



CLARITY
FUEL CELL

***CAFCP Executive Board
Meeting
Sacramento, CA
October 18th, 2016***

**Stephen Ellis
American Honda Motor**





Vehicle & H2 Station Developments

Incremental Advancements and Symbiotic Relationship

Phase 1

2002



2004



Phase 2



Beginning of FCV for "The next 100 year's"

Phase 3

2017 Clarity Fuel Cell



Begin the pathway of "FCV's for Everyone"

Phase 4 (Honda/GM)



700 Bar Fuel System

- 300+ Mile Range
- 40 > 100 Stations in CA
- "Next 200" in CA
- Northeast Expansion

**Fed Govt
Investment and Tax
Policy Needed**

350 Bar Fuel System

- 240 Mile Range
- 3 > 5 Stations

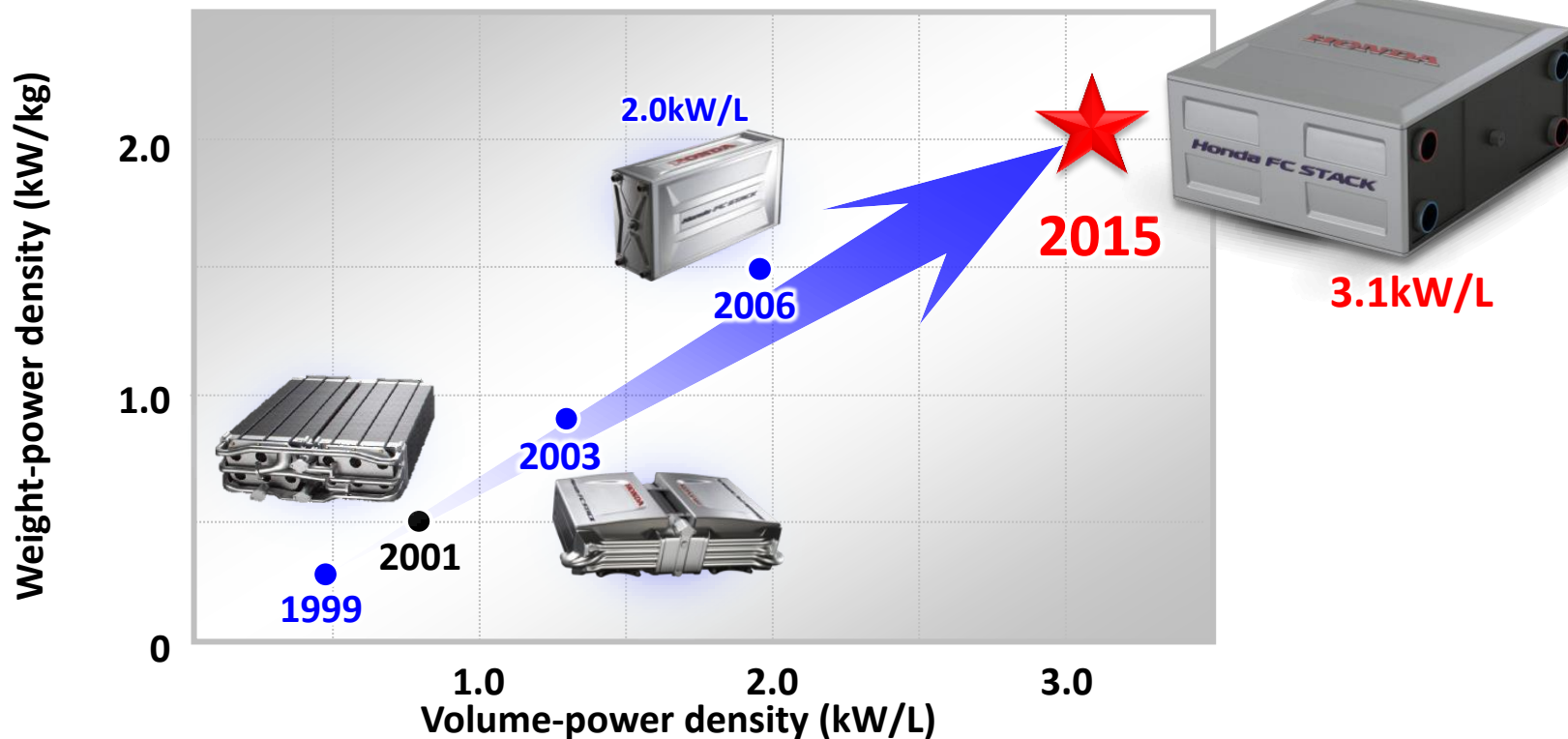
350 Bar Fuel System

- 160 > 180 Mile Range
- 1 > 2 Stations (Research)

