KEYS TO ENABLING H_2 & FUEL CELLS

COLLABORATION & SCALE

H_2USA

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Sustainable Transportation Summit
July 12, 2016

ACHIEVING SUSTAINABLE H_2 FUEL CELL TRANSPORTATION

KEY POINTS

1. CHANGE REQUIRES **CONSTANCY OF PURPOSE**
2. PRIORITIZE **VALUE EQUATION**
3. **COOPERATE**

HOW DOES CHANGE ARRIVE IN TRANSPORTATION INDUSTRY?

PERSPECTIVE

AUTOMOBILES ARE - PERSONAL MOBILITY SOLUTIONS

PERSONAL MOBILITY SOLUTIONS HAVE ALWAYS BEEN SUBJECT TO CHANGE

1917 Last Horse Drawn Street Car

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End of the Streetcar

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PERSPECTIVE

CHANGE IS COMING AGAIN . . .

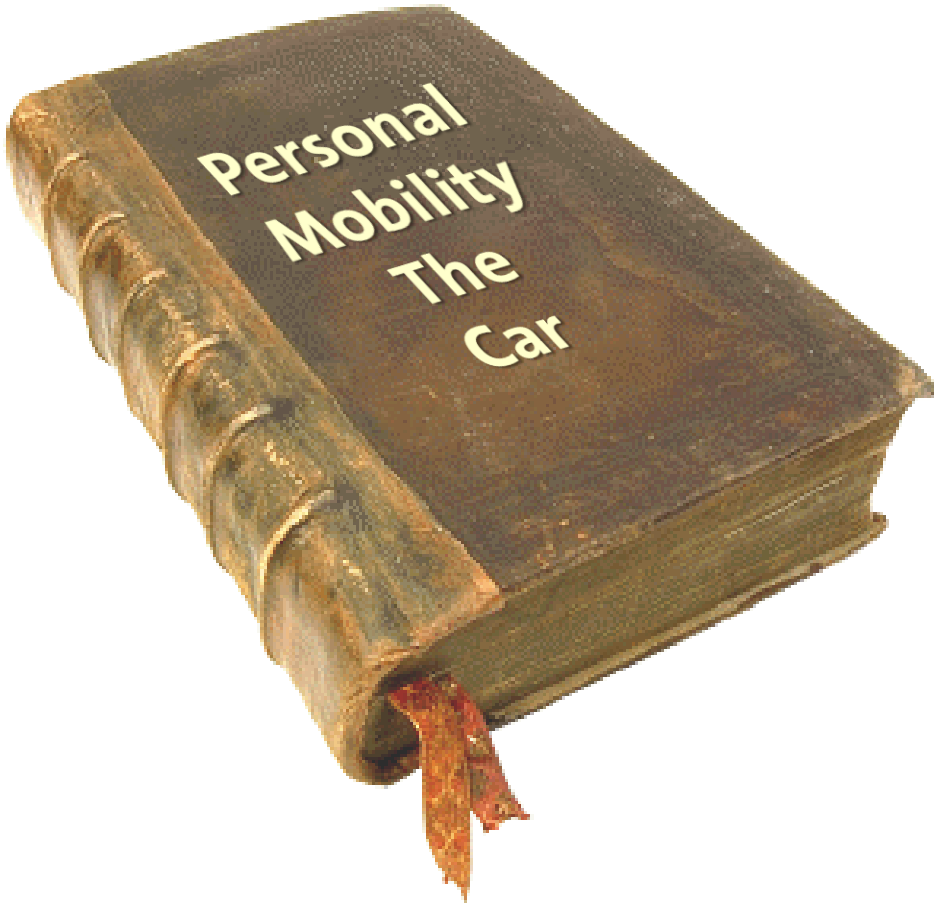
CHANGE IS DRIVEN BY UNLOCKING VALUE

WE ARE SPOILED BY RELATIVE PACE OF ELECTRONICS (MOORE'S LAW) & INSTANT GRATIFICATION

- FOOLED BY APPEARANCE THAT TECHNOLOGY PROGRESSES QUICKLY
- FORGET THINGS RARELY PROGRESS IN STRAIGHT LINES
- OFTEN REQUIRES FITS & STARTS
- REAL CHANGE IS RARELY EASY

A LOOK TO SOME HISTORICAL EXAMPLES

THE FIRST AUTOMOBILE?



