PRELIMINARY DRAFT

Electric Vehicles and Alternative Fuels in MWCOG Jurisdictions

Vision Fleet

April 2015

Agenda

Introduction to Vision Fleet and the Indianapolis model

Fleet assessment approach

Washington DC fleet assessment results

Implications for other MWCOG jurisdictions

Indianapolis' bold vision

By 2025, Indy will have a 100% post-oil fleet of non-pursuit vehicles.

Mayor Greg Ballard signed Executive Order #6 in December 2012, making Indianapolis the first major city in the US to pledge to convert its entire municipal non-police fleet to alternative fueled vehicles by 2025.

Indianapolis' results to date

Freedom Fleet
City of Indianapolis

Largest ever public fleet EV project in US

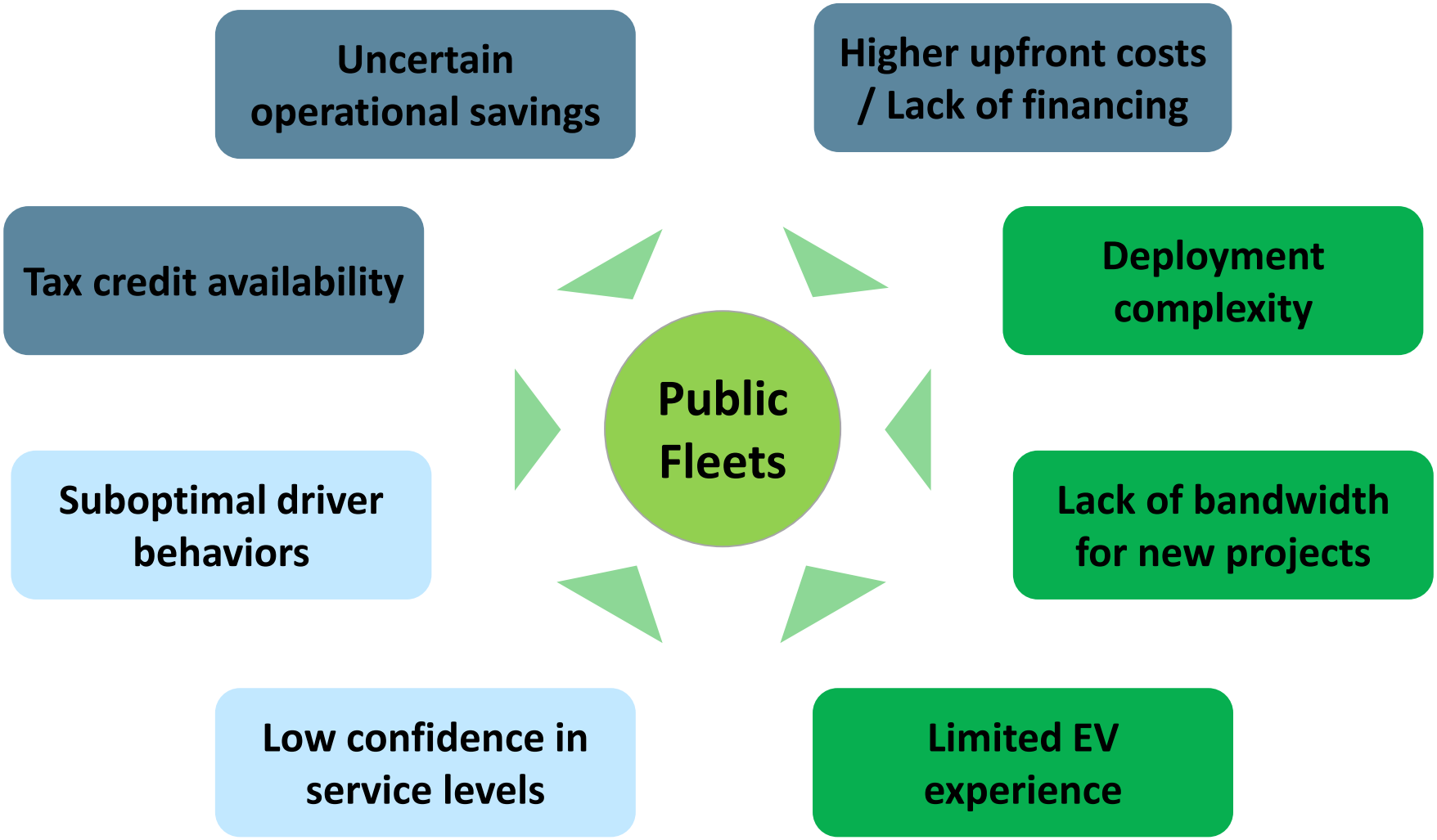
425 plug-in vehicles across Indy departments

