE FLEET



FLEET OPERATIONS

- 4,000 vehicles maintained
- 11 garages & 5 warehouses
- All city departments: Police, Fire, Utilities, Parks, SDOT, etc.



ALT FUEL FLEET

- 79 Battery electric
- 10 Plug-in hybrids
- 500+ conventional hybrids



EVSE INFRASTRUCTURE

- 84 Fleet EVSE over 11 locations
 - 80 L2s + 4 L1s
- 1 DCFC for fleet use (480v)
- Large EVSE expansion project underway – 400 EVSE installed by 2023



ELECTRIFIED MOTOR POOL



ELECTRIFIED MOTOR POOL



- 28 Nissan Leafs in the centralized motor pool.
- Collectively traveled over 550,000 miles and displaced 28,000 gallons of fuel over ICE since 2011.
- Initial infrastructure build out was ~\$250K paid for by ARRA stimulus grant funding in 2010.



BENEFITS OF EV ADOPTION

**Reduced
Emissions**

**Reduced
Operating
Costs**

**Economic
Development**

**Energy
Independence**



REDUCED GHG EMISSIONS

- GHG is a function of miles traveled and miles per gallon
- MPG is a function of vehicle economy and driver behavior

Actual fleet data assuming 5,422 miles per year:

Make/Model	Type	Avg MPG	tCO₂*
Ford Escape	SUV	17.7	3.46
Toyota Prius	Hybrid Sedan	41.1	1.49
Ford CMAX	Hybrid Sedan	26.8	2.29
Nissan Leaf	BEV Sedan	0.46 kWh/mi	0.03

**Based on CARB LCFS CI values and Seattle City Light 2012 retail power emissions factor*

Replacing hybrids or SUVs with BEVs = 98-99% GHG reduction / vehicle



REDUCED OPERATING COSTS

$$\text{TCO} = \text{Acquisition} + \text{Life Fuel} + \text{Life Maint.} - \text{Salvage}$$

Type	Description	Life	Acq.	Fuel	Maint.	Salvage	TCO
Gas	Ford Focus	10 yrs	\$21,284	\$8,000	\$11,790	\$6,811	\$34,263
Hybrid	Toyota Prius	10 yrs	\$28,773	\$4,000	\$6,890	\$9,207	\$30,456
EV	Nissan Leaf	10 yrs	\$32,466	\$1,872	\$6,030	\$10,389	\$29,979
<i>EV*</i>	<i>Nissan Leaf</i>	<i>10 yrs</i>	<i>\$21,649</i>	<i>\$1,872</i>	<i>\$6,030</i>	<i>\$10,389</i>	<i>\$19,162</i>

*Incentives included: Washington State sales tax exemption & Nissan Corporate \$8000 fleet discount

Fleet operating cost for 150 passenger sedans:

ICE Sedans:	\$5,139,419
BEV Sedans:	<u>\$2,874,300</u>
Savings	\$2,265,119



OBSTACLES FOR EV ADOPTION

Vehicle Cost

Infrastructure

**Matching Duty
Cycle**

**Driver
Acceptance**



INFRASTRUCTURE: CREATIVE FINANCING

- Capital project funds
- Scope EVSE into new building design or remodels
- Emergency preparedness funds
- Grant funds
- Government incentives and programs
- Private financing tied to increased fuel efficiency
- Adopt-A-Watt crowd funding
- Utility assistance
- Decentralize EV deployment
- Corporate donations (Nissan donated a DCFC to Seattle)



FINAL THOUGHTS

EVs have been very successful in a fleet application for the City of Seattle. They are low maintenance, fuel cost is minimal and employees enjoy driving them. Exposure to EVs at work gets “butts in seats” and has spurred many private vehicle purchases from city employees.

EV Infrastructure is a strategic long term investment. It provides a closed-loop, renewable* fuel station over several decades that will reduce overall fleet operating costs, increase energy independence, provide the ability to operate in an emergency and achieve GHG reduction targets. Also, redirecting fuel dollars to a local utility provides economic development opportunities and green jobs *locally*.

*Varies regionally with type of power generation



THANK YOU!

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