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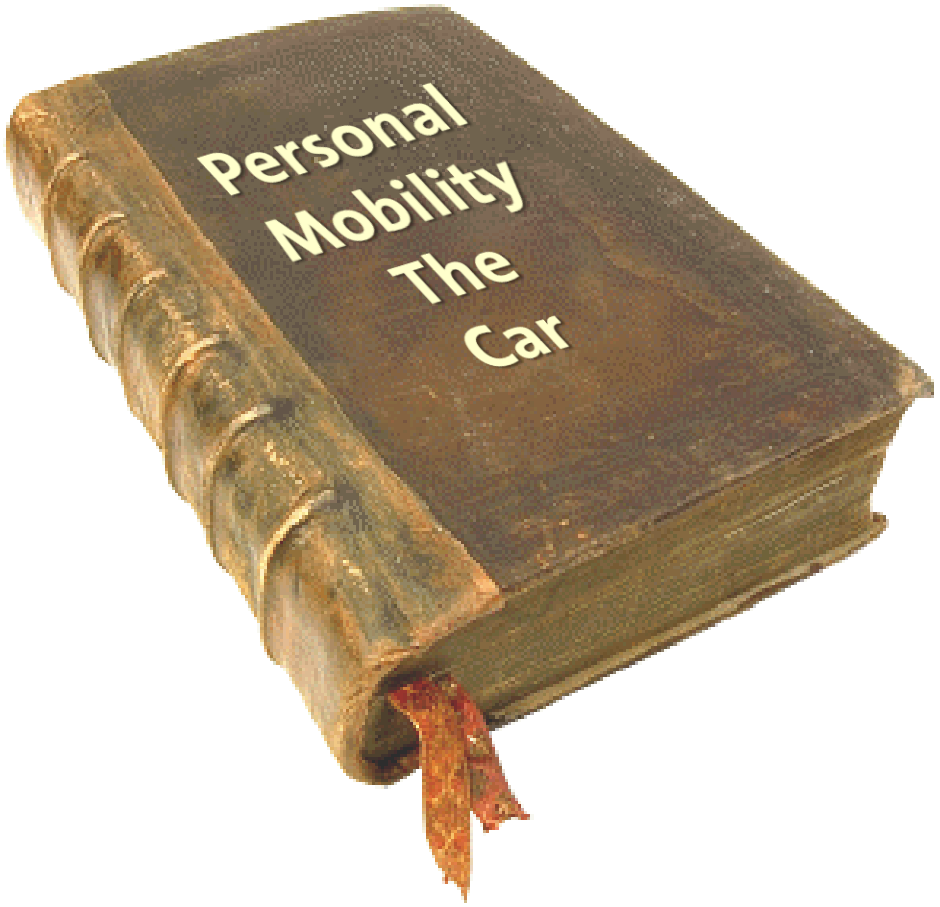

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- 1st Internal Combustion Gasoline Powered "Production Car"

1908 – Henry Ford (Mass Production Model T)

