THE END OF THE PERSONAL VEHICLE

HOW AUTOMATION AND ELECTRIC POWERTRAINS WILL MAKE YOUR CAR OBSOLETE IN THE NEXT DECADE

JONATHAN WALKER – 7-12-16

RMI. Creating a clean, prosperous, and secure energy future.™

Introduction to RMI

OUR PURPOSE

Rocky Mountain Institute transforms global energy use to create a clean, prosperous, and secure future.

WHAT WE DO

RMI advances market-based solutions and engages businesses, communities, cities, and institutions to cost-effectively shift to efficiency and renewables.

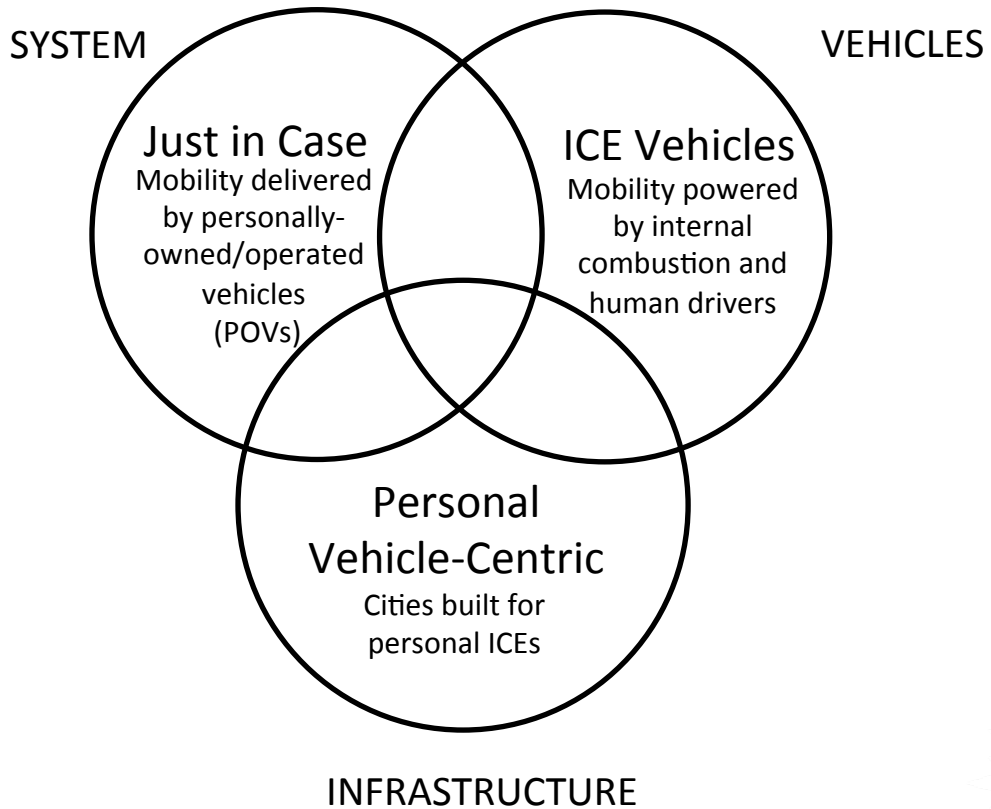
WHAT DIFFERENTIATES US

- Our whole-systems expertise unlocks market-based solutions that can be replicated and implemented now.
- As an independent, non-partisan nonprofit, we convene and collaborate with diverse partners—business, government, academic, nonprofit, philanthropic, and military—to accelerate and scale solutions.
- We tackle the long-term problems—challenges often ignored by those held to short-term results.
- We've built expertise in energy efficiency and renewables for over 30 years.

RMI transforms global energy use to create a clean, properous, and secure future.

THEORY OF CHANGE: START WITH THE WHOLE PICTURE

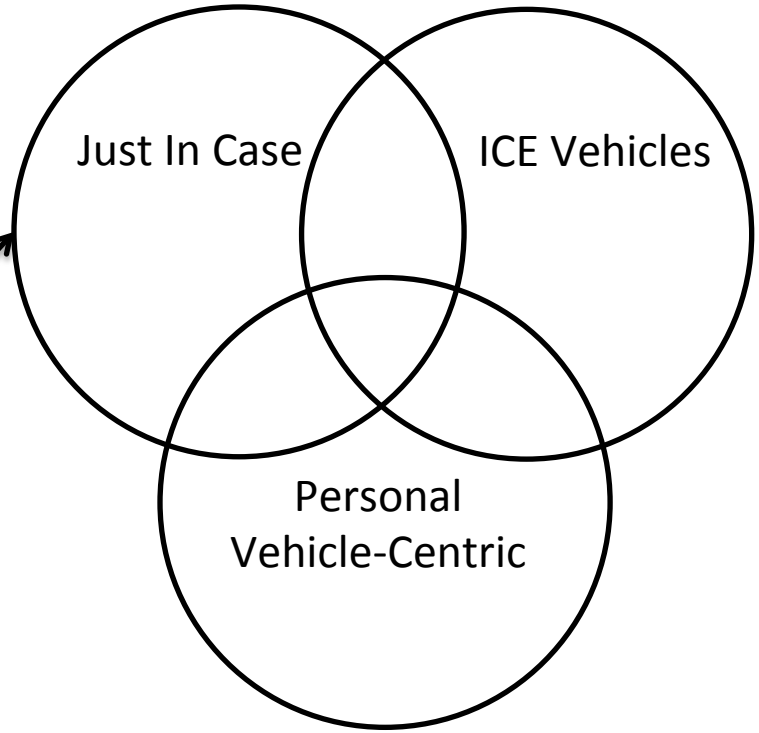
The three elements of mobility are the system, the vehicles, and their mobility environment



PERSONAL MOBILITY IS EXTRAORDINARILY INEFFICIENT

Underutilized:
Our vehicles sit unused 95% of their life

Expensive:
Mobility is the 2nd highest expense for U.S. families, and the highest expense for many low-income families



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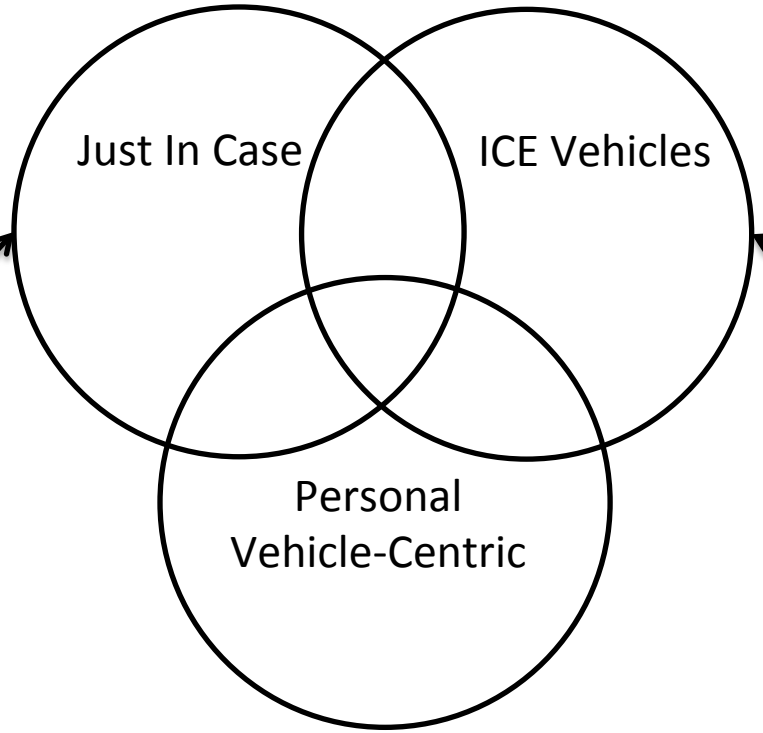

Dirty:
ICEs emit 1.2 Gigatons of CO_2 each year, along with NO_x and SO_x.

