

Hydrogen and Fuel Cell Applications Components-Infrastructure

CSA Standards
November 16, 2009

Agenda

- Introduction
- Hydrogen Standards Activity
- Commercialization-issues
- Questions

CSA GROUP Operating Divisions



OnSpeX

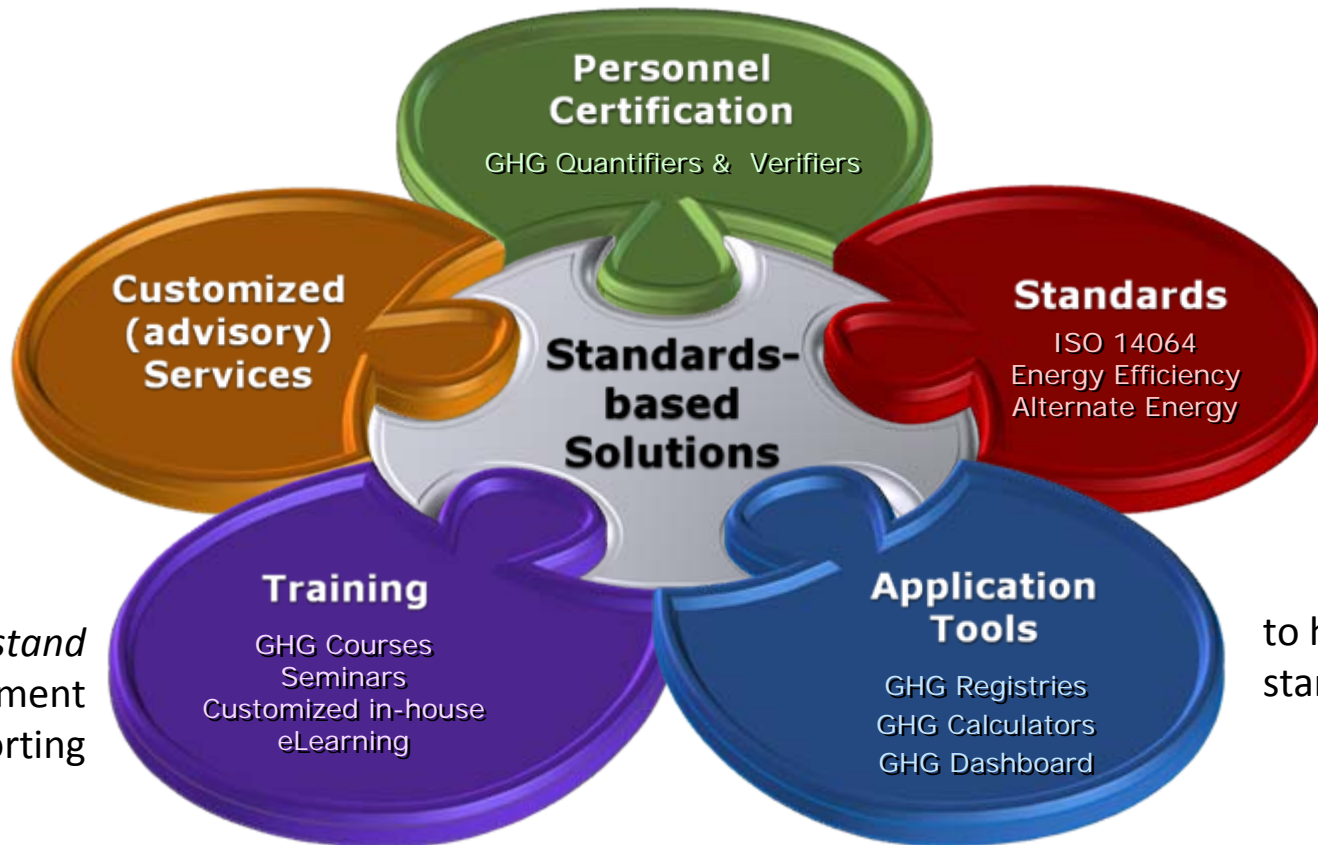
CSA
International

CSA Standards-based Solutions for GHG Management

to help *certify* consistent skill sets

To define a carbon footprint and *implement* a Carbon Management Plan

to help *understand* GHG measurement and reporting



to help *set rules*

to help *apply* standards

Helping to Meet the Climate Change Challenge

At CSA Standards, our goal is simple: To provide you with solutions that makes your environmental management easier.

We offer the unique, multi-functional perspective and resources needed to develop products and services to drive development, commercialization and verification of practical and effective climate change solutions.

CSA Standards is a respected worldwide leader in standards development and has been instrumental in developing international environmental and carbon management standards. On behalf of the Standards Council of Canada (SCC), CSA Standards holds the Secretariat for the committee that developed the ISO 14000 environmental management and ISO 14064 climate change standards. CSA Standards also manages the Canadian Advisory Committees that provide input to other international environmental standards activities.

