HYDROGEN IMPLEMENTING AGREEMENT

www.ieahia.org

With a 30 + year operating history and significant accomplishments to its credit, the International Energy Agency (IEA) Hydrogen Implementing Agreement (HIA) is a unique leader in the conduct of coordinated hydrogen research, development and demonstration activities on a global basis. Through the creation and conduct of thirty + annexes or tasks, the IEA HIA has facilitated and managed a comprehensive range of Research, Development & Demonstration (R, D&D) and analysis programs among its member countries. In September 2004, the IEA HIA released its anniversary report entitled *In Pursuit of the Future: 25 Years of IEA Research toward the Realisation of Hydrogen Energy Systems.* **The IEA HIA continues to pride itself on collaboratively addressing many innovative, longer-term, pre-competitive R, D&D key issues related to hydrogen (H2) production, storage, conversion, safety, integrated systems, economics and markets. It is further committed to analysis and outreach in support of its R, D&D activities. In 2006, the IEA published the IEA HIA's report** *Hydrogen Production and Storage: R&D Priorities and Gaps*. **The IEA HIA welcomes liaison with interested groups in public and private sectors.**

The HIA Strategic Framework

VISION A hydrogen future based on a clean sustainable energy supply of global proportions that plays a key role in all sectors of the economy

MISSION Accelerate hydrogen implementation and widespread utilization to optimize environmental protection, improve energy security and promote economic development internationally, while establishing the HIA as a premier global resource for expertise in hydrogen

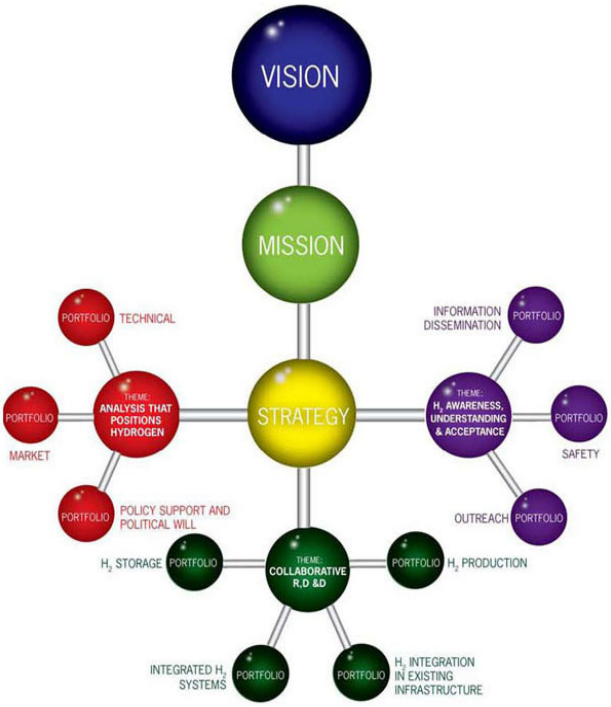
STRATEGY Facilitate, coordinate and maintain innovative research, development and demonstration activities through international cooperation and information exchange

IEA HIA 5-Year Plan (2009-2015): Themes & Portfolios

Collaborative R,D&D
That advances hydrogen science and technology
- **Hydrogen Production**
- **Hydrogen Storage**
- **Integrated Hydrogen Systems**
- **Hydrogen Integration in Existing Infrastructure**

Analysis that positions Hydrogen
- **Technical**
- **Market**
- **Support for Political Decision-Making**

Hydrogen Awareness, Understanding and Acceptance
- **Information Dissemination**
- **Safety**
- **Outreach**



Members

The 25 current IEA HIA members are:
Contracting Parties: Australia, Denmark, Finland, France, Germany, Greece, Japan, Iceland, Israel, Italy, Korea, Lithuania, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States, the Commission of the European Union and the United Nations Industrial Development Organization (UNIDO)
Sponsor Members: HYSAFE, Nationale Organisation Wasserstoff und Brennstoffzellentechnologie (NOW), Shell Global Solutions International BV

CURRENT, CLOSING and SUCCESSOR IEA HIA TASKS

Task 21 Bio-Inspired and BioHydrogen (2010-2014) *Planning for successor task underway*
- Subtask A – BioInspired Systems – increase H2 production from substrates
- Subtask B – Dark BioHydrogen Fermentation Systems • Subtask C – Basic Studies of Light-Driven BioHydrogen Production • Subtask D – Biological Electrochemical Systems
- Subtask E – Overall Analysis - techno-economic analysis and evaluation

Task 22 Fundamental & Applied H_2 Storage Development (2006-2012)
FINAL REPORT COMING SOON