Estimated $8+ million in savings to city

113 EVs deployed as of March 2015

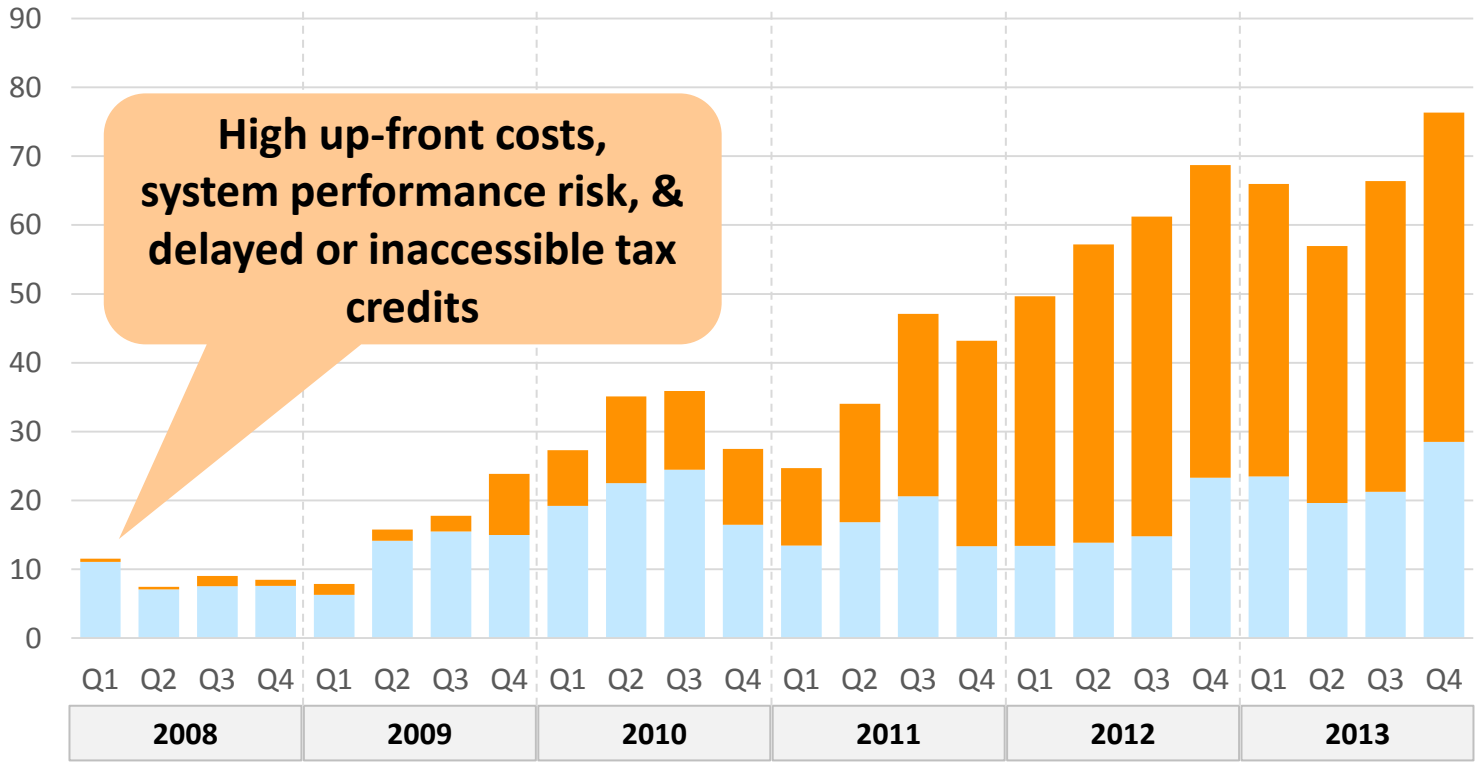
18,000 gallons of gas avoided to-date

Why aren't more fleets doing this? Numerous constraints – in financing, deploying and operating EVs – hold back adoption



How to address these obstacles? Look to other markets that faced similar challenges

