H_2USA Update

Department of Energy
Annual Merit Review Panel
Hydrogen Infrastructure
Thursday, June 19, 2014

H_2USA

H_2USA
Mission Statement

The mission of H_2 USA is to promote the commercial introduction and widespread adoption of FCEVs across America through creation of a public-private collaboration to overcome the hurdle of establishing hydrogen infrastructure.

Goals

- Establishing necessary hydrogen infrastructure and leveraging multiple energy sources, including natural gas and renewables
- Deploying FCEVs across America
- Improving America's energy and economic security
- Significantly reducing greenhouse gas emissions
- Developing domestic sources of clean energy and creating jobs in the United States
- Validating new technologies and creating a strong domestic supply base in the clean energy sector

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Signatories on the Letter of Understanding

U.S. Department of Energy

State of California

Northeast States for Coordinated Air Use Management

Air Liquide

American Gas Association

American Honda Motor Company

Argonne National Laboratory

California Fuel Cell Partnership

Association of Global Automakers

Center for Hydrogen Research

Chrysler Group LLC

Electric Drive Transportation Association

Fuel Cell & Hydrogen Energy Association

General Motors Holding LLC

Hydrogenics

Hyundai Motor America

ITM Power

Massachusetts Hydrogen Coalition

National Renewable Energy Laboratory

Mercedes-Benz USA, LLC

Nissan North America R&D

Toyota Motor North America

PDC Machines

Plug Power Inc.

Proton Onsite

Sandia National Laboratories

Savannah River National Laboratory

Pacific Northwest National Laboratory

SCRA

Nuvera

Linde North America

National Association of Convenience Stores

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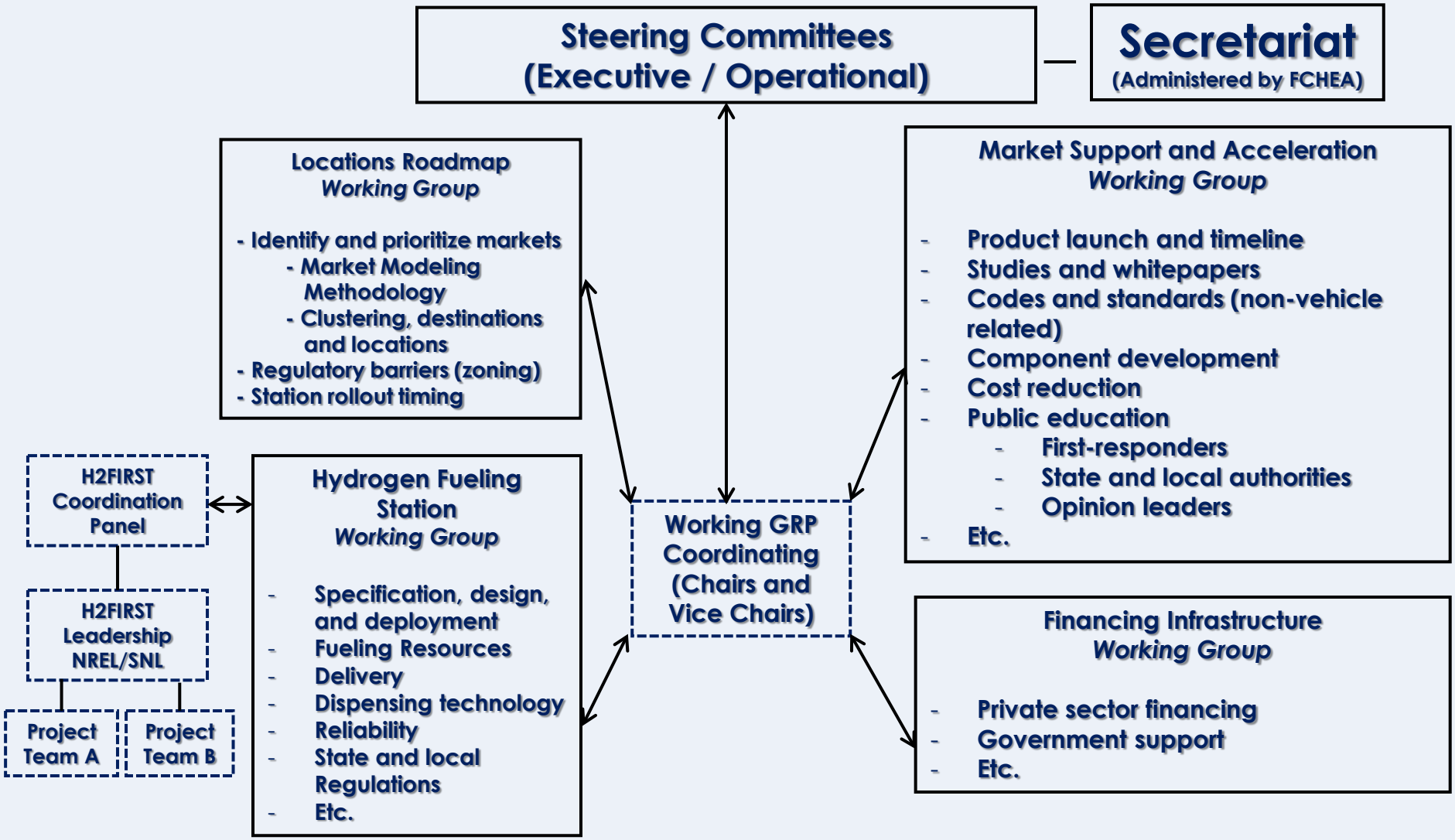
H_2USA Organization Chart