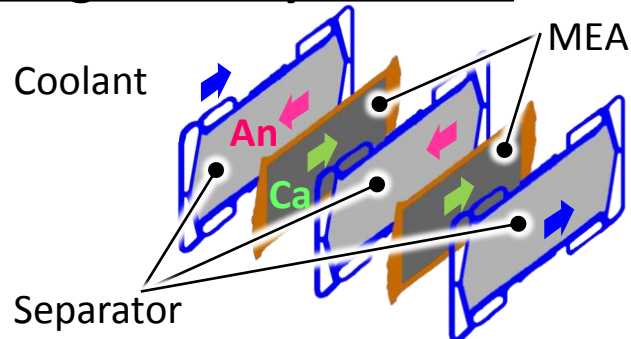


Technical proving test ⇒ New technology shows great promise.

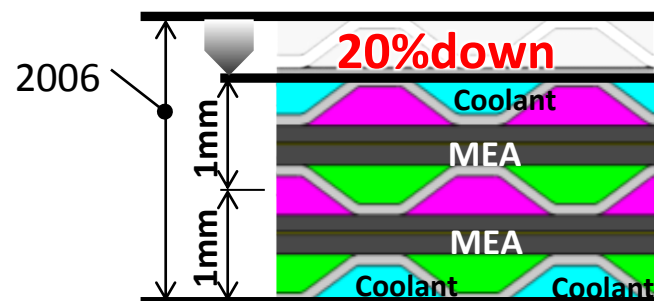
Achieved the world's highest output density



Cooling for every two cells

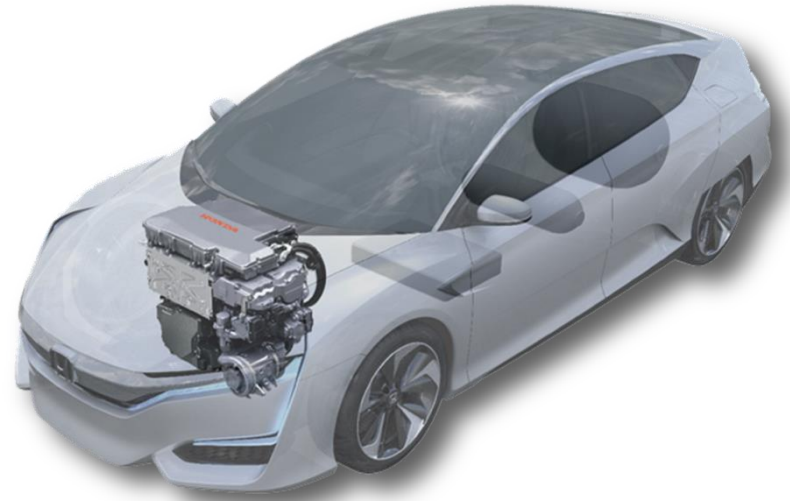
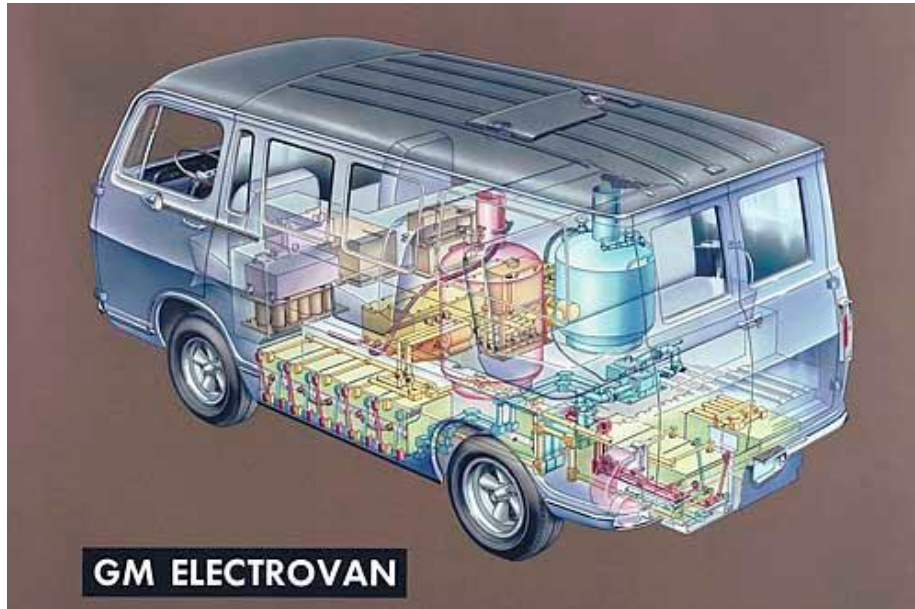


