

# Zero Emission MAP initiative

**UC DAVIS**  
POLICY INSTITUTE FOR ENERGY, ENVIRONMENT AND THE ECONOMY

## Municipal fleets and plug-in vehicles in Indianapolis

**Will St.Clair**

**Vice President Vision Fleet**

**Manuel Mendez**

**Project Manager Indianapolis Office of Audit and Performance**

June 17, 2015

# Introductions

**Manuel  
Mendez**

**Project Manager**

*Indianapolis Office  
of Audit and  
Performance*

Operational lead for Indianapolis  
Freedom Fleet project

Manages day to day operations of  
Freedom Fleet

**Will  
St. Clair**



**Vice President**

*Vision Fleet*

Works at Vision Fleet – Indy's  
partner for the Freedom Fleet

Partners with public fleets  
considering EV/AFVs

# Agenda

- Introduction to Indianapolis's "Freedom Fleet"
- Case for change: Electric vehicle economics
- Barriers to EV adoption and Indy's solutions
- So what? What does this mean for me?

## Looking back: 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.**

# Looking back: Indianapolis' starting point

- Fleet operations fragmented across departments
- Limited and unreliable data on operations and costs
- Old, fuel inefficient vehicles
- Average of 16.6 MPG
- Costly to maintain vehicles
- Minimal experience with EVs
- 5 under-utilized THINK EVs in fleet prior to launching post-oil effort
- Overall, budget cutbacks had left fleet in a tough spot