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Market Support & Acceleration Working Group (MSAWG)

Chair - Bob Wimmer (Toyota)

Co-Chair - Genevieve Cullen (Electric Drive Transportation Association)

Co-Chair - Will (Charles) James (US DOE, SCS)
Jay Keller – Alternate (Zero Carbon Energy Solutions)

Staff Liaison – Jay Keller (H_2USA)

H_2USA Full Participant Meeting
Washington Marriott Wardman Park Hotel
June 19, 2014

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MSAWG Objectives

- **Develop materials and resources for public and stakeholder education**
  - **H_2USA, hydrogen infrastructure, business cases …**
- **Create out-reach resources for H_2USA**
  - **Website**
  - **Frequently Asked Questions (FAQ)**
  - **Standard presentation slide deck**
    - **For use by H_2USA staff and Working Groups (WG)**
- **Coordinate joint WG Task Force(s) to work on items of mutual concern – for example: RC&S**
- **Facilitate efforts to site H_2 fueling in Washington DC.**

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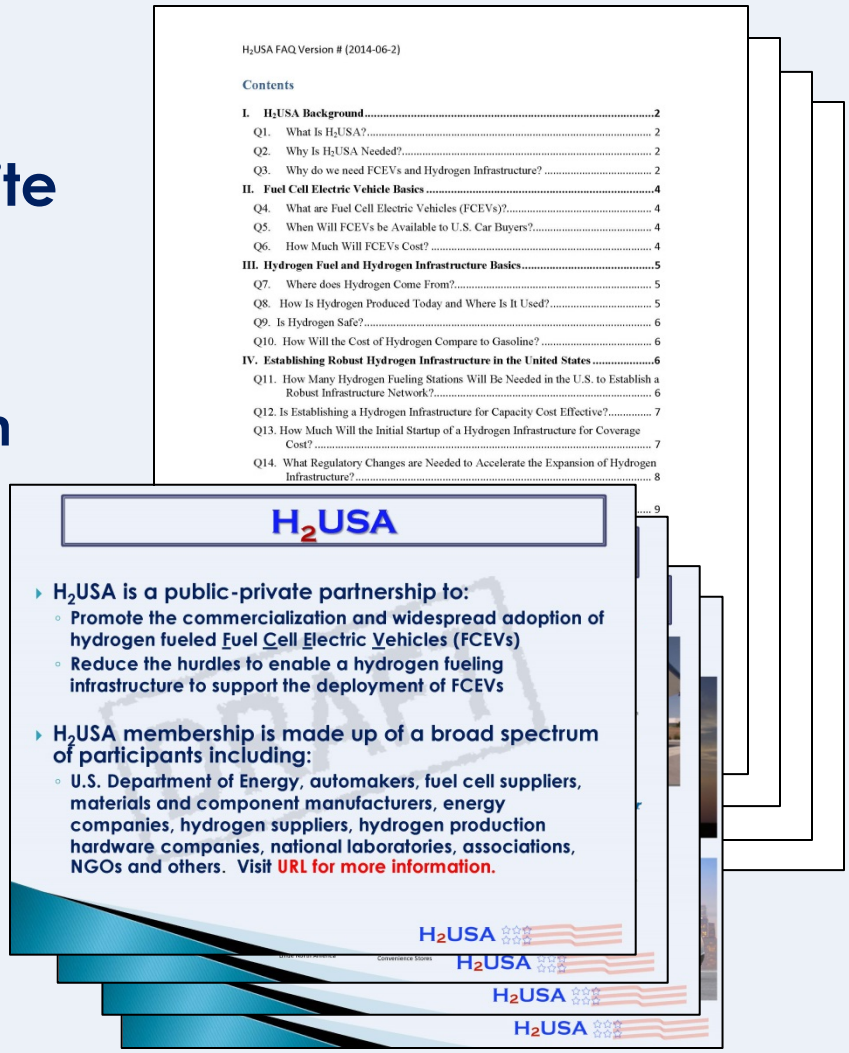
MSAWG Activities