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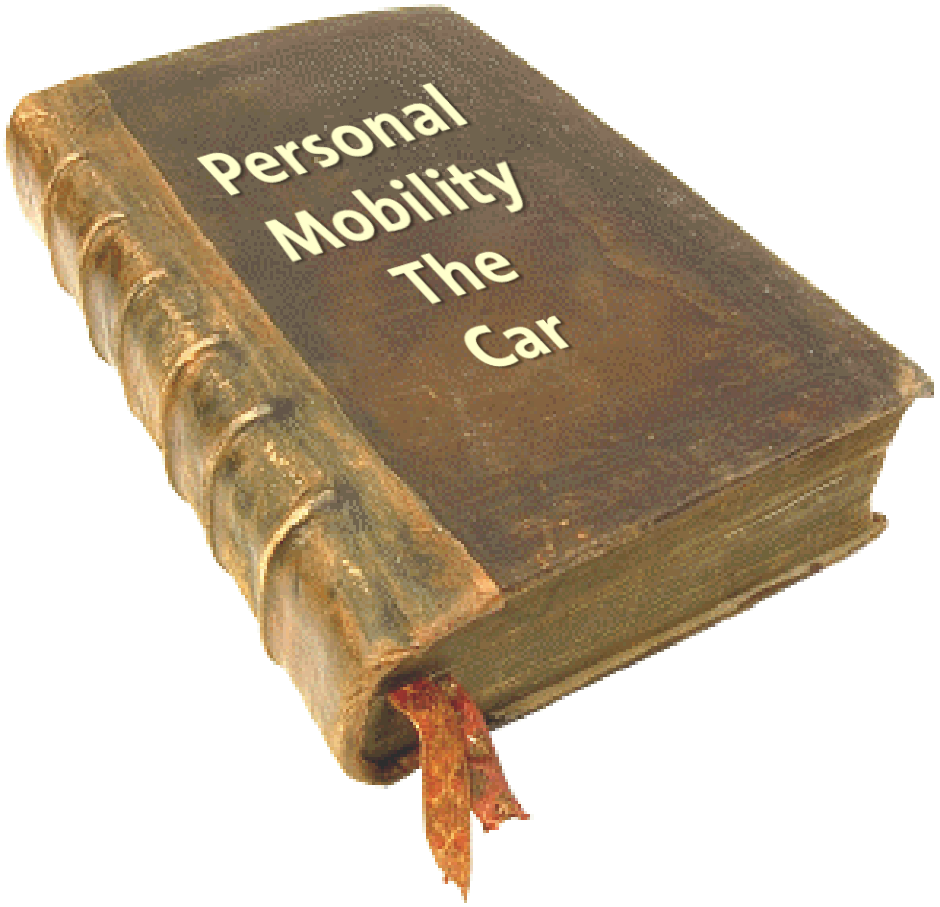

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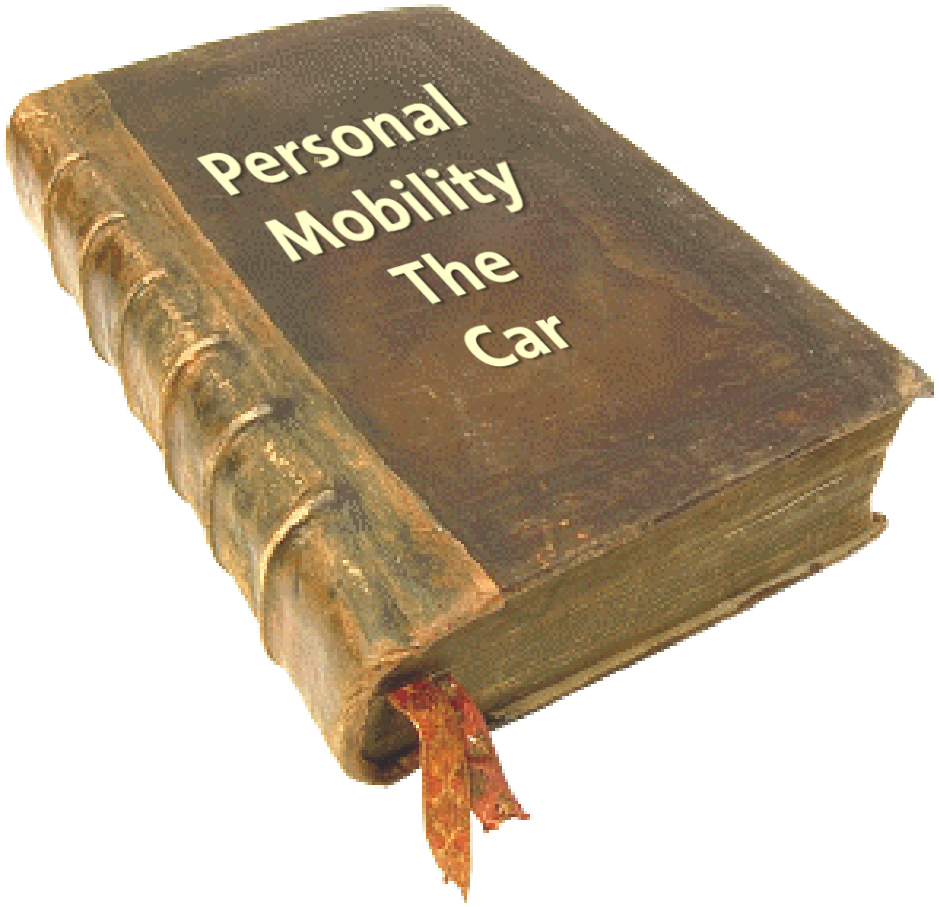