## Fast forward to 2015: Indianapolis' results



**Largest ever public fleet EV project in US**

**425 EVs planned across city departments**

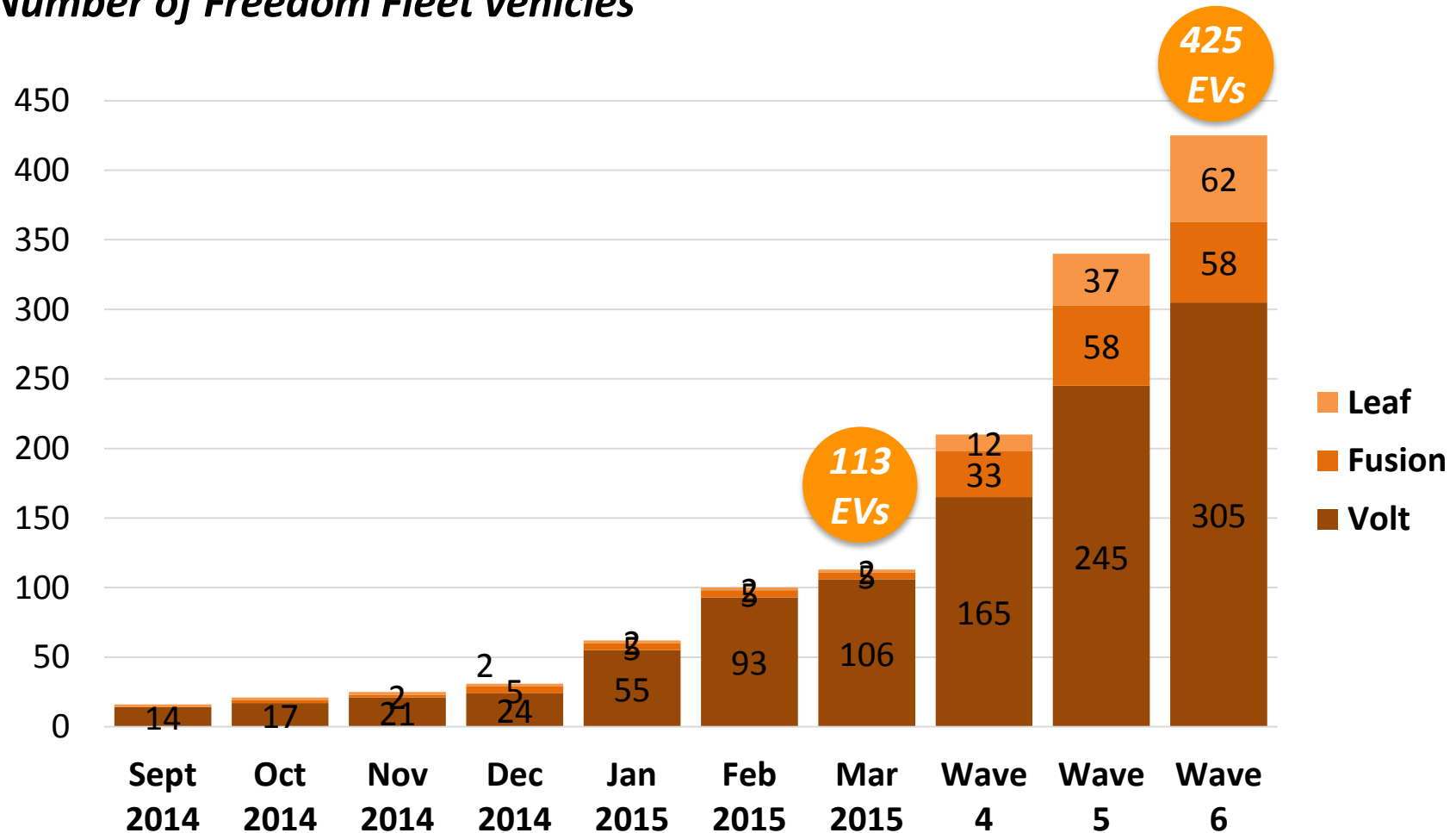
**113 EVs deployed as of March 2015**

**18,000 gallons of gas avoided to-date**



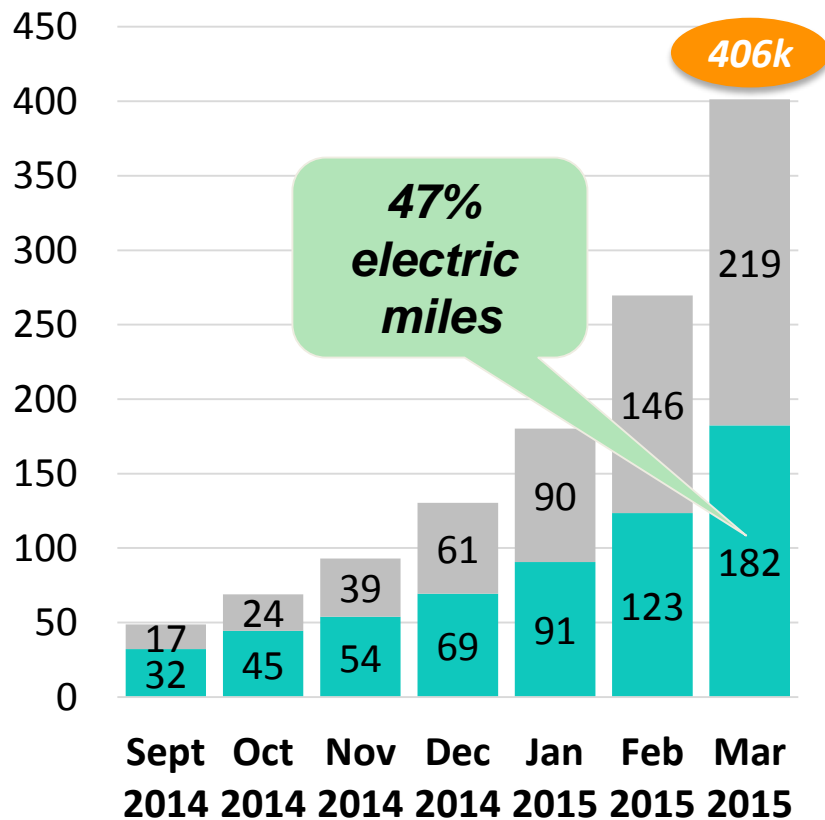
100+ of planned 425 EVs already deployed in Indianapolis departments – remainder will be deployed by early 2016