- **Outreach Task Force**
  - **Completed FAQ for H_2USA website**
  - **PowerPoint slide deck with FAQ foundation for use in:**
    - **Stakeholder briefings & education**
    - **Public briefings & educations**
    - **Posting on H_2USA public website**
  - **Increase visibility of FCEVs in the DC area**
    - **Enabling fueling station**
  - **Created internal and external H_2USA website**



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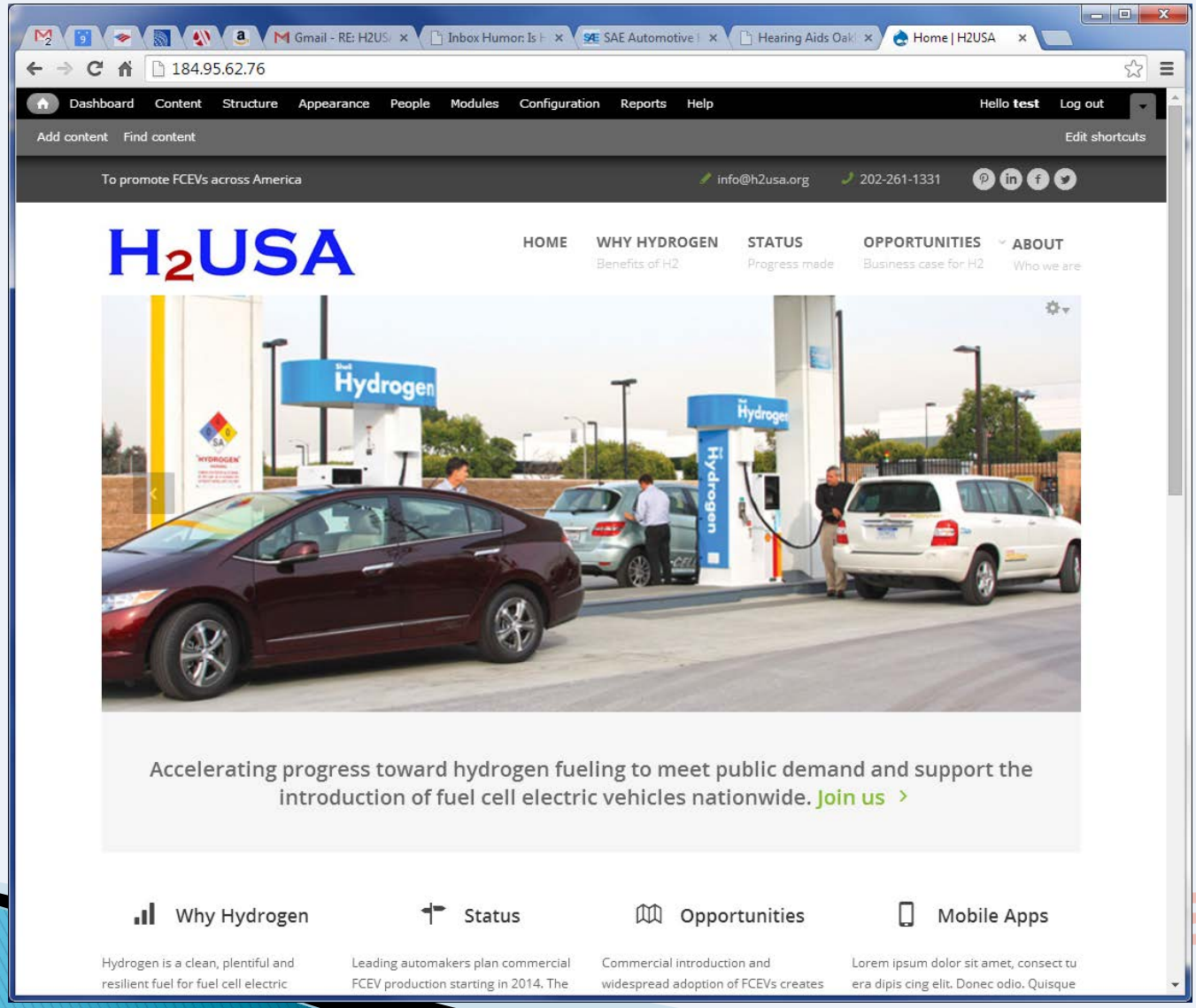
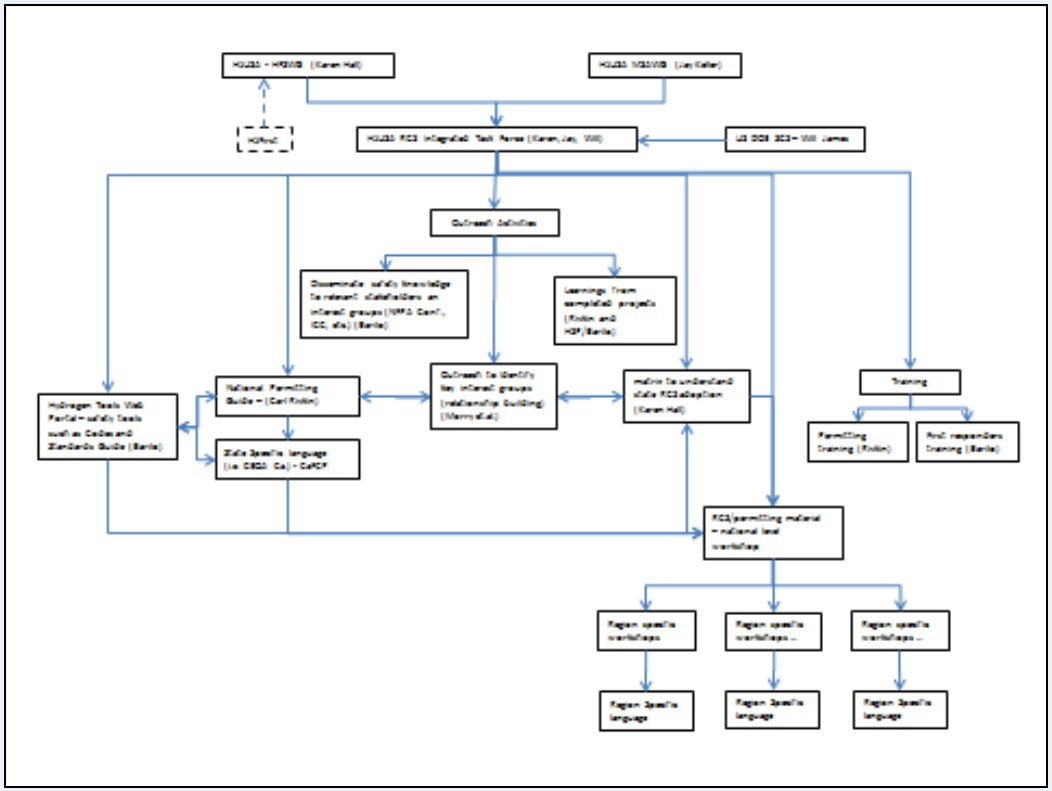
MSAWG Activities