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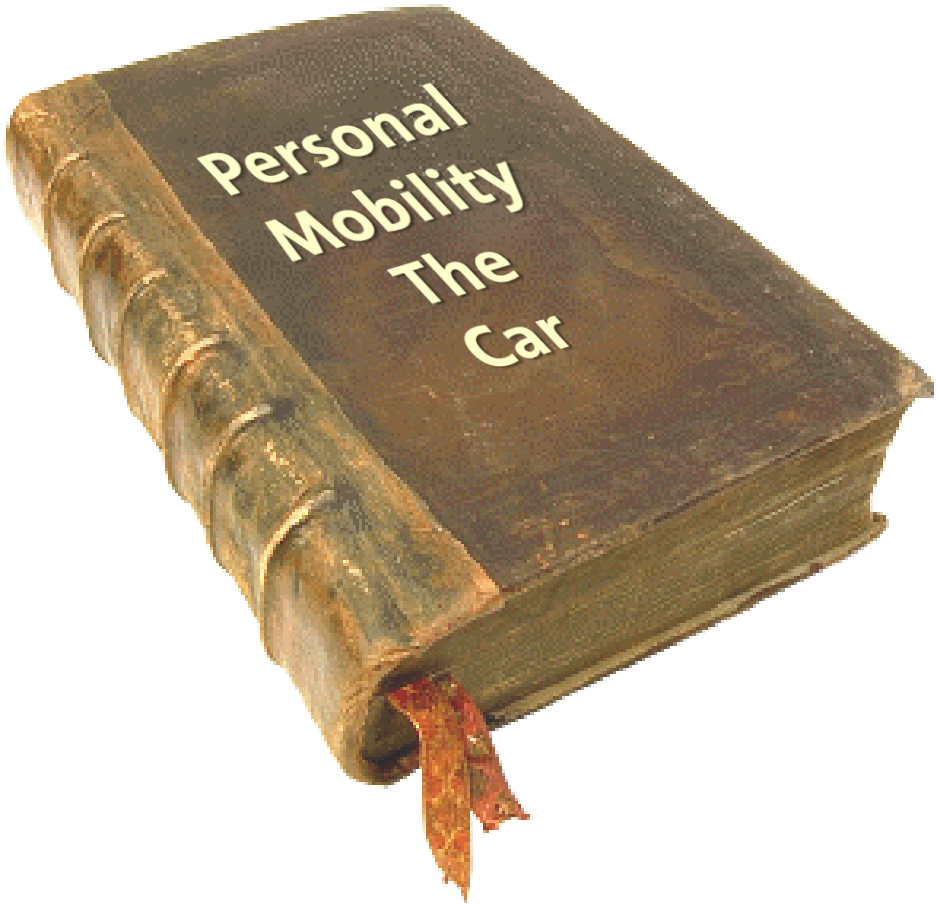

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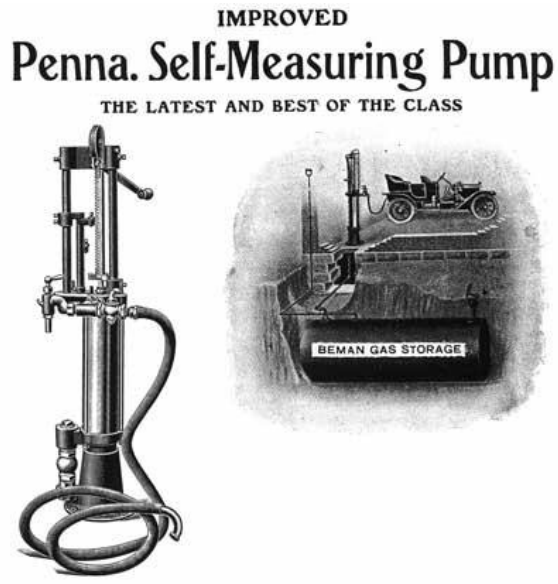
140 Years Elapsed