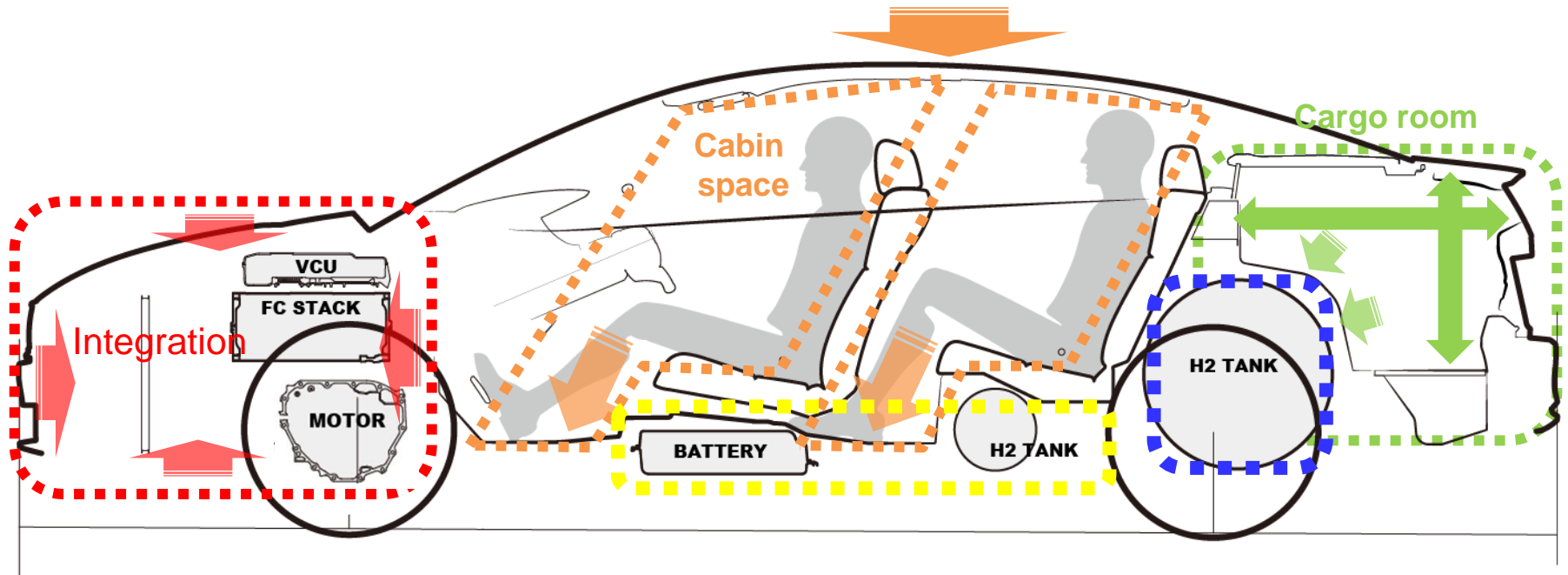
Cell thickness reduction



Cell thickness 1 mm \Rightarrow 20% reduction in stack size

Yes... Packaging Matters





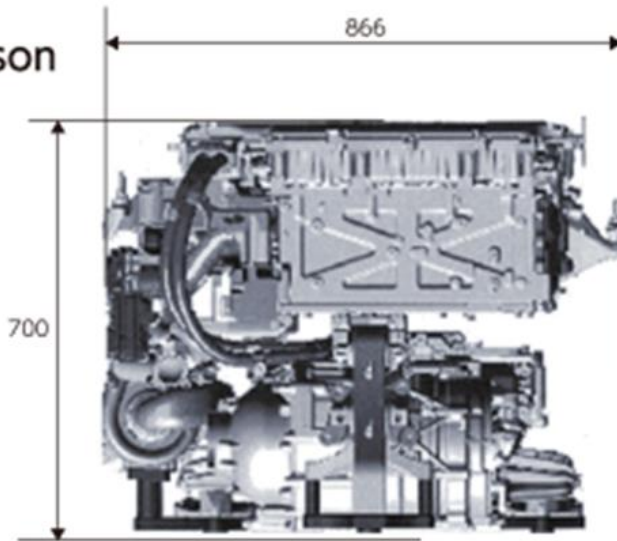
- Efficient packaging of the powertrain
- Energy absorbing structure for frontal collision.

