



**Global Marine and Energy
Hydrogen Technical Advisory Committee
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**Hydrogen Fuel Cell Vehicles and Fueling Infrastructure:
Issues and Impacts on Liability Coverage**

Introductions

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Agenda

- Address Liability Exposures/Risks
- Impacts to Coverage and Premiums
- Issues for Liability Coverage – Vehicle
- Issues for Liability Coverage – Station
- Educating the Insurance Industry



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Areas of Risk

- Hydrogen Fuel Cell Vehicle
 - Operator
 - Fuel Storage
 - Vehicle Storage
- Hydrogen
 - Generator
 - Transport
 - Storage
 - Transfer
 - Odorless/Invisible Gas



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Hydrogen Fuel Cell Vehicle - Operator

- **Operator**
 - Driving Record
 - Criminal Background and Credit Checks
 - Proof of Insurance
 - License
- **Provision to Driver**
 - Training
 - Hydrogen
 - Operation of Vehicle
 - Dispensing of Hydrogen
 - Emergency Procedures



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Hydrogen Fuel Cell Vehicle

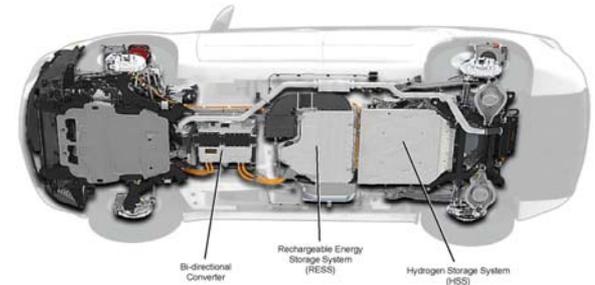
- Leak Potential
 - Sensors for unexplained pressure drops
 - Sensors for hydrogen around tank, vehicle, & vehicle storage garage
 - Odorant Additive



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Hydrogen Fuel Cell Vehicle

- Hydrogen Tank Protection
 - Tank protection/construction
 - Location in vehicle
 - Internal/external
 - Within/outside of car frame
 - Crash tests
 - Pressure relief valves



Source: GM Service Technical College



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Hydrogen Generator

- Generation
 - Location
 - Off-site
 - Dispensing Location
 - Process/Source
 - Electrolysis of water
 - Reforming of natural gas, propane, ethanol, etc
- Process Safeguards
 - Leak Sensors/Detection
 - Natural Gas/Propane Sensors
 - Hydrogen Sensors
 - CO₂ and CO Sensors
 - Fire Protection
 - Security



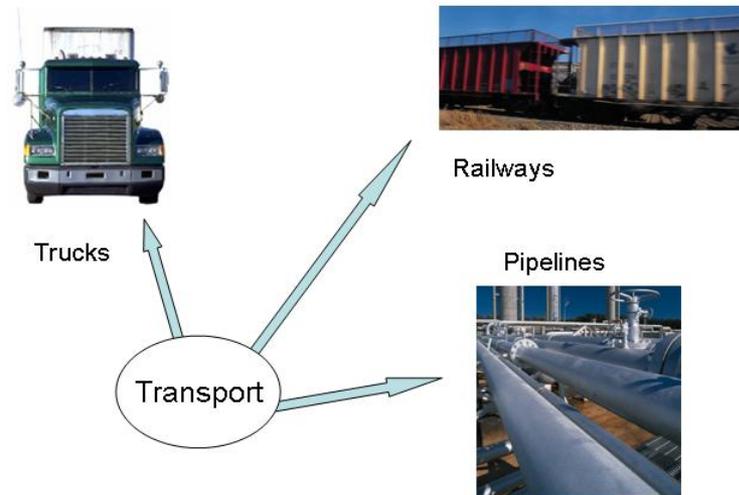
Source: DCFEMS Office of the Fire Marshall



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Hydrogen Transport

- Protection on transport (pipeline, truck, etc)
- Tank protection/construction
- ASME stamping and inspection of tanks and lines
- Sensors
- Traffic and population



Source: Nanopedia



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Hydrogen Storage

- Security
- Fire Protection
- Emergency Shut Offs
- Sensors/Detection
- Pressure Relief Valves
- Quantity/Pressure
- Location
- Tank Protection/Construction
(ASME stamping and inspections)