EARLY AUTOMOBILE INFRASTRUCTURE WAS ANYTHING BUT CERTAIN

Road Challenges



Refueling Infrastructure Challenges

FIFTY YEARS AGO – THIS OCTOBER

THE WORLD MET THE FIRST HYDROGEN FUEL CELL VEHICLE

HUMBLE BEGINNINGS

MANY THINGS TAKE TIME

THIS IS A MARATHON, NOT A SPRINT

AS IN THE PAST, AUTO INDUSTRY IS UNDERGOING DRAMATIC CHANGE:

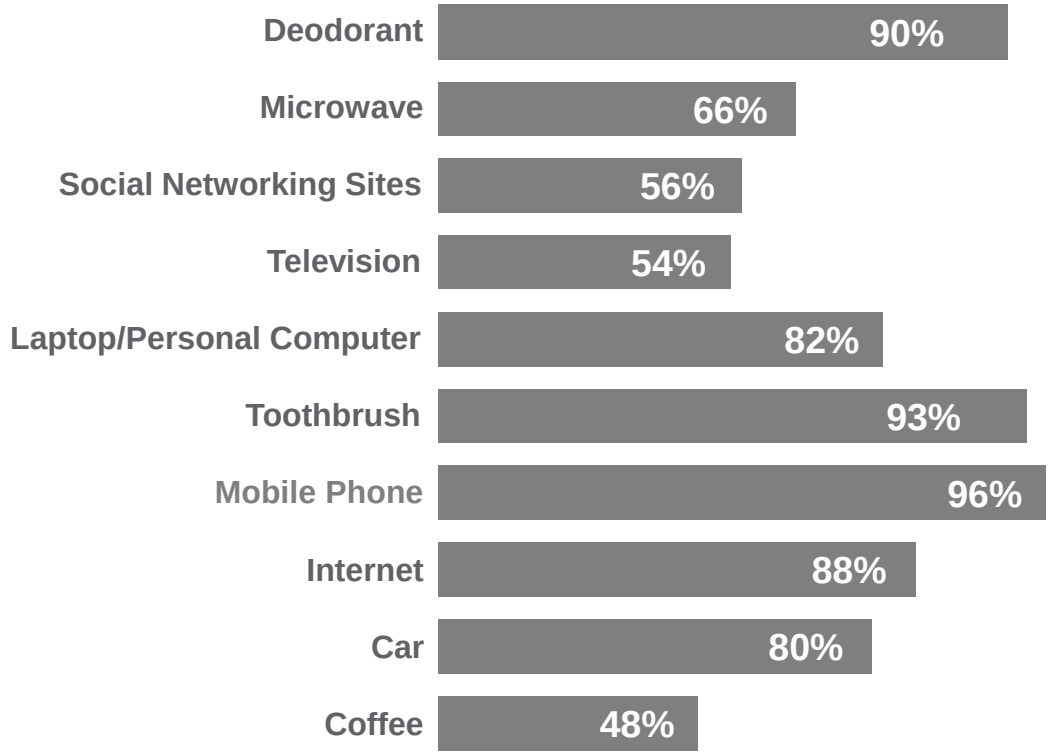
- RAPIDLY DEVELOPING TECHNOLOGY
- RAPIDLY SHIFTING ECONOMIC & GEOPOLITICAL INFLUENCES ON ENERGY
- INCREASINGLY MORE STRINGENT REGULATIONS
- **NEW BUSINESS MODELS**
- **CHANGING DEMOGRAPHICS**
- **EVOLVING CUSTOMER EXPECTATIONS**

The rules of the game are changing while we play it

Stakeholders must also change

CONNECTIVITY
CONSUMERS EXPECT SEAMLESS AND UBIQUITOUS CONNECTIVITY

The youngest Millennials (ages 18-24) view their mobile phone as most important to their daily lives