- **H_2USA website**



MSAWG Activities

- **Codes & Standards Task Force**
  - **Integrating RCS activities to develop station permitting guides (H_2USA, DOE, FCHEA)**
  - **Creating a joint task force between HSWG and MSAWG to coordinate Regulations Codes and Standards (RCS) and Permitting activities.**



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MSAWG Activities

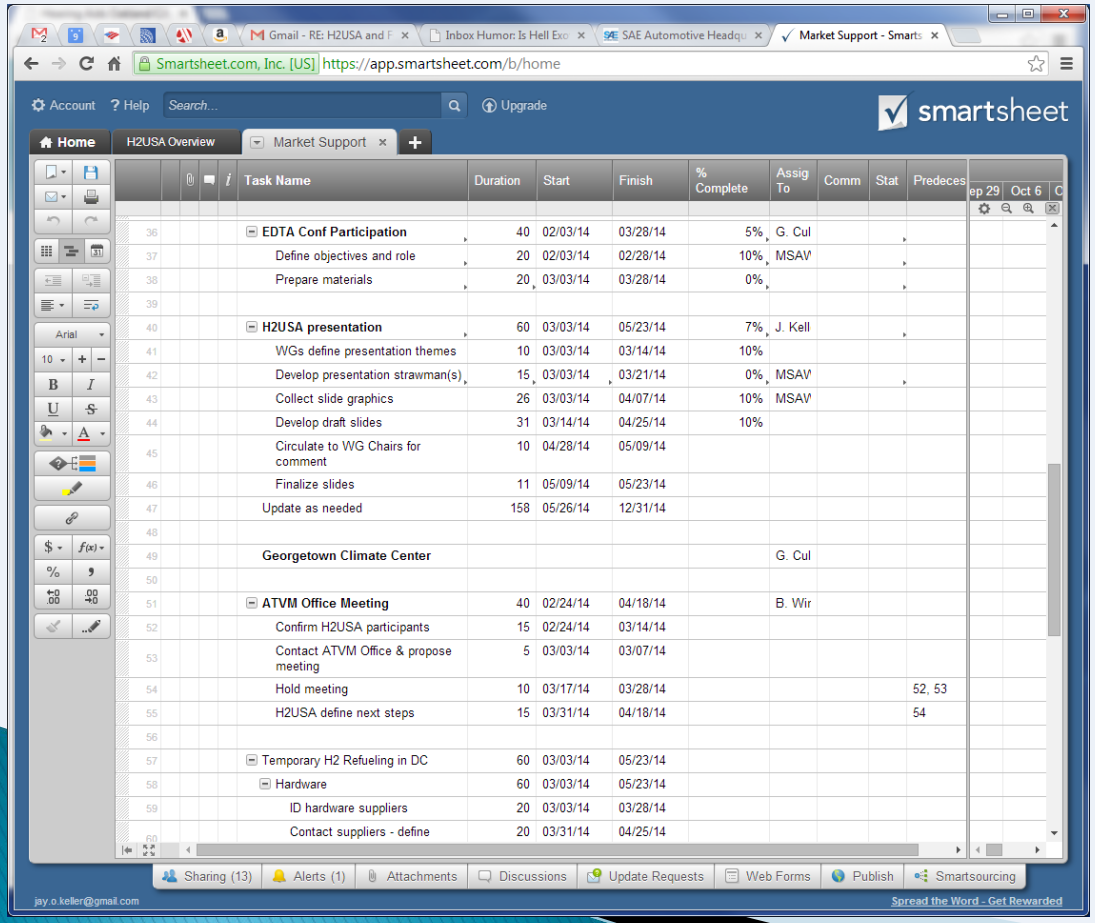
- ~2 year refueling station requested in DC by H_2USA.
- National Park Service (NPS) and DOE FCTO working on interagency plan
- Operational 1st Qtr. 2015 (Target)
- Two sites evaluated:
  - E. Potomac Park (constrained)
  - Brentwood NPS maintenance facility (selected)

- Brentwood advantages:
  - 24 x 7 security
  - Room for tube trailer(s) & dispenser
- Next Steps:
  - Letter from FCTO to NPS for:
    - refueling frequency
    - personnel access
    - fuel truck specifics
- DOE POC – Pete Devlin

Two views of the selected site

MSAWG Activities

- **MSAWG identified the need for a project management tracking tool to coordinate and track H_2USA WG activities**
  - **Selected a web based tool**



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Investment & Finance Working Group

- **Incentives Task Team**
  - Developed, distributed, solicited and received responses to DOE's RFI
  - NREL organized and consolidated key RFI strategy into five recommended financial scenarios
  - NREL developed analysis methodology and reporting metrics for subsequent scenario analysis
  - Based on input from I&F WG, NREL is further analyzing each scenario to determine viable strategies
- **Leadership Task Team**
  - Outreach to the Investment Community
    - Developed potential investor contact list
    - Made multiple presentations about H2USA to investment professionals
    - Successfully recruited one investment company professional to join H2USA and the Investment & Finance WG
  - Expanded the capabilities of the WG
    - Developed an Investment & Finance Glossary of Terms
    - Invited an investment professional to speak at June 11th WG meeting

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HFSWG – Charter & Scope

- **Conduct technical activities that support actionable and economical H2 station deployment plans for individual regions of the USA**

- **Scope of Activity:**
  - Investigate station cost & utilization issues
  - Facilitate station equipment improvement component R&D efforts
  - Address improvements and barrier removal in regulations, codes & standards
  - Coordinate on regional station metrics information

Mindset:

No academic studies.

