



GTI Energy Hydrogen Experience and Capabilities



GTI Energy provides clients and partners the capabilities, laboratories, and large complex multifaceted hydrogen projects to expand the use of hydrogen throughout our nation's economy.

GTI Energy's Hydrogen Technology Center

GTI Energy's Hydrogen Technology Center (HTC) is a compilation of top-tier subject matter experts, thought leadership, recently upgraded labs and facilities, and the experience of decades of successful hydrogen projects. GTI Energy has deep and unbiased hydrogen related technology knowledge and technical expertise to assist government, industry and businesses to safely and effectively expand their companies into the hydrogen economy.

GTI Energy's 18-acre research campus, minutes from Chicago's O'Hare airport, houses GTI Energy's HTC which offers test bays for hydrogen technologies, testing of hydrogen and blended gases, evaluation of hydrogen effects on piping materials, assessment of hydrogen on appliances and expert staff knowledgeable about hydrogen technologies and hydrogen building and safety codes and standards.









A Leader for Over 50 Years

GTI Energy continues to be a leader in hydrogen technology assessment, development, and deployment, and has been, for over 50 years. From the development of the phosphoric acid fuel cell starting in the 1960s, to leading the natural gas industry in assessing the effect of hydrogen blends on distribution pipe and consumer appliances in 2021, GTI Energy offers a wide range of experience, capabilities and project oversight that enhances any hydrogen partnership or collaborative.

Currently GTI Energy is performing over 30 hydrogen projects and is the prime contractor on several large hydrogen collaboratives as well as co-leading administration of the **Low Carbon Resources Initiative (LCRI)** with EPRI—an RD&D collaborative with over 52 members and access to over \$130M dollars.

Multi-Year Deployment Project Experience

GTI Energy has over a decade long history of leading and participating in largescale, multi-year USDOE and other agency-sponsored projects. This experience can assist a project team in understanding the issues and rules surrounding large USDOE-funded projects as well as organizing contracting or administrative activities related to deploying a government-funded Hydrogen Hub project.



Hydrogen Innovation and Technical Assistance

Assisting the Energy Industry



GTI Energy is currently engaged in numerous projects funded by USDOE and the energy industry to test pipe materials (both plastic and metal) and industrial equipment and consumer appliances to understand the effects of natural gas hydrogen in blends. GTI Energy is also assisting the energy industry with the redesign of the natural gas system and end use technologies so that the future hydrogen economy can be realized.

Blending Impacts on Building Equipment

While impacts will vary across product designs, generalized blending levels are:

Low Blending: <10% H ₂ by volume	No minor equipment adjustments	
Medium Blending: 10%–30% H ₂ by volume	Adjustments necessary with components and combustion controls	
High Blending: > 30% H ₂ by volume	Specially-designed equipment are required (e.g, Hydrogen Boiler)	





GTI Energy Facilities

Many GTI Energy testing and deployment facilities are supporting projects focused on ensuring the safe and reliable use of hydrogen as well as assessing hydrogen powered equipment and related technologies. These facilities include the Combined Heat and Power Renewable Energy Test Center, the Residential/ Commercial test center, the Pipe Materials and Pipe Farm facilities and the Environmental Lab as well as the hydrogen generator bay and the hydrogen pad (outdoor space for larger hydrogen technology assessment). These facilities are currently being supported by over 75 companies representing the energy industry and equipment manufacturers. Projects managed by GTI Energy and supported by these facilities or projects engaged in off-site technology deployment have the option to utilize a GTI Energy-developed secure IoT data collection and cloud-based data analytics infrastructure.



H2@Scale in Texas and Beyond



Project Collaboratives

GTI Energy is known for its ability to lead or be a partner in large collaborative technology deployment projects. Currently, GTI Energy is active in several large USDOE-funded technology deployment projects some as the prime contractor, and others as a member of the team. The following table describes a few of the current collaborative projects (hydrogen and other) in which GTI Energy is engaged.

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A sample of collaborative GTI Energy-led R&D projects focused on hydrogen or transportation

Project Name	Project Description	Value/Partners
U.S. Department of Energy	The H2@Scale in Texas and Beyond project will demonstrate co-located multiple renewable hydrogen generation (SMR and electrolysis) and multiple hydrogen use applications (vehicles, drones, and power generation). The project also includes a hydrogen framework study of the viability of renewable hydrogen at the Port of Houston.	\$12M Sponsor: USDOE Project partners: 18
HyBlend U.S. DEPARTMENT OF ENERGY	The HyBlend project will conduct evaluations of metal and polymer piping and pipeline materials to assess hydrogen compatibility (e.g., steel and poly- ethylene), provide life-cycle analysis of technologies using hydrogen and natural gas blends, and quantify the costs and opportunities for hydrogen production and blending.	\$14.4M Sponsor: USDOE Project Partners: 8 National Labs: 30 Industry
HyPER	The HyPER project is collaboration between Cranfield University, GTI Energy, and Doosan Babcock. During the project a state-of-the-art 1.5 MWth hydrogen production pilot plant at Cranfield University will be designed, constructed, and operated.	Phase 1: \$10M (funded) Phase 2: \$13M Sponsor: UK Dept. for Business, Energy and Industrial Strategy Project Partners: 3
Hydrogen Education for a Decarbonized Global Economy	GTI Energy is supporting an EPRI workforce develop- ment initiative designed to cultivate an emerging in- dustry workforce to advance hydrogen technologies and use. Project focuses on developing newly trained personnel as well as enabling existing labor force to migrate into the hydrogen field.	\$2M Sponsor: USDOE Project partners: 6
Multiple Hydrogen Transportation projects	GTI Energy and four project teams are developing a variety of hydrogen-fueled transportation technology demonstrations in California: Switcher locomotive (H2RAM), drayage (Fast Track Fuel Cell Truck), regional haul trucks (Symbio H ₂ Central Valley Express), and terminal tractors (ZECAP). All four projects involve deployment of vehicles fueling stations, safety training, education, and community outreach.	\$29M Sponsors: California Energy Commission, California Air Resources Board Project Partners: 24
Clean Fuels Cross 194	Implement a strategically placed network of DC fast chargers, compressed natural gas (CNG), and propane stations within the Michigan to Montana (M2M) Corridor along I-94 from Port Huron, MI to Billings, MT.	\$10M Sponsor: USDOE Project Partners: 12