Themes and Topics
for ICHS2021
Safe Hydrogen for Net Zero

As the leading conference on hydrogen safety, ICHS2021 looks to cover all topics relating to hydrogen and safety, and are interested to receive papers regarding experimental studies, theoretical mathematical modelling, safety management, incidents, accidents and near misses. Below is a focused list of themes and topics to act as a guide. If you wish to submit an abstract on a topic not listed please do and we will give it our full consideration as below is not an exhaustive list. Alternatively, if you would prefer please contact us before the abstract deadline to discuss.

ENERGY & INFRASTRUCTURE

Safety in Hydrogen Infrastructure
Production at large scale including Steam Methane Reforming (SMR) and Auto Thermal Reforming (ATR); Safety of purification processes; Storage, distribution and transport (hydrogen pipelines, gaseous, liquid, other chemical carriers);Handling and use; Global transport: road, rail, marine and aviation; Repurposing existing infrastructure for H2; Future infrastructure projections and safety implications / consequences.

Power to Hydrogen and Hydrogen to Power Related Safety Issues
Electrolyser Safety; Purification and Intermediate Storage; Fuel Cell and Gas Turbine Safety Operating, at all levels including full operations, demonstration projects, experimental studies, theoretical modelling, incidents, accidents and near misses: Risk Assessment for Those Applications; Safety of materials; Normative or pre-normative research; Root Cause Assessments including Membrane Failures and cross-over in membrane-free electrolysers; Safety of H2/O2 mixtures plant

Energy Storage Systems
Pressurised Storage; liquid Hydrogen Storage; Materials-based Storage; Subsurface Porous Media and Salt Cavern Storage; Gas Grid Scale storage; Liquid Organic Hydrogen Carriers (LOHCs), Ammonia and Cracked Ammonia; Innovative Storage Concepts.

Hydrogen for Heat
Under this theme we are looking for papers covering the whole life cycle of Hydrogen for Heat applications covering 100% Hydrogen and Hydrogen blends with NG, and including Explosions in Weak (Domestic) Structures; Accumulation and Ventilation of Buildings; Ignition Potential; Mitigation; Distribution Network Safety; Appliance Development (burners, cookers, boilers, fires) and Hydrogen Detection in Domestic Setting.

Hydrogen Safety Aspects in Other Applications / Industries / Technologies
Chemical and Steel Plants; Oil Refinery; Nuclear; Defence Applications; Mining Industry (refuelling stations, interface and mining vehicles); Semiconductor/Electronic Industries, Electrical Generators, Neutron Beams and other Fundamental Experiments.

MOBILITY AND TRANSPORT SAFETY

Hydrogen Vehicles (Material Handling, Cars and Buses) and Related Fuelling Infrastructure

Hydrogen Refuelling Stations including: Safe Design; Indoor/Outdoor Fuelling; Permitting; Mitigation; Fuelling Protocols: On-Board Storage upset Conditions: Co-Location with Other Fuels; Mixed/Blended Fuels of Natural Gas and Hydrogen; Material Handling and Operations in Warehouses; Vehicle Operation in Tunnels and Garages; Vehicle Maintenance and Repair Facilities; Related Regulation Codes and Standards; Risk Assessment and Operational Experience in Particular of Fleets.

Safety in Emerging Mobility Markets – Infrastructure, Refuelling and Operation
Fleets; Heavy-Duty Road Vehicles (buses and trucks); Rail; Aviation (drones and planes); Spacecrafts-Unmanned Aerial Vehicles; Mobile Refuelling for Drone & Flight Applications; Maritime (port side, container ships, cruise lines, ferries); Related RCS and Risk Assessment.