*Number of Freedom Fleet vehicles*

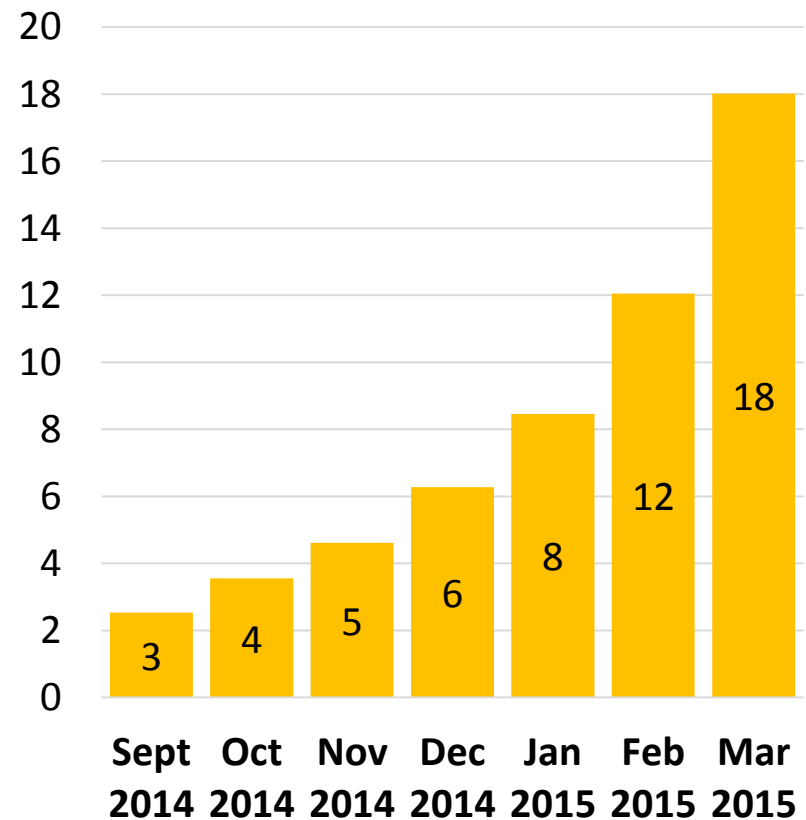


Vehicles have traveled 400k miles as of March 2015, 47% of those on electricity and offset 18k gallons of gas as a result

Cumulative vehicle miles traveled: electric and gas (thousands)



Cumulative gallons of gasoline offset (thousands)





# Why is tracking and monitoring so critical for PHEVs?

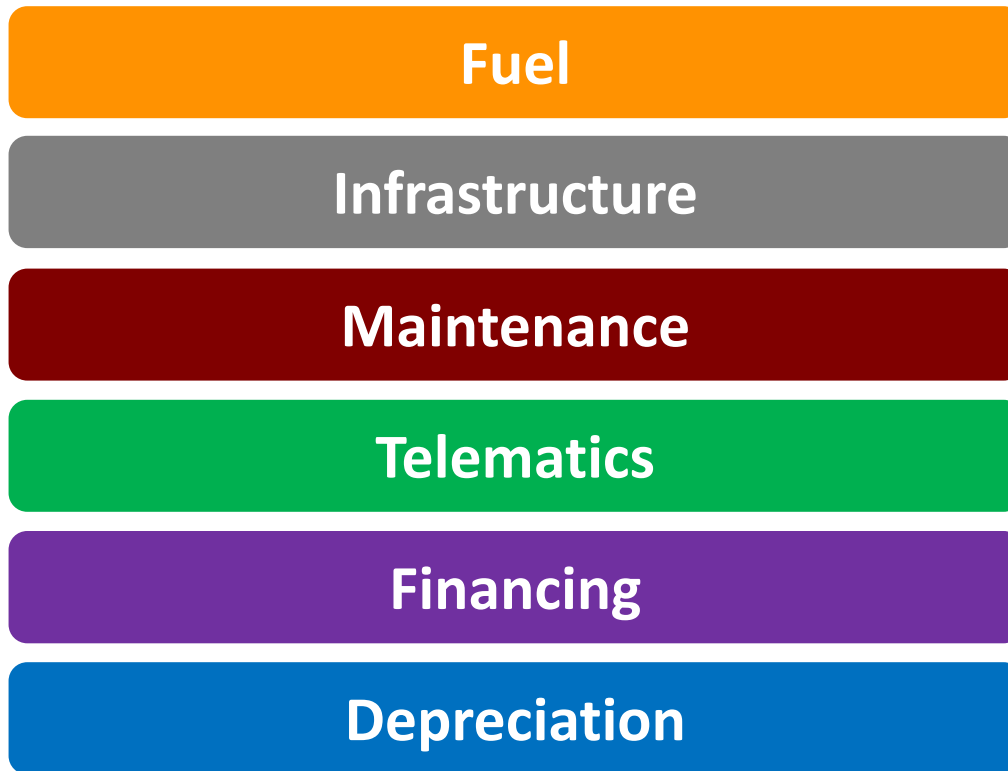
The screenshot shows a webpage from Green Car Reports. The navigation bar includes links for News, Reviews, Guides, Electric, Car Types, Video, and Follow, along with a search box. The breadcrumb trail reads: Home / News / Electric Cars / Chevrolet Volts In Fleet Use: Might As Well Not Have A Plug. The main headline is "Chevrolet Volts In Fleet Use: Might As Well Not Have A Plug" in green text. Below the headline, it says "By John Voelcker" with 158 comments and 7,679 views, dated Aug 14, 2014. There are buttons for "Reddit This!", "Share on Facebook", and "Share on Twitter". A large image of a red Chevrolet Volt is shown. To the right, there is a large empty comment box. Below the main content, a "RELATED ARTICLES" section features two items: "GM's 200-Mile Electric Car For 2017: What We Know So Far" and "2014 Honda Accord Hybrid".