- Place the battery and 2nd small H2 tank under the seats to maximize cargo space.
- Achieve both natural seating posture and low overall-height of a typical sedan.

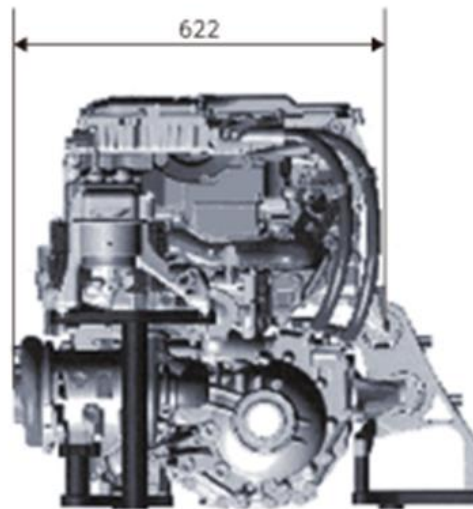
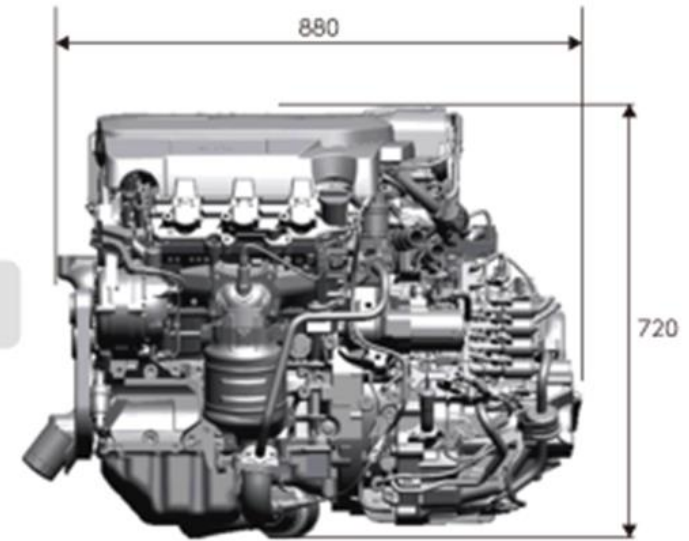
- Maximize cargo room and rear collision safety by placing the larger H2 tank under the cargo room floor.