Safety Issues of Hydrogen Batch Transport & Distribution
Safety of Liquid Hydrogen (LH2) and Compressed Gaseous Hydrogen (CGH2) Road and Rail Trailers; Innovative Designs; Safe Transfer Protocols, Purging etc; Safety of Ship Transport of Hydrogen, in particular LH2 and related transfer; Associated Regulation Codes and Standards and Risk Assessment

CROSS CUTTING TOPICS

Behaviour of Gaseous and Liquid Hydrogen (LH2).
Release and Mixing; Jet Release with Phase Change; Wall Attached Jets and Impinging Jets; Ignition and Auto-Ignition; Combustion in any Relevant Mixture and Thermodynamic Conditions; Fire; Flash Fire; Deflagration; Detonation; Deflagration to Detonation Transition; Transitional effects and Instabilities; Rapid Phase Transitions (RPTs) and BLEVE; Blast Waves; H_2/CH_4 Blending and Possible PSA Impact of De-Blending.

Physical Effects, Consequence Analysis
Thermal Effects; Overpressure Effects; Structural Response; Missile Effects; Effects on Humans and Environments; Storage; Distribution and Transport Hazards; Effect of ventilation and water sprays on mixing and combustion; Effect of suppressants on ignition, fire and transient combustion; Spatial congestion and confinement effects on deflagration–detonation transitions; Methodology for including physical effects into Risk Assessment.

Hydrogen Effects on Materials and Components
Metallic and non-Metallic Material Safety; Embitterment; Permeation/blistering; Liquid Hydrogen Storage; Distribution Transport and Compatibility; Knowledge Transfer from Experience in Other Sectors Such as Oil &Gas; Materials Selection for Specific Environments (e.g. high salinity, desert, cryogenic etc.).

Risk / Safety Management
Hazards and Vulnerabilities Identification and Analysis; Development and Use of Specific Accident Databases; Risk Assessment (cost-benefit analysis, safety perception, acceptance and harm criteria, uncertainties, decision making, risk awareness, risk perception, human factor); Risk Management and Safety Culture (including project safety plans for publicly funded R&D and demonstrations); Comparative Risk (i.e. hydrogen vs. conventional fuels); Inherent Safety(substitution, moderation and simplification); Whole System Safety Approach and Risk-Informed Safety Engineering; Accounting for Prevention and Mitigation (active, passive, sensors, safety distances); Safety Solutions and Implementation to Hydrogen Technologies; Mitigation Technology and Safety Equipment; Insurance.

Regulations, Codes and Standards (RCS)

Aspects of International, National, Regional and Organisation based RCS; Pre-Normative Research (PNR) (needs, priorities, approaches, incorporation of QRA); Experience / Lessons Learned from Bringing PNR Results into Standard Technical Committees; Post-Normative Experience (case studies); Comparison/Compatibility with Other Fuels; Safety Regulations for Hydrogen Carriers in Regional/International Trade (e.g. maritime, rail, pipelines); Permitting of Large Scale Applications; Safety Regulation and International Summary of Injection to Grid / Pipeline / Hydrogen Specifications; RCS Gaps; Internationalisation and Standardisation (Intercountry Trade / Continental Shipments / Pipes); Implications from Mixtures with Bio-Methane, (Blue/Green Hydrogen in Gas Transmission & Distribution Networks).

Education and Training
First and Second Responders Training; Technician Training; Train the Trainers; Academic Education; Vocational training; Accreditation of Public Accessible Education Resources; Role of Open Learning and Science, Technology, Engineering and Mathematics (STEM) Ambassadors ; Best Practice for Application Specific Training (including technician training for gas appliance, for stationary facilities and garages maintaining H2 vehicles).

Communicating Safety
Stakeholder Communication (policy, financial authorities and communities); Public Perception and Acceptance; Risk Perception and Awareness and Trust; Safety Databases and Lessons - Learned; Lessons from Communications about Past and Recent Incidents, Accidents and Near Misses; Social Media–Winning Hearts & Minds; Accreditation of Communications; Informing Key Stakeholders how can Safety Help to Shape Policy; Embedding Safety to Win Social Acceptance Gas Safety at the Domestic / Industrial / Transport End User (the necessary changes to the end user appliances.

OTHER

Case Studies; Safety & Terminology; Showcase of Useful Technologies; Stakeholder Management