# Agenda

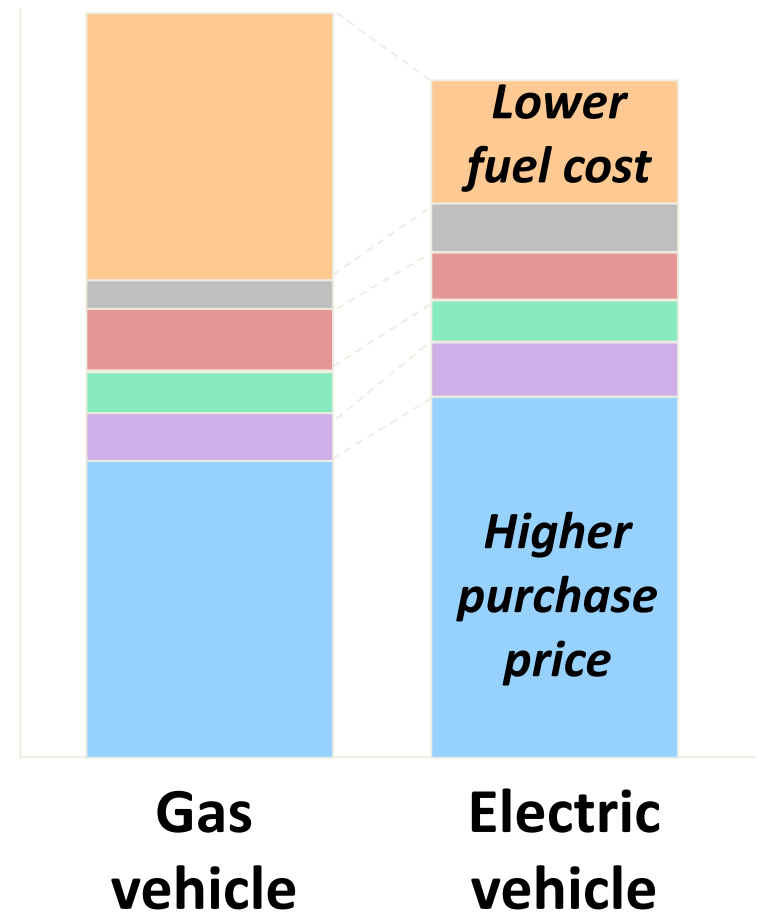
- Introduction to Indianapolis's "Freedom Fleet"
- Case for change: Electric vehicle economics
- Barriers to EV adoption and Indy's solutions
- So what? What does this mean for me?

When does it make sense to deploy EVs economically? When fuel savings sufficient to offset higher initial purchase price