Source: Bank of America

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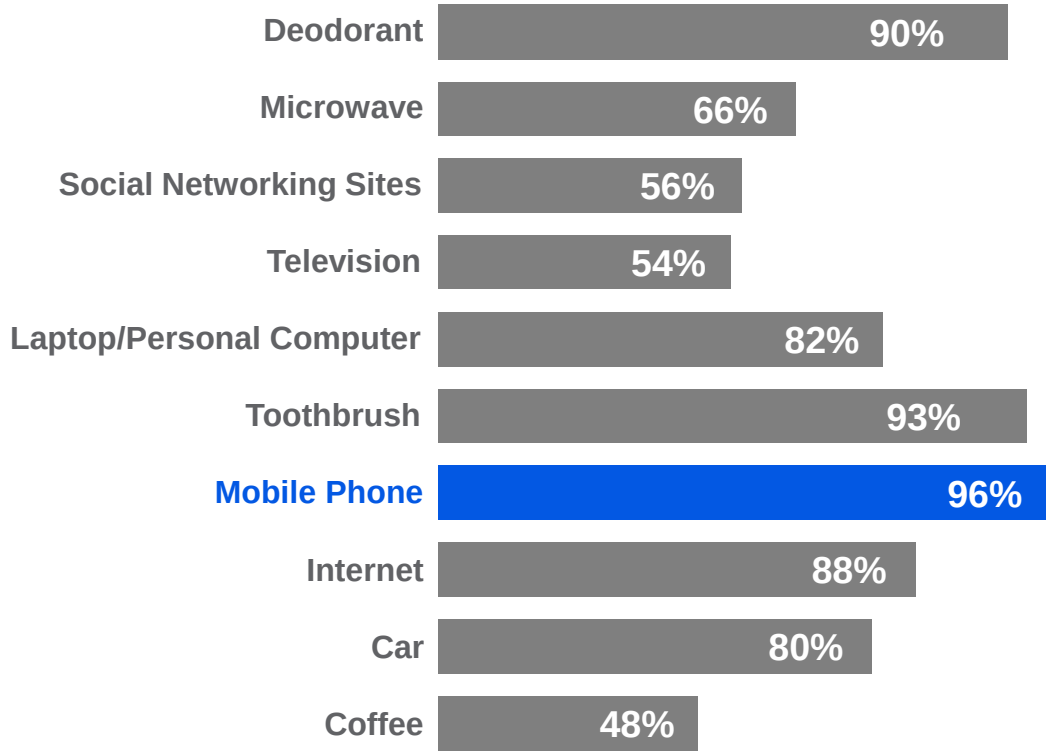

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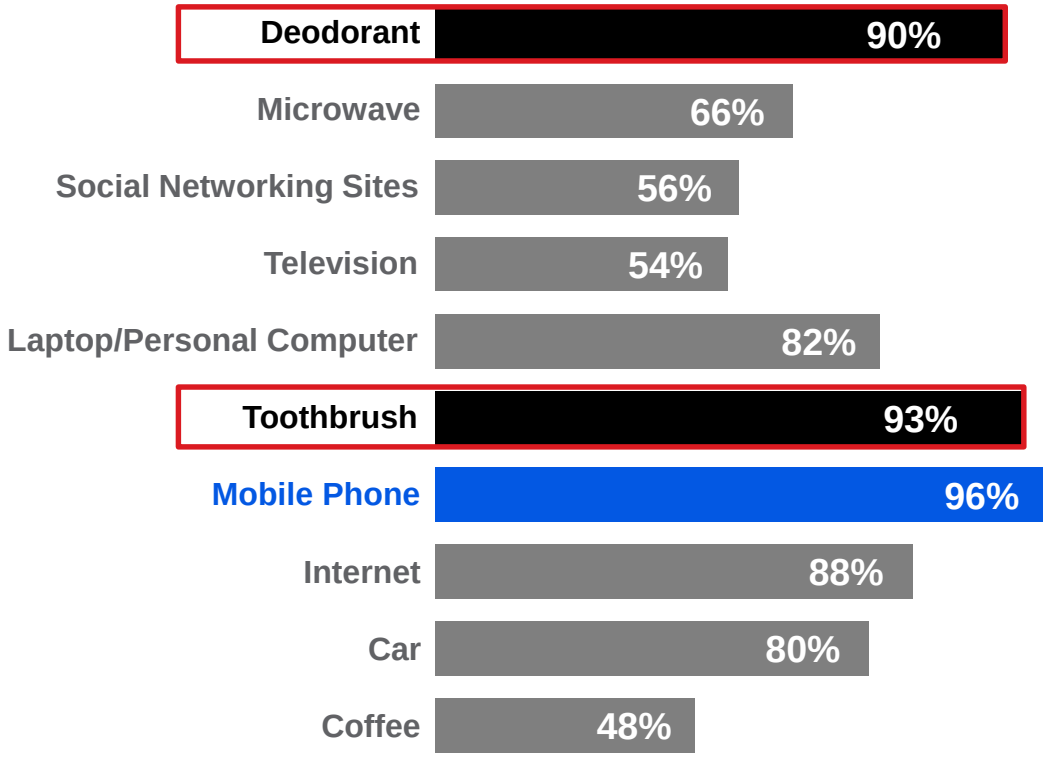