CSA Standards offers a suite of GHG Management products, services and tools to help your organization make the journey to carbon neutrality.

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Advisory Services

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Climate Change

visit: www.csa.ca/climatechange

What we do...

Make standards come to life



CSA Standards' Focus on Hydrogen

- Hydrogen Dispensers and Related Equipment
- Hydrogen Fueling System
- Hydrogen Fittings
- Pressure Relief Devices
- Components
- Vehicle Containers

8 Documents Published

Infrastructure Equipment and Components

- Compressed Hydrogen Dispensers (CSA America HGV 4.1)
- Hoses and Hose Assemblies (CSA America HGV 4.2)
- Breakaway Devices for Hoses (CSA America HGV 4.4)
- Priority and Sequencing Equipment (CSA America HGV 4.5)
- Manually Operated Valves (CSA America HGV 4.6)
- Automatic Pressure Operated Valves (CSA America HGV 4.7)
- Hydrogen Fittings, (CSA America HGV 4.10)

On-board Vehicle Equipment and Components

- Pressure Relief Devices for Compressed Hydrogen Vehicle Fuel Containers (CSA America HPRD1)

TIR Drafts Anticipated

Infrastructure Equipment and Components-December 2009

- Fueling Parameter Verification (CSA America HGV 4.3)
- Hydrogen Gas Vehicle Fueling Station Compressor (CSA America HGV 4.8)
- Hydrogen Fueling Station Guideline (CSA America HGV 4.9)

On-board Vehicle Equipment and Components-March 2010

- Fuel System Components for Hydrogen Vehicles (CSA America HGV 3.1)
- Compressed Hydrogen Gas Vehicle Fuel Containers (CSA America HGV 2)

Material Compatibility standard- ???

- Test Method for Evaluating Material Compatibility in Compressed Hydrogen Applications (CSA America CHMC 1)
- CSA Standards and SAE co-SDO activity
- CSA Standards Lead
- Scope: develop a generic method to evaluate performance of materials in hydrogen applications under the temperatures and pressures anticipated in service. This document is not component specific.

Powered Industrial Truck Applications

Areas requiring investigation:

- Cycle life
- Cycling frequency
- Hydrogen storage capacity
- Duty cycles
- Design life
- Removal from service
- Fueling parameters

Powered Industrial Truck Applications

On-board Vehicle Equipment and Components

- Compressed Hydrogen Powered Industrial Truck On-board Fuel Storage and Handling Components (CSA America HPIT 1)

Infrastructure Equipment and Components

- Compressed Hydrogen Station and Components for Fueling Powered Industrial Truck (CSA America HPIT 2)

Interested in Participating? Please contact:

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Path to Commercialization

Key industry issues

- Build capacity (both vehicle and station)
- Provide consistent method for permitting evaluation
- Support local regulators during the permitting process
- Establish weights and measures meter evaluation
- Establish annual inspection evaluation process

Coordination of Hydrogen Industry Standards---Codes----Regulations North America-Globally

SAE International Fuel Cell Interface Working Group and CSA Standards have been working in tandem to arrive at common station and vehicle refueling protocols and performance verification.

International Code Council (ICC)

National Fire Protection Association (NFPA)

Hydrogen Industry Panel on Codes (HIPOC)

NIST U.S. National Working Group

What we do...