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

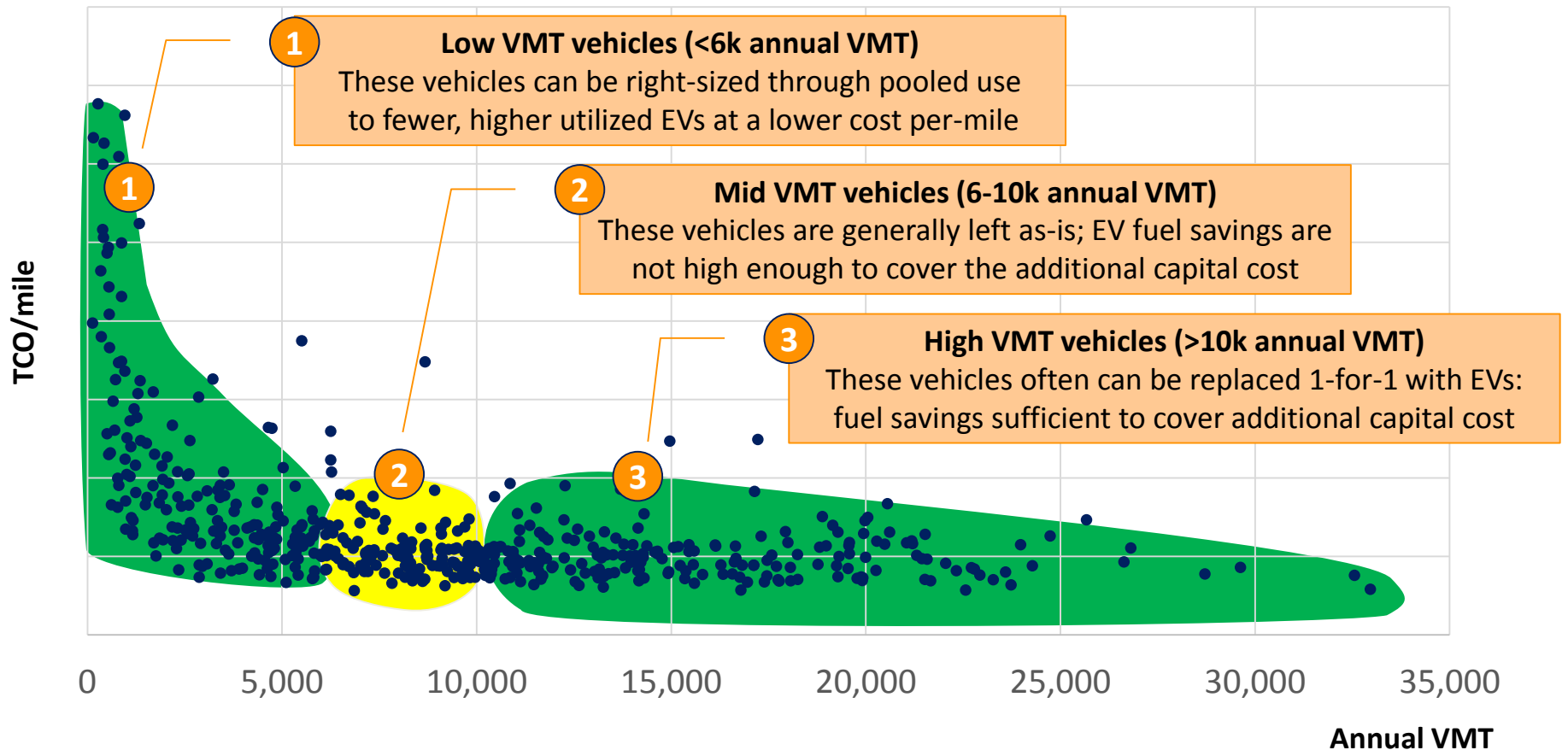


TCO comparison of gas vs. electric (high VMT)



# EVs can economically replace high mileage vehicles 1-for-1 and low mileage vehicles if combined with right-sizing

## TCO per mile of annual VMT for a representative municipal fleet



# Agenda

- Introduction to Indianapolis's "Freedom Fleet"
- Case for change: Electric vehicle economics
- Barriers to EV adoption and Indy's solutions
- So what? What does this mean for me?