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. . . Reducing CO_2

. . . Reducing Fuel Cell Vehicle Costs

. . . Deploying a refueling network

. . . Streamlining transportation costs

. . . Increasing public awareness

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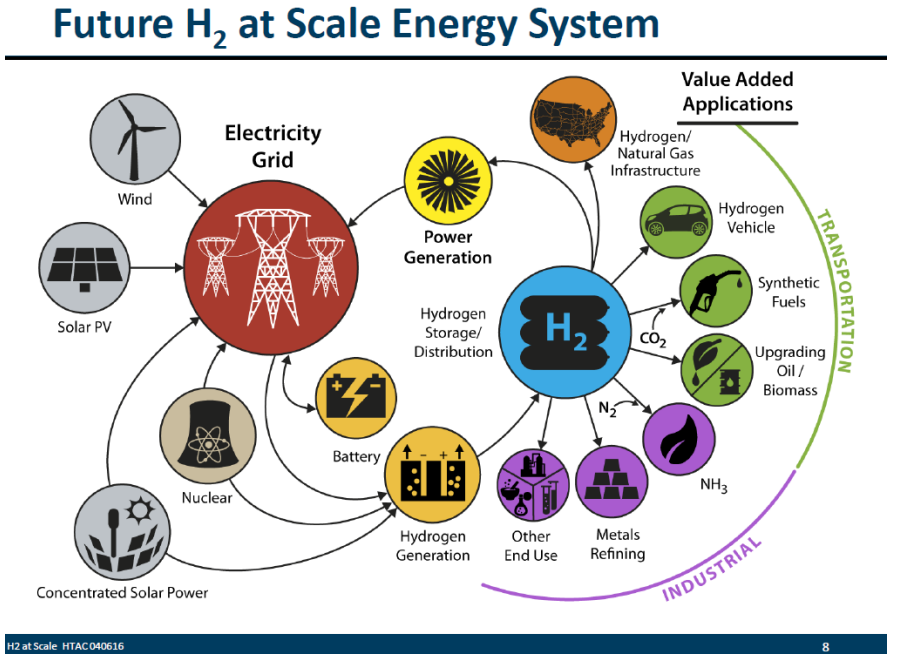
Must do ALL of these things . . . They are necessary, but NOT sufficient

CONSIDER THE "H_2 ECOSYSTEM" THAT . . .

- Delivers a petroleum-free fuel for **≤ $0.57** per Gallon Gas Equivalent
- Solves Electrical Grid Challenges from **Renewable Energy Deployment** (Solar, Wind)
- Maintains vehicle **range (300 - 400 miles)** & short **refueling times (≤ 3 minutes)**
- Doubles light vehicle fuel efficiency
- **Reduces CO_2 emissions 45%** by 2040
- Uniquely …
  - Enables **renewable grid**
  - **Provides Value**, where other solutions fail

H_2 @ Scale can enable all these things



Delivering VALUE with Hydrogen & Fuel Cells

OEMs can deliver these things

- . . . Fun-to-Drive Electric Vehicle
- . . . "Fast Charging Electric Vehicle"
- . . . Long Range, Zero Emission Electric Vehicle
- . . . Deliver competitive fuel cell costs

. . . Cross-Cutting Through Multiple Sectors

. . . "H_2 Ecoystem"

. . . Enabling Renewables . . . Cost Effectively

. . . Providing Sustainable & Affordable Fuel

. . . Flexibility

REQUIRES COOPERATION . . .