Inefficient:
About 1% of total energy used goes to actually moving people

PERSONAL MOBILITY IS A BROKEN SYSTEM

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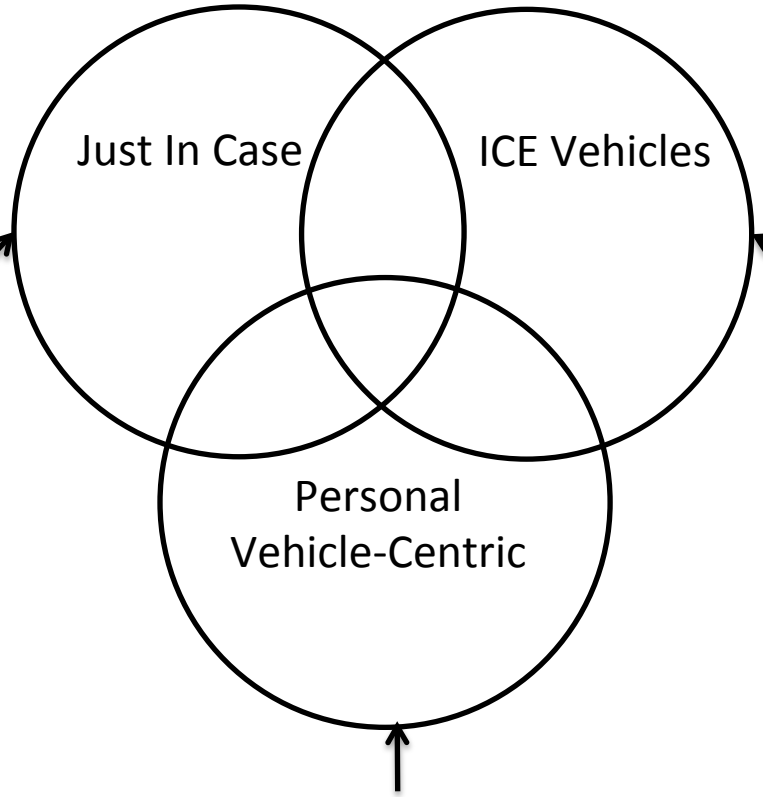

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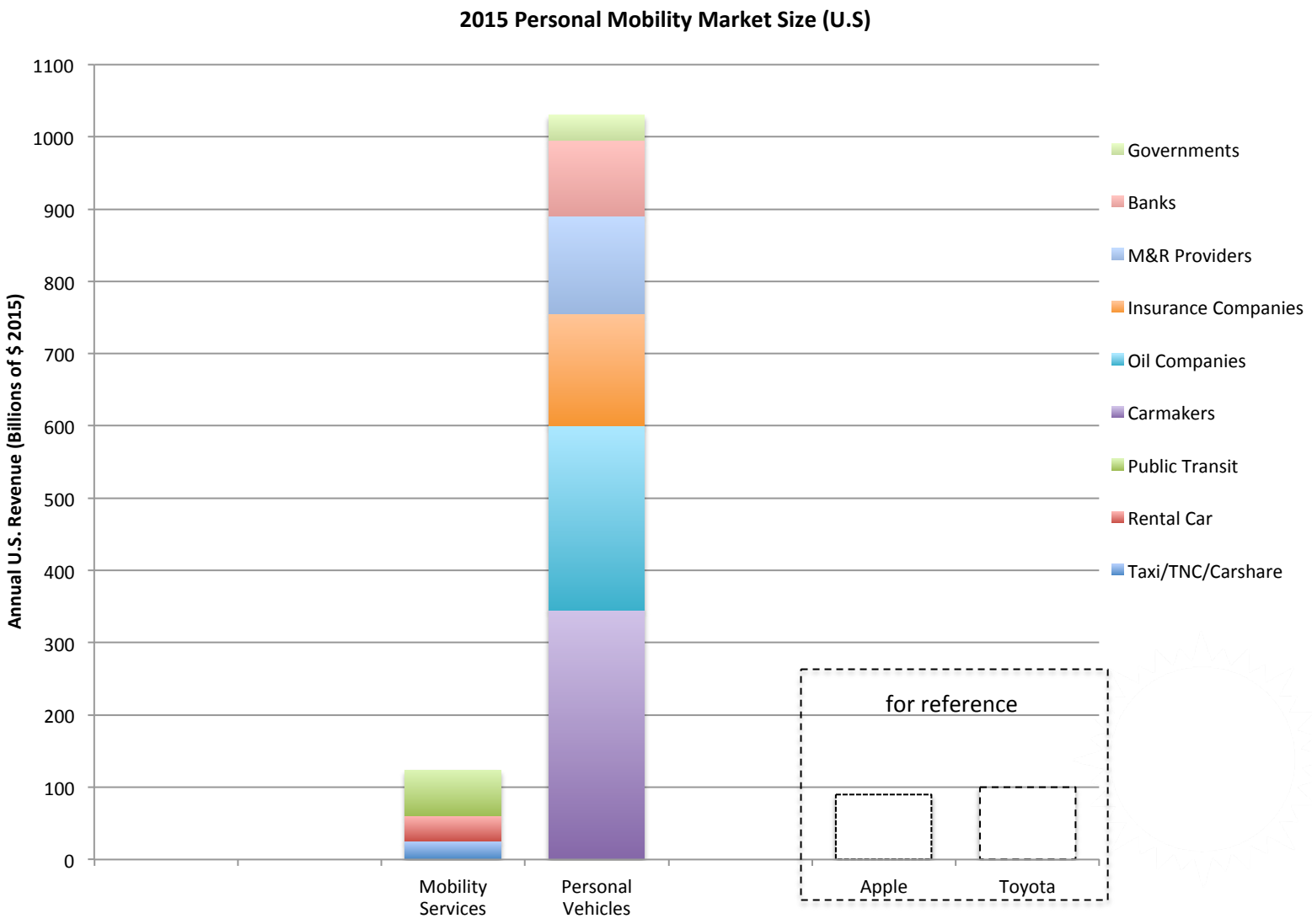
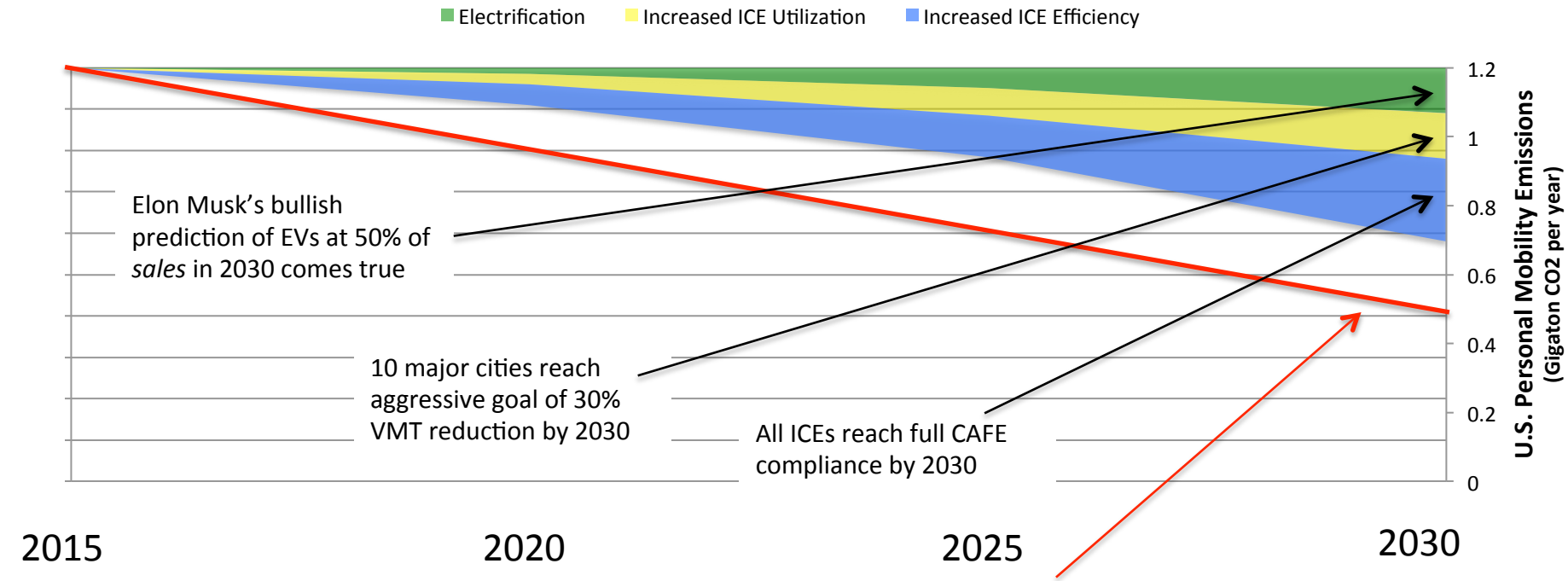
Congested:
Gridlock traffic, stress, and other indirect costs amount to almost $2T in societal expenditure in the existing system