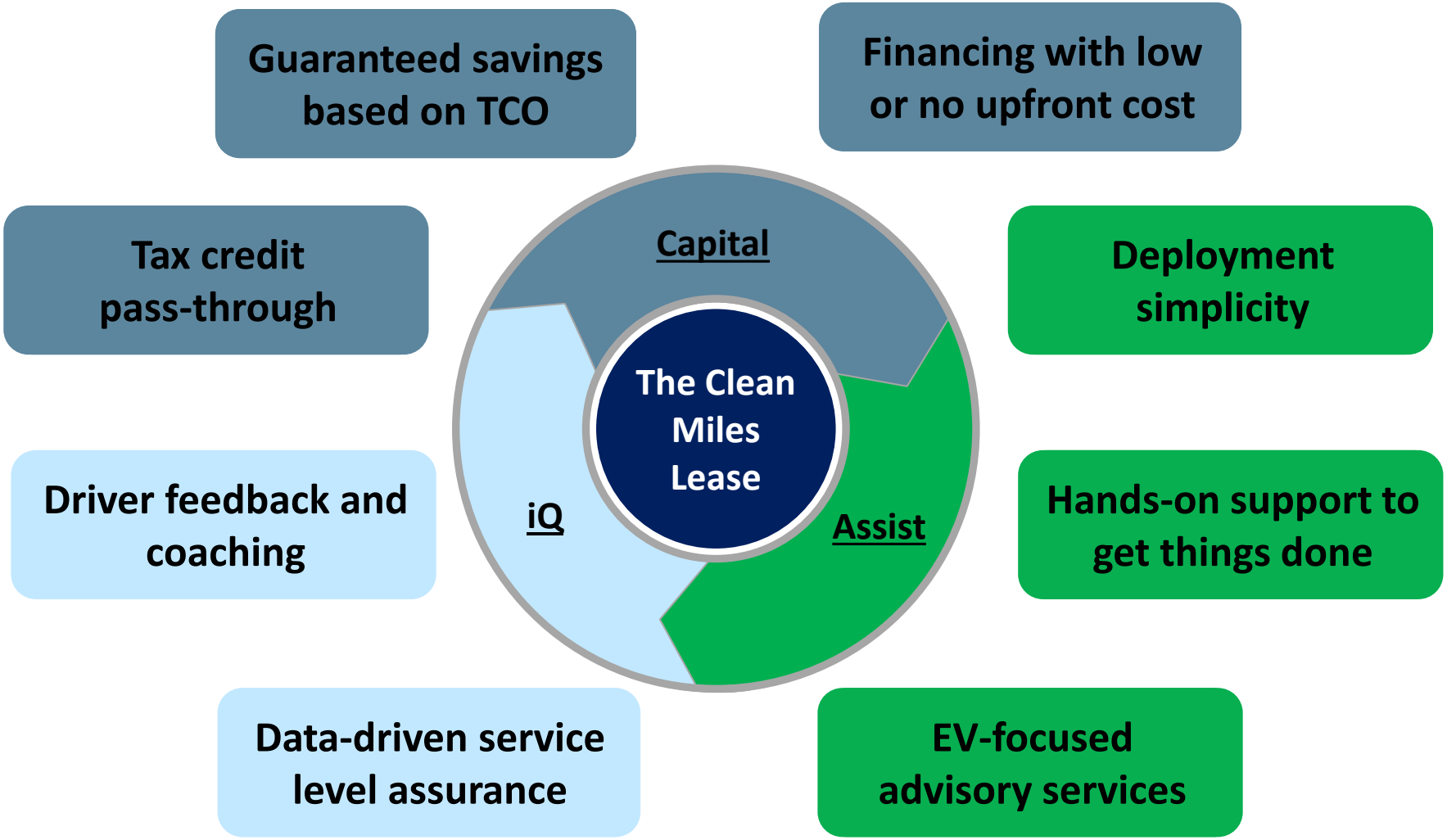
Residential solar PV capacity installed in CSI Program
(nameplate capacity – megawatts)



By bundling costs of owning and operating a solar system, assuming operational responsibility and guaranteeing a lower rate, key obstacles were eliminated

Source: California Solar Initiative data; Dates based on first CSI filing for each project

Using similar principles, Vision Fleet developed a model that comprehensively addresses key adoption barriers



Agenda

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Summary: Approach to assessing Washington DC's fleet

Vehicle-by-vehicle analysis conducted to compare the cost of running current Washington DC vehicles to the cost of running Alternative Fuel Vehicles (AFVs)

Total costs analyzed by assessing fuel, maintenance, capital, telematics, fueling infrastructure, and financing costs

Washington DC's fleet data used for cost of current vehicles while observed costs for AFVs in other fleet deployments used for costs of proposed AFVs

Savings opportunity assessed over 8 years by identifying cost-effective replacement instances and rightsizing opportunities

