

Advancing the Hydrogen Safety Knowledge Base

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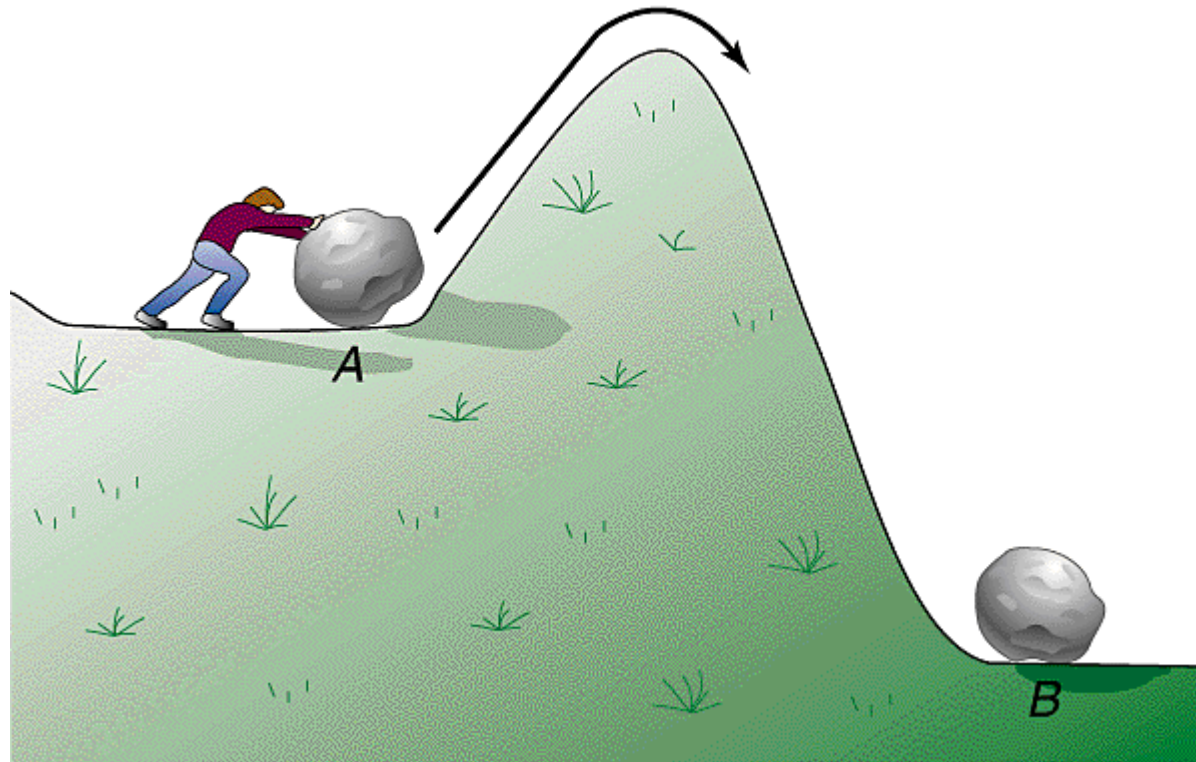
Hydrogen Safety, A Collaboration of Many....



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The Activation Energy for International Collaboration



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Safety Knowledge Tools Enhanced by International Collaboration¹

- **Hydrogen Safety Best Practices (H2bestpractices.org)**
 - Subject matter experts played a significant role in design, review and resolution of technical content (2006-2007)
 - Collaborated with Task 22 to develop “Metal Hydride Storage and Handling” (2008)
- **Hydrogen Incident Reporting and Lessons Learned (H2incidents.org)**
 - Task 19 member countries submit safety event records to emphasize lessons learned (2009)
- **Hydrogen Safety Bibliographic Database**
 - Collaborated with HySafe and Task 19 Subtask B (Experimental and Testing Program) to ensure hydrogen safety information and references are current in each database (2008)
- **Permitting Hydrogen Facilities – Hazard and Risk Analysis**
 - Review and input on the FMEA demonstration tool
 - Ranking of each failure mode for its contribution to risk

¹Weiner, S.C. and Blake, C.W., “Safety Knowledge Tools Enhanced by International Collaboration,” A White Paper of the International Energy Agency Hydrogen Implementing Agreement Task 19 – Hydrogen Safety,” October 18, 2010.