Dangerous:
Automobile accidents kill over 1,000,000 people each year, 33,000 in the U.S. alone

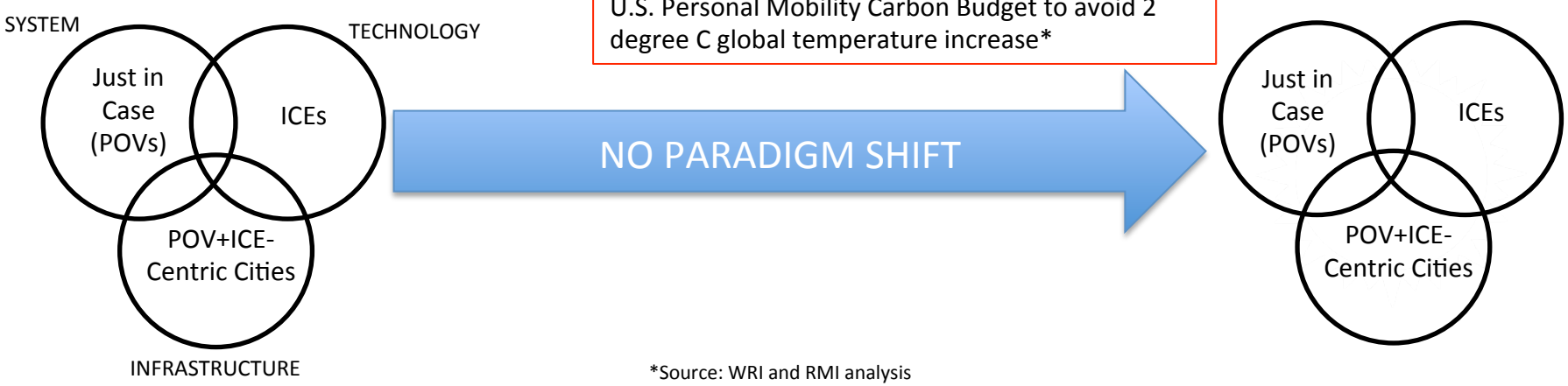
POWERFUL INCUMBENTS OWN THE $1 TRILLION PERSONAL MOBILITY MARKET, AND LITTLE HAS CHANGED IN THE LAST CENTURY



EVEN AT VERY OPTIMISTIC PROJECTIONS, ATTEMPTS TO FIX THIS SYSTEM FALL SHORT



U.S. Personal Mobility Carbon Budget to avoid 2 degree C global temperature increase*

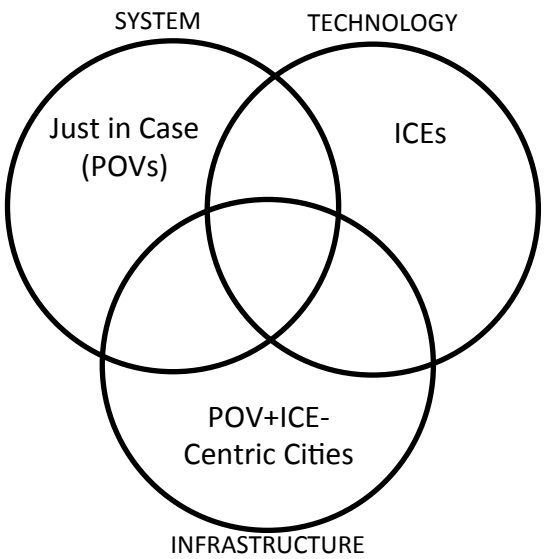


*Source: WRI and RMI analysis

BUT A CONFLUENCE OF EVENTS MAKES NOW THE TIME TO DISRUPT THE $1T MARKET

Social Change

- Rise of the sharing economy
- Social media ubiquity
- Urban population growth
- Flat per capita VMT & deferred vehicle ownership