Make standards come to life

To help
implement
a
best practices



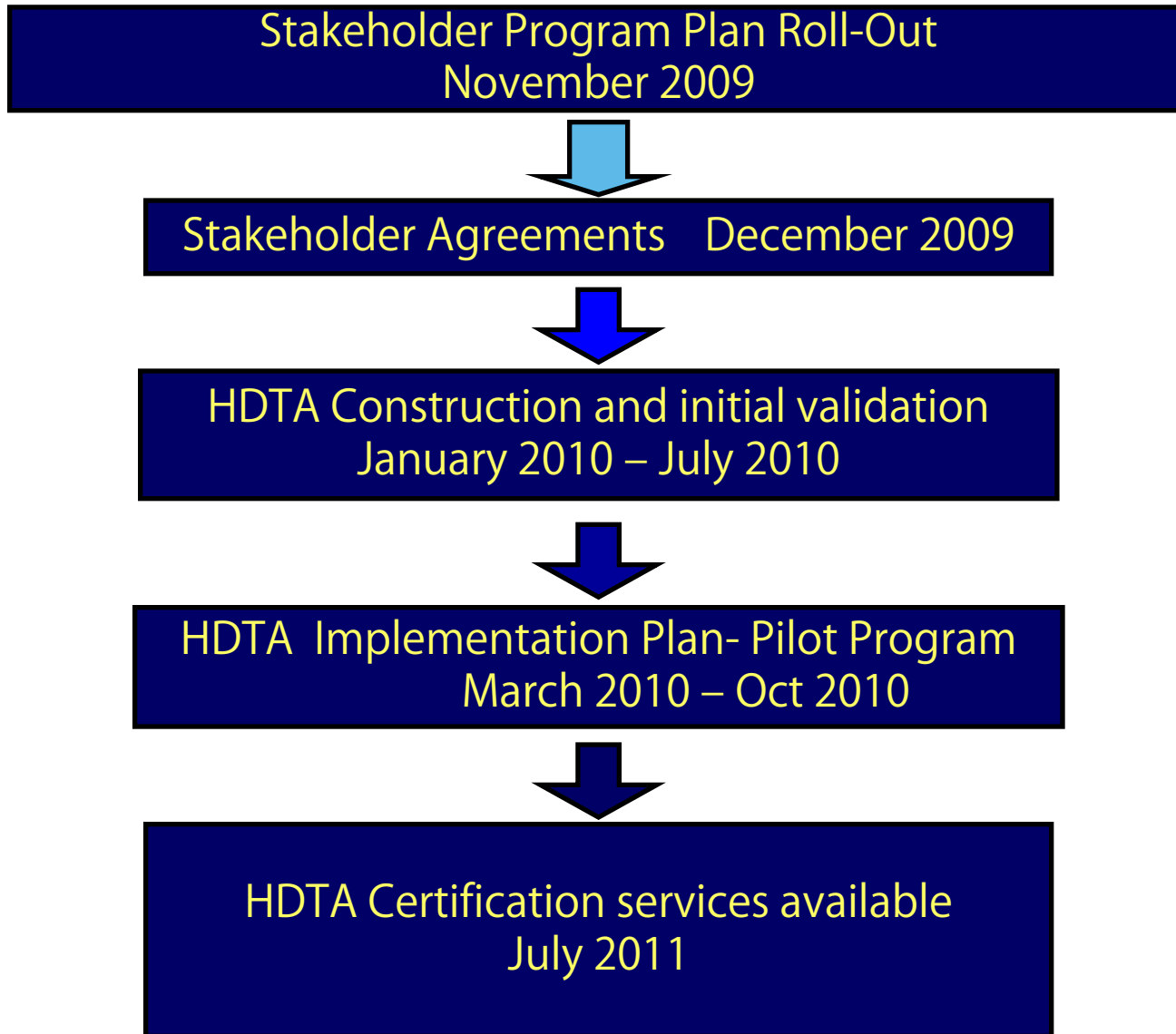
Need

- Assess the capability of dispensers and associated hardware
- Verify fuelling within established safety parameters (SAE J2601 or alternative)
- Support regulators permitting process
- Consistent evaluation

Solution

- Hydrogen dispenser test apparatus (HDTA)
- Independent Nationally Recognized laboratory evaluation

Hydrogen Dispenser Test Apparatus Program Plan



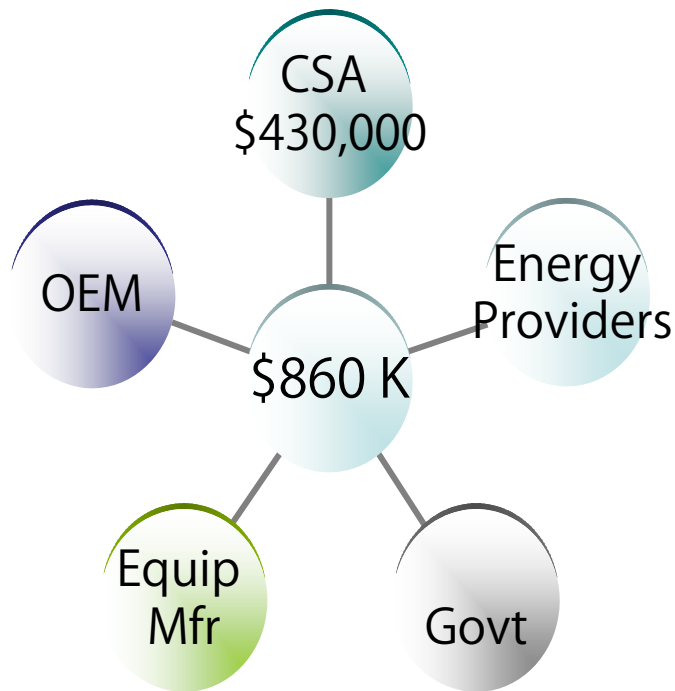
Program Plan Costs

\$860,000 (USD)

HDTA construction

Equipment and protocol validation

Pilot Program (5-6 stations)





Making standards work
for people
and business

to create a *better, safer,*
more sustainable world

Thank You

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