



# Vehicle Retrofit

ARPA-E NG Vehicles Workshop  
Afternoon Breakout

1/26/2012

# Session Readout, Group 2: Passenger NG Vehicle Retrofit

## High Level Solution

- Logistical challenge of retrofitting existing vehicles is enormously difficult. (Existing vehicles are not immediately compatible.)
- Need universal retrofit kit (must work on all vehicles for speed and scale)
- OEM collaboration critical (access to the computer and other design aspects)
- Focus on common components in all vehicles (air filter, spark plugs, etc.)

## Implications for Technical Areas

**Key Challenge:** Make existing vehicles compatible with natural gas

- Ensure reliability of engines (Key task: Harden valves)
- Safety standards
- Vehicle computer system compatibility
- Emissions Compliance & Certification
- Methane slip
- Exhaust gas catalyst retrofit

**Key Challenge:** Fuel Tank Innovations

- Conformable tank
- Leak detection
- Where do you put the tank?
- Adsorbent material in tank
- Decommissioning and tracking end-of-life gas cylinders (RFID Tech)

**Key Challenge:** Fuel Stations

- New Station Designs
- Decommissioning and tracking end-of-life gas cylinders
- New home refueling systems
- Integrated plug-n-play systems

# Session Insights, Group 2: Passenger NG Vehicle Retrofit

- **Necessity could accomplish this with existing technology**
  - Economics, Safety, Emissions, Engine reliability would suffer
  - However, without very strong incentive, 10 year time horizon for full deployment is not realistic...enormous (& expensive) logistical challenge.
- **Short term vs. Long term**
  - An accelerated retrofit approach would not be the final solution
  - Retrofit activities could prompt OEM involvement
- **Component (and NG) availability is difficult**
  - Certification driven to some degree
  - Type I tanks only option at first

# Session Process, Group 2: Passenger NG Vehicle Retrofit

- **How did you come to your solution?**
  - Universal retrofit kit
  - National-level communication and buy-in critical
- **What was the composition of your team?**
  - OEM involvement critical immediately (knowledge of existing vehicles)
  - Existing NG conversion companies
  - NG and Vehicle Trade Associations
- **What techno-economic solutions would break paradigm?**
  - What would break the CNG reliance?
    - ANG (low pressure storage would fundamentally change the solution)
  - Gas to Liquids
  - Conformable Carbon Fiber Tanks (Low Cost)