Powertrain Size Comparison

Fuel Cell
Powertrain



3.5l V6
engine



units: mm

1. World's first sedan with a compact FC powertrain mounted under hood
2. High output electric motor for strong driving performance
3. Improved manufacturability for mass-production FCV





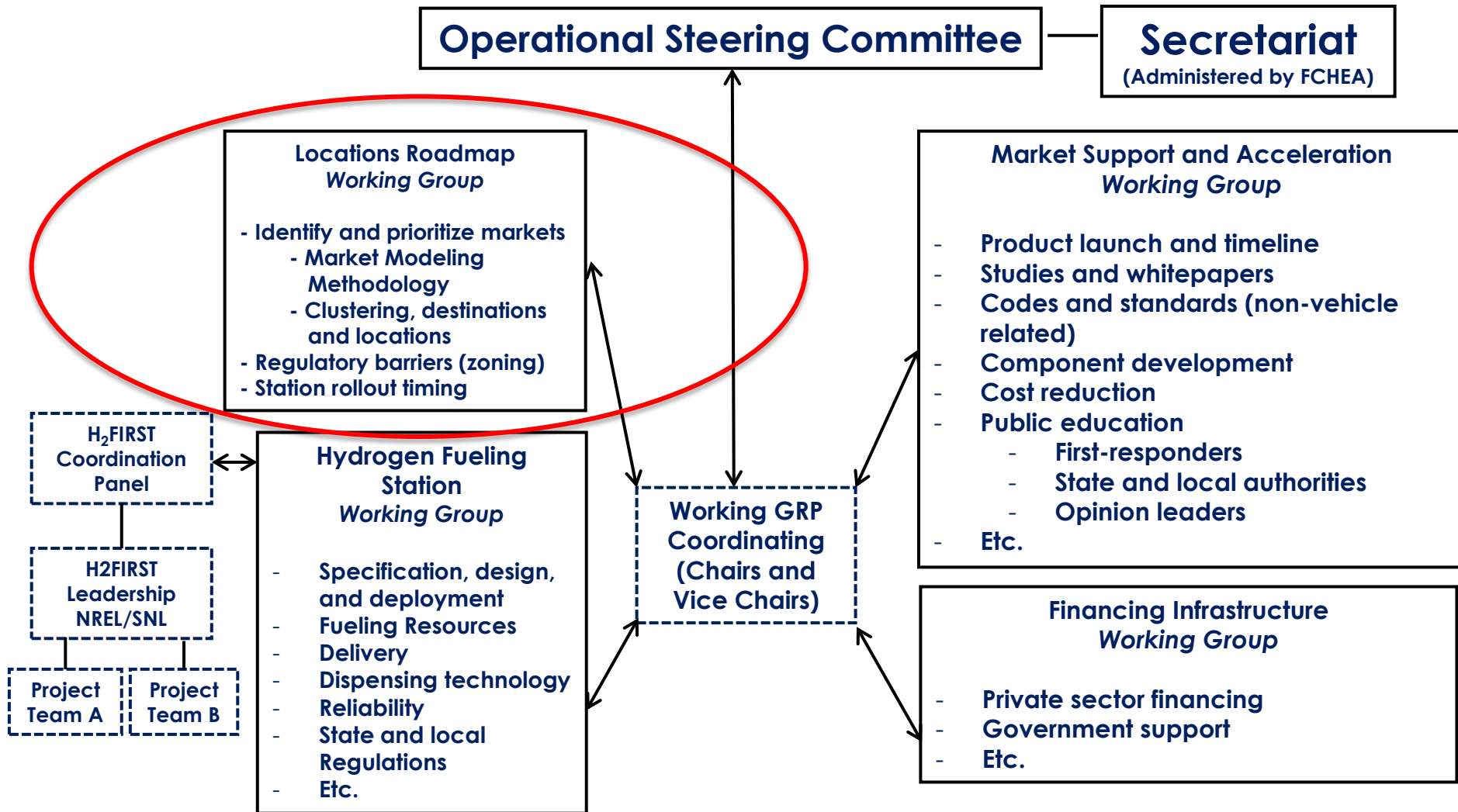
Station and Car Packaging for Success



H₂USA Participants



H₂USA Organization Chart



Locations Roadmap Working Group

- Three models utilized to provide a “toolkit” for states/ regulatory/ NGOs to answer : “How many stations, where, and when”
- Northeast Regional Fuel Cell Fleet Deployment Action Plan
 - Collaboration with the Connecticut Center for Advanced Technology
 - Evaluating northeast fleet potential infrastructure deployment scenarios, including locations, demand potential, job creation and timeframes
- Northeast Retail Modeling
 - Northeast retail consumer approach developed by University of California, Irvine
 - Based on STREET modeling
- National “Scenarios” Modeling
 - Collaboration with the National Renewable Energy Laboratory
 - Identifies criteria for a successful initial market and for potential to follow on market regions most suitable for FCEV adoption
 - Based on SERA Model (Scenario Evaluation & Regionalization Analysis)