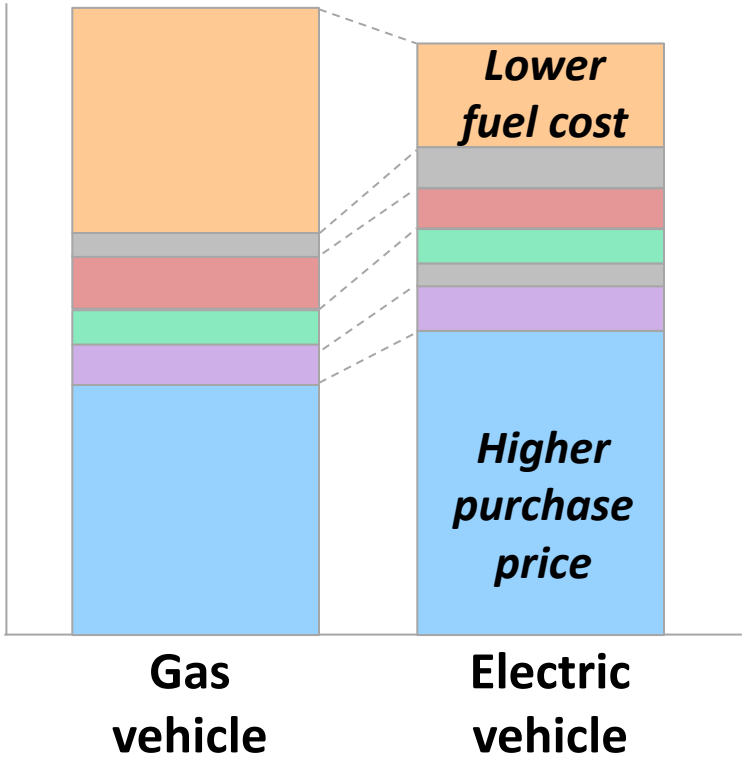
Pursuit Vehicles and existing AFVs excluded from opportunity calculations due to lack of economic viability or suitable replacements

Total cost of ownership approach bundles together all key costs of owning and operating vehicles – and looks for savings

Key elements driving a fleet vehicle's total cost of ownership (TCO)

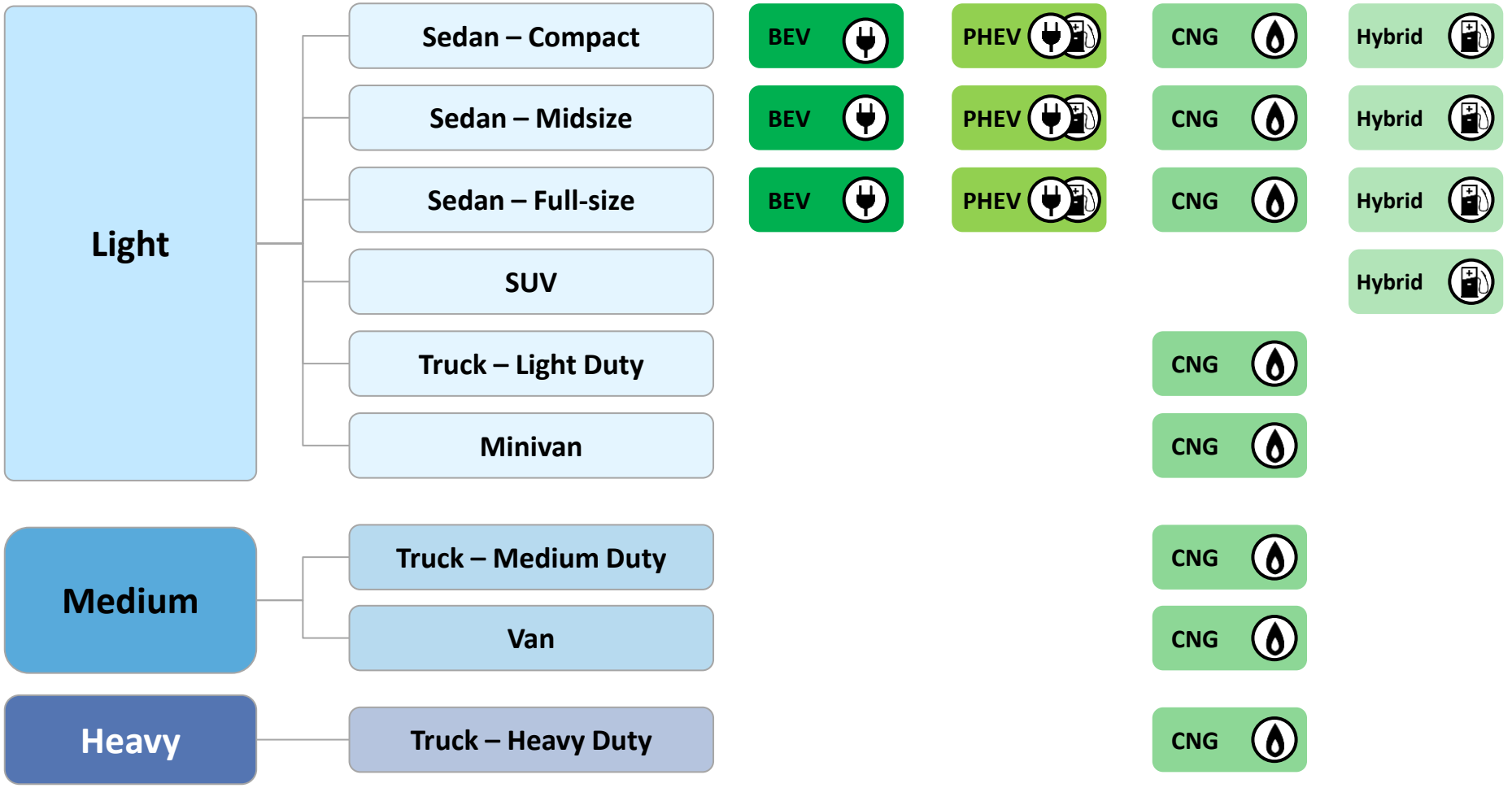
- Fuel
- Infrastructure
- Maintenance
- Telematics
- Financing
- Depreciation