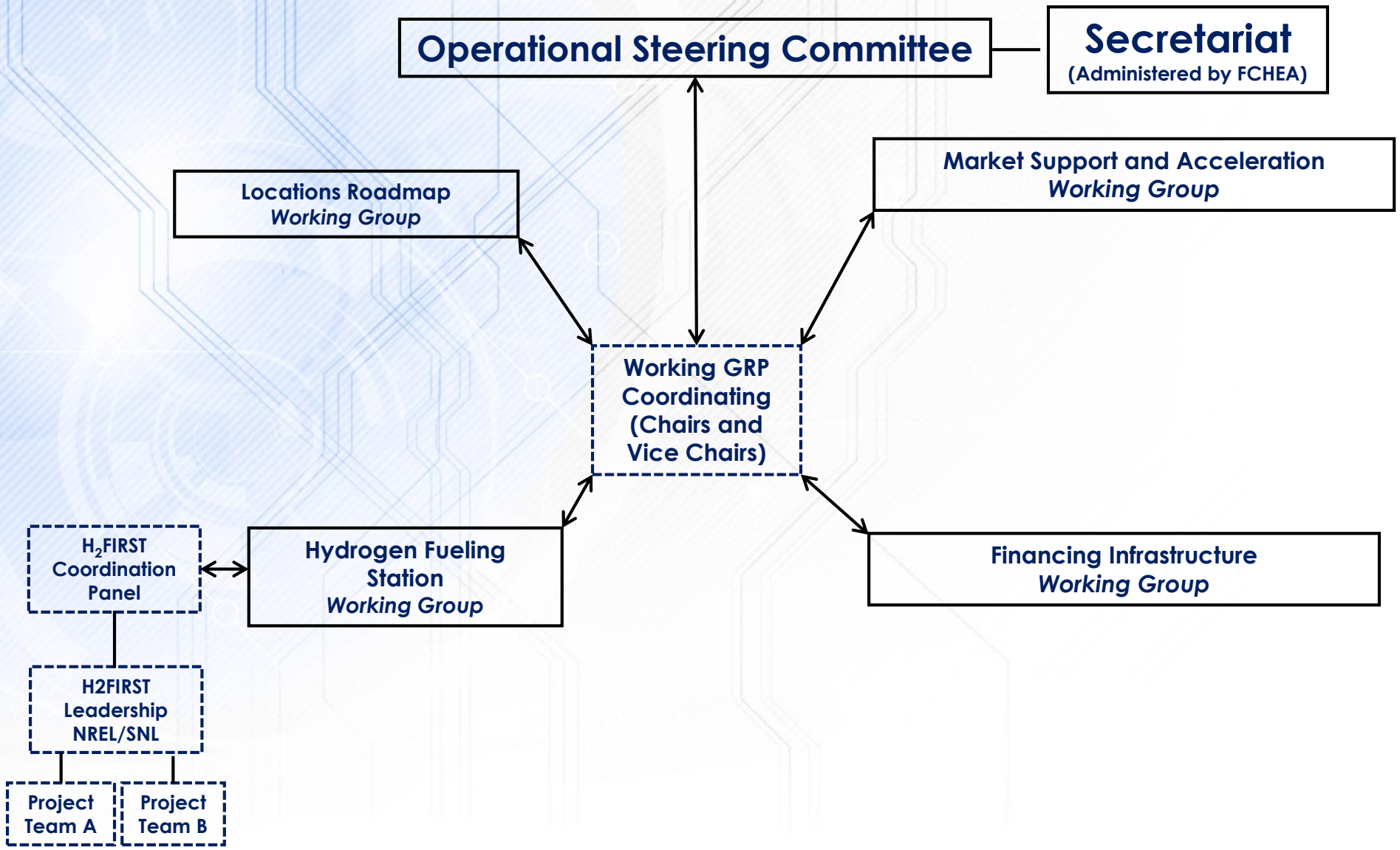
- Public – Private Partnership
- Between Multiple Government Stakeholders (Federal Departments, States, etc.)
- Between Competitors – “Coopetition”
- Cutting across traditional swim lanes
- Infrastructure & Vehicle Manufacturers
- Transportation & Stationary Systems

H_2USA

H_2USA can help enable all these things

H_2USA PARTICIPANTS - COOPERATION

H_2USA ORGANIZATION CHART



ACHIEVING SUSTAINABLE H_2 FUEL CELL TRANSPORTATION

KEY POINTS

1. CHANGE REQUIRES **CONSTANCY OF PURPOSE**

2. PRIORITIZE **VALUE EQUATION**
   - Compelling Vehicles
   - "H_2 Ecosystem"
   - H_2 @ Scale

3. **COOPERATE**
   - H_2USA