DISRUPTIVE PARADIGM SHIFT

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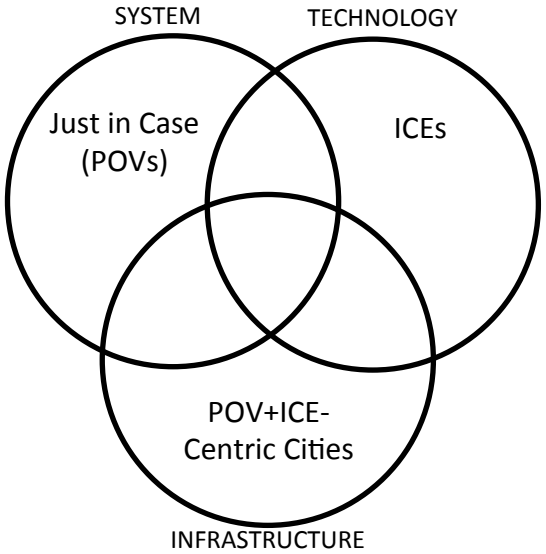
Disruptive Technology

- Data explosion and processing capability
- Self-driving, connected vehicles
- Battery & sensor costs dropping
- Smart phones



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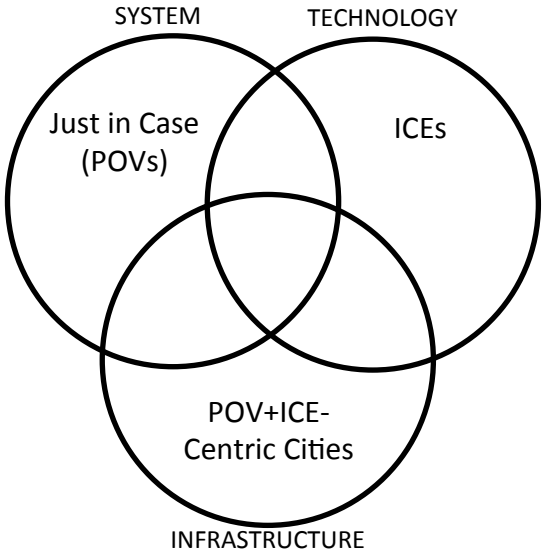
Societal Pressure

- Many cities, states, and the federal government enacting aggressive CO_2 reduction goals
- Some cities are enacting fossil-fueled trip reduction goals and programs



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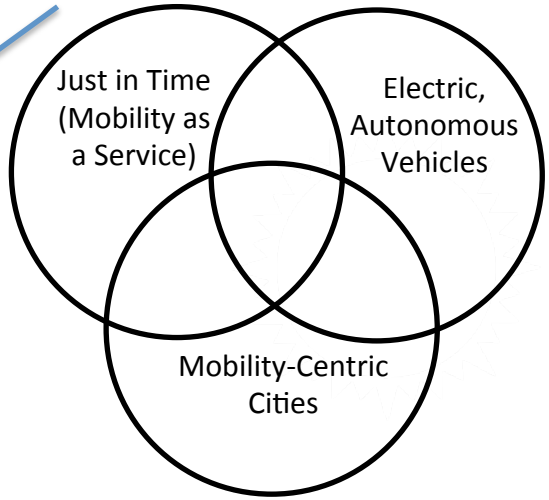
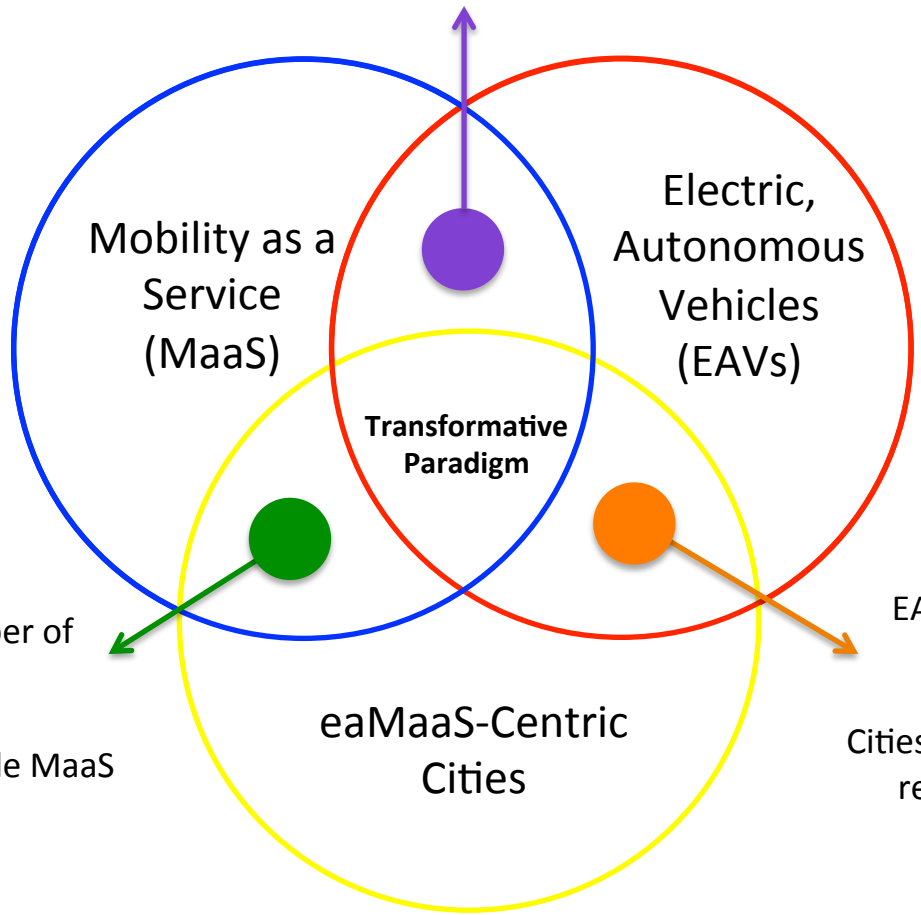


A HOLISTIC SOLUTION IS NEEDED. EACH ELEMENT SUPPORTS, STRENGTHENS, AND ACCELERATES THE OTHERS

MaaS increases vehicle utilization, making electrification and self-driving cost effective