TCO comparison of gas vs. electric[1] (illustrative)



1. For a high mileage usage scenario

AFV options evaluated for each vehicle classification



Agenda

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Washington DC fleet overview

	Vehicles	Vehicles without data issues	Years in Service	Vehicle Miles Traveled	Fuel Efficiency (MPG)	Yearly maintenance spend	Acquisition Price	AFVs	Vehicles under 5K yearly VMT
			Average within segment						
Light	1,301	1,098	5.5	4,704	10.3	$1,816	$19,407	123	720
Medium	345	277	5.5	6,055	7.8	$3,074	$38,445	4	161
Heavy	435	399	7.3	4,322	3.6	$10,589	$98,808	4	276
Other	98	91	7.2	7,022	10.5	$13,252	$115,099	2	62
TOTAL	**2,179**	**1,865**	**6.0**	**4,936**	**10.9**	**$4,550**	**$42,576**	**133**	**1,219**

Note: All statistics other than vehicle counts are computed using vehicle data without issues

Opportunity summary: $4.5M of savings over 8 years

Projected savings = **$ 4.5 M** over 8 years ▶ ***23% of addressable vehicle costs***

Gallons of fuel avoided = **918 K** gallons

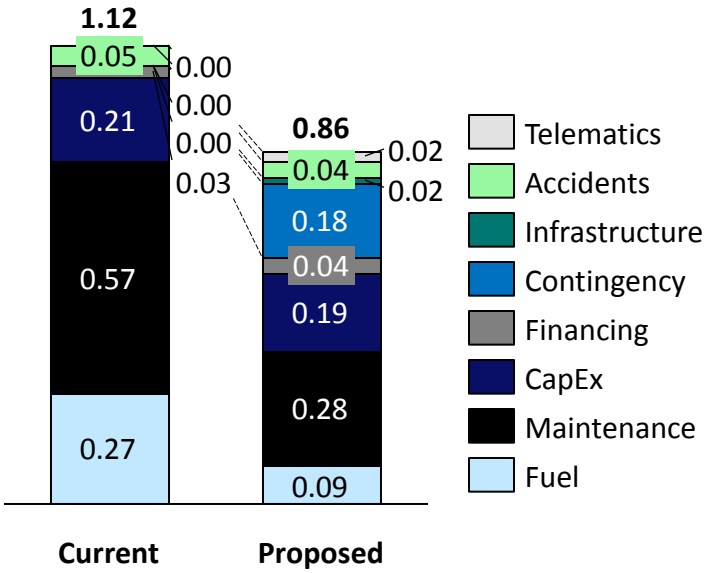
*Equivalent to ~**79** gasoline tanker trucks*

