Idaho National Engineering and Environmental Laboratory

Virtual Center of Excellence for Hydrogen Storage – Chemical Hydrides

Pre-Solicitation Presentation
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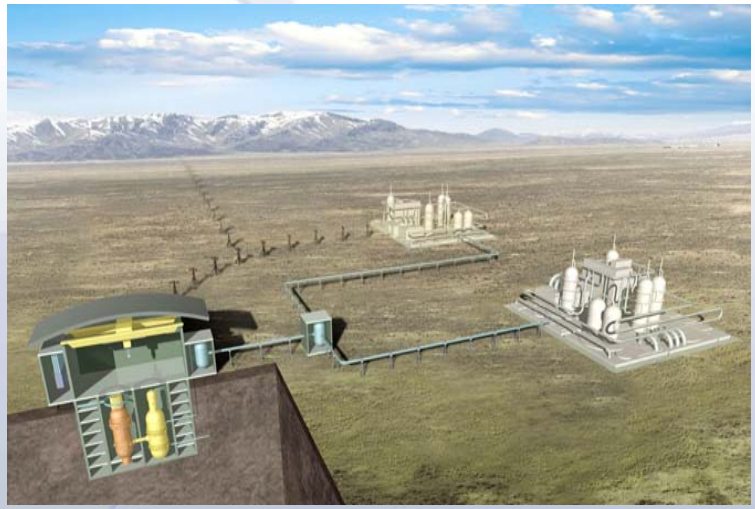
INEEL Hydrogen Program Background



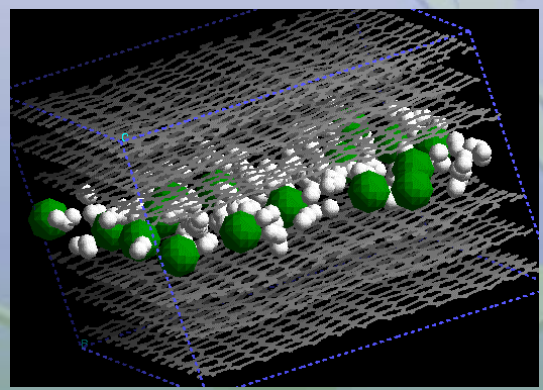
- *By 2015, a 600 MWth prototype Very High Temperature Gas Cooled Reactor (VHTR) will be producing hydrogen and high efficiency electricity.*
- *A Hydrogen Technology Development Facility, a user facility, will demonstrate advanced technologies for hydrogen production, infrastructure, transmission, storage, and utilization.*
  - *Conduct engineered demonstrations of advanced technologies developed at INEEL and elsewhere.*
  - *Demonstrate technologies at increasing scales from small scale prototypes to near commercial scale integrated demos.*

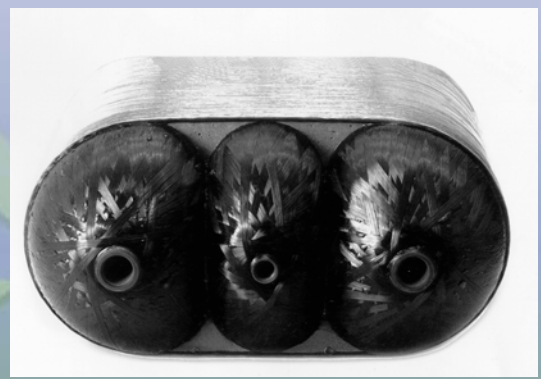
The current INEEL hydrogen program encompasses a wide range of technologies

- The INEEL hydrogen program is supported by industry, DOE-EERE, DOE-NE, and DOE-FE, NIST, and internal funds (both LDRD and royalty income)
- Production
  - 500 KWe diesel reformer to produce PEM Fuel Cell grade hydrogen (INEEL and SOFCo cooperative program)
  - High temperature electrolysis using SOFC technology (EE)
  - Thermochemical cycles for water splitting (NE and LDRD)
- Separation
  - Ion conducting ceramic membrane for high temperature separation (FE)
- Infrastructure/Utilization
  - Phoenix AZ hydrogen and CNG fueling station (EE)
  - Advanced Vehicle Test Program (EE)
  - Fabrication of SOFCs (NIST, ITN, Bechtel)

The INEEL hydrogen program includes several storage activities

- *Two projects on the recycling of borate to borohydride – the critical missing link in the use of $NaBH_4$ as a storage medium (NE, EE, royalty funded)*
- *Advanced carbon materials (LDRD) – (we propose a support role in the carbon materials virtual center)*
- *Electrochemically active barrier liner for composite storage tanks (EE)*





Proposed INEEL Roles

- *Lead laboratory for Virtual Center of Excellence for Chemical Hydride Storage*
- *Support role in carbon storage materials center*
- *We welcome the opportunity to work with others in developing the critical storage technologies needed for the hydrogen economy.*
- *Point of Contact*
  - *Raymond Anderson, PhD, Hydrogen Initiative Leader*
  - *208-526-1623*
  - *anderp@inel.gov*

INEEL Capabilities

- *Major hydrogen production, separation, storage, and utilization programs*
- *Physics, chemistry, handling, permeation behavior of hydrogen*
- *Molecular modeling*
- *Materials science/engineering*
- *Engineering demonstrations – including alternative fuel vehicle fleet*
- *Safety analyses*
- *Laboratory-industry cooperative programs*