Directly serve the needs of those working to deploy H2 stations

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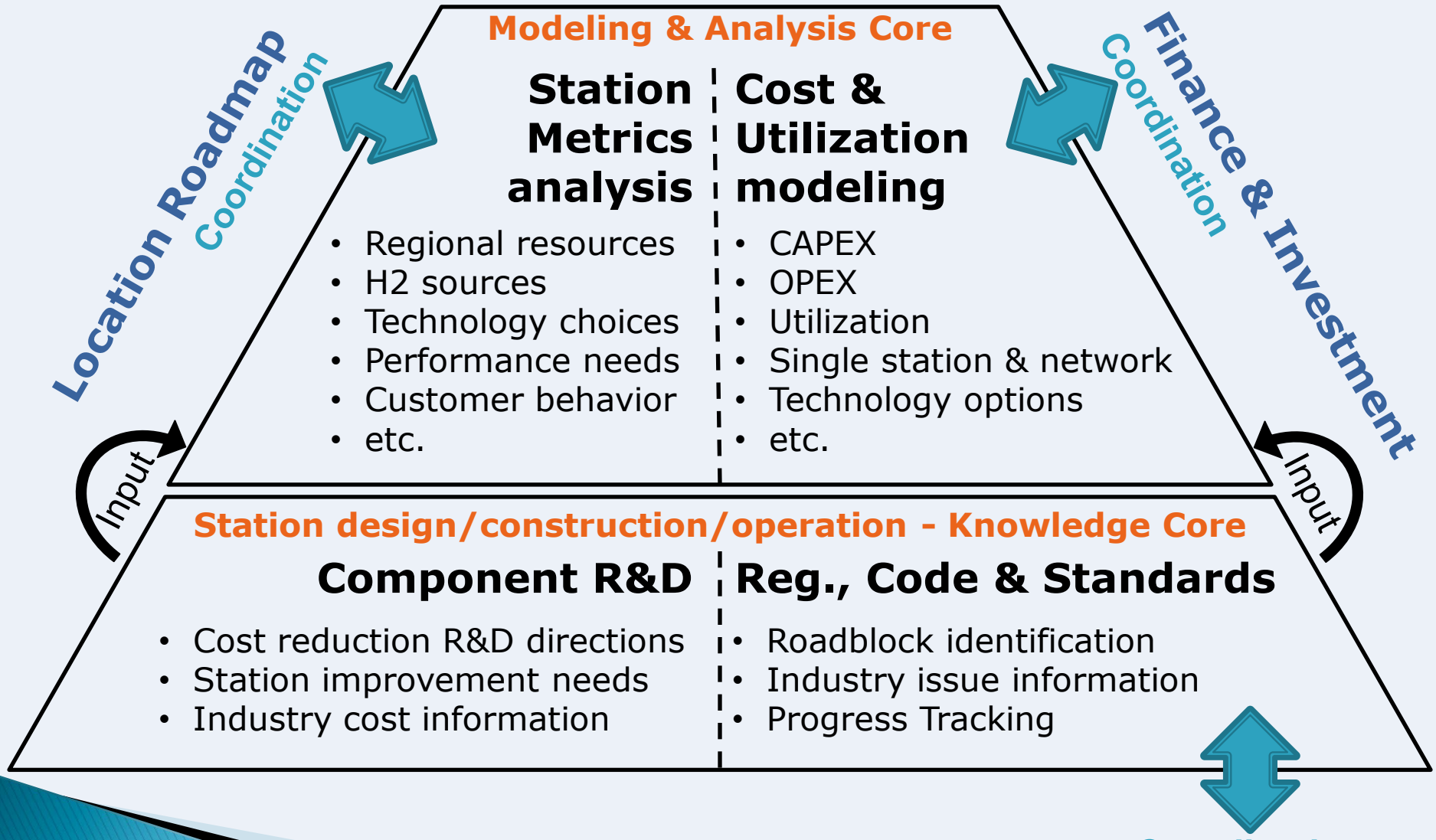
Internal HFSWG Task Team Structure



HFSWG Members

Analysis

- Argonne National Laboratory
- NREL National Renewable Energy Laboratory
- Sandia National Laboratories

Stations

- Air Liquide
- Hydrogenics — Shift Power | Energize Your World
- ITM Power — Energy Storage | Clean Fuel
- The Linde Group — Linde
- NACS National Association of Convenience Stores
- Nuvera — Making hydrogen make sen
- PDC
- Proton — The Leader in On Site Gas Generation.

Regions

- California Fuel Cell Partnership — Driving for the Future
- Fuel Cell & Hydrogen Energy Association
- Massachusetts Hydrogen Coalition