# Context setting: Fleets should be an ideal fit for electric vehicles



**Total cost of ownership mindset**



**Route predictability**



**High vehicle utilization**

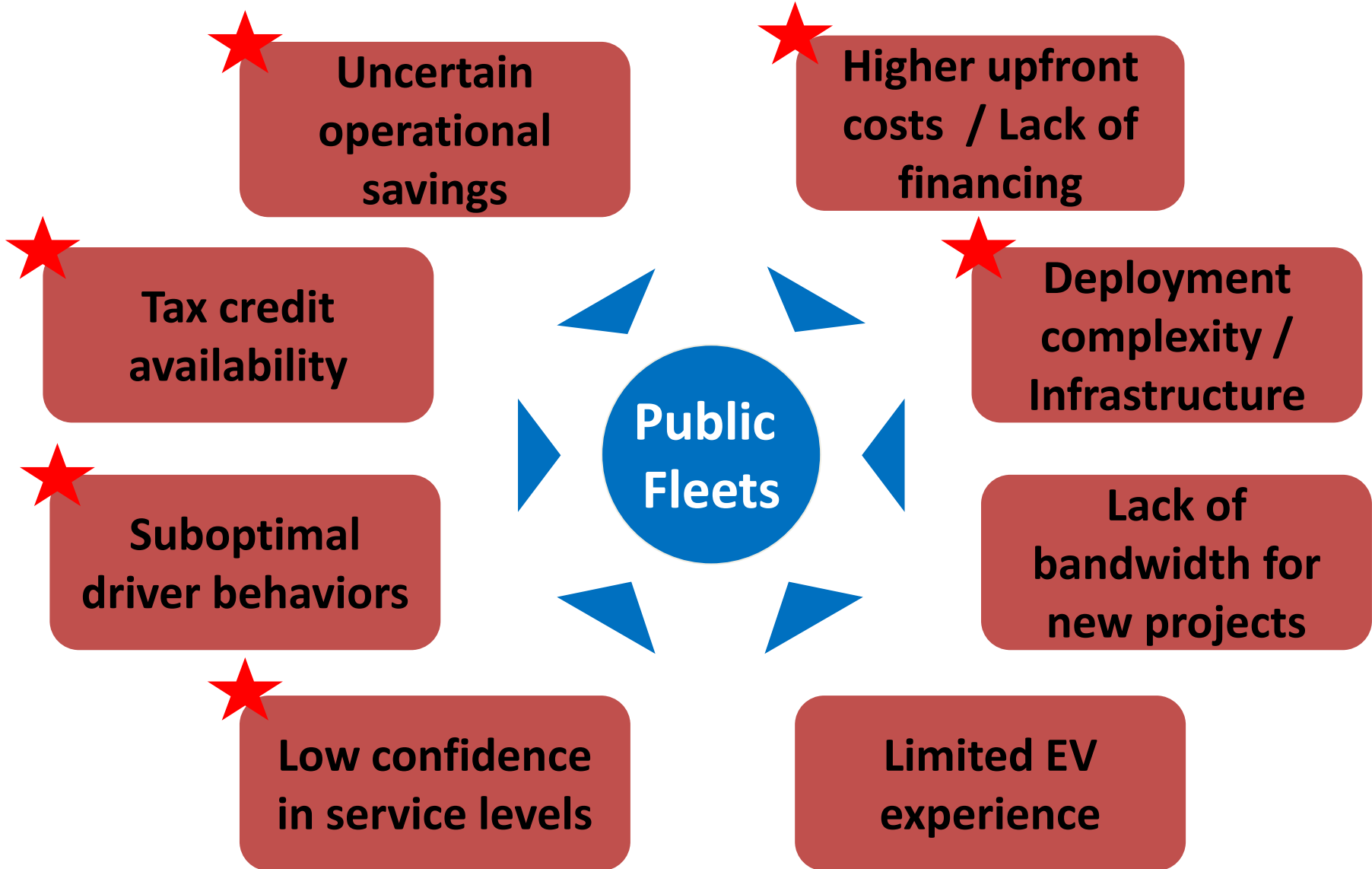


**Central parking facilities**



**Low electricity rates**

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



★ **For further discussion**