EAVs reduce MaaS operating costs and improve logistics



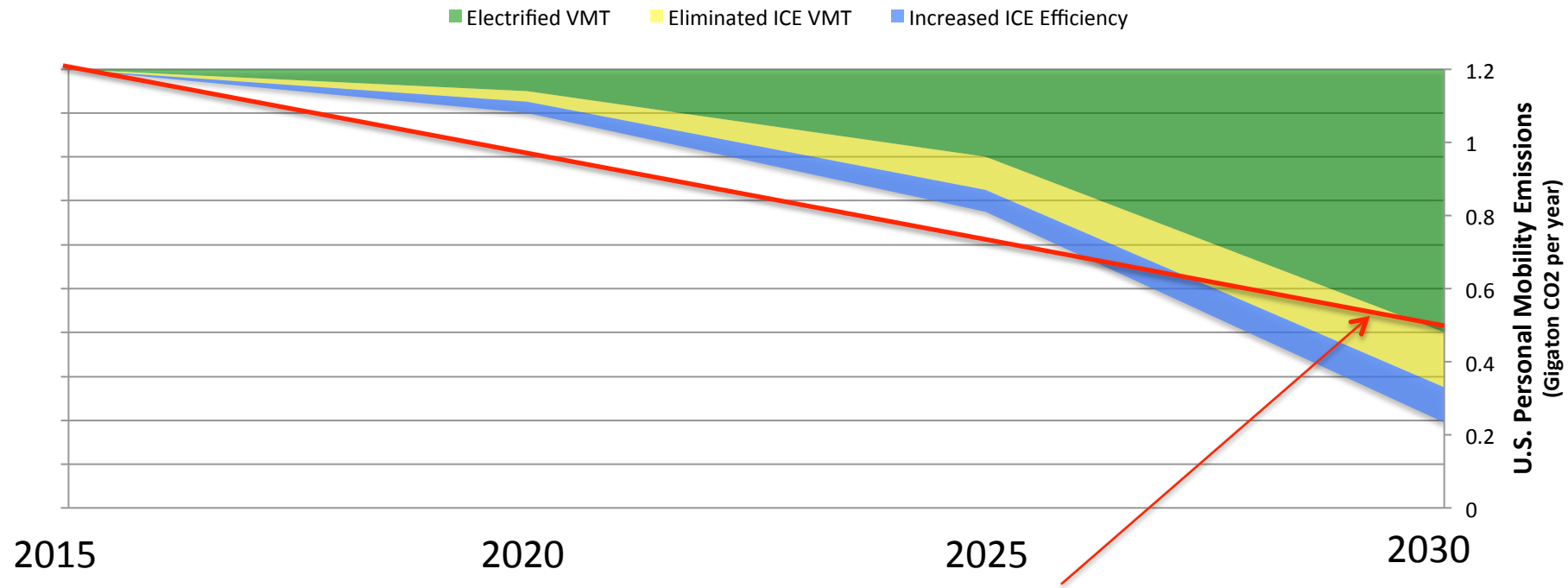
MaaS reduces the number of vehicles in a city

Cities incentivize and enable MaaS business models

EAVs reduce pollution and congestion

Cities provide infrastructure and regulations to enable and accelerate EAVs

BY IMPLEMENTING THE ELEMENTS HOLISTICALLY, WE CAN REDUCE ANNUAL CO_2e BY A FULL GIGATON AND BE UNDER CO_2 BUDGET



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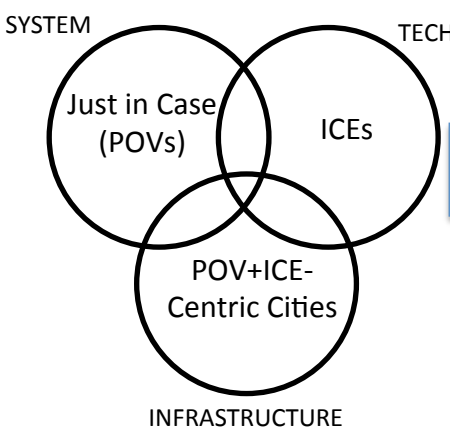

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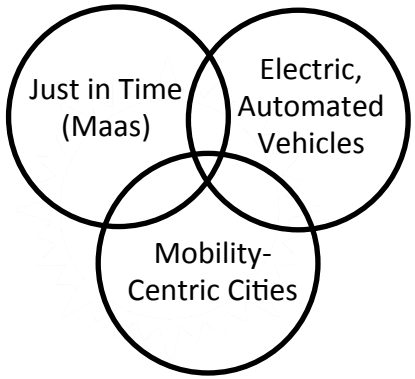


*Source: WRI and RMI analysis

IS THIS REALLY GOING TO HAPPEN?

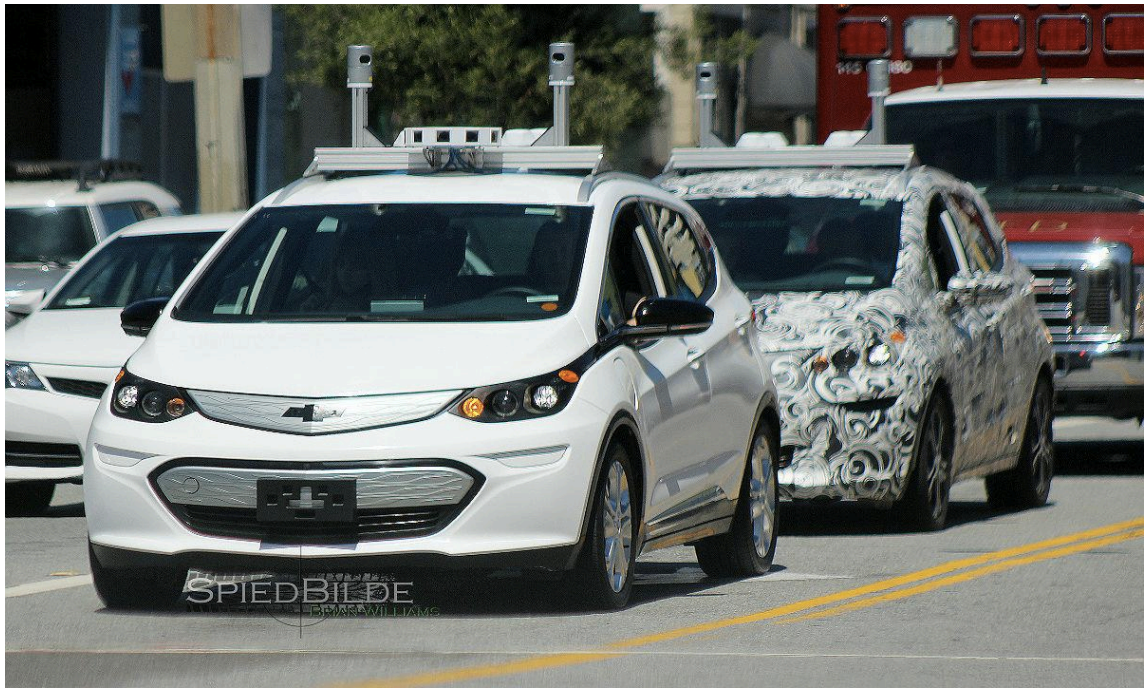
IT’S ALREADY STARTED

IT IS BEING TESTED IN THE REAL WORLD

- Google in Austin, TX, Bay Area, Phoenix, AZ and Kirkland, WA
  - Currently, 1.5 million miles on public roads with 1 at-fault accident (no injuries)

IT IS BEING TESTED IN THE REAL WORLD

- GM/Lyft/Cruise in San Francisco
  - 2017 Chevy Bolt Long Range Electric Vehicle