CO2 emissions reduced = **6 K** tonnes

*Equivalent to ~**149** sedans off the road*

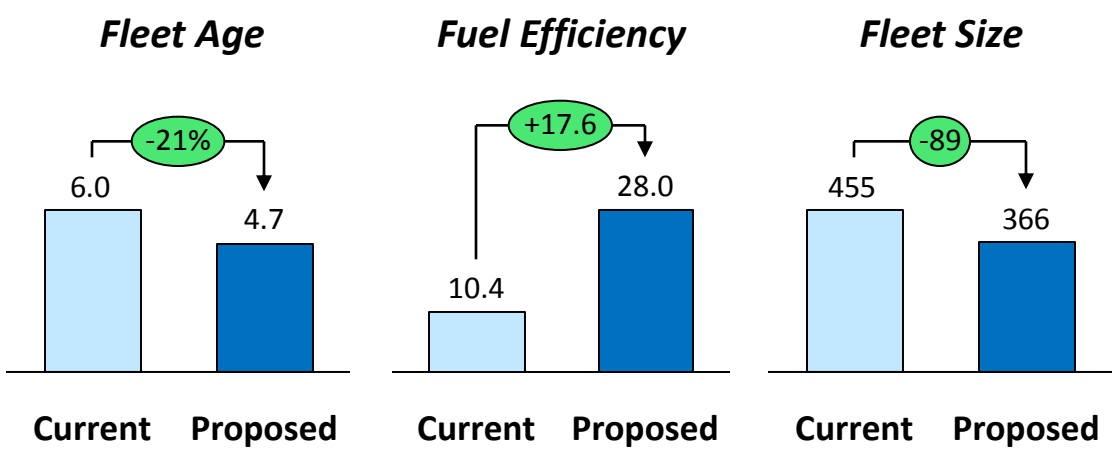
TCO 23% lower

For replacement and rightsizing candidates



Improve fleet performance

Averages



For entire fleet

For replacement and rightsizing candidates

Opportunity summary: Savings by AFV type

Preliminary analysis predicts an opportunity of $4.5 M over 8 years when implementing new AFVs and rightsizing vehicles with low current VMT, net of infrastructure and other costs

Replacement Vehicles:

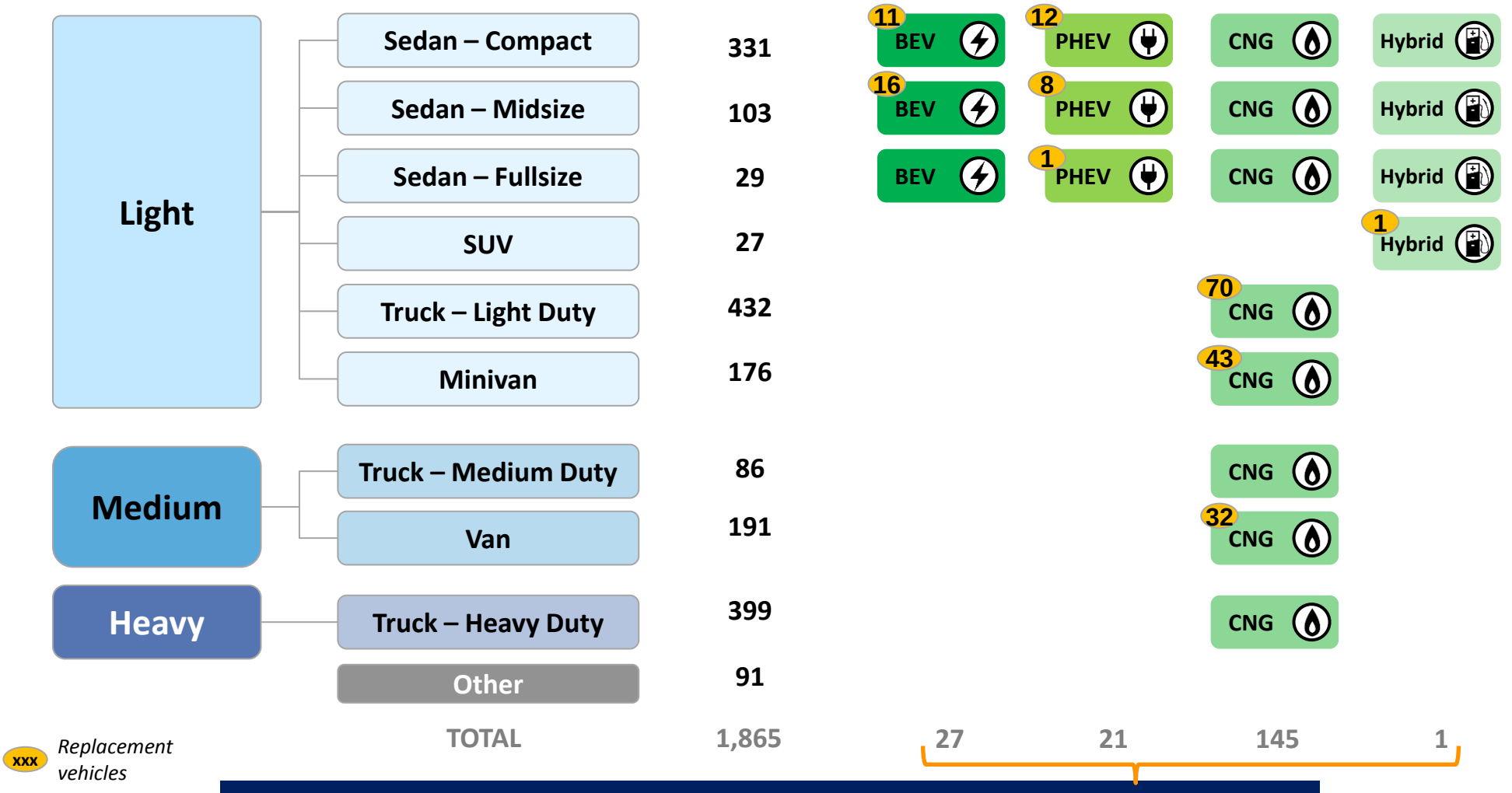
- **21 PHEVs result in $218K of savings while 27 BEVs generate $317K in savings – these figures include the cost of implementing the necessary charging stations**
- **145 CNG vehicles (primarily vans and pickups) would provide $3.1M of savings, without taking into account the implementation of CNG fueling station or the upgrading of maintenance facilities**