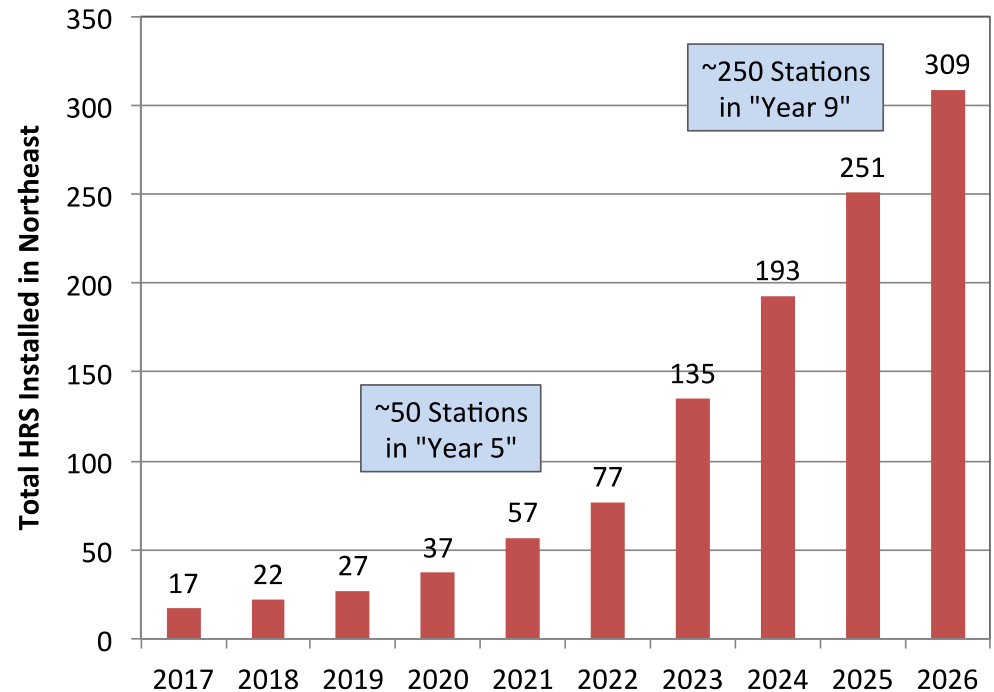
Summary Handout Content and Origin

- DRAFT: Created a 3-4 page handout developed by LRWG
 - Focus on Station Rollout Trends in Northeast
 - Visual Support Maps

H₂USA: Siting Refueling Stations in the Northeast

Handout Overview

- Modeling Hydrogen Refueling Station Deployment with STREET and SERA
- Station Growth over Time
- Modeled Distribution of Hydrogen Refueling Stations across the Northeast
- Deployment to both Retail & Fleets
- Station Clustering: New York Example
- Toolkit for States to further research their ideal pathway