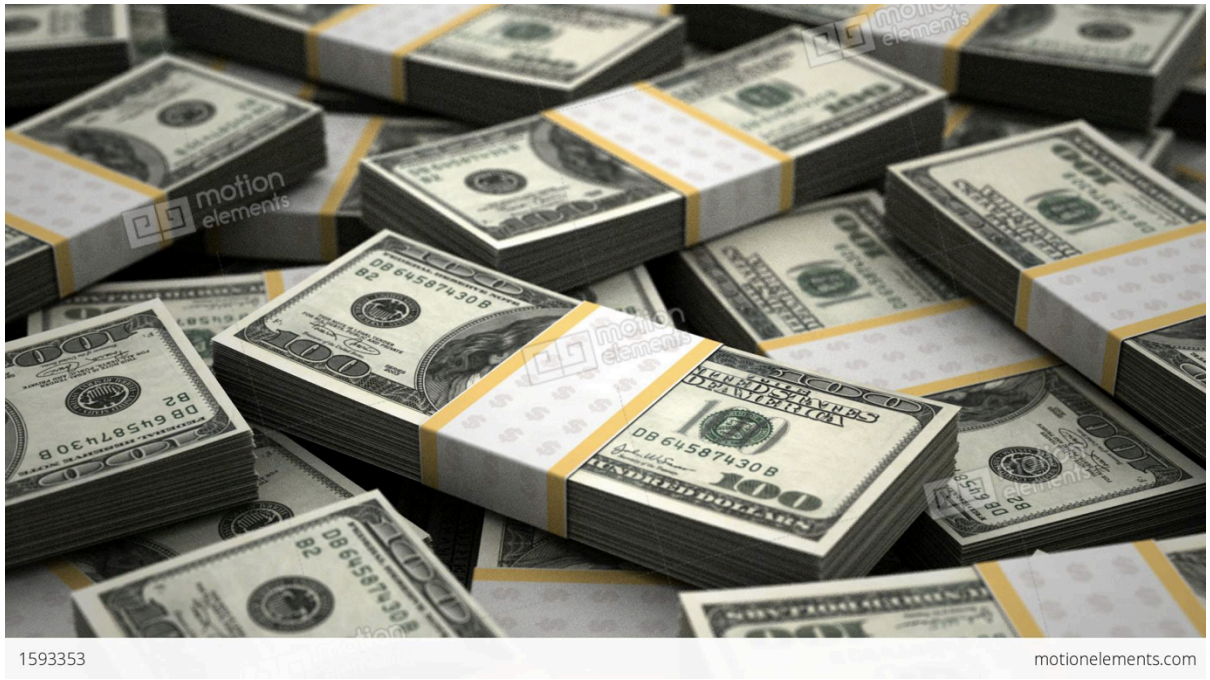


IT IS BEING TESTED IN THE REAL WORLD

- Uber/Ford in Pittsburg
  - 2017 Ford Fusion Hybrid

THE MARKET IS HEDGING

- $3B (that's *billion*) has been invested in eaMaaS partnerships in the past 6 months



THE MARKET THINKS IT WILL HAPPEN

- General Motors: $500M invested in Lyft and $1B acquisition of Cruise Automation
  - The 1st Chevy Bolts will go to Lyft, not dealers

GM

lyft

CRUISE

THE MARKET THINKS IT WILL HAPPEN

- Apple: $1B investment in Chinese ride-sharing company Didi Chuxing

滴滴

滴滴一下 美好出行

THE MARKET THINKS IT WILL HAPPEN

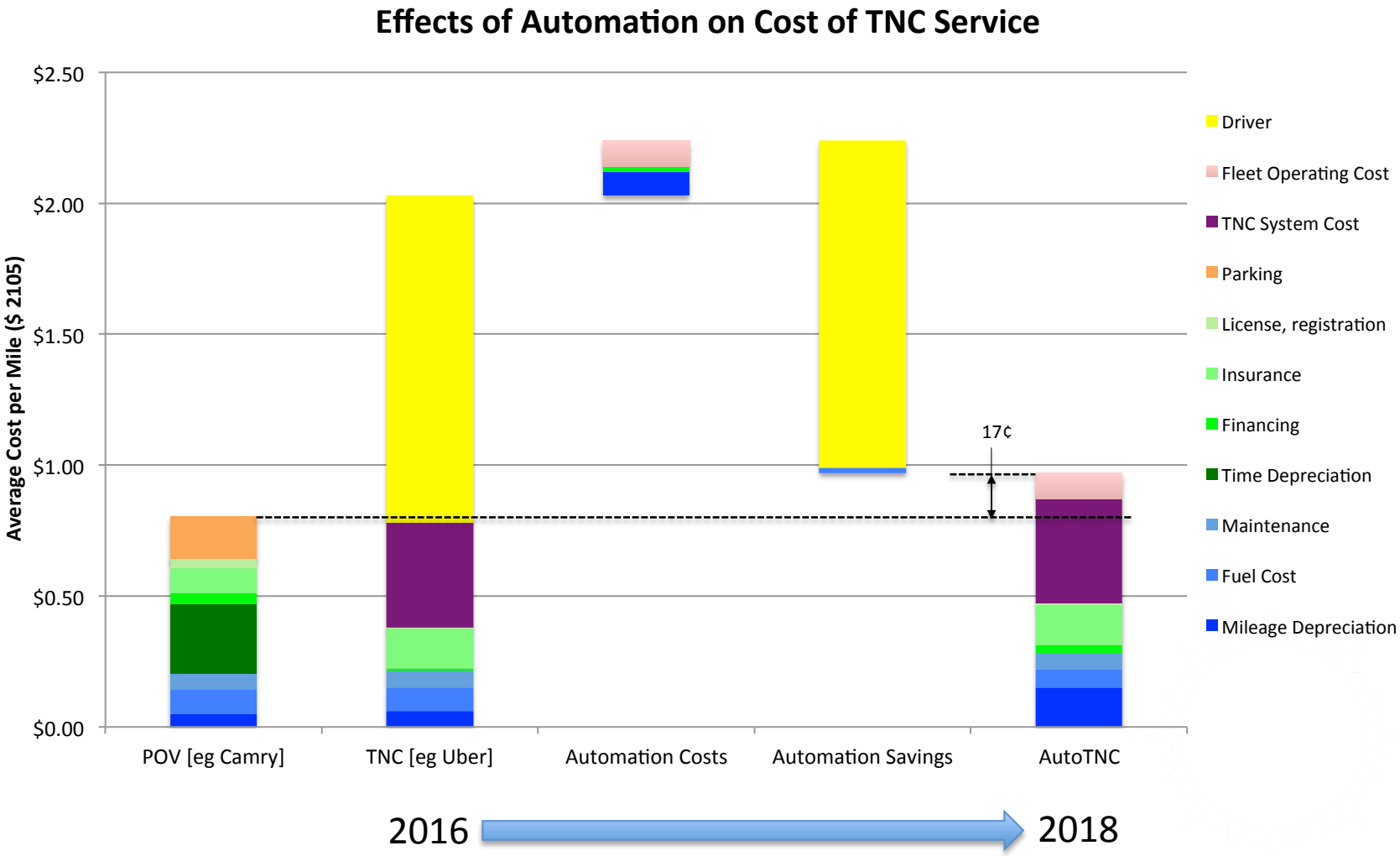
- VW: $300M investment in Gett (European version of Uber)