New Members

- The Great Seal of the State of California
- NESCAUM

Users

As Proxy for Customers

- Honda — The Power of Dreams
- Nissan
- Mercedes-Benz

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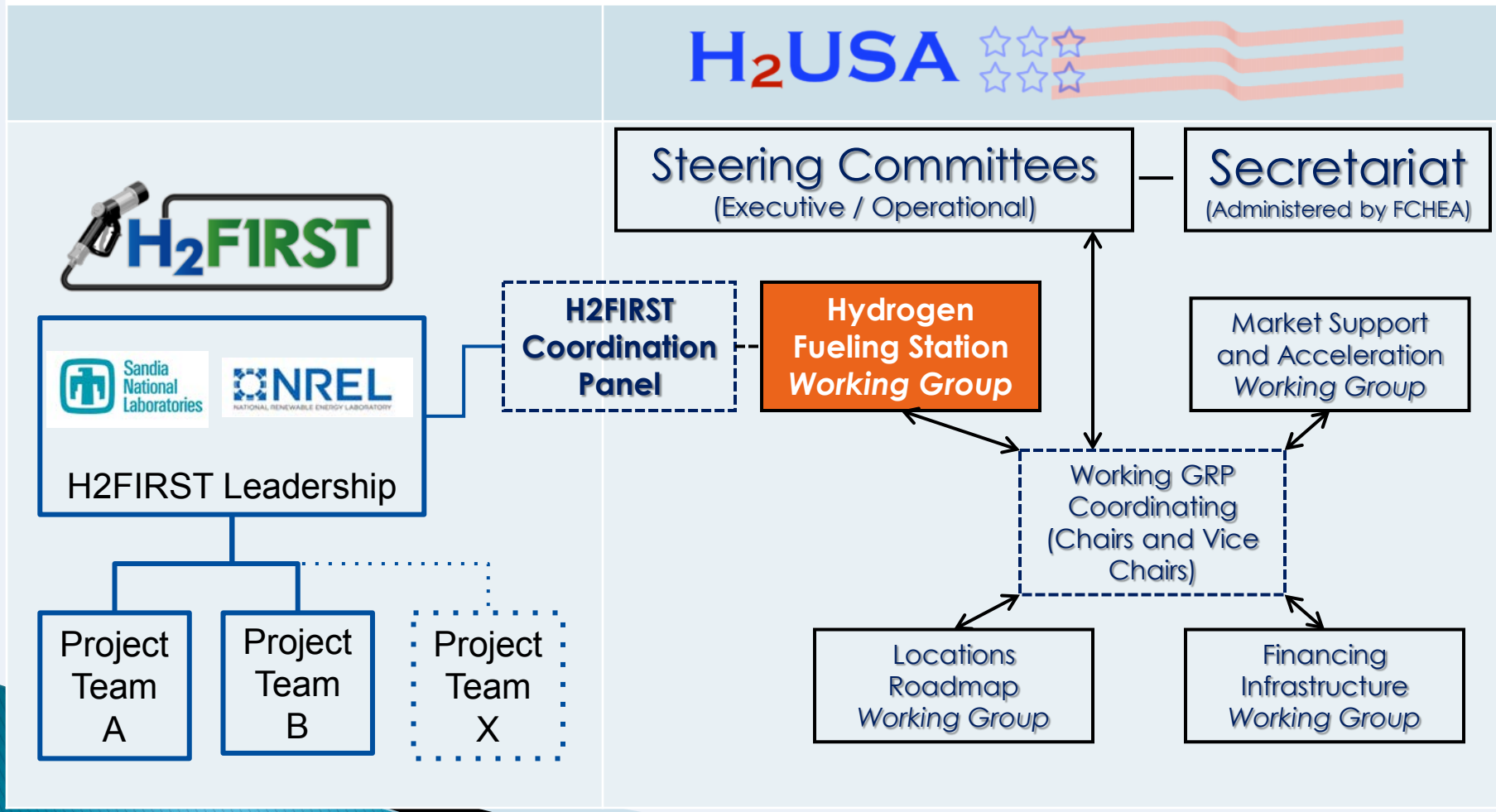
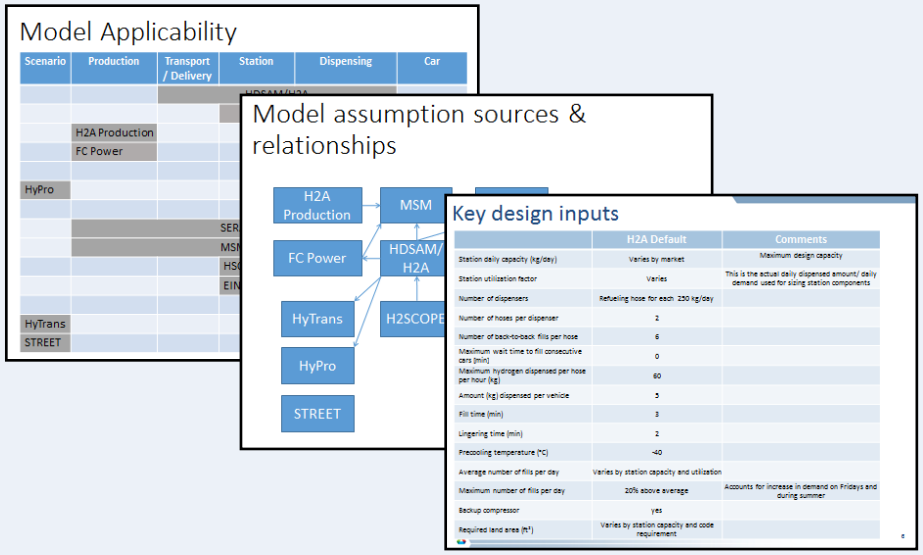
H2FIRST Resource