# Indianapolis' solutions (I): Deployment complexity/Infrastructure

## Obstacle(s)

**Deployment complexity / Infrastructure**

## Solutions in Indy

**Strategic site selection**

**Systems-level optimization**

**Use of existing charging infrastructure**

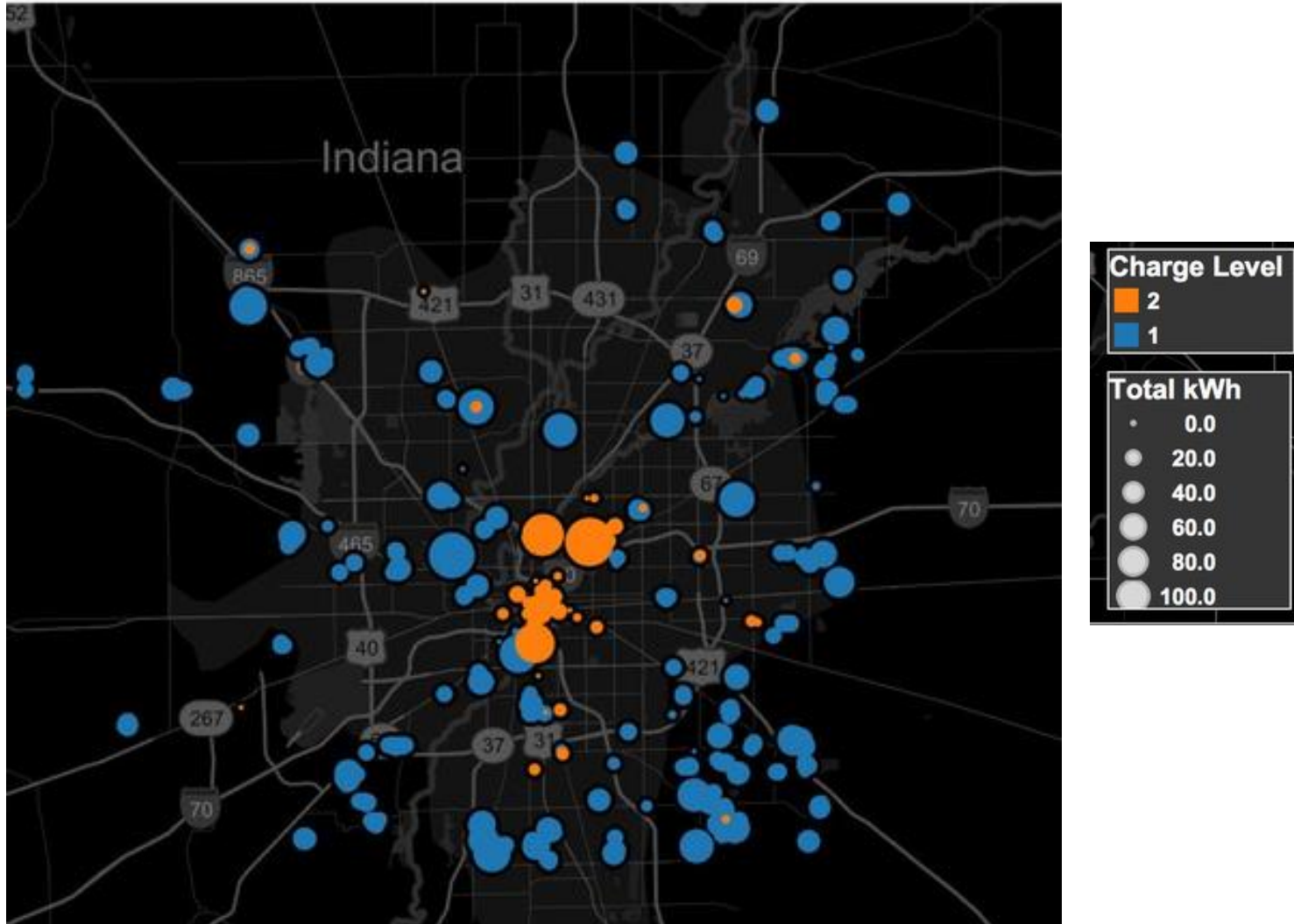
**At-home charging at level I**

**Few behind-the-meter upgrades**



# Indianapolis charging: Level I at-home charging used extensively

Freedom Fleet Charging Hotspots (thru 2/28/15)