THE MARKET THINKS IT WILL HAPPEN

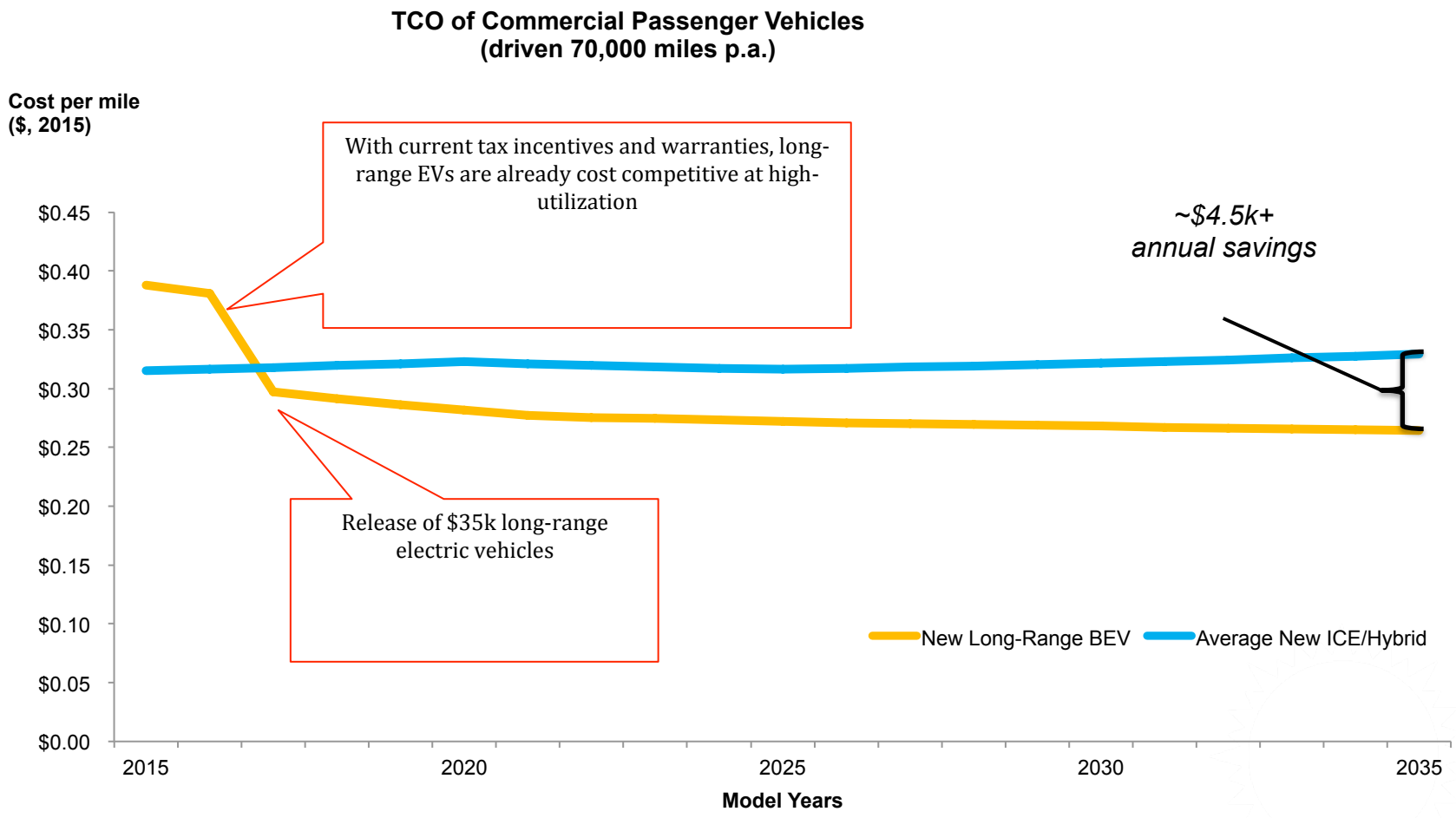
- Toyota: Undisclosed investment in Uber

HOW SOON WILL IT AFFECT BOULDER?