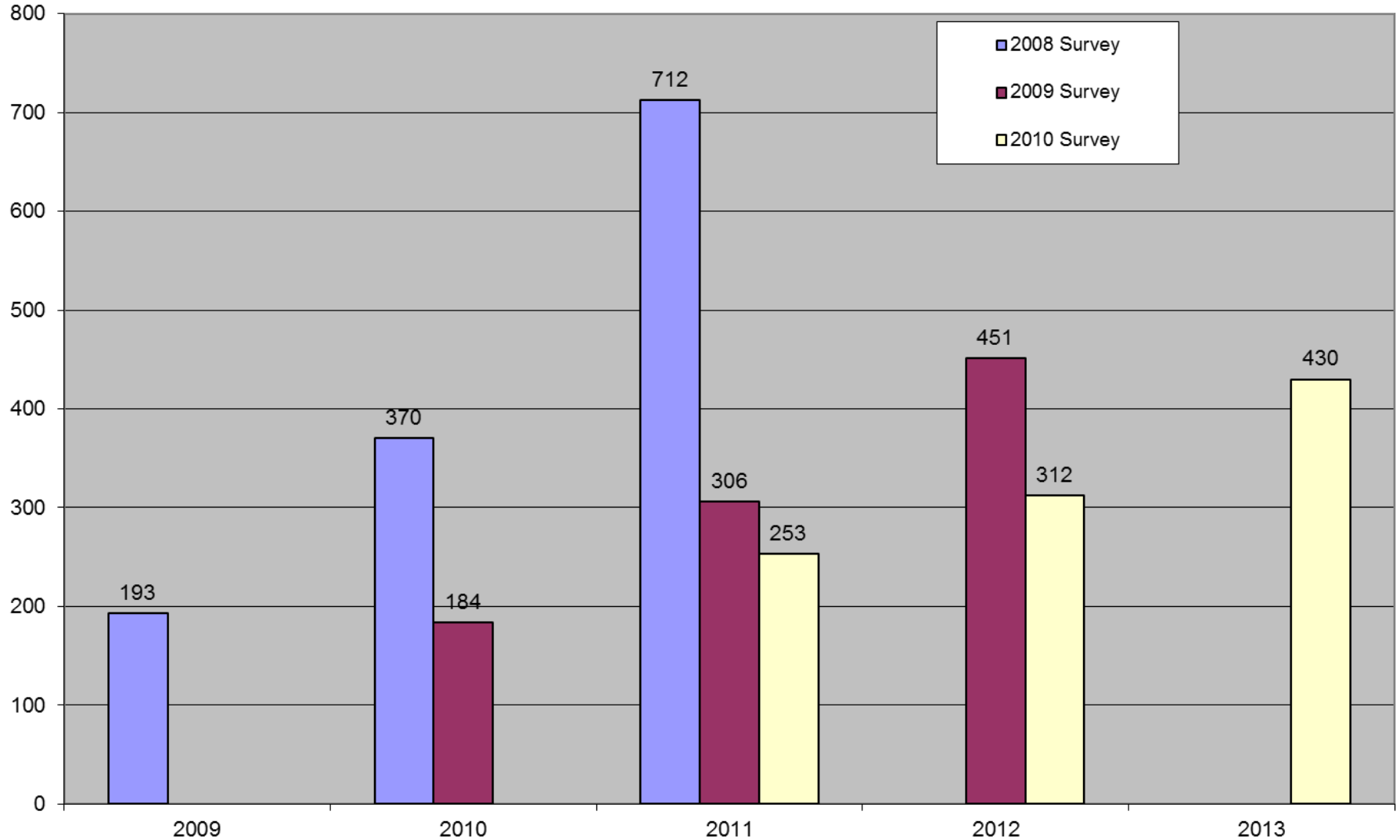


Stations by End of Year

Repeating History

Will uncertainty occur again beyond 100 stations?

OEM UIO Reporting Summary



What is Missing?

Lessons Learned – Teachers teaching students

- CAFCP as the laboratory to prove out “prototype” models
 - Adoption by other states is critical: Missing is the “willingness and motivation” to do so.

Funding Mechanisms

- State of CA “AB-8 Like Model” does not exist outside of CA
- Federal Govt. lack of clear, consistent funding for:
 - Vehicles (FCV Incentives are missing)
 - Stations (H2 Station incentives are missing)
 - Fuel + Fuel
 - Consumer fuel subsidy for lower cost
 - Renewable fuel subsidy for station owner
- **Vision for the next 20 years**
 - The “Puzzle Pieces” are there
 - CA must assist other states to put them together for the full picture and credible action.

3 Luxury Colors



WHITE ORCHID PEARL



BORDEAUX RED METALLIC



CRYSTAL BLACK PEARL

HONDA

The Power of Dreams