Focusing on Hydrogen Safety

Task 31 (2010 – 2013)

Subtask A – Physical Effects and Knowledge Gaps

Subtask B – Storage Systems and Materials Compatibility

Subtask C – Early Markets: Risk Characteristics and Hazard Analysis

Subtask D – Knowledge Analysis, Dissemination and Use

Task 19 (2004 – 2010)

Subtask A – Risk Management

Subtask B – Testing and Experimental Program

Subtask C – Targeted Information Packages for Stakeholder Groups



Advancing the Hydrogen Safety Knowledge Base

- **Developing uniform risk and harm criteria**
- **Expanding safety knowledge tools and resources**
- **Hydrogen sensor technologies – benefitting from collaboration**
- **Developing knowledge to improve guidelines on the indoor use of hydrogen**
- **What is the appropriate lean limit?**
- **A library of hazard assessment tools**



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Developing Uniform Risk and Harm Criteria

- **The development of evidence-based and risk-informed regulations, codes and standards has been an important focus area for both Tasks 19 and 31.**
- **A Task 19 report on knowledge gaps noted that establishment of harm and risk criteria are a key element required to utilize a risk-informed approach for developing hydrogen RC&S for hydrogen facility operation.**
- **Through journal publications and conference presentations, the results of this work have been disseminated as another resource for consideration and use by codes and standards groups and other decision makers.**



Expanding Safety Knowledge Tools and Resources

- **Collaborated with Task members to add safety event records to “H2incidents.org”**

Canada	Switzerland	The Netherlands
Italy	France	Germany
U.K.	Norway	European Commission
Japan		

- **Utilized this network and partnered with IA HySafe’s Hydrogen Incident and Accident Database (HIAD) through the EC’s Joint Research Centre, e.g.,**
 - Share the podium at International Conference on Hydrogen Safety (ICHS4) during the topical session on safety event databases
 - Provide on-line demonstrations of the databases for ICHS attendees
 - Exchange safety event records for the respective databases



Hydrogen Sensor Technologies Benefitting from Collaboration

- **Sensors as key devices for detection and mitigative actions, e.g.,**
 - sounding audible alarms, activating ventilation systems, initiating shutdown of hydrogen systems.
- **Information exchange and knowledge dissemination facilitate the focused development, proper selection and correct deployment of hydrogen safety sensors.**

UQTR



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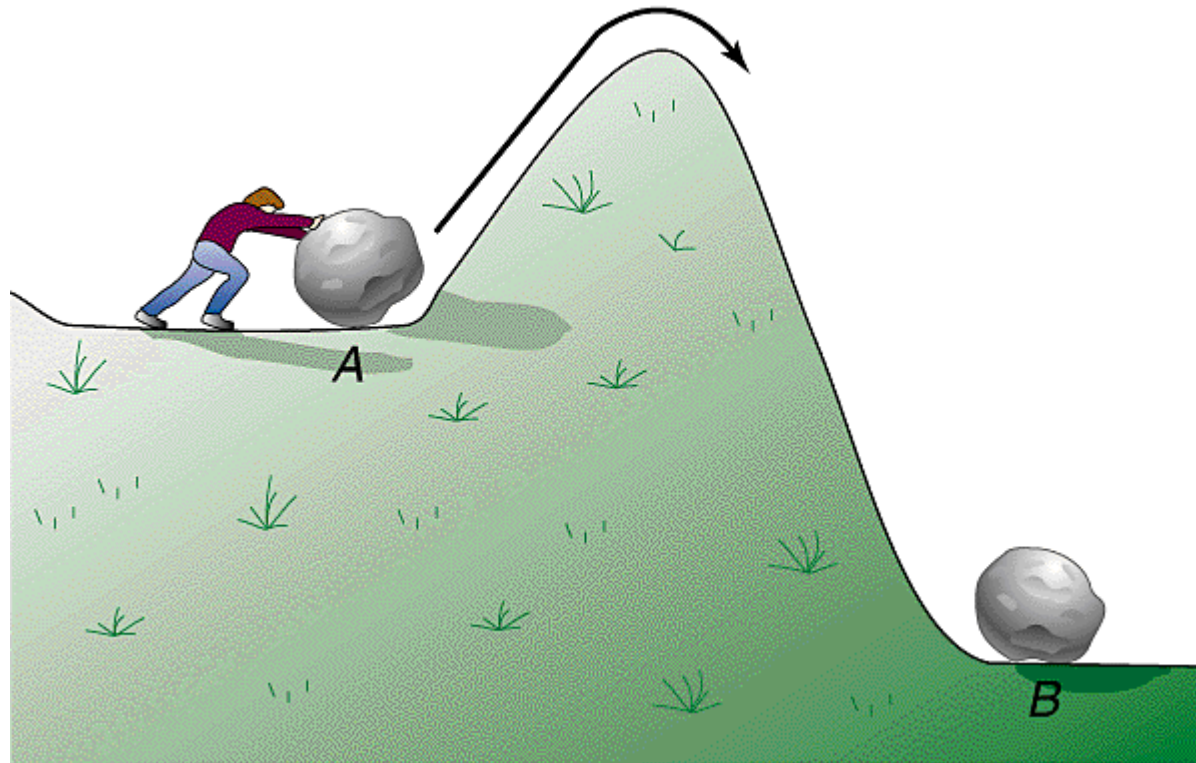
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Concluding Thoughts



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- **Task 19/31 member countries and their participating experts**
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