Rightsized Vehicles:

- **Rightsizing the fleet to raise average VMT across the lowest use vehicles will implement 113 BEVs and eliminate 89 vehicles (leaving 59 unchanged), leading to savings of $793K**

AFV options evaluated for each vehicle classification

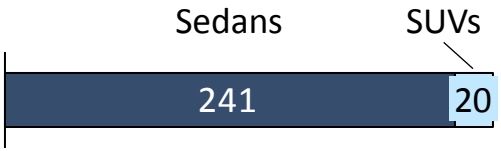
314 vehicles removed due to data issues



Total AFVs = Replacement Candidates + Vehicles Replaced by Rightsizing = 194 + 113 = 307

Assessment suggests substantial opportunities to right-size

261 vehicles considered



Assumptions

- All had annual VMT below 5K; Assumed miles could be pooled within a department to reach 5K per vehicle
- Assumed right-typing as well: all vehicles rightsized replaced by one type of BEV
- If vehicles could not be eliminated, only replaced by BEV if economically viable

Results

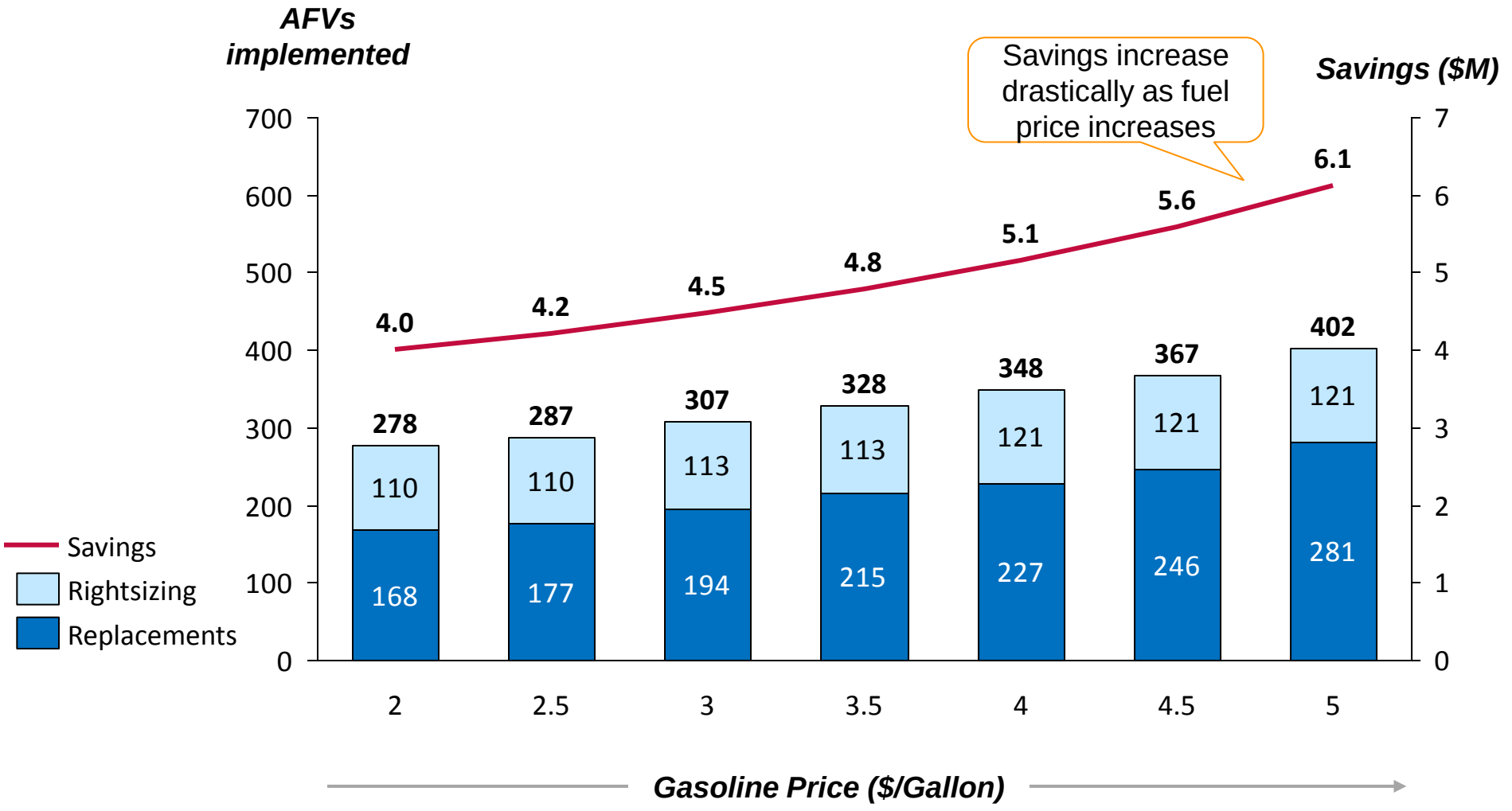
89 vehicles eliminated
$793K savings over 8 years