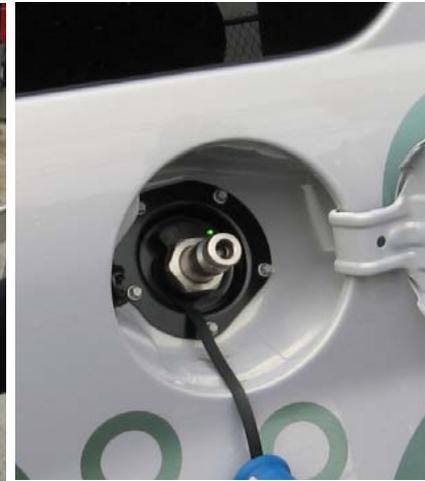
Source: Air Products



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Hydrogen Transfer

- **Dispensing**
 - Self service
 - Station attendant
 - Maintenance
- **Education/Training**
- **Protection**
 - Security
 - Verification of Seal/Ground/Bond
 - Dissipation of Static Electricity
 - Automatic Shut Offs/Interlocks
 - Breakaway Pumps/Nozzle
 - Pressure sensors
 - Fire protection/prevention
 - Smoking, grounding, cell phone, electronics use



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Hydrogen Fueling Station - General

- Dedicated H₂ Station
- Service Station Set-up
- Convenience Stores
- Visitor Centers / Tours
- Location Siting
- Security



Source: Shell



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Hydrogen Fueling Station - General

- Design
 - HazOp Analysis
 - Hazard & Effects Management Process
 - HSE case
 - Risk Assessments
- Operations and Safety Plans
 - Safety Plans
 - Operations Manuals
 - Emergency Response Planning
 - Hazardous Materials Management Plan
 - Training and Education Programs



Source: DCFEMS Office of the Fire Marshall



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Impacts to Coverage and Premiums

- Compliance with Recognized Codes and Standards
 - ASME
 - NFPA
 - IEEE
 - Industry Standards
 - Historical Loss Data
- Preventative measures and effectiveness
- Designs and Safeguards



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Issues for Liability Coverage - Vehicle

- GM program
 - Driver Checks
 - Education and Sensor
- Commercialization
 - Manufacturer
 - Education of driver at purchase
 - Provision or H₂ Sensor or liability waiver
 - Driver
 - Not much different
 - Differences (limits, deductible, rates)



Issues for Liability Coverage - Station

- Early programs would go through added scrutiny due to
 - Different nature of risk
 - Potential unfamiliarity by underwriters
 - Design Assessments
 - Operations and Safety Plans
 - Emergency Response Planning and Training
 - Locations of equipment
- Once various codes and standards are addressed and identified and existence becomes more commonplace – quicker underwriting time frames



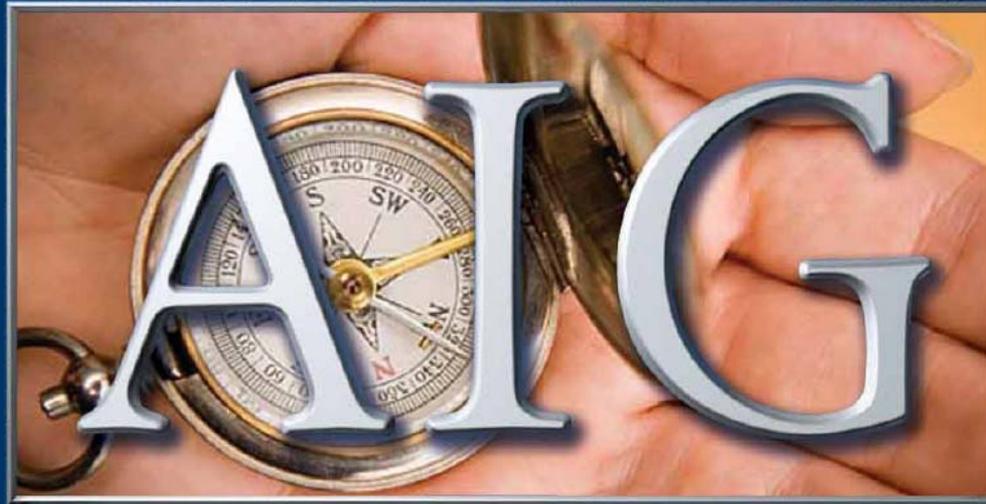
Educating the Insurance Industry

- Insurance Industry Association Conferences
- Insurance Representative “Open Houses”
- Web Sites
- Fact Sheets
- Seminars
- Insurance Trade Publications



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Questions & Answers



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