Task 23 Small Scale Reformers for On-Site H_2 Supply (2006-2011)
FINAL REPORT AVAILABLE at http://ieahia.org/new.htm

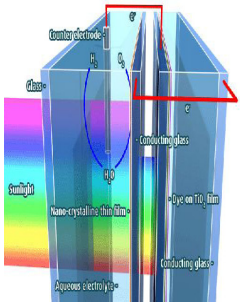
Task 24 Wind Energy and Hydrogen Integration (2006-2010-2011)
FINAL REPORT AVAILABLE at http://ieahia.org/new.htm

Task 25 High Temperature Production (HTP) of Hydrogen (2007-2011)
FINAL REPORT AVAILABLE at http://ieahia.org/new.htm

Task 26 Advanced Materials for WaterPhotolysis of Hydrogen (2008-2012)
Planning for successor task underway
FINAL REPORT AVAILABLE at http://ieahia.org/new.htm

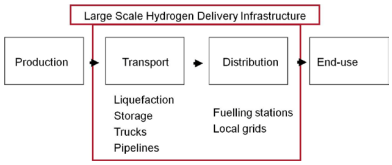
Task 27 Near-Market Routes to Hydrogen by Co-utilisation of Biomass as a Renewable Energy Source (2010-2012)
FINAL REPORT PENDING
- Subtask A – Co-Gasification of Biomass with Fossil Fuels • Subtask B – H2 Market Facilitation – Distributed Processing to New Tradable Intermediates • Subtask C – Near Term Stand-Alone Biomass to Gasification • Subtask D – Roadmap Development and Verification

Task 28 Large Scale Hydrogen Infrastructure and Mass Storage (2010-2013)
- Scope – modeling of large scale hydrogen delivery infrastructure for transport and distribution functions for transportation and stationary applications • Subtask A – Scenarios
- Subtask B – Assessment HRS Concepts • Subtask C – Analysis of H2 Delivery Pathways and Evaluation of IEA data – Comparison of H2 Refueling Station concepts • Subtask D – Supporting large-scale deployment of variable renewable energy sources

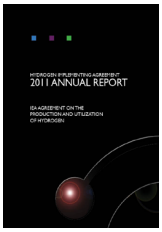


Task 29 Distributed and Community Hydrogen (DISCO H2) (2010-2013)
- Scope - H2 applications in energy communicates integrating H2 with electricity and other energy and mobility networks and distributed systems • Community size – 1000 and installed H2 capacity NTE 500 kW • Community Types: Urban, Rural and Island, Distributed Industrial applications • Subtask 1 – Project Management • Subtask 2 – Analysis and Selection HRS • Subtask 3 – Model Concept Development • Subtask 4 – Concept Replicability • Dissemination

Task 30 Global Hydrogen Systems Analysis (2010-2014)
- Scope - will produce comprehensive, authoritative technical and market analyses of H2 technologies and resources in a low-carbon world with sustainable (including intermittent) energy sources • Subtask A – Detailed Analysis: Global Hydrogen Resources • Subtask B – Updated and harmonized H2 data set • Subtask C – Collaboration with IEA Analysis • Subtack D – Hydrogen for the Smart Grid



Task 31 Safety (2010-2013) *Planning for successor task underway*
- Successor to Task 19 • Scope – logical progression will produce comprehensive, authoritative technical and market analyses of H2 technologies and resources in a low-carbon world with sustainable (including intermittent) energy sources • Subtask A – Physical Phenomena • Subtask B – Storage/Materials Issues • Subtask C – Early Markets
- Subtask D – Knowledge Analysis, Dissemination and Global Relevance



Task 32 Hydrogen-based energy storage (2013-2015) *Approved successor to Task 22*
- Further research needed for new and improved compounds • Demonstration of solid storage systems for both stationary and mobile applications needed • Develop reversible or regenerative H2 storage materials fulfilling the technical targets for mobile and stationary applications • Develop the fundamental and engineering understanding of H2 storage materials and systems that have the capacity to fulfill these targets • Develop materials and systems for H2 based energy storage for use in stationary, mobile and portable applications, and electrochemical storage

Task 33 Local Hydrogen Supply for Energy Applications (2013-2016)
Approved successor to Task 23
- Successor to Task 23 • Provide a platform for evaluation and harmonization of the various technologies for local H2 supply for reduced costs and increased costs and increased employment • Harmonize technological and economic assessment of available on-site supply technologies • Monitor upcoming technologies and their barriers • Generate a meeting arena for reformer and electrolyzer suppliers as well as end-users

Visit the HIA website at www.ieahia.org for further information and recent publications. Or contact IEA HIA Secretariat Manager Mary-Rose de Valladares at mvalladares@ieahia.org +1 301 634 7423 www.ieahia.org