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C R I T I C A L I S S U E S W O R K S H O P
CNG & Hydrogen Cylinders:
Opportunities, Challenges & Strategies
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CYLINDER EXPERTS WANT REGULATIONS 'FIXED' AND HARMONIZED WITH STANDARDS; & MORE SUPPORT FOR TRAINING & INSPECTION

Sixty five gaseous fuel specialists comprised of cylinder manufacturers, related equipment manufacturers, government regulators, vehicle manufacturers and standards experts from 20 countries were on hand in Brussels at this first Clean Fuels Consulting *Critical Issues Workshop, CNG and Hydrogen Cylinders: Opportunities, Challenges and Strategies* to learn about manufacturing techniques, field experiences, quality control and regulatory developments for compressed natural gas (CNG) and hydrogen vehicles fuel storage systems. Cylinder incidents that have occurred around the world were highlighted, as were the causes and corrections needed to maintain the reputation of CNG as one of the safest fuels on the market today and to prepare the market for the advent of hydrogen vehicles in the future.

After two half days of presentations and discussion among CNG and hydrogen stakeholders about compressed natural gas and hydrogen fuel storage cylinders the results from a fairly intensive dialogue were clear:

- **UN Regulations.** United Nations regulation ECE 110 (Specific Components of Motor Vehicles Using Compressed Natural Gas and Installation of these Components) needs revamping and consolidation that combines past years' amendments into a single document. New amendments should be limited and changes should be adopted by reference from the International Standards Organisation (ISO) in order to harmonize regulations and standards to the best extent possible. Hydrogen regulations – the Global Technical Regulations now in progress -- should be developed only after the ISO work is complete and finalized.
- **ISO Standards.** The ISO standards for CNG equipment should be the world model for compressed natural gas and hydrogen cylinder regulations although work needs to be done on revisions and harmonization with ECE 110. For hydrogen much is to be learned from the successes and mistakes derived from the CNG experience. Ultimately, the Global Technical Regulation for hydrogen and fuel cell vehicles will become the international model for future reference. Revisions to the hydrogen and natural gas standards are at committee draft stage. It is very important to get a 'united view' from experts and trade associations and ensure that industry participates!

- **Training.** More and better training of equipment installers and cylinder inspectors is essential, particularly as the markets for CNG and hydrogen expand. Better education worldwide, and particularly in emerging markets, will help reduce incidents and accidents due to poor handling of equipment and the misuse of systems not designed for natural gas, in particular.

Other highlights from speakers and participants included:

- **Gas quality.** Especially in Types I, II and III cylinders gas quality should be monitored to avoid potential damage to the cylinders.
- **Inspections.** National and local enforcement of regular inspections of natural gas vehicles will improve quality control and prevent use of illegal, uncertified, or inappropriate equipment that is unsafe. Concerns were expressed about making unnecessarily restrictive requirements for inspection, particularly on OEM vehicles for CNG and hydrogen. Ironically, however, while safety is a principal concern, customers tend *not* to want to pay extra for it.
- **Cost reduction.** Lower cost manufacturing processes and materials must be found to substantially reduce the cost of cylinders, particularly if hydrogen vehicles are to be competitive in the marketplace. Perceived high costs of cylinders, particularly in emerging markets, are resulting in oxygen and acetylene cylinders being used in place of certified CNG cylinders. Without adequate vehicle inspection and enforcement in these countries, avoidable incidents will give high pressure gaseous fuels a bad name.
- **Vehicle and cylinder markings:** Vehicles should be marked as to what fuels are on board in order to help firefighters respond appropriately when accidents or vehicle fires occur. Equally important, cylinders taken out of service should be adequately marked to prevent their re-use in dangerous situations. Cylinders without the proper marking in accordance with current standards or regulations should not be used.
- **Testing.** To ensure maximum safety, better testing methods must be developed so that fuel vessels don't have to be removed from vehicles. This will be particularly important as higher pressure hydrogen systems enter the market.
- **CNG & hydrogen synergies.** Clearly the advances in hydrogen technologies have been helped by the experiences from the CNG business. But the differences between methane and hydrogen also should be carefully noted because the fuels behave differently and have much different impacts and effects on metal and composite cylinder materials, pressure relief devices, and related equipment.

The complete set of presentations is available to the workshop participants for free at www.CNGandH2workshop.com. Others who are interested in purchasing the proceedings for downloading can find them on www.iangv.org. Additional information about the workshop is available by visiting www.cleanfuelsconsulting.org (Activities & Services/conferences & workshops).

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