Government & Industry Strategy & Coordination Activity



Cost & Utilization Modeling Activity

- **Reviewed Cost & Utilization modeling tools**
- **Developing Near-term modeling assumptions**



- H2FIRST Activity started
  - **Reference Stations**
    - Improve station components and design by identifying gaps and generating example designs through industry feedback and modeling

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Component R&D Activity

- **Questionnaire of station operators to identify specific issues for H2USA support and summarize exiting DOE funded projects.**

Kano Survey of Station Operators H2USA

The stations working group focused on current station operators to find the issues that concern them the most.

Attribute	Preference	Quantitative measure
Mean time to repair	Must Have/Linear	2 hours max outage
Equipment standardization	Exciter	Dispensers
Fill Time	Linear/Exciter	<5 minutes
Back to Back Fills	Linear	5-20 fills
Metering Accuracy	Linear	<3% error
Chiller Reliability	Linear	1 year desired service interval
Dispenser Reliability	Linear	6 months desired service interval
Controls Reliability	Linear	6 months desired service interval
Onsite Production Reliability	Linear	1 year desired service interval
Sensor Reliability	Linear	6 months desired service interval
Fitting/Valve Reliability	Linear	3 months-3 years desired service interval

- H2FIRST — Developing scope & funding strategy
  - **Fuel Contamination Detector**
    - Develop cost effective, deployable, inline fuel quality system
  - **Research Dispenser**
    - Cost reduction and reliability improvements through component and fueling technique enhancements
  - **Station Acceptance**
    - Accelerate station acceptance by developing, validating and implementing test methods and hardware for capacity and performance testing of commercial hydrogen stations

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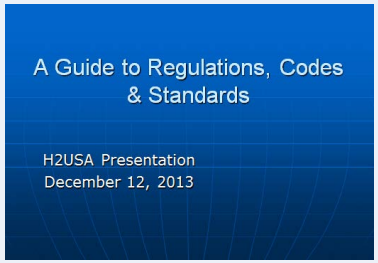
Reg, Code & Standard Activity

- **Developed Layman's overview of codes & standards for new website**



- **Working on matrix of adopted codes in early FCEV launch markets of interest to H2USA**

- H2FIRST Developing scope & funding strategy
  - **Technical Assistance**
    - Flexible, responsive, team of technical experts and facilities to solve urgent/unexpected challenges for hydrogen stations

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HFSWG Future Directions

Task Team	Upcoming Activity	H2USA 2020 Goals
Cost & Utilization	Provide near-term station economic information for planning & investment activity	Stations being Commissioned & Profit model is sound
Component R&D	Catalyze & support H2FIRST activities to lower costs and make improvements	
Station Metrics	Work with Location Roadmap group on regional planning	Multiple Markets/Clusters have stations developed
Reg, Code & Std	Facilitate improvements & adoption of latest codes to support station deployment	

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Locations Roadmap Working Group

- **Automaker Surveys/OEM priorities**
  - Developed and distributed survey and transmittal letter for OEM data
  - Developed procedure for secure transmittal of data

- **Identify Market Potential**
  - Identified metropolitan statistical areas and urban areas through US
  - Identified existing hydrogen users, providers, fleets in northeast US
  - Developed series of maps for New York, Massachusetts, and Connecticut as examples of preliminary roadmaps
  - Analyzed data to identify potential regional deployment of FCEVs and hydrogen refueling infrastructure

H2USA Timeline

- 2015
  - Image of Vehicle Volume is Communicated
- 2020
  - Multiple OEM's Deploying Vehicles
  - Multiple States are Adopting FCEVs
  - Multiple Markets/Clusters are Developed
  - Multiple Investors are Funding Stations
  - Profit Model is Sound for Station Developers
  - Profit Model is Sound for Independent Station Owners

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Examples of WG Activities

- 2014
  - SmartSheet Input Sharing – Target Q2
  - Creation of Tool Box – Target Q2
  - Key Elements for Business – Target Q2
    - Customer Demographics, State motivation, etc.
  - Website / Outreach Material - Target Q2
  - OEM Market Decisions Made – Target Q3
  - State / Local Outreach – Target Q3 and Q4
  - Fueling Capability in DC Metro Area – Target Q4
  - Event Planned at LA Auto Show
  - Situational Analysis

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Thank You