Could obtain **$0.4M – $1.2M** from sales of eliminated cars **(assuming 10% - 30% salvage)**

Example: Top 5 departments with highest savings

Department	Current Vehicles	Future Vehicles	Vehicles Eliminated	Current Average VMT	Future Average VMT	Current Cost	Future Cost	Savings
	Units	Units	Units	Miles (K)	Miles (K)	$ (K)	$ (K)	$ (K)
Department of Public Works/FLEETSHARE	41	25	16	3.0	4.6	773	583	190
Department of Health	17	8	9	2.1	4.3	268	170	97
Department of Consumer and Regulatory Affairs	36	23	13	3.1	4.6	616	538	78
District Department of Transportation	15	8	7	2.7	4.7	262	187	76
Department of General Services	30	12	18	1.9	4.6	337	263	74
Other						1,986	1,709	278
Total						**4,243**	**3,449**	**793**

Potential savings range from $4M - $6M based on gasoline price sensitivity analysis



Note: *This sensitivity analysis only varies the price of gasoline and not that of electricity, diesel, CNG, E85, or any other type of fuel; these prices would however likely be interrelated (though natural gas and gasoline have been decoupled in the past 10 years)*

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Can EVs deliver my fleet savings? Depends on suitability of use cases and relative costliness of vehicles to be retired

Three key factors lead to savings…

1-for-1 replacements

- Vehicles with **annual miles >7,500**
- Vehicles with **suitable AFV replacement**

Right-sizing

- Vehicles with **annual miles <2,500**
- Vehicles that **can be pooled** (central location or within a department)

Right-typing

- Vehicles that **are too large/over-equipped** to accomplish current tasks and can be **replaced by smaller vehicles**

…particularly if current vehicles costly

Fuel

- Vehicles with **low MPG** and **high fuel costs**
- Tend to be older vehicles

Maintenance

- Older vehicles that break down regularly and have **high maintenance costs**

What's the most economical sedan – Gas, BEV, or PHEV?

Most economical sedan (Gas, BEV or PHEV)

Avg. gas price over lifespan	Annual VMT for sedan					
	2,500	5,000	7,500	10,000	12,500	15,000
$2.00						
$2.50						
$3.00						
$3.50						
$4.00						

Additional learnings from Indianapolis

- ☑ New technology requires a new approach – business as usual is usually ineffective
- ☑ Difficult to achieve bold goals acting alone – find capable partners
- ☑ Comprehensive strategy needed – can't just drop in EVs and expect success
- ☑ Data and monitoring is critical to delivering expected value
- ☑ Technology is reliable and proven – good, battle-tested EV options available today
- ☑ Potential financial benefit to fleet operator is substantial when done right

Where to go from here?

Assessments for Alexandria, Prince George County, and Frederick still underway

Vision Fleet happy to be a resource to other COG jurisdictions – please reach out!

For others seriously considering such an effort, rapid assessment may be helpful

- Time commitment from fleet team is modest if data quality is good
- Simply requires serious interest and accessible / reliable fleet data

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