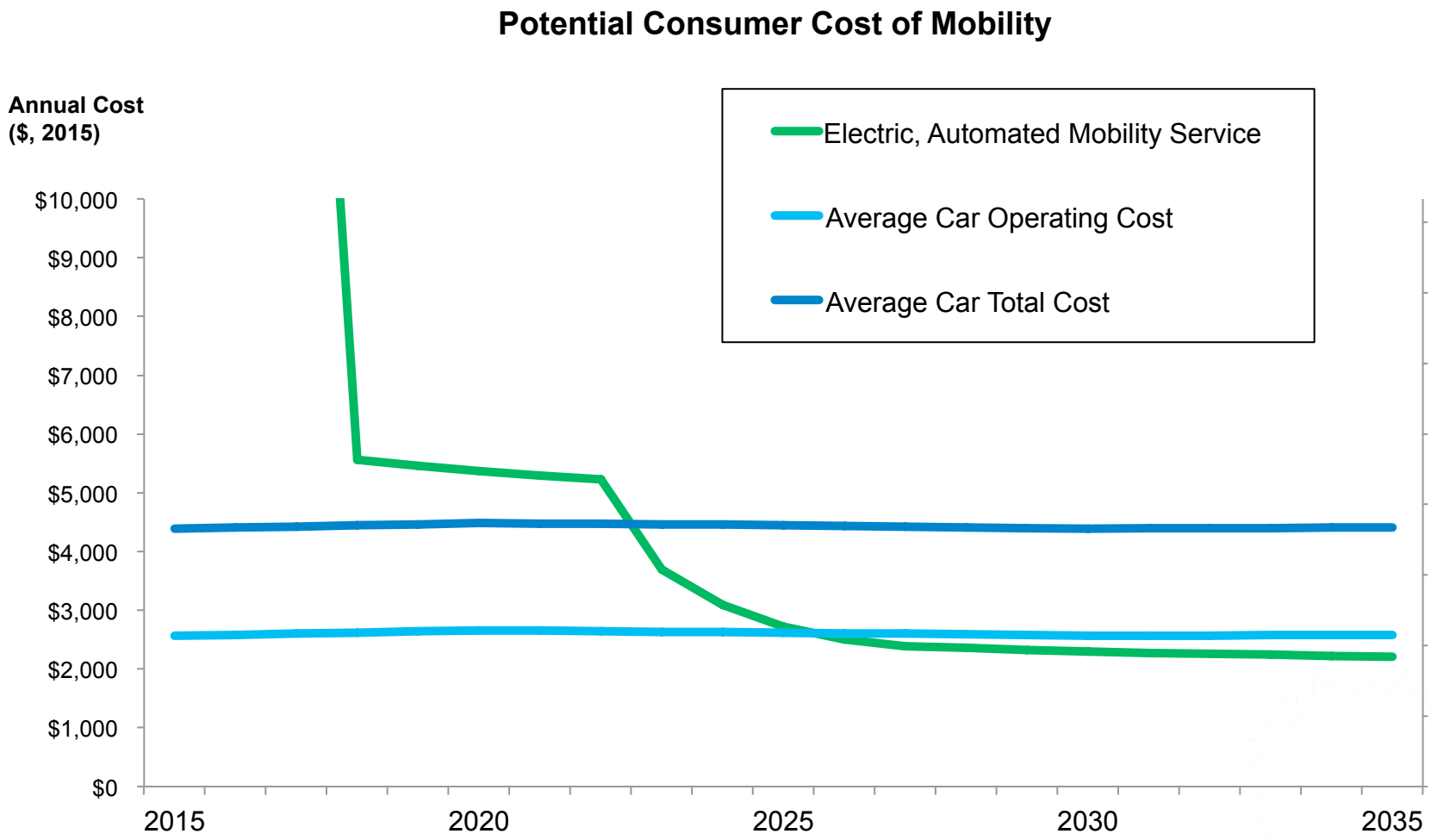
INITIAL CONSUMER DEPLOYMENT WILL BE IN THE NEXT 1-3 YEARS IN SELECT MARKETS



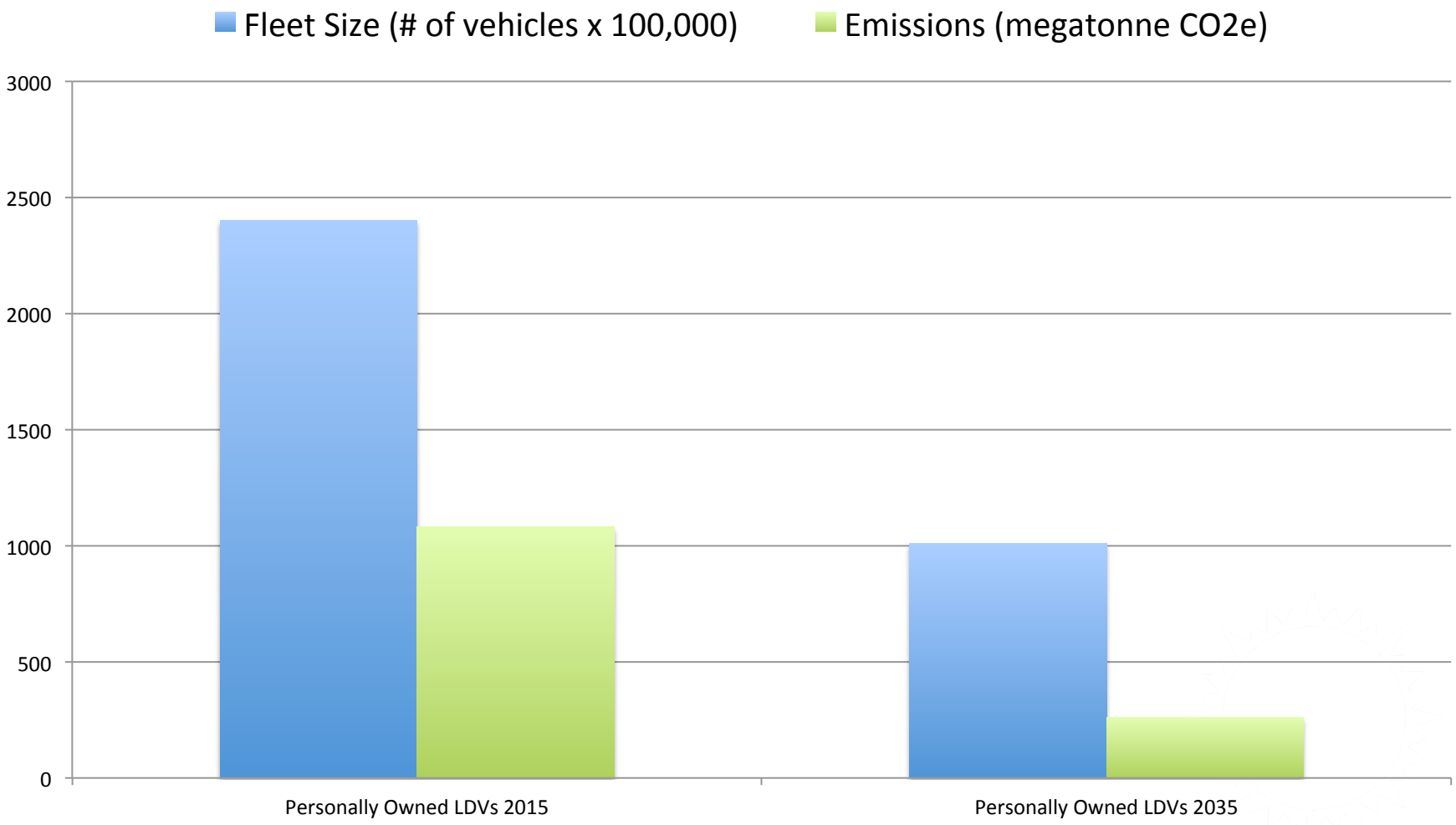
ELECTRIC VEHICLES ARE MORE ECONOMICAL



ELECTRIC, AUTOMATED MOBILITY COSTS PLUMMET



LONGER TERM IMPACTS



WHAT SHOULD BOULDER DO NOW?

WHAT CAN BE DONE TO AVOID SUNK ASSETS

- Value parking correctly
  - There is no such thing as “free parking”
  - $5,000 to $40,000 per space

WHAT CAN BE DONE TO AVOID SUNK ASSETS

- Build with minimum parking possible
  - 15% of Americans have used Uber and/or Lyft
  - 9.2% of U.S. Households have no car

Can reduce parking allocation 10-15% **today**

WHAT CAN BE DONE TO AVOID SUNK ASSETS

- Build parking to be retro-fit ready
  - Apartments
  - Retail
  - Commercial
  - AV parking structures

WHAT CAN BE DONE TO AVOID SUNK ASSETS

- Take advantage of nearly free EVSE for new-build
  - Pre-wiring for new construction is almost free
  - Take advantage of great Colorado incentives
    - Charge Ahead Colorado will pay 80% of charger installation up to:
      - $6260 for 2-port L2
      - $13k for 1-port L3
    - CO State law permits reselling of electricity for retail transportation

WE CAN JUMPSTART MOBILITY SERVICES IN BOULDER

INNOVATIVE MOBILITY SERVICE PROGRAMS EXIST

- Subsidize mobility service to be cost-competitive with personal vehicles today
  - City could allocate parking revenue
  - Businesses could “validate” customers’ trips
  - Employers could provide as an employee benefit

- Issue RFP for mobility providers to participate in the program