# Indianapolis' solutions (II): Higher up-front capital cost; Tax credits

## Obstacle(s)

Higher upfront costs / Lack of financing

Tax credit availability

## Solutions in Indy

Private project partner

Tax credit pass-through

Lease / Rental agreement model

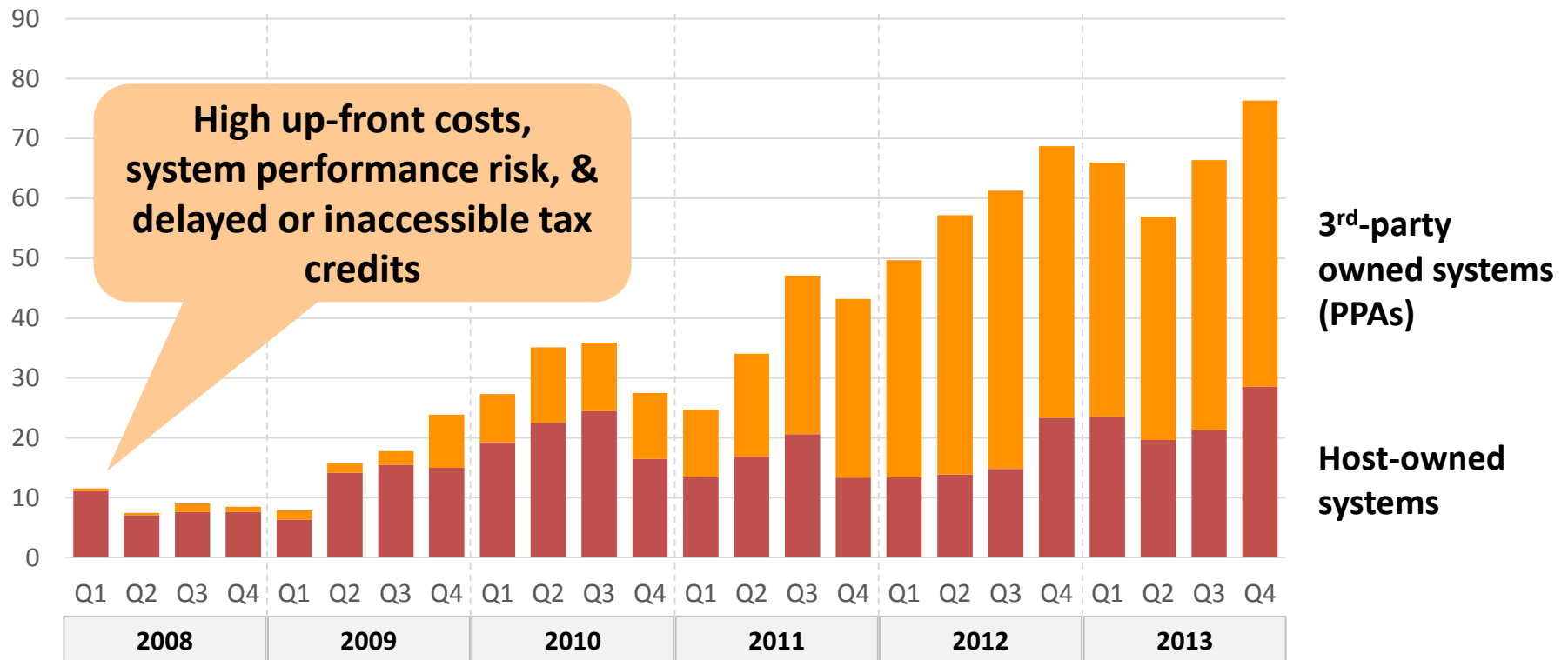
Low upfront payments

Right-sizing of underutilized vehicles

Right-typing to match vehicle with use case

# 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 promising a lower rate, key obstacles were eliminated**

# Indianapolis' solutions (III): Uncertain operational savings

## Obstacle(s)

**Uncertain operational savings**

## Solutions in Indy

**Rigorous total cost of ownership baseline**

**EV costs (cars, fuel, mtce) below baseline**

**3<sup>rd</sup> party guarantees vehicle performance**

**Shared savings for higher efficiency**

**Detailed tracking through telematics**

# Indianapolis' solutions (IV): Suboptimal driver behaviors

## Obstacle(s)

**Suboptimal driver behaviors**

## Solutions in Indy

**Up-front one-on-one training for drivers**

**Detailed monitoring through telematics**

**Real-time access to data by fleet managers**

**Regular 'score-cards' of driver efficiency**

**Incentive for higher efficiency (giftcards)**

**Consistent communication(s) & education**

# Detailed monitoring through telematics

**IQ Dashboard**  
City of Indianapolis

Download Printable Report    November 2014 -    Hi Andrew -

Overview    Deployment    Charging    Efficiency    Maintenance    Recommendations

ALL    SHARED    ASSIGNED    TAKE-HOME

BEV VMT

3,567 / 4,000  
Miles

PHEV VMT

2,452 / 3,000  
Miles

BATTERY UTILIZATION

0% 50% 100% 150% 200%

HERO SCORE

**4.3 / 5**

EFFICIENCY SCORE

**3.2 / 5**

**67% E Miles    345 Gallons Saved**

Car	Status	Model	Dept	Assigned	VMT	% Baseline	Miles/Day AVG	Miles/Mo. AVG	% Gas	% Electric	Gallons Saved	Hero	Efficiency
140804	OK	Leaf	IMPD	Shared	1,043	20%	25.3	1,345.4	20%	20%	25.3	5	3.2
140805	In Shop	Leaf	IFD	Assigned	1,239	40%	35.6	1,345.4	20%	40%	35.6	2.3	5
140806	OK	Prius	IMPD	Assigned	652	20%	13.2	1,345.4	20%	20%	13.2	3.1	4
140807	OK	Volt	IMPD	Shared	1,043	20%	25.3	1,345.4	20%	20%	25.3	5	3.2
140808	In Shop	Leaf	IFD	Assigned	1,239	40%	35.6	1,345.4	40%	20%	35.6	2.3	5
140809	OK	Prius	IMPD	Assigned	652	20%	13.2	1,345.4	20%	20%	13.2	3.1	4
140810	OK	Volt	IMPD	Shared	1,043	20%	25.3	1,345.4	20%	20%	25.3	5	3.2
140811	In Shop	Leaf	IFD	Assigned	1,239	40%	35.6	1,345.4	40%	20%	35.6	2.3	5

**Car 140804**

HERO SCORE **4.3 / 5**    EFFICIENCY SCORE **3.2 / 5**

BEV VMT

3,567 / 4,000  
Miles

CHARGING TIME DISTRIBUTION

Home

Work

● Charging ● Full ● Not Charging

BATTERY UTILIZATION

0% 50% 100% 150% 200%

# Indianapolis' solutions (V): Low confidence in service levels

## Obstacle(s)

**Low confidence  
in service levels**

## Solutions in Indy

**Pilot efforts up front to validate plans**

**Driver focus groups and engagement**

**Careful selection of use cases**

**Up-fits as appropriate (e.g. gun safe)**

**EV champions in each department**

**Responsive and flexible in resolving issues**

# Agenda

- Introduction to Indianapolis's "Freedom Fleet"
- Case for change: Electric vehicle economics
- Barriers to EV adoption and Indy's solutions
- So what? What does this mean for me?



# Summarizing it all: Learnings from Indianapolis

- New technology requires a new approach
- Difficult to achieve bold goals acting alone – find capable partners
- Comprehensive strategy needed – can't just hope for success
- Data and monitoring is critical to delivering expected value
- Technology is proven – good, battle-tested EV options available
- Potential financial benefits are substantial when done right